

Air



# **Polymeric Coating Of Supporting Substrates -- Background Information for Promulgated Standards**

## **Final EIS**

**N S R S**



**POLYMERIC COATING OF SUPPORTING SUBSTRATES--  
BACKGROUND INFORMATION FOR PROMULGATED STANDARDS**

**Emission Standards Division**

**U. S. Environmental Protection Agency  
Office of Air Quality Planning and Standards  
Research Triangle Park, North Carolina 27711**

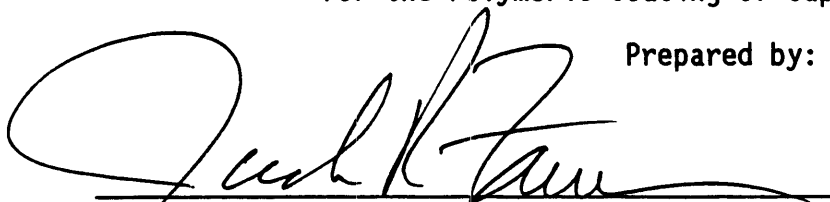
**July 1989**

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ENVIRONMENTAL PROTECTION AGENCY

Background Information  
and Draft  
Environmental Impact Statement  
for the Polymeric Coating of Supporting Substrates

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9/5/89  
(Date)

1. The promulgated standards of performance will limit emissions of volatile organic compounds (VOC) from new, modified, and reconstructed facilities that perform polymeric coating of supporting substrates. Section 111 of the Clean Air Act (42 U.S.C. 7411), as amended, directs the Administrator to establish standards of performance for any category of new stationary source of air pollution that "... causes or contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare."
2. Copies of this document have been sent to the following Federal Departments: Labor, Health and Human Services, Defense, Transportation, Agriculture, Commerce, and Interior; the National Science Foundation; the Council on Environmental Quality; State and Territorial Air Pollution Program Administrators, EPA Regional Administrators; Association of Local Air Pollution Control Officials; Office of Management and Budget; and other interested parties.
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## 1. SUMMARY

On April 30, 1987, the U. S. Environmental Protection Agency (EPA) proposed new source performance standards (NSPS) for the polymeric coating of supporting substrates (52 FR 15906) under authority of Section 111 of the Clean Air Act. Public comments were requested on the proposal published in the Federal Register. A total of 24 comments were submitted during the comment period, including 21 from industry, 2 from trade associations, and 1 from a State agency. The comments that were submitted, along with responses to these comments, are summarized in this document. The summary of comments and responses serves as the basis for the revisions made to the standards between proposal and promulgation.

### 1.1 SUMMARY OF CHANGES SINCE PROPOSAL

In response to the public comments and as a result of EPA reevaluation, several changes have been made to the standards since proposal. In addition, portions of the final regulation were reworded and reorganized to clarify the intent of the rule. The more significant changes, which are categorized under the section headings in the regulation, are summarized below.

#### 1.1.1 Applicability and Designation of Affected Facility

1.1.1.1 Coating Mix Preparation Equipment. A change was made to the definition of coating mix preparation equipment to include only mixing vessels, and not mills, holding tanks, or other equipment used in the preparation of polymeric coatings. Equipment other than mixers was included in the affected facility definition in the proposed standards because it was believed that the controls required for mixers could be easily applied to other types of mix equipment. However, based on a reexamination of the information gathered during the development of the standards and based on the information provided by a commenter, only

mixing vessels are included in the affected facility in the promulgated standards.

1.1.1.2 Exclusions. The regulation has been revised to state explicitly that graphic arts facilities are not covered by the standards. The exclusion of paper, plastic film, metallic foil, and metal coil coaters has been clarified by revising the definition of "polymeric coating of supporting substrates." The exclusion of leather finishers has been clarified by removing the reference to leather in the definition of "web coating." Comments from the leather, graphic arts, and paper coating industries revealed that it was unclear if the proposed standards were applicable to these particular industries. The EPA did not study these industries and did not intend for the standards to be applicable to these industries. An exemption also was added for waterborne coatings because use of these coatings may be incompatible with the available control technologies.

#### 1.1.2 Standards for Volatile Organic Compounds (VOC)

1.1.2.1 Coating Mix Preparation Equipment--VOC Use at Least 130 mg/yr. The standards for mixing vessels serving coating operations that use at least 130 cubic meters per year (Mg/yr) (144 tons per year [tons/yr]) of VOC have been revised consistent with the application of best demonstrated technology (BDT) in actual practice. The proposed standards required "venting all VOC emissions to a 95 percent efficient control device," which implies a 100 percent capture efficiency. The promulgated standards require that mixing vessels be covered during mixing and vented to a 95 percent efficient control device. Allowances for opening the covers during periods of legitimate need are included in the standards.

In addition, a provision has been added to the standards that allows the use of covers alone on mix equipment at modified or reconstructed affected facilities unless there is concurrent construction of a control device. This change was made because it is not certain that the existing control devices at all modified/reconstructed facilities would have sufficient capacity in reserve to control emissions from the mix equipment. As stated at proposal, the installation and use of a dedicated control device for mix equipment emissions is not cost effective.

Therefore, the standards have been revised to ensure that control of mix equipment emissions is cost effective.

1.1.2.2 Coating Mix Preparation Equipment--VOC Use at Least 95 Mg/yr But Less Than 130 Mg/yr. A change has been made to the standards for mixing vessels serving coating operations that use at least 95 Mg/yr (105 tons/yr) but less than 130 Mg/yr (144 tons/yr) of VOC. The proposed standards required each piece of affected coating mix preparation equipment to have a vapor-tight cover with a conservation vent set at 17.2 kilopascals (2.5 pounds per square inch gauge). The promulgated standards require a cover that meets specified requirements. This change was made because there is no significant increase in efficiency gained by using a vapor-tight cover with a conservation vent instead of a simple tight-fitting cover. The chief benefit of conservation vents is the control of "breathing losses," which result from diurnal temperature changes. However, mix equipment is not normally exposed to such temperature changes.

1.1.2.3 Coating Operation. The standards for the coating operation have been revised to require a 90 percent overall emission reduction rather than 93 percent as proposed. This change was made based on a reevaluation of the feasibility of total enclosures in this industry and of the test data available to support the standards. In general, EPA concluded that while facilities that can use total enclosures and 95 percent efficient control devices may achieve 93 percent or greater overall control, the use of this technology may not be available if EPA-prescribed total enclosures cannot be used in existing plants. It was determined that 90 percent overall control is universally achievable, and the standards have been set at this level.

The standards also have been revised to include an alternative standard, i.e., the use of a total enclosure and 95 percent efficient control device, as an alternative to the 90 percent overall emission reduction standard. While this alternative was allowed at proposal as an alternative means of compliance with the emission reduction standard, EPA has now decided to include it as an alternative standard in order to clarify the intent of the rule. This change is not a revision to the substance of the proposed rule.

### 1.1.3 Compliance Provisions

1.1.3.1 Total enclosure specifications. In order to provide sources with guidelines for a total enclosure of the coating operation, specifications have been added that limit the total area of the natural draft openings in the enclosure, specify the minimum allowable distance between the openings and the sources of VOC, and require the maintenance of an average inward face velocity of at least 3,600 meters per hour (m/h) (200 feet per minute [ft/min]) across the openings. These restrictions are necessary to ensure complete containment of the VOC emissions from the coating operation. Flexibility has been maintained by allowing enclosures not meeting the requirements to be considered for approval by the Administrator on a case-by-case basis. Test procedures and monitoring, recordkeeping, and reporting requirements for the use of total enclosures also have been added.

1.1.3.2 Coating Operation Compliance Methods. The final standards have been revised to clarify that the use of certain equipment, i.e., a total enclosure and a 95 percent efficient control device, are available as an alternate standard to the 90 percent emission reduction standard. In other words, the owner or operator may choose to comply with either the emission reduction standard or the alternative standard. In addition, the compliance provisions for coating operations meeting the emission reduction standard have been revised to clarify that owners or operators may demonstrate compliance by any of the applicable methods. The option of performing a one-time, short-term (3- to 7-day) material balance followed by continuous monitoring was added as an optional compliance method. This option may be attractive at facilities that cannot or do not want to conduct the detailed continuous monthly measurements that are required for the other liquid material balance option.

1.1.3.3 Equation 3. An error in Equation 3 (§ 60.743(b)(4)), which is used to determine the efficiency of the vapor capture system, has been corrected in the promulgated standards. The terms  $Q_{bi}$  and  $C_{bi}$  have been changed to  $Q_{di}$  and  $C_{di}$ , respectively.

#### 1.1.4 Monitoring Requirements

1.1.4.1 Accuracy Requirements for Temperature Monitoring. For consistency with other VOC control regulations, the accuracy requirements for temperature monitoring have been changed. In the proposed regulation, the monitoring device was required to be accurate within  $\pm 2.5$  Celsius degrees ( $\pm 4.2$  Fahrenheit degrees). In the promulgated regulation, the monitoring device is required to be accurate to within  $\pm 1$  percent of the temperature being measured in Celsius degrees.

1.1.4.2 VOC Concentration. The monitoring requirement for carbon adsorbers has been revised to require devices that indicate and record the "concentration level of organic compounds" instead of the "VOC concentration in parts per million by volume." Although many monitors give readings in terms of parts per million by volume, the revision is intended to reflect the fact that EPA has not developed performance specifications or other quality assurance procedures to ensure the accuracy of such monitors. However, units are available that are sufficiently precise to allow assessment of operation and maintenance practices by comparing monitor data with the baseline value established during the performance test.

1.1.4.3 Consistency of Monitoring and Performance Testing Provisions. The monitoring and performance testing provisions for fixed bed carbon adsorption systems have been revised to represent more accurately the performance of multiple-bed systems. Performance tests are the direct means of determining the compliance status of an affected facility and serve as the basis for legal enforcement actions against noncomplying sources. In contrast, the monitoring devices required by these standards serve only as indicators of control device performance to aid enforcement agencies in targeting inspections and performance tests toward potential violators. The revised procedures will ensure that the performance test runs and averaging periods for monitoring will parallel the complete adsorption cycles of the individual adsorber vessels or the system's complete sequential rotation through the adsorption cycles of all the vessels. Use of a testing or monitoring period that does not correspond to an integral number of actual adsorber vessel cycles or system rotations could bias the results slightly in either direction.

Efficiencies would be biased high if the test run or monitoring period did not include the elevated emissions typical at the beginning and end of a vessel's adsorption cycle; efficiencies would be biased low if the period included a disproportionate number of these emission peaks.

The performance testing provisions for carbon adsorption systems included in the standards at proposal did not specifically index the test period to discrete adsorber vessel cycles or system rotations. Rather, each of the three requisite performance test runs was required to be a minimum of 30 minutes duration. While this requirement would have allowed the performance test runs to correspond to individual adsorber vessel cycles or system rotations that were at least 30 minutes in duration, it was not mandatory. Because adsorption cycles in different systems can range from several minutes to several hours, performance tests based only on 30-minute runs could be biased somewhat in either direction. The proposed performance testing provisions would have resulted in adequate determinations of the performance of these systems, but the final provisions provide for improved accuracy.

The revised carbon adsorption system performance testing provisions include separate requirements for systems with a single common exhaust stack and for systems with individual stacks for each adsorber vessel. The EPA believes that a common exhaust stack allows simpler performance testing that is more representative of the entire system's performance but has included provisions for individual exhaust stacks because this is currently the more typical configuration.

For adsorption systems with a common exhaust stack serving all the adsorber vessels, the final performance testing provisions require that the system be tested as a whole. Three test runs are required; each run must correspond to one or more complete rotations through the sequential adsorption cycles of all the adsorber vessels.

For adsorption systems with individual exhaust stacks, the final performance testing provisions require that each adsorber vessel be tested individually. Three test runs are required for each vessel; each run must correspond to one or more complete adsorption cycles. A procedure has been added to the compliance provisions for computing a system efficiency from the individual adsorber vessel efficiencies.

The final performance testing provisions are likely to result in somewhat increased testing costs in the case of a multiple-bed system because each test run must include at least one cycle for each bed. However, this increased cost would be very small relative to the control system cost and is reasonable considering the increased accuracy that will result.

The final adsorber monitoring provisions parallel the final performance testing provisions. Again, separate provisions apply to systems with a common exhaust stack and those with individual stacks. No increase in monitoring costs is anticipated.

For adsorption systems with a common exhaust stack, a monitoring device must be installed on the common exhaust stack and one also may be installed on the common inlet duct. The owner or operator must report each occurrence when the average emission level or system efficiency (depending on whether only the outlet or both the inlet and outlet gas streams are monitored) over three successive system rotations varies outside the specified range.

For adsorption systems with individual vessel exhaust stacks, a monitoring device must be installed on each individual exhaust stack, and a monitoring device also may be installed on the common inlet duct or on each individual inlet duct. Each adsorber vessel must be monitored for a minimum of one complete adsorption cycle per day. A 3-day rolling average emission level or efficiency for each vessel (depending on whether only the outlet or both the inlet and outlet gas streams are monitored) must be computed each day from the daily averages, and these 3-day rolling averages must be reported when they vary outside the specified ranges.

**1.1.4.4 General Wording.** The section was reorganized for clarity, and wording has been added to specify clearly that monitors must be in place and operating during all performance tests.

**1.1.5 Test Methods and Procedures**

Because Method 25A is not appropriate for determining the efficiency of a control device when the constitution of the gas stream varies from the inlet to the outlet (e.g., when an incinerator is used), Method 25 has been added for determining VOC concentrations, and is required when an incinerator is used unless it is demonstrated to be technically infeasible

under site-specific test conditions. The use of Method 25A is still allowed when conditions are appropriate. In addition, Method 18 has been included as a method to determine VOC concentration.

#### 1.1.6 Alternative Means of Emission Limitation

Provisions have been added that allow a source to obtain approval from the Administrator for an alternative to simple covers for controlling VOC emissions from affected coating mix preparation equipment serving coating lines using at least 95 Mg/yr (105 tons/yr) of VOC but less than 130 Mg/yr (144 tons/yr) of VOC or from equipment that is part of a facility modified or reconstructed without concurrent construction of a new control device. Provisions also have been added to allow facilities to submit alternate total enclosure designs for the Administrator's approval.

#### 1.1.7 Reporting and Recordkeeping

1.1.7.1 Annual VOC Use. A requirement has been added to report when actual annual VOC use exceeds the applicable cutoff. The proposed standards required a report only when the estimated annual VOC use exceeds the cutoff.

1.1.7.2 Monitoring Variations. A requirement has been added to maintain records of all 3-hour (or applicable carbon adsorption system rotations) periods during actual coating operations when the variations specified in § 60.747(d)(1) through (6) occur, as well as to report such periods. The reporting requirements have been revised to require quarterly reports of exceedances. If none of the variations specified in § 60.747(d)(1)-(6) occur, a semiannual statement certifying this fact must be submitted. This requirement has been added under § 60.747(d)(7).

### 1.2 SUMMARY OF IMPACTS OF PROMULGATED ACTION

#### 1.2.1 Alternatives to Promulgated Action

The regulatory alternatives are discussed in Chapter 6 of the Volume I background information document (BID) for the proposed standards (EPA-450/3-85-022a). These regulatory alternatives reflect the different levels of emission control from which one was selected that represents BDT, considering costs, nonair quality health, and environmental, energy, and economic impacts, for facilities performing polymeric coating of supporting substrates. A new regulatory alternative, IIA, was developed



post-proposal and represents a 90 percent overall level of control. This alternative is identical to Regulatory Alternative II except that the costs associated with total enclosures (from Regulatory Alternative III) replace the partial enclosure costs. This change was made to represent those facilities that cannot install and operate total enclosures as defined in the final regulation. However, it more accurately reflects the costs of the emission capture technology that the industry can (and probably will) use.

#### 1.2.2 Environmental Impacts of Promulgated Action

The environmental impacts projected at proposal are discussed in Chapter 7 and Appendix B of the Volume I BID. Because it is expected that facilities will choose to comply with the coating operation standards by means of the alternative standard, and thus achieve at least 93 percent overall control, the environmental impacts have not changed since proposal. Therefore, the Volume I BID becomes the final Environmental Impact Statement for the promulgated standards.

#### 1.2.3 Energy and Economic Impacts of the Promulgated Action

The energy impacts of the proposed standards were evaluated in Chapter 7 of the Volume I BID. It was determined that the control technologies that are the basis for the regulatory alternatives have a negligible effect on the energy requirements for facilities performing polymeric coating of supporting substrates. Therefore, a negligible energy impact was attributed to the proposed standards; this determination remains unchanged for the final standards.

The economic impacts of the proposed standards were evaluated in Chapter 9 of the Volume I BID. These impacts remain the same.

#### 1.2.4 Other Considerations

1.2.4.1 Irreversible and Irretrievable Commitment of Resources. The Volume I BID concluded in Chapter 7 that the regulatory alternatives will result in the irreversible and irretrievable commitment of energy resources. However, this increased energy demand for pollution control is insignificant compared to the total energy demand of the production line. No changes to these estimated impacts have occurred since proposal.

1.2.4.2 Environmental and Energy Impacts of Delayed Standards. There is no significant benefit to be achieved from delaying the

standards, as discussed in Chapter 7 of the Volume I BID. No changes in the potential effects of delaying the standards have occurred since proposal of the standards.

1.2.4.3 Urban and Community Impacts. These standards will have a positive impact on urban areas and communities because of decreased VOC emissions. There should be no decrease in employment in urban areas and communities because the economic analysis indicated that the standards would have little impact on retail price or profit.

## 2. SUMMARY OF PUBLIC COMMENTS

Twenty-four letters commenting on the proposed standards and the Volume I BID for the proposed standards were received. (One of these simply corrected a minor error in an earlier letter.) A list of commenters, their affiliations, and the EPA document number assigned to their correspondence is given in Table 2-1. No one requested to speak at a public hearing; thus, none was held.

Docket items IV-D-11 through IV-D-24 were received after the close of the public comment period. Nine of these commenters (IV-D-15, IV-D-17, IV-D-18, IV-D-19, IV-D-20, IV-D-21, IV-D-22, IV-D-23, and IV-D-24) petitioned for a reopening of the comment period so that EPA could consider a separate textile subcategory. The EPA decided not to officially reopen the comment period but did consider these late comments in developing the final standards. In addition, EPA met with several members of the American Textile Manufacturers Institute, Inc. (ATMI) at their request to allow them to present followup information on their public comments. This meeting is summarized in Docket Item IV-E-21.

Eight commenters (IV-D-11, IV-D-12, and IV-D-17, IV-D-18, IV-D-19, IV-D-21 and IV-D-22, and IV-D-23) expressed their support for the comments in Docket Item IV-D-7 or IV-D-15 as did ATMI members when they met with EPA (IV-E-21). Docket Item IV-D-7 is a letter from the ATMI. Docket Item IV-D-15, which addresses some of the same issues as Docket Item IV-D-7, is from ATMI and the United States Industrial Fabrics Institute (USIFI). The supporting commenters are referenced below only if their comments expanded upon an issue discussed in IV-D-7 or IV-D-15 or raised a new issue.

The comments and EPA's responses are discussed according to the following topics:

TABLE 2-1. LIST OF COMMENTERS ON PROPOSED STANDARDS OF PERFORMANCE  
FOR NEW STATIONARY SOURCES: POLYMERIC COATING OF SUPPORTING SUBSTRATES

Docket item No. <sup>a</sup>	Commenter/affiliation
IV-D-1	Mr. E. W. Karger Manager, PEPP The Gates Rubber Company 999 South Broadway Post Office Box 5887 Denver, Colorado 80217
IV-D-2	Mr. Frank H. Rutland Technical Director Leather Industries of America, Inc. 2501 M. Street, N.W. Washington, D.C. 20037
IV-D-3	Mr. Roger D. Meadows Vice President, Operations Printing and Textile Products DAY International Post Office Box 360 Waynesville, North Carolina 28786
IV-D-4	Mr. Ray C. Woodcock, CIH DAY International Post Office Box 360 Waynesville, North Carolina 28786 (Correction to p. 5 of IV-D-3)
IV-D-5	Mr. Samuel I. Gutter Attorney for W. R. Grace and Company Polyfibron Division Sidley and Austin 1722 Eye Street, N.W. Washington, D.C. 20006
IV-D-6	Mr. M. F. Tanchuk Environmental Engineer Corporate Environmental Control Department Reynolds Aluminum Reynolds Metals Company Richmond, Virginia 23261
IV-D-7	Ms. Maggie Dean Director, Safety, Health and Environment American Textile Manufacturers Institute, Inc. 1101 Connecticut Avenue, N.W. Suite 300 Washington, D.C. 20036

(continued)

TABLE 2-1. (continued)

Docket item No. <sup>a</sup>	Commenter/affiliation
IV-D-8	Mr. V. A. D'Ippolito Air Quality Coordinator ICI Americas, Inc. Wilmington, Delaware 19897
IV-D-9	Mr. William Juris, P.E. Engineering Section Division of Air Pollution Control State of Ohio Environmental Protection Agency Post Office Box 1049, 1800 Water Mark Drive Columbus, Ohio 43266-0149
IV-D-10	Mr. Paul F. Cash Manager, Environmental Control Mobil Chemical Company 211 College Road East Princeton Forrestal Center Princeton, New Jersey 08540
IV-D-11	Mr. R. F. Cook President WestPoint Pepperell Industrial Fabrics Division Post Office Box 71 West Point, Georgia 31833
IV-D-12	Harold E. Sells Managing Director Coated Fabrics Division American Recreation Products 500 Orchard Street New Haven, Missouri 63068
IV-D-13	Jerry Stenner President James R. Ferron Technical Director Excello Fabric Finishers Incorporated Box 711 810 South Second Street Coshocton, Ohio 43812
IV-D-14	Robert Naujelis Regulatory Affairs Manager Paxar 530 Route 303 Orangeburg, New York 10962

(continued)

TABLE 2-1. (continued)

Docket item No. <sup>a</sup>	Commenter/affiliation
IV-D-15	Maggie Dean Director, Safety, Health & Environment American Textile Manufacturer's Institute, Inc. 1101 Connecticut Avenue, NW Suite 300 Washington, D.C. 20036 and Marcia Thomson Director of Public Affairs United States Industrial Fabrics Institute
IV-D-16	James F. Murphy, Jr. Assistant Vice President Polyfibron Division W. R. Grace and Company 55 Hayden Avenue Lexington, Massachusetts 02173
IV-D-17	Fred T. Eslick General Manager, Engineering, Transportation, and Plastics American Thread Company Post Office Box 880 Old Fort, North Carolina 28762
IV-D-18	Marguerita C. Hindle Vice President Research and Development Kenyon Industries, Inc. Kenyon, Rhode Island 02836
IV-D-19	Walter L. Conine John Boyle and Company Salisbury Road Post Office Box 791 Statesville, North Carolina 28677
IV-D-20	Paul B. Stelzner Senior Vice President and C.O.O. American Recreation Products 1224 Fern Ridge Parkway St. Louis, Missouri 63141
IV-D-21	Guy A. Bivins Manager, Plant Engineering The Bibb Company Post Office Box 4207 Macon, Georgia 31208

(continued)

TABLE 2-1. (continued)

Docket item No. <sup>a</sup>	Commenter/affiliation
IV-D-22	Wayne Holden Technical Director WestPoint Pepperell Industrial Fabrics Division Post Office Box 279 Pulaski, Virginia 24301
IV-D-23	Thomas Tantillo Graniteville Company Graniteville, South Carolina 29829
IV-D-24	George E. Moseley Secretary and General Counsel Reeves Brothers, Inc. Post Office Box 1898 Spartanburg, South Carolina 29304

<sup>a</sup>The docket number for this project is A-83-42. Dockets are on file at EPA Headquarters in Washington, D.C., and at the Office of Air Quality Planning and Standards in Durham, North Carolina.

1. Selection of the Source Category;
2. Affected Facility;
3. Selection of BDT and Emission Limits;
4. Control Costs;
5. Environmental Impacts;
6. Economic Impacts;
7. Compliance;
8. Test Methods and Monitoring;
9. Reporting and Recordkeeping;
10. Wording of the Regulation; and
11. Modification/Reconstruction.

## 2.1 SELECTION OF THE SOURCE CATEGORY

### 2.1.1 Applicability to the Leather Industry

Comment: One commenter (IV-D-2) wrote concerning the applicability of the proposed standards to leather finishing. For certain products, a thin polymeric coating is applied to the unfinished leather substrate. Some coatings are applied in organic solvent solution, although the use of water-based emulsions is increasing. References to leather as a substrate found in the proposal preamble and in the proposed definition of web coating seem to suggest that leather finishing operations would be covered by the proposed rule. The commenter concluded that this would be improper for the following reasons.

1. Leather finishing does not meet the applications criteria established in the proposed standards. Leather is not handled as a continuous web or substrate that is unrolled, finished, dried, and rerolled. Rather, leather finishing is done on discrete skins, hides, or sides. Also, most solvent-borne finishes are sprayed on the leather rather than applied by seasoning machine or roll coater.

2. The leather-like materials that can be coated in continuous form (bonded leather fiber products and artificial leathers) are not properly or legally referred to as "leather" according to accepted trade practice (American Society for Testing and Materials [ASTM] Method D1517) and Federal Trade Commission guidelines. Therefore, these man-made substrates should not be referred to as leather in the final standards.



3. Leather Tanning and Finishing (Standard Industrial Classification [SIC] 3111) is not among the eight SIC codes listed in the Volume I BID as potentially affected by the proposed standards.

4. Consultation with a representative of the Emission Standards Division (ESD) of EPA's Office of Air Quality Planning and Standards confirmed that leather finishing was not intended to fall within the scope of the proposed rule.

In view of these points, the commenter requested that all references to "leather" be deleted in the final rule to avoid confusion.

Response: The commenter correctly noted that, as proposed, the standards could be interpreted to apply to leather finishing operations. The EPA concurs that leather, when defined as a "general term for hide or skin . . ." (Annual Book of ASTM Standards), is not a continuous substrate, and leather finishing was not intended to be covered under the standards. Therefore, leather finishing has been excluded from the list of web coating operations in the final standards. Leather-like materials, such as urethane-coated and bonded leather fiber products are, however, covered by the standards.

It should be noted that the exclusion of the "Leather Tanning and Finishing" SIC code (SIC 3111) from the list of affected SIC's is not grounds for exclusion from the standards. This list was intended to be representative of potentially affected operations, not to be an inclusive list.

#### 2.1.2 Applicability to the Graphic Arts Industry

Comment: One commenter (IV-D-6) wrote that the proposed standards could be erroneously construed to apply to the graphic arts industry. The commenter stated that no facility in the graphic arts industry was studied during the development of the proposed NSPS and that the Volume I BID clearly excludes the graphic arts industry. Furthermore, the commenter met with a representative of the Chemicals and Petroleum Branch of ESD who confirmed that EPA did not intend for this regulation to apply to the graphic arts industry. The commenter recommended that the exclusion of the graphic arts industry also be clearly stated in the preamble to the final regulations.

Response: The polymeric coating NSPS is not intended to include a web coating category already subject to new source performance standards. As the commenter points out, the Volume I BID states that polymeric coating of supporting substrates excludes "those operations that print an image on the surface of the substrate." This exclusion also was included in the proposal Preamble, Section IV.A.2. Exclusions. Section 60.740(a)(3) has been added to the final standards to make this exclusion clear. This section excludes "web coating operations that print an image on the surface of the substrate or coating applied on the same printing line that applies the image."

#### 2.1.3 Applicability to the Paper Coating Industry

Comment: Two commenters (IV-D-9, IV-D-10) believed that the exclusion of paper coating is unclear. One commenter (IV-D-9) stated that the confusion results from the definition of "polymeric coating of supporting substrates," which states ". . . a supporting web other than paper," and from the lack of a definition for paper. The commenter suggested the exclusion of "paper, paperboard, plastic film, metallic foil, and metal coil" be stated in the "polymeric coating of supporting substrates" definition. The commenter stated that if this suggestion were followed, the definition of "paper coating" could be deleted, and that if the suggestion were not followed, "paper coating" should be changed to "paper" or "paper web."

The second commenter (IV-D-10) was concerned specifically with the plastic film coating industry. This commenter concluded that the proposed standards exclude coating on plastic film because: (1) the process is considered a segment of the paper coating industry (which is excluded from the proposed standards); (2) plastic film coating, to date, has been regulated by the States under paper coating State implementation plan (SIP) regulations; (3) the SIC code for this process (2671) was not included in the list of potentially affected SIC codes; (4) the customers who subsequently print or laminate the commenter's product are not covered; and (5) the scope of the background study did not include plastic film coating operations. The commenter stated that the plastic film industry is different from the industries surveyed with respect to the scale and type of equipment and the process itself.

Also, the commenter (IV-D-10) stated that because the BID did not survey the plastic film industry, several assumptions or conclusions presented in the proposal preamble are invalid when applied to this industry. According to the commenter, (1) statements in the proposed rule concerning low-solvent coatings are not valid when applied to low-solvent plastic film coating operations using large-scale equipment; (2) the proposed NSPS implies that line speed and width increases are impractical; however, this is untrue in the commenter's experience; (3) the incremental cost of further reduction of the commenter's low-solvent coating formulation emissions would be unreasonable; and (4) low-solvent waterborne coatings should be BDT for the plastic film industry regardless of the volume of coating used.

If, in fact, plastic film coating operations are included under the proposed regulations, the commenter requested that EPA:

1. Reopen the comment period for more detailed comments;
2. Revise the BID to include plastic film coating operations; and
3. Rescind the proposed NSPS until background information for the plastic film coating industry is developed and evaluated.

Response: The proposed NSPS is intended to exclude paper coating operations, which are defined in the proposed regulation as "the coating of paper, plastic film, or metallic foil. . . ." These paper coating operations are part of the industrial surface coating source category for paper and were not investigated during development of the standards for polymeric coating of supporting substrates. The definition of polymeric coating has been revised to clarify this point, and the definition of paper coating has been deleted.

It should be noted that the exclusion of an industry segment from the list of affected SIC's does not mean the industry segment is excluded from the standard. Such lists are not to be inclusive, but are intended to be representative of potentially affected operations. Also, the fact that subsequent processors of a coated product are not subject to the standards does not, as suggested by one commenter, have any bearing on the applicability of the standards to the initial coating process.

#### 2.1.4 Applicability to the Textile Coating Industry

Comment: Several commenters (IV-D-15, IV-D-18, IV-D-19, IV-D-20, IV-D-21, IV-D-22, IV-D-23, and IV-D-24) requested that EPA establish a separate subcategory in the standards for textile coating operations. The commenters cited product and operational variability as factors limiting this industry's ability to comply with the proposed standards.

Response: The EPA has carefully reviewed the technical comments provided by ATMI and others. The specific comments and EPA's responses to them are detailed elsewhere in this document (primarily in Sections 2.3.1.1 and 2.3.1.3). As a result of this analysis, EPA has decided not to create a separate subcategory or standard for the textile coating industry. However, EPA has adjusted the overall level of the coating operation standard downward to 90 percent in response to the concerns raised by commenters. The EPA believes that this level of control is universally achievable by the polymeric coating industry, including textile coaters.

#### 2.2 AFFECTED FACILITY

Comment: One commenter (IV-D-8) indicated that EPA should clarify how the determination of the affected facility is to be made for coating operations that share mix equipment. The commenter stated that this situation, which is typical of the commenter's plants, is not adequately addressed under the modification/reconstruction provisions. The commenter presented a scenario that involved the installation of a new coating operation served by an existing central mix room. The commenter was concerned that existing coating operations served by the common mix equipment would become affected facilities also.

Response: The affected facility is defined as "each coating operation and any onsite coating mix preparation equipment used to prepare coating for the coating operation." In the case presented by the commenter, the existing coating operations would not become subject to the standards because they are not part of the affected facility that includes the new coating operation. However, the existing mix equipment that serves the new coating operation would become subject to the standards.

The only way that an existing coating operation would come under the standards would be if the potentially affected facility of which it is a

part (i.e., the coating operation with associated mix equipment) were to be modified or reconstructed. A modification is defined in the General Provisions (40 CFR 60.14) as ". . . any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies . . . ."

Certain exceptions are made, including the following: routine maintenance, repair, and replacement; an increase in production rate accomplished without a capital expenditure; an increase in the hours of operation; use of an alternative fuel or raw material if the existing facility was originally designed to accommodate it; addition or replacement of emission control equipment (as long as emissions are not increased); and relocation or change of ownership. The General Provisions (40 CFR 60.15) define reconstruction as the replacement of components of an existing facility to the extent that the fixed capital cost of the new components is greater than 50 percent of the fixed capital cost of a comparable entirely new facility and that compliance with the standard is technically and economically feasible. An increase in the emission rate need not occur.

Comment: Commenters noted (Docket Item IV-E-21) that it is not always possible to dedicate a limited number of pieces of mix equipment to a given affected coating line. The commenters were concerned that entire mix rooms would become affected if a new coating operation is added.

Response: The commenters have interpreted the proposed regulation correctly. However, EPA has revised the regulation to reduce the burden on plants subject to the mix equipment standards. In most cases, venting mix equipment emissions to a control device is judged to be cost effective whether one piece or an entire mix room becomes affected. When a new coating operation is constructed, a new control device would be necessary to control its emissions. This control device could readily be designed to accommodate emissions from the associated mix equipment that becomes affected when the coating operation is constructed. Under this scenario, the venting of mix equipment emissions to a control device is cost effective.<sup>1</sup>

The hypothetical scenario of concern is that mix equipment could become affected by the standards through modification or reconstruction of

a coating operation that uses an existing control device. Although it is considered unlikely, it is possible that the existing control device would have insufficient capacity in reserve to handle all or part of the mix equipment emissions.<sup>1</sup> This would result in a requirement to install a separate control device for these emissions; such separate control of mix equipment emissions is not cost effective. Because it is possible that mix equipment at some modified or reconstructed facilities could not be controlled by existing control devices, the standards have been revised to require use of covers alone (requirements discussed in response to Comment 2.3.2.1) if a coating operation is modified or reconstructed without concurrent construction of a control device. Concurrent construction is defined in the final regulation as the period of time in which construction of an emission control device serving an affected facility is commenced or completed, beginning 6 months prior to the date that construction of the affected facility commences and ending 2 years after the date that construction of the affected facility is completed. This period is designated because it is consistent with the normal planning and purchase cycles for equipment of this type. The 2-year period also coincides with the period for which records required under these standards must be retained.

With this change to the standards, EPA considered whether the affected facility definition should be changed from a combined definition. However, because growth in this industry is still expected to occur in the form of new lines, the maximum emission reduction will be achieved by retaining a combined affected facility definition (see proposal preamble [52 FR 15916] for more discussion of the criteria applicable to affected facility decisions).

## 2.3 SELECTION OF BDT AND EMISSION LIMITS

### 2.3.1 Control of Coating Operation

#### 2.3.1.1 BDT and the Level of the Standard.

Comment: Seven commenters (IV-D-1, IV-D-7, IV-D-8, IV-D-11, IV-D-15, IV-D-16, IV-D-17, and IV-D-18) questioned the capture, control device, and/or overall efficiency required to comply with the proposed 93 percent VOC emission reduction for coating operations. One commenter (IV-D-1) said that the accessibility and clearances needed for feeding and

retrieving products from a treater, the practicality of capturing virtually 100 percent of vapors at all times, the reliability of continuous monitoring equipment, and the number of different combinations of substrates and coating solutions make compliance extremely doubtful. The commenter suggested that, with diligent attention to the equipment, a control device efficiency of 95 percent and a capture efficiency of 80 percent could be attained, allowing an overall efficiency of 76 percent to be attained.

A commenter (IV-D-8) stated that 93 percent overall efficiency has not been demonstrated for a polymeric coating operation. Specifically, the commenter stated that the capture efficiency of 98 percent that would be required to obtain the overall efficiency of 93 percent has not been demonstrated relative to the design factors assumed in the economic analysis. Also, the commenter stated that the selection of a carbon adsorber efficiency of 95 percent is based on insufficient data from the polymeric coating industry. The 95 percent efficiency was based on test data that included only one polymeric coating operation. According to the commenter, these data cannot adequately demonstrate a control technology for an entire industry that uses a multitude of solvents and coating formulations. The commenter stated that EPA has failed to demonstrate that a 95 percent efficiency is consistently achievable and that EPA needs to review carbon adsorption data for the various solvents typically used in the polymeric coating industry before concluding that such an efficiency is consistently attainable. Another commenter (IV-D-11) stated that, based on their best information, the overall efficiencies specified in the regulation could not be consistently attained for new lines, except for those that use low-solvent coatings.

Two commenters (IV-D-7, IV-D-15) cited batch operations, the use of multiple solvents, and the need for frequent (to continuous) worker access to the coating application/flashoff area as reasons for not being able to comply with the proposed standards. In the first correspondence (IV-D-7), only the 95 percent efficiency ascribed by EPA to carbon adsorption was addressed. The commenter indicated that the data from a polymeric coating plant, which are from a plant using a single solvent, do not adequately reflect coating operations that use multiple solvents, other solvents, or

multiple substrates and coating head configurations. The commenter said that the solvent recovery efficiencies are biased because they rely on data obtained with gas analyzers only under the most favorable short-term operating conditions. The second correspondence (IV-D-15) also addressed the concern that a total enclosure that would meet the required capture efficiency while maintaining worker access could not be designed. Case studies from five plants were presented as documentation of these claims (IV-D-15).

Response: The EPA has determined that the final standards for coating operations are attainable. The following discussion of support for this conclusion addresses: (1) capture efficiency, (2) control device efficiency, (3) overall control efficiency, and (4) VOC recovery. For the response to the comment about the reliability of continuous monitoring equipment, see Section 2.8.3.

1. Capture efficiency. In response to comments, EPA has reevaluated the feasibility of total enclosures in the polymeric coating industry. The term "total enclosure" means a structure that is constructed around a source of emissions and operated so that all VOC emissions are collected and exhausted through a stack or duct. With a total enclosure, there will be no fugitive emissions, only stack emissions. The drying oven itself may be part of the total enclosure. A total enclosure must satisfy all of the design and operational requirements as defined in the promulgated regulation and summarized in Table 2-2. Alternatively, it must be demonstrated, to the Administrator's satisfaction, to be equivalent to these requirements. To evaluate the comments, Section 114 information requests were sent to three facilities that had indicated that enclosures were in use, and plant visits were made to three facilities that had indicated that they were batch operations and needed frequent access to the coating equipment during operation. An expert in industrial ventilation and a vendor of local ventilation systems were contacted. Using the data gathered and standard ventilation principles and guidelines, EPA reached the conclusions discussed below.<sup>2</sup>

As indicated by the commenters, a small total enclosure immediately around the application/flashoff area is not feasible at facilities where frequent, routine access to the coating equipment is required. At such



TABLE 2-2. SUMMARY OF TOTAL ENCLOSURE CRITERIA

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Definition: "Total enclosure" means a structure that is constructed around a source of emissions so that all VOC emissions are collected and exhausted through a stack or duct to a control device. With a total enclosure, there will be no fugitive emissions, only stack emissions. The drying oven itself may be part of the total enclosure.

Design and operational criteria:

1. The only openings in the enclosure shall be forced makeup air and exhaust ducts and natural draft openings such as those through which raw materials enter and exit the coating operation.
  2. The total area of all natural draft openings shall not exceed 5 percent of the total surface area of the total enclosure's walls, floor, and ceiling.
  3. All access doors and windows shall be closed during normal operation of the enclosed coating operation, except for brief, occasional openings to accommodate process equipment adjustments. If such openings are frequent, or if the access door or window remains open for a significant amount of time during the process operation, it must be considered a natural draft opening. Access doors used routinely by workers to enter and exit the enclosed area shall be equipped with automatic closure devices.
  4. Average inward face velocity (FV) across all natural draft openings is a minimum of 3,600 meters per hour (200 feet per minute) and demonstrably inward at all times.
  5. All sources of emissions within the enclosure shall be a minimum of four equivalent diameters away from each natural draft opening.
-

facilities, it is doubtful that the access ports necessary to reach the equipment will conform with the total enclosure specification for separation between sources of VOC and openings in the enclosure. Nevertheless, even at facilities with extensive access requirements, local ventilation systems can be constructed that will achieve a very high capture efficiency while affording necessary access. The most universally applicable approach consists of substantially enclosing the application/flashoff area while providing ports that can be opened when access is needed. With a well-designed system, capture will be sufficient to maintain the VOC concentration below the threshold limit value (TLV) outside the enclosure, protecting the health of the workers in the area. The airflow necessary in a well-designed system will be reduced to the point that the total volume can be used as makeup air in the drying oven, minimizing control costs.

In most cases, the local ventilation system described above could be used in conjunction with a larger enclosure to meet the specifications for a total enclosure. The total enclosure could consist of the drying oven itself coupled with a small room (large enough for workers) constructed around the application/flashoff area, a small room constructed around the entire coating operation, or even a large coating room with several coating operations. The size of the total enclosure is immaterial as long as the specifications are met.

Despite the range of acceptable total enclosure configurations, there remains the possibility that some facilities may not be able to install an enclosure that meets the specifications. For instance, at an existing facility adding a new coating operation or modifying/reconstructing an existing coating operation, space constraints might not allow construction of any enclosure large enough for personnel to work within during operation. If the same facility could not install a small total enclosure immediately around the application/flashoff area because of access requirements, the use of a total enclosure would not be feasible for that facility. One of the facilities visited during the investigation of this issue would probably encounter these constraints.

Because there may be facilities at which a total enclosure is not feasible, EPA investigated capture systems that fell short of the

requirements for a total enclosure. Based on EPA's analysis, a capture efficiency of 95 percent can readily be achieved without a total enclosure through the use of a well-designed local ventilation system. Although the actual percentage varies from facility to facility, about 90 percent of the VOC emissions from a coating operation are generated within the drying oven. Assuming that all these emissions are captured, as they will be in a well-designed oven operating under a slight negative pressure, only 50 percent of the emissions generated in the application/flashoff area must be captured to achieve a total capture efficiency of 95 percent. Even if only 80 percent of VOC emissions from the coating operation are generated in the drying oven, only 75 percent of the application/flashoff area emissions must be captured to achieve 95 percent overall capture. The EPA has concluded that these capture efficiencies can be achieved in a cost-effective manner with a well-designed local ventilation system.

2. Control device efficiency. Carbon adsorption has been used for the last 50 years by many industries to recover a wide variety of solvents. With the experience gained from extensive application under very diverse conditions, the technology has matured to the point that an adequately designed, operated, and maintained system can readily attain an efficiency of 95 percent or higher on a continuous basis. This fact has been demonstrated across many industries with many different solvents and solvent blends. The efficiency of a carbon adsorption system is determined by its design and operating parameters and the composition of the solvent-laden airstream (SLA) vented to it, not by the process equipment that generates the exhaust stream.<sup>3</sup> Thus, it is reasonable to expect the attainment of similar efficiencies through the application of this technology in the polymeric coating industry.

The efficiency of carbon adsorption in this and related web coating industries was discussed in the Volume I BID. Measurements during tests ranging from a short-term gaseous emissions test to a 78-hour material balance indicated adsorber efficiencies of 97 percent or higher. At a pressure sensitive tapes and labels (PSTL) plant, an overall control efficiency of 93 percent was achieved over a 4-week period. The fact that this plant, which coated a number of products using a wide variety of solvents, attained a control level of 93 percent demonstrates that a

carbon adsorption system is capable of operating at an efficiency high enough to meet the standards. As discussed in the next comment, data received from a polymeric coating plant also support control efficiencies capable of meeting the standards.

The EPA has recently concluded an extensive study of the ability of carbon adsorbers to operate continuously at least 95 percent efficiency. This report addresses many of the problems cited by commenters that could be faced by a batch operator. In particular, there are two major ways that batch operations could affect carbon adsorber performance.<sup>4</sup> One effect would be expected to occur where multiple lines are ducted to a carbon adsorption system. Under this scenario, it is possible that as lines are brought off- and on-line, the resulting variable flowrates and VOC concentrations of the SLA ducted to the control device could adversely affect recovery efficiency. A second effect would be evident in a situation where an SLA contains varying blends of solvents. If this variable stream is ducted to a single control system, the result could be decreased recovery efficiency.

The effect of variable flowrates should not be a problem with a properly designed system. The primary effect of an increase in volumetric flowrate is to change the width of the mass transfer zone within the carbon bed. As the superficial velocity increases as a result of a higher flowrate, the width of the mass transfer zone also increases because the individual carbon pellets are exposed to the adsorbate for a shorter period of time. With a wider mass transfer zone, the length of the adsorption cycle prior to breakthrough will decrease. However, a bed should be designed for worst-case flowrate conditions (the maximum flowrate expected to be ducted to the system at a given time), so there should be no periods of operation when breakthrough occurs before there is sufficient time to have regenerated a fresh bed.<sup>4</sup>

Another question related to flowrate is the effect of short-term variations in flowrate on system efficiency. One report presents data from a case where the flowrate varied randomly during the entire adsorption cycle and ranged from 25,000 to 45,000 scfm. The recovery efficiencies during this time period varied less than 0.5 percent with all efficiencies being well above 99 percent.<sup>4</sup> Therefore, short-term variations in flowrate do not appear to be a problem.

The remaining concern with respect to variable flowrates is whether they could result in an increase in outlet concentration (rather than a decrease in cycle length as discussed above). However, increases in outlet concentration are due either to the inlet stream physically bypassing a portion of the bed (through channeling, for example) or to a buildup of heel in the last few inches of the bed. Neither of these situations is expected to occur as a result of variations in the flowrate.<sup>4</sup>

The effect of variable VOC concentrations in the SLA on carbon adsorber performance is also expected to be insignificant. Increasing the concentration in the SLA increases the working capacity of the carbon, but not to such an extent that the increase in mass loading is offset. The result is that breakthrough occurs sooner. Over the long term, this could affect the performance of the system if capacity is exceeded, but in a well-designed system this should not occur.<sup>4</sup>

The short-term effect of concern is whether variations in inlet concentration affect outlet concentration. The outlet concentration is a function of the amount of heel that remains in the last few inches of the bed after regeneration. Because the inlet stream reaches equilibrium with the carbon within the mass transfer zone, the amount of heel at the adsorber outlet is independent of inlet concentration.<sup>4</sup> Thus, inlet variations would not be expected to affect outlet concentration.

The carbon adsorption report presents test data from two performance tests that verify this relationship. In the first case, inlet concentrations ranged from 200 to 550 ppm while the outlet concentration varied only from 5 to 15 ppm; the corresponding removal efficiency varied from 95 to 99 percent. In the second case, the inlet concentrations varied from 40 to 880 ppm while the outlet concentration remained relatively constant (0 to 5 ppm). During the majority of the test period the removal efficiency was well above 95 percent. However, when the inlet concentration dropped below 50 ppm, the removal efficiency was also reduced to less than 95 percent. This was expected because properly designed and operated carbon adsorbers are essentially constant outlet concentration devices, so a very low inlet concentration for an extended period will reduce short-term efficiency.<sup>4</sup>

The presence of low inlet concentrations or minor variations in outlet concentrations should not pose a major problem for a facility attempting to show compliance with the coating operation standard. Performance test and monitoring data are averaged over adsorber system cycles, so short-term inlet variations will not greatly affect the long-term average. For the facility referenced above as having inlet concentrations below 50 ppm, the data were reanalyzed using the averaging periods that would apply under the polymeric coating regulation. The results of this analysis show that the average efficiency is greater than 95 percent, and the facility would not generate excess emissions. Under similar inlet concentration conditions, a carbon adsorber at a polymeric coating plant should exhibit similar efficiencies. It is unlikely that more extended periods of low inlet concentrations would occur at polymeric coating plants. The standard has been revised to preclude periods of startup and shutdown for purposes of the gas-phase test to prevent the possibility that extended periods of startup and shutdown would bias test results. (Liquid-phase testing is not as sensitive to this potential bias because periods of startup and shutdown represent only a fraction of the overall test period of 3 to 30 days.) This change is consistent with the General Provisions (40 CFR 60.8(c)).<sup>4</sup>

The carbon adsorption report notes that, because the outlet concentration remains relatively constant throughout an adsorption cycle, large variations in the inlet concentration will result in corresponding variations in removal efficiency. However, if the bed is properly designed and regenerated, a constant outlet concentration can be attained such that greater than 95 percent removal is achieved for the entire range of inlet concentrations. Furthermore, by diverting or shutting off the airflow from idle equipment, inlet concentrations can be consistently maintained at higher levels to ensure the desired removal efficiency.<sup>4</sup>

Variations in the solvent blend and VOC in the SLA ducted to a carbon adsorber can affect either adsorption time or desorption steaming requirements. If this is not accounted for, particularly if timers are used to trigger bed changeover, recovery efficiency could decline. The effects of variable solvent blends are discussed further in Section 4 below.

It is true that fixed-bed carbon adsorbers are not suited to every VOC control application. In such cases, either a fluidized-bed carbon adsorber or a condenser can be used. The analysis of costs carried out prior to proposal and presented in the Volume I BID indicated that a condenser would be less costly to purchase and operate than a carbon adsorption system. Incinerators may also be cost effective in some control situations.<sup>5</sup>

3. Overall control efficiency. An overall control efficiency of 93 percent has been demonstrated by a 4-week liquid material balance at a plant in the PSTL industry that is equipped with a "total building air evacuation system," which was assumed to be a total enclosure for purposes of proposal analyses. The performance of this PSTL plant is considered representative of the control efficiency attainable in the polymeric coating industry because of the many similarities in the two industries. In both, coatings with a similar range of solvent contents are applied with the same types of applicators to continuous substrates and dried in the same types of drying ovens. Capture and control systems for emissions of VOC are very similar. The production at the PSTL plant during the test period was characterized by many short runs of many different products using a variety of solvents, as is often the case at polymeric coating plants.

Since proposal of the polymeric coating standards, EPA received liquid material balance data from a member of the industry (Grace) who coats textile printing blankets (IV-D-16). This operation consists of two coating lines in a room-type enclosure (the data presented by the commenter [IV-D-16] are presented in detail in the section on Comment 2.3.1.). The EPA concluded that these data, which show 93 percent overall recovery based on a 3-day liquid material balance, substantiate, along with the PSTL data, that emission capture and reduction systems are capable of achieving 93 percent control.

The EPA, however, has reevaluated the proposed standards in light of industry comments (particularly issues related to batch operations and design and use of total enclosures discussed elsewhere in this response and in Section 2.3.1.3).<sup>6</sup> Although the polymeric coating standards require demonstration of an overall level of control, the BDT for the

standards is discussed typically in terms of the efficiency of capture and control device efficiencies. The product of these efficiencies yields the overall level of control. The control device component of BDT has been demonstrated to be a minimum efficiency of 95 percent for this industry (see Section 2 on control device efficiency for more discussion of this issue). Therefore, the important variable in evaluating the overall level of control that can be achieved by BDT is the efficiency associated with capture component.

Any change in the assumed level of capture efficiency should be evaluated considering that (1) the two data points at 93 percent overall efficiency (PSTL and Grace) are associated with unknown capture and control device efficiencies and (2) neither capture system demonstrated complete consistency with EPA's total enclosure criteria. It is quite possible (and perhaps probable) that capture efficiency at these plants was less than the 98 percent minimum previously ascribed to a total enclosure. Therefore, to conclude that capture efficiency was 98 percent, based on an assumed control device efficiency of 95 percent (i.e.,  $0.98 \text{ capture} \times 0.95 \text{ control} = 0.93 \text{ overall control efficiency}$ ) may be oversimplification. A more conservative means to estimate the capture efficiency of these two facilities is to assume that the control device efficiency was higher (i.e., 98 percent) instead of the minimum 95 percent. If so, the 93 percent overall control could have resulted with only a 95 percent efficient capture device.

To ensure the selection of achievable standards for the entire industry, the overall level of control required should be based on the minimum efficiencies of the two components of BDT. The EPA has concluded that control devices are at least 95 percent efficient, even while acknowledging that they are capable of, and often achieve, much higher efficiencies. Although EPA believes that total enclosures achieve essentially 100 percent or total capture, it has not been adequately demonstrated that all segments of this diverse industry can install and operate total enclosures that meet EPA's specifications (see Section 1 on capture efficiency for more information on this topic). It is, therefore, reasonable to allow for this variability when setting the capture system efficiency component of BDT for this industry. Based on these



considerations, EPA has adjusted the standards downward from 93 percent to 90 percent overall control (i.e.,  $0.95 \text{ capture} \times 0.95 \text{ control} = 0.90$  overall control efficiency). The promulgated standards recognize that strict adherence to EPA's total enclosure criteria may be neither universally achievable nor required to meet the standards but would still allow use of the alternative standard for those sources that can meet the total enclosure specifications. The EPA believes that this will be an attractive alternative for that majority of plants for which a total enclosure is feasible. Because the compliance test provisions associated with a total enclosure are simpler and less expensive to carry out than a capture efficiency test, there is continuing incentive for sources to install total enclosures.

It should also be noted that there is flexibility in the emission reduction standard. Because only the overall emission reduction is specified, sources may vary capture and control efficiencies as they wish as long as the required overall emission reduction of 90 percent is maintained. Thus, a source may choose to operate the control device in excess of 95 percent efficiency and maintain a capture efficiency below 95 percent, or vice versa.

In conclusion, the standards have been established at an overall control level of 90 percent, with BDT defined as a 90 percent efficient emission reduction system that is composed of an emission capture system and control device. The option of using a total enclosure as the emission capture system is allowed where feasible and is attractive to the source because it simplifies the performance test. This change to the standards takes into account concerns about variability in measurement technique, operating parameters, worker access requirements, etc. As Table 2-3 shows, the revised standards (represented by Regulatory Alternative IIA) remain cost effective despite a lower emission reduction. This option potentially results in a projected decrease in nationwide VOC reduction over 5 years compared to the standards as proposed (964 Mg [1,062 tons] compared to 1,060 Mg [1,168 tons]). However, because of the use of total enclosures or control devices that achieve more than 95 percent efficiency, in many cases, facilities will actually achieve emission reductions much greater than 90 percent.

TABLE 2-3. AVERAGE AND INCREMENTAL COST EFFECTIVENESS FOR MODEL COATING OPERATIONS<sup>4</sup>  
(First Quarter 1984 Dollars/Mg)

Level of control, regulatory alternative <sup>a</sup>	Model coating operations								
	Rubber-coated industrial fabric			Urethane- coated fabric		Rubber- coated cord		Epoxy- coated fiberglass	
	A <sup>b</sup>	B	C	B	C	A	B	B	C
<u>93 percent, III</u>									
Average cost effectiveness (III vs. I)	357	89	(101)	(673)	(831)	351	89	751	396
Incremental cost effec- tiveness (III vs. II)	1,138	558	137	(605)	(944)	1,134	558	(55)	(368)
<u>90 percent, IIA</u>									
Average and incremental cost effectiveness (IIA vs. I)	442	141	(76)	(506)	(699)	442	142	799	432

<sup>a</sup>Regulatory Alternatives (RA's) I, II, and III were developed at proposal and correspond to 81, 90, and 93 percent overall control, respectively. Regulatory Alternative IIA was developed post-proposal and corresponds to 90 percent overall control. Regulatory Alternative IIA costs were developed using the costs associated with a total enclosure (to provide the most conservative costs) and a control system sized to control 90 percent of the emissions.

<sup>b</sup>A, B, and C correspond to small, medium, and large line sizes, respectively.

4. VOC recovery. The type of solvent used and VOC generated is a key design criterion in any carbon adsorption system. The adsorption characteristics of each compound are assessed using data on their physical properties, and the system is designed to accommodate these properties. While adsorbers can be designed to recover a blend of solvents and other VOC successfully, changes in the characteristics of a feed stream (i.e., the introduction of varying solvent blends due to a batch process and cure volatiles) can affect both adsorption and desorption cycles.<sup>4</sup> If the system cannot accommodate the new SLA stream, it is possible that the working capacity of the bed could decrease below design conditions or that costs of increased steam requirements or carbon bed replacement due to excessive fouling could lead to poor performance or excessive costs of operation.

The operator's responsibilities under these conditions are to design the system to accommodate worst-case VOC composition conditions and to monitor the adsorber outlet streams adequately to assure that the beds are not operated after breakthrough. It is advantageous to standardize solvent blends and minimize the number of "incompatible" solvents likely to be ducted to the control device simultaneously. There may be cases where these measures are impossible and carbon adsorber performance cannot be continuously maintained at 95 percent efficiency at reasonable cost; in these cases, carbon adsorption is not the appropriate control technology. Incineration is often selected because it can control a wide variety of VOC with relative ease.

A preliminary cost analysis shows that, when compared to baseline control assuming use of an incinerator, a 98 percent efficient incinerator can cost-effectively control emissions from a coating operation equipped with a total enclosure. Incinerators were not considered cost effective at proposal because they were considered a more stringent regulatory alternative, and the incremental cost compared to a carbon adsorber at 93 percent overall control was considered unreasonable. However, if conditions at a new or modified line prohibit the use of carbon adsorption, these same conditions would prohibit the use of carbon adsorption under baseline regulations. In fact, 67 percent of the VOC emission control devices used by the industry at the time of proposal were

incinerators. Therefore, the cost of incineration under the NSPS should more logically be compared to the cost of incineration under baseline regulations. The cost effectiveness of control is reasonable in all cases when analyzed using these assumptions.<sup>5</sup>

Even if the use of multiple solvents does not affect carbon adsorber performance, it is possible that the cost of VOC recovery may be adversely affected. The model plant analysis did include the cost of simple distillation (one water-soluble solvent and one blend of two solvents), but allowed a 100 percent credit for the recovered solvent. It is possible that, in the case of multiple solvents that are difficult and expensive to distill or where stringent solvent purity requirements exist, a 100 percent credit may overstate the actual credit available to some facilities. An analysis of the regulatory alternatives developed at proposal (RA's I, II, and III) and of an alternative developed post-proposal (RA IIA) shows that solvent credits less than 100 percent (i.e., 60, 30, and 0) result in reasonable control costs in the majority of cases. Reduced solvent recovery credits are not cost effective for some lines, particularly small lines.<sup>5</sup> However, these lines would likely have the same problem at baseline conditions, and incineration would be the control device of choice. Therefore, commenters are correct that VOC recovery could be precluded under some conditions, but this is not the result of the NSPS.

Comment: A commenter (IV-D-16) presented data that, according to the commenter, indicated that only under ideal conditions could the plant (Grace) recover 93 percent of the VOC applied at the coating operation and that, on a day-to-day basis, recovering 93 percent is very unlikely. (The data are claimed to be confidential business information and, therefore, are not presented here.) The commenter stated that their equipment is the same as Regulatory Alternative III. The commenter uses a knife-over-roll coater with a substantially enclosed coater. The coating operation (including the substantially enclosed coater) is enclosed in a room that is under negative pressure. Exhaust from the room is sent to a carbon adsorption system. Over a 3-day continuous run, the operation achieved 93 percent recovery based on a liquid-liquid material balance. The average recovery efficiency over a month for this operation, also

calculated using a liquid-liquid material balance, was 86 percent. The commenter stated that even though 93 percent is theoretically possible, 85 percent is the maximum practical recovery rate.

Response: Followup contacts were made with the commenter to determine the differences between the "ideal" conditions during the 3-day run when a 93 percent overall efficiency was measured and the "typical" operation during the remainder of the month when a monthly average of 86 percent was measured. The two major differences noted by that commenter were (1) more careful measurement taken during the 3-day run and (2) a shorter carbon bed adsorption time during the 3-day run. The commenter emphasized the extensive effort and extreme care used in obtaining measurements for the 3-day material balance. The adsorption time was decreased to 75 percent of the normal adsorption time during the 3-day run to ensure that breakthrough would not occur. The commenter noted that this reduction in adsorption cycle time was not cost effective because of the increased steam requirements for desorption. However, the commenter added that the difference in cycle time would probably not have a significant effect on performance because the original cycle length is "very conservative."<sup>7</sup> The commenter stated that the plant would prefer to use breakthrough monitors instead of timers to control adsorption/desorption cycles; however, a reliable monitor has not been found (IV-D-16).

Although it is not possible to determine quantitatively the cause of the difference between the two data sets because separate control and capture efficiency are not provided in either case, comparison of the short-term and long-term performance data indicates that the measured differences may largely be due to accounting for mix room losses, retained VOC in the web, and waste VOC in the short-term calculations. These losses were not taken into account in the monthly efficiency calculations. When the short-term efficiency is recalculated without accounting for these losses, the value is consistent with the typical monthly efficiencies reported by the source. Thus, it is reasonable to expect that, if these types of losses were taken into account during the long-term measurements, the measured overall efficiency would approximate the short-term results. This indicates that short-term data may be reasonably

representative of long-term performance if measured on the same basis.<sup>6</sup> Furthermore, the short-term measurement techniques reflect the facility's efficiency as it is to be determined for the purposes of conducting a liquid material balance. Thus, EPA believes that rather than discredit the level of the standard, these test data support the standard.

The information from the commenter does indicate that performing a monthly material balance in some cases (i.e., when multiple coatings are used) may require more resources than are reasonable to spend on compliance demonstrations. However, alternative methods of demonstrating compliance with the standards are available (see Section 2.7.2) such as the alternative standard, gas-phase test, and short-term (3- to 7-day) liquid material balance. In any case, the monthly liquid material balance compliance provision has limited applicability and would not be an appropriate compliance method for the situation described by the commenter because multiple emission sources are ducted to the same control device.

Comment: One commenter (IV-D-17) stated that a major flaw in the regulation is the lack of acknowledgment of the variability in any coating process and in measuring its efficiency. The commenter stated that all available data should be statistically analyzed and the control limit based on, at a minimum, the average less three sigma. The commenter pointed out that the results from this type of statistical analysis were used in EPA's textile treated wastewater effluent regulations.

Response: The EPA has considered the range of variable operating conditions likely to be found in this industry. Based on both the theory and actual application of BDT, EPA has determined that these variable operating conditions do not affect a facility's ability to meet an overall control level of 90 percent, representative of BDT. For example, carbon adsorption has been shown to achieve 95 percent efficiency on a continuous basis despite the use of multiple solvents and multiple runs.<sup>4</sup> Enclosures capable of achieving 95 percent or greater capture efficiency while allowing safe worker access have been demonstrated.<sup>4,6</sup> Also, the PSTL plant data that are used as the basis for determining the performance of BDT resemble these operating conditions more closely than they resemble cases of single solvents, long production runs, and limited worker access.

The fact that statistical analysis has been used under other EPA programs is not relevant to the NSPS program. Standards prepared under this program are established under Section 111 of the Clean Air Act and are required to reflect "the degree of emission limitation and the percentage reduction achievable through application of" best demonstrated technology (BDT). The selection of BDT is to be based on:

. . . application of the best system of continuous emission reduction which (taking into consideration the cost of achieving such emission reduction, and nonair quality health and environmental impacts and energy requirements) the Administrator determines has been adequately documented.

The selection of BDT from a range of alternatives is based on engineering and cost evaluations of the technical feasibility and environmental and cost impacts from application of the technology to the industries in the source category. Once BDT is selected, it is assumed, by definition, to apply uniformly to the source category. If a single BDT does not apply to the entire source category, alternate BDT's may be designated for subcategories. A statistical basis for the standard such as that suggested by the commenter is not appropriate under the NSPS process described above.

#### 2.3.1.2 Exemption Level.

Comment: A State agency (IV-D-9) recommended adding a requirement for 90 percent control for facilities using less than  $110 \text{ m}^3/\text{yr}$  (29,059 gal/yr) (95 Mg/yr [105 tons/yr]) of VOC if the incremental cost effectiveness is less than \$1,100/Mg. The commenter stated that 90 percent control appears to be cost effective below  $110 \text{ m}^3/\text{yr}$  (29,059 gal/yr) (95 Mg/yr [105 tons/yr]) of VOC and suggested evaluating this option by using model operation(s) below  $95 \text{ m}^3/\text{yr}$  (25,096 gal/yr) (82 Mg/yr [91 tons/yr]) of VOC usage.

Response: With the development of Regulatory Alternative IIA and the decision to reduce the overall level of control required by the standards from 93 to 90 percent, EPA reevaluated the VOC use cutoff level for this industry. This analysis focused on the same basic question as that raised by the commenter, e.g., would cost-effective control be possible for facilities that qualify for the lower cutoff level. As can be seen from Table 2-3, cost effective control of such facilities at a 90 percent (or

lower) overall control level (Regulatory Alternative IIA) is theoretically possible. However, it is expected that the environmental impact of the change would be relatively small. According to the economic impact analysis conducted at proposal, it is expected that growth in this industry will occur in lines with annual VOC usage greater than 110 m<sup>3</sup>/yr (29,059 gal/yr) (95 Mg/yr [105 tons/yr]). Therefore, the promulgation of a lower VOC use cutoff will not affect the costs and emission reductions projected as a result of the NSPS and the cutoff level has been retained as proposed. Furthermore, it is expected that most facilities will choose to comply with the alternative standard, thus achieving at least 93 percent overall control. For these facilities, the analysis that determined the proposed cutoff is still applicable. In any case, EPA will reconsider the cutoff level at the 4-year review of the NSPS if additional data indicate that there is an environmental benefit to use of a lower cutoff.

#### 2.3.1.3 Consideration of Variable Operating Conditions.

Comment: Ten commenters (IV-D-5, IV-D-7, IV-D-8, IV-D-12, IV-D-13, IV-D-14, IV-D-15, IV-D-17, IV-D-18, IV-D-21) believed that EPA did not properly consider the full range of practices in the industry in development of the proposed standard. One of the commenters (IV-D-5) indicated that the unique character of the printing blanket coating industry makes total enclosure of the coating operation infeasible (see Section 2.4.1). According to the commenter, EPA has failed to satisfy its statutory duty to consider the range of relevant variables that may affect emissions in different plants and promulgate achievable standards. Another commenter (IV-D-8) stated that EPA needs to review a broader cross-section of the fabric coating industry. Specifically, coating operations often have traces of fine resin particulate matter entrained in the dryer exhaust stream that would cause blinding of the carbon bed or catalytic incinerator. The issue of carbon bed contamination was also addressed by another commenter (IV-D-12). This commenter stated that the carbon beds would become contaminated by airborne plasticizers emitted during curing processes and powders emitted during mixing.

Other commenters (IV-D-7, IV-D-13, IV-D-14, IV-D-15, IV-D-18, IV-D-19, IV-D-20, IV-D-21, IV-D-22, IV-D-23, IV-D-24) believed that EPA's



models do not adequately reflect the diversity in the polymeric coating industry because the models are based on operations that use one solvent on one substrate utilizing equipment dedicated to one method of coating. However, according to the commenters, much of the coating equipment is used with several solvents or solvent blends; substrates of several types, thicknesses, and widths; and various impregnating and coating head configurations. Also, because of the specialized properties of coated fabrics, long, efficient runs are rare, and batch processing is typical. One commenter (IV-D-13) stated that coating runs vary from 500 to 25,000 yards and that some days one coating formulation is run continuously, while other days as many as six different formulations may be used. Another commenter (IV-D-14) presented production parameters that may affect emission rates and that demonstrate the variety of substrates, coatings, solvents, and manufacturing methods used. This commenter stated that the coating processes use seven different solvents. A commenter (IV-D-7) contended that models that base control efficiency only on size and solvent use fail to consider adequately major differences in process operations that affect both efficiencies and costs. One commenter (IV-D-12) stated that a review of each plant should be made to determine the final standard because of the diversity of formulated products in the textile finishing market.

A commenter (IV-D-7) disagreed with the assumptions and models used by EPA in developing the proposed standards. The commenter stated that the characterization of magnetic tape coating operations as similar to the polymeric coating industry is grossly inaccurate and jeopardizes the validity and supportability of the proposed rule. Another commenter (IV-D-13) also expressed concern about data transfer from an organic solvent-based tape coating line because all polymeric coaters do not have continuous production like the tape manufacturers.

A commenter (IV-D-7) indicated that EPA was in error in including a model plant controlled by an air-atmosphere condensation system in its analysis, while not considering the use of an inert-atmosphere condenser. The commenter stated that no air-atmosphere condenser is in use in the polymeric coating industry and that EPA has not demonstrated that one can be designed to fit such operations. The commenter also stated that EPA

was in error to assume the use of a VOC concentration of 25 percent of the lower explosive limit (LEL) as the concentration in the oven exhaust and the control device inlet stream. This assumption fails to account for the lower concentrations found in air from solvent storage tanks, mixers, and flashoff areas that would reduce the concentration in the inlet to the control device, thus reducing efficiency. In addition, the commenter stated that an oven cannot be safely operated at this VOC concentration. According to the commenter, EPA has accepted the claims of vendors in this matter, but has no factual data to support this contention.

Response: The EPA believes that the range of practices typical in the polymeric coating industry have been adequately considered in the development of the standards. Based on contacts with and visits to a large number of polymeric coating plants over the course of standards development, four different types of "model lines" were developed to represent the diverse segments of the industry. To account for the range of sizes typically found in each sector of the industry, the impacts of the regulatory alternatives were analyzed for two or three annual VOC use rates within each type of model facility. In all, a total of nine different combinations of facility type and size were analyzed. In the judgment of EPA, these model plants cover the range of variables that affect VOC emissions, and these variables have been given proper consideration in the development of the standards. In fact, after proposal EPA visited and requested detailed process information from representative plants in order to learn more about enclosure design and capture efficiency parameters as well as batch operations. This information confirmed the validity of EPA's approach.

The commenter that manufactures printing blankets (IV-D-5) has not shown that the process used by his company cannot be controlled with reasonable cost effectiveness. The EPA believes that cost-effective control is feasible. A more detailed treatment of this issue is presented in Section 2.4.1.

Difficulties with particulate matter in the SLA stream were not raised as an issue by industry contacts during the background study. However, they have been encountered in many applications of emission control technology. Filters upstream of the VOC control device can

generally alleviate the problem at low cost.<sup>8</sup> In cases where particulate contamination is excessive or where the gas stream quickly deteriorates the filters (assuming that there is no cost-effective, compatible filter material), thermal incineration, rather than carbon adsorption or catalytic incineration, may be the best control technique. In any case, the source would encounter the same difficulties in the absence of the NSPS under baseline control regulations, so the costs incurred cannot be ascribed to the NSPS.

In response to the commenters who stated that EPA needs to review a broader cross-section of the industry, EPA believes, as discussed above, that the model line analysis carried out adequately considered the range of practices in the industry. The model lines were developed based on extensive contact with industry (including textile and other commission coaters) in the form of plant visits, Section 114 information requests, and telephone contacts. Because of the variability of the industry, plant parameters were developed based on annual VOC consumption and basic coating line configurations rather than product specific parameters. This approach is feasible because control device efficiency depends on design and operating parameters of the control device and the composition of the SLA stream, not on the process or equipment that generates the exhaust stream. Emission capture systems can be configured to achieve the required capture efficiency without interfering with necessary process operations.<sup>2</sup> If the variations in VOC, substrates, coating heads, and run lengths are properly considered during the design phase of the control and capture systems and appropriate operation and maintenance procedures are established and observed, process variations need not result in reduced efficiency.

The EPA has determined that most coating operations can be totally enclosed. The appropriate enclosure design may vary from a small structure fitting closely about the application/flashoff area to the entire room in which the coating operation is located. Even in cases where access requirements rule out a close-fitting total enclosure and space constraints make a room-type enclosure impossible, a well-designed local ventilation system can achieve adequate capture to meet the final standards. Carbon adsorption, when designed for the worst-case

conditions, can readily handle varied loading. (See Section 2.3.1.1 for discussion of BDT and the level of the standard.) Two types of model lines that were analyzed by EPA included distillation equipment for the separation of blended or water-miscible solvents and were found to be cost effective in meeting the standards. Thus, the use by some plants of multiple solvents, substrates, and coating techniques does not render invalid the analyses carried out by EPA.

The responses to the other points raised by commenter IV-D-7 are as follows:

1. Although there are differences between magnetic tape and polymeric coating lines, the general characterization of the two as similar is justified. The basic configuration of unwind station, application/flashoff area, drying oven, and rewind station is common to both. The VOC content of the coatings found in the magnetic tape industry are within the range of those found in the polymeric coating industry, and many of the same solvents are used. Some coating application techniques are common to both industries, and the mix equipment is often similar. The SLA streams generated by the processes are similar in composition, as are the applicable control technologies. Based on these considerations, EPA feels it has made appropriate use of data derived from this industry. However, the EPA does recognize that the magnetic tape coating process is largely automated, requires little worker access compared to some polymeric coating operations, and is characterized by a relatively narrow range of coatings and substrates. It should be noted that the magnetic tape industry data do not provide the basis of support for the polymeric coating standard. Rather, data from the pressure sensitive tapes and labels industry, flexible vinyl coating and printing, publication roto-gravure, and the polymeric coating industry itself provide the basis for the standard.

2. At least one air-atmosphere condenser has been used on a polymeric coating operation. A representative of the plant indicated that no major difficulties with the system had been encountered.<sup>9</sup> However, it is unlikely that this control technology will be used at polymeric plants that are controlling mix equipment emissions as well as coating operation emissions because the operation of a fine-tuned, closed-loop condenser can

be adversely affected by the moist, intermittent airflow from mix equipment.<sup>1</sup> The use of an inert-atmosphere condenser was not analyzed because use of this system is incompatible with a process where oxygen in the application/flashoff area is essential for worker access. (See Section 2.4.2.)

3. The assumption that the SLA stream at the inlet of the control device has a concentration as high as 25 percent of the LEL is justified. The standards contain no requirement that emissions from solvent storage tanks be ducted to a control device. Moreover, a system using dampers could be designed to deliver emissions from solvent storage tanks to the control device at a concentration of 25 percent of the LEL. Alternatively, a more dilute SLA stream could be used as makeup air in the drying oven. Emissions from mix equipment are expected to be ducted to the control device at a concentration of 25 percent of the LEL. In addition, the airflow from this source is quite small in comparison to that from the drying oven, so a reduced concentration would have little effect on the overall concentration of the inlet SLA stream. The air containing the emissions from the application/flashoff area is expected to be used as makeup air for the drying oven, not ducted directly to the control device. Drying ovens in this and other industries are operated safely at a concentration of 25 percent of the LEL. In fact, ovens equipped with appropriate safety features are allowed to operate at up to 50 percent of the LEL.<sup>10</sup>

For the reasons presented above, EPA believes that the varied production practices in this industry were adequately considered in the standards development process and that the standards are achievable over the range of production practices expected to occur.

#### 2.3.1.4 Waterborne and Organic Solvent Coating Systems.

Comment: One commenter (IV-D-15) stated that there is no best demonstrated technology for a coating operation that uses both aqueous and organic solvent coating systems, nor is there a provision for handling this type of operation where a common mixer is used.

Response: The commenter is correct that use of the proposed control technologies may be incompatible with the use of waterborne coatings. Therefore, an exemption for waterborne coatings has been added in

§ 60.740, Applicability and Designation of Affected Facility, to specify that the coating operation or mix equipment may be vented directly to the atmosphere while waterborne coatings are used. A definition of waterborne coatings sets the minimum water content (5 percent by weight of the volatile fraction) necessary to be considered a waterborne coating. Because "waterborne" coatings may actually contain organic solvent and generate VOC emissions, the exemption for their use provides a VOC content ceiling of 9 weight percent of the volatile fraction. This ceiling was developed based on a "worst-case" baseline coating that is 85 percent VOC (15 percent solids) by volume. The level specified in the exemption is equivalent to a 90 percent VOC reduction for this coating. The VOC in waterborne coatings is not to be included in the annual VOC usage rate when determining if a facility is below the VOC use cutoff. However, the amount of VOC in waterborne coatings reported by the industry is negligible (zero to 2 percent by weight of coating applied) and the impact of this exclusion is expected to be minor.<sup>11</sup>

#### 2.3.2 Control of Coating Mix Preparation Equipment

##### 2.3.2.1 Equipment Considered as Coating Mix Preparation Equipment.

Comment: One commenter (IV-D-3) recommended that coating mix preparation equipment include only mixers and not mills, holding tanks, or other equipment. The commenter observed that the only coating mix preparation equipment considered in developing the standards and demonstrating the feasibility of the standards was the mix tank. The feasibility of the proposed standard for mills, holding tanks, and other equipment, which are included in the definition for coating mix preparation equipment, was not considered. At the commenter's plant, portable containers are used to transport coating from the mixing area to subsequent coating preparation and application areas. These portable containers appear to be included in the definition as "holding tanks," but, according to the commenter, there is no feasible or practical way for these portable containers to comply with the requirement that all VOC emissions be vented to a control device. The commenter also questioned the feasibility of (1) capturing and venting all VOC emissions from mills to a control device at a concentration range within which the control device is efficient or (2) installing a vapor-tight cover equipped with a conservation vent. The commenter said that

only equipment that was specifically addressed in the development of the standard should be included in the definition of coating mix preparation equipment. The commenter recommended that "coating mix preparation equipment" be defined as "mix tanks in which solvent and polymer are blended to prepare polymeric coating formulations."

Response: The final rule requires that only affected mixing vessels be covered and vented to a 95 percent efficient control device. The definition of "coating mix preparation equipment" has been changed to "all mixing vessels in which solvent and other materials are blended to prepare polymeric coatings."

The commenter is correct in noting that only mixing vessels were considered in the analysis of the cost and cost effectiveness of mix equipment control. This approach was adopted because essentially all mixing area emissions that were intended to be regulated are generated at the mixers. Mills in this industry are most frequently operated using dry ingredients alone and are often tightly sealed to contain the ingredients. Emissions from holding tanks are negligible compared to those from the mixers because both breathing and working losses are minimized. Breathing losses are minimized because holding tanks are generally located indoors at relatively constant temperatures and because the vessels typically are covered during storage to minimize coating composition changes through solvent loss and contamination. Working losses due to the filling of vessels are minimized because holding tanks typically are cleaned between uses; a clean, dry vessel does not have any vapor in the air space to be displaced as the coating is introduced. Emissions during the cleaning process are not regulated because of the inherent difficulties of control. Nevertheless, mills, holding tanks, and other equipment were included in the proposed rule because it had been determined that the controls mandated for the mixers could be easily applied to such equipment.

However, based on a reexamination of the information gathered during the development of the standard and on the information presented by the commenter, EPA has decided that the standards should be applied only to mixers because they are the primary source of mix room emissions and the costs of controlling emissions from mills were not demonstrated. The EPA

also agrees with the commenter that it is infeasible to duct emissions from portable equipment to a control device. However, during the actual mixing process these portable containers are stationary and ducting emissions to a control device is feasible. Thus, portable tanks, including holding tanks, are required to be covered and vented during those times that they are in use as mixing vessels.

#### 2.3.2.2 Feasibility of 100 Percent Capture.

Comment: Three commenters (IV-D-3, IV-D-5, and IV-D-7) stated that capture of all emissions from mix equipment has not been demonstrated. The commenters questioned the technical feasibility of capturing and venting all VOC emissions from coating mix preparation equipment.

One commenter (IV-D-3) whose plant was cited in the proposal preamble as an example of BDT for mix equipment stated that the existing system actually falls short of the technology specified as BDT. The mixer covers are tight fitting but are not "sealed." The need for access to the mixers makes sealed covers impractical. The plant has a system whereby dampers open to increase the draft to the control device when mixer covers are opened, but the commenter questioned the contention that all emissions are prevented in this way. In addition, the commenter stated that EPA failed to consider emissions during the transfer of coatings when EPA proposed the requirement that all emissions from mix equipment be captured. According to the commenter, total enclosure of all transfers from mixers to transfer containers, strainers, coaters, and other mixers is not feasible; nor is it feasible to duct emissions from these transfer points or mix equipment other than mixers (see Section 2.3.2.1) to the control device.

In addition, the commenter (IV-D-3) pointed out that, while the proposal preamble states that BDT for mix equipment is the use of covers vented to a control device and that the format for the standard is an equipment format, the proposed standard does not mention equipment. The commenter stated that the requirement that all VOC emissions be captured and vented makes the proposed standard a performance standard. The commenter stated that as a performance standard the word "all" imposes a condition that is impossible to meet because no engineered system is 100 percent effective, nor can it be operated with 100 percent reliability. The commenter also stated that EPA does not present objective



evidence to support the use of the terms "expected," "sufficient," and "all" and does not define the term "sealed" in the proposal preamble, Section IV(D)(1)(c). The commenter recommended that the performance standard language be deleted and that the standard (§ 60.742(a)(2) as proposed) be restated as an equipment standard as follows:

Control emissions from onsite coating mix preparation equipment servicing coating lines using at least 150 m<sup>3</sup> of solvent/year by installing a cover on each piece of affected coating mix preparation equipment and venting the equipment to a 95 percent efficient control device; the cover must be closed at all times except when adding ingredients, withdrawing samples, transferring the contents, or making visual inspections when such activities cannot be carried out with covers in place; when possible, such activities should be carried out through ports of the minimum practical size. . . .

A second commenter (IV-D-5) focused on the portable containers or "change cans" used specifically in the printing blanket industry for high-viscosity coatings that cannot readily be pumped beyond the shortest distances. According to the commenter, the change cans are generally covered during storage, movement, and mixing but cannot be ducted to a control device because of their portable nature. Some VOC emissions from these containers are inevitable when covers are necessarily removed between the steps of the process. The commenter noted that EPA estimates that coating mix preparation equipment accounts for only 10 percent of the VOC emissions from a coating plant. The commenter suggested that the final rule allow the use on change cans of a plastic film cover at least 2 mils thick and taped around the periphery during storage, transport, and piping of coating to the coating heads, which would result in control at a "somewhat" less stringent standard. Fixed covers with conservation vents are not a viable alternative based on the commenter's experience that such covers are too heavy to be handled manually in a safe manner and that the use of mechanical equipment is cumbersome and may damage the cover, reducing its effectiveness as a control device. The commenter reiterated these comments in Docket Item IV-D-16 and added that the minimum measured VOC concentration at the carbon adsorber outlet was 25 ppm, which would result in no net VOC reduction because of the low level (probably 10 to 25 ppm) of VOC in the air from the mixing room.

The third commenter (IV-D-7) pointed out that companies frequently use different types and sizes of mix equipment. Some are totally enclosed, while others are virtually impossible to enclose well enough to meet the proposed standard. The size of containers varies from a 5-gallon pail to a 500-gallon portable tank. The commenter maintained that companies would find it impossible to capture all emissions from mix equipment because of the nature of the process, cleanups, color changes, short runs, container handling, etc. The commenter also questioned the validity of EPA's contention that coating lines that apply urethane coatings, which are purchased premixed, do not use mix equipment. According to the commenter, all such operations use mix equipment either to adjust the specific properties of a batch of coating or to obtain the proper coating consistency.

Response: The format of the standard for mix equipment was intended to be an equipment standard. But, as noted by the commenters, the use of the term "all" in the proposed standard implies 100 percent capture, which has not been demonstrated in the polymeric coating industry. The standards for mixing vessels that serve coating operations that use at least 130 Mg/yr (144 tons/yr) of VOC (and are not associated with a coating operation without concurrent construction of a control device) have been revised to be consistent with actual workplace conditions as described by the commenters. These mixing vessels are required to be covered during mixing and vented to a 95 percent efficient control device. The covers shall be closed at all times except when adding ingredients, withdrawing samples, transferring the contents, or making visual inspection when such activities cannot be carried out with the cover in place. The cover must extend at least 2 centimeters (cm) (0.8 inch [in.]) beyond the outer rim of the equipment or be attached to the rim and must be of such design and construction that contact is maintained between cover and rim along the entire perimeter. Any breach in the cover (such as a slit for insertion of the mixer shaft or port for addition of ingredients) must be covered as discussed above when not actively in use. An opening sufficient to allow safe clearance for a mixer shaft is acceptable during periods when the shaft is in place. A polyethylene or other nonpermanent cover may be used provided it meets the

requirements above. Such covers may not be reused after once being removed. As discussed in Section 2.3.2.1, the requirements for mix equipment other than mixing vessels have been dropped from the final rule.

The EPA does not believe that the use of portable containers or containers of varying sizes precludes the venting of emissions to a control device during the actual mixing process. In cases where portable tanks are used, the mixing apparatus remains stationary. Ductwork can be installed from this point to the control device. No evidence has been presented that small mixing vessels cannot be similarly equipped. The intent of the proposed mix equipment standards was not to require ducting of the ventilation air from the entire mix room to the control device but to allow installation of ductwork at the mixing station, which would provide a higher solvent concentration for more efficient control. The change from requiring the control of "all" mix equipment emissions to an equipment format, with allowances for opening covers during periods of legitimate need, addresses the concerns cited by the commenters.

The commenter's (IV-D-7) contention that sources applying urethane coatings employ mix equipment does not change the conclusions of the background study. Should these sources use mix equipment, the same cost factors that apply to mix equipment at other plants would apply. In fact, the higher value of the solvents saved by the application of control technology at this type of plant would improve the cost effectiveness of control beyond that calculated for other types of polymeric coating plants. Because of the direction of this change, the impacts of the standards were not recalculated. When such sources use mixers, the beneficial impacts of the standards will be obtained with reasonable cost effectiveness and will far outweigh the negative impacts.

#### 2.3.2.3 Efficiency of Mix Equipment Covers.

Comment: One commenter (IV-D-3) said that EPA appears to have incorrectly applied information on emissions from solvent storage tanks to emissions from mix tanks. The resulting estimate that vapor-tight covers with conservation vents would reduce emissions by 40 percent significantly understates the emission reduction that would be obtained. The commenter went on to say that even a simple cover not equipped with vapor-tight seals or a conservation vent would conserve much more than 40 percent of

the solvent lost from an open mixer. The commenter presented the results of a bench-scale experiment testing this hypothesis. A Pensky-Martens flashpoint tester was used with a small amount of coating to approximate a mixer. It was reported that, relative to an uncovered mixing vessel, covers over 87 percent and 100 percent (not vapor tight) of the vessel opening achieved emission reductions of about 74 percent and 96 percent, respectively. The commenter contended that economic analysis would show that the small gain in emissions control achieved by a vapor-tight cover with a conservation vent as opposed to a simple cover would not be cost effective. The commenter suggested that the standard for mix equipment using at least  $110 \text{ m}^3/\text{yr}$  (29,059 gal/yr) (95 Mg/yr [105 tons/yr]) but less than  $150 \text{ m}^3/\text{yr}$  (39,626 gal/yr) (130 Mg/yr [144 tons/yr]) of VOC (§ 60.742(a)(3) as proposed) be revised to require only a cover that encloses at least 95 percent of the opening and that must be closed at all times except when adding ingredients, withdrawing samples, transferring the contents, or making visual inspection when such activities cannot be carried out with the cover in place.

Response: The EPA agrees that the improvement in control efficiency on mix equipment to be gained from a vapor-tight cover with a conservation vent compared to that from a simple tight-fitting cover is insignificant. The chief benefit to be gained from conservation vents is the control of "breathing losses" resulting from diurnal temperature changes. Because mix equipment is not normally exposed to such changes in this industry, the requirement that covers be sealed and equipped with conservation vents has been dropped. However, EPA does not agree that the emission reduction ascribed to covers is significantly underestimated. The experiment conducted by the commenter explored only evaporative losses during the mixing process. This treatment neglects the impact of the "working losses" that occur due to the filling and emptying of a vessel that contains a solvent-saturated air space. An analysis of cover efficiency was carried out for mix equipment in the magnetic tape manufacturing industry, and the results of this analysis are considered representative of the polymeric coating industry as well.<sup>12</sup> The efficiency of covers was determined by this analysis to be 40 percent.

The standard for mixing vessels that use at least 95 Mg/yr (105 tons/yr) but less than 130 Mg/yr (144 tons/yr) of VOC, § 60.742(c)(3), has been revised to require the equipment to be covered at all times except when adding ingredients, withdrawing samples, transferring the contents, or making visual inspection when such activities cannot be carried out with the cover in place. The same requirements have been extended to mix equipment at facilities using at least 130 Mg/yr (144 tons/yr) of VOC that are associated with coating operations without concurrent construction of a control device. The cover must extend at least 2 cm (0.8 in.) beyond the outer rim of the equipment or be attached to the rim and must be of such design and construction that contact is maintained between cover and rim along the entire perimeter. Any breach in the cover (such as a slit for insertion of the mixer shaft or port for addition of ingredients) must be covered as discussed above when not actively in use. An opening sufficient to allow safe clearance for a mixer shaft is acceptable during periods when the shaft is in place. A polyethylene or other nonpermanent cover may be used provided it meets the requirements above. Such covers may not be reused after once being removed. The cost of compliance with the revised standard will be less than that associated with the use of covers and conservation vents, which were cost effective under the proposed standard. This is because the cost of covers is expected to be included in the purchase price of new equipment so that there is no incremental cost associated with the emission reduction.

## 2.4 CONTROL COSTS

### 2.4.1 Total Enclosure of Print Blanket Coating Equipment

Comment: One commenter (IV-D-5) stated that the cost of totally enclosing print blanket coating equipment was seriously underestimated. This segment of the polymeric coating industry uses very viscous coatings that must be applied in precise thickness according to strict specifications. The operator must constantly observe for dirt contamination or accumulations of dried coatings on the back of the blade and inspect for a smooth appearance of the coating. These factors necessitate constant operator access to the coater. Thus, according to the commenter, a small enclosure immediately around the coating application/flashoff area cannot be used. The commenter also stated that a total room enclosure is

infeasible for existing plants (see Section 2.11.1), because there are typically multiple lines in a single large room with many openings and ventilation systems. The remaining option is to enclose the equipment within a smaller room of sufficient size to allow the constant presence and mobility of equipment operators. However, for worker safety, the concentration of solvent within this enclosure is currently limited to 100 parts per million by volume. According to the commenter, this limit cannot be achieved using a blower system to supply fresh air to the area where the operator is stationed because of the large size of the equipment (up to 80 feet long) and the requirement that the workers be able to move about the equipment to monitor and adjust critical parameters. The commenter also rejected the use of airpacks, which are a serious inconvenience to the worker. The commenter concluded that the only remaining option would be to flush high volumes of air through the enclosure to maintain the low solvent concentration required for employee safety.

The commenter presented an analysis of the costs and cost effectiveness of this approach at one of his company's print blanket coaters. The analysis was based on the capture of an additional 110 pounds of toluene per hour. To dilute this quantity of solvent to the safe concentration, the air handling system would have to be designed for approximately 77,000 cubic feet of air per minute. The commenter stated that an additional carbon adsorption system sized to handle this airflow would cost approximately \$2.5 million. The cost-effectiveness calculations were based on the actual solvent use for the subject coating line. (Many of the details of this analysis were claimed to be confidential business information and are not presented here.) The commenter's analysis, taking into account capital depreciation, steam costs, power costs, and solvent recovery credits, resulted in a cost effectiveness of \$21,005 per ton of solvent recovered relative to the emission level currently allowed by State regulations, which is represented by Regulatory Alternative I.

Response: The commenter's analysis of costs and cost effectiveness was based on the faulty assumption that the only way to protect workers within a total enclosure is to assume that the emissions are released into the enclosure and to dilute the emissions in the enclosure to the level

considered safe for personnel. This assumption resulted in an airflow rate so high that an entirely new carbon adsorption system would be required to control the emissions. The capital cost of this system, coupled with the high operating costs associated with maintaining a high removal efficiency from such a dilute SLA stream, resulted in an unreasonable cost-effectiveness value.

The commenter's assumption is unrealistic and erroneous. In practice, localized pickup points (hoods or other partial enclosures) should be placed within the total enclosure to both protect any workers that must be inside and reduce the ventilation rate to a level such that the air from the enclosure can be used as makeup air in the drying oven. Thus, a new carbon adsorption system would not be required, and the composition of the SLA stream ducted to the control device would be similar to that assumed in EPA's analyses.

The EPA reworked the commenter's analysis using more realistic assumptions. Based on the use of local ventilation devices within a total enclosure, a reasonable concentration for the captured fugitive VOC is 5 percent of the LEL. The ventilation rate of the enclosure under these conditions would be about 12,000 actual cubic feet per minute. Given the drying requirements in the oven under the commenter's scenario, this quantity of ventilation air could be readily accommodated as makeup air for the drying oven, and a new carbon adsorber would not be necessary. Using the commenter's values for annual VOC use, electricity and steam costs, and the value of reclaimed solvent and the factors from EPA's original analysis for adsorber steam and electricity demand, the cost effectiveness of moving from the source's current control level to the level required by the NSPS is less than \$200 per ton of additional solvent recovered.<sup>13</sup> The EPA considers this to be a reasonable value. Thus, EPA believes that the costs associated with totally enclosing equipment such as that operated by the commenter were not underestimated.

#### 2.4.2 Accuracy of Cost Analysis

Comment: Three commenters (IV-D-7, IV-D-8, IV-D-14) questioned the assumptions and models used in performing the cost analyses. The commenters noted the following specifics:

1. Leak-proof ovens. One commenter (IV-D-7) stated that the efficiencies used in the cost analysis were based on leak-proof ovens, which are virtually impossible to construct. The commenter suggested that the efficiencies be based on demonstrated efficiencies such as monthly averages rather than the maximum efficiency achieved over a short period. Also, operating efficiencies for process lines are lower than vendors' claims.

2. Recovered solvent credit. Each of the commenters (IV-D-7, IV-D-8, IV-D-14) stated that the cost credit from recovered solvent is lower than the estimates in the proposed regulation. One commenter (IV-D-7) stated that the costs were based on recovery of a single solvent rather than mixed solvents, which are typically used in the industry. Mixed solvents may have to be disposed of as hazardous wastes. The other commenters (IV-D-8, IV-D-14) noted that the cost analysis did not address processes for which the solvent cannot be reused. One commenter (IV-D-8) said that recovered solvent would probably not meet the stringent quality standards required for solvents used in aerospace and defense applications. The second commenter (IV-D-14) stated that solvent recovery is not a viable alternative for fabric coating of labeling material for the garment industry because of the high purity solvents required. This commenter said that recovered solvents would likely have to be disposed of as hazardous waste. The commenter also stated that incineration would be prohibitive because of the large volume of air and low VOC concentration.

3. Air-atmosphere condensation. One commenter (IV-D-7) stated that the cost data were based on an air-atmosphere condensation system that has not been demonstrated as a feasible technology for the polymeric coating industry. The cost of modifications required to apply this technology to the polymeric coating industry was not considered in the analysis.

4. Costs of air pollution and wastewater controls. One commenter (IV-D-7) stated that the cost of air and wastewater pollution control equipment was not addressed. Specifically, the commenter cited that the cost of distillation systems, which are needed to purify solvents and clean up wastewaters, was not included in some models, and that the capital costs for air pollution control equipment, which refer to a 1978 manual, seem low. A second commenter (IV-D-8) stated that the economic



impact of wastewater discharges should be reassessed because of the recently passed Clean Water Act amendments. The preamble to the proposed standards states that carbon adsorber wastewater discharges to municipal sewer systems are permissible, but the commenter suggested that pretreatment may be required by the recent Clean Water Act amendments.

Response: The EPA continues to believe that the assumptions used in the cost analysis are valid and that the model plants are representative of typical facilities expected to be constructed, modified, or reconstructed in the near future. The following responds to the specific comments summarized above:

1. First, EPA believes an essentially leak-proof oven is possible with proper design and operation at a slightly negative pressure relative to its surroundings. Second, the standards were based on demonstrated efficiencies. An overall efficiency of 93 percent has been demonstrated using a 30-day material balance at a PSTL facility using BDT (See Section 2.3.1.1). This performance is considered representative of the performance of a well-designed and well-operated control system in the polymeric coating industry. Thus, demonstrated performance over a 30-day period was considered in the development of the standards.

2. The EPA's survey of existing plants indicates that typical practice for the polymeric coating industry is to use a single solvent or a reusable mixture, rather than mixed solvents that may have to be disposed as stated by the commenter (IV-D-7). However, the model lines analyzed by EPA also accounted for the use of two types of solvents that required distillation, a two-solvent blend (dimethyl formamide and toluene) and a water-soluble solvent (acetone). In both cases, it was determined that control at the level of the standard is cost effective.

Onsite distillation is expected to become more attractive as regulations on the disposal of liquid hazardous wastes become more restrictive. As the cost of such disposal rises, the relative benefit of distillation increases. Thus, while the cost of reclaiming solvents may not be justified by the value of the solvents themselves, it may be justified when the cost of disposal is considered. If onsite distillation remains infeasible, and the solvent is sold to a reclaimer or disposed as a hazardous waste, the operator will not accrue full value of the

solvent. However, the same will hold true under any of the regulatory alternatives; therefore, the incremental cost to go from one regulatory alternative to the next most stringent regulatory alternative would in most cases be small, and the regulatory decisions would not change.

As one commenter pointed out, the inability to reuse solvents is most likely to occur in aerospace and defense applications because of stringent quality specifications for solvents. However, EPA is working with the Department of Defense to encourage development of end-product specifications.<sup>14</sup> This may enable the defense industry to reuse solvents. If solvents are not recovered and reused, the economic impact to the aerospace and defense industries is expected to be small. Incineration is currently used, without adverse economic impacts, as a VOC emission control measure for these industries (including the commenter's [IV-D-8] plant that was visited during the background study).

As discussed in the response to Comment 2.3.1.1, even solvent recovery credits less than 100 percent (i.e., 60, 30, and 0) result in reasonable control costs in the majority of cases. However, where carbon adsorption control is not cost effective, incineration is a viable alternative that has been successfully used by the polymeric coating industry.<sup>4</sup>

3. At least one polymeric coating plant has operated an air-atmosphere condensation system. At the time the cost analyses for the standard were performed, this condensation system had not been in operation long enough for meaningful efficiency data to be collected. However, preliminary data indicated that the air-atmosphere condensation system would be a viable option. A recent discussion with a representative at the polymeric coating plant that uses an air-atmosphere condensation system supported this conclusion.<sup>9</sup> The air-atmosphere condenser at this plant achieves a control efficiency of 90 to 95 percent. There have been no problems with this system during approximately 3 years of operation. However, as a result of EPA's analysis of the cost and performance of various technologies applicable to the polymeric coating industry, carbon adsorption, not air-atmosphere condensation, was chosen as the BDT on which the standard is based. In addition, it is anticipated that most affected lines, which will also have to duct and control mix equipment

emissions, would be unable to use condensers because the moist, intermittent airflow from mix equipment interferes with condenser performance. The cost of an inert-gas atmosphere condenser was not developed because of its limitations for application in this industry (i.e., the need to purge the unit of inert atmosphere every time workers must access the oven or application/flashoff area).

The costs to fit a coating operation with an air-atmosphere condenser were included in EPA's analyses. These costs consist of the costs of the total enclosure and ductwork.

4. The cost of distillation systems was included for all models requiring distillation, that is, those model coating operations using a solvent blend or a water-soluble solvent. Capital costs for a condenser were developed from estimates provided by a vendor. Capital costs for an incinerator and carbon adsorber were developed using the 1978 Economic Analysis Branch Control Cost manual. However, these costs were adjusted to 1984 dollars using the Plant Cost Index in Chemical Engineering. (All costs are reported in first quarter 1984 dollars.)

The commenter (IV-D-8) correctly points out that wastewater generated because of compliance with the polymeric coating NSPS may be subject to either effluent limitations if the wastewater is discharged to a receiving stream or pretreatment standards if the wastewater is discharged to a municipal sewer. Both the wastewater generated because of compliance with the polymeric coating NSPS and the wastewater generated currently because of compliance with existing State pollution regulations for VOC emissions have to meet the applicable treatment requirements. Because the treatment requirements have to be met under baseline conditions for wastewater discharged currently and because the increase in the volume of wastewater generated after compliance with the polymeric coating NSPS is small, the cost to treat the wastewater was not included in the costs used in the economic evaluation of the technology alternatives for the NSPS. The small increase in treatment costs because of the additional volume of wastewater generated after compliance with the NSPS would affect neither the results of the economic analysis of the technology alternatives nor the selection of the technology used as the basis for the polymeric coating NSPS.

## 2.5 ENVIRONMENTAL IMPACTS

### 2.5.1 Total Enclosure Requirement

Comment: One commenter (IV-D-5) believed that EPA failed to account for the environmental advantages of high-solids coatings. The commenter stated that the need for constant operator access and attention while applying the current high-solids coating formulations used in printing blanket coating operations render the proposed standards economically infeasible (see Section 2.4.1). To avoid this problem, a printing blanket manufacturer contemplating a new coating line might attempt to develop a new process that utilizes a low-solids coating formulation so that portable mix equipment and constant operator access to the coater are not required. Such a process might comply with the proposed mix equipment and coating operation standards while actually increasing emissions relative to existing practice using high-solids coatings. (The commenter presented an example of such a situation, but many of the details were claimed to be confidential business information and, thus, are not presented here.) The commenter suggested that Regulatory Alternative I, the prevailing SIP limit in nonattainment areas, be adopted in the final rule.

Response: The EPA does not believe that any manufacturer would need to develop a new process using a low-solids coating formulation in order to comply with the standards. The commenter's assertion that a total enclosure would be infeasible for his company's high-solids coating operation was based on faulty assumptions (see Section 2.4.1). Also, a revision to the definition of coating mix preparation equipment excludes the portable mix equipment described by the commenter except during those periods when the portable vessels are in use as mixing vessels (see Section 3.2.1). Thus, the hypothetical scenario presented by the commenter is not expected to occur. The EPA has demonstrated that the final standards (with a solvent use cutoff to exempt small sources) provides a greater emission reduction than would be achieved under baseline conditions for a reasonable cost. The commenter has not provided information that would change this determination.

### 2.5.2 Accuracy of Environmental Impact Analysis

Comment: One commenter (IV-D-9) questioned the accuracy of the environmental and economic impact analyses because of discrepancies in the data base for existing plants. The commenter stated that only 6 of the 13 Ohio plants listed in Table 9-7 of the Volume I BID (Plants Applying Polymeric Coatings to Supporting Substrates . . .) actually apply a polymeric coating; the others apply a printing ink to vinyl or vinyl fabric. The commenter provided a list of the 13 plants and the process used at each plant. The commenter stated that this discrepancy "casts a shadow" over the analyses of environmental and economic impacts.

Response: The environmental and economic impact analyses were based on a projection of sources expected to become subject to the NSPS in the next 5 years. These sources are expected to be new coating lines rather than modified or reconstructed lines. The analyses were performed using model lines developed from information about existing polymeric coating plants that are considered to be representative of new polymeric plants, and not using the list of existing sources presented in Table 9-7 of the Volume I BID. Thus, any inaccuracies in the information presented in Table 9-7 would not affect the environmental or economic impact analyses.

### 2.5.3 Baseline Control Level

Comment: Two commenters (IV-D-5, IV-D-9) questioned the determination of the baseline emission level for coating operations. One commenter (IV-D-5) stated that the designated baseline, Regulatory Alternative I, actually represents a control level that would require significant reductions in emissions from many coating operations. Many State regulations allow a level of control that is considerably more lax than Regulatory Alternative I, and various States that do require this level allow exceptions under some circumstances. On the basis of this and the analysis in Section 2.5.1, this commenter suggested that Regulatory Alternative I be adopted in the final standards. The second commenter (IV-D-9) noted that some fabric coating plants in Ohio had variances from the SIP control level requirement.

Response: The baseline control level is defined as the existing level of control that is typical for the industry. The baseline emission level used in the analyses for coating operations is 0.35 kilogram of VOC

per liter of coating (kg VOC/l) (2.9 pounds of VOC per gallon of coating [1b VOC/gal]). This level is the most prevalent and among the most stringent of the State standards. Because it is uncertain where facilities subject to the NSPS will be located and it is uncertain whether these facilities will be exempt from a particular State's standards, 0.35 kg VOC/l (2.9 lb VOC/gal) was judged to be the best choice for baseline. If actual SIP requirements affecting a significant portion of the industry are, in fact, less stringent than this baseline level, the emission reductions for the regulatory alternatives have been underestimated, and average cost-effectiveness values have been overstated. Because the choice of a baseline level of 0.35 kg VOC/l (2.9 lb VOC/gal) results in a conservative analysis, raising the baseline emission level would not alter but would actually reinforce the selection of the level of the final standards.

## 2.6 ECONOMIC IMPACTS

### 2.6.1 Accuracy of Economic Impact Analysis

Comment: One commenter (IV-D-7) believed that the economic impact was underestimated because the analysis was based on faulty data (see Section 2.3.1.3). The Volume I BID states that for all regulatory alternatives other than Regulatory Alternative IV, the use of incineration, price and cost increases would be relatively small. However, the commenter contended that incineration is the only control method that could achieve compliance with the proposed standard.

A second commenter (IV-D-12) stated that because the enclosures recommended by EPA would create LEL concentrations that are unacceptable for current insurance coverage, insurance rates would increase and it may become difficult to get coverage. The commenter stated that this increased cost would be passed on to the customers, decreasing their competitiveness.

Response: As discussed in Sections 2.3.1.1 and 2.3.1.3, available data support the selection of carbon adsorption system as BDT, even under the variable operating conditions discussed by the commenter. However, EPA does acknowledge that incineration may be cost effective in some situations.<sup>5</sup> In any case, EPA maintains that the economic impact of the standards was correctly determined and supports the selection of

90 percent overall control, for which price and cost increases are relatively small, as the basis for the coating operation standard.

The LEL insurance requirements for enclosures are the same as for ovens, i.e., enclosures would typically have to be maintained at less than 25 percent of the LEL. Analysis has indicated that a local ventilation system in the application/flashoff area can be constructed so that the bulk of the drying oven makeup air is drawn through the system, carrying nearly all the emissions from this area with it.<sup>2</sup> The very low level of emissions escaping from such a local capture system would be far below the level necessary to approach 25 percent of the LEL in the surrounding area. In fact, a well-designed system would achieve sufficient capture to maintain a safe level of worker exposure (i.e., a concentration below the TLV) in the coating room. The concentration within the capture system also would be well below 25 percent of the LEL. Emissions in the application/flashoff area typically are on the order of 10 percent of total emissions from the coating operation. Using most of the oven makeup air (which is sufficient to dilute the 90 percent of the solvent volatilized in the drying oven to below 25 percent of the LEL) to capture this fraction of the total emissions will result in an SLA far below 25 percent of the LEL. Therefore, fire hazard and worker exposure will not increase as a result of the NSPS, and insurance rates would not be adversely affected. For these reasons, no changes have been made to the economic analysis.

#### 2.6.2 Trend Toward Reduced Solvent Usage

Comment: One commenter (IV-D-7) stated that a continued trend toward reduced solvent usage as projected in the economic analysis may not be accurate. The commenter noted that certain high-specification and defense-related products must be made with solvents and must continue to be manufactured in the United States.

Response: The number of new facilities likely to become subject to the standards from 1986 to 1990 was derived from the estimated percentage of industry production using organic solvent-based coatings and the estimated change in industry capacity required to meet market demand during this 5-year period.<sup>15</sup> The percentage of production using organic solvent-based coatings for each year was based on a linear extrapolation

of values from 1976 and 1981.<sup>15</sup> The calculated VOC use factors and new VOC-based production capacity requirements for the 5-year period are presented in Table 9-18 (page 9-44) of the Volume I BID. The estimated number of new facilities and potential total fifth year net annualized costs that would result from adoption of the most costly regulatory alternatives are presented in Table 9-19 (page 9-48) of the Volume I BID.

If, as suggested by the commenter, the reduction in VOC use were less than that projected over the 5-year period, there would be a larger number of facilities subject to the standards, and the total fifth year net annualized cost would be greater than that presented in the Volume I BID. However, this would have no effect on the economic impacts of the standards. Production cost and price impacts were calculated based on individual facilities and products and would not be affected by the increase in the total number of affected facilities.

If the VOC use factor were to remain constant at its 1981 level instead of continuing the downward trend noted between 1976 and 1981, the estimated new VOC-based production capacity necessary to meet projected market demand would approximately double. As a result, the total number of new facilities and the total net annualized costs shown in Table 9-19 (page 9-48) of the Volume I BID would also nearly double. As a consequence of this change, the potential worst-case fifth year net annualized cost of the standards would increase from \$1.86 million to about \$3.7 million. Thus, even if the VOC use factor is assumed to remain constant, the total estimated fifth year cost is considerably less than the \$100 million listed in Executive Order 12291 as indicative of a "major rule."

If the number of facilities subject to the standards were nearly to double, the environmental and energy impacts would be similarly increased. Thus, the reduction in nationwide VOC emissions in the fifth year would be about 2,400 Mg beyond the emission level stated in the typical SIP. All impacts would be increased proportionally, so the judgment based on the original analysis that the beneficial impacts outweigh the negative impacts would not be altered.

The original analyses performed by EPA have not been revised as a result of this comment. In EPA's judgment, the estimation techniques used



previously remain valid. The commenter only speculated that the "projection may not be accurate" and offered no data to support this contention. As mentioned in Section 2.4.2, EPA is working with the Defense Department toward end-product specifications that have the potential of allowing increased use of low-solvent coatings in defense applications.<sup>14</sup> Because a change in the trend toward reduced VOC use in this industry would have no effect on the production cost and price impacts of the standards and the other impacts would be affected proportionally, EPA sees no need for new impact analyses.

### 2.6.3 Industry Growth

Comment: One commenter (IV-D-15) questioned EPA's estimate that 18 new solvent-borne lines would be constructed by 1990. The commenter predicted that, if the proposed regulations go into effect, no new lines would be built in the U.S. because EPA has failed to demonstrate that available technology can achieve the required emission reductions. The commenter continued to say that no company can afford to invest in new equipment without data to demonstrate that it will meet environmental requirements. The commenter also stated that without relief, textile coaters could not expand nor could they successfully compete with foreign imports. Another commenter (IV-D-11) stated that no new lines other than low-solvent lines will be built in the U.S. and expansion of solvent-borne lines will move overseas. A third commenter (IV-D-18) stated that their industry, which is one of the largest specialty fabric commission coaters in the U.S., could not grow or may not even survive if they do not get some relief from the proposed standards. A second commenter (IV-D-16) stated that the standards, as proposed, would prevent the addition of new equipment and the modification of existing equipment at their older plants.

Response: Because the standards for coating lines are achievable and cost effective for all segments of the polymeric coating industry (see Section 2.3.1.1 and Chapter 8 of the Volume I BID), EPA continues to support its estimate that 18 new lines will be constructed in the U.S. by 1990. The EPA believes that most affected facilities will choose to demonstrate compliance for coating operations by the alternative standard (§ 60.743(b)), which requires a total enclosure vented to a 95 percent

efficient control device. These provisions have been clarified by adding design and operating specifications for a total enclosure. This should simplify the process of obtaining approval for a total enclosure and reassure industry that compliance can be demonstrated for new equipment that is properly designed and operated. The EPA also continues to support its position that the standards are achievable for most coating lines that would be modified or reconstructed.

## 2.7 COMPLIANCE

### 2.7.1 Control Device Downtime

Comment: One commenter (IV-D-3) stated that the standard should allow for the fact that solvent recovery systems are not 100 percent reliable and that some downtime is inevitable. The commenter cited design deficiencies, steam and electric interruptions, mechanical breakdowns, and major maintenance such as replacing the carbon or overhauling components as causes for downtime. Since it is not always feasible to shut down production during these interruptions, the commenter recommended that enforcement be based on failure to correct a solvent recovery system deficiency in a reasonable time, rather than on the occurrence of such a deficiency.

Response: The EPA recognizes the inevitability of air pollution control equipment downtime and accounts for this in the General Provisions. Section 60.8(c) (Performance tests) states that emissions in excess of the applicable emission limit during periods of malfunction are not considered a violation unless otherwise specified in the applicable standard. The polymeric coating standard does not specify that excess emissions due to malfunctioning air pollution control equipment trigger a violation. "Malfunction" is defined in § 60.2 (Definitions) as "any sudden and unavoidable failure of air pollution control equipment or process equipment or of a process to operate in a normal or usual manner. Failures that are caused entirely or in part by poor maintenance careless operation, or any other preventable equipment breakdown shall not be considered malfunctions."

Section 60.7(b) (Notification and Recordkeeping) requires that records of the occurrence and duration of any malfunction of air pollution control equipment be maintained. Also, § 60.11(d) (Compliance with

standards and maintenance requirements) requires that at all times, including periods of malfunction, owners and operators shall, to the extent practical, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Information used to determine whether operating and maintenance procedures are acceptable includes monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. Thus, the reporting of an exceedance is only an indication that the facility may not be in compliance.

#### 2.7.2 Compliance Provisions

Comment: One commenter (IV-D-16) sought confirmation that under the proposed regulations compliance could be demonstrated with an "approved" room enclosure around the coating equipment and data that indicate proper operation of collecting equipment. The commenter's interpretation is that the design of the room enclosure will be approved by EPA on a case-by-case basis and that the major requirement for approval is that the room be under negative pressure and the exhaust which produces this negative pressure be vented to a 95 percent efficient control device. Data to prove proper operation of the control device would be taken from continuous recordings of the pollutant concentration in the gas vented from the carbon beds.

Response: The final standards have been revised to clarify that the use of certain equipment, i.e., a total enclosure and a 95 percent efficient control device, is available as an alternative standard to the 90 percent emission reduction standard. In other words, the owner or operator may choose to comply with either the emission reduction standard or the alternative standard. The EPA also has revised the compliance provisions to include specifications for a total enclosure. Case-by-case approval by the Administrator is not required if these specifications are met. After the initial determination of compliance, an approved parameter (such as fan amperage or duct flow rates) shall be monitored to demonstrate proper operation of the vapor capture system. Also, the control device must be monitored in accordance with the same provisions that apply when the two-part gaseous emissions test is used to demonstrate

compliance. If the control device is a carbon adsorber, monitoring of the pollutant concentration in either the control device outlet stream or both inlet and outlet streams is required.

In addition, the compliance provisions for coating operations meeting the emission reduction standard have been clarified and revised since proposal. In the final standards, one method of demonstrating compliance is to perform a two-part gaseous emissions test to measure both capture efficiency and control device efficiency. Compliance is demonstrated if the product of these two efficiencies is equal to or greater than 0.90. This compliance method is available to all affected facilities. Another alternative to performing the gaseous emissions tests is performing a liquid-liquid material balance. However, this compliance provision has limited applicability. A liquid-liquid material balance can only be used when a single coating operation is vented to a dedicated control device (i.e., the control device may not be used to control emissions from any other emission source, including mix equipment). This compliance provision is most likely to be applicable for facilities with mix equipment that is not required to be vented to the control device. The liquid-liquid material balance compliance provisions include two options. The first option requires that a liquid-liquid material balance be performed for each nominal 1-month period. When using this option, no monitoring is required beyond that necessary to perform the material balance. The second option, which has been added since proposal, requires performing a one-time material balance over 3 to 7 days followed by continuous monitoring. The number of days for the performance test is selected by the operator and shall provide data that represent the plant's typical coating practices. The monitoring requirements are the same as those specified for the two-part gaseous emissions test and alternative standard. This second option may be attractive for facilities that cannot or do not want to conduct the detailed continuous monthly liquid material balance measurements that are required for an accurate balance (e.g., VOC applied at the coater, retained VOC [optional], VOC waste losses).

## 2.8 TEST METHODS AND MONITORING

### 2.8.1 Proposed Compliance Provisions

Comment: One commenter (IV-D-1) stated that the 93 percent reduction required of coating operations will be unattainable because of the inherent vagaries of the parameters that must be measured to perform the liquid material balance compliance test. The commenter stated that the method requires measurement techniques that are not currently used. Factors anticipated to affect the accuracy of the measurements are residual materials left in dip tanks, the change in solvent concentration during a normal process run, and water entrained in the recovered VOC following carbon adsorption.

The commenter stated that the measurement techniques and formula for the control device efficiency in the gas balance compliance test are realistic but that the formula for capture efficiency appears to assume that all uncontrolled solvent vapors will be discharged through a measurable point and that there will be no "stray" fugitive emissions.

Response: The EPA acknowledges that short-term variations in process conditions could affect a facility's ability to perform the measurements required to demonstrate compliance in the short term by means of a liquid material balance. For this reason, a relatively long averaging time (in this case, 1 month) is available to allow for a representative variety of coatings and products, as well as to reduce the impact of short-term variations due to process upsets, solvent spills, and variable amounts of solvent in use in the process (Vol. I BID, p. D-16). Facilities should already keep at least some of the required records as part of normal business practices and should be able to negotiate any specific problems faced by an individual facility with the enforcing agency. As stated in the previous section, facilities that find the recordkeeping and measurements burdensome may opt to conduct the short-term liquid balance or gas-phase test to demonstrate compliance. In any case, the alternative standard, use of a total enclosure and a 95 percent efficient control device, is available to facilities that do not wish to perform the testing and measurements associated with the capture portion of emission reduction standard. Because EPA has determined that facilities can conduct the measurements required for a liquid material balance and because several

alternatives are available, the month-long liquid material balance has been retained in the final standards.

In response to the commenter's other concern, it appears that the commenter has misinterpreted the requirements of the gaseous emissions compliance test. The standard requires (not assumes) that all uncontrolled solvent vapors will be passed through stacks suitable for measurement. To carry out the compliance test, the source must ensure that all VOC emissions will either be directed to the control device or be measured at the exit stack of a temporary enclosure or at all room exhaust points. In other words, there should be no "stray" fugitive emissions that are not accounted for in the compliance test.

#### 2.8.2 Plant-Wide Material Balance

Comment: One commenter (IV-D-3) recommended that the standard include a plant-wide solvent recovery of 85 percent as an alternative method of demonstrating compliance. The commenter stated that using a plant-wide material balance to demonstrate compliance is justified because it is a simple, inexpensive, and effective method. The proposed standards regulate some processes within a polymeric coating plant at different levels and leave other emissions, such as those from storage, cleaning, and transfers, unregulated. In the commenter's experience, enforcement officers prefer methods such as a plant-wide material balance and invariably ask for this information along with the data required by a particular standard.

According to the commenter, a plant-wide material balance can be easily obtained. The solvent disbursed to the plant can be readily measured by metering solvent withdrawals from solvent tanks. Solvent purchases, which are always measured accurately, are a direct measure of emissions from the plant because recovered solvent is replaced into inventory. Thus, the plant's VOC recovery efficiency can be calculated as the difference between VOC used and VOC (including solvent) purchased, divided by the VOC used.

Based on the fact that some emissions in the plant would be unregulated, the commenter concluded that the proposed standards assume and accept a plant-wide recovery of less than 93 percent. It was suggested that EPA analyze plant-wide solvent recovery data from

representative plants in this and related industries to determine an appropriate recovery level under the final standard. Using several years of data from a modern facility that nearly conforms with the proposed standard, the commenter concluded that a plant-wide recovery of 85 percent would be a reasonable level for a new plant designed to comply with the proposed standard.

Response: The option of demonstrating compliance using a plant-wide material balance has not been incorporated into the final standards. Section 111 of the CAA requires that the standards be based on BDT. Compliance methods must demonstrate that the affected facility meets standards that reflect BDT. If a plant-wide material balance were used to demonstrate compliance for polymeric coating operations, a plant-wide control efficiency that ensures 90 (formerly 93) percent control of VOC emissions from the affected coating operation(s) would be required. Without extensive testing to apportion emissions from all VOC sources in the plant, a plant-wide material balance demonstrating less than 90 percent control would not ensure that the affected facility initially achieves 90 percent control or maintains 90 percent control over each month of operation.

It is not feasible to select a plant-wide VOC recovery value because of the wide range of potential emission points that differ from plant to plant. These include existing coating operations and mix equipment, solvent storage tanks, and cleanup operations. With the variation in emissions from such sources, it is not possible to select a single plant-wide recovery efficiency value that would reflect BDT, yet be achievable in all cases. Even if such a level were established, it would be impossible to tell whether the affected facilities within the plant were in compliance with the standards applicable to them individually. For these reasons, a plant-wide material balance has not been added to the standards as an alternative method of demonstrating compliance.

#### 2.8.3 Carbon Adsorber Monitors

Comment: One commenter (IV-D-4) noted the unreliability and the expense of maintaining a continuous monitoring device for a carbon adsorber. The commenter stated that these monitors work well for short-term measurements but are not reliable for continuous measurements because

the high water content of the carbon adsorber exhaust immediately after desorption damages the monitors. Thus, the industry may have difficulty maintaining continuous monitoring over the long term as required in the proposed regulation.

Response: The EPA must have available the means to determine whether proper carbon adsorber operation and maintenance practices are being carried out. The monitoring of organic compounds is the only parameter that has been identified that adequately relates to adsorber performance. Without these monitors, sources are unable to detect when they may be operating out of compliance. Tests on existing systems show that the lack of proper monitoring is a major cause of poor performance of carbon adsorbers systems. Discussions with carbon adsorber experts indicated that continuous monitors are available that are reliable when the proper calibrations and maintenance procedures are used.<sup>16,17</sup>

## 2.9 REPORTING AND RECORDKEEPING

Comment: One commenter (IV-D-1) recommended deleting § 60.747(d), which requires monitoring and reporting of all 3-hour periods when a control device discharge exceeds allowable limits. The commenter stated that reporting of monthly compliance or noncompliance based on a liquid material balance is sufficient and that the 3-hour requirement places an unwarranted burden on the facility. The commenter also stated that the recordkeeping needed for the monthly calculation of the VOC balance using the formula in § 60.743(a) (as proposed) would be overwhelming.

A second commenter (IV-D-9) noted similarly that the requirement for reporting 3-hour periods during which the average VOC concentration is more than 20 percent greater than the average test value appears improper when the compliance test goes beyond 3 hours (e.g., a 1-month recovery test). The commenter suggested that a frequency requirement would be more appropriate. The same comment applies to any other 3-hour limit that does not adequately relate to a test exceeding 3 hours.

Response: Commenter IV-D-1 implies that an owner or operator must comply with the requirements of § 60.747(d) as well as those of § 60.747(e). The observations of Commenter IV-D-9 also reflect a misunderstanding of the requirements of the proposed standards. The proposed standards required that either § 60.747(d) or § 60.747(e),



depending upon the method used to demonstrate compliance, would be used to determine reporting and recordkeeping requirements. The reportable monitoring exceedance periods were consistent with the compliance test periods in those cases when monitoring is required.

The final standards have been revised to attempt to avoid misconceptions of this nature. Cross-reference tables have been added to the standards that summarize the final standards as well as compliance, reporting, and recordkeeping provisions.

Although the final standards allow the option of a short-term liquid material balance, EPA believes the recordkeeping needed for the month-long liquid material balance calculation is reasonable and not excessive. Most companies routinely maintain records of at least some of the information needed for the calculation, such as the amount of VOC used in the coating operation, the amount of VOC recovered, and formulation data. Also, the liquid material balance is used to determine compliance only when the VOC recovery device is dedicated to a single affected coating operation. It is anticipated that only a small number of facilities will meet the criteria for the use of this compliance method and that most of these will choose to demonstrate compliance by means of the alternative standard.

## 2.10 WORDING OF THE REGULATION

### 2.10.1 General Wording

Comment: One commenter (IV-D-1) recommended converting all references to  $m^3$  to pounds. This would be consistent with the units normally used by the industry for recordkeeping, solvent purchases, and pollution control system and equipment specifications.

Response: Consistent with U.S. government policy, EPA has chosen the International System of Units as the format for regulations. However, EPA has revised all references in the final standards of  $m^3$  to Mg to be consistent with the mass reporting basis typically used by industry and enforcing agencies. Reporting emissions and VOC usage rates on a mass basis rather than a volume basis also avoids the need to select average or typical densities of materials when reporting general values.

Comment: One commenter (IV-D-1) recommended eliminating the references to § 60.742(a)(3) (as proposed) found in § 60.744(a) (as proposed) and §§ 60.747(b) and (c). The commenter believes that the

wording in the latter sections, which establishes the reporting and recordkeeping requirements for affected facilities using less than 110 m<sup>3</sup>/yr (29,059 gal/yr) (95 Mg/yr [105 tons/yr]) of VOC and for affected facilities using at least 110 m<sup>3</sup>/yr (29,059 gal/yr) (95 Mg/yr [105 tons/yr]) but less than 150 m<sup>3</sup>/yr (39,626 gal/yr) (130 Mg/yr [144 tons/yr]) of VOC, is misleading. The commenter stated that, because of the reference to § 60.742(a)(3) (as proposed), strict interpretation of these provisions seems to require vapor-tight covers for coating mix equipment servicing coating lines using less than 110 m<sup>3</sup>/yr (29,059 gal/yr) (95 Mg/yr [105 tons/yr]) of VOC.

Response: References to § 60.742(a)(3) (now § 60.742(c)(3)) are made in order to avoid repetition of affected facility classifications and requirements. This section clearly refers to equipment serving coating lines that use "at least 95 Mg of VOC per year but less than 130 Mg of VOC per year."

Section 60.744(a) (now § 60.744(b)) sets forth monitoring requirements for coating operations that utilize less than 95 Mg/yr (105 tons/yr) of VOC and coating operations described in § 60.742(a)(3) (now § 60.742(c)(3)). Section 60.744(a) (now § 60.744(b)) does not state that coating operations that use less than 95 Mg/yr (105 tons/yr) of VOC are subject to the requirements specified in § 60.742(a)(3) (now § 60.742(c)(3)).

Section 60.747(b) presents reporting and recordkeeping requirements for coating operations described in § 60.742(a)(3) (now § 60.742(c)(3)) and coating operations that use less than 95 Mg (105 tons) of VOC in the first year of operations. Section 60.747(c) specifies requirements for operations described in § 60.742(a)(3) (now § 60.742(c)(3)) that initially use less than 130 Mg/yr (144 tons/yr) of VOC and operations that initially use less than 95 Mg/yr (105 tons/yr) of VOC. Neither section states that coating operations that use less than 95 Mg/yr (105 tons/yr) of VOC are subject to § 60.742(a)(3) (now § 60.742(c)(3)).

Elimination of the references to § 60.742(a)(3) (now § 60.742(c)(3)) would exclude from the monitoring, reporting, and recordkeeping requirements of the standards those coating operations using at least 95 Mg/yr (105 tons/yr) but less than 130 Mg/yr (144 tons/yr) of VOC, leaving no means of monitoring the continued applicability of the standards for mix

equipment in this VOC use range. Thus, the requested change has not been made.

Comment: One commenter (IV-D-1) recommended revising the words "by other means" to "by alternate readily available, economically feasible means" in § 60.743(a)(1)(iv) (as proposed). Section 60.743(a)(1) sets provisions for demonstrating that the VOC retained ( $RS_i$  in Equation 1 for demonstrating compliance with § 60.742[a][1]) is greater than zero. Specifically, § 60.743(a)(1)(iv) states that the owner or operator must submit "documentation that the inherent properties of the product require higher levels and that such properties cannot be achieved by other means." The commenter believes that the words "by other means" are too comprehensive and do not take into account economic and technical feasibility.

Response: The intent of § 60.743(a)(1)(iv) (now § 60.742(c)(3)) as proposed was to ensure that all facilities take steps to minimize uncontrolled emissions from retained VOC whenever possible. The exemption for retained VOC was written to permit the facility as much flexibility as possible in demonstrating to the Administrator the level of, and need for, retained VOC. However, EPA has revised this requirement to minimize the burden on both enforcement and plant personnel. The revised requirement eliminates the need for the plant to justify the need for retained VOC if the measured value of  $RS_i$  is less than or equal to 6 percent by weight of the liquid VOC applied. A limited survey of the industry indicated that 6 percent is a common breakpoint in retained VOC values and would encompass the majority of plants reporting retained VOC.<sup>18</sup> Plants reporting  $RS_i$  values above 6 percent by weight of the liquid VOC applied would still be required to demonstrate to the satisfaction of the Administrator that the retained VOC is required for product quality or to meet product specifications. In all cases, plants would be required to submit for approval data on the specific measurement techniques used to determine  $RS_i$ .

Comment: One commenter (IV-D-9) recommended that a continuous monitoring device (CMD) be required for a carbon adsorber that controls just one emission source. The wording in the proposal preamble indicated that a CMD is required when two emission sources are controlled, but not just one.

Response: When a source chooses to make a monthly compliance demonstration using a liquid material balance, no monitoring of the solvent recovery device is required. This compliance method is applicable only when emissions from a single affected coating operation are recovered by a dedicated control device. The wording in the proposal preamble was based on the use of this compliance method. However, should such a source choose to demonstrate compliance with the alternative standard, the monitor appropriate for the control device in use would be required.

Comment: One commenter (IV-D-3) recommended that § 60.742(a)(1) (as proposed) read "Reduce VOC emissions to the atmosphere by at least 93 percent, compared to an uncontrolled coating operation, from each coating operation; and. . . ." Adding the words "compared to an uncontrolled coating operation" would eliminate any confusion that the 93 percent reduction may be compared to a controlled source before modification or reconstruction.

Response: The intent of the emission reduction standard for coating operations is to require that at least 90 percent (93 percent at proposal) of the VOC content of the coating applied at the coating applicator(s) be prevented from entering the atmosphere. The EPA believes this intent to be clear in § 60.742(a)(1) (now § 60.742(b)(1)) as written. The compliance provisions also make the intent of the standard clear. Determination of 90 percent control is based on all VOC in the coating applied at the coating applicator(s) and not just the incremental increase in VOC resulting from modification or reconstruction. Therefore, no changes to the wording of the standard have been made.

Comment: One commenter (IV-D-7) noted that the allowance for 2 percent fugitive losses from mix equipment is not clearly stated in the proposal.

Response: The standards do not make an allowance for 2 percent fugitive losses from mix equipment. Section 60.742(a)(2) (now § 60.742(c)), as proposed, clearly stated that all VOC emissions shall be captured. However, in response to other comments, the language of the section has been modified. A detailed explanation of the change can be found in the response to Comment 2.4.2.

Comment: One commenter (IV-D-9) suggested that the volumetric flow rate be stated on a wet basis rather than a dry basis since, according to a contact at EPA, Method 25A results in parts per million by volume on a wet basis.

Response: The commenter is correct. Measurements made using Method 25A are in terms of parts per million by volume on a wet basis; therefore, the volumetric flow rate also should be stated on a wet basis when this method is used. The final standard has been corrected to specify that volumetric flow rates used in conjunction with Method 25A concentration measurements are to be expressed in standard cubic meters per hour (wet basis). However, volumetric flow rates used in conjunction with Method 25 concentration measurements are to be expressed in dry standard cubic meters per hour.

#### 2.10.2 Definitions

##### 2.10.2.1 "Coating Line".

Comment: One commenter (IV-D-9) stated that, for consistency with other NSPS and State regulations, coating mix preparation equipment should not be included in the definition for a coating line. The commenter believed that the term "coating line" was unnecessary since "coating operations" and "coating mix preparation equipment" are described. The commenter suggested changing all references to "coating operations" to "coating lines" since these two terms, by his definition, are synonymous.

Response: In the proposed NSPS, coating line was defined as "the coating operation(s) and coating mix preparation equipment that service the coating operation(s)." According to the commenter, the term coating line is commonly used interchangeably with coating operation. To avoid confusion, the term "coating line" is not used in the final standard. The term "coating operation" has been retained in order to maintain consistency with the Volume I BID and proposal preamble.

##### 2.10.2.2 "Common Emission Control Device".

Comment: One commenter (IV-D-9) requested clarification of the definition of "common emission control device." He stated that it was unclear whether the proposed definition referred to a device controlling both a coating operation and mix equipment or a device that controls two or more coating operations.

Response: In response to the commenter and for clarification, the definition has been amended to read: "'Common emission control device' means a control device controlling emissions from an affected coating operation as well as from any other emission source." The "other emission source" may be a coating operation(s), mix equipment, or any other point of emissions.

#### 2.10.2.3 "Drying Oven".

Comment: One commenter (IV-D-3) recommended eliminating references to baking, curing, and polymerizing from the definition for drying oven. In the commenter's process, drying and curing are done in separate ovens. Although the preamble makes clear that the curing oven is not covered by the standard, the proposed definition for "drying oven" suggests that the curing oven is included.

Response: The definition of drying oven has been changed to "a chamber within which heat is used to dry a surface coating; drying may be the only process or one of multiple processes performed in the chamber." By eliminating references to baking, curing, and polymerizing, this revised definition makes it clear that the standard does not apply to chambers in which drying is not performed. The definition also makes it clear that the standard does apply to any chamber within which drying is performed, regardless of the other processes performed in the chamber. This change is consistent with the fact that cure volatiles resulting from separate curing ovens are expected to be minimal in this industry and to occur off-site, and thus, are not available for control.

#### 2.10.2.4 "Knife Coater".

Comment: One commenter (IV-D-9) believed that a definition of "knife coater" would be useful. The commenter pointed out that the term "blade" is used in the "web coating" definition.

Response: A definition of "knife coater" has not been added because EPA believes that the term is self-explanatory. Knife coating and blade coating were used interchangeably in the proposed regulation. To avoid confusion, the reference to blade coating in the definition of "web coating" has been changed to knife coating. The new definition of "web coating" is "the coating of products, such as fabric, paper, plastic film, metallic foil, metal coil, cord, and yarn, that are flexible enough to be

unrolled from a large roll; coated as a continuous substrate by methods including, but not limited to, knife coating, roll coating, dip coating, impregnation, rotogravure, and extrusion; and, after drying, rerolled."

#### 2.10.2.5 "Solvent".

Comment: One commenter (IV-D-2) suggested adding a definition of "solvent" to clarify that the regulation addresses only volatile organic liquids. The commenter stated that an increased amount of polymeric coating is done with waterborne emulsions. Without a specific definition for solvent, one could erroneously conclude that polymeric coating solvents other than volatile organic liquids (e.g., water) are included in the "solvent used" for purposes of determining the applicability of the emission limits.

Response: The commenter correctly pointed out that for the purposes of this regulation as proposed, solvent refers only to volatile organic liquids and does not include water. Part of the confusion resulted from the use of the term's "VOC" and "solvent" interchangeably in the proposed rule and supporting documents. The final rule has corrected this problem by specifying that VOC is the pollutant of concern. Organic solvent is a major component of VOC, not water. (See Section 2.10.2.6 for this definition.)

#### 2.10.2.6 "Solvent (VOC) Used".

Comment: One commenter (IV-D-8) recommended changing the definition for solvent used from "the amount of solvent delivered to the coating mix preparation equipment of the affected facility" to "the net quantity consumed in the coating operation line." With this change, the amount of solvent (VOC) used would represent the amount actually applied to the substrate. According to the commenter, coating mixes are typically prepared in greater quantities than required for a specific production run. The excess coating may be recycled, which would result in double counting, or disposed as a waste material.

Response: "Solvent used" was defined at proposal as the amount of solvent delivered to the coating mix preparation equipment because (1) this is the simplest and most direct measurement point, and (2) it reflects the quantity used in determining the cutoff. The commenter's suggested definition of "solvent use" would make accurate measurement

considerably more difficult because sampling and analysis of the applied coating would be required. Also, the commenter's suggested definition does not take into account VOC emitted during mixing, which were included in the computation of the solvent-(VOC-)use cutoff. The cutoff was computed by determining the minimum quantity of applied VOC that could be cost-effectively controlled and then adjusting this volume to account for VOC emitted before the coating reaches the applicator of the affected coating operation.

The proposed definition was not intended to result in double counting. However, it may require the owner or operator to keep careful records of VOC use in cases where prepared coatings are not used immediately.

To clarify the meaning of this term, the definition has been changed to "VOC used." The amount of "VOC used" should be computed as the sum of (1) the VOC to the mix equipment from storage, (2) any VOC added after initial formulation is complete (e.g., dilution solvent added at the coating operation), and (3) the VOC content of any ingredients prepared off the plant site that are used in the preparation of coatings. When excess coating is recycled for use in a later coating run, the VOC it contains should not be counted a second time. Should a source reclaim the VOC from excess coatings, the VOC will enter the VOC recovery system just as if it were applied to a substrate. When this reclaimed VOC is reused, it will be properly counted toward the volume of VOC used. It is true that coatings disposed as waste materials were not considered when the annual VOC use cutoff was calculated. However, EPA believes that such wastes should be minimized. Thus, to provide an incentive to minimize these wastes, no change has been made to this aspect of the definition.

A change has been made to the proposed definition to account for facilities that purchase premixed coatings or other ingredients that contain VOC. The new definition reads "the amount of VOC delivered to the coating mix preparation equipment of the affected facility (including any contained in premixed coatings or other ingredients prepared off the plant site). If premixed coatings that require no mixing at the plant site are used, "VOC used" means the amount of VOC delivered to the coating applicator(s) of the affected facility.



#### 2.10.2.7 "Web Coating".

Comment: One commenter (IV-D-9) questioned whether the definition of "web coating," which states ". . . flexible enough to be unrolled from a large roll; . . .; and, after drying, rerolled," should include the requirement that the web be rerolled. The commenter pointed out that at some facilities products are cut into strips or sheets after drying. In addition, the commenter suggested including extrusion (i.e., the use of a slotted die) as an application method.

Response: Taken literally, the proposed definition of "web coating" requires only that the substrate be flexible enough to be unrolled, coated, and rerolled, not that these operations actually be carried out. However, to avoid confusion concerning the EPA's intent, the definition of "coating operation" has been modified to clarify the point that no polymeric coating facility is to be exempt simply because it lacks a rewind station. The definition has been changed to "any coating applicator(s), flashoff area(s), and drying oven(s) located between a substrate unwind station and a rewind station that coat a continuous web to produce a substrate with a polymeric coating. Should the coating process not employ a rewind station, the end of the coating operation is at the end of the last drying oven in the process." In addition, the definition of web coating has been refined to eliminate reference to rerolling.

The commenter's suggestion that extrusion be added to the list of web coating techniques contained in the definition of "web coating" has been adopted. Also, wording has been added to make it clear that the list of coating techniques is not intended to be inclusive. As discussed in Section 1.1, leather has been removed from the list of substrates. The definition of "web coating" has been revised to "the coating of products, such as fabric, paper, plastic film, metallic foil, metal coil, cord, and yarn, that are flexible enough to be unrolled from a large roll; coated as a continuous substrate by methods including, but not limited to, knife coating, roll coating, dip coating, impregnation, rotogravure, and extrusion."

#### 2.10.2.8 "M<sub>r</sub>".

Comment: One commenter (IV-D-8) suggested redefining the symbol  $M_r$  used in Equation 1 as the total VOC recovered before purification. The

proposed definition does not allow for VOC losses during separation/purification.

Response: As proposed, the definition of " $M_r$ " does not specify whether the recovered VOC is to be measured before or after separation/purification. The 93 percent recovery efficiency required to demonstrate compliance using Equation 1 was determined considering the VOC recovered after carbon adsorption and not after separation/purification. Therefore, EPA cannot require measuring " $M_r$ " after separation/purification. There may be cases, however, where it is more convenient to measure " $M_r$ " after separation/purification. Thus, a measurement point for " $M_r$ " has not been specified, but it is to be established when the compliance procedures are approved. This is explained in § 60.743(a)(3)(vi), which has been added to the compliance provisions.

#### 2.10.2.9 " $RS_i$ ".

Comment: One commenter (IV-D-8) suggested redefining the term  $RS_i$  in Equation 1 to include all VOC, not just the solvent, retained on the substrate. A portion of the VOC in some coating formulations is monomer that is retained in the substrate as either free monomer or polymer. The suggested definition change would make it clear that any monomer retained in the substrate would be included in the term  $RS_i$ .

Response: In response to the commenter's suggestion, the definition of  $RS_i$  has been changed to "the total mass (kg) of VOC retained in the substrate after oven drying for a given combination of coating and substrate." Without this change, coatings that release reaction by-products when tested by Method 24 would indicate the presence of some VOC which may not be available for recovery by the VOC recovery system unless the coating is exposed to a similar temperature within the oven. If the amount of monomer retained on the substrate is significant, this may affect a source's ability to demonstrate compliance. Changing "solvent" to VOC in the definition of  $RS_i$  enables the source to account for the amount of VOC retained on the substrate. The source is responsible for demonstrating the quantity retained on the substrate.

## 2.11 MODIFICATION/RECONSTRUCTION

### 2.11.1 Retrofitting Total Enclosures in Printing Blanket Manufacturing

Comment: One commenter (IV-D-5) stated that EPA failed to consider the feasibility of the proposed regulation for modified facilities. The commenter stated that, while it may be possible to develop new coating techniques that would allow new coating equipment to be totally enclosed, it is virtually impossible to retrofit total enclosures to existing coating equipment in the printing blanket manufacturing industry. Citing practical limitations, the commenter ruled out a small enclosure around the coater, as well as the possibility of enclosing the entire coating room. The commenter stated that the only feasible method of capturing VOC emissions from existing printing blanket coaters is to construct a small room enclosing the affected coating equipment. The commenter determined that the only practical means of ensuring worker safety while implementing this method would be to exhaust high volumes of air from the enclosure. However, in the commenter's analysis, this would drive up the cost of control equipment significantly and result in an unacceptably high cost effectiveness (see Section 2.4.1).

Response: The EPA has considered the feasibility of the standards for modified facilities. This subject was discussed both in the preamble to the proposed standards and in the Volume I BID. It was concluded that changes to coating operations that would be considered modifications under the General Provisions of 40 CFR Part 60 are unlikely. In those cases where modifications do occur, the same capture and control techniques that can be used at new facilities can be applied at modified facilities at a reasonable cost. However, since proposal EPA has reexamined the feasibility of total enclosures and reached the following conclusions.<sup>2</sup>

1. Because frequent access to the application/flashoff area is required in some segments of this industry, a small total enclosure immediately around the application/flashoff area could not be used in all cases.

2. A local ventilation system could be constructed in all cases that would capture emissions from the application/flashoff area very efficiently and be protective of worker health and safety at a reasonable cost. In conjunction with an appropriately designed larger, room-type

enclosure, the capture system would meet the total enclosure specifications added since proposal.

3. A room-type total enclosure may not be universally feasible. Space constraints at existing plants may not allow construction of a room to enclose a new or modified/reconstructed coating operation.

As a result of this analysis, the standards for new and modified/reconstructed coating operations have been revised to require either a 90 percent overall emission reduction or a total enclosure and 95 percent efficient control device (alternative standard).

The EPA does not accept the commenter's conclusion that workers inside a room-type total enclosure cannot be protected in a cost-effective manner. The commenter's analysis was based on the assumption that the only way to ensure the safety of workers within the total enclosure is to ventilate the enclosure with enough air to dilute emissions to a safe level. However, as discussed above, localized pickups can be designed to direct emissions away from the workers while reducing the airflow to a level allowing cost-effective control. This issue is more fully examined in Section 2.4.1.

#### 2.11.2 NSPS Applicability Date

Comment: One commenter (IV-D-7) stated that compliance with the NSPS will be required of facilities where modifications or reconstruction began after the issuance of the proposed rule rather than upon adoption of the final rule. In the commenter's view, this policy is onerous. The commenter stated that EPA has not demonstrated that control technology exists for this industry that would comply with the proposed regulations (see Sections 2.3.1.1, 2.3.1.3, and 2.3.2.2). Thus, companies must delay the installation of new equipment or modification of existing equipment, including pollution control devices, because they may not meet the final standards. Companies that have incurred major capital expenditures to meet State requirements would be at an even greater disadvantage if their new control equipment fails to meet EPA's standards but is considered subject to them.

Response: Section 111(a)(2) of the CAA requires that the applicability date for NSPS be the date of proposal. For the polymeric coating NSPS, the standard is applicable to affected facilities that are

constructed, modified, or reconstructed on or after April 30, 1987. This date could be adjusted if it were determined that BDT was not available for use on that date. In this case, EPA believes that BDT is available and is not aware of a technical problem that has prevented sources from proceeding with modifications.

As discussed in the proposal preamble and Volume I BID, changes to polymeric coating operations with associated mix equipment that would be considered modifications under the General Provisions (40 CFR 60.14) are expected to occur rarely, if at all. In any case, sources that installed control equipment prior to April 30, 1987, to meet existing State requirements and that subsequently modify their facilities are expected only to have to modify the capture systems at those facilities in order to comply with the NSPS. The existing control devices will, with some operational changes, be capable of achieving the efficiency necessary to meet the standards. The cost to retrofit capture systems may be slightly more than the cost of capture systems installed at the time of original construction, but this increase is not expected to be so large as to make the costs unreasonable. The cost effectiveness for such facilities is no different than for other existing sources at the same level of control efficiency.

## 2.12 REFERENCES FOR CHAPTER 2

1. Memo from Lang, C. and Friedman, B., Midwest Research Institute, to Polymeric Coating project file. December 22, 1988. Affected Facility Options for Polymeric Coating NSPS: Mix Equipment.
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16. ABSTRACT Standards of performance for the control of VOC emissions from the polymeric coating of supporting substrates are being promulgated under the authority of Section 111 of the Clean Air Act. These standards apply to all new, modified, or reconstructed polymeric coating lines using at least 95 mg/yr of VOC per year in the production of polymeric-coated supporting substrates. This document contains a detailed summary of the public comments on the proposed standards (52 FR 15906), responses to these comments, and a summary of the changes to the proposed standards.		
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