

United States  
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Research Triangle Park NC 27711

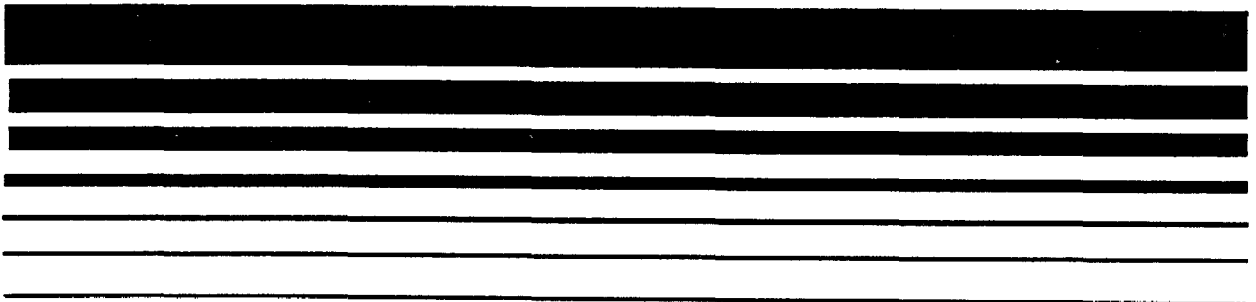
EPA-450/3-90-019  
December 1990

Air



# **EPA Polymer Manufacturing Industry -**

## **Enabling Document**



N S R S

# **POLYMER MANUFACTURING INDUSTRY ENABLING DOCUMENT**

*Prepared By  
Emissions Standards Division*

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
Office of Air and Radiation  
Office of Air Quality Planning and Standards  
Research Triangle Park, North Carolina 27711**

*December 1990*

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## Section 1 Introduction

The EPA has promulgated standards that were proposed in September 1987 and in January 1989 for the polypropylene, polyethylene, polystyrene, and poly(ethylene terephthalate) (PET) source categories, which are collectively referred to as the polymer manufacturing industry for simplicity. This Polymer Manufacturing Industry Enabling document is a compilation and presentation of pertinent information regarding the Polymer Manufacturing Industry NSPS rulemaking in a simple, easy to understand format. It is intended to assist EPA enforcement and other personnel who will implement these regulations and will need to respond to comments and questions on them. In addition, this document should be of assistance to those who are regulated by this NSPS. Any comments on this document may be sent to Fred Dimmick, Chief, Regulations Preparation Section (MD-13); U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

Section 2 presents the summary of the standards for each of the source categories. It summarizes the applicability, exemptions, control requirements, and reporting and recordkeeping requirements of the standards. It presents a brief synopsis designed to be useful in a quick determination of whether any facility is subject to the rules or not. Enforcement/compliance personnel, however, should carefully read the other pertinent sections of the published regulations before making a final determination.

Section 3 presents three important sections of the general provisions from the Code of Federal Regulations (40 CFR Part 60) which relate to NSPS requirements; §60.12, Circumvention; §60.14,

## Section 2 Summary of Regulation

This section presents a summary of the regulation for the polymer manufacturing industry. The polymer manufacturing industry regulations apply to four major polymer types and their copolymers. The four major polymer types are polypropylene, polyethylene, polystyrene, and poly(ethylene terephthalate) (PET). The regulations apply to both process emissions and equipment leaks (fugitive emissions) for all of these polymers and their copolymers, except for expandable polystyrene and PET facilities. The regulations control only equipment leaks from expandable polystyrene facilities; they do not control process emissions. In contrast, the regulations control only process emissions from PET facilities; they do not control equipment leaks from PET facilities.

The process emission standards affect both continuous and intermittent emissions at polypropylene and polyethylene facilities. Only continuous process emissions are controlled at polystyrene and PET facilities.

This section is divided into two major parts. The first part discusses the rule as it applies to process emissions (both continuous and intermittent). In this part, the process emissions rules are reviewed first for polypropylene and polyethylene facilities (page 2-3), then for polystyrene facilities (page 2-25), and lastly for PET facilities (page 2-28). As noted above, there are no process emission standards for expandable polystyrene plants.

The second part of this section discusses the rule as it applies to equipment leaks of VOC (fugitive emissions) (page 2-34). The standards of performance cover equipment leaks of VOC emissions within

polypropylene, polyethylene, polystyrene (including expandable polystyrene), and their copolymer manufacturing plants. As noted above, the equipment leak standards do not cover equipment in PET or PET copolymer manufacturing plants.

The information is presented primarily in a question and answer format. This format was selected because it was felt to be the best way to convey the intricacies associated with the final rule. We have asked (and answered) the most likely questions that will arise to help clarify the regulations for those affected by the polymer manufacturing industry regulations. Other questions may arise that are not readily answered in this document. Should such questions arise, the reader can contact one of the persons listed in Section 6 of this document for further guidance.

I. PROCESS EMISSIONS

A. Polypropylene and Polyethylene Facilities

1. Applicability

Q1. Do the process emission standards apply to all newly constructed, modified, or reconstructed plants that produce polypropylene and polyethylene?

A. No. These standards only cover those polypropylene and polyethylene plants (newly constructed, modified, or reconstructed) that use a continuous production process. Polypropylene and polyethylene plants that use a batch production process are not covered by these standards. However, the intent of the standards is to cover all types of continuous processes that produce polypropylene and polyethylene.

In addition, the standards cover those plants that produce polypropylene copolymers and polyethylene copolymers using a continuous process. (See Section 4 of this report for the definitions of these polymers and their copolymers.)

Q2. What is the definition of affected facility for process emissions from plants producing polypropylene, polyethylene, or their copolymers?

A. The definition of affected facility for process emissions is process section, which is defined in §60.561 (see page 4-18 of this document). Five process sections have been identified, which are typically found at any polypropylene, polyethylene, or polypropylene or polyethylene copolymer manufacturing plant. These five process sections are:

1. raw materials preparation section;
2. polymerization reaction section;
3. material recovery section;
4. product finishing section; and
5. product storage section.

Except as discussed in Question 3, these are the affected facilities for both continuous and intermittent emissions.

Q3. Are all five process sections affected facilities for all polypropylene and polyethylene plants?

A. The answer to this question depends on when the process section was newly constructed, modified, or reconstructed.

For polypropylene and polyethylene production plants that are constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989, only some of the process sections are affected facilities. The process

sections that are affected facilities depends on the type of production process being used at the plant. In addition, both continuous and intermittent emissions may not need to be controlled. The process sections (and the type of emissions) that are affected facilities, and thus are to be controlled, are identified by an "X" in Table 1.

For polypropylene or polyethylene production plants that are newly constructed, modified, or reconstructed after January 10, 1989, all five process sections (for both continuous and intermittent emissions) are affected facilities, regardless of the type of production process being used.

**Q4. What is the applicability date for polypropylene and polyethylene affected facilities?**

**A.** Unlike most other standards, this standard has two applicability dates. The applicability date depends on when the process section is newly constructed, modified, or reconstructed and, in some instances, on the type of production process.

**1. September 30, 1987**

As noted in the response to Question 3, only some process sections in polypropylene or polyethylene plants that are newly constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989, are affected facilities. The process sections (and the type of emissions) that are affected facilities for these plants, and the type of emissions to be controlled, are identified by an "X" in Table 1. The applicability date for the affected facilities identified by an "X" in Table 1 is September 30, 1987.

**2. January 10, 1989**

For any polypropylene or polyethylene process section that is constructed, modified, or reconstructed after January 10, 1989, the applicability date is January 10, 1989, for each affected facility, regardless of the type of continuous production process being used.

**Q5. If a process section (and its emissions) is marked with an "--" in Table 1, is that process section and its emissions exempt from the standards?**

**A.** No. Process sections (and their emissions) that are marked with an "--" in Table 1 become affected facilities if they are newly constructed, modified, or reconstructed after January 10, 1989. The applicability date for these process sections is January 10, 1989. Thus, any process section that is newly constructed, modified, or reconstructed after January 10, 1989, becomes subject to these standards.



Table 1. Polypropylene and Polyethylene Affected Facilities with September 30, 1987, Applicability Date

| <u>Polymer</u>            | <u>Production Process</u> | <u>Process Section</u>    | <u>Emissions</u>  |                     |
|---------------------------|---------------------------|---------------------------|-------------------|---------------------|
|                           |                           |                           | <u>Continuous</u> | <u>Intermittent</u> |
| Polypropylene             | Liquid phase              | Raw Materials Preparation | X                 | --                  |
|                           |                           | Material Recovery         | X                 | --                  |
|                           |                           | Polymerization Reaction   | X                 | X                   |
|                           |                           | Product Finishing         | X                 | --                  |
|                           |                           | Product Storage           | --                | --                  |
| Polypropylene             | Gas Phase                 | Raw Materials Preparation | --                | --                  |
|                           |                           | Polymerization Reaction   | --                | X                   |
|                           |                           | Material Recovery         | X                 | --                  |
|                           |                           | Product Finishing         | --                | --                  |
|                           |                           | Product Storage           | --                | --                  |
| Low Density Polyethylene  | High Pressure             | Raw Materials Preparation | --                | X                   |
|                           |                           | Polymerization Reaction   | --                | X                   |
|                           |                           | Material Recovery         | --                | X                   |
|                           |                           | Product Finishing         | --                | X                   |
|                           |                           | Product Storage           | --                | X                   |
| Low Density Polyethylene  | Low Pressure              | Raw Materials Preparation | X                 | X                   |
|                           |                           | Polymerization Reaction   | --                | X                   |
|                           |                           | Material Recovery         | --                | --                  |
| High Density Polyethylene | Gas Phase                 | Product Finishing         | X                 | --                  |
|                           |                           | Product Storage           | --                | --                  |
| High Density Polyethylene | Liquid Phase Slurry       | Raw Materials Preparation | --                | X                   |
|                           |                           | Polymerization Reaction   | --                | --                  |
|                           |                           | Material Recovery         | X                 | --                  |
|                           |                           | Product Finishing         | X                 | --                  |
|                           |                           | Product Storage           | --                | --                  |
| High Density Polyethylene | Liquid Phase Solution     | Raw Materials Preparation | X                 | X                   |
|                           |                           | Polymerization Reaction   | --                | X                   |
|                           |                           | Material Recovery         | X                 | X                   |
|                           |                           | Product Finishing         | --                | --                  |
|                           |                           | Product Storage           | --                | --                  |

NOTE: "X" denotes that that process section is an affected facility for continuous or intermittent emissions or both, as shown, which has a September 30, 1987, applicability date.

"--" denotes that that process section is not considered an affected facility for continuous or intermittent emissions or both, as shown, if the process section is constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989. These process sections are affected facilities if they are constructed, modified, or reconstructed after January 10, 1989.

Q6. What happens if an owner or operator of a production process that has been newly constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989, does not believe that his or her process is reasonably represented by the processes listed in Table 1?

A. After the January 10, 1989, Federal Register notice was published, the Agency received several comments that called into question the representativeness of the model plants used to develop the standards that were proposed on September 30, 1987, in comparison to actual production processes. For example, one commenter stated that a liquid phase, solution process is used to produce low density polyethylene. None of the model plants took this combination of product and production process into account. A liquid phase solution process is a low pressure process, but is not a gas phase process, which was the basis for the model plant for low density polyethylene using a low pressure process. Thus, the owner or operator does not have a production process match among the low density polyethylene model plants.

Since the affected facilities that have a September 30, 1987, applicability date are determined by the type of production process (e.g., liquid phase, gas phase), the final rule requires each owner or operator to identify the product/production process combination from among those listed in Table 1 to apply to his or her own particular process [§60.560(b)(1)(ii)]. This procedure establishes the affected facilities and the emissions that are subject to the standards for production processes that have been newly constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989.

This provision [§60.560(b)(1)(ii)] addresses those situations where existing product/production process combinations are not covered by any of the model plants (i.e., the various product/production process combinations shown in Table 1). For such situations, the selection should be guided by identifying the model plant whose emissions and their characteristics most closely matches the emission stream characteristics of the owner's or operator's particular product/production process. Since, in the example cited by the commenter, the emission characteristics are similar to those of the liquid phase, solution process used to produce high density polyethylene, that model plant should be selected by the owner or operator for determining the affected facilities and the emissions to be controlled.

This provision is not intended to allow anyone to pick and choose any model plant for identifying the affected facilities and emissions to be controlled. For example, an owner or operator that produces polypropylene using a gas phase process is to use that model plant, even if

modifications have been made to the process that result in a different process configuration or emission streams. In other words, if an owner or operator has a product/production process that is listed in Table 1, then the owner or operator is to use that model plant for determining the affected facilities and the emissions that are subject to control regardless of how well the process matches that used to develop the particular model plant.

## 2. Exemptions

Q7. Are there exemptions provided for the polypropylene and polyethylene standards?

A. Yes. There are three (3) types of exemptions. Each is discussed below.

1. Individual affected facilities with uncontrolled emission rates below specified uncontrolled threshold emission rates are exempt from the standards. These rates are shown in Table 2. This exemption applies only to affected facilities that are constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989.
2. Individual vent streams that emit continuous emissions with uncontrolled annual emissions of less than 1.6 Mg are exempt from the standards.
3. Individual vent streams that emit continuous emissions with a weight percent TOC of less than 0.10 are exempt for the standards.

Q8. How is "uncontrolled emission rate" defined?

A. "Uncontrolled emission rate" refers to the emission rate of a vent stream that vents directly to the atmosphere and to the emission rate of a vent stream to the atmosphere that would occur in the absence of any add-on control devices, but after any material recovery devices that constitute part of the normal material recovery operations in a process line where potential emissions are recovered for recycle or resale.

Q9. Regarding the uncontrolled threshold emission rate exemption for individual affected facilities identified in answer to Question 7, is an affected facility that is exempted based on its uncontrolled emission rate permanently exempted?

A. No. There are two scenarios that may bring such an affected facility under the standards. First, if the emissions from the affected facility exceeds the uncontrolled emission rate

Table 2. Maximum Uncontrolled Threshold Emission Rates for Polypropylene and Polyethylene Affected Facilities with September 30, 1987, Applicability Date<sup>a</sup>

| Production Process                                       | Process Section           | Uncontrolled Emission Rate, kg TOC/Mg product |
|--|---------------------------|---|
| Polypropylene, liquid phase process                      | Raw Materials Preparation | 0.15 <sup>b</sup>                             |
|  | Polymerization Reaction   | 0.14 <sup>b</sup> , 0.24 <sup>c</sup>         |
|  | Material Recovery         | 0.19 <sup>b</sup>                             |
|  | Product Finishing         | 1.57 <sup>b</sup>                             |
| Polypropylene, gas phase process                         | Polymerization Reaction   | 0.12 <sup>c</sup>                             |
|  | Material Recovery         | 0.02 <sup>b</sup>                             |
| Low Density Polyethylene, high pressure process          | Raw Materials Preparation | 0.41 <sup>d</sup>                             |
|  | Polymerization Reaction   | e   |
|  | Material Recovery         | e   |
|  | Product Finishing         | e   |
|  | Product Storage           | e   |
| Low Density Polyethylene, low pressure process           | Raw Materials Preparation | 0.05 <sup>f</sup>                             |
|  | Polymerization Reaction   | 0.03 <sup>g</sup>                             |
|  | Production Finishing      | 0.01 <sup>b</sup>                             |
| High Density Polyethylene, liquid phase slurry process   | Raw Materials Preparation | 0.25 <sup>c</sup>                             |
|  | Material Recovery         | 0.11 <sup>b</sup>                             |
|  | Product Finishing         | 0.41 <sup>b</sup>                             |
| High Density Polyethylene, liquid phase solution process | Raw Materials Preparation | 0.24 <sup>f</sup>                             |
|  | Polymerization Reaction   | 0.16 <sup>c</sup>                             |
|  | Material Recovery         | 1.68 <sup>f</sup>                             |
| High Density Polyethylene, gas phase process             | Raw Materials Preparation | 0.05 <sup>f</sup>                             |
|  | Polymerization Reaction   | 0.03 <sup>g</sup>                             |
|  | Product Finishing         | 0.01 <sup>b</sup>                             |

<sup>a</sup> "Uncontrolled emission rate" refers to the emission rate of a vent stream that vents directly to the atmosphere and to the emission rate of a vent stream to the atmosphere that would occur in the absence of any add-on control devices but after any material recovery devices that constitute part of the normal material recovery operations in a process line where potential emissions are recovered for recycle or resale.

<sup>b</sup> Emission rate applies to continuous emissions only.

<sup>c</sup> Emission rate applies to intermittent emissions only.

<sup>d</sup> Total emission rate for non-emergency intermittent emissions from raw materials preparation, polymerization reaction, material recovery, product finishing, and product storage process sections.

<sup>e</sup> See footnote d.

<sup>f</sup> Emission rate applies to both continuous and intermittent emissions.

<sup>g</sup> Emission rate applies to non-emergency intermittent emissions only.

cutoff level at some later date, then that affected facility is subject to the standards. Second, if that affected facility is modified or reconstructed after January 10, 1989, then the affected facility is subject to the standards.

Q10. If an individual vent stream meets either the low annual emissions exemption or the weight percent exemption, is it permanently exempted?

A. No. If the affected facility from which the vent stream in question is later modified or reconstructed such that the emissions or TOC concentration increases above the exemption level for which the stream was originally exempted, then that stream becomes subject to the standards at that time.

Q11. Do these exemptions apply to intermittent emissions?

A. Only the uncontrolled threshold emission rate exemption for individual affected facilities, which was identified in the answer to Question 7, is applicable to intermittent emissions, as identified in Table 1. There are no individual stream exemptions for intermittent emissions based on annual emissions or weight percent TOC.

Q12. Are there any other exemptions for intermittent emissions?

A. Yes. The standards exempt emergency vent streams from control requirements. This exemption is further explained in the answer to Question 75, which is found in Section 3 of this document.

Q13. Are emissions that are already controlled by existing control devices exempt from the standards?

A. No. However, emissions (continuous or intermittent) from modified or reconstructed affected facilities that are already controlled by an existing control device and that have uncontrolled emission rates greater than the uncontrolled threshold emission rates identified in Table 1 are exempt from the requirements of §60.562-1 unless and until the existing control device is modified, reconstructed, or replaced.

Q14. Do the individual stream exemptions apply to streams that are already being controlled?

A. No.

### 3. Standards

Q15. What are the standards for continuous emission streams?

- A. Except as discussed in the answer to Question 20 below, all continuous emission streams that have been determined to require control are to be reduced by 98 percent or to a concentration of 20 ppmv, whichever is less stringent.

However, there are two specified conditions where the standard can be met:

1. If a flare is used that meets certain specified operating conditions, and
2. if a boiler or process heater with a design heat input capacity of 150 million Btu/hour or greater is used, provided the vent stream is introduced into its flame zone.

In some instances, the standards require only that the continuous emissions be vented to an existing control device at the plant site without regard to the destruction or control efficiency of the control device. (For a related discussion, see Question 20.)

**Q16. What are the standards for intermittent emissions?**

- A. Intermittent emissions are to be controlled by either combusting them in a flare or in an incinerator, boiler, or process heater.

If a flare is used, there are certain requirements concerning visible emissions, flame presence, and flame stability.

If an incinerator is used, the standards simply require that the emissions are vented to the incinerator.

If a boiler or process heater is used, the emissions are required to be introduced into the flame zone of the boiler or process heater.

**Q17. Which continuous and intermittent emissions from polypropylene and polyethylene affected facilities are required to be controlled?**

- A. The procedures for determining which polypropylene and polyethylene process emissions are to be controlled are fairly complex. Five flow diagrams, which are presented as Figures 1 through 3, illustrate these procedures. The purpose of these figures is to provide only an overview of the determination procedures for polypropylene and polyethylene process emissions, and do not contain specific details found in the final rule. The following paragraphs summarize each figure, some of which repeat some of the information discussed above.

Figure 1 initiates the determination procedure for each process section. Through the procedures shown in this figure, affected facilities are identified and separated according to their applicability dates (September 30, 1987, and January 10, 1989).

This figure also includes the exemption step provided to affected facilities with an applicability date between September 30, 1987, and January 10, 1989 (see Block 1.6). For process sections that are identified affected facilities subject to the standard, Figure 1 directs the user to Figure 2A for continuous emissions and to Figure 3 for intermittent emissions.

Figure 2A is the first of three flow diagrams applicable to continuous emissions. The first step in Figure 2A separates those continuous emission streams that are uncontrolled from those that are controlled in an existing control device. This is necessary as the determination procedure is different depending on whether the emission streams are already being controlled. If they are controlled, the flow diagram directs the user to Figure 2C. For uncontrolled continuous emission streams, Figure 2A continues by showing the exemptions provided for individual emission streams. Once qualifying individual emission streams are exempted, the user is directed to Figure 2B.

Figure 2B outlines the procedures for combining nonexempt uncontrolled continuous emission streams and determining which emission streams are to be controlled. This figure corresponds to the steps detailed in Table 3 in the final rule (see page 4-25 of this document). An important feature of the rule is the "loop" provided between Blocks 2B.12 and 2B.3. Uncontrolled emission streams that remain uncontrolled after passing through this determination procedure are still subject to control in the future as new process sections become affected facilities and as existing control devices are modified, reconstructed, or replaced. (For related discussions, see Questions 28 through 34.)

Figure 2C outlines the procedure for handling emissions that are already being controlled. Note that for these emissions there are no individual stream exemptions as for uncontrolled emission streams. The stream characteristics of the inlet stream to the control device are used first to calculate the calculated threshold emission (CTE) level and second to compare with the CTE level (Block 2C.2). Also note that uncontrolled emission streams are combined with controlled emission streams in one of two ways. First, if the controlled stream is to meet the standards the next time the control device is modified, reconstructed, or replaced (Block 2C.4), any uncontrolled emission streams in the same weight percent range as the controlled stream are also to be controlled to meet the standards. Second, if the controlled

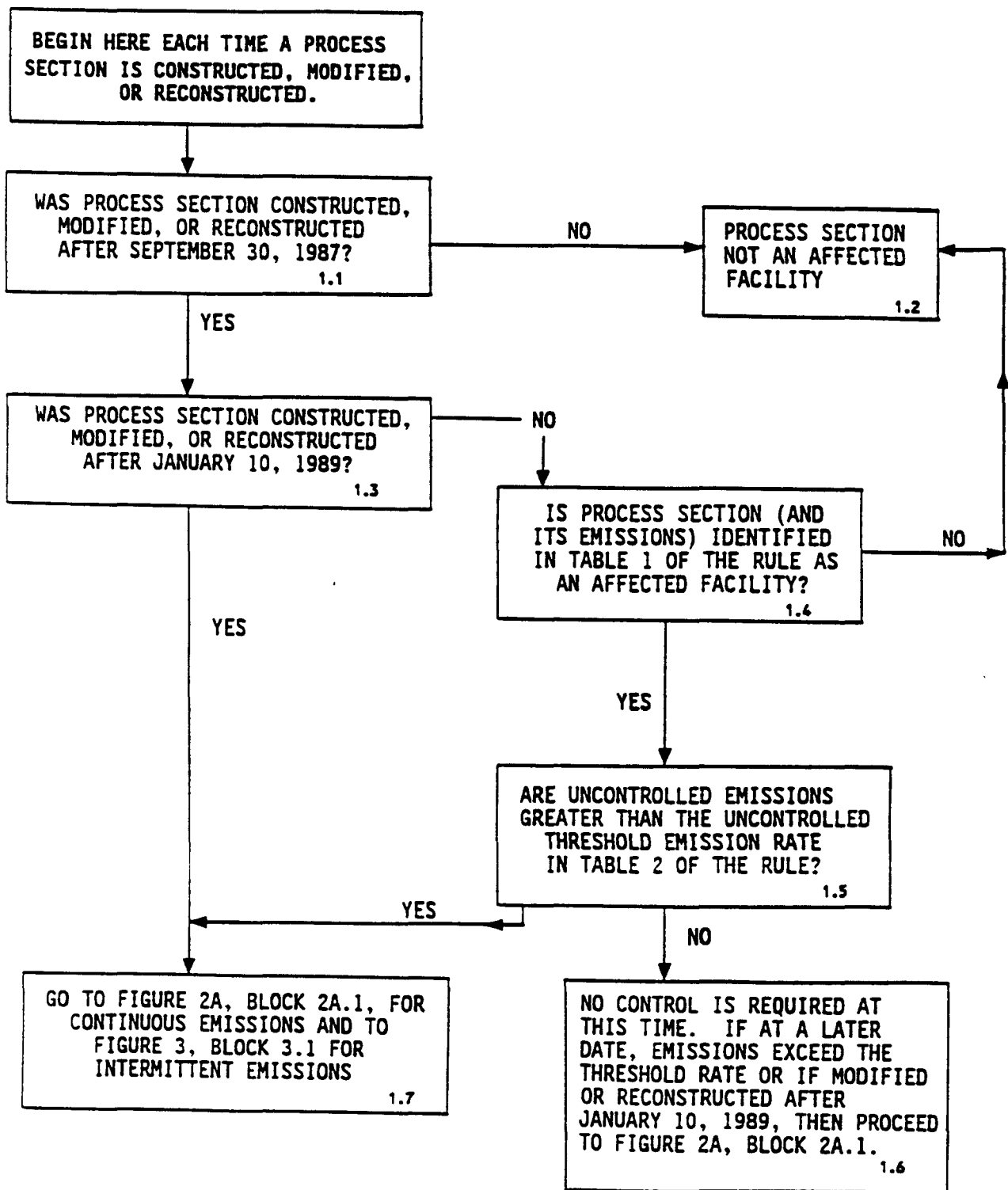


Figure 1. Initial Decisionmaking for Determining Which Polypropylene and Polyethylene Process Sections Are Affected Facilities Subject to the Standards



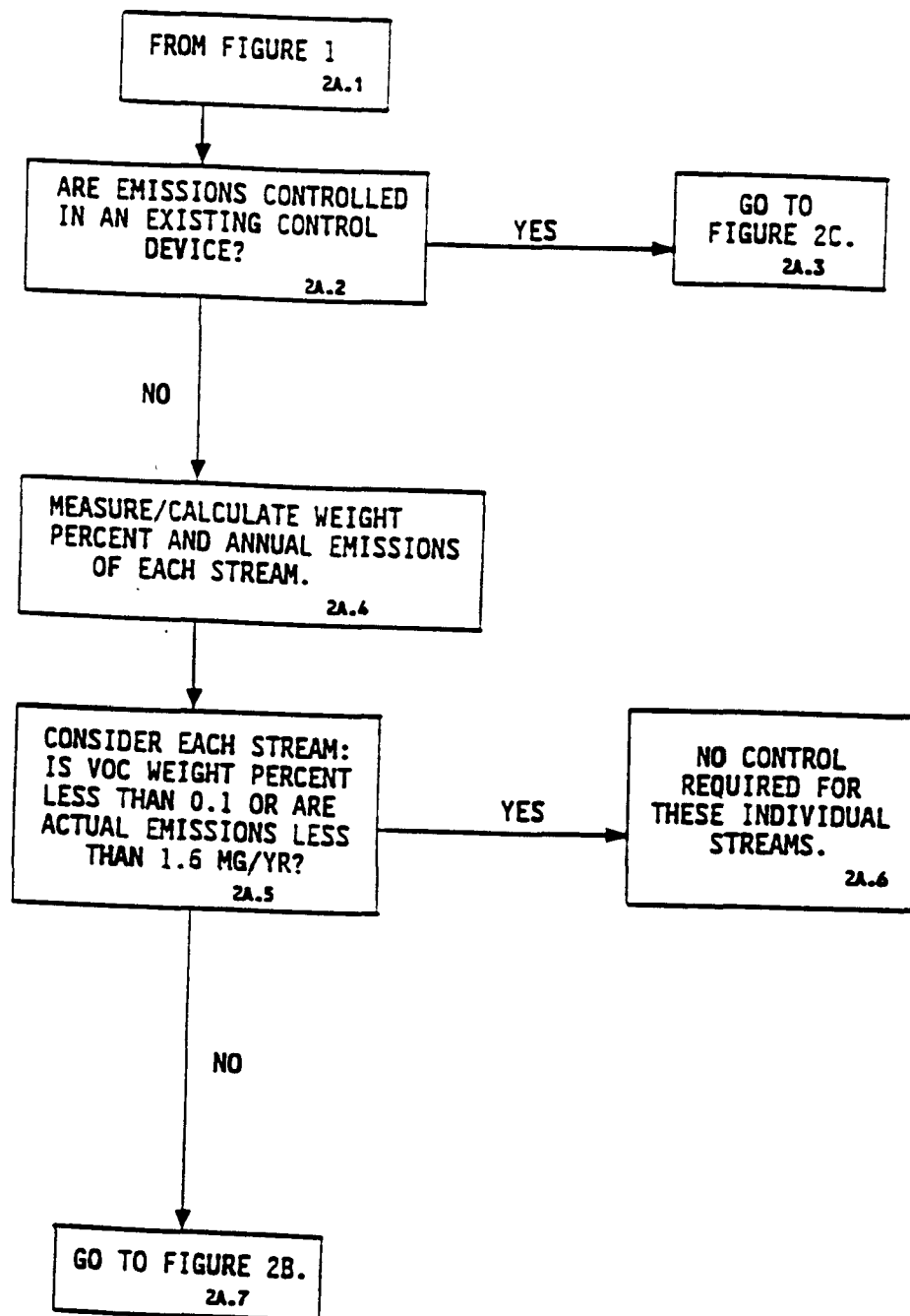


Figure 2A. Continuous Emissions - Separation of Controlled from Uncontrolled Emissions and Individual Stream Exemptions

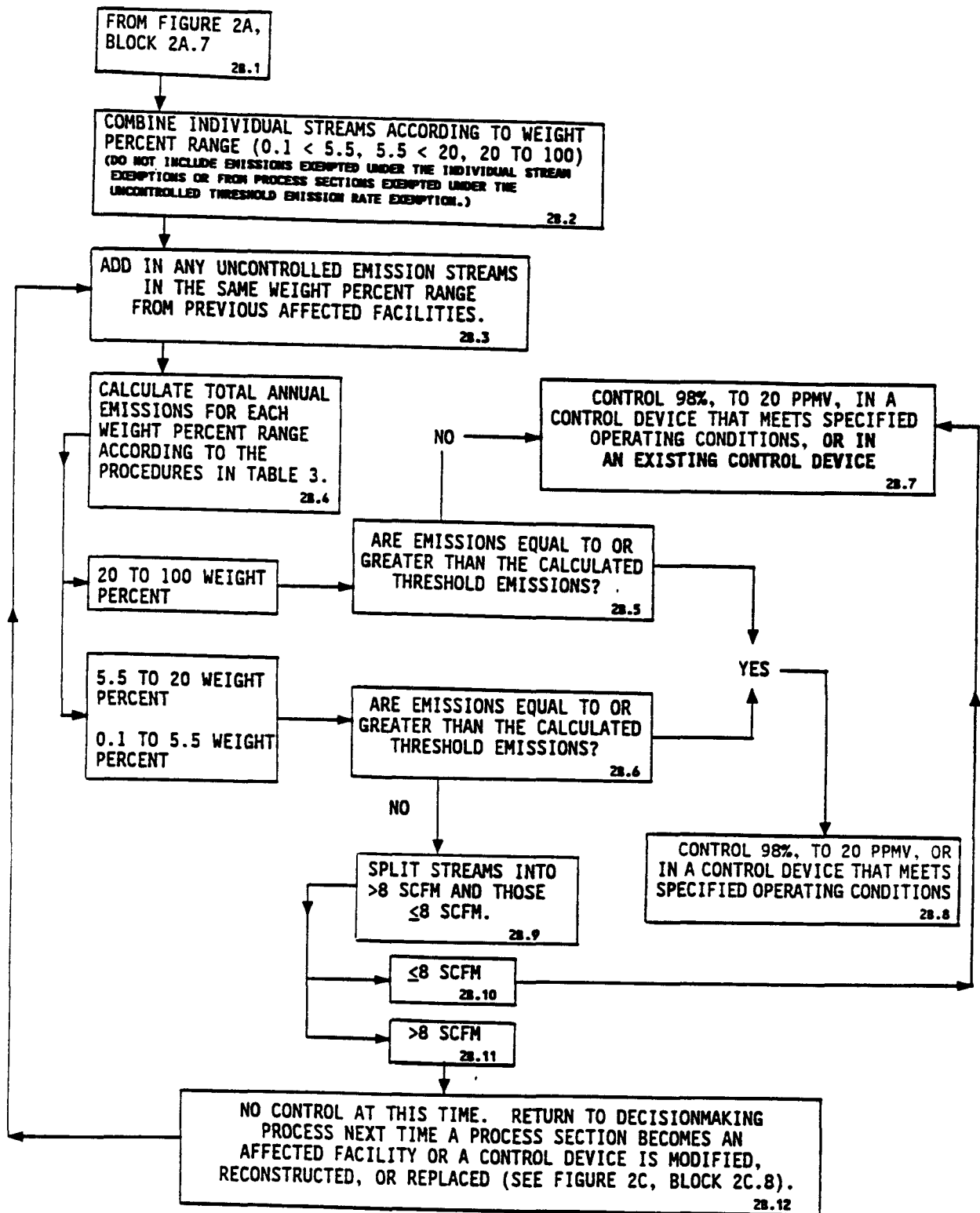
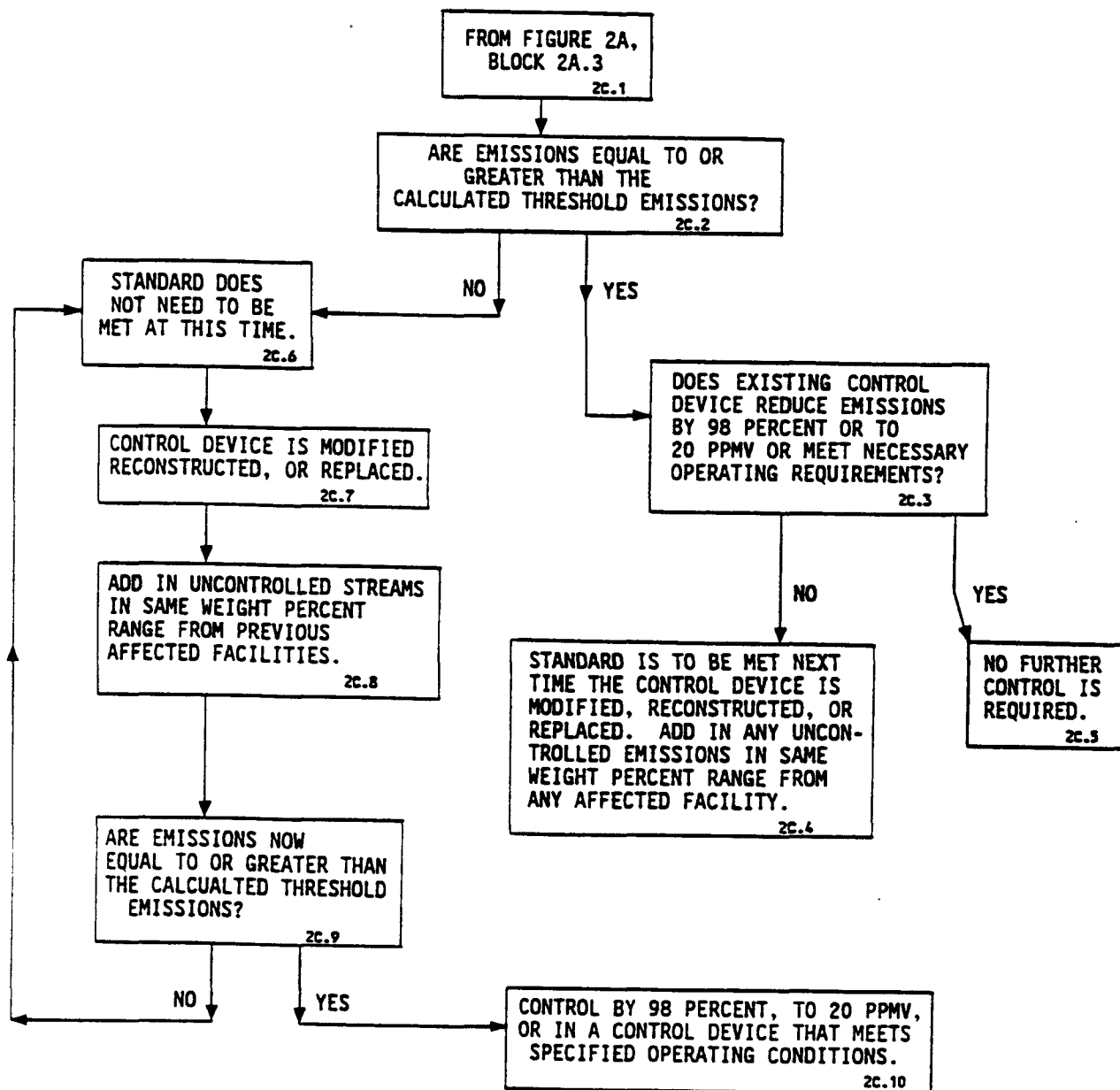


Figure 2B. Decisionmaking Process for Uncontrolled Continuous Emissions from Polypropylene and Polyethylene Affected Facilities



NOTE: THERE ARE NO INDIVIDUAL STREAM EXEMPTIONS FOR EMISSIONS ALREADY CONTROLLED BY EXISTING CONTROL DEVICES

Figure 2C. Decisionmaking Process for Continuous Emissions Already Controlled at Polypropylene and Polyethylene Affected Facilities

stream's uncontrolled emissions are less than the CTE level, any uncontrolled emission streams in the same weight percent range are combined with the controlled stream (Block 2C.8) if and when the control device is modified, reconstructed, or replaced (Block 2C.7).

Lastly, Figure 3 outlines the determination procedure for intermittent emissions. This procedure is much simpler than for continuous emissions as it is based on stream type rather than stream characteristics. This figure shows the exemption for emergency vent streams and the timing for when the standards are to be met, which depends on whether the intermittent streams are uncontrolled or controlled in an existing control device.

Q18. Is the procedure outlined above in Figures 1 through 3 used for all affected facilities or only those that have a January 10, 1989, applicability date?

A. The procedure outlined in Figures 1 through 3 is to be used for all affected facilities, including those that have a September 30, 1987, applicability date (i.e., those process sections identified in Table 1). Note that, as discussed earlier in the answer to Question 7, this procedure allows affected facilities that have a September 30, 1987, applicability date to be exempted from control requirements if, and as long as, their uncontrolled emission rates are below those indicated in Table 2.

Q19. In order to comply with the standards, can an existing control device be used to control uncontrolled emission streams?

A. Yes, under certain circumstances. If the uncontrolled emission streams are required to be controlled by 98 percent or to 20 ppmv, the existing control device can be used to control the streams provided that the control device still meets the standards after the uncontrolled streams are combined with the currently controlled stream. If the control device can not meet the standards when controlling the combined streams, then the existing control device can not be used to control the uncontrolled emission streams. Either a new control device would be used or another existing control device could be used, provided the standards are met.

If the annual emissions of the uncontrolled emission streams are less than the applicable CTE level(s), then control is required only for those uncontrolled emission streams in the 20 to 100 weight percent range (see Blocks 2B.5 and 2B.7) and for those individual emission streams with flows of 8 scfm or less (see Blocks 2B.6, 2B.10, and 2B.7). For such emissions, an existing control device can be used to control

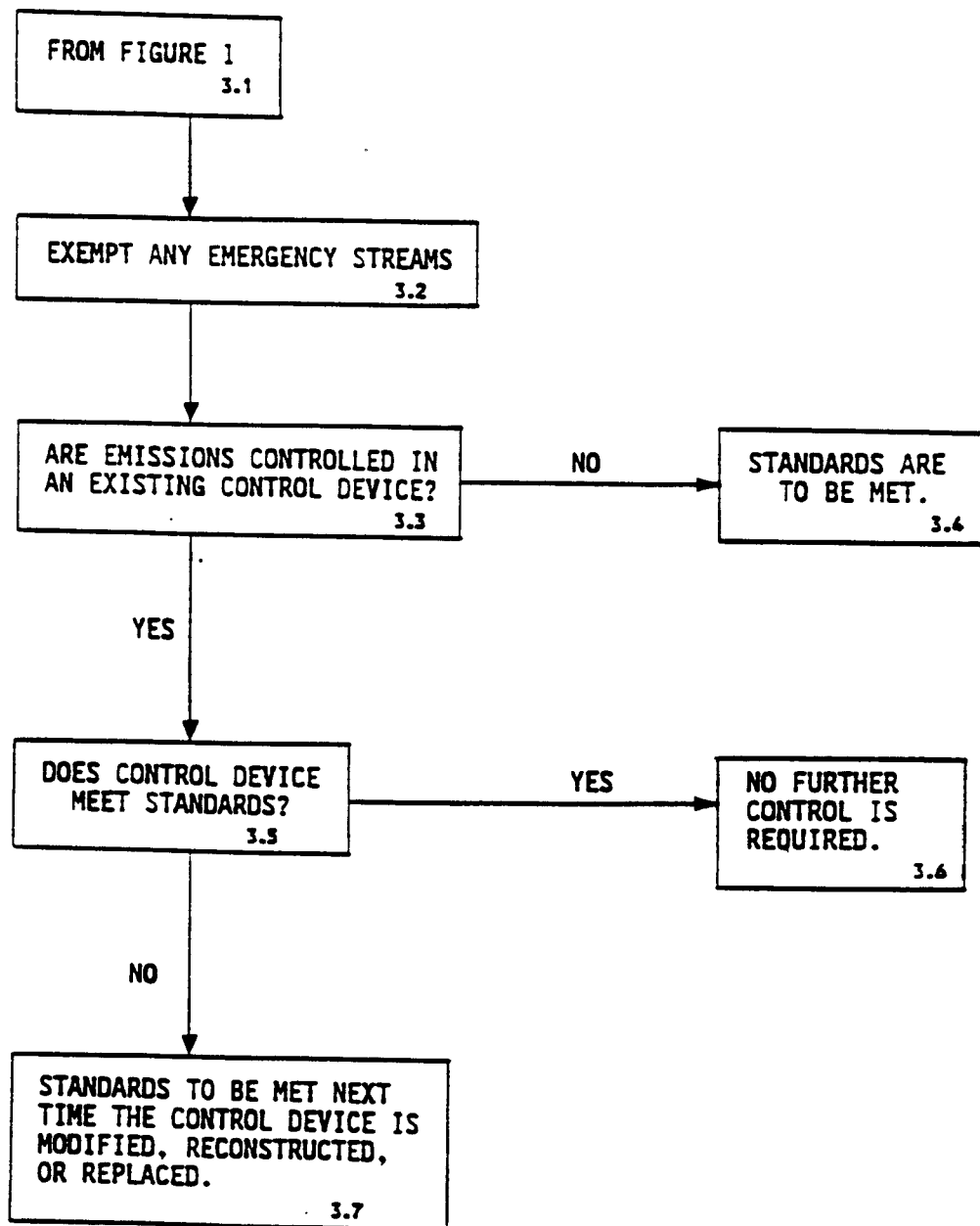


Figure 3. Decisionmaking Process for Intermittent Emissions from Polypropylene and Polyethylene Affected Facilities

the streams. (For related discussions, see Questions 20 and 21.)

- Q20. When are continuous emissions allowed to be vented to an existing control device that does not achieve 98 percent reduction or that does not reduce the VOC concentration to 20 ppmv?
- A. There are two scenarios that allow emissions to be controlled in an existing control device that does not meet the 98 percent reduction or 20 ppmv standard.
1. Uncontrolled emission streams in a weight percent range whose total annual emissions are less than the CTE level are generally not required to be controlled. However, if there are uncontrolled individual emission streams with flows of 8 scfm or less, then each individual emission stream with a flow of 8 scfm or less is still required to be controlled (see Blocks 2B.10 and 2B.7 in Figure 2B). In such instances and for such streams, the standards allow these vent streams to be controlled in any existing control device (i.e., regardless of that control devices control efficiency). Note that for emissions in the 20 to 100 VOC weight percent range, all emissions are required to be controlled, even if the total annual emissions are less than the CTE level (see Blocks 2B.5, 2B.7, and 2B.8 in Figure 2B).
  2. If emissions are already controlled in an existing control device and if such emissions are greater than the CTE level for the VOC weight percent of those emissions, then the controlled emissions may continue to be controlled in the existing control device regardless of the control efficiency of the control device (see Blocks 2C.2, 2C.3, and 2C.4 in Figure 2C). However, if the existing control device is modified, reconstructed, or replaced at a later date, then the emissions must be controlled by 98 percent or to a concentration of 20 ppmv, whichever is less stringent (see Block 2C.4 in Figure 2C).
- Q21. If the emissions of uncontrolled emission streams exceed the CTE level, can the emissions that come from emission streams with individual flows of 8 scfm or less be controlled in an existing control device?
- A. No. If the total annual emissions exceed the CTE level, all emission streams are to meet the 98% or 20 ppmv standard, even those emissions that come from streams with flows of 8 scfm or less.
- Q22. Are all continuous emission streams with a flow of 8 scfm or less required to be controlled?

- A. No. If a stream with 8 scfm or less of flow has less than 1.6 Mg per year of emissions or less than 0.10 weight percent TOC concentration, it is exempt from control. Control is only required of those 8 scfm or less streams that have both emissions of 1.6 Mg per year or more and a TOC concentration of 0.10 weight percent or higher.
- Q23. Are there any other situations in which control of individual vent streams with a flow of 8 scfm or less is not required to be controlled?
- A. Yes. Individual vent streams with a flow of 8 scfm or less are not required to be controlled if they are in an affected facility that is exempt from control through the uncontrolled threshold emission rate exemption.
- Q24. In calculating the total emissions for each weight percent range, are the emissions from affected facilities whose uncontrolled emissions are less than the uncontrolled threshold emission rate for that affected facility included in the total?
- A. It depends on the applicability date of the affected facility.
- If the affected facility has an applicability date of September 30, 1987, then the emissions from the affected facility whose emission rate is less than the uncontrolled threshold emission rate for that affected facility would not be included in the total (see Block 1.5 of Figure 1).
- If the affected facility has an applicability date of January 10, 1989, then all emissions are included in calculating total emissions. (This question is not relevant to affected facilities with a January 10, 1989, applicability date because only those affected facilities with a September 30, 1987, applicability date can "take advantage" of the uncontrolled threshold emission rate exemption.)
- Q25. In calculating the total emissions for each weight percent range, are the emissions from those individual emission streams that have either less than 1.6 Mg per year of emissions or less than 0.10 weight percent TOC included in the total?
- A. No.
- Q26. If the annual emissions (Mg/yr) for a weight percent range are less than the applicable CTE level, but the emission rate (kg VOC/Mg product) from one of the affected facilities is greater than the uncontrolled threshold emission rate for that affected facility, are the emissions from that affected facility required to be controlled?

- A. No. With the exception noted in the following paragraph, the procedure for making control/no control determinations relies on the comparison of the annual emissions in a weight percent range with the CTE calculated for that weight percent range. For the above situation, the fact that one of the affected facility's emission rate is greater than the uncontrolled threshold emission rate is irrelevant to the control/no control determination. Thus, for this situation, none of the emissions in that weight percent range would require control at this time.

If the annual emissions (Mg/yr) for a weight percent range were greater than the CTE level, but the emission rate (kg VOC/Mg product) from one of the affected facilities was less than the uncontrolled threshold emission rate for that affected facility, then, as shown in Block 1.5 of Figure 1, the emissions from that affected facility would not require control at this time. This provision only applies to those affected facilities that have a September 30, 1987, applicability date. (For related discussion, see Question 24.)

- Q27. Suppose an existing process section has three emission streams. Stream A is controlled in an existing control device, and the other two streams are uncontrolled. The process section is modified, thus becoming subject to the NSPS. How many CTE levels need to be calculated?

- A. As shown in Figure 2A, the procedure separates streams that are uncontrolled from streams that are controlled. For this situation, at least two CTE levels would be calculated. One CTE level would be calculated for the stream that is currently controlled. If the streams that are uncontrolled are in the same weight percent range as each other, then a second CTE level would be calculated. If the two uncontrolled streams are in different weight percent ranges, then CTE levels would be calculated for each uncontrolled stream.

If the uncontrolled emission streams and the controlled emission stream are in the same weight percent range, there is only one scenario in which controlled and uncontrolled emissions in the same weight percent range are combined to calculate a CTE level. If the controlled stream's uncontrolled emissions (i.e., the emissions entering the control device) are less than the CTE level, any uncontrolled emission streams in the same weight percent range are combined with the controlled stream if and when the control device is modified, reconstructed, or replaced. At such times, a CTE level is calculated based on the combined uncontrolled and controlled emission streams to calculate a CTE level to determine whether the combined emissions are required to meet the standard (98 percent or



20 ppmv). This is illustrated in Figure 2C, in Blocks 2C.7, 2C.8, and 2C.9.

Q28. For the situation described in Question 27, is the currently controlled stream subject to the standard?

A. Yes. But as shown in Figure 2C, the time at which the standard is to be met varies.

If the controlled stream's uncontrolled emissions are greater than the CTE level, then compliance is required. If the control device does not already meet the standard, compliance is required the next time the control device is modified, reconstructed, or replaced (see Block 2C.4). At that time, all uncontrolled emission streams in the same weight percent range are also required to be controlled to meet the standards.

If the controlled stream's uncontrolled emissions are less than the applicable CTE level for those emissions, then the stream is not required to meet the 98 percent or 20 ppmv standard (or equivalent) at that time (see Block 2C.6). If the control device is modified, reconstructed, or replaced, the controlled emission stream would be reconsidered, adding to it any uncontrolled emission streams in the same weight percent range from previously affected facilities (see Block 2C.8). If the combined emissions are equal to or greater than the CTE level calculated for the combined emissions, then control to the standard is required for the combined emissions (see Blocks 2C.9 and 2C.10).

Q29. Suppose in the example situation in Question 27 the control device is replaced (or modified or reconstructed) at the same time the process section is modified, thus becoming subject to the NSPS. Block 2B.3 (affecting uncontrolled streams) and Block 2C.8 (affecting controlled streams) both require consideration of uncontrolled emission streams from previously affected facilities in the control/no control determination procedure. How are the uncontrolled emission streams from the previously affected facilities to be handled in this situation?

A. Should such a situation arise, the control/no control determination for all uncontrolled emission streams should be made first. Thus, any uncontrolled emission streams from previously affected facilities would be added to the two uncontrolled emission streams from the currently modified process section as appropriate (i.e., by virtue of being in the same weight percent range) and the control/no control determination would be made.

Once the control/no control determination has been made for the uncontrolled streams, then the controlled stream from the currently modified process section would be considered.

If, after considering all of the uncontrolled emission streams (from both the previously affected facilities and the currently modified process section), there are any uncontrolled emission streams from the previously affected facilities that remain uncontrolled and that are in the same weight percent range as the controlled stream's uncontrolled emissions, then such emission streams would be added to the controlled emission stream.

Q30. If, in the example presented in Question 29, there are uncontrolled emission streams from the currently modified process section that remain uncontrolled, should they be combined with the controlled stream's uncontrolled emissions (provided they are in the same weight percent range) in making the control/no control determination for the currently controlled emission stream?

A. Yes. Although not explicitly shown in the figures, adding in such streams is completely consistent with the basis and methodology used to derive the procedures. (See Questions 32 and 34 for additional discussion related to this point.)

Questions 31 through 34 address various scenarios to assist in understanding how these procedures are to be used. They are all based initially on the sample situation presented in Question 27.

Q31. Suppose the uncontrolled emission levels for both the controlled emission stream and the uncontrolled emission streams are greater than their respective CTE levels. What would be the control/no control decisions?

A. In this scenario, all three streams are subject to the standard. The uncontrolled emission streams are required to meet the standards at this time. However, the timing of when the controlled emission stream is to be in compliance depends on the current performance of the control device (see Blocks 2C.3, 2C.4, and 2C.5). (If an owner or operator so elects, all three emission streams could be controlled in a single control device.)

If the existing control device is replaced at the same time as the process section is modified, the currently controlled emission stream is required to meet the standard at this time. If the existing control device is not replaced at the same time as the process section is modified, then the currently controlled emission stream would not have to meet the standard until the control device is later replaced (or modified or reconstructed).

Q32. Suppose the uncontrolled emission rate for the controlled emission stream is greater than the CTE level for that stream, but the uncontrolled emission rates for the uncontrolled emission streams are less than their respective CTE level. What would be the control/no control decisions?

- A. Except as discussed in the following paragraph, control is not required for the two uncontrolled emission streams in this scenario. The controlled emission stream would be subject to the standards and would be required to comply with the standards as discussed in the answer to Question 29.

If the existing control device is modified (or replaced or reconstructed) at the same time that the process section is modified, then (as discussed in the response to Question 30) the uncontrolled emission streams would be combined with the currently controlled emission stream (provided they are in the same weight percent range) and would be controlled. This is an application of Block 2C.4.

- Q33. Suppose the uncontrolled emission rate for the controlled emission stream is less than the CTE level for that stream, but the uncontrolled emission rates for the uncontrolled emission streams are greater than their respective CTE levels. What would be the control/no control decisions?

- A. In this scenario, the uncontrolled emission streams would be required to comply with the standards at this time.

The currently controlled emission stream would not be required to meet the standards at this time (see Blocks 2C.2 and 2C.6).

- Q34. Suppose the uncontrolled emission levels for both the controlled emission stream and the uncontrolled emission streams are less than their respective CTE levels.

- A. Except as discussed in the following paragraph, none of the emission streams would be need to comply with the standards at this time.

If the existing control device is modified (or replaced or reconstructed) at the same time that the process section is modified and if any of the uncontrolled emission streams are in the same weight percent range as the controlled stream, then such streams would be combined with the currently controlled emission stream, a new CTE level would be calculated, and a new control/no control determination would be made. This is an application of Block 2C.8, as discussed in the response to Question 30.

#### 4. Reporting and Recordkeeping Requirements

- o Notification and recordkeeping requirements of §60.7 of the General Provisions, which include such notifications as notification of date of construction, anticipated start-up, actual date of initial start-up, and physical or operational changes that may increase the emission rate.

- o Notification of which process operation in Table 1 of the final rule that an owner or operator:
  - 1. Is applying for the purpose of identifying the applicable affected facilities for process sections that are constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989, [§60.560(b)(1)(ii)]; or
  - 2. Is selecting for purposes of determining applicable affected facilities and uncontrolled threshold emission rates for process sections that are constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989, and that are in process lines in which more than one type of polymer is being produced [§60.560(i)].
- o Up-to-date, readily accessible record of the initial performance test and of all subsequent performance tests.
- o With the initial performance test, an engineering report describing in detail the vent system used to vent each affected vent stream to a control device.
- o Monitoring of control device parameters, with semiannual reports of when monitored parameters are exceeded.
- o Records of any changes in production capacity, feedstock type, or catalyst type, or of any replacement, removal or addition of product recovery equipment.
- o Record and report any changes in process operations that increase the uncontrolled emission rate of the process line in which the affected facility is located if the owner or operator is seeking to exempt that affected facility from the standard by complying with the uncontrolled emission rate exemption.
- o Record and report any changes in process operations that increase the uncontrolled annual emissions or VOC concentration, as appropriate, for each individual stream an owner or operator is seeking to exempt from the standard by complying with the uncontrolled annual emissions or VOC weight percent concentration exemption for individual streams.

B. Polystyrene

1. Applicability

Q35. Do the process emission standards affect all plants that produce polystyrene?

A. No. The process emission standards apply only to those plants producing general purpose (crystal) or impact polystyrene or polystyrene copolymers using a continuous process. The process emission standards do not apply to plants that produce general purpose (crystal) or impact polystyrene or polystyrene copolymers using a batch production process or to plants that produce expandable polystyrene using either an in-situ suspension process or a post-impregnation suspension process.

Q36. What are the affected facilities for polystyrene plants?

A. The affected facility for process emissions is each material recovery section. Note that this applies only to plants producing general purpose or impact polystyrene or polystyrene copolymers using a continuous process.

Q37. What is the applicability date for polystyrene affected facilities?

A. The applicability date for all polystyrene affected facilities is September 30, 1987.

2. Exemptions

Q38. Are there any exemptions provided for in the polystyrene standards?

A. Yes. Individual material recovery sections with uncontrolled emission rates below 0.05 kilogram (kg) TOC per megagram (Mg) of product are exempt from the standards. This is the only exemption provided for polystyrene affected facilities.

Q39. Do these uncontrolled threshold emission rates apply to constructed, modified, and reconstructed material recovery sections?

A. No. This exemption applies only to those material recovery sections that are modified or reconstructed. They do not apply to constructed (i.e., new) material recovery sections.

Q40. How is "uncontrolled emission rate" defined?

A. "Uncontrolled emission rate" refers to the emission rate of a vent stream that vents directly to the atmosphere and to the emission rate of a vent stream to the atmosphere that

would occur in the absence of any add-on control devices, but after any material recovery devices that constitute part of the normal material recovery operations in a process line where potential emissions are recovered for recycle or resale.

### 3. Standards

Q41. What are the process emission standards for polystyrene facilities?

A. The process emission standards are:

1. limit the emissions of TOC (minus methane and ethane) to 0.0036 kg of TOC per Mg of product (0.0036 lbs TOC/1,000 lbs product) from each material recovery section, or
2. limit the outlet gas temperature from each final condenser in each material recovery section to -25°C (-13°F), or
3. reduce emissions from each material recovery section by 98 weight percent or to 20 ppmv.

An owner or operator is required to meet one of these limits; he or she is not required to meet each limit.

Q42. How is compliance with the outlet gas temperature requirement determined?

A. If an owner or operator elects to comply with the outlet temperature standard, the rule requires a temperature monitor equipped with a continuous recorder to calculate the average exit temperature measured at least every 15 minutes and average over the performance test period. Each 3-hour period constitutes a performance test.

### 4. Reporting and Recordkeeping Requirements

- o Notification and recordkeeping requirements of §60.7 of the General Provisions, which include such notifications as notification of date of construction, anticipated start-up, actual date of initial start-up, and physical or operational changes that may increase the emission rate.
- o Up-to-date, readily accessible record of the initial performance test and of all subsequent performance tests.
- o With the initial performance test, an engineering report describing in detail the vent system used to vent each affected vent stream to a control device.

- o Monitoring of control device parameters, with semiannual reports of when monitored parameters are exceeded.
- o Records of any changes in production capacity, feedstock type, or catalyst type, or of any replacement, removal or addition of product recovery equipment.
- o Record and report any changes in process operations that increases the uncontrolled emission rate of the process line in which the affected facility is located if the owner or operator is seeking to exempt that affected facility from the standard by complying with the uncontrolled emission rate exemption.

C. Poly(ethylene terephthalate) (PET)

1. Applicability

Q43. Do the standards affect all plants that produce PET?

A. The process emission standards apply to all plants producing PET or PET copolymers using either the dimethyl terephthalate (DMT) process or the terephthalic acid (TPA) process in a continuous production process. The standards do not apply to process emissions from facilities that use a batch production process.

Q44. What are the affected facilities for plants producing PET?

A. For plants producing PET using the DMT process, the affected facilities are each:

1. material recovery section, and
2. polymerization reaction section.

For plants producing PET using the TPA process, the affected facilities are each:

1. raw materials preparation section, and
2. polymerization reaction section.

Q45. What is the applicability date for PET affected facilities?

A. The applicability date for all PET affected facilities is September 30, 1987.

2. Exemptions

Q46. Are there any exemptions provided for in the PET standards?

A. Yes. Individual affected facilities with uncontrolled emission rates below specified uncontrolled threshold emission rates are exempt from the standards. These rates are shown in Table 3. This is the only exemption provided for PET affected facilities.

Q47. How is "uncontrolled emission rate" defined?

A. "Uncontrolled emission rate" refers to the emission rate of a vent stream that vents directly to the atmosphere and to the emission rate of a vent stream to the atmosphere that would occur in the absence of any add-on control devices, but after any material recovery devices that constitute part of the normal material recovery operations in a process line where potential emissions are recovered for recycle or resale.



Table 3. Maximum Uncontrolled Threshold Emission Rates<sup>a</sup>  
for Poly(ethylene terephthalate) Affected Facilities<sup>a</sup>

| Production Process  | Process Section           | Uncontrolled<br>Emission Rate,<br>kg TOC/Mg product |
|---|---------------------------|---|
| Poly(ethylene terephthalate),<br>dimethyl terephthalate process | Material Recovery         | 0.12 <sup>bc</sup>                                  |
|   | Polymerization Reaction   | 1.80 <sup>cde</sup>                                 |
| Poly(ethylene terephthalate),<br>terephthalic acid process      | Raw Materials Preparation | g<br>1.80 <sup>ce,h</sup>                           |
|   | Polymerization Reaction   | 3.92 <sup>cf,h</sup>                                |

<sup>a</sup> "Uncontrolled emission rate" refers to the emission rate of a vent stream that vents directly to the atmosphere and to the emission rate of a vent stream to the atmosphere that would occur in the absence of any add-on control devices but after any material recovery devices that constitute part of the normal material recovery operations in a process line where potential emissions are recovered for recycle or resale.

<sup>b</sup> Emission rate applies to continuous emissions only.

<sup>c</sup> Applies to modified or reconstructed affected facilities only.

<sup>d</sup> Includes emissions from the cooling water tower.

<sup>e</sup> Applies to a process line producing low viscosity poly(ethylene terephthalate).

<sup>f</sup> Applies to a process line producing high viscosity poly(ethylene terephthalate).

<sup>g</sup> See footnote h.

<sup>h</sup> Applies to the sum of emissions to the atmosphere from the polymerization reaction section (including emissions from the cooling water tower) and the raw materials preparation section (i.e., the esterifiers).

### 3. Standards

#### Q48. What are the standards for PET facilities?

A. Table 4 summarizes the standards for PET facilities.

For PET plants using the DMT process:

- o The standards limit TOC to the atmosphere from each material recovery section (i.e., methanol recovery) to 0.018 kg of TOC per Mg of product (0.018 lbs TOC/1,000 lbs product), or the outlet gas temperature from each final condenser in the material recovery section (i.e., methanol recovery) to +3°C (+37°F).

An owner or operator is required to meet one or the other of these limits; he or she is not required to meet both limits.

- o The standards also limit TOC to the atmosphere from each polymerization reaction section to 0.02 kg TOC per Mg of product (0.02 lbs TOC/1,000 lbs product). This limit includes emissions from any equipment used to recover further the ethylene glycol for reuse in the process or sale offsite, but does not include organic compound emissions released to the atmosphere from the cooling tower used to provide the cooling water to the vacuum system servicing the polymerization reaction section.
- o If steam-jet ejectors are used to provide the vacuum in the polymerization reaction section, the standards also limit the ethylene glycol concentration in either the effluent exiting the vacuum system servicing the polymerization reaction section or in the cooling water in the cooling tower used to provide the cooling water to the vacuum system servicing the polymerization reaction.
  - o If either a low viscosity PET product is being produced using one or more end finishers per process line or a high viscosity PET product is being produced using single end finishers per process line, the ethylene glycol concentration in the effluent exiting the vacuum system is limited to 0.35 percent by weight based on a 14-day rolling average on a daily basis.
  - o If a high viscosity product is being produced using multiple end finishers, the ethylene glycol concentration in the cooling water in the cooling tower is limited to 6.0 percent by weight based on a 14-day rolling average on a daily basis.

Table 4. Summary of PET Standards

| PROCESS | AFFECTED FACILITY         | VISCOSITY | NUMBER OF END FINISHERS | TYPE OF VACUUM PRODUCER | STANDARD  |
|---------|---------------------------|-----------|-------------------------|-------------------------|---|
| DMT     | Material Recovery         | Low       | --                      | --                      | 0.018 kg TOC/Mg of product <u>OR</u> limit temperature to +37 °F from each final condenser in the material recovery section |
|         |                           | High      | Single                  | --                      | (same as above)   |
|         |                           |           | Multiple                | --                      | (same as above)   |
| DMT     | Polymerization Reaction   | Low       | --                      | not steam jets          | 0.02 kg TOC/Mg of product   |
|         |                           |           |                         | steam jets              | 0.02 kg TOC/Mg of product <u>AND</u> 0.35 % ethylene glycol by weight in the effluent exiting the vacuum system             |
|         |                           | High      | Single                  | not steam jets          | 0.02 kg TOC/Mg of product   |
|         |                           |           |                         | steam jets              | 0.02 kg TOC/Mg of product <u>AND</u> 0.35 % ethylene glycol by weight in the effluent exiting the vacuum system             |
|         |                           |           | Multiple                | not steam jets          | 0.02 kg TOC/Mg of product   |
|         |                           |           |                         | steam jets              | 0.02 kg TOC/Mg of product <u>AND</u> 6.0 % ethylene glycol by weight in the cooling water in the cooling tower              |
| TPA     | Raw Materials Preparation | Low       | --                      | --                      | 0.04 kg TOC/Mg of product   |
|         |                           | High      | Single                  | --                      | (same as above)   |
|         |                           |           | Multiple                | --                      | (same as above)   |
| TPA     | Polymerization Reaction   | Low       | --                      | not steam jets          | 0.02 kg TOC/Mg of product   |
|         |                           |           |                         | steam jets              | 0.02 kg TOC/Mg of product <u>AND</u> 0.35 % ethylene glycol by weight in the effluent exiting the vacuum system             |
|         |                           | High      | Single                  | not steam jets          | 0.02 kg TOC/Mg of product   |
|         |                           |           |                         | steam jets              | 0.02 kg TOC/Mg of product <u>AND</u> 0.35 % ethylene glycol by weight in the effluent exiting the vacuum system             |
|         |                           |           | Multiple                | not steam jets          | 0.02 kg TOC/Mg of product   |
|         |                           |           |                         | steam jets              | 0.02 kg TOC/Mg of product <u>AND</u> 6.0 % ethylene glycol by weight in the cooling water in the cooling tower              |

KEY: DMT = dimethyl terephthalate  
TPA = terephthalic acid

For plants producing PET using the TPA process:

- o The standards limit TOC from each raw materials preparation section (i.e., the esterifiers) to 0.04 kg of TOC per Mg of product (0.04 lbs TOC/1,000 lbs product).
- o The standards for polymerization reaction section in which the TPA process is being used are the same as for the polymerization reaction section in PET plants using the DMT process.

Q49. How is compliance with the ethylene glycol limits determined?

- A. For determining compliance with the ethylene glycol concentration standards, ASTM D2908-74, "Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Chromatography," is to be used. At least one sample per operating day is to be collected with an average ethylene glycol concentration by weight calculated on a daily basis over a rolling 14-day period of operating days. Each daily average ethylene glycol concentration so calculated constitutes a performance test. The promulgated standards allow an owner or operator to institute a reduced testing program if the concentration of the ethylene glycol in the vacuum system effluent or in the cooling water, as applicable, meets certain criteria.

#### 4. Reporting and Recordkeeping Requirements

- o Notification and recordkeeping requirements of §60.7 of the General Provisions, which include such notifications as notification of date of construction, anticipated start-up, actual date of initial start-up, and physical or operational changes that may increase the emission rate.
- o Up-to-date, readily accessible record of the initial performance test and of all subsequent performance tests.
- o With the initial performance test, an engineering report describing in detail the vent system used to vent each affected vent stream to a control device.
- o Monitoring of control device parameters, with semiannual reports of when monitored parameters are exceeded.
- o Records of any changes in production capacity, feedstock type, or catalyst type, or of any replacement, removal or addition of product recovery equipment.
- o Record and report any changes in process operations that increases the uncontrolled emission rate of the process line in which the affected facility is located if the owner or

operator is seeking to exempt that affected facility from the standard by complying with the uncontrolled emission rate exemption.

## **II. EQUIPMENT LEAKS OF VOC EMISSIONS (FUGITIVE EMISSIONS)**

(These standards apply Subpart VV, "Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry" to the polymer manufacturing industry. The standards for equipment leaks of VOC emissions for polymer manufacturing facilities, therefore, are the same as those for the SOCM1.)

### **1. Applicability**

**Q50. Are all of the polymer production processes covered by the standards for equipment leaks of VOC?**

**A.** The standards of performance for equipment leaks of VOC emissions apply to polypropylene, polyethylene, polystyrene (including impact polystyrene), polypropylene copolymer, polyethylene copolymer, and polystyrene copolymer manufacturing plants. Equipment leaks from equipment in PET or PET copolymer manufacturing plants are not covered by these standards.

**Q51. What are the affected facilities for equipment leaks?**

**A.** The affected facility is each process unit. This is the same affected facility as for Subpart VV, "Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry."

**Q52. What is the applicability date for equipment leak affected facilities?**

**A.** The applicability date for all equipment leak affected facilities is September 30, 1987.

**Q53. What type of equipment are covered by the equipment leak standards?**

**A.** The equipment leak standards apply to pumps, valves, sampling connections, pressure relief devices, open-ended valves, and compressors in VOC service within each new, modified, and reconstructed process unit.

### **2. Exemptions**

**Q54. What exemptions are there for equipment leaks of VOC?**

**A.** There are two exemptions associated with equipment leaks.

1. Affected facilities with a design capacity to produce less than 1,000 Mg per year (of product) are exempted. This is the same exemption as found in Subpart VV.

2. In §60.482-2(b) of Subpart VV, there are two definitions of when a leak is detected: (1) "If an instrument reading of 10,000 ppm or greater is measured" and (2) "If there are indications of liquids dripping from the pump seal." Certain polymer pumps are designed to purge polymer fluid from bleed ports, thereby allowing small quantities of VOC emissions to escape to the atmosphere. These pumps must use the polymer fluid to provide lubrication and/or cooling of the pump shaft. The final rule exempts purging from bleed ports that are technologically required in existing pumps from the "indications of liquid dripping" definition until the pump is replaced or reconstructed. Once such pumps are replaced or reconstructed, then both definitions of when a leak is detected apply.

### 3. Standards

#### Q55. What are the standards for equipment leaks of VOC?

- A. The promulgated standards require owners and operators of affected facilities in the plants identified above to comply with 40 CFR Part 60 - Subpart VV - "Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry" (SOCMI).

Subpart VV, which is made applicable to the affected facilities in the plants specified above, requires: (1) a leak detection and repair program for valves in gas or light liquid service and for pumps in light liquid service; (2) certain equipment for compressors, sampling connection systems, and open-ended valves; and (3) no detectable emissions from pressure relief devices in gas service during normal operation.

Subpart VV allows the use of "leakless" equipment for valves, pumps, compressors and sampling connection systems as an alternative to the required equipment and work practices. In addition, Subpart VV allows the use of alternative leak detection and repair programs for valves. Subpart VV also contains a procedure for determining the equivalency of alternative leak detection and repair programs.

#### Q56. What do "in VOC," "in gas" and "in light liquid" service mean?

- A. "In VOC service" means that a fugitive emission source contains or contacts a fluid containing 10 or more percent by weight VOC.

"In gas service" means that a fugitive emission source contains VOC fluids in the gaseous or vapor state.

"In light liquid service" means that a fugitive emission source contains a liquid in which the vapor pressure of one or more of the components is greater than 0.3 kPa at 20 °C, as obtained from standard reference texts or as determined by ASTM Method D-2879, and the total concentration of the pure components having a vapor pressure greater than 0.3 kPa at 20 °C equal to or greater than 20 percent by weight.



### Section 3 General Provisions

General provisions, which are used in implementing NSPS, are contained in Subpart A of 40 CFR Part 60, from §60.1 to §60.18. These provisions should be consulted whenever there are questions regarding applicability or implementation of the standard. In this section, summaries of §§60.12 (Circumvention), 60.14 (Modification), and 60.15 (Reconstruction) are presented. The reason for explaining circumvention is that the rule contains two cutoffs (one based on weight percent VOC and the other one annual VOC emissions) that allow individual streams with continuous emissions from polypropylene and polyethylene facilities to be exempt from any control. It is possible to dilute individual streams to take advantage of these cutoffs to avoid their control under these standards; to do so is inappropriate. The reason for explaining modification and reconstruction is to help ensure identification of existing facilities to which the rule should be applied. Finally, the rule requires control of all intermittent releases from polypropylene and polyethylene facilities, except for certain emergency releases. The definition of emergency release includes concepts similar to those in the definition of malfunction, and the relationship between this provision and the definition of malfunction is reviewed.

**I. CIRCUMVENTION (§60.12)**

**Q57. What constitutes a circumvention under Section 111 of the Clean Air Act?**

**A.** Any method employed by an owner or operator to conceal emissions that would otherwise constitute a violation of an applicable standard. For example, the use of gaseous diluents to achieve compliance with an opacity standard or a standard that is based on the concentration of a pollutant in the gases discharged to the atmosphere would be considered circumvention.

**Q58. Besides circumventing an applicable standard, are there other aspects of the standard that an owner or operator may try to circumvent that are likewise prohibited?**

**A.** Yes. It is possible for an owner or operator to manipulate the construction, modification, or reconstruction of a polypropylene or polyethylene affected facility to take advantage of the individual vent stream exemptions for continuous emissions found at §60.560(g), which allows such a stream to be exempt from the standards if its uncontrolled annual emissions are less than 1.6 Mg or if its TOC concentration is less than 0.10 weight percent.

**Q59. How can one determine whether an owner or operator is trying to manipulate an individual vent stream so as to take advantage of §60.560(b)?**

**A.** This would be difficult to do, but there should be enough indicators to determine the intent of the owner or operator. One indicator that can be used for either exemption criteria is the past practice of the company at the same plant site, similar plant site, or similar facilities owned by other companies. Splitting a vent stream into multiple vent streams that are then emitted to the atmosphere would be an obvious attempt to take advantage of the annual emissions exemption. New facilities should be discouraged from venting small multiple vent streams that are in close proximity to each other (e.g., analyzer vents at a building) where they could be combined into a single stream. However, where a company has used this construction practice in the past, such a situation does not constitute circumvention.

Especially important is to ensure that an emission stream is not intentionally diluted to take advantage of the weight percent VOC exemption. Dilution is most likely to be of concern for streams emanating from the product finishing and product storage sections as these streams already tend to be fairly dilute, but can have significant emissions. Past practices and concentration levels can be very helpful in making determinations of "circumvention." It is possible that as more VOC is recovered upstream of these process sections, the emission streams from them will become more dilute. Therefore, all aspects of the process will probably need to be examined to ensure proper design levels are being employed.

II. MODIFICATION (§60.14)

Q60. What constitutes a modification under Section 111 of the Clean Air Act?

A. 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.

Q61. Are there any exceptions to this?

A. Yes. At §60.14(e) there are six specific exceptions, any one of which by itself is not considered a modification. Also at §60.14(f) there is one general exception - the rule that wherever a subpart is more specific than the general provision, the more specific language takes precedence. The exceptions under §60.14(e) are listed below:

1. maintenance, repair, and replacement which the Administrator determines to be routine for a source category;
2. an increase in production rate of an existing facility, if the increase was accomplished without a capital expenditure on the facility;
3. an increase in the hours of production;
4. the use of an alternative fuel or raw material, if prior to the date that the source becomes subject to an applicable standard under 40 CFR Part 60, the facility was designed to use the alternative fuel or raw material;
5. the addition or use of any air pollution control system or device except when such a system is removed or replaced by a system that the Administrator determines to be less environmentally beneficial; or
6. the relocation or change in ownership of an existing facility.

Q62. What is a capital expenditure?

A. This term is defined at §60.2 as an expenditure for a physical or operational change to an existing facility which exceeds the product of the applicable "annual asset guideline repair allowance percentage" and the existing facility's basis. However, the total expenditure for a physical or operational change to an existing facility must not be reduced by any "excluded additions" as defined in the Internal Revenue Service (IRS) Publication 534, as would be done for tax purposes.

The annual asset guideline repair allowance percentage is also found in IRS Publication 534, and the existing facility's basis is defined by §1012 of the Internal Revenue Code. Please note that while the IRS continues to issue Publication 534, the edition with

the "annual asset guideline repair allowance percentage" (AAGRAP) was last published in 1984. A copy of the 1984 edition was sent to all State and local air program directors in a memorandum dated July 11, 1989. As published is the 1984 edition, the AAGRAP for the industries affected by the Polymer Manufacturing Industry NSPS was 12.5.

**Q63. What happens once a source is modified?**

- A. Once modified, an existing facility becomes an affected facility for each pollutant to which a standard applies and for which there is an increase in the emission rate to the atmosphere. EPA gives the following example at 39 FR 36946-36947 (October 15, 1974):

"... if an affected facility is regulated by standards of performance for particulate matter, nitrogen oxides, and sulfur dioxide, and if emissions of ammonia and particulate matter from a corresponding existing facility increase as the result of a physical or operational change, standards of performance [apply] only to the particulate matter emissions from the modified facility. [Once modified] the existing facility is considered an affected facility and is subject to the standards of performance in the same way as a newly constructed affected facility. Therefore, the entire affected facility is subject to the standards of performance, not just the portion...responsible for the increase in emissions."

**Q64. How is the emission rate determined?**

- A. An emission rate is expressed as kg/hr of any pollutant discharged into the atmosphere for which a standard is applicable. The Administrator determines an emission rate by using emission factors specified in the latest issue of EPA Publication AP-42, "Compilation of Air Pollutant Emission Factors." He or she can also use material balances, continuous monitoring data, or manual emission tests to determine emission factors. Where an emission rate is based on the results of continuous monitoring data or a manual emission test, the procedures in Appendix C to 40 CFR Part 60 must be followed and the test shall be conducted under the conditions specified by the Administrator. Three valid runs of the test must be conducted before the modification and three after. In addition, all operating parameters that may affect emissions must be held constant to the maximum degree feasible for all runs. The requirements for determining an emission rate are specified at §60.14(b).

**Q65. What happens if a stationary source is expanded by constructing an affected facility? What happens if an affected facility is constructed at a stationary source as a replacement for an existing facility?**

- A. Under §60.14(c), either action by itself will not cause the remainder of the stationary source to be subject to standards of

performance. EPA gives this explanation at 39 FR 36947 (October 15, 1974):

"It can be inferred from the definition in the Act...that if emissions increase as the result of the construction of a new basic oxygen furnace in an iron and steel mill, the entire iron and steel mill (or at least the affected facilities for which standards have been developed) would be subject to standards of performance. [However,] this interpretation has not been adopted because ... the costs which would result from requiring all existing facilities in a stationary source to comply with standards of performance because of a change in one existing facility would ... be disproportionate to the capital investment required to originally make the physical or operational change."

- Q66. If a source is modified, what is the time period for achieving compliance?
- A. Compliance with all applicable standards must be accomplished within 180 days of completing the physical or operational change. This time period is specified at §60.14(g).
- Q67. Where can more information on §60.14 be found?
- A. The preamble to the proposed rule published at 39 FR 36946 (October 15, 1974) and the preamble to the final rule published at 40 FR 58419 (December 16, 1975) contain useful information on the intent of this rule. Also note that the rule has been modified twice since its original promulgation: at 43 FR 34347 (August 3, 1978) and at 45 FR 5617 (January 23, 1980).

### III. RECONSTRUCTION (§60.15)

#### Q68. What is reconstruction?

- A. Reconstruction is defined at §60.15(b) and means the replacement of components of an existing facility to such an extent that (1) the fixed capital cost of the new components exceeds 50 percent (half) of the fixed capital cost that would be required to construct a comparable entirely new facility, and (2) it is technologically and economically feasible to meet the applicable performance standards of 40 CFR 60. Also, bear in mind that §60.15(g) includes the caveat: "Individual subparts of [Part 60] may include specific provisions which refine and delimit the concept of reconstruction set forth in [§60.15]."

#### Q69. What is "fixed capital cost?"

- A. The fixed capital cost is the capital needed to provide all the depreciable components. In layman's terms, this would be the principal needed to cover the cost of engineering, purchase, and installation of major process equipment, contractors' fees, instrumentation, auxiliary facilities, buildings, and structures. Fixed capital cost does not include the purchase and installation of equipment primarily used for air pollution control unless that equipment is required as part of the process (e.g., product recovery). "Fixed capital cost" is further discussed at 40 FR 58418 (December 16, 1975) and in a letter from Ajax to Thoen dated October 11, 1983.

#### Q70. How is reconstruction significantly different from modification?

- A. When an existing facility is reconstructed, it becomes an affected facility, regardless of any change in emission rate.

#### Q71. What are the responsibilities of an owner or an operator of a facility under §60.15?

- A. If an owner or operator of an existing facility proposes to replace components and the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility, he or she must notify EPA of the proposed replacements. The notice must be postmarked 60 days, or as soon as practicable, before construction of the replacement begins, and the notice must contain seven key elements specified at §60.15(d).

#### Q72. What happens after that notice is submitted to EPA?

- A. The Administrator has 30 days from receipt of the notice and any additional information he or she may reasonably require within which to determine whether the proposed replacement constitutes a reconstruction. The determination shall be based on technical and economic information specified under §60.15(f).

#### IV. MALFUNCTION

Q73. What is a "malfunction"?

A. Section 60.2 defines malfunction 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 upset condition or preventable equipment breakdown shall not be considered malfunctions."

Q74. Is an owner or operator in violation of a standard if emissions exceed the standard during a period of malfunction?

A. No, unless the subpart specifies otherwise [§60.8(c)]. However, an owner or operator is still required to operate the affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions.

Q75. How does a malfunction, as defined at Section 60.2, relate to the exemption for emergency vent streams provided for at Section 60.560(h)?

A. Under this rule, emergency vent streams, which are one type of intermittent emissions, are not required to be controlled. This rule defines an "emergency vent stream" as:

"... an intermittent emission that results from a decomposition, attempts to prevent decompositions, power failure, equipment failure, or other unexpected cause that requires immediate venting of gases from process equipment in order to avoid safety hazards or equipment damage. This includes intermittent vents that occur from process equipment where normal operating parameters (e.g., pressure or temperature) are exceeded such that the process equipment cannot be returned to normal operating conditions using the design features of the system and venting must occur to avoid equipment failure or adverse safety personnel consequences and to minimize adverse effects of the runaway reaction. This does not include intermittent vents that are designed into the process to maintain normal operating conditions of process vessels including those vents that regulate normal process vessel pressure."

In general, the definition of emergency vent stream deals with emissions that arise as a result of some type of a malfunction to the process equipment or to the process itself. Decompositions and attempts to prevent them occur when the process fails to operate in a normal or usual manner. "Equipment failure or other unexpected cause" are intended to refer to process equipment failures. The definition of "emergency vent stream", however, is

intended to clarify situations that are required to be controlled, even if the emissions might be argued to have arisen as a result of a "malfunction" as defined in the General Provisions. More specifically, intermittent emissions that occur as a result of a malfunction, but that do not pose safety hazards or equipment damage, are required to be controlled, including those intermittent emissions that occur as a result of system features designed to regulate normal process conditions. Normal process conditions may be upset as a result of a malfunction. The process system may be designed so that the process can be returned to normal process conditions. Intermittent emissions occurring as a result of this malfunction through the return of the process to its normal operating conditions are to be controlled. In some instances, however, a malfunction may occur such that the capabilities of the system are exceeded and the process cannot be returned to normal process operating conditions. In these instances, emissions that occur after the point of "no return" may be vented to the atmosphere provided such venting is necessary to avoid equipment failure and severe adverse safety personnel consequences, and to minimize adverse effects of the runaway reactions. Intermittent emissions that occur prior to point of "no return" are to be controlled.

Q76. Are there any qualifications to the definition of "malfunction" as applied to continuous emissions?

A. No.



#### Section 4 Regulation for the Polymer Manufacturing Industry

The rulemaking for the polymer manufacturing industry is presented here in its entirety as it appears in the Federal Register notice for the promulgation of these standards. The rulemaking is presented here so that it can be referred to whenever questions arise after reviewing the summary of standards presented earlier.

#### **Final Rule for the Polymer Manufacturing Industry**

40 CFR Part 60 is amended as follows:

1. The authority citation for Part 60 continues to read as follows:

Authority: Secs. 101, 111, 114, 116, 301, Clean Air Act as amended (42 U.S.C. 7401, 7411, 7414, 7416, 7601).

2. By adding a new subpart DDD to read as follows:

Subpart DDD - Standards of Performance for Volatile Organic Compound (VOC) Emissions from the Polymer Manufacturing Industry

Sec.

60.560 Applicability and designation of affected facilities.

60.561 Definitions.

60.562-1 Standards: Process emissions.

60.562-2 Standards: Equipment leaks of VOC.

60.563 Monitoring requirements.

60.564 Test methods and procedures.

60.565 Reporting and recordkeeping requirements.

60.566 Delegation of authority.

Subpart DDD - Standards of Performance for Volatile Organic Compound  
(VOC) Emissions from the Polymer Manufacturing Industry

**§60.560 Applicability and designation of affected facilities**

(a) Affected Facilities. The provisions of this subpart apply to affected facilities involved in the manufacture of polypropylene, polyethylene, polystyrene, or poly(ethylene terephthalate) as defined in §60.561 of this subpart. The affected facilities designated below for polypropylene and polyethylene are inclusive of all equipment used in the manufacture of these polymers, beginning with raw materials preparation and ending with product storage, and cover all emissions emanating from such equipment.

(1) For process emissions from any polypropylene and polyethylene manufacturing process that uses a continuous process, the affected facilities are each of the following process sections: each raw materials preparation section, each polymerization reaction section, each material recovery section, each product finishing section, and each product storage section. These process sections are affected facilities for process emissions that are emitted continuously and for process emissions that are emitted intermittently.

(2) For process emissions from polystyrene manufacturing processes that use a continuous process, the affected facilities are each material recovery section. These process sections are affected facilities for only those process emissions that are emitted continuously.

(3) For process emissions from poly(ethylene terephthalate) manufacturing processes that use a continuous process, the affected facilities are each polymerization reaction section. If the process

uses dimethyl terephthalate, then each material recovery section is also an affected facility. If the process uses terephthalic acid, then each raw materials preparation section is also an affected facility. These process sections are affected facilities for only those process emissions that are emitted continuously.

(4) For VOC emissions from equipment leaks from polypropylene, polyethylene, and polystyrene (including expandable polystyrene) manufacturing processes, the affected facilities are each group of fugitive emissions equipment (as defined in §60.561) within any process unit (as defined in §60.561). This subpart does not apply to VOC emissions from equipment leaks from poly(ethylene terephthalate) manufacturing processes.

(i) Affected facilities with a design capacity to produce less than 1,000 Mg/yr shall be exempt from §60.562-2.

(ii) Addition or replacement of equipment for the purposes of improvement which is accomplished without a capital expenditure shall not by itself be considered a modification under §60.562-2.

(b) Applicability Dates. The applicability date identifies when an affected facility becomes subject to a standard. Usually, a standard has a single applicability date. However, some polypropylene and polyethylene affected facilities have a September 30, 1987, applicability date and others have a January 10, 1989, applicability date. The following paragraphs identify the applicability dates for all affected facilities subject to this subpart.

(1) Polypropylene and Polyethylene. Each process section in a polypropylene or polyethylene production process is a potential affected facility for both continuous and intermittent emissions. The

applicability date depends on when the process section was constructed, modified, or reconstructed and, in some instances, on the type of production process.

(i) The applicability date for any polypropylene or polyethylene affected facility that is constructed, modified, or reconstructed after January 10, 1989, regardless of the type of production process being used, is January 10, 1989.

(ii) Only some polypropylene or polyethylene process sections that are constructed, modified, or reconstructed on or before January 10, 1989, but after September 30, 1987, are affected facilities. These process sections (and the type of emissions to be controlled) are identified by an "x" in Table 1. The applicability date for the process sections (and the emissions to be controlled) that are identified by an "x" in Table 1 is September 30, 1987. Since the affected facilities that have a September 30, 1987, applicability date are determined by the type of production process (e.g., liquid phase, gas phase), each owner or operator shall identify the particular production process that applies to his or her particular process.

(2) Polystyrene. The applicability date for each polystyrene affected facility is September 30, 1987.

(3) Poly(ethylene terephthalate). The applicability date for each poly(ethylene terephthalate) affected facility is September 30, 1987.

(c) Any facility under paragraph (a) of this section that commences construction, modification, or reconstruction after its applicability date as identified under paragraph (b) is subject to the requirements of this subpart, except as provided in paragraphs (d) through (f) of this section.

Table 1. Polypropylene and Polyethylene Affected Facilities with September 30, 1987, Applicability Date

| Polymer                   | Production Process    | Process Section           | Emissions  |              |
|---------------------------|-----------------------|---------------------------|------------|--------------|
|                           |                       |                           | Continuous | Intermittent |
| Polypropylene             | Liquid phase          | Raw Materials Preparation | X          | --           |
|                           |                       | Material Recovery         | X          | --           |
|                           |                       | Polymerization Reaction   | X          | X            |
|                           |                       | Product Finishing         | X          | --           |
|                           |                       | Product Storage           | --         | --           |
| Polypropylene             | Gas Phase             | Raw Materials Preparation | --         | --           |
|                           |                       | Polymerization Reaction   | --         | X            |
|                           |                       | Material Recovery         | X          | --           |
|                           |                       | Product Finishing         | --         | --           |
|                           |                       | Product Storage           | --         | --           |
| Low Density Polyethylene  | High Pressure         | Raw Materials Preparation | --         | X            |
|                           |                       | Polymerization Reaction   | --         | X            |
|                           |                       | Material Recovery         | --         | X            |
|                           |                       | Product Finishing         | --         | X            |
|                           |                       | Product Storage           | --         | X            |
| Low Density Polyethylene  | Low Pressure          | Raw Materials Preparation | X          | X            |
|                           |                       | Polymerization Reaction   | --         | X            |
|                           |                       | Material Recovery         | --         | --           |
| High Density Polyethylene | Gas Phase             | Product Finishing         | X          | --           |
|                           |                       | Product Storage           | --         | --           |
| High Density Polyethylene | Liquid Phase Slurry   | Raw Materials Preparation | --         | X            |
|                           |                       | Polymerization Reaction   | --         | --           |
|                           |                       | Material Recovery         | X          | --           |
|                           |                       | Product Finishing         | X          | --           |
|                           |                       | Product Storage           | --         | --           |
| High Density Polyethylene | Liquid Phase Solution | Raw Materials Preparation | X          | X            |
|                           |                       | Polymerization Reaction   | --         | X            |
|                           |                       | Material Recovery         | X          | X            |
|                           |                       | Product Finishing         | --         | --           |
|                           |                       | Product Storage           | --         | --           |

NOTE: "X" denotes that that process section is an affected facility for continuous or intermittent emissions or both, as shown, which has a September 30, 1987, applicability date.

"--" denotes that that process section is not considered an affected facility for continuous or intermittent emissions or both, as shown, if the process section is constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989. These process sections are affected facilities if they are constructed, modified, or reconstructed after January 10, 1989.

(d) Any polypropylene or polyethylene affected facility with a September 30, 1987, applicability date that commenced construction, modification, or reconstruction after September 30, 1987, and on or before January 10, 1989, with an uncontrolled emission rate (as defined in footnote a to Table 2) at or below those identified in Table 2 is not subject to the requirements of §60.562-1 unless and until its uncontrolled emission rate exceeds that rate listed for it in Table 2 or it is modified or reconstructed after January 10, 1989. At such time, such facility becomes subject to §60.562-1 and the procedures identified in §60.562-1(a) shall be used to determine the control of emissions from the facility.

(e)(1) Modified or reconstructed affected facilities at polystyrene and poly(ethylene terephthalate) plants with uncontrolled emission rates at or below those identified in Table 2 are exempt from the requirements of §60.562-1. This exemption does not apply to new polystyrene or poly(ethylene terephthalate) affected facilities.

(2) Emissions from modified or reconstructed affected facilities that are controlled by an existing control device and that have uncontrolled emission rates greater than the uncontrolled threshold emission rates identified in Table 2 are exempt from the requirements of §60.562-1 unless and until the existing control device is modified, reconstructed, or replaced.

(f) No process section of an experimental process line is considered an affected facility for continuous or intermittent process emissions.

(g) Individual vent streams that emit continuous emissions with uncontrolled annual emissions of less than 1.6 Mg/yr or with a weight percent TOC of less than 0.10 percent from a new, modified, or

Table 2. Maximum Uncontrolled Threshold Emission Rates<sup>a</sup>

| Production Process   | Process Section           | Uncontrolled Emission Rate, kg TOC/Mg product  |
|--|---------------------------|--|
| Polypropylene, liquid phase process                          | Raw Materials Preparation | 0.15 <sup>b</sup>                              |
|  | Polymerization Reaction   | 0.14 <sup>b</sup> , 0.24 <sup>c</sup>          |
|  | Material Recovery         | 0.19 <sup>b</sup>                              |
|  | Product Finishing         | 1.57 <sup>b</sup>                              |
| Polypropylene, gas phase process                             | Polymerization Reaction   | 0.12 <sup>c</sup>                              |
|  | Material Recovery         | 0.02 <sup>b</sup>                              |
| Low Density Polyethylene, high pressure process              | Raw Materials Preparation | 0.41 <sup>d</sup>                              |
|  | Polymerization Reaction   | e  |
|  | Material Recovery         | e  |
|  | Product Finishing         | e  |
|  | Product Storage           | e  |
| Low Density Polyethylene, low pressure process               | Raw Materials Preparation | 0.05 <sup>f</sup>                              |
|  | Polymerization Reaction   | 0.03 <sup>g</sup>                              |
|  | Production Finishing      | 0.01 <sup>b</sup>                              |
| High Density Polyethylene, liquid phase slurry process       | Raw Materials Preparation | 0.25 <sup>c</sup>                              |
|  | Material Recovery         | 0.11 <sup>b</sup>                              |
|  | Product Finishing         | 0.41 <sup>b</sup>                              |
| High Density Polyethylene, liquid phase solution process     | Raw Materials Preparation | 0.24 <sup>f</sup>                              |
|  | Polymerization Reaction   | 0.16 <sup>c</sup>                              |
|  | Material Recovery         | 1.68 <sup>f</sup>                              |
| High Density Polyethylene, gas phase process                 | Raw Materials Preparation | 0.05 <sup>f</sup>                              |
|  | Polymerization Reaction   | 0.03 <sup>g</sup>                              |
|  | Product Finishing         | 0.01 <sup>b</sup>                              |
| Polystyrene, continuous process                              | Material Recovery         | 0.05 <sup>b,h</sup>                            |
| Poly(ethylene terephthalate), dimethyl terephthalate process | Material Recovery         | 0.12 <sup>b,h</sup>                            |
|  | Polymerization Reaction   | 1.80 <sup>b,i,j</sup>                          |
| Poly(ethylene terephthalate), terephthalic acid process      | Raw Materials Preparation | l  |
|  | Polymerization Reaction   | 1.80 <sup>b,j,m</sup><br>3.92 <sup>b,k,m</sup> |

Footnotes to Table 2.

- <sup>a</sup> "Uncontrolled emission rate" refers to the emission rate of a vent stream that vents directly to the atmosphere and to the emission rate of a vent stream to the atmosphere that would occur in the absence of any add-on control devices but after any material recovery devices that constitute part of the normal material recovery operations in a process line where potential emissions are recovered for recycle or resale.
- <sup>b</sup> Emission rate applies to continuous emissions only.
- <sup>c</sup> Emission rate applies to intermittent emissions only.
- <sup>d</sup> Total emission rate for non-emergency intermittent emissions from raw materials preparation, polymerization reaction, material recovery, product finishing, and product storage process sections.
- <sup>e</sup> See footnote d.
- <sup>f</sup> Emission rate applies to both continuous and intermittent emissions.
- <sup>g</sup> Emission rate applies to non-emergency intermittent emissions only.
- <sup>h</sup> Applies to modified or reconstructed affected facilities only.
- <sup>i</sup> Includes emissions from the cooling water tower.
- <sup>j</sup> Applies to a process line producing low viscosity poly(ethylene terephthalate).
- <sup>k</sup> Applies to a process line producing high viscosity poly(ethylene terephthalate).
- <sup>l</sup> See footnote m.
- <sup>m</sup> Applies to the sum of emissions to the atmosphere from the polymerization reaction section (including emissions from the cooling water tower) and the raw materials preparation section (i.e., the esterifiers).



reconstructed polypropylene or polyethylene affected facility are exempt from the requirements of §60.562-1(a)(1). If at a later date, an individual stream's uncontrolled annual emissions become 1.6 Mg/yr or greater (if the stream was exempted on the basis of the uncontrolled annual emissions exemption) or VOC concentration becomes 0.10 weight percent or higher (if the stream was exempted on the basis of the VOC concentration exemption), then the stream is subject to the requirements of §60.562-1.

(h) Emergency vent streams, as defined in §60.561, from a new, modified, or reconstructed polypropylene or polyethylene affected facility are exempt from the requirements of §60.562-1(a)(2).

(i) An owner or operator of a polypropylene or polyethylene affected facility that commenced construction, modification, or reconstruction after September 30, 1987, and on or before January 10, 1989, and that is in a process line in which more than one type of polyolefin (i.e., polypropylene, low density polyethylene, high density polyethylene, or their copolymers) is produced shall select one of the polymer/production process combinations in Table 1 for purposes of determining applicable affected facilities and uncontrolled threshold emission rates.

[Note: The numerical emission limits in these standards are expressed in terms of total organic compounds, measured as total organic compounds less methane and ethane.]

## §60.561 Definitions

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act, in Subpart A of Part 60, or in Subpart VV of Part 60, and the following terms shall have the specific meanings given them.

Boiler means any enclosed combustion device that extracts useful energy in the form of steam.

Capital expenditure means, in addition to the definition in 40 CFR 60.2, an expenditure for a physical or operational change to an existing facility that exceeds P, the product of the facility's replacement cost, R, and an adjusted annual asset guideline repair allowance, A, as reflected by the following equation:  $P = R \times A$ , where

(a) The adjusted annual asset guideline repair allowance, A, is the product of the percent of the replacement cost, Y, and the applicable basic annual asset guideline repair allowance, B, as reflected by the following equation:  $A = Y \times (B \div 100)$ ;

(b) The percent Y is determined from the following equation:  $Y = 1.0 - 0.57 \log X$ , where X is 1986 minus the year of construction; and

(c) The applicable basic annual asset guideline repair allowance, B, is equal to 12.5.

Car-sealed means, for purposes of these standards, a seal that is placed on the device used to change the position of a valve (e.g., from opened to closed) such that the position of the valve cannot be changed without breaking the seal and requiring the replacement of the old seal once broken with a new seal.

Closed vent system means a system that is not open to the atmosphere and that is composed of piping, connections, and, if

necessary, flow inducing devices that transport gas or vapor from a piece or pieces of equipment to a control device.

Continuous emissions means any gas stream containing VOC that is generated essentially continuously when the process line or any piece of equipment in the process line is operating.

Continuous process means polymerization process in which reactants are introduced in a continuous manner and products are removed either continuously or intermittently at regular intervals so that the process can be operated and polymers produced essentially continuously.

Control device means an enclosed combustion device, vapor recovery system, or flare.

Copolymer means a polymer that has two different repeat units in its chain.

Decomposition means, for the purposes of these standards, an event in a polymerization reactor that advances to the point where the polymerization reaction becomes uncontrollable, the polymer begins to break down (decompose), and it becomes necessary to relieve the reactor instantaneously in order to avoid catastrophic equipment damage or serious adverse personnel safety consequences.

Decomposition emissions refers to those emissions released from a polymer production process as the result of a decomposition or during attempts to prevent a decomposition.

Emergency vent stream means, for the purposes of these standards, an intermittent emission that results from a decomposition, attempts to prevent decompositions, power failure, equipment failure, or other unexpected cause that requires immediate venting of gases from process equipment in order to avoid safety hazards or equipment damage. This includes intermittent vents that occur from process equipment where

normal operating parameters (e.g., pressure or temperature) are exceeded such that the process equipment can not be returned to normal operating conditions using the design features of the system and venting must occur to avoid equipment failure or adverse safety personnel consequences and to minimize adverse effects of the runaway reaction. This does not include intermittent vents that are designed into the process to maintain normal operating conditions of process vessels including those vents that regulate normal process vessel pressure.

End finisher means a polymerization reaction vessel operated under very low pressures, typically at pressures of 2 torr or less, in order to produce high viscosity poly(ethylene terephthalate). An end finisher is preceded in a high viscosity poly(ethylene terephthalate) process line by one or more polymerization vessels operated under less severe vacuums, typically between 5 and 10 torr. A high viscosity poly(ethylene terephthalate) process line may have one or more end finishers.

Existing control device means, for the purposes of these standards, an air pollution control device that has been in operation on or before September 30, 1987, or that has been in operation between September 30, 1987, and January 10, 1989, on those continuous or intermittent emissions from a process section that is marked by an "--" in Table 1 of this subpart.

Existing control device is reconstructed means, for the purposes of these standards, the capital expenditure of at least 50 percent of the replacement cost of the existing control device.

Existing control device is replaced means, for the purposes of these standards, the replacement of an existing control device with another control device.

Expandable polystyrene means a polystyrene bead to which a blowing agent has been added using either an in-situ suspension process or a post-impregnation suspension process.

Experimental process line means a polymer or copolymer manufacturing process line with the sole purpose of operating to evaluate polymer manufacturing processes, technologies, or products. An experimental process line does not produce a polymer or resin that is sold or that is used as a raw material for nonexperimental process lines.

Flame zone means that portion of the combustion chamber in a boiler occupied by the flame envelope.

Fugitive emissions equipment means each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, valve, and flange or other connector in VOC service and any devices or systems required by Subpart VV of this part.

Gas phase process means a polymerization process in which the polymerization process is carried out in the gas phase; i.e., the monomer(s) are gases in a fluidized bed of catalyst particles and granular polymer.

High density polyethylene (HDPE) means a thermoplastic polymer or copolymer comprised of at least 50 percent ethylene by weight and having a density of greater than  $0.940 \text{ g/cm}^3$ .

High pressure process means the conventional production process for the manufacture of low density polyethylene in which a reaction pressure of about 15,000 psig or greater is used.

High viscosity poly(ethylene terephthalate) means poly(ethylene terephthalate) that has an intrinsic viscosity of 0.9 or higher and is used in such applications as tire cord and seat belts.

Incinerator means an enclosed combustion device that is used for destroying VOC.

In-situ suspension process means a manufacturing process in which styrene, blowing agent, and other raw materials are added together within a reactor for the production of expandable polystyrene.

Intermittent emissions means those gas streams containing VOC that are generated at intervals during process line operation and includes both planned and emergency releases.

Liquid phase process means a polymerization process in which the polymerization reaction is carried out in the liquid phase; i.e., the monomer(s) and any catalyst are dissolved, or suspended in a liquid solvent.

Liquid phase slurry process means a liquid phase polymerization process in which the monomer(s) are in solution (completely dissolved) in a liquid solvent, but the polymer is in the form of solid particles suspended in the liquid reaction mixture during the polymerization reaction; sometimes called a particle form process.

Liquid phase solution process means a liquid phase polymerization process in which both the monomer(s) and polymer are in solution (completely dissolved) in the liquid reaction mixture.

Low density polyethylene (LDPE) means a thermoplastic polymer or copolymer comprised of at least 50 percent ethylene by weight and having a density of  $0.940 \text{ g/cm}^3$  or less.

Low pressure process means a production process for the manufacture of low density polyethylene in which a reaction pressure markedly below that used in a high pressure process is used. Reaction pressure of current low pressure processes typically go up to about 300 psig.

Low viscosity poly(ethylene terephthalate) means a poly(ethylene terephthalate) that has an intrinsic viscosity of less than 0.75 and is used in such applications as clothing, bottle, and film production.

Material recovery section means the equipment that recovers unreacted or by-product materials from any process section for return to the process line, off-site purification or treatment, or sale. Equipment designed to separate unreacted or by-product material from the polymer product are to be included in this process section, provided at least some of the material is recovered for reuse in the process, off-site purification or treatment, or sale, at the time the process section becomes an affected facility. Otherwise such equipment are to be assigned to one of the other process sections, as appropriate. Equipment that treats recovered materials are to be included in this process section, but equipment that also treats raw materials are not to be included in this process section. The latter equipment are to be included in the raw materials preparation section. If equipment is used to return unreacted or by-product material directly to the same piece of process equipment from which it was emitted, then that equipment is considered part of the process section that contains the process equipment. If equipment is used to recover unreacted or by-product material from a process section and return it to another process section or a different piece of process equipment in the same process section or sends it off-site for purification, treatment, or sale, then such equipment are considered part of a material recovery section. Equipment used for the on-site recovery of ethylene glycol from poly(ethylene terephthalate) plants, however, are not included in the material recovery section, but are covered under the standards applicable to the polymerization reaction section [§60.562-1(c)(1)(ii)(A) or (2)(ii)(A)].

Operating day means, for the purposes of these standards, any calendar day during which equipment used in the manufacture of polymer was operating for at least 8 hours or one labor shift, whichever is shorter. Only operating days shall be used in determining compliance with the standards specified in §60.562-1(c)(1)(ii)(B), (1)(ii)(C), (2)(ii)(B), and (2)(ii)(C). Any calendar day in which equipment is used for less than 8 hours or one labor shift, whichever is less, is not an "operating day" and shall not be used as part of the rolling 14-day period for determining compliance with the standards specified in §60.562-1(c)(1)(ii)(B), (1)(ii)(C), (2)(ii)(B), and (2)(ii)(C).

Polyethylene means a thermoplastic polymer or copolymer comprised of at least 50 percent ethylene by weight; see low density polyethylene and high density polyethylene.

Poly(ethylene terephthalate) (PET) means a polymer or copolymer comprised of at least 50 percent bis-(2-hydroxyethyl)-terephthalate (BHET) by weight.

Poly(ethylene terephthalate) (PET) manufacture using dimethyl terephthalate means the manufacturing of poly(ethylene terephthalate) based on the esterification of dimethyl terephthalate (DMT) with ethylene glycol to form the intermediate monomer bis-(2-hydroxyethyl)-terephthalate (BHET) that is subsequently polymerized to PET.

Poly(ethylene terephthalate) (PET) manufacture using terephthalic acid means the manufacturing of poly(ethylene terephthalate) based on the esterification reaction of terephthalic acid (TPA) with ethylene glycol to form the intermediate monomer bis-(2-hydroxyethyl)-terephthalate (BHET) that is subsequently polymerized to form PET.

Polymerization reaction section means the equipment designed to cause monomer(s) to react to form polymers, including equipment designed



primarily to cause the formation of short polymer chains (oligomers or low polymers), but not including equipment designed to prepare raw materials for polymerization, e.g., esterification vessels. For the purposes of these standards, the polymerization reaction section begins with the equipment used to transfer the materials from the raw materials preparation section and ends with the last vessel in which polymerization occurs. Equipment used for the on-site recovery of ethylene glycol from poly(ethylene terephthalate) plants, however, are included in this process section, rather than in the material recovery process section.

Polypropylene (PP) means a thermoplastic polymer or copolymer comprised of at least 50 percent propylene by weight.

Polystyrene (PS) means a thermoplastic polymer or copolymer comprised of at least 80 percent styrene or para-methylstyrene by weight.

Post-impregnation suspension process means a manufacturing process in which polystyrene beads are first formed in a suspension process, washed, dried, or otherwise finished and then added with a blowing agent to another reactor in which the beads and blowing agent are reacted to produce expandable polystyrene.

Process heater means a device that transfers heat liberated by burning fuel to fluids contained in tubular coils, including all fluids except water that is heated to produce steam.

Process line means a group of equipment assembled that can operate independently if supplied with sufficient raw materials to produce polypropylene, polyethylene, polystyrene (general purpose, crystal, or expandable) or poly(ethylene terephthalate) or one of their copolymers. A process line consists of the equipment in the following process

sections (to the extent that these process sections are present at a plant): raw materials preparation, polymerization reaction, product finishing, product storage, and material recovery.

Process section means the equipment designed to accomplish a general but well-defined task in polymer production. Process sections include raw materials preparation, polymerization reaction, material recovery, product finishing, and product storage and may be dedicated to a single process line or common to more than one process line.

Process unit means equipment assembled to perform any of the physical and chemical operations in the production of polypropylene, polyethylene, polystyrene (general purpose, crystal, or expandable), or poly(ethylene terephthalate) or one of their copolymers. A process unit can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the product. Examples of process units are raw materials handling and monomer recovery.

Product finishing section means the equipment that treats, shapes, or modifies the polymer or resin to produce the finished end product of the particular facility, including equipment that prepares the product for product finishing. For the purposes of these standards, the product finishing section begins with the equipment used to transfer the polymerized product from the polymerization reaction section and ends with the last piece of equipment that modifies the characteristics of the polymer. Product finishing equipment may accomplish product separation, extruding and pelletizing, cooling and drying, blending, additives introduction, curing, or annealing. Equipment used to separate unreacted or by-product material from the product are to be included in this process section, provided the material separated from the polymer product is not recovered at the time the process section

becomes an affected facility. If the material is being recovered, then the separation equipment are to be included in the material recovery section. Product finishing does not include polymerization, the physical mixing of the pellets to obtain a homogenous mixture of the polymer (except as noted below), or the shaping (such as fiber spinning, molding, or fabricating) or modification (such as fiber stretching and crimping) of the finished end product. If physical mixing occurs in equipment located between product finishing equipment (i.e., before all the chemical and physical characteristics have been "set" by virtue of having passed through the last piece of equipment in the product finishing section), then such equipment are to be included in this process section. Equipment used to physically mix the finished product that are located after last piece of equipment in the product finishing section are part of the product storage section.

Product storage section means the equipment that is designed to store the finished polymer or resin end product of the particular facility. For the purposes of these standards, the product storage section begins with the equipment used to transfer the finished product out of the product finishing section and ends with the containers used to store the final product. Any equipment used after the product finishing section to recover unreacted or by-product material are to be considered part of a material recovery section. Product storage does not include any intentional modification of the characteristics of any polymer or resin product, but does include equipment that provide a uniform mixture of product, provided such equipment are used after the last product finishing piece of equipment. This process section also does not include the shipment of a finished polymer or resin product to another facility for further finishing or fabrication.

Raw materials preparation section means the equipment located at a polymer manufacturing plant designed to prepare raw materials, such as monomers and solvents, for polymerization. For the purposes of these standards, this process section begins with the equipment used to transfer raw materials from storage and recovered material from material recovery process sections, and ends with the last piece of equipment that prepares the material for polymerization. The raw materials preparation section may include equipment that accomplishes purification, drying, or other treatment of raw materials or of raw and recovered materials together, activation of catalysts, and esterification including the formation of some short polymer chains (oligomers), but does not include equipment that is designed primarily to accomplish the formation of oligomers, the treatment of recovered materials alone, or the storage of raw materials.

Recovery system means an individual unit or series of material recovery units, such as absorbers, condensers, and carbon adsorbers, used for recovering volatile organic compounds.

Total organic compounds (TOC) means those compounds measured according to the procedures specified in §60.564.

Vent stream means any gas stream released to the atmosphere directly from an emission source or indirectly either through another piece of process equipment or a material recovery device that constitutes part of the normal recovery operations in a polymer process line where potential emissions are recovered for recycle or resale, and any gas stream directed to an air pollution control device. The emissions released from an air pollution control device are not considered a vent stream unless, as noted above, the control device is

part of the normal material recovery operations in a polymer process line where potential emissions are recovered for recycle or resale.

Volatile organic compounds (VOC) means, for the purposes of these standards, any reactive organic compounds as defined in §60.2 Definitions.

#### **§60.562-1 Standards: Process emissions**

(a) Polypropylene, low density polyethylene, and high density polyethylene. Each owner or operator of a polypropylene, low density polyethylene, or high density polyethylene process line containing a process section subject to the provisions of this subpart shall comply with the provisions in this section on and after the date on which the initial performance test required by §60.8 is completed, but not later than 60 days after achieving the maximum production rate at which the affected facility will be operated, or 180 days after initial startup, whichever comes first.

(1) Continuous Emissions. For each vent stream that emits continuous emissions from an affected facility as defined in §60.560(a)(1), the owner or operator shall use the procedures identified in paragraphs (a)(1)(ii) and (iii) of this section for determining which continuous emissions are to be controlled and which level of control listed in paragraph (a)(1)(i) of this section is to be met. The owner or operator shall use the procedures identified in paragraphs (a)(1)(ii) and (iii) of this section each time a process section is constructed, modified, or reconstructed at the plant site.

(i) Level of Control. Continuous emission streams determined to be subject to control pursuant to the procedures identified in paragraphs (a)(1)(ii) and (iii) of this section, as applicable, shall meet one of the control levels identified in paragraphs (a)(1)(i)(A) through (D) of this section. The procedures in paragraphs (a)(1)(ii) and (iii) of this section identify which level of control may be met. The level of control identified in paragraph (a)(1)(i)(D) of this section is limited to certain continuous emission streams, which are

identified through the procedures in paragraphs (a)(1)(ii) and (iii) of this section.

(A) Reduce emissions of total organic compounds (minus methane and ethane) (TOC) by 98 weight percent, or to a concentration of 20 parts per millions by volume (ppmv) on a dry basis, whichever is less stringent. The TOC is expressed as the sum of the actual compounds, not carbon equivalents. If an owner or operator elects to comply with the 20 ppmv standard, the concentration shall include a correction to 3 percent oxygen only when supplemental combustion air is used to combust the vent stream.

(B) Combust the emissions in a boiler or process heater with a design heat input capacity of 150 million Btu/hour or greater by introducing the vent stream into the flame zone of the boiler or process heater. (Note: A boiler or process heater of lesser design heat capacity may be used, but must demonstrate compliance with paragraph (a)(1)(i)(A) of this section.)

(C) Combust the emissions in a flare that meets the conditions specified in §60.18. If the flare is used to control both continuous and intermittent emissions, the flare shall meet the conditions specified in §60.18 at all times (i.e., when controlling continuous emissions alone or when controlling both continuous and intermittent emissions).

(D) Vent the emissions to a control device located on the plant site.

(ii) Uncontrolled Continuous Emissions. For each vent stream that emits continuous emissions from an affected facility as defined in §60.560(a)(1) and that is not controlled in an existing control device, the owner or operator shall use the procedures identified in Table 3 to

identify those continuous emissions from each constructed, modified, or reconstructed affected facility that are to be controlled. The owner shall include in the procedure all uncontrolled continuous vent streams from previously constructed, modified, or reconstructed affected facilities at the plant site each time a process section is constructed, modified, or reconstructed at the plant site. In applying the procedures shown in Table 3, the stream characteristics may be either measured or calculated as specified in §60.564(d). For modified or reconstructed affected facilities, these stream characteristics are to be determined after a modification or reconstruction determination has been made by the Administrator, but before any actual changes have been undertaken, and then again after the actual changes have been made. Figure 1 provides a summary overview of the control determination procedure described in Table 3.

(iii) Controlled Continuous Emissions. For each vent stream that emits continuous emissions from an affected facility as defined in §60.560(a)(1) and that is controlled in an existing control device, each owner or operator shall determine whether the emissions entering the control device are greater than or equal to the calculated threshold emissions (CTE) level, which is to be calculated using the TOC concentration of the inlet vent stream and the equations in footnote b of Table 3. If the inlet stream's TOC concentration is equal to or less than 20 weight percent, the calculated threshold emissions level is 18.2 Mg/yr. If multiple emission streams are vented to the control device, the individual streams are not to be separated into individual weight percent ranges for calculation purposes as would be done for uncontrolled emission streams. Emissions vented to an existing control device are required to be controlled as described in paragraphs



Table 3. Procedure for Determining Control and Applicable Standard for Continuous Emission Streams from New, Modified, or Reconstructed Polypropylene and Polyethylene Affected Facilities

| Procedure <sup>a</sup>   | Applicable TOC Weight Percent Range | Control/No Control Criteria  | Applicable Standard                   |
|--|-------------------------------------|--|---------------------------------------|
| 1. Sum all uncontrolled streams with TOC weight percent within the applicable weight percent range from all affected facilities at a plant site.<br><br>2. Calculate total uncontrolled annual emissions for each weight percent range. For modified or affected facilities, use the total uncontrolled emissions after modification or reconstruction.                    | 0.10 < 5.5                          | 1. If total combined uncontrolled emissions are equal to or greater than the calculated threshold emissions (CTE) <sup>b</sup> , control.                  | 1. §60.562-1(a)(1)(i)(A), (B), or (C) |
|  |                                     | 2. If total combined uncontrolled emission are less than the CTE <sup>b</sup> , control only individual streams with volume flow rates of 8 scfm or less.  | 2. §60.562-1(a)(1)(i)(A) through (D)  |
| 3. Calculate composite TOC concentration (weight percent) for streams in the 0.10 to less than 5.5 weight percent range and for streams in the 5.5 to less than 20 weight percent range. For modified or reconstructed affected facilities, calculate the composite VOC concentration before and after modification and reconstruction.                                    | 5.5 < 20                            | 1. If total combined uncontrolled emissions are equal to or greater than CTE, control.   | 1. §60.562-1(a)(1)(i)(A), (B), or (C) |
|  |                                     | 2. If total combined uncontrolled emissions are less than the CTE <sup>b</sup> , control only individual streams with volume flow rates of 8 scfm or less. | 2. §60.562-1(a)(1)(i)(A) through (D)  |
| 4. Select the higher of the two TOC concentrations for each weight percent range for vent streams from a modified or reconstructed affected facility.<br><br>5. Calculate the threshold emissions for the 0.10 to less than 5.5 weight percent range and for the 5.5 to less than 20 weight percent range using the respective composite TOC concentration selected above. | 20 to 100                           | 1. If total combined uncontrolled emissions are equal to or greater than 18.2 Mg/yr, control.  | 1. §60.562-1(a)(1)(i)(A), (B), or (C) |
|  |                                     | 2. If total combined uncontrolled emissions are less than 18.2 Mg/yr, control.   | 2. §60.562-1(a)(1)(i)(A) through (D)  |

Footnotes to Table 3.

<sup>a</sup> Individual streams excluded under paragraph §60.560(g) from the requirements of §60.562-1 are to be excluded from all calculations in this table. This paragraph exempts all individual emission streams with individual uncontrolled annual emission rates of less than 1.6 Mg/yr and all individual emission streams with individual TOC concentrations of less than 0.10 percent TOC by weight.

<sup>b</sup> For the 0.10 to less than 5.5 weight percent range, the following equations are used:

| <u>If the percent composite TOC concentration is...</u> | <u>Use this equation to calculate threshold emissions...</u> |
|---|--|
| 0.10 < 0.12   | $(a \times 7.5 \times 10^6) + 226$                           |
| 0.12 < 0.2  | $(b \times 58.3) + 116.8$                                    |
| 0.2 < 0.3   | $(c \times 3020) + 71.8$                                     |
| 0.3 < 0.4   | $(d \times 547) + 54.5$                                      |
| 0.4 < 0.6   | $48.3 + 31 (0.6 - \text{weight percent TOC})$                |
| 0.6 < 5.5   | 48.3   |

where:  $a = (0.12 - \text{weight percent TOC})^{2.5}$

$$b = \frac{\frac{0.18}{\text{weight percent TOC}}^{0.5} - 1}{\text{weight percent TOC}}$$

$$c = (0.3 - \text{weight percent TOC})^2$$

$$d = (0.4 - \text{weight percent TOC})^{1.5}$$

For the 5.5 to less than 20 weight percent range, the following equations are used.

| <u>If the percent composite TOC concentration is...</u> | <u>Use this equation to calculate threshold emissions...</u> |
|---|--|
| 5.5 < 7.0   | $(e \times .740) + 31$                                       |
| 7.0 < 9.0   | $(f \times 324) + 25.0$                                      |
| 9.0 < 20  | $(g \times 125) + 18.2$                                      |

where:

$$e = \frac{\frac{7.0}{\text{weight percent TOC}}^{0.5} - 1}{\text{weight percent TOC}}$$

$$f = \frac{\frac{9.0}{\text{weight percent TOC}}^{0.5} - 1}{\text{weight percent TOC}}$$

$$g = \frac{\frac{20.0}{\text{weight percent TOC}}^{0.5} - 1}{\text{weight percent TOC}}$$

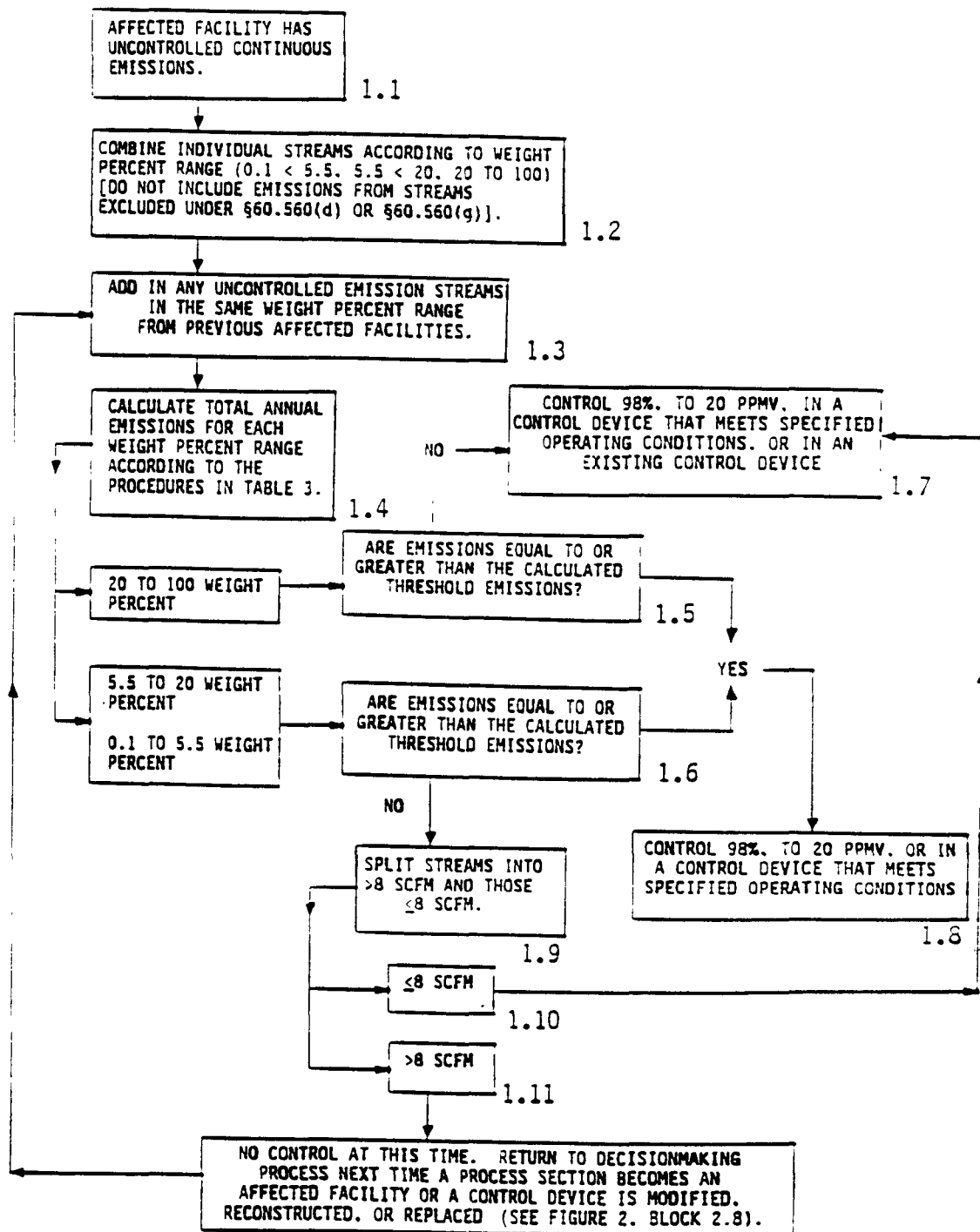
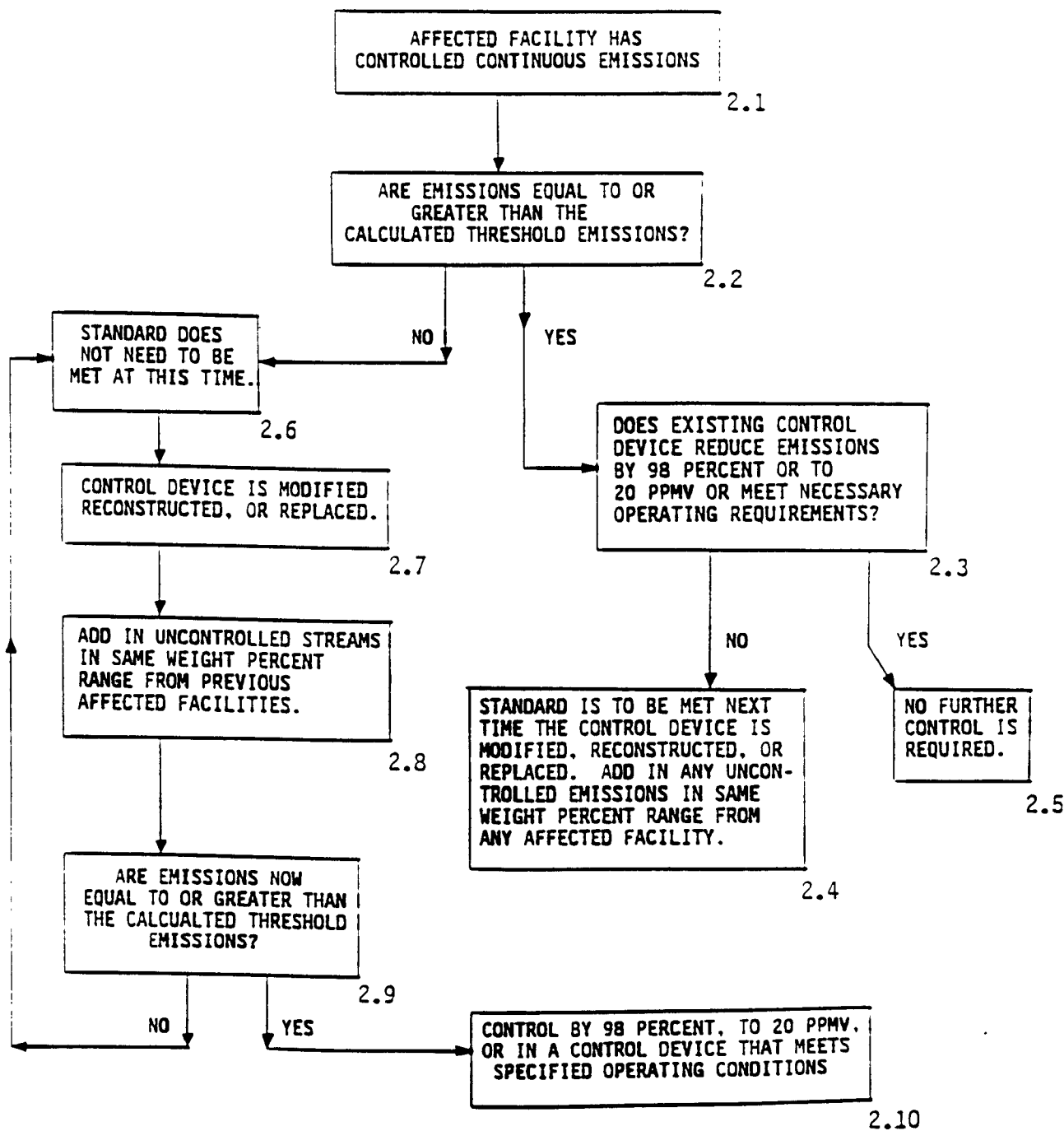


Figure 1. Decisionmaking Process for Uncontrolled Continuous Emissions from Polypropylene and Polyethylene Affected Facilities

(a)(1)(iii)(A) and (B) of this section. Figure 2 illustrates the control determination procedure for controlled continuous emissions.

(A) If the annual emissions of the stream entering the control device are equal to or greater than the CTE levels, then compliance with one of the requirements identified in §60.562-1(a)(1)(i)(A), (B), or (C) is required at such time the control device is reconstructed or replaced or has its operating conditions modified as a result of State or local regulations (including changes in the operating permit) including those instances where the control device is reconstructed, replaced, or modified in its operation at the same time the existing process section is modified or reconstructed and becomes an affected facility. If the existing control device already complies with one of the requirements identified in §60.562-1(a)(1)(i)(A), (B), or (C), no further control is required.

(B) If the annual emissions of the stream entering the control device are less than the CTE level, then the requirements of §60.562-1(a)(1)(i)(A), (B), or (C) are not applicable at that time. However, if the control device is replaced, reconstructed, or modified at a later date, each owner or operator shall reevaluate the applicability of these standards. This is done by combining with the vent stream entering the control device any uncontrolled vent streams in the same weight percent range as the controlled vent stream and determining whether the annual emissions of the stream entering the control device plus the applicable uncontrolled vent streams are greater than or equal to the CTE level, which is based on the weighted TOC concentration of the controlled vent stream and the uncontrolled vent streams. If the annual emissions entering the control device (including the applicable uncontrolled vent streams) are greater than or equal to the CTE level, then compliance



NOTE: There are no individual stream exemptions for emissions already controlled by existing control devices.

Figure 2. Decisionmaking Process for Continuous Emissions Already Controlled at Polypropylene and Polyethylene Affected Facilities

with one of the requirements identified in §60.562-1(a)(1)(i)(A), (B), or (C) is required at that time for both the controlled and uncontrolled vent streams. If the annual emissions are less than the CTE level, compliance with these standards is again not required at such time. However, if the control device is again replaced, reconstructed, or modified, each owner or operator shall repeat this determination procedure.

(2) Intermittent Emissions. The owner or operator shall control each vent stream that emits intermittent emissions from an affected facility as defined in §60.560(a)(1) by meeting one of the control requirements specified in paragraphs (a)(2)(i) and (ii) of this section. If a vent stream that emits intermittent emissions is controlled in an existing flare, incinerator, boiler, or process heater, the requirements of this paragraph are waived until such time the control device is reconstructed or replaced or is modified in its operating conditions as a result of State or local regulation, including changes in the operating permit. This paragraph does not apply to emergency vent streams exempted by §60.560(h) and as defined in §60.561.

(i) Combust the emissions in a flare that is:

(A) Designed for and operated with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours,

(B) Operated with a flame present at all times, and

(C) Designed to maintain a stable flame.

(ii) Combust the emissions in an incinerator, boiler, or process heater. Such emissions shall be introduced into the flame zone of a boiler or process heater.

(b) Polystyrene. Each owner or operator of a polystyrene process line containing process sections subject to the provisions of this subpart shall comply with the provisions in this section on and after the date on which the initial performance test required by §60.8 is completed, but not later than 60 days after achieving the maximum production rate at which the affected facility will be operated, or 180 days after initial startup, whichever comes first. Each owner or operator of a polystyrene process line using a continuous process shall:

(1) Limit the continuous TOC emissions from the material recovery section by complying with one of the following:

(i) Not allow continuous TOC emissions to be greater than 0.0036 kg TOC/Mg product; or

(ii) Not allow the outlet gas stream temperature from each final condenser in the material recovery section to exceed -25°C (-13°F). For purposes of this standard, temperature excursions above this limit shall not be considered a violation when such excursions occur during periods of startup, shutdown, or malfunction; or

(iii) Comply with §60.562-1(a)(1)(i)(A), (B), or (C).

(2) If continuous TOC emissions from the material recovery section are routed through an existing emergency vapor recovery system, then compliance with these standards is required when the emergency vapor recovery system undergoes modification, reconstruction, or replacement. In such instances, compliance with these standards shall be achieved no later than 180 days after completion of the modification, reconstruction, or replacement.

(c) Poly(ethylene terephthalate). Each owner or operator of a poly(ethylene terephthalate) process line containing process sections subject to the provisions of this subpart shall comply with provisions

in this section on and after the date on which the initial performance test required by §60.8 is completed, but not later than 60 days after achieving the maximum production rate at which the affected facility will be operated, or 180 days after initial startup, whichever comes first.

(1) Each owner or operator of a PET process line using a dimethyl terephthalate process shall:

(i) Limit the continuous TOC emissions from the material recovery section (i.e., methanol recovery) by complying with one of the following:

(A) Not allow the continuous TOC emissions to be greater than 0.018 kg TOC/Mg product; or

(B) Not allow the outlet gas temperature from each final condenser in the material recovery section (i.e., methanol recovery) to exceed +3°C (+37°F). For purposes of this standard, temperature excursions above this limit shall not be considered a violation when such excursions occur during periods of startup, shutdown, or malfunction.

(ii) Limit the continuous TOC emissions and, if steam-jet ejectors are used to provide vacuum to the polymerization reactors, the ethylene glycol concentration from the polymerization reaction section by complying with the appropriate standard set forth below. The ethylene glycol concentration limits specified in paragraphs (c)(1)(ii)(B) and (C) of this section shall be determined by the procedures specified in §60.564(j).

(A) Not allow continuous TOC emissions from the polymerization reaction section (including emissions from any equipment used to further



recover the ethylene glycol, but excluding those emissions from the cooling tower) to be greater than 0.02 kg TOC/Mg product; and

(B) If steam-jet ejectors are used as vacuum producers and a low viscosity product is being produced using single or multiple end finishers or a high viscosity product is being produced using a single end finisher, maintain the concentration of ethylene glycol in the liquid effluent exiting the vacuum system servicing the polymerization reaction section at or below 0.35 percent by weight, averaged on a daily basis over a rolling 14-day period of operating days; or

(C) If steam-jet ejectors are used as vacuum producers and a high viscosity product is being produced using multiple end finishers, maintain an ethylene glycol concentration in the cooling tower at or below 6.0 percent by weight averaged on a daily basis over a rolling 14-day period of operating days.

(2) Each owner or operator of a PET process line using a terephthalic acid process shall:

(i) Not allow the continuous TOC emissions from the esterification vessels in the raw materials preparation section to be greater than 0.04 kg TOC/Mg product.

(ii) Limit the continuous TOC emissions and, if steam-jet ejectors are used to provide vacuum to the polymerization reactors, the ethylene glycol concentration from the polymerization reaction section by complying with the appropriate standard set forth below. The ethylene glycol concentration limits specified in paragraphs (c)(2)(ii)(B) and (C) of this section shall be determined by the procedures specified in §60.564(j).

(A) Not allow continuous TOC emissions from the polymerization reaction section (including emissions from any equipment used to further

recover the ethylene glycol, but excluding those emissions from the cooling tower) to be greater than 0.02 kg TOC/Mg product; and

(B) If steam-jet ejectors are used as vacuum producers and a low viscosity product is being produced using single or multiple end finishers or a high viscosity product is being produced using a single end finisher, maintain the concentration of ethylene glycol in the liquid effluent exiting the vacuum system servicing the polymerization reaction section at or below 0.35 percent by weight, averaged on a daily basis over a rolling 14-day period of operating days; or

(C) If steam-jet ejectors are used as vacuum producers and a high viscosity product is being produced using multiple end finishers, maintain an ethylene glycol concentration in the cooling tower at or below 6.0 percent by weight averaged on a daily basis over a rolling 14-day period of operating days.

(d) Closed vent systems and control devices used to comply with this subpart shall be operated at all times when emissions may be vented to them.

(e) Vent systems that contain valves that could divert a vent stream from a control device shall have car-sealed opened all valves in the vent system from the emission source to the control device and car-sealed closed all valves in vent system that would lead the vent stream to the atmosphere, either directly or indirectly, bypassing the control device.

**§60.562-2 Standards: Equipment leaks of VOC**

(a) Each owner or operator of an affected facility subject to the provisions of this subpart shall comply with the requirements specified in §60.482-1 through §60.482-10 as soon as practicable, but no later than 180 days after initial startup, except that indications of liquids dripping from bleed ports in existing pumps in light liquid service are not considered to be a leak as defined in §60.482-2(b)(2). For purposes of this standard, a "bleed port" is a technologically-required feature of the pump whereby polymer fluid used to provide lubrication and/or cooling of the pump shaft exits the pump, thereby resulting in a visible leak of fluid. This exemption expires when the existing pump is replaced or reconstructed.

(b) An owner or operator may elect to comply with the requirements specified in §60.483-1 and §60.483-2.

(c) An owner or operator may apply to the Administrator for a determination of equivalency for any means of emission limitation that achieves a reduction in emissions of VOC at least equivalent to the reduction in emissions of VOC achieved by the controls required in this subpart. In doing so, the owner or operator shall comply with requirements specified in §60.484.

(d) Each owner or operator subject to the provisions of this subpart shall comply with the provisions specified in §60.485 except an owner or operator may use the following provision in addition to §60.485(e): Equipment is in light liquid service if the percent evaporated is greater than 10 percent at 150°C as determined by ASTM Method D86-78 (incorporated by reference as specified in §60.17).

(e) Each owner or operator subject to the provisions of this subpart shall comply with §60.486 and §60.487.

### **§60.563 Monitoring requirements.**

(a) Whenever a particular item of monitoring equipment is specified in this section to be installed, the owner or operator shall install, calibrate, maintain, and operate according to manufacturer's specifications that item as follows:

(1) A temperature monitoring device to measure and record continuously the operating temperature to within 1 percent (relative to degrees Celsius) or  $\pm 0.5^{\circ}\text{C}$  ( $\pm 0.9^{\circ}\text{F}$ ), whichever is greater.

(2) A flame monitoring device, such as a thermocouple, an ultra-violet sensor, an infrared beam sensor, or similar device to indicate and record continuously whether a flare or pilot light flame is present, as specified.

(3) A flow monitoring indicator to indicate and record whether or not flow exists at least once every fifteen minutes.

(4) An organic monitoring device (based on a detection principle such as infrared, photoionization, or thermal conductivity) to indicate and record continuously the concentration level of organic compounds.

(5) A specific gravity monitoring device to measure and record continuously to within 0.02 specific gravity unit.

(b) The owner or operator shall install, as applicable, the monitoring equipment for the control means used to comply with §60.562-1, except §60.562-1(a)(1)(i)(D), as follows:

(1) If the control equipment is an incinerator:

(i) For a noncatalytic incinerator, a temperature monitoring device shall be installed in the firebox.

(ii) For a catalytic incinerator, temperature monitoring devices shall be installed in the gas stream immediately before and after the catalytic bed.

(2) If a flare is used:

(i) A flame monitoring device shall be installed to indicate the presence of a flare flame or a flame for each pilot light, if the flare is used to comply with §60.562-1(a)(1), including those flares controlling both continuous and intermittent emissions.

(ii) A thermocouple or equivalent monitoring device to indicate the presence of a flame at each pilot light, if used to comply with §60.562-1(a)(2).

(3) If a boiler or process heater is used:

(i) If the boiler or process heater has a heat input design capacity of less than 150 million Btu/hr, a temperature monitoring device shall be installed between the radiant section and the convection zone for watertube boilers and between the furnace (combustion zone) and the firetubes for firetube boilers.

(ii) If the boiler or process heater has a heat input design capacity of 150 million Btu/hr or greater, such records to indicate the periods of operation of the boiler or process heater shall be maintained. The records must be readily available for inspection.

(4) If an absorber is the final unit in a system:

(i) A temperature monitoring device and a specific gravity monitoring device for the scrubber liquid shall be installed, or

(ii) An organic monitoring device shall be installed at the outlet of the absorber.

(5) If a condenser is the final unit in a system:

(i) A temperature monitoring device shall be installed at the condenser exit (product side), or

(ii) An organic monitoring device shall be installed at the outlet of the condenser.

(6) If a carbon adsorber is the final unit in a system, an organic monitoring device shall be installed at the outlet of the carbon bed.

(c) Owners or operators of control devices used to comply with the provisions of this subpart, except §60.562-1(a)(1)(i)(D), shall monitor these control devices to ensure that they are operated and maintained in conformance with their designs.

(d) Owners or operators using a vent system that contains valves that could divert a vent stream from a control device used to comply with the provisions of this subpart shall do one or a combination of the following:

(1) Install a flow indicator immediately downstream of each valve that if opened would allow a vent stream to bypass the control device and be emitted, either directly or indirectly, to the atmosphere. The flow indicator shall be capable of recording flow at least once every fifteen minutes.

(2) Monitor the valves once a month, checking the position of the valves and the condition of the car seal, and identify all times when the car seals have been broken and the valve position has been changed (i.e., from opened to closed for valves in the vent piping to the control device and from closed to open for valves that allow the stream to be vented directly or indirectly to the atmosphere).

(e) An owner or operator complying with the standards specified under §60.562-1, except §60.562-1(a)(1)(i)(D), with control devices other than an incinerator, boiler, process heater, flare, absorber, condenser, or carbon adsorber or by any other means shall provide to the Administrator information describing the operation of the control device and the process parameter(s) which would indicate proper operation and

maintenance of the device. The Administrator may request further information and will specify appropriate monitoring procedures or requirements.

#### **§60.564 Test methods and procedures.**

(a) In conducting the performance tests required in §60.8, the owner or operator shall use as reference methods and procedures the test methods in Appendix A of this part or other methods and procedures specified in this section, except as provided under §60.8(b). Owners or operators complying with §60.562-1(a)(1)(i)(D) need not perform a performance test on the control device, provided the control device is not used to comply with any other requirement of §60.562-1(a).

(1) Whenever changes are made in production capacity, feedstock type or catalyst type, or whenever there is replacement, removal, or addition of a control device, each owner or operator shall conduct a performance test according to the procedures in this section as appropriate, in order to determine compliance with §60.562-1.

(2) Where a boiler or process heater with a design heat input capacity of 150 million Btu/hour or greater is used, the requirement for an initial performance test is waived, in accordance with §60.8(b). However, the Administrator reserves the option to require testing at such other times as may be required, as provided for in §114 of the Act.

(3) The owner or operator shall determine the average organic concentration for each performance test run using the equipment described in §60.563(a)(4). The average organic concentration shall be determined from measurements taken at least every 15 minutes during each performance test run. The average of the three runs shall be the base value for the monitoring program.

(4) When an absorber is the final unit in the system, the owner or operator shall determine the average specific gravity for each performance test run using specific gravity monitoring equipment described in §60.563(a)(5). An average specific gravity shall be



determined from measurements taken at least every 15 minutes during each performance test run. The average of the three runs shall be the base value for the monitoring program.

(5) When a condenser is the final unit in the system, the owner or operator shall determine the average outlet temperature for each performance test run using the temperature monitoring equipment described in §60.563(a)(1). An average temperature shall be determined from measurements taken at least every 15 minutes during each performance test run while the vent stream is normally routed and constituted. The average of the three runs shall be the base value for the monitoring program.

(b) The owner or operator shall determine compliance with the emission concentration standard in §60.562-1(a)(1)(i)(A) or (b)(1)(iii) if applicable [if not, see paragraph (c) of this section] as follows:

(1) The TOC concentration is the sum of the individual components and shall be computed for each run using the following equation:

$$C_{\text{TOC}} = \sum_{j=1}^n C_j$$

where:

$C_{\text{TOC}}$  = Concentration of TOC (minus methane and ethane),  
dry basis, ppmv.

$C_j$  = the concentration of sample component j, ppm.

$n$  = Number of components in the sample.

(i) Method 18 shall be used to determine the concentration of each individual organic component ( $C_j$ ) in the gas stream. Method 1 or 1A, as appropriate, shall be used to determine the sampling site at the outlet of the control device. Method 4 shall be used to determine the moisture content, if necessary.

(ii) The sampling time for each run shall be 1 hour in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, then the samples shall be taken at 15 minute intervals.

(2) If supplemental combustion air is used, the TOC concentration shall be corrected to 3 percent oxygen and shall be computed using the following equation:

$$C_{\text{CORR}} = C_{\text{MEAS}} \times \frac{17.9}{20.9 - \%O_{2d}}$$

where:

$C_{\text{CORR}}$  = Concentration of TOC corrected to 3 percent oxygen, dry basis, ppm by volume.

$C_{\text{MEAS}}$  = Concentration of TOC (minus methane and ethane), dry basis, ppm by volume, as calculated in paragraph (1) above.

$\%O_{2d}$  = Concentration of  $O_2$ , dry basis, percent by volume.

(i) The emission rate correction factor, integrated sampling and analysis procedure of Method 3 shall be used to determine the oxygen concentration ( $\%O_{2d}$ ). The sampling site shall be the same as that of the TOC sample and the samples shall be taken during the same time that the TOC samples are taken.

(c) If paragraph (b) of this section is not applicable, then the owner or operator shall determine compliance with the percent emission reduction standard in §60.562-1(a)(1)(i)(A) or (b)(1)(iii) as follows:

(1) The emission reduction of TOC (minus methane and ethane) shall be determined using the following equation:

$$P = \frac{E_{\text{inlet}} - E_{\text{outlet}}}{E_{\text{inlet}}} \times 100$$

where:  $P$  = Percent emission reduction, by weight.

$E_{\text{inlet}}$  = Mass rate of TOC entering the control device, kg TOC/hr.

$E_{\text{outlet}}$  = Mass rate of TOC, discharged to the atmosphere, kg TOC/hr.

(2) The mass rates of TOC ( $E_i$ ,  $E_o$ ) shall be computed using the following equations:

$$E_i = K_1 \left( \sum_{j=1}^n C_{ij} M_{ij} \right) Q_i$$

$$E_o = K_1 \left( \sum_{j=1}^n C_{oj} M_{oj} \right) Q_o$$

where:

$C_{ij}, C_{oj}$  = Concentration of sample component "j" of the gas stream at the inlet and outlet of the control device, respectively, dry basis, ppmv.

$M_{ij}, M_{oj}$  = Molecular weight of sample component "j" of the gas stream at the inlet and outlet of the control device respectively, g/g-mole (lb/lb-mole).

$Q_i, Q_o$  = Flow rate of the gas stream at the inlet and outlet of the control device, respectively, dscm/hr (dscf/hr).

$$K_1 = \frac{4.157 \times 10^{-8} [(kg)/g\text{-mole}]}{5.711 \times 10^{-15} [(lb)/(lb\text{-mole})]} \frac{[(g)(ppm)(dscm)]}{[(lb)(ppm)(dscf)]}$$

(i) Method 18 shall be used to determine the concentration of each individual organic component ( $C_{ij}$ ,  $C_{oj}$ ) in the gas stream. Method 1 or 1A, as appropriate, shall be used to determine the inlet and outlet sampling sites. The inlet site shall be before the inlet of the control device and after all product recovery units.

(ii) Method 2, 2A, 2C, or 2D, as appropriate, shall be used to determine the volumetric flow rates ( $Q_i$ ,  $Q_o$ ). If necessary, Method 4 shall be used to determine the moisture content. Both determinations shall be compatible with the Method 18 determinations.

(iii) Inlet and outlet samples shall be taken simultaneously. The sampling time for each run shall be 1 hour in which either an

integrated sample or four grab samples shall be taken. If grab sampling is used, then the samples shall be taken at 15 minute intervals.

(d) An owner or operator shall determine compliance with the individual stream exemptions in §60.560(g) and the procedures specified in Table 3 for compliance with §60.562-1(a)(1) as identified in paragraphs (d)(1) and (2) of this section. An owner or operator using the procedures specified in §60.562-1(a)(1) for determining which continuous process emissions are to be controlled may use calculations demonstrated to be sufficiently accurate as to preclude the necessity of actual testing for purposes of calculating the uncontrolled annual emissions and weight percent of TOC. Owners or operators seeking to exempt streams under §60.560(g) must use the appropriate test procedures specified in this section.

(1) The uncontrolled annual emissions of the individual vent stream shall be determined using the following equation:

$$E_{unc} = K_1 \left( \sum_{j=1}^n C_j M_j \right) Q \times 8,600 \times \frac{1 \text{ Mg}}{1,000 \text{ kg}}$$

where:  $E_{unc}$  = uncontrolled annual emissions, Mg/yr

$C_j$  = concentration of sample component "j" of the gas stream, dry basis, ppmv.

$M_j$  = Molecular weight of sample component "j" of the gas stream, g/g-mole (lb/lb-mole).

$Q$  = Flow rate of the gas stream, dscm/hr (dscf/hr).

$K_1 = \frac{4.157 \times 10^{-8} [(kg)/g-mole]}{(5.711 \times 10^{-15} [(lb)/(lb-mole)]/(lb)(ppm)(dscf))}$

8,600 = operating hours per year

(i) Method 18 shall be used to determine the concentration of each individual organic component ( $C_j$ ) in the gas stream. Method 1 or

1A, as appropriate, shall be used to determine the sampling site. If the gas stream is controlled in an existing control device, the sampling site shall be before the inlet of the control device and after all product recovery units.

(ii) Method 2, 2A, 2C, or 2D, as appropriate, shall be used to determine the volumetric flow rate (Q). If necessary, Method 4 shall be used to determine the moisture content. Both determinations shall be compatible with the Method 18 determinations.

(iii) The sampling time for each run shall be 1 hour in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, then the samples shall be taken at 15 minute intervals.

(2) The weight percent VOC of the uncontrolled individual vent stream shall be determined using the following equation:

$$\text{weight \% TOC} = \frac{\sum_{j=1}^n C_j M_j}{MW_{\text{gas}} \times 10^6} \times 100$$

where:  $C_j$  = concentration of sample TOC component "j" of the gas stream, dry basis, ppmv.

$M_j$  = Molecular weight of sample TOC component "j" of the gas stream, g/g-mole (lb/lb-mole).

$MW_{\text{gas}}$  = Average molecular weight of the entire gas stream, g/g-mole (lb/lb-mole).

(i) Method 18 shall be used to determine the concentration of each individual organic component ( $C_j$ ) in the gas stream. Method 1 or 1A, as appropriate, shall be used to determine the sampling site. If the gas stream is controlled in an existing control device, the sampling site shall be before the inlet of the control device and after all product recovery units. If necessary, Method 4 shall be used to

determine the moisture content. This determination shall be compatible with the Method 18 determinations.

(ii) The average molecular weight of the gas stream shall be determined using methods approved by the Administrator. If the carrier component of the gas stream is nitrogen, then an average molecular weight of 28 g/g-mole (lb/lb-mole) may be used in lieu of testing. If the carrier component of the gas stream is air, then an average molecular weight of 29 g/g-mole (lb/lb-mole) may be used in lieu of testing.

(iii) The sampling time for each run shall be 1 hour in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, then the samples shall be taken at 15 minute intervals.

(e) The owner or operator shall determine compliance of flares with the visible emission and flare provisions in §60.562-1 as follows:

(1) Method 22 shall be used to determine visible emission. The observation period for each run shall be 2 hours.

(2) The monitoring device of §60.563(b)(2) shall be used to determine whether a flame is present.

(f) The owner or operator shall determine compliance with the net heating value provisions in §60.18 as referenced by §60.562-1(a)(1)(i)(C). The net heating value of the process vent stream being combusted in a flare shall be computed as follows:

$$H_T = K_2 \left( \sum_{j=1}^n C_j H_j \right)$$

where:  $H_T$  = Net heating value of the sample based on the net enthalpy per mole of offgas combusted at 25°C and 760 mmHg, but the standard temperature for determining the volume corresponding to one mole is 20°C, MJ/scm.

$$K_2 = \text{Conversion constant, } 1.740 \times 10^{-7} \left( \frac{1}{\text{ppm}} \right) \left( \frac{\text{g mole}}{\text{scm}} \right) \left( \frac{\text{MJ}}{\text{kcal}} \right),$$

where standard temperature for  $\left( \frac{\text{g mole}}{\text{scm}} \right)$  is 20°C;

$C_j$  = Concentration of sample component j in ppm on a wet basis.

$H_j$  = Net heat of combustion of sample component j, at 25°C and 760 mm Hg, kcal/g-mole.

(1) Method 18 shall be used to determine the concentration of each individual organic component ( $C_j$ ) in the gas stream. Method 1 or 1A, as appropriate, shall be used to determine the sampling site to the inlet of the flare. Using this same sample, ASTM D1946-77 (incorporated by reference--see §60.17) shall be used to determine the hydrogen and carbon monoxide content.

(2) The sampling time for each run shall be 1 hour in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, then the samples shall be taken at 15 minute intervals.

(3) Published or calculated values shall be used for the net heats of combustion of the sample components. If values are not published or cannot be calculated, ASTM D2382-76 (incorporated by reference--see §60.17) may be used to determine the net heat of combustion of component "j."

(g) The owner or operator shall determine compliance with the exit velocity provisions in §60.18 as reference by §60.562-1(a)(1)(i)(C) as follows:

(1) If applicable, the net heating value ( $H_T$ ) of the process vent shall be determined according to the procedures in paragraph (f) of this section to determine the applicable velocity requirements.

(2) If applicable, the maximum permitted velocity ( $V_{\max}$ ) for steam-assisted and nonassisted flares shall be computed using the following equation:

$$\text{Log}_{10}(V_{\max}) = (H_T + 28.8)/31.7$$

where:

$V_{\max}$  = Maximum permitted velocity, m/sec.

28.8 = Constant.

31.7 = Constant.

$H_T$  = The net heating value as determined in paragraph (f) of this section.

(3) The maximum permitted velocity,  $V_{\max}$ , for air-assisted flares shall be determined by the following equation:

$$V_{\max} = 8.706 + 0.7084(H_T)$$

where:

$V_{\max}$  = Maximum permitted velocity, m/sec.

8.706 = Constant.

0.7084 = Constant.

$H_T$  = The net heating value as determined in paragraph (f) of this section.

(4) The actual exit velocity of a flare shall be determined by dividing the volumetric flow rate (in units of standard temperature and pressure), as determined by Method 2, 2A, 2C, or 2D as appropriate, by the unobstructed (free) cross sectional area of the flare tip.

(h) The owner or operator shall determine compliance with the mass emission per mass product standards in §§60.560(d) and (e) and in §§60.562-1(b)(1)(i), (c)(1)(i)(A), (c)(1)(ii)(A), (c)(2)(i), and (c)(2)(ii)(A). The emission rate of TOC shall be computed using the following equation:

$$ER_{\text{TOC}} = \frac{E_{\text{TOC}}}{P_p \times \frac{1 \text{ Mg}}{1,000 \text{ kg}}}$$



where:  $ER_{TOC}$  = Emission rate of total organic compounds (minus methane and ethane), kg TOC/Mg product.

$E_{TOC}$  = Emission rate of total organic compounds (minus methane and ethane) in the sample, kg/hr.

$P_p$  = The rate of polymer produced, kg/hr.

(1) The mass rate of TOC,  $E_{TOC}$ , shall be determined according to the procedures, as appropriate, in paragraph (c)(2) of this section. The sampling site for determining compliance with §§60.560(d) and (e) shall be before any add-on control devices and after all product recovery devices. Otherwise, the sampling site shall be at the outlet of the control device.

(2) The rate of polymer produced,  $P_p$  (kg/hr), shall be determined by dividing the weight of polymer pulled in kilograms (kg) from the process line during the performance test by the number of hours (hr) taken to perform the performance test. The polymer pulled, in kilograms, shall be determined by direct measurement or, subject to prior approval by the Administrator, computed from materials balance by good engineering practice.

(i) The owner or operator shall determine continuous compliance with the temperature requirements in §§60.562-1(b)(1)(ii) and 60.562-1(c)(1)(i)(B) by using the temperature monitoring equipment described in §60.563(a)(1). An average temperature shall be determined from measurements taken at least every 15 minutes every three hours while the vent stream is normally routed and constituted. Each three-hour period constitutes a performance test.

(j) For purposes of determining compliance with §60.562-1(c)(1)(ii)(B), (1)(ii)(C), (2)(ii)(B), or (2)(ii)(C), the ethylene glycol concentration in either the cooling tower or the liquid effluent

from steam-jet ejectors used to produce a vacuum in the polymerization reactors, whichever is applicable, shall be determined:

(1) Using procedures that conform to the methods described in ASTM D2908-74, "Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas Chromatography" (incorporated by reference -- see §60.17), except as provided in paragraph (j)(2) of this section:

(i) At least one sample per operating day shall be collected using the grab sampling procedures of ASTM D3370-76, "Standard Practices for Sampling Water" (incorporated by reference -- see §60.17). An average ethylene glycol concentration by weight shall be calculated on a daily basis over a rolling 14-day period of operating days, except as provided in paragraphs (j)(1)(ii) and (iii) of this section. Each daily average ethylene glycol concentration so calculated constitutes a performance test. Exceedance of the standard during the reduced testing program specified in paragraphs (j)(1)(ii) and (iii) of this section is a violation of these standards.

(ii) For those determining compliance with §60.562-1(c)(1)(ii)(B) or (2)(ii)(B), the owner or operator may elect to reduce the sampling program to any 14 consecutive day period once every two calendar months, if at least seventeen consecutive 14-day rolling average concentrations immediately preceding the reduced sampling program are each less than 0.10 weight percent ethylene glycol. If the average concentration obtained over the 14 day sampling during the reduced testing period exceeds the upper 95 percent confidence interval calculated from the most recent test results in which no one 14-day average exceeded 0.10 weight percent ethylene glycol, then the owner or operator shall

reinstitute a daily sampling program. A reduced sampling program can be reinstituted if the requirements specified in this paragraph are met.

(iii) For those determining compliance with §60.562-1(c)(1)(ii)(C) or (2)(ii)(C), the owner or operator may elect to reduce the sampling program to any 14 consecutive day period once every two calendar months, if at least seventeen consecutive 14-day rolling average concentrations immediately preceding the reduced sampling program are each less than 1.8 weight percent ethylene glycol. If the average concentration obtained over the 14 day sampling during the reduced test period exceeds the upper 95 percent confidence interval calculated from the most recent test results 14-day in which no one 14-day average exceeded 1.8 weight percent ethylene glycol, then the owner or operator shall reinstitute a daily sampling program. A reduced program can be reinstituted if the requirements specified in this paragraph are met.

(iv) The upper 95 percent confidence interval shall be calculated using the equation:

$$CI_{95} = \frac{\sum_{i=1}^n x_i}{n} + 2 \sqrt{\frac{n \sum x^2 - (\sum x)^2}{n(n-1)}}$$

where:  $x_i$  = daily ethylene glycol concentration for each day used to calculate each 14-day rolling average used in test results to justify implementing the reduced testing program.

$n$  = number of ethylene glycol concentrations

(2) Measuring an alternative parameter, such as carbon oxygen demand or biological oxygen demand, that is demonstrated to be directly proportional to the ethylene glycol concentration. Such parameter shall be measured during the initial 14-day performance test during which the facility is shown to be in compliance with the ethylene glycol

concentration standard whereby the ethylene glycol concentration is determined using the procedures described in paragraph (j)(1) of this section. The alternative parameter shall be measured on a daily basis and the average value of the alternative parameter shall be calculated on a daily basis over a rolling 14-day period of operating days. Each daily average value of the alternative parameter constitutes a performance test.

**§60.565 Reporting and recordkeeping requirements.**

(a) Each owner or operator subject to the provisions of this subpart shall keep an up-to-date, readily-accessible record of the following information measured during each performance test, and shall include the following information in the report of the initial performance test in addition to the written results of such performance tests as required under §60.8. Where a control device is used to comply with §60.562-1(a)(1)(i)(D) only, a report containing performance test data need not be submitted, but a report containing the information in §60.565(a)(11) is required. Where a boiler or process heater with a design heat input capacity of 150 million Btu/hour or greater is used to comply with §60.562-1(a), a report containing performance test data need not be submitted, but a report containing the information in §60.565(a)(2)(i) is required. The same information specified in this section shall be submitted in the reports of all subsequently required performance tests where either the emission control efficiency of a combustion device or the outlet concentration of TOC (minus methane and ethane) is determined.

(1) When an incinerator is used to demonstrate compliance with §60.562-1, except §60.562-1(a)(2):

(i) The average firebox temperature of the incinerator (or the average temperature upstream and downstream of the catalyst bed), measured at least every 15 minutes and averaged over the performance test period, and

(ii) The percent reduction of TOC (minus methane and ethane) achieved by the incinerator, the concentration of TOC (minus methane and ethane) (ppmv, by compound) at the outlet of the control device on a dry basis, or the emission rate in terms of kilograms TOC (minus methane and

ethane) per megagram of product at the outlet of the control device, whichever is appropriate. If supplemental combustion air is used, the TOC concentration corrected to 3 percent oxygen shall be recorded and reported.

(2) When a boiler or process heater is used to demonstrate compliance with §60.562-1, except §60.562-1(a)(2):

(i) A description of the location at which the vent stream is introduced into the boiler or process heater, and

(ii) For boilers or process heaters with a design heat input capacity of less than 150 million Btu/hr, all 3-hour periods of operation during which the average combustion temperature was more than 28°C (50°F) below the average combustion temperature during the most recent performance test at which compliance was determined.

(3) When a flare is used to demonstrate compliance with §60.562-1, except §60.562-1(a)(2):

(i) All visible emission readings, heat content determination, flow rate measurements, and exit velocity determinations made during the performance test,

(ii) Continuous records of the pilot flame heat-sensing monitoring, and

(iii) Records of all periods of operations during which the pilot flame is absent.

(4) When an incinerator, boiler, or process heater is used to demonstrate compliance with §60.562-1(a)(2), a description of the location at which the vent stream is introduced into the incinerator, boiler, or process heater.

(5) When a flare is used to demonstrate compliance with §60.562-1(a)(2):

(i) All visible emission readings made during the performance test,

(ii) Continuous records of the pilot flame heat-sensing monitoring, and

(iii) Records of all periods of operation during which the pilot flame is absent.

(6) When an absorber is the final unit in a system to demonstrate compliance with §60.562-1, except §60.562-1(a)(2), the specific gravity (or alternative parameter that is a measure of the degree of absorbing liquid saturation, if approved by the Administrator), and average temperature, measured at least every 15 minutes and averaged over the performance test period, of the absorbing liquid (both measured while the vent stream is normally routed and constituted).

(7) When a condenser is the final unit in a system to demonstrate compliance with §60.562-1, except §60.562-1(a)(2), the average exit (product side) temperature, measured at least every 15 minutes and averaged over the performance test period while the vent stream is normally routed and constituted.

(8) Daily measurement and daily average 14-day rolling average of the ethylene glycol concentration in the liquid effluent exiting the vacuum system servicing the polymerization reaction section, if an owner or operator is subject to §60.562-1(c)(1)(ii)(B) or (2)(ii)(B), or of the ethylene glycol concentration in the cooling water in the cooling tower, if subject to §60.562-1(c)(2)(ii)(C) or (2)(iii)(C).

(9) When a carbon adsorber is the final unit in a system to demonstrate compliance with §60.562-1, except §60.562-1(a)(2): the concentration level or reading indicated by the organics monitoring device at the outlet of the adsorber, measured at least every 15 minutes

and averaged over the performance test period while the vent stream is normally routed and constituted.

(10) When an owner or operator seeks to comply with the requirements of this subpart by complying with the uncontrolled threshold emission rate cutoff provision in §§60.560(d) and (e) or with the individual stream exemptions in §60.560(g), each process operation variable (e.g., pressure, temperature, type of catalyst) that may result in an increase in the uncontrolled emission rate, if §60.560(d) or (e) is applicable, or in an increase in the uncontrolled annual emissions or the VOC weight percent, as appropriate, if §60.560(g) is applicable, should such operating variable be changed.

(11) When an owner or operator uses a control device to comply with §60.562-1(a)(1)(i)(D) alone: all periods when the control device is not operating.

(b)(1) Each owner or operator subject to the provisions of this subpart shall submit with the initial performance test or, if complying with §60.562-1(a)(1)(i)(D), as a separate report, an engineering report describing in detail the vent system used to vent each affected vent stream to a control device. This report shall include all valves and vent pipes that could vent the stream to the atmosphere, thereby bypassing the control device, and identify which valves are car-sealed opened and which valves are car-sealed closed.

(2) If a vent system containing valves that could divert the emission stream away from the control device is used, each owner or operator subject to the provisions of this subpart shall keep for at least two years up-to-date, readily accessible continuous records of:

(i) All periods when flow is indicated if flow indicators are installed under §60.563(d)(1).



(ii) All times when maintenance is performed on car-sealed valves, when the car seal is broken, and when the valve position is changed (i.e., from open to closed for valves in the vent piping to the control device and from closed to open for valves that vent the stream directly or indirectly to the atmosphere bypassing the control device).

(c) Where an incinerator is used to comply with §60.562-1, except §§60.562-1(a)(1)(i)(D) and (a)(2), each owner or operator subject to the provisions of this subpart shall keep for at least 2 years up-to-date, readily accessible continuous records of:

(1) The temperature measurements specified under §60.563(b)(1),

(2) Records of periods of operation during which the parameter boundaries established during the most recent performance test are exceeded. Periods of operation during which the parameter boundaries established during the most recent performance test are exceeded are defined as follows:

(i) For noncatalytic incinerators, all 3-hour periods of operation during which the average combustion temperature was more than 28°C (50°F) below the average combustion temperature during the most recent performance test at which compliance was demonstrated.

(ii) For catalytic incinerators, all 3-hour periods of operation during which the average temperature of the vent stream immediately before the catalyst bed is more than 28°C (50°F) below the average temperature of the vent stream during the most recent performance test at which compliance was demonstrated. The owner or operator also shall record all 3-hour periods of operation during which the average temperature difference across the catalyst bed is less than 80 percent of the average temperature difference of the device during the most recent performance test at which compliance was demonstrated.

(d) Where a boiler or process heater is used to comply with §60.562-1, except §§60.562-1(a)(1)(i)(D) and (a)(2), each owner or operator subject to the provisions of this subpart shall keep for at least 2 years up-to-date, readily accessible continuous records of:

(1) Where a boiler or process heater with a heat input design capacity of 150 million Btu/hr or greater is used, all periods of operation of the boiler or process heater. (Examples of such records could include records of steam use, fuel use, or monitoring data collected pursuant to other State or Federal regulatory requirements), and

(2) Where a boiler or process heater with a heat input design capacity of less than 150 million Btu/hr is used, all periods of operation during which the parameter boundaries established during the most recent performance test are exceeded. Periods of operation during which the parameter boundaries established during the most recent performance test are exceeded are defined as all 3-hour periods of operation during which the average combustion temperature was more than 28°C (50°F) below the average combustion temperature during the most recent performance test at which compliance was demonstrated.

(e) Where a flare is used to comply with §60.562-1, except §60.562-1(a)(1)(i)(D), each owner or operator subject to the provisions of this subpart shall keep for at least 2 years up-to-date, readily accessible continuous records of:

(1) The flare or pilot light flame heat sensing monitoring specified under §60.563(b)(2), and

(2) All periods of operations in which the flare or pilot flame, as appropriate, is absent.

(f) Where an adsorber, condenser, absorber, or a control device other than a flare, incinerator, boiler, or process heater is used to comply with §60.562-1, except §60.562-1(a)(1)(i)(D), each owner or operator subject to the provisions of this subpart shall keep for at least 2 years up-to-date, readily-accessible continuous records of the periods of operation during which the parameter boundaries established during the most recent performance test are exceeded. Where an owner or operator seeks to comply with §60.562-1, periods of operation during which the parameter boundaries established during the most recent performance tests are exceeded are defined as follows:

(1) Where an absorber is the final unit in a system:

(i) All 3-hour periods of operation during which the average absorbing liquid temperature was more than 11°C (20°F) above the average absorbing liquid temperature during the most recent performance test, and

(ii) All 3-hour periods of operation during which the average absorbing liquid specific gravity was more than 0.1 unit above, or more than 0.1 unit below, the average absorbing liquid specific gravity during the most recent performance test (unless monitoring of an alternative parameter that is a measure of the degree of absorbing liquid saturation is approved by the Administrator, in which case he or she will define appropriate parameter boundaries and periods of operation during which they are exceeded).

(2) Where a condenser is the final unit in a system, all 3-hour periods of operation during which the average condenser operating temperature was more than 6°C (10°F) above the average operating temperature during the most recent performance test.

(3) Where a carbon adsorber is the final unit in a system, all 3-hour periods of operation during which the average organic concentration level in the carbon adsorber gases is more than 20 percent greater than the exhaust gas concentration level or reading measured by the organics monitoring system during the most recent performance test.

(g) Each owner or operator of an affected facility subject to the provisions of this subpart and seeking to demonstrate compliance with §60.562-1 shall keep up-to-date, readily accessible records of:

(1) Any changes in production capacity, feedstock type, or catalyst type, or of any replacement, removal or addition of product recovery equipment; and

(2) The results of any performance test performed pursuant to the procedures specified by §60.564.

(h) Each owner or operator of an affected facility that seeks to comply with the requirements of this subpart by complying with the uncontrolled threshold emission rate cutoff provision in §§60.560(d) and (e) or with the individual stream exemptions in §60.560(g) shall keep for at least 2 years up-to-date, readily accessible records of any change in process operation that increases the uncontrolled emission rate of the process line in which the affected facility is located, if §60.560(d) or (e) is applicable, or that increase the uncontrolled annual emissions or the VOC weight percent of the individual stream, if §60.560(g) is applicable.

(i) Each owner and operator subject to the provisions of this subpart is exempt from §60.7(c) of the General Provisions.

(j) The Administrator will specify appropriate reporting and recordkeeping requirements where the owner or operator of an affected

facility complies with the standards specified under §60.562-1 other than as provided under §60.565(a) through (e).

(k) Each owner or operator that seeks to comply with the requirements of this subpart by complying with the uncontrolled threshold emission rate cutoff provision of §§60.560(d) and (e), the individual stream exemptions of §60.560(g), or the requirements of §60.562-1 shall submit to the Administrator semiannual reports of the following recorded information, as applicable. The initial report shall be submitted within 6 months after the initial start-up date.

(1) Exceedances of monitored parameters recorded under §§60.565(c), (d)(2), and (f).

(2) All periods recorded under §60.565(b) when the vent stream has been diverted from the control device.

(3) All periods recorded under §60.565(d) when the boiler or process heater was not operating.

(4) All periods recorded under §60.565(e) in which the flare or pilot flame was absent.

(5) All periods recorded under §60.565(a)(8) when the 14-day rolling average exceeded the standard specified in §60.562-1(c)(1)(ii)(B), (1)(ii)(C), (2)(ii)(B), or (2)(ii)(C), as applicable.

(6) Any change in process operations that increases the uncontrolled emission rate of the process line in which the affected facility is located, as recorded in §60.565(h).

(7) Any change in process operations that increases the uncontrolled annual emissions or the VOC weight percent of the individual stream, as recorded in §60.565(h).

(l) Each owner or operator subject to the provisions of this subpart shall notify the Administrator of the specific provisions of

§60.562, §60.560(d), or §60.560(e), as applicable, with which the owner or operator has elected to comply. Notification shall be submitted with the notification of initial startup required by §60.7(a)(3). If an owner or operator elects at a later date to use an alternative provision of §60.562 with which he or she will comply or becomes subject to §60.562 for the first time (i.e., the owner or operator can no longer meet the requirements of this subpart by complying with the uncontrolled threshold emission rate cutoff provision in §60.560(d) or (e)), then the owner or operator shall notify the Administrator 90 days before implementing a change and, upon implementing a change, a performance test shall be performed as specified in §60.564.

(m) The requirements of this subsection remain in force until and unless EPA, in delegating enforcement authority to a State under Section 111(c) of the Act, approves alternative reporting requirements or means of compliance surveillance adopted by such State. In that event, affected sources within the State will be relieved of the obligation to comply with this subsection, provided that they comply with the requirements established by the State.

**§60.566 Delegation of Authority.**

(a) In delegating implementation and enforcement authority to a State under Section 111(c) of the Act, the authority contained in paragraph (b) of this section shall be retained by the Administrator and not transferred to a State.

(b) Authority which will not be delegated to States:

**§60.562-2(c)**

3. Section 60.17(a) is amended by revising paragraphs (a)(6), (a)(38), and (a)(40) and by adding paragraphs (a)(60) and (a)(61) to read as follows:

§60.17 Incorporations by reference.

\* \* \* \* \*

(a) \* \* \*

(6) ASTM D1946-77, Standard Method for Analysis of Reformed Gas by Gas Chromatography, IBR approved for §§60.45(f)(5)(i), 60.18(f), 60.614(d)(2)(ii), 60.614(d)(4), 60.664(d)(2)(ii), 60.664(d)(4) and 60.564(f).

(38) ASTM D2382-76, Heat of Combustion of Hydrocarbon Fuels by Bomb Calorimeter [High-Precision Method], IBR approved for §§60.18(f), 60.485(g), 60.614(d)(4), 60.664(d)(4), and 60.564(f).

(40) ASTM D86-78, Distillation of Petroleum Products, IBR approved for §60.593(d), §60.633(h), and §60.562-2(d).

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(60) ASTM D2908-74, Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas Chromatography, IBR approved for §60.564(j).

(61) ASTM D3370-76, Standard Practices for Sampling Water, IBR approved for §60.564(j).

## Section 5 Lists of Sources Affected

In this section sources that may be affected by the promulgated regulations are listed. These sources were identified in the source categories of polypropylene, polyethylene, polystyrene, and poly(ethylene terephthalate). These lists should assist the EPA/State air program personnel in informing the industry regarding the new regulations. The lists must be used with caution as some sources may have ceased operation, may have changed ownership, or may have changed operations. At the same time, there may be some other sources that are not on the list but may be subject to the standards. Further the polystyrene and poly(ethylene terephthalate) source lists may contain some sources that use batch production operations, which are not covered by these.<sup>1</sup> Latest information available should be used in the determination of the sources being subject to standards. These lists may be supplemented by using Toxic Release Inventory System (TRIS) and other databases available.

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<sup>1</sup> Plants producing expandable polystyrene are, however, covered by these VOC standards for equipment leaks of VOC, but not for process VOC emissions.



## I. Polypropylene Producers

| <u>Company</u>   | <u>Location</u>                              |
|------------------|--|
| Amoco            | Cedar Bayou, Texas<br>Chocolate Bayou, Texas |
| Aristech         | LaPorte, Texas<br>Neal, West Virginia        |
| Eastman          | Longview, Texas                              |
| Exxon            | Baytown, Texas                               |
| Fina             | LaPorte, Texas                               |
| Genesis Polymers | Marysville, Michigan                         |
| Himont           | Bayport, Texas<br>Lake Charles, Louisiana    |
| Huntsman         | West Deptford, New Jersey                    |
| Phillips         | Pasadena, Texas                              |
| Rexene           | Bayport, Texas<br>Odessa, Texas              |
| Quantum (USI)    | Morris, Illinois                             |
| Shell            | Norco, Louisiana                             |
| Shell-Carbide    | Seadrift, Texas                              |
| Soltex           | Deer Park, Texas                             |

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SOURCE: Chemical Profile: Polypropylene. Chemical Marketing Reporter. October 1, 1988.

Epsilon, Inc. of Marcus Hook, Pennsylvania, is scheduled to start up a new plant in 1990.

## II. High Density Polyethylene Producers

| <u>Company</u>   | <u>Location</u>   |
|------------------|---|
| Allied           | Baton Rouge, Louisiana  |
| Chevron          | Orange, Texas   |
| Dow Chemical     | Plaquemine, Louisiana<br>Freeport, Texas  |
| Hoechst Celanese | Bayport, Texas  |
| Occidental       | Bay City, Texas<br>Orange, Texas<br>Victoria, Texas                             |
| Phillips         | Pasadena, Texas   |
| Quantum (USI)    | Clinton, Iowa<br>Chocolate Bayou, Texas<br>Houston, Texas<br>Port Arthur, Texas |
| Soltex Polymer   | Deer Park, Texas  |

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SOURCE: Chemical Profile: Polyethylene - HD. Chemical Marketing Reporter. October 1, 1988.

Quantum's USI Division is building a HDPE plant in Deer Park, Texas, to be completed by 1990.

Union Carbide is building a new HDPE/LDPE plant at Seadrift, Texas, scheduled for completion by 1990.

### III. Low Density Polyethylene Producers

| <u>Company</u> | <u>Location</u>  |
|----------------|--|
| Chevron        | Cedar Bayou, Texas<br>Orange, Texas  |
| Dow            | Plaquemine, Louisiana<br>Freeport, Texas   |
| DuPont         | Orange, Texas<br>Victoria, Texas   |
| Eastman        | Longview, Texas  |
| Exxon          | Baton Rouge, Louisiana<br>Mont Belvieu, Texas  |
| Mobil          | Beaumont, Texas  |
| Rexene         | Odessa, Texas<br>Bayport, Texas  |
| Quantum (USI)  | Clinton, Iowa<br>Morris, Illinois<br>Houston, Texas<br>Port Arthur, Texas<br>Tuscola, Illinois |
| Union Carbide  | Seadrift, Texas<br>Taft, Louisiana   |

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SOURCE: Chemical Profile: Polyethylene - LD. Chemical Marketing Reporter. October 1, 1988.

Allied-Signal operates a polyethylene wax facility in Orange, Texas.

Quantum is building a LLDPE/HDPE swing plant in Morris, Illinois, scheduled to be completed by 1990.

#### IV. Polystyrene Producers

| <u>Company</u>             | <u>Location</u>  |
|----------------------------|--|
| A&E Plastics               | City of Industry, California   |
| American Polymers          | Oxford, Massachusetts  |
| Amoco                      | Torrance, California<br>Joliet, Illinois<br>Willow Springs, Illinois   |
| Arco <sup>1</sup>          | Monaca, Pennsylvania<br>Painesville, Ohio  |
| BASF                       | South Brunswick, New Jersey <sup>1</sup>   |
| Chevron                    | Marietta, Ohio   |
| Dart Polymers              | Owensboro, Kentucky  |
| Dow                        | Allyn's Point, Connecticut<br>Hanging Rock, Ohio<br>Joliet, Illinois<br>Midland, Michigan<br>Pevely, Missouri<br>Torrance, California                |
| Fina                       | Calumet City, Illinois<br>Carville, Louisiana<br>Windsor, New Jersey   |
| Goodson                    | Troy, Ohio   |
| Huntsman                   | Belpre, Ohio<br>Chesapeake, Virginia<br>Peru, Illinois <sup>1</sup><br>Rome, Georgia   |
| Kama                       | Hazelton, Pennsylvania   |
| Mobil                      | Holyoke, Massachusetts<br>Joliet, Illinois<br>Santa Ana, California  |
| Polysar (Nova<br>Plastics) | Addyston, Ohio<br>Akron, Ohio <sup>2</sup><br>Decatur, Alabama<br>Leominster, Massachusetts<br>Springfield, Massachusetts<br>West Haven, Connecticut |

#### IV. Polystyrene Producers (concluded)

| <u>Company</u> | <u>Location</u>                |
|----------------|--------------------------------|
| Texstyrene     | Fort Worth, Texas <sup>1</sup> |
| Vititek        | Delano, California             |

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<sup>1</sup> Capable of producing expandable polystyrene.

<sup>2</sup> Plant is closed.

SOURCE: Chemical Profile: Polystyrene. Chemical Marketing Reporter.  
October 1, 1988.

V. Poly(ethylene terephthalate) Producers

| <u>Company</u>                         | <u>Location</u>   |
|--|---|
| Allied Corp.                           | Moncure, North Carolina   |
| BASF Corp.                             | Lowland, Tennessee  |
| Bemis Company, Inc.                    | New London, Wisconsin<br>Oshkosh, Wisconsin   |
| E.I. duPont de Nemours                 | Charleston, South Carolina<br>Chattanooga, Tennessee<br>Kinston, North Carolina<br>Old Hickory, Tennessee<br>Wilmington, North Carolina<br>Brevard, North Carolina<br>Circleville, Ohio<br>Florence, South Carolina |
| Eastman Kodak                          | Columbia, South Carolina<br>Kingsport, Tennessee<br>Rochester, New York<br>Windsor, Colorado  |
| Firestone Tire and Rubber Co.          | Hopewell, Virginia  |
| Goodyear Tire and Rubber Co.           | Scottsboro, Alabama<br>Point Pleasant, West Virginia  |
| Hoechst Celanese                       | Spartanburg, South Carolina<br>Greer, South Carolina<br>Florence, South Carolina<br>Salisbury, North Carolina<br>Shelby, North Carolina   |
| ICI Americas                           | Hopewell, Virginia<br>Fayetteville, North Carolina  |
| Minnesota Mining and Manufacturing Co. | Decatur, Alabama<br>Greenville, South Carolina  |

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SOURCE: 1988 Directory of Chemical Producers - United States.  
PET film (polyester film), PET, and PET - bottle grade resins.

Section 6 Implementation Plan for Polymer  
Manufacturing Industry (40 CFR 60, Subpart DDD)

This plan identifies those activities and documents necessary to enable the regional offices and delegated authorities to implement and enforce the national source performance standards for the polymer manufacturing industry to be promulgated in April 1990. This plan will note the lead office, contact person, due date, and objective of each activity and document identified.

The goal of each activity and document identified in this plan should be the successful implementation of this new NSPS. In setting the deadline for each item identified in this plan, SSCD tried to set realistic dates, i.e., a balance between the need for timely guidance and training and the recognition of the competing demands made upon the person responsible for developing that guidance or training. Given that these two forces are often in a state of flux, the deadlines in this plan are subject to change. SSCD hopes to keep all parties informed of changes in deadlines as soon as those changes are known. If you have any questions regarding this plan, please contact Barbara Durso at FTS 245-3653.

I. Polymer Manufacturing Compliance Monitoring Strategy

LEAD: SSCD

CONTACT: Barbara Durso

DUE DATE: 9/1/90

TELEPHONE: FTS 245-3653

OBJECTIVE: SSCD will explore the need for a compliance monitoring strategy (CMS). Designed for use by the headquarters, regions, and delegated authorities, a CMS describes the responsibilities of each office in implementing the rule and provides guidance on targeting inspections and using self-monitoring data (where available and

applicable). Since this NSPS is automatically delegated in most cases to State and local authorities, SSCD will explore the need to develop such a plan. A decision whether or not to develop a compliance monitoring strategy for the polymer manufacturing NSPS will be made by 9/1/90.

## II. Summary of Rules

LEAD: ESD

CONTACT: Sims Roy

DUE DATE: May 1990

TELEPHONE: FTS 629-5263

OBJECTIVE: Designed for use by the regions, headquarters, State and local authorities, and owners/operators of affected facilities, this document will provide "plain English" summaries of the rules. This document will also consist of flowcharts or tables for determining applicability, standards, compliance, and exemptions.

## III. Inspection Manual and Training for Subpart DDD

LEAD: SSCD

CONTACT: Omayra Salgado

DUE DATE: est. FY91

TELEPHONE: FTS 382-2837

OBJECTIVE: Designed for use by regional, State, and local inspectors and in-house auditors, these documents will provide a step-by-step guide to inspecting the facilities affected by Subpart DDD. SSCD is considering the need to include development of an inspection manual and training for Subpart DDD on the Technical Agenda for FY91.

## IV. List of Sources Affected

LEAD: SSCD with ESD

CONTACT: Barbara Durso

DUE DATE: May 1990

TELEPHONE: FTS 245-3653

OBJECTIVE: Designed for use by headquarters, regions, and delegated authorities, this document will be an initial compilation of sources known to be or believed to be affected by Subpart DDD. This list will



be compiled from information in existing databases and from data gathered in the process of rule development. The list will also provide SICs for source categories affected by the new rules. The regional offices will need to identify to SSCD those sources for which there is not enough information to input the source in CDS. Based on the regional feedback, SSCD will explore the possibility of having a contractor put together a list with complete source names and addresses.

V.     Compilation of Available Technical Support

LEAD:   SSCD with ESD     CONTACT:  Barbara Durso

DUE DATE:  9/30/91     TELEPHONE:  FTS 245-3653

OBJECTIVE:  Designed for headquarters, regions, delegated authorities, and owners/operators of affected facilities, this document will serve as an annotated bibliography of existing reference books, guidance, background information documents, and hotlines related to polymer manufacturing control methodology, health risks, and related topics. This document must be placed on the Technical Agenda and probably will be put together with contractor assistance.

## **APPENDIX A**

### **LIST OF OAQPS CONTACTS**

## LIST OF OAQPS CONTACTS

|                          | <u>Telephone Number</u> | <u>FTS</u> |
|--------------------------|-------------------------|------------|
| <u>Technical</u>         |                         |            |
| Evans, Les               | 919-541-5410            | 629-5410   |
| Rosensteel, Robert       | 919-541-5608            | 629-5608   |
| Roy, Sims                | 919-541-5263            | 629-5263   |
| <u>Compliance Policy</u> |                         |            |
| Durso, Barbara           | 202-245-3653            | 245-3653   |

**APPENDIX B**

**REPRINT OF FEDERAL REGULATIONS  
FROM FEDERAL REGISTER**

# **Federal Register**

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**Tuesday,  
December 11, 1990**

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## **Part III**

### **Environmental Protection Agency**

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**40 CFR Part 60**

**Standards of Performance for New  
Stationary Sources; Polypropylene,  
Polyethylene, Polystyrene, and  
Poly(ethylene terephthalate)  
Manufacturing Industry; Final Rule**



# ENVIRONMENTAL PROTECTION AGENCY

## 40 CFR Part 60

[FRL-3752-2]

RIN 2060-AA37

### Standards of Performance For New Stationary Sources: Polypropylene, Polyethylene, Polystyrene, and Poly(ethylene terephthalate) Manufacturing Industry

**AGENCY:** Environmental Protection Agency (EPA or the Agency).

**ACTION:** Final rule.

**SUMMARY:** Standards of performance to limit volatile organic compound (VOC) emissions from new, modified, and reconstructed process sections at certain polymer manufacturing plants were proposed in the Federal Register on September 30, 1987 (52 FR 36678). A new approach for determining which process emissions from polypropylene and polyethylene production would be subject to the proposed standards was presented for public comment in the Federal Register on January 10, 1989 (54 FR 890). This action promulgates these standards of performance for polypropylene, polyethylene, polystyrene, and poly(ethylene terephthalate) (PET) plants. These standards implement section 111 of the Clean Air Act and are based on the Administrator's determination that emissions from these polymer manufacturing facilities cause, or contribute significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare. The intended effect of these standards is to require all new, modified, and reconstructed process sections at these polymer manufacturing plants to achieve emission levels that reflect the best demonstrated system of continuous emission reduction considering costs, non-air quality health, and environmental and energy impacts.

**EFFECTIVE DATES:** December 11, 1990. These standards of performance become effective upon promulgation but apply to affected facilities for which construction, modification, or reconstruction commenced after either September 30, 1987, or January 10, 1989, as identified in the final rule.

Under section 307(b)(1) of the Clean Air Act, judicial review of the actions taken by this notice is available only by the filing of a petition for review in the U.S. Court of Appeals for the District of Columbia Circuit within 60 days of today's publication of this rule. Under section 307(b)(2) of the Clean Air Act,

the requirements that are the subject of today's notice may not be challenged later in civil or criminal proceedings brought by EPA to enforce these requirements. *Incorporation by Reference:* The incorporation by reference of certain publications in these standards is approved by the Director of the Office of the Federal Register as of December 7, 1990.

**ADDRESSES:** *Background information document.* The background information document (BID) for the promulgated standards may be obtained from the U.S. EPA Library (MD-35), Research Triangle Park, North Carolina 27711, telephone number (919) 541-2777. Please refer to "Polymer Manufacturing Industry—Background Information for Promulgated Standards of Performance" (EPA-450/3-89-019b). The BID contains (1) A summary of all the public comments made on the proposed standards and the Administrator's responses to the comments, (2) a summary of the changes made to the standards since proposal, and (3) the final Environmental Impact Statement, which summarizes the impacts of the standards.

**Docket:** A docket number A-82-19, containing information considered by EPA in the development of the promulgated standards is available for public inspection between 8:30 a.m. and 3:30 p.m. Monday through Friday at EPA's Air Docket (LE-131) room M-1500 1st Floor Waterside Mall 401 M Street SW Washington, DC 20460. A reasonable fee may be charged for copying.

**FOR FURTHER INFORMATION CONTACT:** For further information and official interpretations of applicability compliance requirements, and reporting aspects of the promulgated standards, contact the appropriate Regional, State, or local office contact as listed in 40 CFR 60.4. For further information on the background of the regulatory decisions in the promulgated standards, contact Mr. Sims Roy, Standards Development Branch, Emission Standards Division (MD-13) U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone (919) 541-5263. For further information on the technical aspects of the promulgated standards, contact Mr. Les Evans, Chemicals and Petroleum Branch, Emission Standards Division (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone (919) 541-5410. For further information on the testing and monitoring requirements of the promulgated standards, contact Mr. Bill Grimley, Emission Measurement Branch,

Technical Support Division (MD-14), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone (919) 541-1065.

## SUPPLEMENTARY INFORMATION:

### I. The Standards

Standards of performance for new sources established under section 111 of the Clean Air Act reflect:

- • • application of the best technological system of continuous emission reduction which (taking into consideration the cost of achieving such emission reduction, any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated (Section 111(a)(1)).

For convenience, this will be referred to as "best demonstrated technology," or "BDT."

As prescribed by Section 111, promulgation of these standards was preceded by the Administrator's determination (40 CFR 60.16, 44 FR 49220, dated August 21, 1979) that segments of the polymer manufacturing industry contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare and for which standards are to be promulgated. Segments of the polymer manufacturing industry identified include polypropylene, polyethylene, polystyrene, and polyester resins.

The promulgated standards limit VOC emissions from certain process sources in new, modified, and reconstructed affected facilities within polymer manufacturing plants that produce the following basic polymers: polypropylene, polyethylene, polystyrene, and PET. In addition, the promulgated standards apply to certain sources in polymer manufacturing plants that produce copolymers consisting of at least 50 percent weight of ethylene, propylene, or bis-(2-hydroxyethyl)-terephthalate, or at least 80 percent by weight of styrene. The promulgated standards also cover VOC emissions from equipment leaks in all of these plants except those producing PET or PET copolymers. The promulgated standards do not cover manufacturers of elastomers or synthetic rubber.

As in the proposed standards, the limits in the final rule are expressed in terms of total organic compounds (TOC) minus methane and ethane rather than in terms of VOC. As explained in the September 30, 1987, Federal Register notice (52 FR 36698), the best systems of continuous emission reduction applicable to polymer manufacturing operations do not selectively control VOC, but rather these control

technologies control all organic compounds. Moreover, the numerical values of the emission limits were based on total organic data (excluding methane and ethane). Therefore, to reflect accurately the performance of technologies selected as the best systems of continuous emission reduction and to make the emission limits consistent with the data and test methods from which the limits were derived, the standards are expressed in terms of TOC (minus methane and ethane). For the same reason, the test procedures prescribe measurement of TOC (minus methane and ethane). In short, the standards rely on controlling TOC (minus methane and ethane) as the best demonstrated surrogate for controlling VOCs, which react to form ozone in the atmosphere.

The affected facility for process sources of VOC emissions is the "process section" and for equipment leaks of VOC emissions, the "process unit." These are the same affected facility designations as were proposed, although the definitions of the various process sections have been revised for purposes of clarification.

#### Process Emissions

**Background.** On September 30, 1987, standards to control VOC emissions from certain polymer manufacturing facilities were proposed (52 FR 36678). The standards proposed were based on an analysis of the environmental, energy, and economic impacts of various levels of emission reduction achieved through the application of various control technologies to reduce emissions. The technologies analyzed for controlling process emissions were selected based on the particular characteristics of the emission streams being controlled. For example, waste gas streams from polypropylene and polyethylene production processes are characterized by the presence of low boiling components, polymerizable materials, and a mixture of VOC's. These characteristics tend to make recovery techniques, such as condensers, impractical. Controlling these streams is more likely to involve combustion techniques. Therefore, combustion technologies, such as flares and incinerators, were analyzed for reducing VOC emissions from these polymer production processes.

To analyze the impacts of applying the various levels of emission reductions, process sections and model plants were developed as representative of production steps and processes found in the polymer industry. A total of five generic process sections and twelve model plants were developed for the

four major polymers. In general, increasing levels of control of process emissions were obtained by controlling additional emission streams from process sections or, in the case of condensers, increasing the efficiency of the control device. For each level of control, the Agency calculated VOC emission reduction impacts, annual and capital costs, secondary air quality, energy, and economic impacts, and cost-effectiveness values. Based on these factors, the Agency identified which process emissions from process section in each model plant would be required to be controlled and the level of control reflecting BDT. Such process emissions and process section were then proposed for control in the September 30, 1987, Federal Register notice.

The public comment period on the September 30, 1987, Federal Register notice closed February 8, 1988. Fourteen comment letters were received, all from industry sources. A wide range of comments were received. Numerous comments focused on the use of model plants as the basis for determining which process emissions from the polypropylene and polyethylene segments of the industry would be subject to the proposed standards. Most of these comments expressed concern over the inflexibility of standards, determined through the analysis of model plants, for dealing with process changes in these two segments of the industry. According to the commenters, such process changes significantly affect the emission stream characteristics. As a result, controls that were identified as BDT for model plants would, in some cases, be unreasonable for processes that did not correspond to the models. Similarly, other processes or streams for which control is reasonable may not be affected by the standards. As a result of information received in these comments, the Agency examined alternative approaches that would ensure that emission streams, for which reasonable controls are available, are required to be controlled. This need existed primarily for polypropylene and polyethylene production processes. The Agency did not propose to extend this new approach to polystyrene or PET production processes. Polystyrene and PET processes are more mature and significant changes are not expected. As such, the model plant approach is a less complex, more direct regulatory approach. A generic approach would be more complicated and potentially less effective for these processes due to the use of recovery-type controls and the difficulty in applying these to combined streams.

On January 10, 1989, the Agency reopened the public comment period for the limited purpose of allowing public comment on a new approach for determining which process emissions from polypropylene and polyethylene production processes would be subject to the proposed standards (54 FR 890). The new approach was developed considering the same types of control techniques as for the model plant approach. Under the new approach, generic emission stream characteristics would be used to make the control determination rather than rely on a fixed set of emission stream characteristics based on model plants. For continuous process emissions, the control determination would be based on either the VOC concentration or annual emissions or both. For intermittent emissions, it would be based on the type of release alone.

Comments received on the January 10, 1989, Federal Register notice were generally favorable, although several significant concerns were raised. These concerns were on identifying which intermittent releases would be exempt from control; the VOC weight percent exemption suggested for individual emission streams from modified and reconstructed affected facilities, but not for emission streams from new affected facilities; and the definition of "concurrent" by which emission streams from affected facilities constructed, modified, or reconstructed would be combined in making the control determination. These and other comments resulted in changes to the proposed standards and are discussed below.

**Polypropylene and polyethylene.** The promulgated process emission standards for polypropylene and polyethylene plants apply to all new, modified, and reconstructed process sections involved in the manufacture of polypropylene, polyethylene, or a polypropylene or polyethylene copolymer. Because of the new approach for determining which process emissions are to be controlled, some polypropylene and polyethylene affected facilities have a September 30, 1987, applicability date and others have a January 10, 1989, applicability date.

The promulgated standards implement the new approach presented in the January 10, 1989, Federal Register notice, with several important changes. The basic procedure for determining which continuous process emissions are to be controlled requires combining emission streams within one of three VOC weight percent ranges, calculating the combined stream's weight percent VOC and total annual emissions, calculating a



threshold emission level based on the combined stream's VOC concentration, and comparing the combined stream's total annual emissions with the calculated threshold emission (CTE) level. If the combined stream's total annual emissions are equal to or greater than the CTE level, then all of the individual emission streams that made up the combined stream are to be controlled by 98 percent reduction or to 20 ppm by volume (ppmv), whichever is less stringent. If the combined stream's total annual emissions are less than the CTE level, then only those individual streams with individual flows of 8 scfm or less and with annual emissions of at least 1.6 Mg/yr are required to be controlled at that time. Control of these streams, however, does not need to be by 98 percent reduction or to 20 ppmv. These streams may be controlled in any existing control device. Individual streams with annual emissions less than 1.6 Mg/yr or with VOC concentrations of less than 0.1 weight percent VOC are exempt from control and are not used in any of the above procedures.

The above procedures are essentially the same as that presented in the January 10, 1989, Federal Register notice with the following exceptions:

1. The individual weight percent VOC cutoff has been extended to new affected facilities. It was proposed that only emission streams from existing sources that are modified or reconstructed could use this exemption.
2. The specific term "concurrent" has been eliminated in the final rule. However, the final rule requires all emission streams to be subject to potential control if sufficient emissions become available to require control under the new approach regardless of when one affected facility is constructed, modified, or reconstructed relative to another.
3. Emission streams that become subject to BDT under this standard and that are already controlled by a control device that is required as a result of a Federally enforceable rule do not need to be controlled by 98 percent or to 20 ppmv until the existing control device is modified or reconstructed or replaced.

For intermittent emissions from polypropylene and polyethylene sources, the promulgated rule requires control of all intermittent emissions except emergency releases. For purposes of this rule, emergency releases involve, in part, those intermittent releases that are necessary

to prevent catastrophic equipment damage or personnel safety hazards, including those necessary to minimize the adverse effects of a runaway reaction such as may occur in a low pressure process, and those releases that occur as a result of decompositions and of attempts to prevent decompositions, such as occur in high pressure processes. Intermittent releases that occur as part of specific system features designed to maintain normal operating conditions in the process vessel are to be controlled. The promulgated rule for intermittent emissions follows more closely the proposed rule in the September 30, 1987, Federal Register notice than that rule presented in the January 10, 1989, Federal Register notice.

The promulgated standards for polypropylene and polyethylene sources allow affected facilities that are constructed, modified, or reconstructed between September 30, 1987, and January 10, 1989, to be exempt from control if their uncontrolled emission rates are below those uncontrolled threshold emission rates presented in the September 30, 1987, Federal Register notice. Emissions from such affected facilities, however, become subject to the standards if the process section's uncontrolled emission rate becomes greater than the uncontrolled threshold emission rate at a later date or if the process section is modified or reconstructed after January 10, 1989.

If the uncontrolled emission rate of an existing facility with a control device is greater than the uncontrolled threshold emission rate and control by 98 percent or to 20 ppmv has been determined to be required under the new approach, the promulgated rule allows such stream to continue to be controlled in its present control device. At such time that the existing control device is modified, reconstructed, or replaced, the vent stream is then required to be controlled by 98 percent or to 20 ppmv.

The promulgated standards for polypropylene and polyethylene contain fairly complex procedures for determining which process emissions are subject to the standards. This is the result of adopting a generic approach. Commenters requested that the Agency clarify this procedure and the standards that are to be met. To meet this request,

the Agency developed a series of five flow diagrams, which are presented as Figures 1 through 3. The purpose of these figures is to provide only an overview of the determination procedure for polypropylene and polyethylene process emissions, and do not contain specific details found in the final rule. The following paragraphs summarize the purpose of each figure.

Figure 1 initiates the determination procedure for each process section. Through this figure, affected facilities are identified and separated according to their applicability date (between September 30, 1987, and on or before January 10, 1989, and after January 10, 1989). This figure also includes the exemption step provided to affected facilities with an applicability date between September 30, 1987, and January 10, 1989, and identifies how these emissions can become subject to the rule at a later date (see Block 1.6). For process sections that are identified as affected facilities subject to the standard, Figure 1 directs the user to Figure 2A for continuous emissions and to Figure 3 for intermittent emissions.

Figure 2A is the first of three flow diagrams applicable to continuous emissions. The first step in Figure 2A separates those continuous emissions that are uncontrolled from those that are controlled in an existing control device. This is necessary as the determination procedure is different depending on whether the emissions are already being controlled. If they are, the flow diagram directs the user to Figure 2C. For uncontrolled continuous emissions, Figure 2A continues by showing the exemptions provided for individual emission streams (see Block 2A.5). (Note that an individual stream that is exempted based on its annual emissions or its VOC weight percent becomes subject to the standards at a later date if its annual emissions become 1.6 Mg/yr or greater (if it had been exempted on the basis of the annual emissions exemption) or its VOC concentration becomes 0.10 weight percent or greater (if it had been exempted on the basis of the VOC concentration exemption) (see Block 2A.6).) Once qualifying individual emission streams are exempted, the user is directed to Figure 2B.

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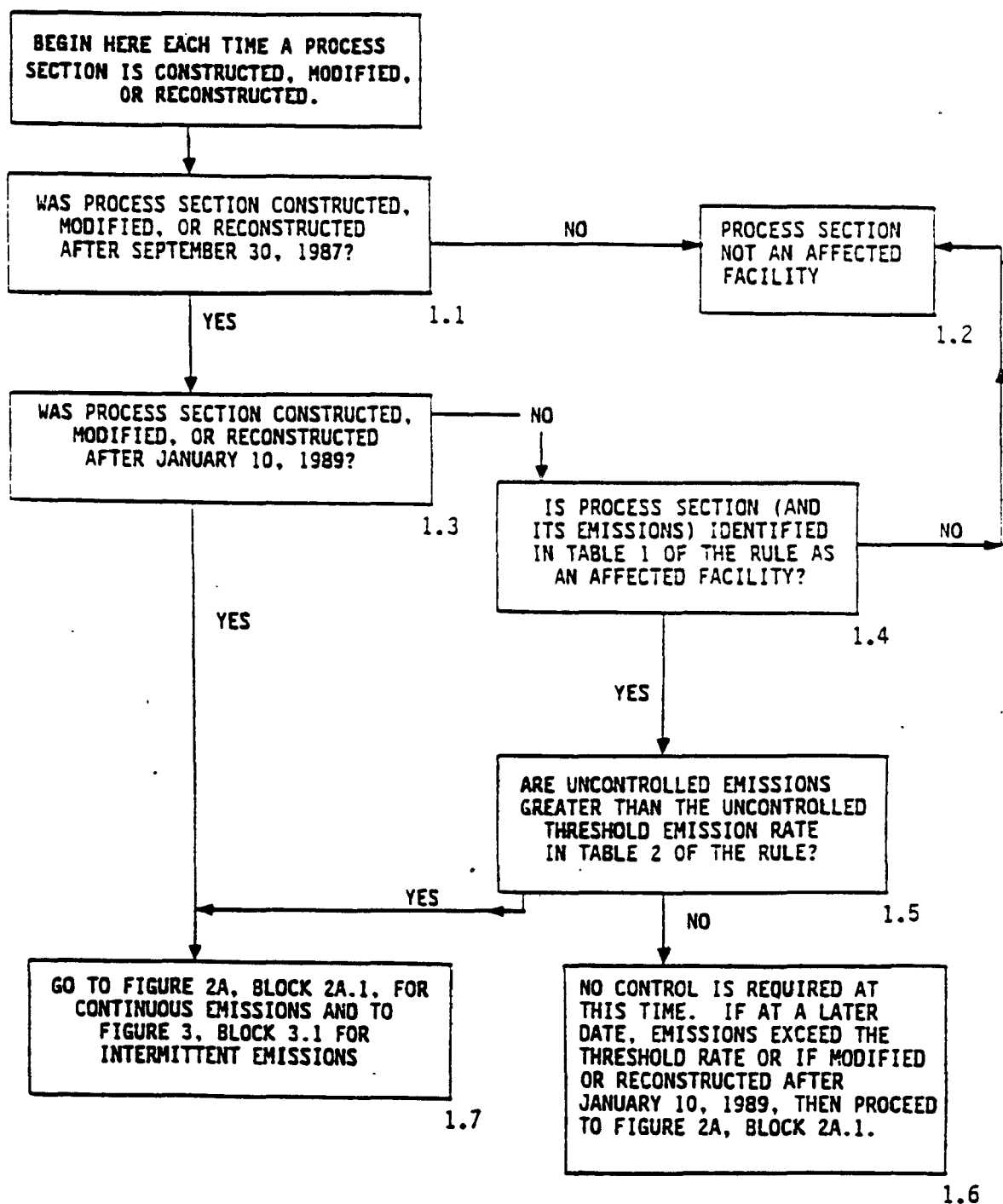


Figure 1. Initial Decisionmaking for Determining Which Polypropylene and Polyethylene Process Sections Are Affected Facilities Subject to the Standards

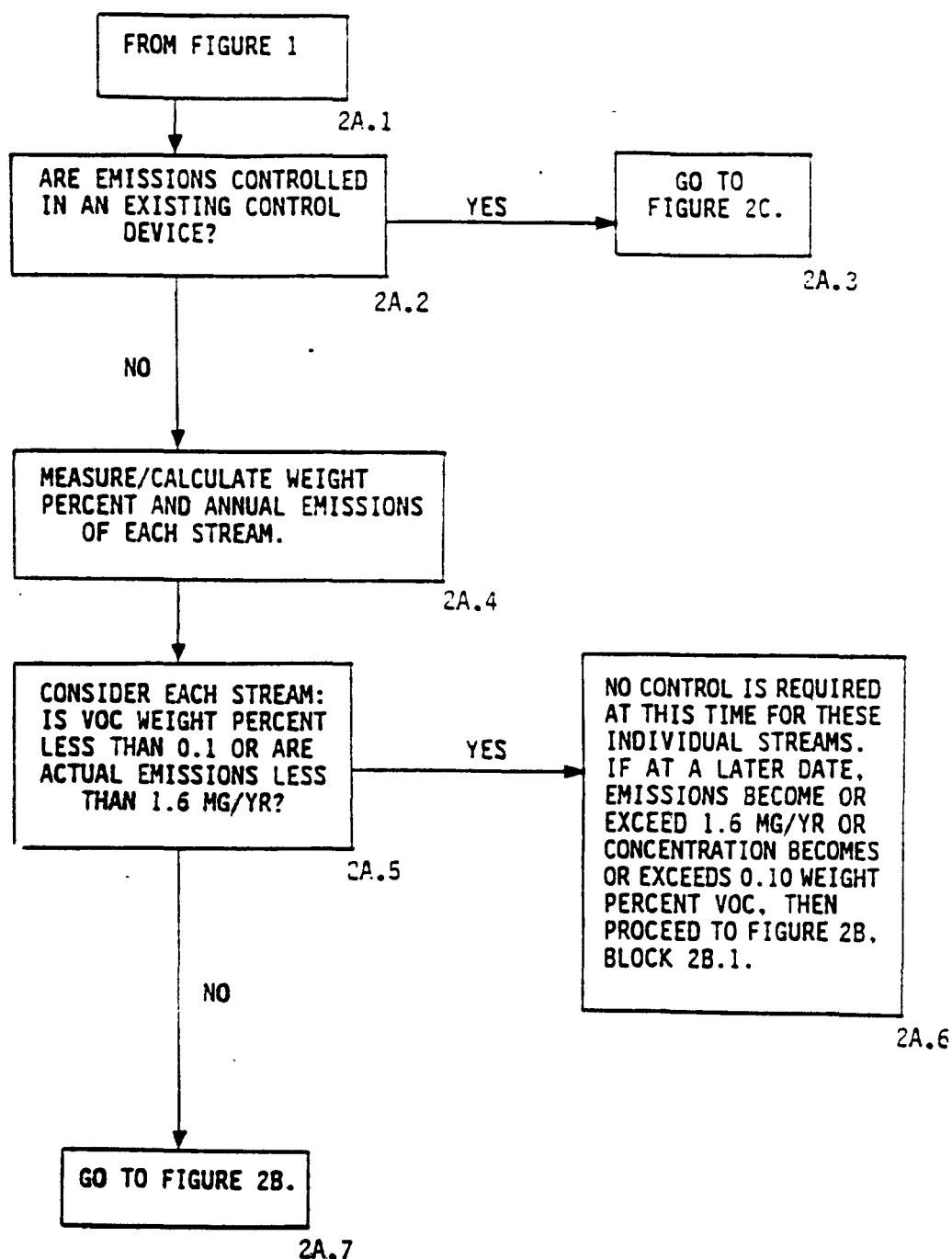


Figure 2A. Continuous Emissions - Separation of Controlled from Uncontrolled Emissions and Individual Stream Exemptions

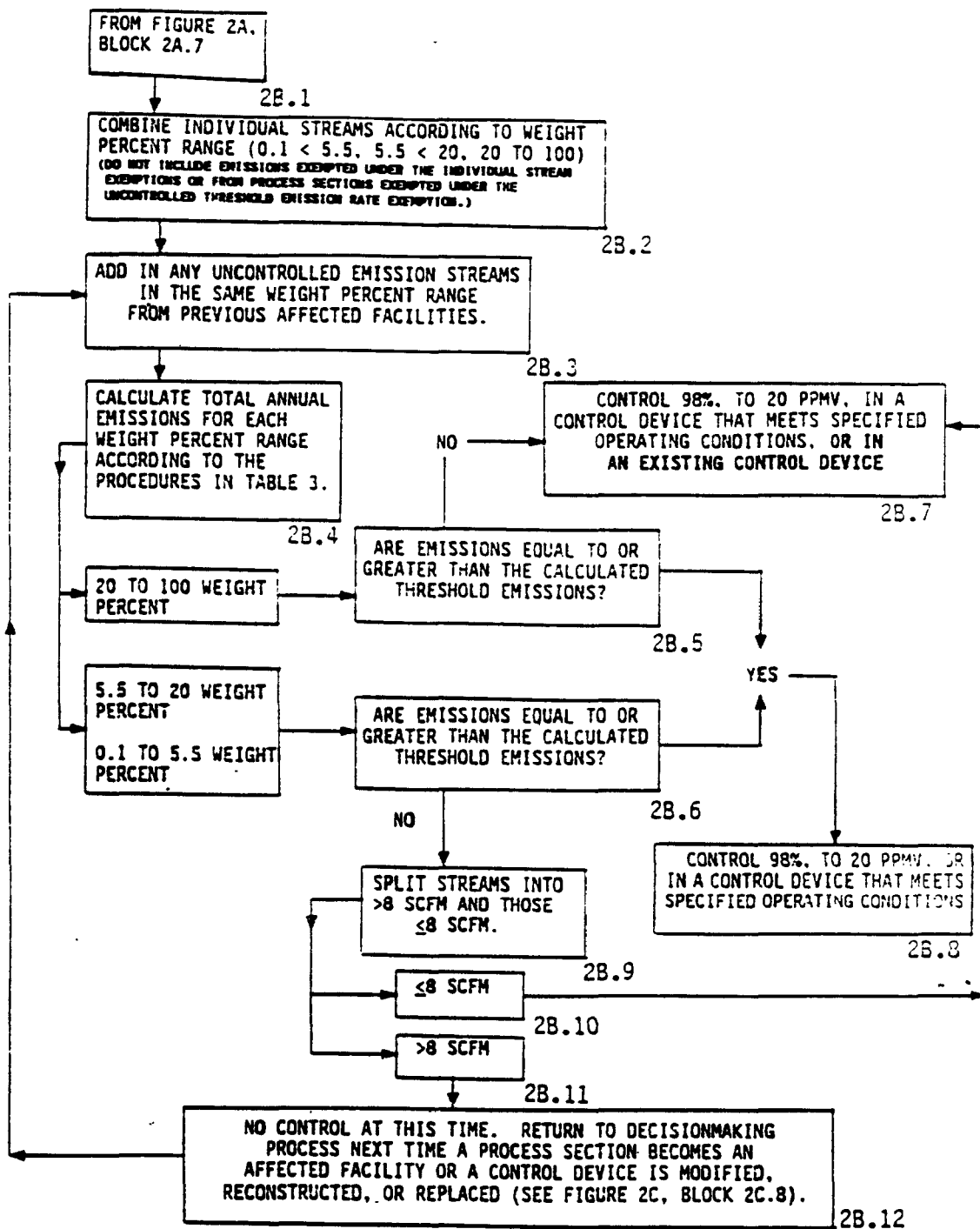
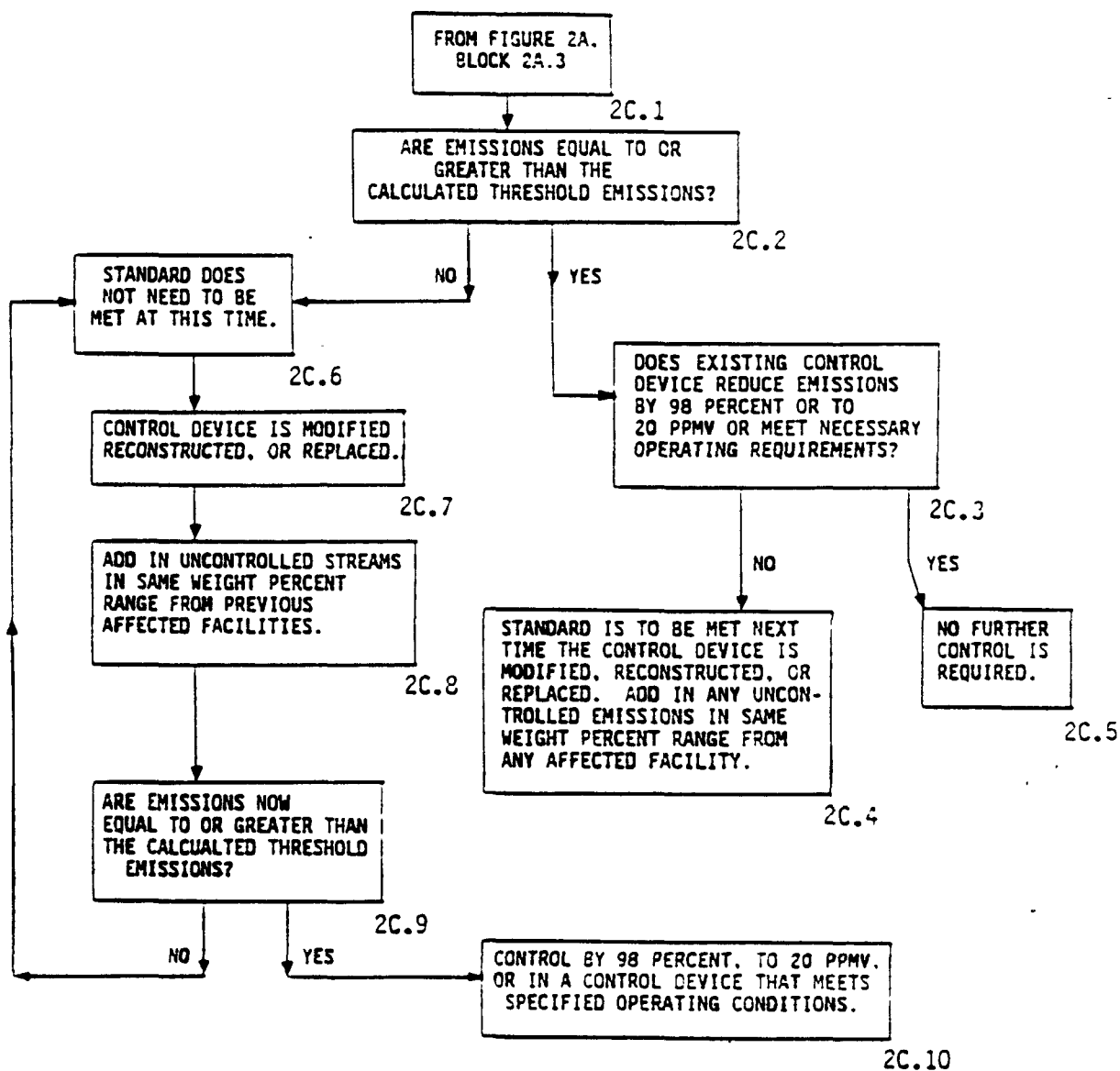


Figure 28. Decisionmaking Process for Uncontrolled Continuous Emissions from Polypropylene and Polyethylene Affected Facilities



NOTE: THERE ARE NO INDIVIDUAL STREAM EXEMPTIONS FOR EMISSIONS ALREADY CONTROLLED BY EXISTING CONTROL DEVICES

Figure 2C. Decisionmaking Process for Continuous Emissions Already Controlled at Polypropylene and Polyethylene Affected Facilities

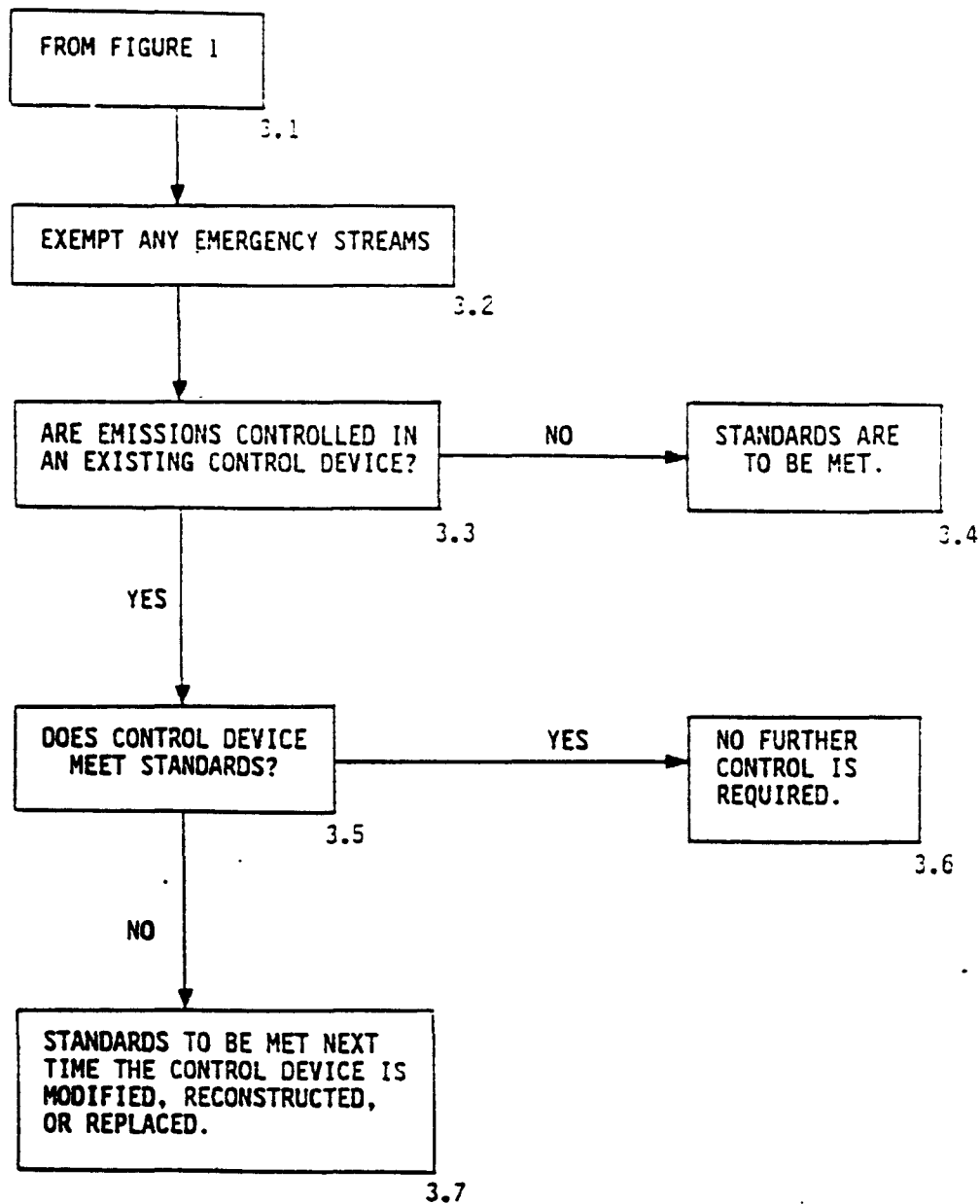


Figure 3. Decisionmaking Process for Intermittent Emissions of Polypropylene and Polyethylene Affected Facilities

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Figure 2B outlines the procedures for combining nonexempt uncontrolled continuous emissions and determining which emissions are to be controlled. This figure corresponds to the steps detailed in Table 3 in the final rule. An important feature of the rule is the "loop" provided between Blocks 2B.12 and 2B.3. In the final rule, uncontrolled emissions that remain uncontrolled after passing through this determination procedure are still subject to control in the future as new process sections become affected facilities.

Figure 2C outlines the procedure for handling emissions that are already being controlled. Note that for these emissions there are no individual stream exemptions as for uncontrolled emissions. The stream characteristics of the inlet stream to the control device are used first to calculate the CTE level and second to compare with the CTE level (Block 2C.2). Also note that uncontrolled emissions are combined with the controlled emissions in one of two ways. First, if the controlled stream is to meet the standards the next time the control device is modified, reconstructed, or replaced (Block 2C.4), any uncontrolled emissions in the same weight percent range as the controlled stream are also to be controlled to meet the standards. Second, if the controlled stream's emissions are less than the CTE level, any uncontrolled emissions in the same weight percent range are combined with the controlled stream (Block 2C.8) if and when the control device is modified, reconstructed, or replaced (Block 2C.7).

Lastly, Figure 3 outlines the determination procedure for intermittent emissions. This procedure is much simpler than for continuous emissions as it is based on stream type rather than stream characteristics. This figure shows the exemption for emergency vent streams and the timing for when the standards are to be met, which depends on whether the intermittent streams are uncontrolled or controlled in an existing control device.

**Polystyrene.** The promulgated process emission standards for polystyrene plants apply to certain new, modified, and reconstructed facilities producing general purpose (crystal) or impact polystyrene or polystyrene copolymers. The standards apply only to certain facilities in those plants producing general purpose or impact polystyrene using a continuous process. These standards do not affect process emissions from facilities that produce general purpose (crystal) or impact polystyrene or polystyrene copolymers using a batch production process or for facilities that produce expandable

polystyrene using either an in-situ suspension process or a post-impregnation suspension process.

For plants producing general purpose or impact polystyrene using a continuous process, the affected facility is each material recovery section. The promulgated process emission standards limit the emissions of total organic compounds (minus methane and ethane) (TOC) from each new, modified, or reconstructed material recovery section to 0.0036 kilograms (kg) of TOC per megagram (Mg) of product (0.0036 lbs TOC/1,000 lbs product) or the outlet gas temperature from each final condenser in the material recovery section to  $-25^{\circ}\text{C}$  ( $-13^{\circ}\text{F}$ ). An owner or operator may also elect to comply with these standards by reducing emissions by 98 weight percent or to 20 ppmv. If an owner or operator elects to comply with the outlet temperature standard, the promulgated rule requires a temperature monitor equipped with a continuous recorder to calculate the average exit temperature measured at least every 15 minutes and average over the performance test period. Each 3-hour period constitutes a performance test.

**Poly(ethylene terephthalate)** The promulgated process emission standards for PET plants apply to certain new, modified, or reconstructed facilities producing PET or PET copolymers using either the dimethyl terephthalate (DMT) process or the terephthalic acid (TPA) process. The standards apply only to certain facilities in those plants using a continuous production process. The promulgated standards do not apply to process emissions from facilities that use a batch production process.

For plants producing PET using the DMT process, the affected facilities are each material recovery section and each polymerization reaction section. These standards limit TOC to the atmosphere from each new, modified, or reconstructed material recovery section (i.e., methanol recovery) to 0.018 kg of TOC per Mg of product (0.018 lbs TOC/1,000 lbs product) or the outlet gas temperature from each final condenser in the material recovery section (i.e., methanol recovery) to  $+3^{\circ}\text{C}$  ( $+37^{\circ}\text{F}$ ). The promulgated process emission standards limit TOC to the atmosphere from each new, modified, or reconstructed polymerization reaction section to 0.02 kg TOC per Mg of product (0.02 lbs TOC/1,000 lbs product). This limit includes emissions from any equipment used to recover further the ethylene glycol for reuse in the process or sale offsite, but does not include organic compound emissions released to the atmosphere from the

cooling tower used to provide the cooling water to the vacuum system servicing the polymerization reaction section. If steam-jet ejectors are used to provide the vacuum in the polymerization reaction section, the standards also limit the ethylene glycol concentration in either the liquid effluent exiting the vacuum system servicing the polymerization reaction section or in the cooling water in the cooling tower used to provide the cooling water to the vacuum system servicing the polymerization reaction. If either a low viscosity PET product is being produced using one or more end finishers per process line or a high viscosity PET product is being produced using a single end finisher per process line, the ethylene glycol concentration in the liquid effluent exiting the vacuum system is limited to 0.35 percent by weight based on a 14-day rolling average on a daily basis. If a high viscosity product is being produced using multiple end finishers, the ethylene glycol concentration in the cooling water in the cooling tower is limited to 6.0 percent by weight based on a 14-day rolling average on a daily basis.

For plants producing PET using the TPA process, the affected facilities are each raw materials preparation section and each polymerization reaction section. The standards limit TOC from each new, modified, or reconstructed raw materials preparation section (i.e., the esterifiers) to 0.04 kg of TOC per Mg of product (0.04 lbs TOC/1,000 lbs product). The promulgated process emission standards for each new, modified, or reconstructed polymerization reaction section in which the terephthalic acid process is being used are the same as for the polymerization reaction section in PET plants using the dimethyl terephthalate process.

For determining compliance with the ethylene glycol concentration standards, ASTM-D2908-74, "Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Chromatography," is used. At least one sample per operating day is to be collected with an average ethylene glycol concentration by weight calculated on a daily basis over a rolling 14-day period of operating days. Each daily average ethylene glycol concentration so calculated constitutes a performance test. The promulgated standards allow an owner or operator to institute a reduced testing program if the concentration of the ethylene glycol meets certain criteria.

As an alternative to demonstrating compliance with the 98 percent emission reduction requirements contained in any of the standards outlined above, affected facilities may demonstrate compliance with a TOC emission limit of 20 ppmv. Flares may be used to comply with the promulgated standards, provided the flares are operated under conditions, as specified in § 60.18 of the General Provisions, that have been shown to result in a 98 percent reduction in TOC.

#### *Fugitive Emissions*

The promulgated standards of performance cover certain equipment leaks of VOC emissions within polypropylene, polyethylene, polystyrene (including expandable polystyrene), polypropylene copolymer, polyethylene copolymer, and polystyrene copolymer manufacturing plants. The equipment leak standards do not cover equipment in PET or PET copolymer manufacturing plants.

The promulgated standards require owners and operators of affected facilities in the plants identified above to comply with 40 CFR part 60—subpart VV—“Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry” (SOCMI) and apply to pumps, valves, sampling connections, pressure relief devices, open-ended valves, and compressors in VOC service within each new, modified, and reconstructed process unit. “In VOC service” means that a fugitive emission source contains or contacts a fluid containing 10 or more percent by weight VOC.

The SOCMI standards that are made applicable to the affected facilities in the plants specified above require: (1) A leak detection and repair program for valves in gas or light liquid service and for pumps in light liquid service; (2) certain equipment for compressors, sampling connection systems, and open-ended valves; and (3) no detectable emissions from pressure relief devices in gas service during normal operation. “In gas service” means that a fugitive emission source contains VOC fluids in the gaseous or vapor state. “In light liquid service” means that a fugitive emission source contains a liquid in which the vapor pressure of one or more of the components is greater than 0.3 kPa at 20 degrees Centigrade, as obtained from standard reference texts or as determined by ASTM Method D-2879, and the total concentration of the pure components having a vapor pressure greater than 0.3 kPa at 20 degrees Centigrade is equal to or greater than 20 percent by weight.

The SOCMI standards allow the use of “leakless” equipment for valves, pumps, compressors and sampling connection systems as an alternative to the required equipment and work practices. In addition, the SOCMI standards for valves provide for the use of alternative leak detection and repair programs. The SOCMI standards also contain a procedure for determining the equivalency of alternative leak detection and repair programs.

One change to the proposed application of subpart VV to polymer manufacturing plants has occurred since proposal. In § 60.482-2(b), there are two definitions of when a leak is detected: (1) “If an instrument reading of 10,000 ppm or greater is measured” and (2) “If there are indications of liquids dripping from the pump seal.” Certain polymer pumps are designed to purge polymer fluid from bleed ports, thereby allowing small quantities of VOC emissions to escape to the atmosphere. These pumps must use the polymer fluid to provide lubrication and/or cooling of the pump shaft. While the Agency believes that “indications of liquids dripping from the pump seal” should not be applied to such pumps, the 10,000 ppm or greater definition should be retained to ensure these pumps are not emitting significant quantities of VOC. Further, the Agency does not believe that this exemption should be applied to “new” or replaced pumps, because there are pumps available that do not have this designed-in purge. Therefore, the final rule exempts purging from bleed ports in existing pumps that must have such ports from the “indications of liquid dripping” definition until the pump is replaced or reconstructed.

#### *Monitoring*

Where an incinerator, a boiler or heater with a heat input design capacity of less than 150 million Btu/hr. or a condenser is used to comply with these standards, a temperature monitor is required. Where a flare is used to comply with these standards, a thermocouple, an ultraviolet sensor, an infrared beam sensor, or similar monitoring device is required to indicate the continuous presence of either the flare flame or each pilot light flame, depending on the types of emission streams being controlled. Where an adsorber is used, a scrubbing liquid temperature monitor and a specific gravity monitor are required. For absorbers, condensers, and adsorbers, an organic monitoring device that indicates the concentration level of organic compounds may be used instead.

The promulgated standards also require owners or operators using a vent

system that contains valves that could divert a vent stream from a control device either to: (1) Install a flow indicator, equipped with a recorder, immediately downstream of each valve that if opened would divert the vent stream to the atmosphere or (2) implement monitoring, recordkeeping, and reporting requirements concerning the position of such valves and their car seals.

#### *Exemption and Threshold Levels*

These standards contain various types of cutoffs. Some of these cutoffs exempt individual process emission streams and groups of process emission streams from control. Other cutoffs identify threshold emission levels, which are used for determining when process emissions from certain affected facilities are to be controlled. The factors considered in selecting these various cutoff levels are specific to the Polymer Manufacturing NSPS, and would not necessarily be appropriate for other source categories. Likewise, the various cutoff levels selected should not be viewed as benchmarks for other standards. Cutoffs found to be necessary for other source categories will be based on factors relevant to those categories, and may or may not resemble those for the polymer manufacturing processes covered under these standards.

#### *II. Environmental Impacts*

The promulgated standards are based on the application of BDT to control VOC emissions from certain polymer manufacturing facilities. To estimate the impacts of the promulgated standards, EPA projected that 85 newly constructed, modified, and reconstructed polymer manufacturing process lines, which is approximately equal to 27 plants, would be affected by the standards during the first 5 years after the effective date of the standards. The EPA estimates that VOC emissions would be reduced in the fifth year following implementation of the promulgated standards by 2.9 to 3.2 gigagrams (Gg) (3,200 to 3,500 tons), an emission reduction of approximately 42 percent from projected emission levels under the regulatory baseline. This range results from assumptions as to how new growth in the industry will occur. These estimates are essentially the same as estimated at proposal.

Solid waste impacts are projected to be minimal. The promulgated standards are projected to result in the first five years in less than 0.1 cubic meter (m<sup>3</sup>) (1.2 cubic feet) per year of solid waste, which would be generated through the use of catalytic incinerators at high density polyethylene (HDPE), slurry



process plants. As process sections are modified and reconstructed over time, more catalytic incinerators are likely to be installed accompanied by an increase in solid waste. Solid waste generated by VOC equipment leak detection and repair programs include mechanical seals, seal packing, rupture disks, and valves. The solid waste impact of these programs are not anticipated to be significant because of the ability to recycle metal solid wastes and the small quantity of wastes generated.

Noise impacts attributable to the promulgated standards is also expected to be minimal. Flares can be a source of noise pollution. Noise generated during flaring results from unsteadiness in the combustion process and steam injection. Almost all polymer production processes already have flares located on site. Many of these flares may be used to meet the promulgated standards. For new flares, by employing proper flare design and site selection, potential noise impacts on community areas surrounding each affected plant should be minimal.

No adverse water impact and radiation impacts are expected to occur as a result of the promulgated standards.

### III. Energy Impacts

The promulgated standards would increase energy consumption slightly in most polymer plants through the application of BDT for process emissions. Nationwide, total energy consumption due to process VOC controls is estimated to increase between 11 and 30 terajoules (TJ) per year. The 11 TJ estimate is based upon assumptions concerning how new growth in the industry will occur and the sharing of control devices by individual affected facilities. The 30 TJ estimate is a worst-case estimate in which all growth is assumed to occur as individual process sections and each process section has its own control device. These estimates of increased energy consumption represent small amounts of energy compared to that required to produce a polymer. For example, a HDPE solution process model plant comprised of three process lines would use approximately 24,000 TJ per year. Thus, total nationwide energy consumption is estimated to be between 0.05 and 0.13 percent of the energy consumed in this one model plant.

Application of BOT for equipment leaks of VOC emissions is estimated to reduce VOC emissions that have a total energy value of approximately 66 TJ per year. By taking into account this energy value, the promulgated standards are estimated to result in a net decrease in

energy consumption of between 36 and 55 TJ per year in the fifth year after these standards are in place.

### IV. Cost Impacts

The costs for these standards have changed slightly since proposal. Capital costs have increased for polystyrene plants and PET plants reflecting revised condenser costs, which, in part, took into account potential freezing problems that required a different condenser system. The annual costs were also revised to reflect revised unit price costs for natural gas and electricity. The net effect of these changes was marginal. Total nationwide capital costs in the fifth year following the promulgation of these standards is estimated to be approximately \$4.3 to \$4.5 million (compared to \$4.5 million at proposal) and annual costs to be approximately \$1.3 million (down from \$1.4 million at proposal) (reported in June 1980 dollars).

Under the promulgated standards, increased capital expenditures over the baseline range from approximately \$4,600 per process line-equivalent in a PET plant using a DMT process to approximately \$273,000 per process line-equivalent in a polypropylene plant using a liquid phase process. Annualized cost increases range from about \$1,400 per process line-equivalent in a PET plant using a DMT process to approximately \$92,000 per process line-equivalent in a polypropylene plant using a liquid phase process.

### V. Economic Impacts

Adverse impacts would be minor. If all costs are passed through to the customer, maximum price increases range from less than 0.2 percent, for plants producing PET using a DMT process, to approximately 0.44 percent, for polypropylene plants using a liquid phase process. The Agency has determined that the costs of these promulgated standards will not have any significant impacts on the industry.

The environmental, energy, and economic impacts are discussed in greater detail in the background information document for the proposed standards, "Polymer Manufacturing Industry—Background Information for Proposed Standards," EPA-450/3-83-019a, and in Docket Items IV-B-13 and IV-B-22.

In addition, the incremental cost effectiveness of alternative levels of control were also evaluated in order to determine the reasonableness of control in light of the costs to reduce emissions and to ensure that the controls required by this rule are reasonable relative to other regulations. Additional details on

costs can be found in the BID for the proposed standards.

### VI. Public Participation

Prior to proposal of the standards, interested parties were advised by public notice in the *Federal Register* (48 FR 12825), March 28, 1983, of a meeting of the National Air Pollution Control Techniques Advisory Committee to discuss the standards for polymer manufacturing plants recommended for proposal. This meeting was held on April 26, 27, and 28, 1983. The meeting was open to the public and each attendee was given an opportunity to comment on the standards recommended for proposal.

The standards were proposed and published in the *Federal Register* on September 30, 1987 (52 FR 36678) and January 10, 1989 (54 FR 890). The preamble to the proposed standards discussed the availability of the BID, "Polymer Manufacturing Industry—Background Information for Proposed Standards," EPA-450/3-019a, which described in detail the regulatory alternatives considered and the impacts of those alternatives. Public comments were solicited at the time of proposal, and copies of the BID were distributed to interested parties.

To provide interested persons the opportunity for oral presentation of data, views, or arguments concerning the proposed standards, a public hearing was held on November 16, 1987, at Research Triangle Park, North Carolina. The hearing was open to the public; however, no one presented any comments.

The public comment period was from September 30, 1987, to February 8, 1988 for the September 30, 1987, *Federal Register* notice and from January 10, 1989, to February 21, 1989, for the January 10, 1989, *Federal Register* notice. Some 14 comment letters were received on the first *Federal Register* notice and 11 comment letters on the second notice. The comments have been carefully considered and, where determined to be appropriate by the Administrator, changes have been made in the proposed standards.

### VII. Significant Comments and Changes to the Proposed Standards

Comments on the proposed standards were received from industry and trade associations. A detailed discussion of these comments and responses can be found in the promulgation BID, which is referred to in the ADDRESSES section of this preamble. The summary of comments and responses in the BID serve as the basis for the revisions that

have been made to the standards between proposal and promulgation. The major comments and responses are summarized in this preamble. Most of the comment letters contained multiple comments. The comments have been divided into the following areas: Basis for the Standards, Control Technology-Process Emissions, Control Technology-Equipment Leaks of VOC, Modification/Reconstruction, Monitoring Requirements, Test Methods and Procedures, Reporting and Recordkeeping Requirements, and Miscellaneous.

#### **Basis for the Standards**

##### *Coverage of Processes*

**Comment:** Two commenters (IV-D-2, IV-D-14) were concerned that processes that produce certain elastomers and rubber products would be covered by the proposed standards, and that this would be inappropriate. Commenter IV-D-2 felt that the assumption made by EPA that as long as the proportion of propylene used in the production of polypropylene copolymers is at least 50 percent by weight in the copolymer product, the production processes used to manufacture both the polymer and the copolymer are essentially the same, and the resulting definition of polypropylene would include inappropriately their copolymer production facilities that produced ethylene-propylene terpolymers rubber products, which are considered "elastomers" under industry definitions. This commenter stated that the intent of these regulations is to cover thermoplastics and their manufacturers, and that there appears to be a lack of documentation evidencing studies of the processes of rubber manufacturers in the Agency's published documentation. Thus, this commenter concluded, any regulation of their facilities without a more comprehensive study that includes the specific nature of design and manufacture of synthetic rubber producers in premature and could harm any further expansion projects now under consideration.

Commenter IV-D-14 stated that several of their member companies produce synthetic rubbers using processes entirely unlike those used for production of plastics composed of polyethylene, polypropylene, polystyrene or polybis(2-hydroxyethyl)terephthalate. The commenter noted that the composition and physical arrangement of compounds in the polymer molecule result in physical characteristics that are clearly those of a rubber rather than a "thermoplastic." The commenter pointed

out that none of their member companies' ethylene/propylene/diene monomers (EPDM) production facilities were included in the surveys conducted by EPA prior to proposal of these rules. In view of the major differences between the polymerization and finishing operations of the EPDM rubber plants and those of the thermoplastic resin plants, this commenter requested that the proposed standards for polyethylene and polypropylene apply to certain sources in polymer manufacturing plants that produce copolymers consisting of at least 80 percent (rather than 50 percent) by weight of ethylene or propylene, respectively.

**Response:** The intent of these standards is to cover certain producers of thermoplastic or thermoset resins and copolymers of these resins that are in turn themselves thermoplastic or thermoset resins. The Agency does not intend for these standards to cover synthetic rubber producers, including manufacturers of thermoplastic or thermoset elastomers, such as ethylene-propylene copolymers and terpolymers that are elastomers or rubbers. Resins are thermoplastic or thermoset polymers that are essentially synonymous with the term plastic. Elastomers are also thermoplastic or thermoset polymers, but are capable of returning their initial form following deformation. Synthetic rubber and elastomer producers, however may still be regulated in the future under this standard or a new standard should the Agency decide such regulation is warranted.

The Agency agrees that the definition of polypropylene in the September 30, 1987, Federal Register notice would have subjected certain elastomer and synthetic rubber producers to these standards, because the definition did not contain the clarifying term "thermoplastic." Therefore, the Agency has revised the definition of polypropylene to include the term "thermoplastic." The Agency believes that the revision to the definition of polypropylene limits the scope of these standards appropriately.

**Comment:** One commenter (IV-D-1) stated that there are more alternative polypropylene technologies than the two listed in BID Vol. I and in the proposed regulations. This commenter assumed that the new source performance standards (NSPS) should be applicable to all polypropylene processes. The commenter then concluded that the NSPS should be amended to include, at least, the "bulk (liquid-phase) polymerization technology." The

commenter stated that bulk plant technology, although in principle a liquid-phase polymerization process, is unlike the "traditional" slurry process and hence, conclusions drawn on the basis of the "slurry process" do not apply directly to the bulk process.

Commenter IV-D-45 also noted that in order to determine applicability dates for affected facilities (using Tables 1 and 2 of the proposed regulation), one must still have a clear understanding of which "production process" applies (the applicable model plant) and the definition of "process section" (which equipment falls into which process section), especially where plants have commenced construction, modifications, or reconstruction between the two proposed regulation dates.

**Response:** The commenter is correct in assuming that the standards proposed in the September 30, 1987, Federal Register notice were to be applicable to all polypropylene processes. At that time, the Agency understood that all such processes could be described as either liquid phase or gas phase processes and that the model plants described in BID Vol. I were reasonable representations of those processes upon which to base standards. Comments received on the September 30, 1987, Federal Register notice, however, indicated that the polypropylene model plants may not be adequate representations of all processes. As a result of this and other comments, the Agency undertook an analysis to examine alternative ways to determine which process emissions from polypropylene (and polyethylene) plants should be controlled. The results of this analysis were presented in a January 10, 1989, Federal Register notice for public comment. The approach selected by the Agency and incorporated into the final rule is independent of the particular process technology used to produce polypropylene or polyethylene. Thus, the non-representatives of the polypropylene, liquid phase-model plant presented in BID Vol. I as it applies to the bulk process is no longer a concern.

For polypropylene facilities that are constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989, the owner or operator of such facilities must still determine which process—liquid phase or gas phase—his or her facility falls under for purposes of determining the affected facilities. The final rule requires an owner or operator to select one of the production processes listed in Table 1 of the final rule to apply to his or her facility. The determination of which emissions from these affected facilities

would be controlled are made using the new approach, which is independent of process type, rather than the control/no control decisions that were based on the model plant. However, an owner or operator can still use the uncontrolled threshold emission rates proposed in the September 30, 1987, Federal Register notice to exempt these affected facilities from control, if he or she so elects.

#### *Definition of Affected Facility*

**Comment:** One commenter (IV-D-13) stated that the selection of process sections as affected facilities results in unreasonable cost and gives unfair trade advantage to patent holders of these processes which the Agency selected as model plants. The commenter stated that the proposed standards will require companies with existing polymer plants to divide up their plants into process sections and process lines, creating a need to develop expensive new accounting and recordkeeping methods and procedures to determine if modifications occur. The commenter stated that plants are not designed, estimated, justified and built, and cost centers are not usually set up by process sections. A large polypropylene or polyethylene polymer plant may have as many as 10 to 15 affected facilities, according to the commenter, and over the course of a year many small changes may be made to these plants. To evaluate whether a modification that has been made falls under the proposed rules, the commenter stated that completely new accounting systems must be developed and implemented. For existing polypropylene and polyethylene plants, the commenter believes a more reasonable choice would be to designate each process line as the affected facility. The commenter stated that a problem recognized by EPA concerning the choice of process units, i.e., "a process line cannot be determined clearly" (52 FR 36683), is even more of a problem with the selection of process section as the affected facility. Specifically, the commenter pointed out, material recovery is being utilized more and more by the industry as a means of reducing overall emissions. According to the commenter, in the model plants studied by the Agency, material recovery occurred primarily after the reaction section, while modern plants continue the recovery of raw materials throughout the process line, wherever it can be done economically. The commenter concluded that the standards need to be revised to a process line concept.

**Response:** The main considerations in selecting the definition of affected

facility are the application of best demonstrated technology and the degree to which replacement equipment is brought under the standards. As a result, narrower definitions are preferred. This preference can be overcome if analysis concludes that a broader designation would result in greater emission reductions or avoid unreasonable impacts (i.e., costs, energy, or other environmental impacts). The commenter's main point for changing the definition of affected facility is the need by industry to develop and implement completely new accounting systems to track costs for as many as 10 to 15 affected facilities in a large polypropylene or polyethylene plant. The commenter also believes that defining process sections is even more difficult than defining a process line and refers to changing practices of material recovery in the industry.

The Agency disagrees with the commenter on both points. The imposition of new regulations on the industry would likely require some plants to develop new accounting systems to track modifications and reconstructions whether the definition of affected facility is "process section" or "process line." Furthermore, under either definition, the owner or operator would still need to track all changes. The only difference is the number of affected facilities that would be tracked. On this issue, the commenter claims that 10 to 15 affected facilities is too many. The Agency simply disagrees with this statement. The Agency rejected designating each individual emission point as an affected facility because a typical plant may have as many as 40 individual process emission points; a large plant may have substantially more. In terms of process sections, the commenter notes that a large plant may have 10 to 15 process sections; a typical plant would likely have fewer. The number of process lines at any plant will always be less than the number of process sections; but, the Agency is not convinced that at large plants 10 to 15 affected facilities is unreasonable.

With regard to the second point, the commenter claims that the definition of "process section" is even more of a problem than that of a "process line." The Agency again disagrees. The example provided by the commenter may not match the material recovery section of the model plant, but that is irrelevant to the definition. The concept of material recovery is the key aspect of identifying the material recovery process section or material recovery process sections at a plant. (The Agency has revised the definitions of the

process sections to help clarify the placement of equipment in the appropriate process section (see § 60.561, Definitions, of the final rule and § 2.2, Definition of Affected Facility in the BID for the promulgated standards).) Further, the Agency identified a major conceptual problem with trying to define a "process line," where equipment was shared between two otherwise distinct process lines. The commenter offered no suggestions as to how to deal with that problem.

In summary, the Agency finds no reason to change the definition of affected facility for process emissions.

#### *Model Plant vs. Generic Approach*

The majority of comments received dealt with the appropriateness of using model plants as the basis for determining which process emissions from polypropylene and polyethylene plants would be subject to the standards. Based on these comments, the Agency has adopted a "generic" approach in the final rule, which is basically the same as that approach presented in the January 10, 1989, Federal Register notice reopening the public comment period.

**Comment:** Several commenters (IV-D-6, IV-D-7, and IV-D-8) stated that, in many cases, the model plants used to develop this standard do not adequately reflect current operation of manufacturing plants. For example, Commenter IV-D-7 referred to the model plant for low density polyethylene (LDPE) based on the UNIPOL process. This commenter noted that the model plant did not consider the modified UNIPOL process that has a pelletizer section added and the linear low density polyethylene (LLDPE) solution process. The commenter stated that emission characteristics differ significantly from the model plant, but are controlled the same. The commenter then stated that the gas phase process for polypropylene failed to consider emergency atmospheric vents that are used on newer plants. Therefore, Commenter IV-D-8 suggested that these model plants be reviewed to ensure that they are representative of operating plants throughout the industry. Similarly, Commenters IV-D-6 and IV-D-8 stated that there are several aspects of the fluid bed gas phase polyethylene process model plant (used to describe the LDPE low pressure and HDPE gas phase processes) that do not reflect actual current operations. A number of specific discrepancies (and the changes suggested by Commenter IV-D-8) were identified by the commenters.

Commenter IV-D-8 also stated that by using reaction mechanisms as the models for developing the NSPS control requirements EPA has tailored the rule to these particular patented processes and that this provides an unfair advantage for both the licensors and licensees of those technologies because the sale of licenses is due, in part, to the ability of a process to comply with applicable environmental standards. The commenter pointed to the low pressure, LDPE process as the best example. The commenter stated that when the model plant for this process was developed, the only process in use was a fluid bed gas phase facility licensed by a major U.S. chemical company. Since that time, the commenter continues, both a slurry and a solution process have been revised to produce the linear low density product, and a new gas phase facility licensed by a major British petrochemical company is currently under construction. According to the commenter, these newer processes differ greatly from the low pressure process that the Agency considers state-of-the-art. The commenter notes that if the NSPS is promulgated as written, it will require that similar new installations, as well as existing units that are modified or reconstructed, be equipped with emission controls designed specifically for the fluid bed gas phase facility. The commenter suggests that the economic penalty resulting from this action be considered before the regulation is finalized.

This commenter then suggested that it might be more appropriate for EPA to establish control requirements based on the system pressure and process type rather than the specific technology used because system pressure (not reaction mechanism) is the primary factor influencing emissions from polyolefin manufacturing facilities and will determine the relative ease at which unreacted raw materials are removed from reacted mixtures. The commenter also stated that system pressure will also be a factor in defining the process step from which the unreacted raw material will be emitted, noting that the higher pressure processes tend to hold on to the unreacted materials longer, thereby yielding greater emissions in later process steps (i.e., product storage).

The commenter illustrated this suggestion by breaking the polyethylene processes into two broad classes—high and low pressure. Under the low pressure classification, the commenter indicated that there are presently three commercial processes—(1) Gas phase,

(2) liquid slurry and (3) liquid solution. According to the commenter, each of these processes in the newer and more recently modified plants has the capability of manufacturing both HDPE and LDPE. Under the high pressure classification, the commenter indicated that there are presently two commercial processes—(1) tubular and (2) autoclave—both of which manufacture conventional LDPE.

The commenter pointed out that under the proposed regulation, if these low pressure solution or slurry process plants manufacture LLDPE, then they are grouped with the gas phase model plant, while if they manufacture HDPE, they are grouped with either the HDPE solution model or the HDPE slurry model. The problem or inconsistency with this result, according to the commenter, is that from a product, process, and emissions point of view, when a solution plant manufactures LLDPE it actually more closely resembles the HDPE solution model and when a slurry plant manufactures LLDPE, it more closely resembles the HDPE slurry model than the gas phase model plant. Finally, the commenter pointed out that the product finishing areas of modern solution and slurry LDPE plants resemble the HDPE solution and HDPE slurry model plants much more than they do the gas phase model plant.

Commenter IV-D-6 stated that there are no intermittent (non-emergency) vents from the product finishing and product storage process sections in high pressure, LDPE plants. This commenter pointed out that continuous emissions from these two process sections were not proposed for control and felt, therefore, that these sections should not be considered as affected facilities.

**Response:** These comments were made in response to the September 30, 1987, Federal Register notice. The Agency took these comments under consideration and as a result of extensive analysis presented in the January 10, 1989, Federal Register notice, a new approach for determining which process emissions from all polypropylene and polyethylene plants would be subject to control. The new approach encompasses all emission streams and process sections in these types of polymer plants as an integral part of the new approach. The new approach does away with the need to define model plants and the Agency determined it was unnecessary to revise the model plants. Under the new approach, it may be possible that certain processes do not have one type of emissions from certain process sections

or lack one of the basic process sections. It is not the intent of the new approach to identify such specific situations, thereby potentially limiting its applicability, if not now, then in the future as processes change. Therefore, the Agency has retained as designated affected facilities under the new approach all process sections and emissions from polypropylene and polyethylene plants, as was presented in the January 10, 1989, Federal Register notice.

#### *Low VOC Concentration Streams*

**Comment:** Three commenters (IV-D-6, IV-D-8, IV-D-13) expressed concern over requiring control of dilute streams. Commenters IV-D-6 and IV-D-8 stated that the Agency has not demonstrated that using a device that is 98 percent efficient or reducing the TOC concentration to 20 ppmv on a dry basis (corrected to three percent oxygen content) is either possible or economically reasonable for dilute gas streams. The commenters noted that control of dilute streams has become much more significant since the industry now relies more heavily on material recovery for control and, as a result, the extent to which low concentration (TOC) streams now exist in these processes was not anticipated and the difficulty and expense involved in controlling these streams was not considered by EPA. Commenters IV-D-8 and IV-D-13 concluded, that, unless EPA can establish the availability and cost effectiveness of controls for dilute gas streams, controls should not be required.

Commenter IV-D-8 also stated that if BiD Vol. I did in fact establish that 20 ppmv is the lowest VOC concentration achievable by combustion of gas streams containing less than 2,000 ppmv VOC, then the lowest achievable VOC concentration is controlled far greater than the best technology system called for by Section 111 of the Clean Air Act.

Finally, the commenters suggested that EPA should also establish a procedure in the regulation that would exempt any dilute concentration stream in any affected facility from control if it can be shown that control of that stream is not cost effective. Commenter IV-D-8 suggested as one possible way to do this is to consider the application of a Total Resource Effective (TRE) Index to the subject vent streams. This was also suggested by the other two commenters. If a suitable alternative test cannot be provided, the commenter (IV-D-8) continued, EPA should exempt all low concentration streams from control in this standard using the same rationale it

used to exempt the continuous vent streams from the product storage bins.

**Response:** The BID for the proposed standards summarized information contained in Docket Items II-B-4 and II-B-5. These docket items contain the conclusions reached by EPA concerning thermal incinerator performance over a number of tests. The Agency believes that the conclusions reached in those docket items are still valid and support the proposed standard. Furthermore, the new approach presented in the January 10, 1989, Federal Register notice and adopted in the final rule considers a wide range of low VOC concentration streams and the cost of their control for determining the level of emissions necessary for control to be cost effective. The final rule incorporates a low VOC concentration exemption for new and existing affected facilities.

With regard to specific points raised by the commenters, one commenter (IV-D-8) suggested that 20 ppmv is more stringent than the best technology system called for by Section 111 of the Clean Air Act (presumably calculating 99 percent reduction (2000-20/2000=0.99)), which is more stringent than the 98 percent destruction. The commenter is incorrect, but the Agency understands the confusion. In evaluating the performance capabilities of incinerators, the Agency examined a large number of streams that had combustion air added to them prior to being combusted. For these streams, the tests showed a leveling off at 20 ppmv at the outlet when the concentration of streams with combustion air fell below 1,000 ppmv. In other words, 98 percent destruction was still being achieved by emission streams with combustion air that had VOC concentrations down to 1,000 ppmv. Many of the streams examined, however, required combustion air to be added to them. The amount of combustion air required typically reduced the VOC concentration by one-half. Thus, 2,000 ppmv of VOC before combustion air is required could be incinerated by 98 percent (on a weight basis). In summary, the 20 ppmv standard does not require a greater degree of control than the best technology system, which is 98 percent destruction by weight.

**Comment:** Four commenters (IV-D-39, IV-D-43/IV-D-50, IV-D-44, IV-D-45) expressed concern over the lack of an exemption for streams with less than 0.1 weight percent VOC from new affected facilities. The commenters noted that the Agency's reason for excluding new affected facilities from the low VOC concentration exclusion was to preclude operators from purposefully diluting

streams to benefit from the exemption. Commenter IV-D-39 pointed out that "intentional dilution is circumvention of control, which is already forbidden." The commenters all believed that the lack of this exemption would result in the imposition of controls that were not cost effective. Commenter IV-D-43/50 identified several reasons as to why very low VOC concentrations (0 to 5 percent of the lower explosive level (LEL)) are found in the industry and stated that EPA should not require companies to compromise safety by requiring higher VOC concentrations when history has led industry to use more dilute levels to ensure employee safety.

As a group, the commenters recommended that EPA use the same procedures for determining control of dilute VOC streams (<5.5 weight percent VOC) for new affected facilities as it did for modified and reconstructed facilities, and the EPA promulgate the same provisions for determining control required for new facilities as it has proposed for modified and reconstructed facilities. Commenter IV-D-45 stated that not to do so would subject the proposal to allegations that it is not representative of all affected facilities in the categories being regulated, hence defective.

**Response:** The Agency has carefully considered this issue. The Agency is still concerned that new facilities could be designed so as to "take advantage" of a low VOC concentration cutoff, and at less expense than the cost of controlling the streams. One commenter (IV-D-43/50) indicated that the Agency could compare the purge air rates of a new facility with existing rates. The Agency agrees that this could be a useful mechanism to evaluate whether a company is trying to intentionally dilute the stream to circumvent the rule. The Agency is concerned that this is not necessarily applicable in all cases, either because it is a first time facility for an owner or operator or because its technology is sufficiently different from the technology at existing facilities that a comparison is inappropriate. Another commenter (IV-D-45) pointed out that the nature of storage bin purges are such that the VOC concentration is initially high and drops over time, and that such equipment and air purges are designed so that the maximum concentration would be between 20 and 25 of the LEL. The Agency believes that recognition of this design feature is a useful tool for evaluating whether "too much" dilution is taking place. This again is somewhat limited in that not all dilute streams will have VOC concentrations that vary as

dramatically as might occur in storage bins. On the other hand, designing storage bin air purge rates so as to have maximum VOC concentrations at 20 and 25 percent of the LEL makes it more difficult to justify streams that are diluted so that the maximum VOC concentration is significant below this level. By examining these and other items (e.g., design criteria for pneumatic conveyors), the Agency now believes that there are a sufficient number of indicators that can be used to judge whether intentional circumvention is being practiced at new facilities. Therefore, the Agency has extended both the VOC concentration exemption and the calculated threshold emission equations used for existing affected facilities to new affected facilities.

#### *Applicability of Generic Approach*

**Comment:** One commenter (IV-D-44) stated that the model plant approach, contained in the September 30, 1987, proposal, excluded certain process sections from being affected facilities for both continuous and intermittent emissions, and that the January 10, 1989, proposal appears to provide an exemption for only facilities exempted by Table 1. According to the commenter, it would be unfair to penalize projects which commenced construction, modification, or reconstruction under this September 30, 1987, guidance and on or before the January 10, 1989, proposal, which were not designated as affected facilities in the September 30, 1987, proposal. The commenter then stated that the Agency recognized (54 FR 905) that certain emissions and process sections not required to be controlled under the standards proposed on September 30, 1987, may be required to be controlled under the new approach and therefore, the Agency proposed to resolve this potential compliance problem by proposing a new applicability date (i.e., January 10, 1989) for those facilities that would have been excluded under the original proposal, but subject under the new approach. The commenter recommended that the model plant approach (September 30, 1987, proposal) should be the governing standard for polypropylene and polyethylene construction, modification, and reconstruction projects which can be shown to have commenced after September 30, 1987, but on or before January 10, 1989.

**Response:** The January 10, 1989, Federal Register notice does what the commenter recommends in Table 2 of the regulation portion of that notice. Table 2 lists all the emission and process sections that were excluded as

affected facilities in the September 30, 1987, notice and applies a January 10, 1989, applicability date to these emissions and process sections. Thus, as indicated in the January 10, 1989, Federal Register notice and as provided for in the final rule, only those process sections identified in the September 30, 1987, Federal Register notice are affected facilities when constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989, for the appropriate continuous or intermittent emissions. It should be noted that the procedure for determining control or no control of the emissions from these process sections is the "generic" or new approach. The uncontrolled threshold emission rates proposed in the September 30, 1987, Federal Register notice, however, can still be used for these affected facilities, if an owner or operator so elects, to exempt individual process sections from control. (Note: Process sections that are exempted on the basis of an uncontrolled threshold emission rate become subject to the standards if the uncontrolled emissions exceed the uncontrolled threshold emission rate at a later date or if the process section is modified or reconstructed after January 10, 1989.)

**Comment:** One commenter (IV-D-5) stated that it is possible for equipment to be designed to produce more than one of the polymers covered by the proposed standards. The commenter pointed out that the preamble indicates that merely switching production from one type of polymer to another would not be classified as a "modification" as long as the original equipment was designed to accommodate both products. The commenter requested clarification as to which category of polymer process (and thus standards) would be applicable to new facilities that are designed to produce more than one polymer using the same process equipment.

**Response:** The situation described by the commenter had not been envisioned by the Agency when the standards were proposed on September 30, 1987. Where a new facility is constructed, modified, or reconstructed after January 10, 1989, the situation described by the commenter does not exist because the same procedure is applied for determining control regardless of whether a LDPE, HDPE, or polypropylene product is being produced. However if a facility is built after September 30, 1987, and on or before January 10, 1989, the standards to be met could be different where that facility is designed to produce more than one polymer (e.g., HDPE and LDPE) as

different process sections (and their emissions) were designated as affected facilities depending upon whether HDPE or LDPE was being produced. As presented in the January 10, 1989, Federal Register notice, the new approach did not guide an operator or owner in determining which process sections are to be considered affected facilities for those process sections constructed, modified, or reconstructed on or before January 10, 1989, where two types of polymers (e.g., LDPE and HDPE) are produced in the same equipment.

In addition, the uncontrolled threshold emission rate to be applied in exempting emissions from control differ depending on whether HDPE or LDPE is being produced. The January 10, 1989, Federal Register notice allowed owners or operators the option to exempt from control emissions that under the new approach would require control, but could be shown under the model plant approach to be exempt from control through the use of the uncontrolled threshold emission rate exemption. (Note: Process sections that are exempted on the basis of an uncontrolled threshold emission rate become subject to the standards if the uncontrolled emissions exceed the uncontrolled threshold emission rate at a later date or if the process section is modified or reconstructed after January 10, 1989.)

The Agency considered several options to clarify which process sections and uncontrolled threshold emission rates are to be used where a facility is designed to produce more than one polymer using the same process equipment. Of the options considered, the Agency selected the option that would allow the owner/operator to select one model plant (presumably the one that most closely matches the hybrid facility) for the purpose of determining the affected facilities with a September 30, 1987, applicability date and use the uncontrolled threshold emission rates for those process sections as identified in the September 30, 1987, Federal Register notice.

**Comment:** Three commenters (IV-D-7, IV-D-8, IV-D-13) recommended that any existing facility which becomes modified should not have to meet the requirements of section 60.562-1 if the facility's existing emissions (controlled or uncontrolled) are already equal to or less than the rates in Table 1 of the proposed standards. The commenters stated that proposed exemption rates failed to consider that there are some existing facilities, which will become modified, that are already achieving significant emission reductions through

existing State and prevention of significant deterioration permits, and that additional controls are likely to be installed on existing facilities as a result of State Implementation Plan revisions for ozone nonattainment areas.

Another commenter (IV-D-47) stated that the criteria for determining applicability should not be termed "uncontrolled emissions," but "Federally enforceable emissions limits" in order to allow credit for the emissions controls that have already been required by State Air Pollution Control Agencies.

**Response:** The Agency agrees that the regulation needs to take into account emission streams that are already controlled as a result of State regulations, especially those that are Federally enforceable. The promulgated regulation requires an owner or operator to examine the uncontrolled emissions (i.e., those that would be emitted to the atmosphere in the absence of an add-on control device). Where an emission stream in an affected facility is controlled by an existing control device (i.e., one that was operating before September 30, 1987, or one that was operating between September 30, 1987, and January 10, 1989, on emissions from a process section that was not identified as an affected facility in the September 30, 1987, Federal Register notice), the inlet conditions to the control device would be examined to determine whether that emission stream is required to be controlled by BDT. Individual streams that are vented to the same control device constitute a single stream. The following describes how control determinations are to be made for controlled streams.

For polypropylene and polyethylene affected facilities with an applicability date of September 30, 1987, but before January 10, 1989, the inlet emission rate is compared to the uncontrolled threshold emission rate for the appropriate process section and type of emission (i.e., continuous or intermittent). If the inlet emission rate is equal to or less than the corresponding uncontrolled threshold emission rate, no further control is required. However, if the inlet emission rate were to exceed the uncontrolled threshold emission rate at some time in the future, then the new approach for determining which process emissions are required to meet the standards, as discussed in the following paragraphs, would be used to redetermine whether these emissions need to be controlled to meet the standards in the final rule. The new approach would also be used in those instances where the inlet emission rate



is greater than the corresponding uncontrolled threshold emission rate.

For polypropylene and polyethylene affected facilities with a January 10, 1989, applicability date and for those facilities identified above, the new approach would be used. Under the new approach, the annual emissions of the inlet emission stream would be compared to the CTE level, which would be calculated based on the TOC weight percent of the inlet stream.

If the emissions (Mg/yr) of the stream entering the control device are greater than or equal to the CTE level, then that stream is subject to BDT (98 percent reduction, 20 ppmv, control in flare meeting the specified operating conditions). If the existing control device is meeting BDT, then no further control of the stream (or combined streams) is required. If the existing control device is not meeting BDT (e.g., only achieves 90 percent reduction), then the emission stream is required to be controlled to BDT at the next available opportunity. The Agency considers this to be a reasonable approach because the cost of immediately retrofitting the control device would be high compared to the incremental emission reduction obtained during the interim period. The next available opportunity constitutes the next time the existing control device is reconstructed or replaced or its operation is changed as the result of changes in State or local requirements. At such time, any uncontrolled emissions in the same weight percent range from any affected facility are also required to be controlled.

If the emissions (Mg/yr) of the stream entering the control device are less than the CTE level, BDT is not required at that time. Whenever the existing control device is reconstructed, replaced, or changed (as discussed above), the controlled stream is reevaluated to see if BDT is required by combining its annual inlet emissions with the annual emissions of any uncontrolled vent stream within the same weight percent range and comparing the combined emissions to the CTE level, which is calculated based on the TOC weight percent of the combined emissions. If these combined emissions are now equal to or greater than the CTE level, BDT is required for the controlled and uncontrolled vent streams.

It is important to note that the "delay" in applying BDT to a controlled stream does not affect the timing for applying BDT to uncontrolled emission streams. Application of BDT is required for all uncontrolled emissions as soon as the total annual emissions for a combined stream (or single stream) are equal to or

greater than the CTE level for the weight percent.

For all polystyrene and PET affected facilities, if the inlet emission rate is less than or equal to the uncontrolled threshold emission rate, then the existing control does not need to be BDT. If the inlet emission rate is greater than the uncontrolled threshold emission rate, then the stream is required to meet BDT at the next available opportunity (as discussed above).

#### Control Technology—Process Emissions Intermittent Emissions

*Comment:* Commenters identified several concerns related to the January 10, 1989, Federal Register notice regarding the proposed generic approach for determining which intermittent emissions from polyethylene and polypropylene plants would be required to be controlled. Commenter IV-D-43 pointed out that the regulation presented in the January 10, 1989, Federal Register notice, which now requires that intermittent vents in an affected facility be combusted by a flare, allows an exemption for decompositions, but no longer exempts emergency intermittent streams [§ 80.562-1(a)(2)] as was provided for in the September 30, 1987, Federal Register notice. The commenter stated that the exemption for emergency vents should be retained for reasons of personal safety, lack of available technology, and cost. Primarily for these reasons, the commenters also expressed concern over the definition of decomposition.

The following paragraphs summarize these comments into one of three categories: (1) The availability and adequacy of technology for controlling all intermittent releases other than decompositions; (2) the cost of controlling emergency releases other than decompositions; and (3) the definition of "decomposition". For additional detail, please refer to section 2.6.6, Emergency Stream Exemption, in Chapter 2, and section 3.3, Intermittent Emissions, in Chapter 3 of BID Vol. II.

*Control technology.* Several commenters questioned the availability of controls for non-decomposition emergency releases and the safety of requiring controls for such releases. Commenters made this comment primarily in reference to high pressure releases from the LDPE, high pressure process.

Commenter IV-D-48 stated that facilities required to capture non-decomposition emergency releases in a high pressure plant would likely have to design to criteria for facilities designed

to capture decomposition emissions, because decomposition emissions are going to exit through the same emergency release system (i.e., open dump valves or blown rupture discs). According to the commenter, a containment system to capture a high pressure emergency release would create an undesirable safety risk because of the enormous size of the system and the possibility of overpressurization or internal ignition that could cause a catastrophic explosion. To minimize these problems, the commenter stated that an enormous vent collection system would be required to collect the emergency release and feed it to a flare, and each emergency vent collection system would require a sophisticated polymer filtering system that would not create backpressure in the system. The commenter stated that they were not aware of any such system in this service. Commenter IV-D-47 stated that, until technology to control such releases is developed, safety concerns should mandate venting such releases to the air.

More generally, Commenter IV-D-44 stated that the requirement that each intermittent vent stream other than decompositions be controlled does not take into account that some intermittent streams for safety reasons cannot be controlled in a flare system. This commenter pointed out that relief valves are extensively used in the chemical industry for protecting pressure vessels from the over-pressurization which may occur for a number of reasons (i.e., fire, exothermic reaction, inadequate cooling). The commenter noted that, based on the definition of "Intermittent Emissions" (52 FR 36707), the emissions from relief valves would be included as an intermittent emission source, thus requiring control. This commenter stated that relief valves in the polyethylene industry are primarily vented to flare systems and secondary relief devices that vent emissions to the atmosphere are only used when normal venting to flare is too slow to protect plant personnel from injury or prevent mechanical damage to the plant. As an example, the commenter noted that should for any reason the flare header become plugged (which has happened) and a plant experiences an emergency situation, the secondary relief valve would be the only avenue of process relief to protect personnel and equipment. In the commenter's opinion, requiring these to be controlled would compromise the safety and integrity of the process unit.

**Costs.** Most commenters (IV-D-39, IV-D-42, IV-D-43, IV-D-44, 45, 46, 47, 48) expressed concern over the costs of controlling certain intermittent streams that would be incurred because of the way the types of intermittent streams were defined in the January 10, 1989, Federal Register notice. Commenter IV-D-39 pointed out that their HDPE and polypropylene plants do not contain decomposition streams, but they do have runaway reactions. The commenter pointed out that they have in the past installed rupture discs under pressure safety valves to vent to the atmosphere emissions from these runaway reactions. According to the commenter, these emissions would not be allowed to be vented to the atmosphere under the proposed rule presented in the January 10, 1989, Federal Register notice, and significantly higher equipment costs (e.g., flare header size) would be incurred.

Commenter IV-D-44 stated that routing of other emergency vent streams, which currently utilizes an automatic control mechanism for atmospheric venting, to a control device may be significantly different in cost for retrofit of an existing unit versus cost for a new unit, that the cost for retrofitting the control and associated hardware would be excessive, and therefore the regulation should allow for a cost effective-justification review for retrofit requirements.

Commenter IV-D-46 stated the cost of controlling high pressure emergency releases, as would be required by the proposed procedure outlined in the January 10, 1989, Federal Register notice, would be prohibitive, if achievable. This commenter stated that the control facilities required to capture a high pressure, non-decomposition emergency release or a high pressure decomposition emergency release would be similar in design and cost, the control of either would be not cost effective; and, therefore, all emergency releases should be excluded from the need to be controlled.

Two commenters (IV-D-42 and IV-D-48) expressed concern that the proposed standards as presented in the January 10, 1989, Federal Register notice would require control of the UNIPOL emergency reactor blowdown. These commenters indicated that these emergency blowdowns are very infrequent and occur as a result of a runaway reaction. The commenters stated that the consequences of not having an emergency blowdown are quite costly (because of a resin meltdown in the reaction). Commenter IV-D-42 stated that the alternative of,

using a very large flare to handle these very short duration emergency blowdowns is extremely expensive and has been documented in their comments to the September 30, 1987, proposed rule.

**Definition.** Several commenters expressed concern that the definition of decomposition, which was proposed in the January 10, 1989, Federal Register notice, would exclude certain intermittent streams that should also be exempted from control requirements under these standards. Commenter IV-D-47 stated that the distinction between decomposition releases and planned releases to prevent decomposition is a matter of semantics more than a technical difference as the technological difficulties for controlling each release are similar. The commenter pointed out that the time interval between detection of a need to release and the time that decomposition actually occurs is on the order of one second. According to Commenter IV-D-44, there is no system that can distinguish between an out-of-control condition and a false indication, therefore the same preventative measures must be taken quickly in either case to protect equipment and personnel.

Another type of comment concerning the definition of decomposition was that certain facilities did not experience decompositions, but had other types of runaway reactions or upset conditions that should also be excluded from control because of the high costs of controlling such releases. As noted earlier, two commenters (IV-D-42 and IV-D-48) were concerned that the definition of decomposition did not appear to include the UNIPOL emergency reactor blowdowns. Due to the cost of control, these commenters recommended that UNIPOL emergency reactor blowdowns be excluded from control in the same manner as "decompositions."

Commenter IV-D-47 stated that the Agency's proposed rules should provide an exemption for upset operations emissions in the polypropylene process. Commenters IV-D-47 noted that current polypropylene technology is such that runaway reactions do not occur. In the event of a power failure affecting the recirculation compressors, the commenter stated that the reactor beds would no longer be fluidized and unless the reactor is vented the reaction will continue to the point of making one large polymer "chunk" in the reactor. According to the commenter, the clean up procedure following such an occurrence would require personnel to enter the reactor vessel where potential pockets of decomposition gas remain.

The polymer "chunk" would have to be cut into small blocks using air-driven saws. The downtime required for this situation may take two weeks and be very labor intensive and costly. The commenter pointed out that while such an occurrence is very infrequent, upset operations emissions do occur and requested that they be addressed in the proposed regulations.

**Response:** The Agency partially agrees with the commenters. The Agency agrees that the definition of "decomposition" was (unintentionally) too narrow and would have resulted in costly applications of the technology. On the other hand, the Agency has found control systems available and demonstrated for all types of intermittent emissions, although such systems are not used uniformly throughout the industry. The Agency has found that process design is an important factor in the particular control system used at a plant. Thus, some intermittent emissions are released to the atmosphere because they are a part of the process design for maintaining normal operations, for preventing more serious process upsets, or for relieving process equipment when process conditions exceed the design capacity of the system. Regardless of the particular set of intermittent emissions a particular system was found to control, in every case, each system can be designed and operated in a safe manner. However, the Agency agrees with the commenters that some types of intermittent releases may not be reasonable to control on the basis of the costs and emission reduction involved. The following paragraphs focus the Agency's response to this set of comments in the same three general areas as used above: Control technology, costs, and definition.

**Control technology.** The commenters were primarily concerned with the availability of technology for controlling non-decomposition emissions from LDPE, high pressure plants. These emissions can be very similar to decompositions emissions in terms of the length of release (very short) and the magnitude of the volume of the release (very large). The commenters also mentioned the control of relief valves that protect process vessels during times of fire, exothermic reactions, and inadequate cooling. The commenters felt that the definition of decomposition in the January 10, 1989, Federal Register notice would require control of these streams, and that such control technology was unavailable for the safe control of such streams. The Agency understands and concurs with the need to provide safe operations and does not



expect that operators would do anything unsafe in response to these standards. There is always the possibility of safety concerns with any manufacturing process, including its air pollution control equipment. The Agency expects operators to act prudently when complying with the standards by designing and operating air pollution control equipment properly. In selecting BDT and drafting standards, EPA considers only demonstrated technologies, as required by the Clean Air Act, and, therefore, only requires technologies that can be properly designed and operated.

Intermittent releases from polymer manufacturing plants can be among the largest sources of VOC emissions at a plant. Some of these releases have high volumes released in very short periods of times. During the development of these standards, the Agency has collected much information on a variety of polypropylene and polyethylene processes and their emission control systems. The control of decomposition emissions was found to have occurred at a single LDPE, high pressure facility (see Docket Item II-D-7). None of the other LDPE, high pressure facilities controlled decomposition emissions. The control of non-decomposition emergency releases varies from among facilities and types of processes. At least two LDPE, high pressure plants control some of the non-decomposition releases, which include safety valve discharges, and releases from various process upsets and certain types of equipment malfunctions (e.g., seal and gasket "blow outs"). Other types of plants (polypropylene; LDPE, low pressure or gas phase; and HDPE) control similar types of emissions, although one type of emissions controlled at one plant may not be controlled at another. Those emissions that generally are uncontrolled throughout the industry include releases that occur as a result of fire, power failure, and other unexpected events that could lead to severe equipment or personnel injury if not vented to the atmosphere. However, even some of these emissions are controlled at certain plants. For example, most of the polypropylene, liquid phase plants for which information has been gathered control all emergency-type releases. The following two paragraphs describe, in detail, the intermittent control systems employed at two different facilities.

One company (see Docket Item II-B-75) sends pressure relief emissions from the compressors at a LDPE, high pressure plant to the plant's flare. These safety relief valves regulate the pressure

in the system around the compressors. When pressures go "too high," these valves open and relieve the pressure. This pressure relief system protects the equipment from internal problems. At this plant, seals, gaskets, or some other equipment will occasionally "blow out," creating a hazardous situation unless brought under immediate control. A "block and dump" valve system is employed to handle this situation. Combustible gas alarms signal an operator that an explosive situation has arisen. The operator will activate the block and dump system. Valves are opened to evacuate the ethylene in the system at the point where the leak has occurred and dump it to the flare. At the same time, the main ethylene feed to the area is blocked off, the reaction is stopped, and the catalyst feed is shut off. This block and dump system is designed to protect the equipment from external problems. Decompositions are accidents, unplanned runaway reactions that occur due to bearing failure, too much catalyst, or some unknown cause. This company does not attempt to recognize and prevent decompositions. When one does occur, they review the incident to try to determine the cause. Once the cause is found, the company tries to implement whatever may be necessary to reduce the likelihood of the triggering cause from recurring. The only emissions at this plant that are not vented to the flare are the decompositions. This company stressed that to require the venting of decompositions to a flare would be outside their safety practices.

Another company (see Docket Item IV-D-55) uses a multi-stage relief system to protect plant equipment against overpressure in two stages. This company uses a system of automatically controlled vents, operator activated vents, and relief devices to discharge vents that result from normal plant upsets and equipment malfunctions to a closed system, such as a flare or incinerator. Relief vents that result from emergency conditions, such as fires, total loss of power, and runaway reactions, are discharged to the atmosphere through relieving devices, which are set slightly above the set pressure of the first stage relieving device. More specifically, for this company's polypropylene and polyethylene flash chambers, the relief valves discharging to the flare provides overpressure protection for the flash chamber for typical process upsets, whereas the additional relief valves discharge to the atmosphere in the event of an emergency condition resulting from a plant power failure or fire, and in

the case of the polypropylene flash chambers, from a runaway reaction in the polypropylene reactor. In the case of the polyethylene reactor, the relief valve discharging to the atmosphere provides overpressure protection for the reactor in the event of fire in the polyethylene reactor. Both reactor systems are designed to withstand all other possible causes of overpressure.

In summary, the Agency believes that the control technology exists for the safe control of any intermittent release that may occur at a facility subject to these standards. However, the cost of achieving such control may be sufficiently high as not to warrant control under these standards. The following section of this response addresses the costs of control.

**Costs.** The Agency has costed flame systems for controlling the various types of emergency releases identified by the commenters (see Docket Items II-D-105, IV-B-11, and IV-B-12). Generally, the cost of controlling decomposition emissions exceeded \$7,000/Mg of VOC reduction and was as high as \$200,000/Mg of VOC reduction. The cost of controlling runaway reaction releases from UNIPOL polypropylene and polyethylene process were generally around \$9,000/Mg of VOC reduction. Based on these findings, the Agency believes that the cost of controlling high volumes of flow that are released over short periods of time under the circumstances described by the commenters are unreasonable given the resulting emission reduction. Based on the information provided by the commenters and previously by the industry as a whole, these releases are related to operating conditions that are abnormal and abnormal to the point that the design of the process cannot return conditions to normal operations. In at least one instance, in the case of emissions during attempts to prevent decompositions, these releases are triggered to prevent a decomposition from occurring although there is no guarantee that a decomposition would actually have occurred if the release was not made. However, the explosive nature of a decomposition and the rapidity with which it occurs makes it virtually impossible to distinguish between situations. Thus, the Agency decided to "broaden" the definition of decomposition emissions to include those emissions that occur as a result of attempts to prevent decompositions.

In contrast, some polymer producers use pressure relief valves or other mechanisms to vent emissions from process vessels as part of the process design for operating the vessels under

normal operating conditions and certain upset conditions, and for maintaining normal process conditions. Examination of the information available indicates that these emissions have been controlled and can be controlled cost effectively. The costs of controlling intermittent emissions from polypropylene and polyethylene plants were estimated based on the model plants presented in BID Vol. I (see Docket Item IV-B-12). The cost of control for routine and non-decomposition, emergency-type releases in a flare ranged from \$70 to \$1,890 per Mg of VOC reduction for single process lines and between \$45 and \$885 per Mg for whole plants. These intermittent releases are designed to keep the process vessel in normal operating conditions; they are not releases that occur because of abnormal operating conditions (e.g., fire or loss of power) or because releases are necessary to prevent equipment damage or personnel safety hazardous because the operating conditions can no longer be returned to normal operating conditions.

**Definition.** While the Agency would like to relate the decision on whether to require control for all intermittent releases in the same manner as has been done for continuous emissions, that approach is not feasible (54 FR 903). Therefore, the promulgated standard continues to require control of appropriate intermittent releases by defining the types of intermittent releases that are exempt from the standards. As noted earlier in this response, the January 10, 1989, Federal Register notice defined too narrowly those intermittent releases that could be exempted from control by using the term "decomposition." In the promulgated standard, the definition of "emergency vent stream" has been revised and is used for exempting individual intermittent releases from control requirements. The definition exempts intermittent streams in a very similar way as the September 30, 1987, Federal Register notice. The final definition of emergency vent stream covers those intermittent vents that occur from process equipment where normal operating parameters are exceeded such that the process equipment cannot be returned to normal operating conditions using the design features of the system and venting must occur to avoid equipment failure or adverse safety personnel consequence. Releases of this nature include emissions that occur during a decomposition event, during attempts to prevent decompositions, and during reactor dumps to minimize the adverse consequences of a runaway

reaction (other than a decomposition). In addition, the definition of "decomposition emissions" has been revised to include those emissions that occur as a result of attempts to prevent decompositions.

#### Condensers

**Comment:** One commenter (IV-D-8) stated that the use of refrigeration condensers are not technically feasible for polystyrene processes and do not meet the criteria for standards of performance as stated in the BID: "standards of performance must (1) Realistically reflect best demonstrated control practices; (2) adequately consider the cost, the nonair quality, health and environmental impacts, and the energy requirement of such control; (3) be applicable to existing sources that are modified or reconstructed as well as new installations; and (4) meet the conditions of all variations of operating conditions being considered anywhere in the country."

The commenter wrote that the Agency is correct in stating in the BID that condensers are cost effective for recovery of compounds with relatively high boiling points like styrene and that a refrigerated condenser is not feasible when moisture is present in the stream which might cause freezing in the condenser. The commenter then pointed out that the latter holds true for continuous polystyrene processes.

The commenter then gave a number of reasons why freezing will occur. First and most important, according to the commenter, is the water in the vent. The commenter noted that the Agency assumed that when plants switched from steam ejectors to vacuum pumps, the freezing problem associated with water disappeared with the steam. However, the commenter stated, there is water entering with the raw materials and with the air leakage into the system (especially true in hot, humid climates). The commenter pointed out that most of the water comes from the water content of the styrene and the rubber used in the manufacture of high impact polystyrene (HIPS). Another potential problem with using a refrigerated condenser, according to the commenter, is the presence of additives in the process, some of which have high freezing points. One company reports freezing of the primary condensers coming off the devolatilizer when they ran the condenser's glycol system at -2 to -4°C. Thus, if certain additives are present, the freezing is more likely to take place.

**Response:** After further investigation, the Agency agrees that freezing may be a problem at sub-zero temperatures.

Therefore, the Agency has reanalyzed the regulatory alternatives for polystyrene plants using spared heat exchangers with defrost capabilities and a refrigeration system for sub-zero applications. This reanalysis is presented in Docket Item IV-B-18.

**Comment:** Two commenters (IV-D-6, IV-D-8) expressed concern over the costs basis used to select refrigerated condensers as the basis of the proposed standards for polystyrene plants.

Commenter IV-D-8 stated that the Agency did not adequately determine the costs and cost-effectiveness associated with using refrigerated condensers in the polystyrene continuous process. Commenter IV-D-6 stated the cost of the refrigeration condenser system for the model plant in the BID appears to be totally unrealistic and grossly underestimated and the cost of the specified technology to achieve the indicated reductions does not appear to justify the additional control above 0.12 kg/Mg of product. The commenter pointed out the following cost factors they felt might have been overlooked:

1. Moisture content of the stream would require drying systems;
2. Poor heat transfer coefficients due to the high nitrogen and noncondensable content of the stream;
3. Explosion-proof requirements must be Class I division 2;
4. Refrigeration system would be non-standard (probably propylene) due to the temperature requirements;
5. Higher metallurgy (stainless steel) required due to the low temperature requirement; and
6. Cost for new process condenser and associated piping appears not to have been considered in development of the proposal. Existing chilled water condensers are not rated for this low temperature application and refrigeration service. Therefore, new process condensers would be required.

On the basis of these comments regarding the cost and cost-effectiveness of refrigerated condensers, as well as the questionable viability of the technology due to the presence of water, Commenter IV-D-8 stated that EPA must redetermine the best technology system for polystyrene continuous processes.

**Response:** The commenters have brought up a number of points concerning the use of and cost estimates for refrigerated condensers on emission streams from polystyrene plants using continuous processes. For the response to these comments, the reader is referred to Docket Item IV-B-18. The following summarizes the Agency's response to the commenters concerns.

The Agency agrees that consideration of subzero condenser applications requires dealing with moisture level. Based on conversations with a number of vendors, the Agency has reevaluated control below 32 °F using a system composed of two heat exchangers each equipped with a defrost unit and a refrigeration unit to service both heat exchangers. This system now incorporates stainless steel construction. The system previously considered noncondensibles and, thus, the Agency feels proper heat transfer coefficients have been used. Vendor contacts indicated that ethylene glycol-water solutions and Freon 502 coolants would suffice; non-standard refrigerants would not be needed. In addition, the explosion proof requirements, which refer to electrical wiring requirements, have been directly considered. Based on these assumptions, the Agency has recalculated the costs of the control alternatives.

Commenter IV-D-8 suggested that the Agency establish a new baseline to determine cost effectiveness before determining the final rule. The Agency provides for an uncontrolled emission rate threshold level that protects against non-cost effective control of facilities referred to by the commenter. Therefore, the Agency has retained the baseline as presented in BID Vol. I.

*Comment:* One commenter (IV-D-6) stated that the uncontrolled emission rate of 0.016 kg VOC/Mg of product for continuous polystyrene plants needs to be reconsidered to take into account the presence of water in the material recovery condenser vent stream. The commenter stated further that it appears inappropriate that the newest facilities built with the latest devolatilizing vacuum and refrigeration technologies cannot meet this uncontrolled emission level. The commenter suggested that this value, if appropriate at all, needs to be in the 0.050 kg VOC/Mg product range.

*Response:* The uncontrolled emission rate for the material recovery section from polystyrene plants has been recalculated based on the new data concerning water in the material recovery condenser vent stream. The new uncontrolled threshold emission rate has increased to 0.05 kg TOC/Mg product. This increase reflects the use of a spared condenser system to bypass the potential freezing problem of using subfreezing temperatures in the condenser.

The commenter refers to the inappropriateness of the proposed uncontrolled emission rate by referring to the newest facilities with the latest devolatilizing vacuum and refrigeration technologies not being able to meet that

level. The commenter appears to presume a relationship between the level of uncontrolled emissions from a facility that installs the latest process equipment and the level of emissions that can be achieved when air pollution control is sought. The Agency disagrees with this apparent assumption. The uncontrolled emissions from an industrial facility in the absence of environmental regulation is typically determined by a different set of economic and cost criteria than the criteria used in setting environmental standards. The lower level of emissions required by the standards does not say anything about the technical capabilities of the latest equipment installed by industry, but reflects the use of emission control equipment that allows further reduction in emissions. As noted above, the Agency reevaluated the appropriateness of the control technique used and as a result of this reevaluation has increased the uncontrolled emission rate.

#### *Poly(ethylene terephthalate) Standards*

*Comment:* One commenter (IV-D-12) stated that the vapor streams from the material recovery (methanol recovery) section of PET processes both high and low viscosity DMT are laden with water vapor. The commenter pointed out that the concentration of TOC emissions and condenser temperature are regulated in sections 60.562-1(c)(1) (i) and (ii) and 60.562-1(c)(4)(iv) of the September 30, 1987, Federal Register notice. According to the commenter, if a refrigerated condenser were used as the final condenser in the material recovery section, the vapor stream would have to be dried before entering the condenser or the condenser would freeze and plug. The commenter stated that such a drier for that large a flow and concentration would be prohibitively expensive in terms of capital and operating cost and should be excluded.

*Response:* The Agency has reevaluated the regulator alternatives for the material recovery section from PET/DMT processes to taken into account potential freezing problems. However, rather than using a drier on the stream, the Agency used a lower cost approach of analyzing the potential emission reduction and cost using a spared condenser system. This has resulted in a revision to the standard for this process section. Based on the revised analysis, the final rule sets an emission limit of 0.018 kg TOC/Mg product for material recovery sections. Alternatively, an owner or operator of an affected facility may limit the outlet temperature of the final condenser to +3 °C (+37 °F). At proposal, these

limits were 0.0027 kg TOC/Mg product and -24 °C (-11 °F), respectively. In addition, the uncontrolled threshold emission rate increased to 0.12 kg TOC/Mg product.

*Comment:* One commenter (IV-D-11) stated that the limit of 0.04 kg TOC/Mg product from esterification vessels for high viscosity PET using multiple end finishers (Section 60.562-1(c)(4)(iii) of the September 30, 1987, Federal Register notice) appears to be in error and is not supported by BID Vol. I. The commenter stated that the appropriate limit should be 0.15 kg TOC/Mg product.

*Response:* The Agency reviewed the information in BID Vol. I and the docket concerning this comment. The sources show inconsistent treatment of esterifiers from high viscosity PET plants using multiple end finishers. For example, Chapter 8 states that baseline control costs for these facilities were estimated assuming reflux condensers on the esterifiers, which are associated with an emission rate of 0.04 kg TOC/Mg of product. The commenter, who uses a different type of condenser on their esterifiers, has stated that they would expect their condenser to be as efficient as reflux condensers. While a previous estimate based on sampling conducted in 1978 at the commenter's facility showed an estimated emission rate of 0.15 kg TOC/Mg product, a more recent test conducted by the commenter shows that the controlled emissions from the esterifiers are below 0.04 kg TOC/Mg product. In developing the baseline control costs, the Agency incorporated reflux condensers as baseline control. Unfortunately, this was not shown in Chapter 6, where the contradictory, and erroneous, statement that distillation columns with an emission rate of 0.15 kg TOC/Mg product are shown. For new plants, it was the Agency's judgment that reflux condensers represented best available technology and should serve as baseline for new, grass roots plants. As noted above, the more recent test by the commenter shows that their condensers are achieving equivalent levels of control. The Agency also conducted a new analysis specifically estimating the cost of controlling the commenter's 0.15 kg TOC/Mg product stream to 0.04 kg TOC/Mg product (see Docket Item IV-B-20). This analysis showed the cost of control to be reasonable. Thus, while the commenter is correct in pointing out discrepancies in the BID for the proposed standards, the final rule retains the proposed standard of 0.04 kg TOC/Mg product.

*Comment:* Two commenters (IV-D-8, IV-D-13) stated that while the control

technology exists to achieve final condenser outlet temperatures of  $-24^{\circ}\text{C}$  during steady state operation of a poly(ethylene terephthalate) plant, there are routine stages of the operation of a plant which make this temperature unachievable. The commenters pointed out that the composition of the vent stream during startup, shutdown, and process upsets varies to the point that maintaining an outlet temperature of  $-24^{\circ}\text{C}$  would lead to freeze ups and further process upsets. The water content, polymer carryover and other contaminants in the stream during startup or shutdown, the commenter continued, will affect the temperature at which the condenser outlet can be operated without freezing during this portion of the processing. Therefore, the commenters stated, if a gas temperature is specified in the standard and is included as a permit parameter, there will be times when the process must perforce violate the permit and adequate recognition that the standards do not apply during startup, shutdown, or malfunction conditions must be given.

The commenters then suggested that the regulatory language be changed to reflect that if refrigerated condensers are used for control, then when the process runs at steady state the outlet gas temperature should be  $-24^{\circ}\text{C}$ .

**Response:** Periods of startup, shutdown, and malfunction are not considered to be in violation if they exceed the expressed emission limits, as provided for in the General Provisions, section 60.8(c):

"\* \* \* nor shall emissions in excess of the level of the applicable emission limit during periods of startup, shutdown, and malfunction be considered a violation of the applicable emission limit unless otherwise specified in the applicable standard."

Since the proposed standards do not specify otherwise, the General Provision section was assumed to be prevailing. However, the alternative temperature standard does not necessarily fall within the definition of "emission limit" as used in § 60.8(c). The Agency intends the same treatment to be accorded the alternative temperature standard as for a true emission limit. Owners and operators are still required to 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, to the extent practicable, at all times including periods of startup, shutdown, and malfunction (General Provisions, § 60.11(d)). Therefore, the promulgated standard includes the commenter's suggestion.

#### Modification/Reconstruction

**Comment:** One commenter (IV-D-47) referred to 54 FR 893 in which is stated: "Under the new approach, any existing process section that is modified or reconstructed becomes an affected facility subject to the proposed standards. Similarly, any newly constructed process section at an existing plant or a new plant would be an affected facility \* \* \*." The commenter then stated that the impact of these statements is unclear where an existing process section that is modified or reconstructed becomes an affected facility subject to the proposed standards, yet that modification or reconstruction results in increased emissions only in another section. The commenter asked how the standards are to be applied in this situation.

**Response:** Modification or reconstruction to a process section only affects that process section regardless of the effect on emissions in other process sections. A process section is "modified" if a physical change occurs to the facility or there is an operational change to the facility either of which results in an increase in the emission rate. In the example provided by the commenter, the modified process section would not become an affected facility because there is no increase in emissions from that process section. Assuming the other process section is not modified, as defined, then it is not considered to be an affected facility because there is no increase in emissions from that process section. Assuming the other process section is not modified, as defined, then it is not considered to be an affected facility even though there is an increase in emissions.

A process section is "reconstructed" if the replacement of components in the existing facility occurs so that the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new process section and it is technologically and economically feasible to meet the applicable standards. The definition of reconstruction does not depend on an increase in emissions. Thus, in the example provided by the commenter, if the first process section is reconstructed, then it becomes an affected facility subject to the standards regardless of the fact there has been no increase in emissions. (Note: This is also true even if a decrease in emissions occurs.) As before, if the process section in which emissions do increase does not undergo replacement of components so as to constitute a reconstruction, then that

process section is not an affected facility and is not subject to the standards.

#### Miscellaneous

**Comment:** Several commenters (IV-D-39, IV-D-44, IV-D-50) expressed concern over the definition of "concurrent" in the January 10, 1989, Federal Register notice and the concept of concurrently constructed, modified, and reconstructed affected facilities. Commenter IV-D-39 suggested that the word "concurrent" be deleted. This commenter stated that its purpose is unclear and that it appears to require that modifications to existing facilities occurring within two years of each other would be treated as new facilities with the stricter low VOC concentration requirements being applied.

Commenter IV-D-44 suggested that the two-year time frame in the definition of "concurrent" be replaced with a six-month period. This commenter stated that the definition of concurrent as proposed could impose retroactive additional control measures and costs to projects already completed or near completion. Commenter IV-D-44 believes that no additional requirements should ever be imposed on projects already completed or which have initiated construction. This commenter illustrated their concern by stating that major projects could be vulnerable for additional control requirements and incurred costs up to five years (three years from commencement to completion plus two-year concurrent period) from date of commencement. Commenter IV-D-44 stated that this was "totally unreasonable and not cost effective." The commenter believes that all control decisions for concurrent projects should be made during their common planning/design phase and that projects should not be considered concurrent unless they have a common planning time frame. According to this commenter, two years is too long a time frame for the definition of concurrent and is longer than most planning cycles.

Commenter IV-D-44 also stated that the proposed use of concurrent does not appear to exempt projects under construction, modification, or reconstruction prior to January 10, 1989, from additional control requirements. The commenter recommended that projects started prior to January 10, 1989, be excluded from being considered concurrent with other projects begun after January 10, 1989.

Commenter IV-D-50 stated that the wording of the definition of concurrent is confusing (54 FR 895). According to this commenter, the definition as stated

now would lead to the following scenario: when a plant commences a project "B" within two years of the commencement of a previous project "A" at the same plant, and it commences a project "C" within two years of the commencement of project "B," then "B" can be concurrent with "A" and "C" can be concurrent with "B" while "C" may not be concurrent with "A". Commenter IV-D-50 then stated that this situation could foreseeably go on for years and makes the completion date of each successive project irrelevant. Commenter IV-D-50 recommended that the EPA eliminate the concept of concurrent control, but that if the EPA feels this definition is absolutely necessary, suggested as an alternative to the statement in the revised proposal (54 FR 895) the following language:

"... construction, modification, or reconstruction within a process unit (replacing, "of affected facilities") which has commenced in the two year period prior to the commencement date of the construction, modification, or reconstruction of an affected facility."

**Response:** Under the generic approach for determining which process emission streams are to be controlled from polypropylene and polyethylene facilities, the Agency proposed in the January 10, 1989, Federal Register notice that emissions from all concurrently constructed, modified, and reconstructed affected facilities be combined (according to the procedures outlined in that notice) for purposes of determining which emission streams would be controlled. When a new plant is built, all of the process sections are (obviously) concurrent, and the generic approach requires combining emission streams in the same weight percent range across all process sections. This procedure formed the basis for the development of the calculated threshold emission levels proposed in the January 10, 1989, Federal Register notice.

The Agency extended this concept of concurrent construction to modified and reconstructed affected facilities. If two process sections are modified at the same time, the Agency knows of no reason not to combine streams across the two process sections for control determinations. In fact, the generic approach is specifically designed to reach more reasonable control/no control determinations when this is done than when each process section is considered individually. Further, the Agency believes that reasonable control decisions can be made even for affected facilities that are not "concurrent," as

defined in the January 10, 1989, Federal Register notice.

The Agency has decided that the term "concurrent" is unnecessary to implement the generic approach and has eliminated it from the final rule. However, the Agency has replaced it with a different and more expansive procedure. This new procedure requires uncontrolled emission streams from an affected facility to be examined for pollutant control whenever a process section at the plant site is constructed, modified, or reconstructed regardless of the time interval between the commencement or completion dates of the affected facilities. Once an emission stream is controlled as a result of these standards, it is never again considered for determining the control of other emission streams.

In implementing this new procedure, the Agency disagrees with the commenters that it is unreasonable to require control of emissions from an affected facility that has begun operation (i.e., after it has been completed). The generic approach was designed to identify that level of annual emissions for a given weight percent of VOC in a single or combined emission stream above which control is deemed to be reasonable, regardless of the number of emission streams, the period of time when they became subject to the standards, or the planning phases or periods at a plant site. In addition, the Agency disagrees that there is a need to distinguish between those process sections that became affected facilities on or before January 10, 1989, and those that became affected facilities after January 10, 1989. Reasonable control determinations can be made regardless of an affected facility's applicability date.

To illustrate how this new procedure works, the following example is provided.

**Example:** At a polypropylene plant, Process Section A is reconstructed. There are three continuous emission streams (1, 2, and 3), one in each of the three weight percent ranges. Stream 3, which is in the 20 to 100 weight percent VOC range, has emissions greater than the CTE level and, thus, control is required. Emissions from Streams 1 and 2 are below their respective CTE's and, thus, no control is required. Process Section B is modified, and has two emission streams, 4 and 5. Emission Stream 4 is in the same weight percent range as Emission Stream 1, and Emission Stream 5 is in the same weight percent range as Emission Stream 2. These emission streams would now be combined (4 with 1 and 5 with 2) to determine whether emissions in each weight percent range are greater than their respective CTE's. Suppose the total emissions from Emission Streams 5 and 2 are greater than the CTE level for their

weight percent. These two streams would now be controlled. Suppose the other two streams (4 and 1) remain uncontrolled (i.e., their total annual emissions are less than the CTE level for their weight percent).

Finally, Process Section C is constructed at the plant site. Process Section C has two emission streams, 6 and 7. Emission Stream 6 is in the same weight percent range as Emission Streams 4 and 1. Since the latter two streams are still uncontrolled, they would be combined with Emission Stream 6 from Process Section C to determine whether control is required of all three streams. Suppose the total emissions now exceed the CTE level for the combined weight percent, then all three streams would be controlled. Emission Stream 7, which is in the 20 to 100 weight percent range, would be evaluated on its own, since there are no uncontrolled streams from an affected facility in this weight percent range. If the annual emissions of Emission Stream 7 are less than the CTE level, no control is required. (Note: In all cases where control is not required, streams with flow less than or equal to 8 scfm are still required to be controlled.)

#### Monitoring Requirements

**Comment:** Four commenters (IV-D-5, IV-D-6, IV-D-7, IV-D-8) questioned the need and desirability of requiring flow measuring devices on vents to control equipment. According to the commenters, this will add significant cost, provide no useful data, and add to the burden of recordkeeping. One commenter (IV-D-6) specifically wondered how the flow monitoring data would affect the control of emissions. This commenter also stated that the flare requirement portion of the fugitive emission standard (40 CFR part 60—subpart VV) does not require flow monitoring devices.

Two commenters (IV-D-7, IV-D-8) maintained that flow measurement on intermittent vents will be especially valueless since it will be difficult to differentiate between true no-flow situations and instrument problems. Two of the commenters (IV-D-7, IV-D-8) stated that installation of flow devices in a process flare system that also serves as a safety flare is not a good practice from a maintenance or safety standpoint. One commenter (IV-D-8) stated further that the temperature, density, pressure, and fouling or corrosive characteristics of flared gases tend to cause maintenance and reliability problems on flow measuring elements that are placed into the flare gas line. Commenter IV-D-8 noted that while external measurement devices are available, they are expensive and certainly should not be required on each individual vent stream into the flare gas header. This commenter also claimed that measuring every flare gas vent stream flow is not possible, with even

single stream flare gas flow measurements being notoriously difficult to measure.

One commenter (IV-D-6) stated that technical problems exist for retrofit of modified facilities where emergency vent systems are integrated with normal process vent streams, because the range of flow rates makes accurate measurement of lower flows impossible without causing excessive restrictions to emergency ventings.

Commenter (IV-D-8) suggested that paragraphs 60.563(a)(2), (b)(2), and (c)(2) of the September 30, 1987, Federal Register notice, which require the installation of a flow indicator to provide a record of the vent stream flow to the incinerator or flare, be deleted. All four commenters felt that engineering estimates and design calculations of the vent flows should be adequate to ascertain compliance with flare flow allowable ranges.

One commenter (IV-D-5) recommended that a requirement for an engineering piping report be substituted for the flow instrument requirements for flares. This commenter believes that an engineering report describing the piping arrangement for the vent streams would provide assurance that these streams will be continuously flared. Such a report, the commenter said, would achieve the same objective as the flow instrument requirement by showing that the vent streams are "hard wired" (no physical possibility of an atmospheric release prior to the flare) without the burden of installing, operating, and maintaining a large number of flow recorders.

**Response:** The EPA considers it very important to ensure that vent streams are continuously vented to the flare (or other control device). The primary intent of the flow monitoring requirement was to provide a means for indicating when vent streams were bypassing the flare or other control device. In the September 30, 1987, Federal Register notice, flow indicators were proposed. Flow indicators envisioned by the Agency would simply provide an indication of flow/no flow, and need not provide quantitative estimates of flow rates. The Agency has reevaluated the use of flow indicators as proposed and in light of the comments received. This reevaluation has led the Agency to the following conclusions.

1. Flow meters, which provide quantitative estimates for flow rates, could be one way to ensure emissions are vented to a control device. However, as pointed out by the commenters, there may be technical problems and less expensive ways to achieve the same goal.

2. Flow indicators located on the vent pipe between the emission source and the control device by themselves may be insufficient to meet the intent (even though this was what was proposed).

3. Engineering reports that show an emission stream is "hard piped" to a control device is a less expensive method than flow meters to ensure the entire flow will be vented to the control device. Other piping arrangements can be used, but car seals on valves or flow indicators located immediately downstream of each valve that could divert a portion of the flow to the atmosphere, either directly or indirectly, become necessary.

Considering the above conclusions, the Agency is now requiring an engineering report that describes the piping arrangement for venting the affected emission streams to the control device. If any valves are present in the line between the source and the control device, the rule requires them to be car-sealed opened. In addition, all valves that allow emissions to bypass the control device are required to be car-sealed closed. The monitoring requirements have been revised now that this engineering report is required. An owner or operator may elect to follow one of two methods for monitoring the vent system. One method would require monthly inspection of the valves to inspect the car seals, the reporting and recording of any time the car seals are broken, and the recording and reporting of any time the valve position has changed. The other method would require the installation of a flow indicator, which gives an indication of flow/no flow, at the closest downstream point of each valve that is required to be car-sealed closed. The owner or operator is to record all periods of flow (which indicates a portion of the emission stream is bypassing the control device) and report such periods of flow.

**Comment:** The commenters (IV-D-6, IV-D-8) pointed out that the preamble clearly states that thermocouples is the only acceptable monitor, while the standard allows for a thermocouple or similar device. The commenters requested that this confusion be eliminated from the rule.

Four commenters (IV-D-6, IV-D-7, IV-D-8, IV-D-49) requested that a provision for any other equivalent devices capable of detecting a flame be allowed with the regulations (§§ 60.563 (b)(1) and (c)(1) of the September 30, 1987, Federal Register notice). One commenter (IV-D-8) suggested that visual inspection combined with an assessment of the reliability of the fuel supply to the pilot be allowed as an equivalent pilot flame detection system. The commenters stated that the final rule should allow individual plants to select alternate flame sensors as the

point of the regulation should be to require a pilot detection system (i.e., thermocouples, flame ionization detectors and remote infrared scanners) capable of detecting a flame.

**Response:** The preamble for the proposed rule should not have stated so distinctly that thermocouples were the only acceptable monitor. Other similar devices are acceptable provided they provide the necessary recordkeeping requirements.

The presence of a flame is obviously critical to the operation of a flare as a control device. The intent of the flare monitoring regulation is to require a reliable monitoring device on the flare that will indicate there is no flame present and, thus, when the flare is not operating; or in the case of intermittent emissions, not in a ready state to control emissions. For flares controlling continuous emissions, monitoring of the flare flame or pilot light flames is appropriate to ensure the vent stream is being destroyed. For flares controlling intermittent emissions, a flare flame will not always be present. Thus, for these flares, it is important to monitor the pilot light flames.

Thermocouples are generally accepted as the most reliable means to monitor the presence of a pilot flame. For flares controlling intermittent emissions alone, it is important to ensure that the pilot lights are lit (i.e., have a flame present). Thus, the standards require such flares to monitor the pilot light flames using a thermocouple or equivalent monitoring device. For flares controlling both intermittent and continuous emissions or continuous emissions alone, EPA has decided that the use of certain optical devices is also acceptable to indicate the presence of a flame (either the flare flame or pilot light flames). Ultra-violet or infrared beam sensors may be used in lieu of thermocouples for these flares. These devices offer an advantage over thermocouples because they may be installed remote from the flare tip thereby allowing maintenance to be done without shutting down the flare. It is important that these optical devices be installed properly to minimize the effects of solar radiance. Although these devices may have difficulty in distinguishing the pilot flame from the main flame, the detection of a flame fulfills the intent of the regulation for flares used to control both continuous and intermittent emissions or continuous emissions alone.

The detection of flame presence by visual means or by remote video camera is not a suitable method of monitoring. If a flame is operating smokelessly, it can



be difficult to determine if a flame is present.

Flame ionization detectors are not considered as reliable as other monitoring technologies. The experience of one flare manufacturer (see Docket Item IV-D-54) showed major problems with the accumulation of moisture on the flame rod, which tended to ground the flame rod and then lock up the system. Further, this manufacturer found that the formation of small amounts of carbon in the pilot flame and its accumulation around the base of the flame rod also tended to "ground out" the flame rod and lock up the system.

The EPA is willing to take into consideration any operating records or test data for alternative monitoring devices.

**Comment:** Four commenters (IV-D-6, IV-D-7, IV-D-8, IV-D-49) stated that thermocouples are known to be unreliable when placed in the severe operating environment at the top of a flare and that the flare tip maintenance period can typically be much longer than the service period for a thermocouple. The commenters then asked what needs to be done when a pilot flame thermocouple burns out. Is the flare to be shut down prior to the regular maintenance to replace the pilot thermocouple? The commenters pointed out that since flares are emergency relief devices, taking a flare out of service can not usually be done without taking the entire process which the flare services out of services and that more emissions would undoubtedly result from premature flare maintenance related to thermocouple burnout. Commenter IV-D-49 also stated that thermocouples can be difficult to replace.

**Response:** Recent improvements in thermocouple installation technology have extended the operating life of thermocouples in flare monitoring service. If a thermocouple is sheathed within a thermowell, the thermocouple is protected from the severe flame environment, and the thermocouple operating life can be extended to approximately the same length of time as the flare tip maintenance period. Installing a thermocouple with thermowell will reduce significantly the number of times an operator must decide whether to shut down upon thermocouple failure.

Any breakdown or malfunction of the thermocouple should be repaired as soon as practicable as stated in § 61.14(b) of the General Provisions. The operator is expected to determine the best time to shut the flare down after considering how to minimize emissions both for safety and environmental reasons.

**Comment:** Two commenters (IV-D-44, IV-D-50) stated that language in the January 10, 1989, Federal Register notice appears to require monitoring of existing continuous emission streams prior to any modifications or reconstructions. The commenters believe that a monitoring requirement would raise the following concerns or questions:

- Determination of emissions prior to modification by sampling is not appropriate because emissions may vary with product runs, and the worse case product may not be available for monitoring within a reasonable time. These emissions can be calculated with reasonable accuracy. (IV-D-44)
- What is the economic justification/basis for requiring testing of existing streams as opposed to calculating? (IV-D-44, IV-D-50)
- What test method, duration, frequency and monitoring are contemplated? (IV-D-50)
- For processes that make a wide variety of products, what product line emissions (different hydrocarbon constituents, product densities, etc.) should be measured? (IV-D-50)
- What is the environmental benefit of requiring testing of existing streams? (IV-D-50)

The commenters pointed out that Table 4 "Procedure for Determining Control and Applicable Standard for Continuous Emission Streams from Modified or Reconstructed Polypropylene and Polyethylene Affected Facilities" (Ref: 54 FR 908) specifies in Step 3 that calculations of VOC concentration in the applicable weight percent range should be made before and after any modification or reconstruction. The commenters requested clarification of this issue (monitoring vs. calculation) and recommended engineering calculations as specified in Table 4 be used in the procedural step in determining control requirements of emissions before and after any modification or reconstruction. The word "measure" on page 54 FR 895 should be changed to "calculate," according to Commenter IV-D-44.

**Response:** The language in the preamble to the January 10, 1989, Federal Register notice did not intend to imply that monitoring of existing continuous emissions was being required, although the language was not as precise as it should have been. In that notice, the Agency intended that measurements rather than calculations be used to obtain the VOC concentrations of each applicable VOC stream. Measurement of the applicable stream would occur after a modification or reconstruction determination has been made by the appropriate enforcement agency, but before any actual changes have been undertaken. This clarification narrows the language in the preamble from "any changes to an

existing process section that could conceivably be a modification or reconstruction" to only those that are determined to be modification or reconstruction.

In the final rule, the requirement to measure the VOC concentration or the annual emission rate rather than calculate these values is applied to only those individual streams that an owner or operator seek to exempt from control through either the VOC weight percent exemption or the low annual emissions exemption. As provided in the General Provisions, if an owner or operator believes that an alternative procedure is as accurate as a measurement, then the owner or operator may still petition the Administrator for approval.

While the Agency would prefer actual test data, the final rule allows an owner or operator to submit calculations calculating the weight percent and annual emissions of each nonexempt vent stream in lieu of actual test data, provided such calculations can be demonstrated to be sufficiently accurate as to preclude the necessity of a test.

In testing or calculating the weight percent and annual emissions of a vent stream, an owner or operator is required to evaluate the stream under conditions representative of normal operation. This may require an owner or operator to make assumptions or estimates of how the affected facility will be operated or how emission streams will vary during production of various products. The period during which testing of a stream occurs, thus, need not be a "worst case" product, but preferably a representative product. Where affected facilities are used to produce a wide variety of products, then an owner or operator would calculate (or measure) the emission streams that would occur during the course of a year for each of the products. The resulting data would be combined to identify composite streams and their weighted average VOC concentrations and total annual emissions. Each composite stream's VOC concentration would then be used to calculate the threshold emission rate and a control/no control determination would be made by comparing the calculated (or measured) annual emissions with the threshold emission rate.

Where an owner or operator tests an emission stream, the final rule requires the use of Test Method 18 to determine the VOC concentration and Test Method 2, 2A, 2C or 2D, as appropriate, to determine the volumetric flow rate. Each test shall consist of three 1-hour runs in which either an integrated sample or four grab samples shall be taken.

In determining whether a test or calculation is to be required, the Agency considers a number of factors such as the use of the information, the relative cost of conducting the tests, and the availability of alternative procedures. Because the individual stream exemptions allow an individual stream to be exempt from control under this NSPS, the Agency believes this decision needs to be made based on test data. (Note: If the annual emissions become 1.6 Mg/yr or greater (if using the annual emissions exemption) or the VOC concentration becomes 0.10 weight percent or higher (if using the VOC concentration exemption) at a later date, then the individual stream is no longer exempt from the standards.) For nonexempt streams, a no control decision may change to a control decision as more facilities at a plant are constructed, modified, or reconstructed. Thus, while test data are preferable for determining the VOC weight percent concentrations, the Agency has decided that calculations showing the VOC concentrations can be an acceptable alternative to testing, and at greatly reduced costs.

#### VIII. Administrative

The docket is an organized and complete file of all the information considered by EPA in the development of this rulemaking. The docket is a dynamic file, since material is added throughout the rulemaking development. The docketing system is intended to allow members of the public and industries involved to readily identify and locate documents so that they can effectively participate in the rulemaking process. Along with the statement of basis and purpose of the proposed and promulgated standards and EPA responses to significant comments, the contents of the docket, except for interagency review materials, will serve as the record in case of judicial review (section 307(d)(7)(A)).

The effective date of this regulation is December 11, 1991. Section 111 of the Clean Air Act provides that standards of performance or revisions thereof become effective upon promulgation and apply to certain affected facilities of which the construction or modification was commenced after the date of proposal, September 30, 1987, and for other affected facilities, after January 10, 1989.

As prescribed in section 111, the promulgation of these standards was preceded by the Administrator's determination (40 CFR 60.16, 44 FR 49222, dated August 21, 1979) that polypropylene, polyethylene, polystyrene, and polyester resin plants

contribute significantly to air pollution that may reasonably be anticipated to endanger public health or welfare. In accordance with Section 117 of the Act, publication of these promulgated standards was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies.

This regulation will be reviewed 4 years from the date of promulgation as required by the Clean Air Act. This review will include an assessment of such factors as the need for integration with other programs, the existence of alternative methods, enforceability, improvements in emission control technology, and reporting requirements.

Section 317 of the Clean Air Act requires the Administrator to prepare an economic impact assessment for any new source standard of performance promulgated under section 111(b) of the Act. An economic impact assessment was prepared for this regulation and for other regulatory alternatives. All aspects of the assessment were considered in the formulation of the standards to ensure that cost was carefully considered in determining the best demonstrated technology. The economic impact assessment is included in the BID for the proposed standards.

Information collection requirements associated with this regulation (those included in 40 CFR part 60, subpart A and subpart DDD) have been approved by the Office of Management and Budget (OMB) under the provisions of the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.* and have been assigned OMB control number (2060-0145).

Under Executive Order 12291, EPA is required to judge whether a regulation is a "major rule" and therefore subject to the requirements of a regulatory impact analysis (RIA). The Agency has determined that this regulation would result in none of the adverse economic effects set forth in Section 1 of the Order as grounds for finding a regulation to be a "major rule." The Agency has, therefore, concluded that this regulation is not a "major rule" under Executive Order 12291.

The Regulatory Flexibility Act of 1980 requires the identification of potentially adverse impacts of Federal regulations upon small business entities. The Act specifically requires the completion of a Regulatory Flexibility Analysis in those instances where small business impacts are possible. Because these standards impose no adverse economic impacts, a Regulatory Flexibility has not been conducted.

Pursuant to the provisions of 5 U.S.C. 605(b), I hereby certify that this rule will not have a significant economic impact on a substantial number of small entities.

#### List of Subjects in 40 CFR Part 60

Air pollution control, Incorporation by reference, Intergovernmental relations, Plastic materials, synthetic resins, and nonvulcanizable elastomers (SIC 2821), and Reporting and recordkeeping requirements.

Dated: November 7, 1990.

William K. Reilly,  
Administrator.

#### PART 60—[AMENDED]

40 CFR part 60 is amended as follows:

1. The authority citation for part 60 continues to read as follows:

Authority: Secs. 101, 111, 114, 116, 301, Clean Air Act as amended (42 U.S.C. 7401, 7411, 7414, 7416, 7601.)

2. By adding a new subpart DDD to read as follows:

#### Subpart DDD—Standards of Performance for Volatile Organic Compound (VOC) Emissions from the Polymer Manufacturing Industry

Sec.

60.560 Applicability and designation of affected facilities.

60.561 Definitions.

60.562-1 Standards: Process emissions.

60.562-2 Standards: Equipment leaks of VOC.

60.563 Monitoring requirements.

60.564 Test methods and procedures

60.565 Reporting and recordkeeping requirements.

60.566 Delegation of authority.

#### Subpart DDD—Standards of Performance for Volatile Organic Compound (VOC) Emissions from the Polymer Manufacturing Industry

##### § 60.560 Applicability and designation of affected facilities.

(a) *Affected facilities.* The provisions of this subpart apply to affected facilities involved in the manufacture of polypropylene, polyethylene, polystyrene, or poly (ethylene terephthalate) as defined in § 60.561 of this subpart. The affected facilities designated below for polypropylene and polyethylene are inclusive of all equipment used in the manufacture of these polymers, beginning with raw materials preparation and ending with product storage, and cover all emissions emanating from such equipment.

(1) For process emissions from any polypropylene and polyethylene manufacturing process that uses a continuous process, the affected



facilities are each of the following process sections: each raw materials preparation section, each polymerization reaction section, each material recovery section, each product finishing section, and each product storage section. These process sections are affected facilities for process emissions that are emitted continuously and for process emissions that are emitted intermittently.

(2) For process emissions from polystyrene manufacturing processes that use a continuous process, the affected facilities are each material recovery section. These process sections are affected facilities for only those process emissions that are emitted continuously.

(3) For process emissions from poly(ethylene terephthalate) manufacturing processes that use a continuous process, the affected facilities are each polymerization reaction section. If the process uses dimethyl terephthalate, then each material recovery section is also an affected facility. If the process uses terephthalic acid, then each raw materials preparation section is also an affected facility. These process sections are affected facilities for only those process emissions that are emitted continuously.

(4) For VOC emissions from equipment leaks from polypropylene, polyethylene, and polystyrene (including expandable polystyrene) manufacturing processes, the affected facilities are each group of fugitive emissions equipment (as defined in § 60.561) within any process unit (as defined in § 60.561). This subpart does not apply to VOC emissions from equipment leaks from poly(ethylene terephthalate) manufacturing processes.

(i) Affected facilities with a design capacity to produce less than 1,000 Mg/yr shall be exempt from § 60.562-2.

(ii) Addition or replacement of equipment for the purposes of improvement which is accomplished without a capital expenditure shall not by itself be considered a modification under § 60.562-2.

(b) *Applicability dates.* The applicability date identifies when an affected facility becomes subject to a standard. Usually, a standard has a single applicability date. However, some polypropylene and polyethylene affected facilities have a September 30, 1987, applicability date and others have a January 10, 1989, applicability date. The following paragraphs identify the applicability dates for all affected facilities subject to this subpart.

(1) *Polypropylene and polyethylene.* Each process section in a polypropylene

or polyethylene production process is a potential affected facility for both continuous and intermittent emissions. The applicability date depends on when the process section was constructed, modified, or reconstructed and, in some instances, on the type of production process.

(i) The applicability date for any polypropylene or polyethylene affected facility that is constructed, modified, or reconstructed after January 10, 1989, regardless of the type of production process being used, is January 10, 1989.

(ii) Only some polypropylene or polyethylene process sections that are constructed, modified, or reconstructed on or before January 10, 1989, but after September 30, 1987, are affected facilities. These process sections (and the type of emissions to be controlled) are identified by an "x" in Table 1. The applicability date for the process sections (and the emissions to be controlled) that are identified by an "x" in Table 1 is September 30, 1987. Since the affected facilities that have a September 30, 1987, applicability date are determined by the type of production process (e.g., liquid phase, gas phase), each owner or operator shall identify the particular production process that applies to his or her particular process.

TABLE 1.—POLYPROPYLENE AND POLYETHYLENE AFFECTED FACILITIES WITH SEPTEMBER 30, 1987, APPLICABILITY DATE

| Polymer                   | Production process    | Process section           | Emissions  |              |
|---------------------------|-----------------------|---------------------------|------------|--------------|
|                           |                       |                           | Continuous | Intermittent |
| Polypropylene             | Liquid phase          | Raw Materials Preparation | X          | —            |
|                           |                       | Material Recovery         | X          | —            |
|                           |                       | Polymerization Reaction   | X          | X            |
|                           |                       | Product Finishing         | X          | —            |
|                           |                       | Product Storage           | —          | —            |
| Polypropylene             | Gas Phase             | Raw Materials Preparation | —          | —            |
|                           |                       | Polymerization Reaction   | —          | X            |
|                           |                       | Material Recovery         | X          | —            |
|                           |                       | Product Finishing         | —          | —            |
|                           |                       | Product Storage           | —          | —            |
| Low Density Polyethylene  | High Pressure         | Raw Materials Preparation | —          | X            |
|                           |                       | Polymerization Reaction   | —          | X            |
|                           |                       | Material Recovery         | —          | X            |
|                           |                       | Product Finishing         | —          | X            |
|                           |                       | Product Storage           | —          | X            |
| Low Density Polyethylene  | Low Pressure          | Raw Materials Preparation | X          | X            |
|                           |                       | Polymerization Reaction   | —          | X            |
|                           |                       | Material Recovery         | —          | —            |
|                           |                       | Product Finishing         | X          | —            |
|                           |                       | Product Storage           | —          | —            |
| High Density Polyethylene | Gas Phase             | Raw Materials Preparation | —          | X            |
|                           |                       | Polymerization Reaction   | —          | —            |
|                           |                       | Material Recovery         | X          | —            |
|                           |                       | Product Finishing         | X          | —            |
|                           |                       | Product Storage           | —          | —            |
| High Density Polyethylene | Liquid Phase Slurry   | Raw Materials Preparation | —          | X            |
|                           |                       | Polymerization Reaction   | —          | —            |
|                           |                       | Material Recovery         | X          | —            |
|                           |                       | Product Finishing         | X          | —            |
|                           |                       | Product Storage           | —          | —            |
| High Density Polyethylene | Liquid Phase Solution | Raw Materials Preparation | X          | X            |
|                           |                       | Polymerization Reaction   | —          | X            |
|                           |                       | Material Recovery         | X          | X            |
|                           |                       | Product Finishing         | —          | —            |
|                           |                       | Product Storage           | —          | —            |

NOTE: "X" denotes that that process section is an affected facility for continuous or intermittent emissions or both, as shown, which has a September 30, 1987, applicability date.

"—" denotes that that process section is not considered an affected facility for continuous or intermittent emissions or both, as shown, if the process section is constructed, modified, or reconstructed after September 30, 1987, and on or before January 10, 1989. These process sections are affected facilities if they are constructed, modified, or reconstructed after January 10, 1989.

(2) *Polystyrene*. The applicability date for each polystyrene affected facility is September 30, 1987.

(3) *Poly(ethylene terephthalate)*. The applicability date for each poly(ethylene terephthalate) affected facility is September 30, 1987.

(c) Any facility under paragraph (a) of this section that commences construction, modification, or reconstruction after its applicability date as identified under paragraph (b) of this section is subject to the requirements of this subpart, except as provided in paragraphs (d) through (f) of this section.

(d) Any polypropylene or polyethylene affected facility with a September 30, 1987, applicability date that commenced construction, modification, or reconstruction after September 30, 1987, and on or before January 10, 1989, with an uncontrolled emission rate (as defined in footnote a to Table 2) at or below those identified in Table 2 is not subject to the requirements of § 60.562-1 unless and until its uncontrolled emission rate exceeds that rate listed for it in Table 2 or it is modified or reconstructed after January 10, 1989. At such time, such facility becomes subject to § 60.562-1 and the procedures identified in § 60.562-1(a) shall be used to determine the control of emissions from the facility.

TABLE 2.—MAXIMUM UNCONTROLLED THRESHOLD EMISSION RATES \*

| Production process                               | Process section            | Uncontrolled emission rate, kg TOC/mg product |
|--|----------------------------|---|
| Polypropylene, liquid phase process.             | Raw Materials Preparation. | 0.15 *  |
|  | Polymerization Reaction.   | 0.14 *, 0.24 *                                |
|  | Material Recovery.         | 0.19 *  |
| Polypropylene, gas phase process.                | Product Finishing.         | 1.57 *  |
|  | Polymerization Reaction.   | 0.12 *  |
| Low Density Polyethylene, high pressure process. | Material Recovery.         | 0.02 *  |
|  | Raw Materials Preparation. | 0.41 *  |
|  | Polymerization Reaction.   | (*)   |
|  | Material Recovery.         | (*)   |
|  | Product Finishing.         | (*)   |
|  | Product Storage.           | (*)   |

TABLE 2.—MAXIMUM UNCONTROLLED THRESHOLD EMISSION RATES \*—Continued

| Production process  | Process section            | Uncontrolled emission rate, kg TOC/mg product |
|---|----------------------------|---|
| Low Density Polyethylene, high pressure process.              | Raw Materials Preparation. | 0.05 †  |
|   | Polymerization Reaction.   | 0.03 *  |
| High Density Polyethylene, liquid phase slurry process.       | Product Finishing.         | 0.01 *  |
|   | Raw Materials Preparation. | 0.25 *  |
|   | Material Recovery.         | 0.11 *  |
| High Density Polyethylene, liquid phase solution process.     | Product Finishing.         | 0.41 *  |
|   | Raw Materials Preparation. | 0.24 †  |
|   | Polymerization Reaction.   | 0.16 *  |
| High Density Polyethylene, gas phase process.                 | Material Recovery.         | 1.68 †  |
|   | Raw Materials Preparation. | 0.05 †  |
|   | Polymerization Reaction.   | 0.03 *  |
| Polystyrene, continuous process.                              | Product Finishing.         | 0.01 *  |
|   | Material Recovery.         | 0.05 *  |
| Poly(ethylene terephthalate), dimethyl terephthalate process. | Material Recovery.         | 0.12 *  |
|   | Polymerization Reaction.   | 1.80 **, †                                    |
| Poly(ethylene terephthalate), terephthalic acid process.      | Raw Materials Preparation. | (*)   |
|   | Polymerization Reaction.   | 1.80 **, †                                    |
|   |                            | 3.92 **, †                                    |

\* "Uncontrolled emission rate" refers to the emission rate of a vent stream that vents directly to the atmosphere and to the emission rate of a vent stream to the atmosphere that would occur in the absence of any add-on control devices but after any material recovery devices that constitute part of the normal material recovery operations in a process line where potential emissions are recovered for recycle or resale.

† Emission rate applies to continuous emissions only.

‡ Emission rate applies to intermittent emissions only.

\* Total emission rate for non-emergency intermittent emissions from raw materials preparation, polymerization reaction material recovery, product finishing, and product storage process sections.

† See footnote d.

‡ Emission rate applies to both continuous and intermittent emissions.

§ Emission rate applies to non-emergency intermittent emissions only.

\* Applies to modified or reconstructed affected facilities only.

† Includes emissions from the cooling water tower.

‡ Applies to a process line producing low viscosity poly(ethylene terephthalate).

§ Applies to a process line producing high viscosity poly(ethylene terephthalate).

¶ See footnote m.

‡ Applies to the sum of emissions to the atmosphere from the polymerization reaction section (including emissions from the cooling water tower) and the raw materials preparation section (i.e., the esters).

(e)(1) Modified or reconstructed affected facilities at polystyrene and poly(ethylene terephthalate) plants with uncontrolled emission rates at or below those identified in Table 2 are exempt from the requirements of § 60.562-1 unless and until its uncontrolled emission rate exceeds that rate listed for it in Table 2. This exemption does not apply to new polystyrene or poly(ethylene terephthalate) affected facilities.

(2) Emissions from modified or reconstructed affected facilities that are controlled by an existing control device and that have uncontrolled emission rates greater than the uncontrolled threshold emission rates identified in Table 2 are exempt from the requirements of § 60.561 unless and until the existing control device is modified, reconstructed, or replaced.

(f) No process section of an experimental process line is considered an affected facility for continuous or intermittent process emissions.

(g) Individual vent streams that emit continuous emissions with uncontrolled annual emissions of less than 1.6 Mg/yr or with a weight percent TOC of less than 0.10 percent from a new, modified, or reconstructed polypropylene or polyethylene affected facility are exempt from the requirements of § 60.562-1(a)(1). If at a later date, an individual stream's uncontrolled annual emissions become 1.6 Mg/yr or greater (if the stream was exempted on the basis of the uncontrolled annual emissions exemption) or VOC concentration becomes 0.10 weight percent or higher (if the stream was exempted on the basis of the VOC concentration exemption), then the stream is subject to the requirements of § 60.562-1.

(h) Emergency vent streams, as defined in § 60.561, from a new, modified, or reconstructed polypropylene or polyethylene affected facility are exempt from the requirements of § 60.562-1(a)(2).

(i) An owner or operator of a polypropylene or polyethylene affected

facility that commenced construction, modification, or reconstruction after September 30, 1987, and on or before January 10, 1989, and that is in a process line in which more than one type of polyolefin (i.e., polypropylene, low density polyethylene, high density polyethylene, or their polymers) is produced shall select one of the polymer/production process combinations in Table 1 for purposes of determining applicable affected facilities and uncontrolled threshold emissions rates.

(Note: The numerical emissions limits in these standards are expressed in terms of total organic compounds, measured as total organic compounds less methane and ethane.)

#### § 60.561 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act, in subpart A of part 60, or in subpart VV of part 60, and the following terms shall have the specific meanings given them.

**Boiler** means any enclosed combustion device that extracts useful energy in the form of steam.

**Capital expenditure** means, in addition to the definition in 40 CFR 60.2, an expenditure for a physical or operational change to an existing facility that exceeds P, the product of the facility's replacement cost, R, and an adjusted annual asset guideline repair allowance, A, as reflected by the following equation:  $P = R \times A$ , where

(a) The adjusted annual asset guideline repair allowance, A, is the product of the percent of the replacement cost, Y, and the applicable basic annual asset guideline repair allowance, B, as reflected by the following equation:  $A = Y \times (B \div 100)$ ;

(b) The percent Y is determined from the following equation:  $Y = 1.0 - 0.57 \log X$ , where X is 1986 minus the year of construction; and

(c) The applicable basic annual asset guideline repair allowance, B, is equal to 12.5.

**Car-sealed** means, for purposes of these standards, a seal that is placed on the device used to change the position of a valve (e.g., from opened to closed) such that the position of the valve cannot be changed without breaking the seal and requiring the replacement of the old seal once broken with a new seal.

**Closed vent system** means a system that is not open to the atmosphere and that is composed of piping, connections, and, if necessary, flow inducing devices that transport gas or vapor from a piece or pieces of equipment to a control device,

**Continuous emissions** means any gas stream containing VOC that is generated essentially continuously when the process line or any piece of equipment in the process line is operating.

**Continuous process** means polymerization process in which reactants are introduced in a continuous manner and products are removed either continuously or intermittently at regular intervals so that the process can be operated and polymers produced essentially continuously.

**Control device** means an enclosed combustion device, vapor recovery system, or flare.

**Copolymer** means a polymer that has two different repeat units in its chain.

**Decomposition** means, for the purposes of these standards, an event in a polymerization reactor that advances to the point where the polymerization reaction becomes uncontrollable, the polymer begins to break down (decompose), and it becomes necessary to relieve the reactor instantaneously in order to avoid catastrophic equipment damage or serious adverse personnel safety consequences.

**Decomposition emissions** refers to those emissions released from a polymer production process as the result of a decomposition or during attempts to prevent a decomposition.

**Emergency vent stream** means, for the purposes of these standards, an intermittent emission that results from a decomposition, attempts to prevent decompositions, power failure, equipment failure, or other unexpected cause that requires immediate venting of gases from process equipment in order to avoid safety hazards or equipment damage. This includes intermittent vents that occur from process equipment where normal operating parameters (e.g., pressure to temperature) are exceeded such that the process equipment can not be returned to normal operating conditions using the design features of the system and venting must occur to avoid equipment failure or adverse safety personnel consequences and to minimize adverse effects of the runaway reaction. This does not include intermittent vents that are designed into the process to maintain normal operating conditions of process vessels including those vents that regulate normal process vessel pressure.

**End finisher** means a polymerization reaction vessel operated under very low pressures, typically at pressures of 2 torr or less, in order to produce high viscosity poly(ethylene terephthalate). An end finisher is preceded in a high viscosity poly(ethylene terephthalate)

process line by one or more polymerization vessels operated under less severe vacuums, typically between 5 and 10 torr. A high viscosity poly(ethylene terephthalate) process line may have one or more end finishers.

**Existing control device** means, for the purposes of these standards, an air pollution control device that has been in operation on or before September 30, 1987, or that has been in operation between September 30, 1987, and January 10, 1989, on those continuous or intermittent emissions from a process section that is marked by an "—" in Table 1 of this subpart.

**Existing control device is reconstructed** means, for the purposes of these standards, the capital expenditure of at least 50 percent of the replacement cost of the existing control device.

**Existing control device is replaced** means, for the purposes of these standards, the replacement of an existing control device with another control device.

**Expandable polystyrene** means a polystyrene bead to which a blowing agent has been added using either an in-situ suspension process or a post-impregnation suspension process.

**Experimental process line** means a polymer or copolymer manufacturing process line with the sole purpose of operating to evaluate polymer manufacturing processes, technologies, or products. An experimental process line does not produce a polymer or resin that is sold or that is used as a raw material for nonexperimental process lines.

**Flame zone** means that portion of the combustion chamber in a boiler occupied by the flame envelope.

**Fugitive emissions equipment** means each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, valve, and flange or other connector in VOC service and any devices or systems required by subpart VV of this part.

**Gas phase process** means a polymerization process in which the polymerization process is carried out in the gas phase: i.e., the monomer(s) are gases in a fluidized bed of catalyst particles and granular polymer.

**High density polyethylene (HDPE)** means a thermoplastic polymer or copolymer comprised of at least 50 percent ethylene by weight and having a density of greater than 0.940 g/cm<sup>3</sup>.

**High pressure process** means the conventional production process for the manufacture of low density polyethylene in which a reaction pressure of about 15,000 psig or greater is used.

**High viscosity poly(ethylene terephthalate)** means poly(ethylene terephthalate) that has an intrinsic viscosity of 0.9 or higher and is used in such applications as tire cord and seat belts.

**Incinerator** means an enclosed combustion device that is used for destroying VOC.

**In-situ suspension process** means a manufacturing process in which styrene, blowing agent, and other raw materials are added together within a reactor for the production of expandable polystyrene.

**Intermittent emissions** means those gas streams containing VOC that are generated at intervals during process line operation and includes both planned and emergency releases.

**Liquid phase process** means a polymerization process in which the polymerization reaction is carried out in the liquid phase; i.e., the monomer(s) and any catalyst are dissolved, or suspended in a liquid solvent.

**Liquid phase slurry process** means a liquid phase polymerization process in which the monomer(s) are in solution (completely dissolved) in a liquid solvent, but the polymer is in the form of solid particles suspended in the liquid reaction mixture during the polymerization reaction; sometimes called a particle form process.

**Liquid phase solution process** means a liquid phase polymerization process in which both the monomer(s) and polymer are in solution (completely dissolved) in the liquid reaction mixture.

**Low density polyethylene (LDPE)** means a thermoplastic polymer or copolymer comprised of at least 50 percent ethylene by weight and having a density of 0.940 g/cm<sup>3</sup> or less.

**Low pressure process** means a production process for the manufacture of low density polyethylene in which a reaction pressure markedly below that used in a high pressure process is used. Reaction pressure of current low pressure processes typically go up to about 300 psig.

**Low viscosity poly(ethylene terephthalate)** means a poly(ethylene terephthalate) that has an intrinsic viscosity of less than 0.75 and is used in such applications as clothing, bottle, and film production.

**Material recovery section** means the equipment that recovers unreacted or by-product materials from any process section for return to the process line, off-site purification or treatment, or sale. Equipment designed to separate unreacted or by-product material from the polymer product are to be included in this process section, provided at least some of the material is recovered for

reuse in the process, off-site purification or treatment, or sale, at the time the process section becomes an affected facility. Otherwise such equipment are to be assigned to one of the other process sections, as appropriate. Equipment that treats recovered materials are to be included in this process section, but equipment that also treats raw materials are not to be included in this process section. The latter equipment are to be included in the raw materials preparation section. If equipment is used to return unreacted or by-product material directly to the same piece of process equipment from which it was emitted, then that equipment is considered part of the process section that contains the process equipment. If equipment is used to recover unreacted or by-product material from a process section and return it to another process section or a different piece of process equipment in the same process section or sends it off-site for purification, treatment, or sale, then such equipment are considered part of a material recovery section. Equipment used for the on-site recovery of ethylene glycol from poly(ethylene terephthalate) plants, however, are not included in the material recovery section, but are covered under the standards applicable to the polymerization reaction section (§ 60.562-1(c)(1)(ii)(A) or (2)(ii)(A)).

**Operating day** means, for the purposes of these standards, any calendar day during which equipment used in the manufacture of polymer was operating for at least 8 hours or one labor shift, whichever is shorter. Only operating days shall be used in determining compliance with the standards specified in § 60.562-1(c)(1)(ii)(B), (1)(ii)(C), (2)(ii)(B), and (2)(ii)(C). Any calendar day in which equipment is used for less than 8 hours or one labor shift, whichever is less, is not an "operating day" and shall not be used as part of the rolling 14-day period for determining compliance with the standards specified in § 60.562-1(c)(1)(ii)(B), (1)(ii)(C), (2)(ii)(B), and (2)(ii)(C).

**Polyethylene** means a thermoplastic polymer or copolymer comprised of at least 50 percent ethylene by weight; see low density polyethylene and high density polyethylene.

**Poly(ethylene terephthalate) (PET)** means a polymer or copolymer comprised of at least 50 percent bis-(2-hydroxyethyl)-terephthalate (BHET) by weight.

**Poly(ethylene terephthalate) (PET) manufacture using dimethyl terephthalic** means the manufacturing of poly(ethylene terephthalate) based on the esterification of dimethyl

terephthalate (DMT) with ethylene glycol to form the intermediate monomer bis-(2-hydroxyethyl)-terephthalate (BHET) that is subsequently polymerized to PET.

**Poly(ethylene terephthalate) (PET) manufacture using terephthalic acid** means the manufacturing of poly(ethylene terephthalate) based on the esterification reaction of terephthalic acid (TPA) with ethylene glycol to form the intermediate monomer bis-(2-hydroxyethyl)-terephthalate (BHET) that is subsequently polymerized to form PET.

**Polymerization reaction section** means the equipment designed to cause monomer(s) to react to form polymers, including equipment designed primarily to cause the formation of short polymer chains (oligomers or low polymers), but not including equipment designed to prepare raw materials for polymerization, e.g., esterification vessels. For the purposes of these standards, the polymerization reaction section begins with the equipment used to transfer the materials from the raw materials preparation section and ends with the last vessel in which polymerization occurs. Equipment used for the on-site recovery of ethylene glycol from poly(ethylene terephthalate) plants, however, are included in this process section, rather than in the material recovery process section.

**Polypropylene (PP)** means a thermoplastic polymer or copolymer comprised of at least 50 percent propylene by weight.

**Polystyrene (PS)** means a thermoplastic polymer or copolymer comprised of at least 80 percent styrene or para-methylstyrene by weight.

**Post-impregnation suspension process** means a manufacturing process in which polystyrene beads are first formed in a suspension process, washed, dried, or otherwise finished and then added with a blowing agent to another reactor in which the beads and blowing agent are reacted to produce expandable polystyrene.

**Process heater** means a device that transfers heat liberated by burning fuel to fluids contained in tubular coils, including all fluids except water that is heated to produce steam.

**Process line** means a group of equipment assembled that can operate independently if supplied with sufficient raw materials to produce polypropylene, polyethylene, polystyrene, (general purpose, crystal, or expandable) or poly(ethylene terephthalate) or one of their copolymers. A process line consists of the equipment in the following process sections (to the extent

that these process sections are present at a plant): raw materials preparation, polymerization reaction, product finishing, product storage, and material recovery.

**Process section** means the equipment designed to accomplish a general but well-defined task in polymer production. Process sections include raw materials preparation, polymerization reaction, material recovery, product finishing, and product storage and may be dedicated to a single process line or common to more than one process line.

**Process unit** means equipment assembled to perform any of the physical and chemical operations in the production of polypropylene, polyethylene, polystyrene, (general purpose, crystal, or expandable), or poly(ethylene terephthalate) or one of their copolymers. A process unit can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the product. Examples of process units are raw materials handling and monomer recovery.

**Product finishing section** means the equipment that treats, shapes, or modifies the polymer or resin to produce the finished end product of the particular facility, including equipment that prepares the product for product finishing. For the purposes of these standards, the product finishing section begins with the equipment used to transfer the polymerized product from the polymerization reaction section and ends with the last piece of equipment that modifies the characteristics of the polymer. Product finishing equipment may accomplish product separation, extruding and pelletizing, cooling and drying, blending, additives introduction, curing, or annealing. Equipment used to separate unreacted or by-product material from the product are to be included in this process section, provided the material separated from the polymer product is not recovered at the time the process section becomes an affected facility. If the material is being recovered, then the separation equipment are to be included in the material recovery section. Product finishing does not include polymerization, the physical mixing of the pellets to obtain a homogenous mixture of the polymer (except as noted below), or the shaping (such as fiber spinning, molding, or fabricating) or modification (such as fiber stretching and crimping) of the finished end product. If physical mixing occurs in equipment located between product finishing equipment (i.e., before all the chemical and physical characteristics

have been "set" by virtue of having passed through the last piece of equipment in the product finishing section), then such equipment are to be included in this process section. Equipment used to physically mix the finished product that are located after last piece of equipment in the product finishing section are part of the product storage section.

**Product storage section** means the equipment that is designed to store the finished polymer or resin end product of the particular facility. For the purposes of these standards, the product storage section begins with the equipment used to transfer the finished product out of the product finishing section and ends with the containers used to store the final product. Any equipment used after the product finishing section to recover unreacted or by-product material are to be considered part of a material recovery section. Product storage does not include any intentional modification of the characteristics of any polymer or resin product, but does include equipment that provide a uniform mixture of product, provided such equipment are used after the last product finishing piece of equipment. This process section also does not include the shipment of a finished polymer or resin product to another facility for further finishing or fabrication.

**Raw materials preparation section** means the equipment located at a polymer manufacturing plant designed to prepare raw materials, such as monomers and solvents, for polymerization. For the purposes of these standards, this process section begins with the equipment used to transfer raw materials from storage and recovered material from material recovery process sections, and ends with the last piece of equipment that prepares the material for polymerization. The raw materials preparation section may include equipment that accomplishes purification, drying, or other treatment of raw materials or of raw and recovered materials together, activation of catalysts, and esterification including the formation of some short polymer chains (oligomers), but does not include equipment that is designed primarily to accomplish the formation of oligomers, the treatment of recovered materials alone, or the storage of raw materials.

**Recovery system** means an individual unit or series of material recovery units, such as absorbers, condensers, and carbon adsorbers, used for recovering volatile organic compounds.

**Total organic compounds (TOC)** means those compounds measured according to the procedures specified in § 60.564.

**Vent stream** means any gas stream released to the atmosphere directly from an emission source or indirectly either through another piece of process equipment or a material recovery device that constitutes part of the normal recovery operations in a polymer process line where potential emissions are recovered for recycle or resale, and any gas stream directed to an air pollution control device. The emissions released from an air pollution control device are not considered a vent stream unless, as noted above, the control device is part of the normal material recovery operations in a polymer process line where potential emissions are recovered for recycle or resale.

**Volatile organic compounds (VOC)** means, for the purposes of these standards, any reactive organic compounds as defined in § 60.2 Definitions.

#### § 60.562-1 Standards: Process emissions.

(a) Polypropylene, low density polyethylene, and high density polyethylene. Each owner or operator of a polypropylene, low density polyethylene, or high density polyethylene process line containing a process section subject to the provisions of this subpart shall comply with the provisions in this section on and after the date on which the initial performance test required by § 60.8 is completed, but not later than 60 days after achieving the maximum production rate at which the affected facility will be operated, or 180 days after initial startup whichever comes first.

(1) **Continuous emissions.** For each vent stream that emits continuous emissions from an affected facility as defined in § 60.560(a)(1), the owner or operator shall use the procedures identified in paragraphs (a)(1)(ii) and (iii) of this section for determining which continuous emissions are to be controlled and which level of control listed in paragraph (a)(1)(i) of this section is to be met. The owner or operator shall use the procedures identified in paragraphs (a)(1)(ii) and (iii) of this section each time a process section is constructed, modified, or reconstructed at the plant site.

(i) **Level of control.** Continuous emission streams determined to be subject to control pursuant to the procedures identified in paragraphs (a)(1)(ii) and (iii) of this section, as applicable, shall meet one of the control levels identified in paragraphs (a)(1)(i)

(A) through (D) of this section. The procedures in paragraphs (a)(1) (ii) and (iii) of this section identify which level of control may be met. The level of control identified in paragraph (a)(1)(i)(D) of this section is limited to certain continuous emission streams, which are identified through the procedures in paragraphs (a)(1) (ii) and (iii) of this section.

(A) Reduce emissions of total organic compounds (minus methane and ethane) (TOC) by 98 weight percent, or to a concentration of 20 parts per millions by volume (ppmv) on a dry basis, whichever is less stringent. The TOC is expressed as the sum of the actual compounds, not carbon equivalents. If an owner or operator elects to comply with the 20 ppmv standard, the concentration shall include a correction to 3 percent oxygen only when supplemental combustion air is used to combust the vent stream.

(B) Combust the emissions in a boiler or process heater with a design heat input capacity of 150 million Btu/hour or

greater by introducing the vent stream into the flame zone of the boiler or process heater. (Note: A boiler or process heater of lesser design heat capacity may be used, but must demonstrate compliance with paragraph (a)(1)(i)(A) of this section.)

(C) Combust the emissions in a flare that meets the conditions specified in § 60.18. If the flare is used to control both continuous and intermittent emissions, the flare shall meet the conditions specified in § 60.18 at all times (i.e., which controlling continuous emissions alone or when controlling both continuous and intermittent emissions).

(D) Vent the emissions to a control device located on the plant site.

(ii) *Uncontrolled Continuous Emissions.* For each vent stream that emits continuous emissions from an affected facility as defined in § 60.560(a)(1) and that is not controlled in an existing control device, the owner or operator shall use the procedures identified in Table 3 to identify those

continuous emissions from each constructed, modified, or reconstructed affected facility that are to be controlled. The owner shall include in the procedure all uncontrolled continuous vent streams from previously constructed, modified, or reconstructed affected facilities at the plant site each time a process section is constructed, modified, or reconstructed at the plant site. In applying the procedures shown in Table 3, the stream characteristics may be either measured or calculated as specified in § 60.564(d). For modified or reconstructed affected facilities, these stream characteristics are to be determined after a modification or reconstruction determination has been made by the Administrator, but before any actual changes have been undertaken, and then again after the actual changes have been made. Figure 1 provides a summary overview of the control determination procedure described in Table 3.

TABLE 3.—PROCEDURE FOR DETERMINING CONTROL AND APPLICABLE STANDARD FOR CONTINUOUS EMISSION STREAMS FROM NEW, MODIFIED, OR RECONSTRUCTED POLYPROPYLENE AND POLYETHYLENE AFFECTED FACILITIES

| Procedure /a/   | Applicable TOC weight percent range | Control/no control criteria  | Applicable standard  |
|---|-------------------------------------|--|--|
| 1. Sum all uncontrolled streams with TOC weight percent within the applicable weight percent range from all affected facilities at a plant site.  | 0.10 < 5.5                          | 1. If total combined uncontrolled emissions are equal to or greater than the calculated threshold emissions (CTE) /b/, control.                  | 1. § 60.562-1(a)(1)(i) (A), (B), or (C).   |
| 2. Calculate total uncontrolled annual emissions for each weight percent range. For modified or affected facilities, use the total uncontrolled emissions after modification or reconstruction.   |                                     | 2. If total combined uncontrolled emissions are less than the CTE /b/, control only individual streams with volume flow rates of 8 scfm or less. | 2. § 60.562-1(a)(1)(i) (A) through (D).  |
| 3. Calculate composite TOC concentration (weight percent) for streams in the 0.10 to less than 5.5 weight percent range and for streams in the 5.5 to less than 20 weight percent range. For modified or reconstructed affected facilities, calculate the composite VOC concentration before and after modification and reconstruction. | 5.5 < 20                            | 1. If total combined uncontrolled emissions are equal to or greater than CTE, control.   | 1. § 60.562-1(a)(1)(i) (A), (B), or (C)<br>2. § 60.562-1(a)(1)(i) (A) through (D). |
| 4. Select the higher of the two TOC concentrations for each weight percent range for vent streams from a modified or reconstructed affected facility.   | 20 to 100                           | 2. If total combined uncontrolled emissions are less than the CTE /b/, control only individual streams with volume flow rates of 8 scfm or less. |  |
| 5. Calculate the threshold emissions for the 0.10 to less than 5.5 weight percent range and for the 5.5 to less than 20 weight percent range using the respective composite TOC concentration selected above.   |                                     | 1. If total combined uncontrolled emissions are equal to or greater than 18.2 Mg/yr, control.  | 1. § 60.562-1(a)(1)(i) (A), (B), or (C).   |
|   |                                     | 2. If total combined uncontrolled emissions are less than 18.2 Mg/yr, control.   | 2. § 60.562-1(a)(1)(i) (A) through (D).  |

a Individual streams excluded under paragraph § 60.560(g) from the requirements of § 60.562-1 are to be excluded from all calculations in this table. This paragraph exempts all individual emission streams with individual uncontrolled annual emission rates of less than 1.6 Mg/yr and all individual emission streams with individual TOC concentrations of less than 0.10 percent TOC by weight.

b For the 0.10 to less than 5.5 weight percent range, the following equations are used:

| If the percent composite TOC concentration is | Use this equation to calculate threshold emissions | If the percent composite TOC concentration is | Use this equation to calculate threshold emissions |
|---|--|---|--|
| 0.10 < 0.12                                   | $(a \times 7.5 \times 10^4) + 226$                 | 0.4 < 0.6                                     | $48.3 + 31 (0.6 - \text{weight percent TOC})$      |
| 0.12 < 0.2                                    | $(b \times 58.3) + 116.8$                          | 0.6 < 5.5                                     | 48.3   |
| 0.2 < 0.3                                     | $(c \times 3020) + 71.8$                           |   |  |
| 0.3 < 0.4                                     | $(d \times 547) + 54.5$                            |   |  |

where:  $a = (0.12 - \text{weight percent TOC})^{2.5}$

$$\left[ \frac{0.18}{\text{weight percent TOC}} \right]^{0.5} - 1$$

$$b = \frac{\text{weight percent TOC}}{\text{weight percent TOC}}$$

$$c = (0.3 - \text{weight percent TOC})^2$$

$$d = (0.4 - \text{weight percent TOC})^{1.5}$$

For the 5.5 to less than 20 weight percent range, the following equations are used.

| If the percent composite TOC concentration is | Use this equation to calculate threshold emissions |
|---|--|
| 5.5 < 7.0.....                                | $(e \times 740) + 31$                              |
| 7.0 < 9.0.....                                | $(f \times 324) + 25.0$                            |
| 9.0 < 20.....                                 | $(g \times 125) + 18.2$                            |

where:

$$e = \frac{\left[ \frac{7.0}{\text{weight percent TOC}} \right]^{0.5} - 1}{\text{weight percent TOC}}$$

$$f = \frac{\left[ \frac{9.0}{\text{weight percent TOC}} \right]^{0.5} - 1}{\text{weight percent TOC}}$$

$$g = \frac{\left[ \frac{20.0}{\text{weight percent TOC}} \right]^{0.5} - 1}{\text{weight percent TOC}}$$

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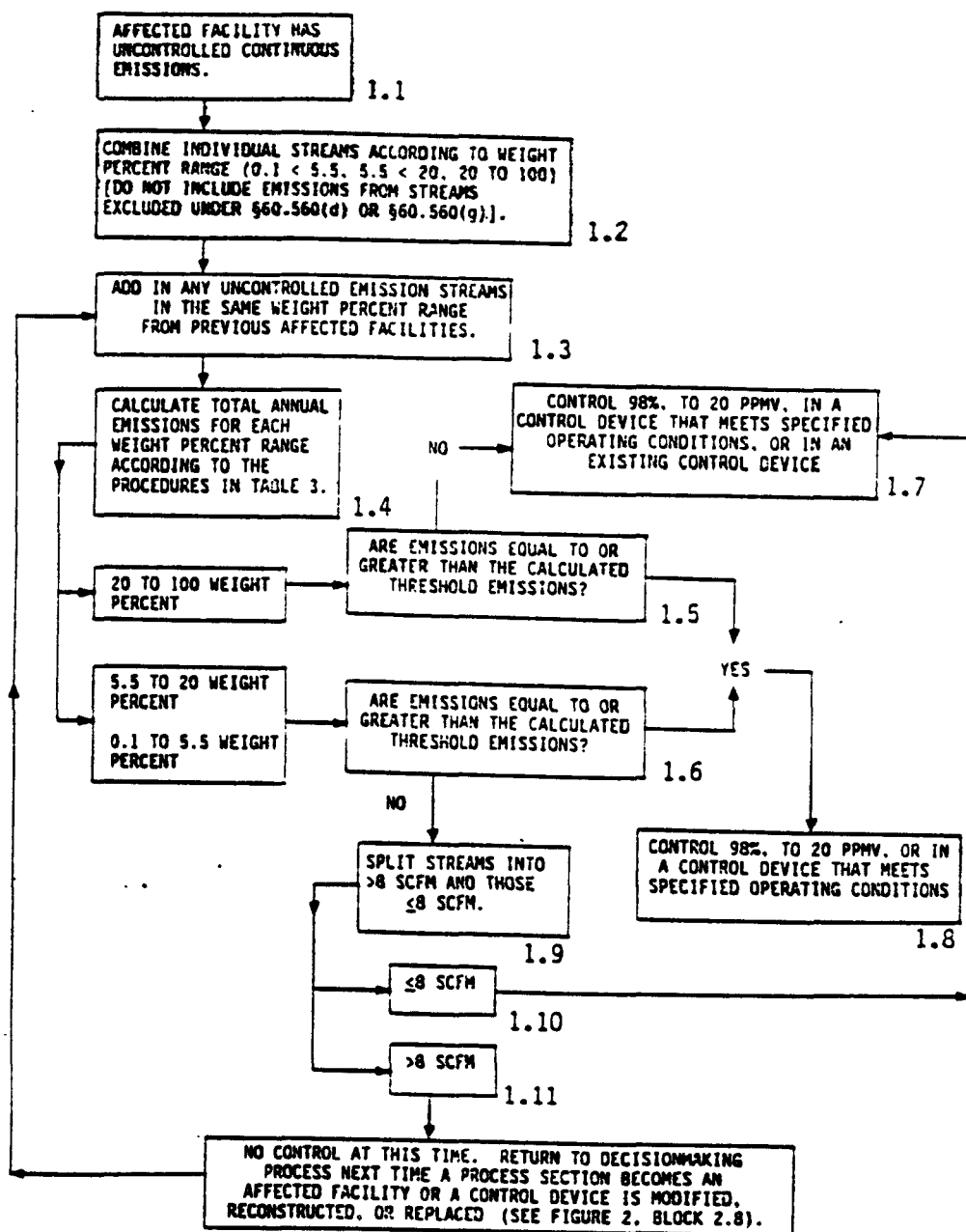


Figure 1. Decisionmaking Process for Uncontrolled Continuous Emissions from Polypropylene and Polyethylene Affected Facilities

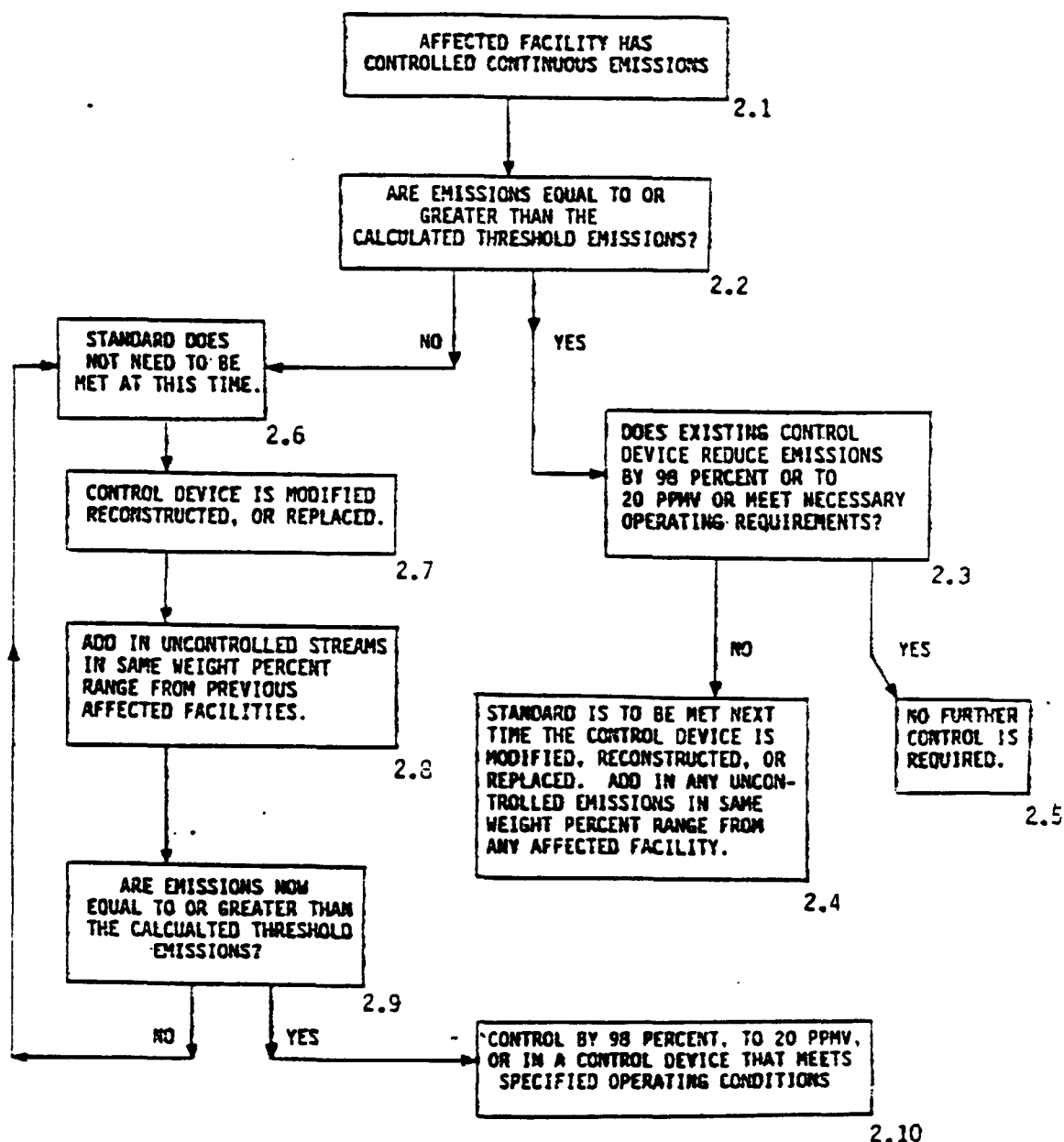


(iii) **Controlled Continuous Emissions.** For each vent stream that emits continuous emissions from an affected facility as defined in § 60.560(a)(1) and that is controlled in an existing control device, each owner or operator shall determine whether the emissions entering the control device are greater than or equal to the calculated threshold emissions (CTE) level, which is to be

calculated using the TOC concentration of the inlet vent steam and the equations in footnote b of Table 3. If the inlet stream's TOC concentration is equal to or less than 20 weight percent, the calculated threshold emissions level is 18.2 Mg/yr. If multiple emission streams are vented to the control device, the individual streams are not to be separated into individual weight percent

ranges for calculations purposes as would be done for uncontrolled emission streams. Emissions vented to an existing control device are required to be controlled as described in paragraphs (a)(1)(iii) (A) and (B) of this section. Figure 2 illustrates the control determination procedure for controlled continuous emissions.

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NOTE: There are no individual stream exemptions for emissions already controlled by existing control devices.

Figure 2. Decisionmaking Process for Continuous Emissions Already Controlled at Polypropylene and Polyethylene Affected Facilities

(A) If the annual emissions of the steam entering the control device are equal to or greater than the CTE levels, then compliance with one of the requirements identified in § 60.562-1(a)(1)(i) (A), (B), or (C) is required at such time the control device is reconstructed or replaced or has its operating conditions modified as a result of State or local regulations (including changes in the operating permit) including those instances where the control device is reconstructed, replaced, or modified in its operation at the same time the existing process section is modified or reconstructed and becomes an affected facility. If the existing control device already complies with one of the requirements identified in § 60.562-1(a)(1)(i) (A), (B), or (C), no further control is required.

(B) If the annual emissions of the stream entering the control device are less than the CTE level, then the requirements of § 60.562-1(a)(1)(i) (A), (B), or (C) are not applicable at that time. However, if the control device is replaced, reconstructed, or modified at a later date, each owner or operator shall reevaluate the applicability of these standards. This is done by combining with the vent stream entering the control device any uncontrolled vent streams in the same weight percent range as the controlled vent stream and determining whether the annual emissions of the stream entering the control device plus the applicable uncontrolled vent streams are greater than or equal to the CTE level, which is based on the weighted TOC concentration of the controlled vent stream and the uncontrolled vent streams. If the annual emissions entering the control device (including the applicable uncontrolled vent streams) are greater than or equal to the CTE level, then compliance with one of the requirements identified in § 60.562-1(a)(1)(i) (A), (B), or (C) is required at that time for both the controlled and uncontrolled vent streams. If the annual emissions are less than the CTE level, compliance with these standards is again not required at such time. However, if the control device is again replaced, reconstructed, or modified, each owner or operator shall repeat this determination procedure.

(2) *Intermittent emissions.* The owner or operator shall control each vent stream that emits intermittent emissions from an affected facility as defined in § 60.560-1(a)(1) by meeting one of the control requirements specified in paragraphs (a)(2) (i) and (ii) of this section. If a vent stream that emits intermittent emissions is controlled in an existing flare, incinerator, boiler, or

process heater, the requirements of this paragraph are waived until such time the control device is reconstructed or replaced or is modified in its operating conditions as a result of State or local regulation, including changes in the operating permit. This paragraph does not apply to emergency vent streams exempted by § 60.560(h) and as defined in § 60.561.

(i) Combust the emissions in a flare that is:

(A) Designed for and operated with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

(B) Operated with a flame present at all times, and

(C) Designed to maintain a stable flame.

(ii) Combust the emissions in an incinerator, boiler, or process heater. Such emissions shall be introduced into the flame zone of a boiler or process heater.

(b) *Polystyrene.* Each owner or operator of a polystyrene process line containing process section subject to the provisions of this subpart shall comply with the provisions in this section on and after the date on which the initial performance test required by § 60.8 is completed, but not later than 60 days after achieving the maximum production rate at which the affected facility will be operated, or 180 days after initial startup, whichever comes first. Each owner or operator of a polystyrene process line using a continuous process shall:

(1) Limit the continuous TOC emissions from the material recovery section by complying with one of the following:

(i) Not allow continuous TOC emissions to be greater than 0.0036 kg TOC/Mg product; or

(ii) Not allow the outlet gas stream temperature from each final condenser in the material recovery section to exceed  $-25^{\circ}\text{C}$  ( $-13^{\circ}\text{F}$ ). For purposes of this standard, temperature excursions above this limit shall not be considered a violation when such excursions occur during periods of startup, shutdown, or malfunction; or

(iii) Comply with § 60.562-1(a)(1)(i) (A), (B), or (C).

(2) If continuous TOC emissions from the material recovery section are routed through an existing emergency vapor recovery system, then compliance with these standards is required when the emergency vapor recovery system undergoes modification, reconstruction, or replacement. In such instances, compliance with these standards shall be achieved no later than 180 days after

completion of the modification, reconstruction, or replacement.

(c) *Poly(ethylene terephthalate).* Each owner or operator of a poly(ethylene terephthalate) process line containing process sections subject to the provisions of this subpart shall comply with provisions in this section on and after the date on which the initial performance test required by § 60.8 is completed but not later than 60 days after achieving the maximum production rate at which the affected facility will be operated, or 180 days after initial startup, whichever comes first.

(1) Each owner or operator of a PET process line using a dimethyl terephthalate process shall:

(i) Limit the continuous TOC emissions from the material recovery section (i.e., methanol recovery) by complying with one of the following:

(A) Not allow the continuous TOC emissions to be greater than 0.018 kg TOC/Mg product; or

(B) Not allow the outlet gas temperature from each final condenser in the material recovery section (i.e., methanol recovery) to exceed  $+3^{\circ}\text{C}$  ( $+37^{\circ}\text{F}$ ). For purposes of this standard, temperature excursions above this limit shall not be considered a violation when such excursions occur during periods of startup, shutdown, or malfunction.

(ii) Limit the continuous TOC emissions and, if steam-jet ejectors are used to provide vacuum to the polymerization reactors, the ethylene glycol concentration from the polymerization reaction section by complying with the appropriate standard set forth below. The ethylene glycol concentration limits specified in paragraphs (c)(1)(ii) (B) and (C) of this section shall be determined by the procedures specified in § 60.564(j).

(A) Not allow continuous TOC emissions from the polymerization reaction section (including emissions from any equipment used to further recover the ethylene glycol, but excluding those emissions from the cooling tower) to be greater than 0.02 kg TOC/Mg product; and

(B) If steam-jet ejectors are used as vacuum producers and a low viscosity product is being produced using single or multiple end finishers or a high viscosity product is being produced using a single end finisher, maintain the concentration of ethylene glycol in the liquid effluent exiting the vacuum system servicing the polymerization reaction section at or below 0.35 percent by weight, averaged on a daily basis over a rolling 14-day period of operating days; or

(C) If steam-jet ejectors are used as vacuum producers and a high viscosity product is being produced using multiple end finishers, maintain an ethylene glycol concentration in the cooling tower at or below 6.0 percent by weight averaged on a daily basis over a rolling 14-day period of operating days.

(2) Each owner or operator of a PET process line using a terephthalic acid process shall:

(i) Not allow the continuous TOC emissions from the esterification vessels in the raw materials preparation section to be greater than 0.04 kg TOC/Mg product.

(ii) Limit the continuous TOC emissions and, if steam-jet ejectors are used to provide vacuum to the polymerization reactors, the ethylene glycol concentration from the polymerization reaction section by complying with the appropriate standard set forth below. The ethylene glycol concentration limits specified in paragraphs (c)(2)(ii) (B) and (C) of this section shall be determined by the procedures specified in § 60.564(j).

(A) Not allow continuous TOC emissions from the polymerization reaction section (including emissions from any equipment used to further recover the ethylene glycol, but excluding those emissions from the cooling tower) to be greater than 0.02 kg TOC/Mg product; and

(B) If steam-jet ejectors are used as vacuum producers and a low viscosity product is being produced using single or multiple end finishers or a high viscosity product is being produced using a single end finisher, maintain the concentration of ethylene glycol in the liquid effluent exiting the vacuum system servicing the polymerization reaction section at or below 0.35 percent by weight, averaged on a daily basis over a rolling 14-day period of operating days; or

(C) If steam-jet ejectors are used as vacuum producers and a high viscosity product is being produced using multiple end finishers, maintain an ethylene glycol concentration in the cooling tower at or below 6.0 percent by weight averaged on a daily basis over a rolling 14-day period of operating days.

(d) Closed vent systems and control devices used to comply with this subpart shall be operated at all times when emissions may be vented to them.

(e) Vent systems that contain valves that could divert a vent stream from a control device shall have car-sealed opened all valves in the vent system from the emission source to the control device and car-sealed closed all valves in vent system that would lead the vent stream to the atmosphere, either directly

or indirectly, bypassing the control device.

#### § 60.562-2 Standards: Equipment leaks of VOC.

(a) Each owner or operator of an affected facility subject to the provisions of this subpart shall comply with the requirements specified in § 60.482-1 through § 60.482-10 as soon as practicable, but no later than 180 days, after initial startup, except that indications of liquids dripping from bleed ports in existing pumps in light liquid service are not considered to be a leak as defined in § 60.482-2(b)(2). For purposes of this standard, a "bleed port" is a technologically-required feature of the pump whereby polymer fluid used to provide lubrication and/or cooling of the pump shaft exits the pump, thereby resulting in a visible leak of fluid. This exemption expires when the existing pump is replaced or reconstructed.

(b) An owner or operator may elect to comply with the requirements specified in § 60.483-1 and § 60.483-2.

(c) An owner or operator may apply to the Administrator for a determination of equivalency for any means of emission limitation that achieves a reduction in emissions of VOC at least equivalent to the reduction in emissions of VOC achieved by the controls required in this subpart. In doing so, the owner or operator shall comply with requirements specified in § 60.484.

(d) Each owner or operator subject to the provisions of this subpart shall comply with the provisions specified in § 60.485 except an owner or operator may use the following provision in addition to § 60.485(e): Equipment is in light liquid service if the percent evaporated is greater than 10 percent at 150 °C as determined by ASTM Method D86-78 (incorporated by reference as specified in § 60.17).

(e) Each owner or operator subject to the provisions of this subpart shall comply with § 60.486 and § 60.487.

#### § 60.563 Monitoring requirements.

(a) Whenever a particular item of monitoring equipment is specified in this section to be installed, the owner or operator shall install, calibrate, maintain, and operate according to manufacturer's specifications that item as follows:

(1) A temperature monitoring device to measure and record continuously the operating temperature to within 1 percent (relative to degrees Celsius) or  $\pm 0.5$  °C ( $\pm 0.9$  °F), whichever is greater.

(2) A flame monitoring device, such as a thermocouple, an ultraviolet sensor, an infrared beam sensor, or similar device

to indicate and record continuously whether a flare or pilot light flame is present, as specified.

(3) A flow monitoring indicator to indicate and record whether or not flow exists at least once every fifteen minutes.

(4) An organic monitoring device (based on a detection principle such as infrared, photoionization, or thermal conductivity) to indicate and record continuously the concentration level of organic compounds.

(5) A specific gravity monitoring device to measure and record continuously to within 0.02 specific gravity unit.

(b) The owner or operator shall install, as applicable, the monitoring equipment for the control means used to comply with § 60.562-1, except § 60.562-1(a)(1)(i)(D), as follows:

(1) If the control equipment is an incinerator:

(i) For a noncatalytic incinerator, a temperature monitoring device shall be installed in the firebox.

(ii) For a catalytic incinerator, temperature monitoring devices shall be installed in the gas stream immediately before and after the catalytic bed.

(2) If a flare is used:

(i) A flame monitoring device shall be installed to indicate the presence of a flare flame or a flame for each pilot light, if the flare is used to comply with § 60.562-1(a)(1), including those flares controlling both continuous and intermittent emissions.

(ii) A thermocouple or equivalent monitoring device to indicate the presence of a flame at each pilot light, if used to comply with § 60.562-1(a)(2).

(3) If a boiler or process heater is used:

(i) If the boiler or process heater has a heat input design capacity of less than 150 million Btu/hr, a temperature monitoring device shall be installed between the radiant section and the convection zone for watertube boilers and between the furnace (combustion zone) and the firetubes for firetube boilers.

(ii) If the boiler or process heater has a heat input design capacity of 150 million Btu/hr or greater, such records to indicate the periods of operation of the boiler or process heater shall be maintained. The records must be readily available for inspection.

(4) If an absorber is the final unit in a system:

(i) A temperature monitoring device and a specific gravity monitoring device for the scrubber liquid shall be installed, or

(ii) An organic monitoring device shall be installed at the outlet of the absorber.

(5) If a condenser is the final unit in a system:

(i) A temperature monitoring device shall be installed at the condenser exit (product side), or

(ii) An organic monitoring device shall be installed at the outlet of the condenser.

(6) If a carbon adsorber is the final unit in a system, an organic monitoring device shall be installed at the outlet of the carbon bed.

(c) Owners or operators of control devices used to comply with the provisions of this subpart, except § 60.562-1(a)(1)(i)(D), shall monitor these control devices to ensure that they are operated and maintained in conformance with their designs.

(d) Owners or operators using a vent system that contains valves that could divert a vent stream from a control device used to comply with the provisions of this subpart shall do one or a combination of the following:

(1) Install a flow indicator immediately downstream of each valve that if opened would allow a vent stream to bypass the control device and be emitted, either directly or indirectly, to the atmosphere. The flow indicator shall be capable of recording flow at least once every fifteen minutes.

(2) Monitor the valves once a month, checking the position of the valves and the condition of the car seal, and identify all times when the car seals have been broken and the valve position has been changed (i.e., from opened to closed for valves in the vent piping to the control device and from closed to open for valves that allow the stream to be vented directly or indirectly to the atmosphere).

(e) An owner or operator complying with the standards specified under § 60.562-1, except § 60.562-1(a)(1)(i)(D), with control devices other than an incinerator, boiler, process heater, flare, absorber, condenser, or carbon adsorber or by any other means shall provide to the Administrator information describing the operation of the control device and the process parameter(s) which would indicate proper operation and maintenance of the device. The Administrator may request further information and will specify appropriate monitoring procedures or requirements.

#### § 60.564 Test methods and procedures.

(a) In conducting the performance tests required in § 60.8, the owner or operator shall use as reference methods and procedures the test methods in appendix A of this part or other methods and procedures specified in this section.

except as provided under § 60.8(b). Owners or operators complying with § 60.562-1(a)(1)(i)(D) need not perform a performance test on the control device, provided the control device is not used to comply with any other requirement of § 60.562-1(a).

(1) Whenever changes are made in production capacity, feedstock type or catalyst type, or whenever there is replacement, removal, or addition of a control device, each owner or operator shall conduct a performance test according to the procedures in this section as appropriate, in order to determine compliance with § 60.562-1.

(2) Where a boiler or process heater with a design heat input capacity of 150 million Btu/hour or greater is used, the requirement for an initial performance test is waived, in accordance with § 60.8(b). However, the Administrator reserves the option to require testing at such other times as may be required, as provided for in § 114 of the Act.

(3) The owner or operator shall determine the average organic concentration for each performance test run using the equipment described in § 60.563(a)(4). The average organic concentration shall be determined from measurements taken at least every 15 minutes during each performance test run. The average of the three runs shall be the base value for the monitoring program.

(4) When an absorber is the final unit in the system, the owner or operator shall determine the average specific gravity for each performance test run using specific gravity monitoring equipment described in § 60.563(a)(5). An average specific gravity shall be determined from measurements taken at least every 15 minutes during each performance test run. The average of the three runs shall be the base value for the monitoring program.

(5) When a condenser is the final unit in the system, the owner or operator shall determine the average outlet temperature for each performance test run using the temperature monitoring equipment described in § 60.563(a)(1). An average temperature shall be determined from measurements taken at least every 15 minutes during each performance test run while the vent stream is normally routed and constituted. The average of the three runs shall be the base value for the monitoring program.

(b) The owner or operator shall determine compliance with the emission concentration standard in § 60.562-1(a)(1)(i)(A) or (b)(1)(iii) if applicable [if not, see paragraph (c) of this section] as follows:

(1) The TOC concentration is the sum of the individual components and shall be computed for each run using the following equation:

$$C_{\text{TOC}} = \sum_{j=1}^n C_j$$

where:

$C_{\text{TOC}}$  = Concentration of TOC (minus methane and ethane), dry basis, ppmv.

$C_j$  = the concentration of sample component  $j$ , ppm.

$n$  = Number of components in the sample.

(i) Method 18 shall be used to determine the concentration of each individual organic component ( $C_j$ ) in the gas stream. Method 1 or 1A, as appropriate, shall be used to determine the sampling site at the outlet of the control device. Method 4 shall be used to determine the moisture content, if necessary.

(ii) The sampling time for each run shall be 1 hour in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, then the samples shall be taken at 15 minute intervals.

(2) If supplemental combustion air is used, the TOC concentration shall be corrected to 3 percent oxygen and shall be computed using the following equation:

$$C_{\text{CORR}} = C_{\text{MEAS}} \times \left( \frac{17.9}{20.9 - \%O_{2d}} \right)$$

where:

$C_{\text{CORR}}$  = Concentration of TOC corrected to 3 percent oxygen, dry basis, ppm by volume.

$C_{\text{MEAS}}$  = Concentration of TOC (minus methane and ethane), dry basis, ppm by volume, as calculated in paragraph (b)(1) of this section.

$\%O_{2d}$  = Concentration of  $O_2$ , dry basis, percent by volume.

The emission rate correction factor, integrated sampling and analysis procedure of Method 3 shall be used to determine the oxygen concentration ( $\%O_{2d}$ ). The sampling site shall be the same as that of the TOC sample and the samples shall be taken during the same time that the TOC samples are taken.

(c) If paragraph (b) of this section is not applicable, then the owner or operator shall determine compliance with the percent emission reduction standard in § 60.562-1(a)(1)(i)(A) or (b)(1)(iii) as follows:

(1) The emission reduction of TOC (minus methane and ethane) shall be determined using the following equation:

$$P = \frac{E_{\text{inlet}} - E_{\text{outlet}}}{E_{\text{inlet}}} \times 100$$

where:

P = Percent emission reduction, by weight.

$E_{\text{inlet}}$  = Mass rate of TOC entering the control device, kg TOC/hr.

$E_{\text{outlet}}$  = Mass rate of TOC, discharged to the atmosphere, kg TOC/hr.

(2) The mass rates of TOC ( $E_i$ ,  $E_o$ ) shall be computed using the following equations:

$$E_i = K_1 \left( \sum_{j=1}^n C_{ij} M_{ij} \right) Q_i$$

$$E_o = K_1 \left( \sum_{j=1}^n C_{oj} M_{oj} \right) Q_o$$

where:

$C_{ij}, C_{oj}$  = Concentration of sample component "j" of the gas stream at the inlet and outlet of the control device, respectively, dry basis, ppmv.

$M_{ij}, M_{oj}$  = Molecular weight of sample component "j" of the gas stream at the inlet and outlet of the control device respectively, g/g-mole (lb/lb-mole).

$Q_i, Q_o$  = Flow rate of the gas stream at the inlet and outlet of the control device, respectively, dscm/hr (dscf/hr).

$K_1 = 4.157 \times 10^{-6} \{[(\text{kg})/(\text{g-mole})] / [(\text{g})(\text{ppm})(\text{dscm})] \} \{5.711 \times 10^{-15} [(\text{lb})/(\text{lb-mole})] / [(\text{lb})(\text{ppm})(\text{dscf})] \}$

(i) Method 18 shall be used to determine the concentration of each individual organic component ( $C_{ij}$ ,  $C_{oj}$ ) in the gas stream. Method 1 or 1A, as appropriate, shall be used to determine the inlet and outlet sampling sites. The inlet site shall be before the inlet of the control device and after all product recovery units.

(ii) Method 2, 2A, 2C, or 2D, as appropriate, shall be used to determine

the volumetric flow rates ( $Q_i$ ,  $Q_o$ ). If necessary, Method 4 shall be used to determine the moisture content. Both determinations shall be compatible with the Method 18 determinations.

(iii) Inlet and outlet samples shall be taken simultaneously. The sampling time for each run shall be 1 hour in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, then the samples shall be taken at 15 minute intervals.

(d) An owner or operator shall determine compliance with the individual stream exemptions in § 60.560(g) and the procedures specified in Table 3 for compliance with § 60.562-1(a)(1) as identified in paragraphs (d)(1) and (2) of this section. An owner or operator using the procedures specified in § 60.562-1(a)(1) for determining which continuous process emissions are to be controlled may use calculations demonstrated to be sufficiently accurate as to preclude the necessity of actual testing for purposes of calculating the uncontrolled annual emissions and weight percent of TOC. Owners or operators seeking to exempt streams under § 60.560(g) must use the appropriate test procedures specified in this section.

(1) The uncontrolled annual emissions of the individual vent stream shall be determined using the following equation:

$$E_{\text{unc}} = K_1 \left( \sum_{j=1}^n C_j M_j \right) Q \times 8.600 \times \frac{1 \text{ Mg}}{1,000 \text{ kg}}$$

where:

$E_{\text{unc}}$  = uncontrolled annual emissions, Mg/yr  
 $C_j$  = concentration of sample component "j" of the gas stream, dry basis, ppmv.

$M_j$  = Molecular weight of sample component "j" of the gas stream, g/g-mole (lb/lb-mole).

$Q$  = Flow rate of the gas stream, dscm/hr (dscf/hr).

$K_1 = 4.157 \times 10^{-6} \{[(\text{kg})/(\text{g-mole})] / [(\text{g})(\text{ppm})(\text{dscm})] \} \{5.711 \times 10^{-15} [(\text{lb})/(\text{lb-mole})] / [(\text{lb})(\text{ppm})(\text{dscf})] \}$

8.600 = operating hours per year

(i) Method 18 shall be used to determine the concentration of each individual organic component ( $C_{ij}$ ) in the gas stream. Method 1 or 1A, as appropriate, shall be used to determine the sampling site. If the gas stream is controlled in an existing control device, the sampling site shall be before the inlet of the control device and after all product recovery units.

(ii) Method 2, 2A, 2C, or 2D, as appropriate, shall be used to determine the volumetric flow rate ( $Q$ ). If necessary, Method 4 shall be used to determine the moisture content. Both determinations shall be compatible with the Method 18 determinations.

(iii) The sampling time for each run shall be 1 hour in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, then the samples shall be taken at 15 minute intervals.

(2) The weight percent VOC of the uncontrolled individual vent stream shall be determined using the following equation:

$$\text{weight \% TOC} = \frac{\sum_{j=1}^n C_j M_j}{MW_{\text{gas}} \times 10^4} \times 100$$

where:

$C_j$  = concentration of sample TOC component "j" of the gas stream, dry basis, ppmv.

$M_j$  = Molecular weight of sample TOC component "j" of the gas stream, g/g-mole (lb/lb-mole).

$MW_{\text{gas}}$  = Average molecular weight of the entire gas stream, g/g-mole (lb/lb-mole).

(i) Method 18 shall be used to determine the concentration of each individual organic component ( $C_{ij}$ ) in the gas stream. Method 1 or 1A, as appropriate, shall be used to determine the sampling site. If the gas stream is controlled in an existing control device, the sampling site shall be before the inlet of the control device and after all product recovery units. If necessary, Method 4 shall be used to determine the moisture content. This determination

shall be compatible with the Method 18 determinations.

(ii) The average molecular weight of the gas stream shall be determined using methods approved by the Administrator. If the carrier component of the gas stream is nitrogen, then an average molecular weight of 28 g/g-mole (lb/lb-mole) may be used in lieu of testing. If the carrier component of the gas stream is air, then an average molecular weight of 29 g/g-mole (lb/lb-mole) may be used in lieu of testing.

(iii) The sampling time for each run shall be 1 hour in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, then the samples shall be taken at 15 minute intervals.

(e) The owner or operator shall determine compliance of flares with the visible emission and flare provisions in § 60.562-1 as follows:

(1) Method 22 shall be used to determine visible emission. The observation period for each run shall be 2 hours.

(2) The monitoring device of § 60.563(b)(2) shall be used to determine whether a flame is present.

(f) The owner or operator shall determine compliance with the net heating value provisions in § 60.18 as referenced by § 60.562-1(a)(1)(i)(C). The net heating value of the process vent stream being combusted in a flare shall be computed as follows:

$$H_T = K_s \left( \sum C_i H_i \right)$$

where:

$H_T$  = Net heating value of the sample based on the net enthalpy per mole of offgas combusted at 25 °C and 760 mmHg, but the standard temperature for determining the volume corresponding to one mole is 20 °C, MJ/scm.

$K_s$  = Conversion constant,  $1.740 \times 10^{-7}$

$$\frac{(1) \text{ (g mole)}}{\text{ppm}} \frac{\text{(g mole)}}{\text{scm}} \frac{\text{(MJ)}}{\text{kcal}}$$

where standard temperature for

$$\frac{\text{(g mole)}}{\text{scm}} \text{ is } 20^\circ\text{C:}$$

$C_i$  = Concentration of sample component  $i$  in ppm on a wet basis.

$H_i$  = Net heat of combustion of sample component  $i$ , at 25 °C and 760 mm Hg, kcal/g-mole.

(1) Method 18 shall be used to determine the concentration of each individual organic component ( $C_i$ ) in the gas stream. Method 1 or 1A, as appropriate, shall be used to determine the sampling site to the inlet of the flare. Using this same sample, ASTM D1946-77 (incorporated by reference—see § 60.17) shall be used to determine the hydrogen and carbon monoxide content.

(2) The sampling time for each run shall be 1 hour in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, then the samples shall be taken at 15 minute intervals.

(3) Published or calculated values shall be used for the net heats of combustion of the sample components. If values are not published or cannot be calculated, ASTM D2382-76 (incorporated by reference—see § 60.17) may be used to determine the net heat of combustion of component "j."

(g) The owner or operator shall determine compliance with the exit velocity provisions in § 60.18 as referenced by § 60.562-1(a)(1)(i)(C) as follows:

(1) If applicable, the net heating value ( $H_T$ ) of the process vent shall be determined according to the procedures in paragraph (f) of this section to determine the applicable velocity requirements.

(2) If applicable, the maximum permitted velocity ( $V_{max}$ ) for steam-assisted and nonassisted flares shall be computed using the following equation:

where:

$$\log_{10}(V_{max}) = (H_T + 28.8)/31.7$$

$V_{max}$  = Maximum permitted velocity, m/sec.

28.8 = Constant.

31.7 = Constant.

$H_T$  = The net heating value as determined in paragraph (f) of this section.

(3) The maximum permitted velocity,  $V_{max}$ , for air-assisted flares shall be determined by the following equation:

where:

$$V_{max} = 8.706 + 0.7084(H_T)$$

$V_{max}$  = Maximum permitted velocity, m/sec.

8.706 = Constant.

0.7084 = Constant.

$H_T$  = The net heating value as determined in paragraph (f) of this section.

(4) The actual exit velocity of a flare shall be determined by dividing the volumetric flow rate (in units of standard temperature and pressure), as determined by Method 2, 2A, 2C, or 2D as appropriate, by the unobstructed (free) cross sectional area of the flare tip.

(h) The owner or operator shall determine compliance with the mass emission per mass product standards in §§ 60.560 (d) and (e) and in §§ 60.562-1

(b)(1)(i), (c)(1)(i)(A), (c)(1)(ii)(A), (c)(2)(i), and (c)(2)(ii)(A). The emission rate of TOC shall be computed using the following equation:

$$ER_{TOC} = \frac{E_{TOC}}{P_p \times 1.000 \text{ kg}}$$

where:

$ER_{TOC}$  = Emission rate of total organic compounds (minus methane and ethane), kg TOC/Mg product.

$E_{TOC}$  = Emission rate of total organic compounds (minus methane and ethane) in the sample, kg/hr.

$P_p$  = The rate of polymer produced, kg/hr.

(1) The mass rate of TOC,  $E_{TOC}$ , shall be determined according to the procedures, as appropriate, in paragraph (c)(2) of this section. The sampling site for determining compliance with §§ 60.560 (d) and (e) shall be before any add-on control devices and after all product recovery devices. Otherwise, the sampling site shall be at the outlet of the control device.

(2) The rate of polymer produced,  $P_p$  (kg/hr), shall be determined by dividing the weight of polymer pulled in kilograms (kg) from the process line during the performance test by the number of hours (hr) taken to perform the performance test. The polymer pulled, in kilograms, shall be determined by direct measurement or, subject to prior approval by the Administrator, computed from materials balance by good engineering practice.

(i) The owner or operator shall determine continuous compliance with the temperature requirements in §§ 60.562-1(b)(1)(ii) and 60.562-1(c)(1)(i)(B) by using the temperature monitoring equipment described in § 60.563(a)(1). An average temperature shall be determined from measurements taken at least every 15 minutes every three hours while the vent stream is normally routed and constituted. Each three-hour period constitutes a performance test.

(j) For purposes of determining compliance with § 60.562-1(c)(1)(ii)(B), (1)(ii)(C), (2)(ii)(B), or (2)(ii)(C), the ethylene glycol concentration in either the cooling tower or the liquid effluent from steam-jet ejectors used to produce a vacuum in the polymerization reactors, whichever is applicable, shall be determined:

(1) Using procedures that conform to the methods described in ASTM D2908-74, "Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas

Chromatography" (incorporated by reference—see § 60.17), except as provided in paragraph (j)(2) of this section:

(i) At least one sample per operating day shall be collected using the grab sampling procedures of ASTM D3370-76, "Standard Practices for Sampling Water" (incorporated by reference—see § 60.17). An average ethylene glycol concentration by weight shall be calculated on a daily basis over a rolling 14-day period of operating days, except as provided in paragraphs (j)(1) (ii) and (iii) of this section. Each daily average ethylene glycol concentration so calculated constitutes a performance test. Exceedance of the standard during the reduced testing program specified in paragraphs (j)(1) (ii) and (iii) of this section is a violation of these standards.

(ii) For those determining compliance with § 60.562-1(c) (1)(ii)(B) or (2)(ii)(B), the owner or operator may elect to reduce the sampling program to any 14 consecutive day period once every two calendar months, if at least seventeen consecutive 14-day rolling average concentrations immediately preceding the reduced sampling program are each less than 0.10 weight percent ethylene glycol. If the average concentration obtained over the 14 day sampling during the reduced testing period exceeds the upper 95 percent confidence interval calculated from the most recent test results in which no one 14-day average exceeded 0.10 weight percent ethylene glycol, then the owner or operator shall reinstitute a daily sampling program. A reduced sampling program can be reinstituted if the requirements specified in this paragraph are met.

(iii) For those determining compliance with § 60.562-1(c)(1)(ii)(C) or (c)(2)(ii)(C), the owner or operator may elect to reduce the sampling program to any 14 consecutive day period once every two calendar months, if at least seventeen consecutive 14-day rolling average concentrations immediately preceding the reduced sampling program are each less than 1.8 weight percent ethylene glycol. If the average concentration obtained over the 14 day sampling during the reduced test period exceeds the upper 95 percent confidence interval calculated from the most recent test results 14-day in which no one 14-day average exceeded 1.8 weight percent ethylene glycol, then the owner

or operator shall reinstitute a daily sampling program. A reduced program can be reinstituted if the requirements specified in this paragraph are met.

(iv) The upper 95 percent confidence interval shall be calculated using the equation:

$$CL_{95} = \frac{\sum_{i=1}^n X_i}{n} + 2 \sqrt{\frac{n \sum X_i^2 - (\sum X_i)^2}{n(n-1)}}$$

where:

$X_i$  = daily ethylene glycol concentration for each day used to calculate each 14-day rolling average used in test results to justify implementing the reduced testing program.

$n$  = number of ethylene glycol concentrations.

(2) Measuring an alternative parameter, such as carbon oxygen demand or biological oxygen demand, that is demonstrated to be directly proportional to the ethylene glycol concentration. Such parameter shall be measured during the initial 14-day performance test during which the facility is shown to be in compliance with the ethylene glycol concentration standard whereby the ethylene glycol concentration is determined using the procedures described in paragraph (j)(1) of this section. The alternative parameter shall be measured on a daily basis and the average value of the alternative parameter shall be calculated on a daily basis over a rolling 14-day period of operating days. Each daily average value of the alternative parameter constitutes a performance test.

#### § 60.565 Reporting and recordkeeping requirements.

(a) Each owner or operator subject to the provisions of this subpart shall keep an up-to-date, readily-accessible record of the following information measured during each performance test, and shall include the following information in the report of the initial performance test in addition to the written results of such performance tests as required under § 60.8. Where a control device is used to comply with § 60.562-1(a)(1)(i)(D) only, a report containing performance test data need not be submitted, but a report containing the information in § 60.565(a)(11) is required. Where a boiler or process heater with a design heat input capacity of 150 million Btu/hour or greater is used to comply with § 60.562-1(a), a report containing performance test data need not be

submitted, but a report containing the information in § 60.565(a)(2)(i) is required. The same information specified in this section shall be submitted in the reports of all subsequently required performance tests where either the emission control efficiency of a combustion device or the outlet concentration of TOC (minus methane and ethane) is determined.

(1) When an incinerator is used to demonstrate compliance with § 60.562-1, except § 60.562-1(a)(2):

(i) The average firebox temperature of the incinerator (or the average temperature upstream and downstream of the catalyst bed), measured at least every 15 minutes and averaged over the performance test period, and

(ii) The percent reduction of TOC (minus methane and ethane) achieved by the incinerator, the concentration of TOC (minus methane and ethane) (ppmv, by compound) at the outlet of the control device on a dry basis, or the emission rate in terms of kilograms TOC (minus methane and ethane) per megagram of product at the outlet of the control device, whichever is appropriate. If supplemental combustion air is used, the TOC concentration corrected to 3 percent oxygen shall be recorded and reported.

(2) When a boiler or process heater is used to demonstrate compliance with § 60.562-1, except § 60.562-1(a)(2):

(i) A description of the location at which the vent stream is introduced into the boiler or process heater, and

(ii) For boiler or process heaters with a design heat input capacity of less than 150 million Btu/hr, all 3-hour periods of operation during which the average combustion temperature was more than 28°C (50°F) below the average combustion temperature during the most recent performance test at which compliance was determined.

(3) When a flare is used to demonstrate compliance with § 60.562-1, except § 60.562-1(a)(2):

(i) All visible emission readings, heat content determination, flow rate measurements, and exit velocity determinations made during the performance test.

(ii) Continuous records of the pilot flame heat-sensing monitoring, and

(iii) Records of all periods of operations during which the pilot flame is absent.



(4) When an incinerator, boiler, or process heater is used to demonstrate compliance with § 60.562-1(a)(2), a description of the location at which the vent stream is introduced into the incinerator, boiler, or process heater.

(5) When a flare is used to demonstrate compliance with § 60.564-1(a)(2):

(i) All visible emission readings made during the performance test;

(ii) Continuous records of the pilot flame heat-sensing monitoring, and

(iii) Records of all periods of operation during which the pilot flame is absent.

(6) When an absorber is the final unit in a system to demonstrate compliance with § 60.562-1, except § 60.562-1(a)(2), the specific gravity (or alternative parameter that is a measure of the degree of absorbing liquid saturation, if approved by the Administrator), and average temperature, measured at least every 15 minutes and averaged over the performance test period, of the absorbing liquid (both measured while the vent stream is normally routed and constituted).

(7) When a condenser is the final unit in a system to demonstrate compliance with § 60.562-1, except § 60.562-1(a)(2), the average exit (product side) temperature, measured at least every 15 minutes and averaged over the performance test period while the vent stream is normally routed and constituted.

(8) Daily measurement and daily average 14-day rolling average of the ethylene glycol concentration in the liquid effluent exiting the vacuum system servicing the polymerization reaction section, if an owner or operator is subject to § 60.562-1(c) (1)(ii)(B) or (2)(ii)(B), or of the ethylene glycol concentration in the cooling water in the cooling tower, if subject to § 60.562-1(c) (2)(ii)(C) or (2)(iii)(C).

(9) When a carbon adsorber is the final unit in a system to demonstrate compliance with § 60.562-1, except § 60.562-1(a)(2): the concentration level or reading indicated by the organics monitoring device at the outlet of the adsorber, measured at least every 15 minutes and averaged over the performance test period while the vent stream is normally routed and constituted.

(10) When an owner or operator seeks to comply with the requirements of this subpart by complying with the uncontrolled threshold emission rate cutoff provision in §§ 60.560 (d) and (e) or with the individual stream exemptions in § 60.560(g), each process operation variable (e.g., pressure, temperature, type of catalyst) that may

result in an increase in the uncontrolled emission rate, if § 60.560(d) or (e) is applicable, or in an increase in the uncontrolled annual emissions or the VOC weight percent, as appropriate, if § 60.560(g) is applicable, should such operating variable be changed.

(11) When an owner or operator uses a control device to comply with § 60.564-1(a)(1)(i)(D) alone: all periods when the control device is not operating.

(b)(1) Each owner or operator subject to the provisions of this subpart shall submit with the initial performance test or, if complying with § 60.564-1(a)(1)(i)(D), as a separate report, an engineering report describing in detail the vent system used to vent each affected vent stream to a control device. This report shall include all valves and vent pipes that could vent the stream to the atmosphere, thereby bypassing the control device, and identify which valves are car-sealed opened and which valves are car-sealed closed.

(2) If a vent system containing valves that could divert the emission stream away from the control device is used, each owner or operator subject to the provisions of this subpart shall keep for at least two years up-to-date, readily accessible continuous records of:

(i) All periods when flow is indicated if flow indicators are installed under § 69.563(d)(1).

(ii) All times when maintenance is performed on car-sealed valves, when the car seal is broken, and when the valve position is changed (i.e., from open to closed for valves in the vent piping to the control device and from closed to open for valves that vent the stream directly or indirectly to the atmosphere bypassing the control device).

(c) Where an incinerator is used to comply with § 69.562-1, except §§ 60.562(a)(1)(i)(D) and (a)(2), each owner or operator subject to the provisions of this subpart shall keep for at least 2 years up-to-date, readily accessible continuous records of:

(1) The temperature measurements specified under § 69.563(b)(1).

(2) Records of periods of operation during which the parameter boundaries established during the most recent performance test are exceeded. Periods of operation during which the parameter boundaries established during the most recent performance test are exceeded are defined as follows:

(i) For noncatalytic incinerators, all 3-hour periods of operation during which the average combustion temperature was more than 28 °C (50 °F) below the average combustion temperature during the most recent performance test to which compliance was demonstrated.

(ii) For catalytic incinerators, all 3-hour periods of operation during which the average temperature of the vent stream immediately before the catalyst bed is more than 28 °C (50 °F) below the average temperature of the vent stream during the most recent performance test at which compliance was demonstrated. The owner or operator also shall record all 3-hour periods of operation during which the average temperature difference across the catalyst bed is less than 80 percent of the average temperature difference of the device during the most recent performance test at which compliance was demonstrated.

(d) Where a boiler or process heater is used to comply with § 60.562-1, except §§ 60.562-1(a)(1)(i)(D) and (a)(2), each owner or operator subject to the provisions of this subpart shall keep for at least 2 years up-to-date, readily accessible continuous records of:

(1) Where a boiler or process heater with a heat input design capacity of 150 million Btu/hr or greater is used, all periods of operation of the boiler or process heater. (Examples of such records could include records of steam use, fuel use, or monitoring data collected pursuant to other State or Federal regulatory requirements), and

(2) Where a boiler or process heater with a heat input design capacity of less than 150 million Btu/hr is used, all periods of operation during which the parameter boundaries established during the most recent performance test are exceeded. Periods of operation during which the parameter boundaries established during the most recent performance test are exceeded are defined as all 3-hour periods of operation during which the average combustion temperature was more than 28 °C (50 °F) below the average combustion temperature during the most recent performance test at which compliance was demonstrated.

(e) Where a flare is used to comply with § 60.562-1, except § 60.562-1(a)(1)(i)(D), each owner or operator subject to the provisions of this subpart shall keep for at least 2 years up-to-date, readily accessible continuous records of:

(1) The flare or pilot light flame heat sensing monitoring specified under § 60.563(b)(2), and

(2) All periods of operations in which the flare or pilot flame, as appropriate, is absent.

(f) Where an adsorber, condenser, absorber, or a control device other than a flare, incinerator, boiler, or process heater is used to comply with § 60.562-1, except § 60.562-1(a)(1)(i)(D), each owner or operator subject to the provisions of this subpart shall keep for at least 2

years up-to-date, readily-accessible continuous records of the periods of operation during which the parameter boundaries established during the most recent performance test are exceeded. Where an owner or operator seeks to comply with § 60.562-1, periods of operation during which the parameter boundaries established during the most recent performance tests are exceeded are defined as follows:

(1) Where an absorber is the final unit in a system:

(i) All 3-hour periods of operation during which the average absorbing liquid temperature was more than 11 °C (20 °F) above the average absorbing liquid temperature during the most recent performance test, and

(ii) All 3-hour periods of operation during which the average absorbing liquid specific gravity was more than 0.1 unit above, or more than 0.1 unit below, the average absorbing liquid specific gravity during the most recent performance test (unless monitoring of an alternative parameter than is a measure of the degree of absorbing liquid saturation is approved by the Administrator, in which case he or she will define appropriate parameter boundaries and periods of operation during which they are exceeded).

(2) Where a condenser is the final unit in a system, all 3-hour periods of operation during which the average condenser operating temperature was more than 6 °C (10 °F) above the average operating temperature during the most recent performance test.

(3) Where a carbon adsorber is the final unit in a system, all 3-hour periods of operation during which the average organic concentration level in the carbon adsorber gases is more than 20 percent greater than the exhaust gas concentration level or reading measured by the organics monitoring system during the most recent performance test.

(g) Each owner or operator of an affected facility subject to the provisions of this subpart and seeking to demonstrate compliance with § 60.562-1 shall keep up-to-date, readily accessible records of:

(1) Any changes in production capacity, feedstock type, or catalyst type, or of any replacement, removal or addition of product recovery equipment; and

(2) The results of any performance test performed pursuant to the procedures specified by § 60.564.

(h) Each owner or operator of an affected facility that seeks to comply with the requirements of this subpart by complying with the uncontrolled

threshold emission rate cutoff provision in §§ 60.560 (d) and (e) or with the individual stream exemptions in § 60.560(g) shall keep for at least 2 years up-to-date, readily accessible records of any change in process operation that increases the uncontrolled emission rate of the process line in which the affected facility is located, if § 60.560 (d) or (e) is applicable, or that increase the uncontrolled annual emissions or the VOC weight percent of the individual stream, if § 60.560(g) is applicable.

(i) Each owner and operator subject to the provisions of this subpart is exempt from § 60.7(c) of the General Provisions.

(j) The Administrator will specify appropriate reporting and recordkeeping requirements where the owner or operator of an affected facility complies with the standards specified under § 60.562-1 other than as provided under § 60.565 (a) through (e).

(k) Each owner or operator that seeks to comply with the requirements of this subpart by complying with the uncontrolled threshold emission rate cutoff provision of §§ 60.560 (d) and (e), the individual stream exemptions of § 60.560(g), or the requirements of § 60.562-1 shall submit to the Administrator semiannual reports of the following recorded information, as applicable. The initial report shall be submitted within 6 months after the initial start-up date.

(1) Exceedances of monitored parameters recorded under §§ 60.565 (c), (d)(2), and (f).

(2) All periods recorded under § 60.565(b) when the vent stream has been diverted from the control device.

(3) All periods recorded under § 60.565(d) when the boiler or process heater was not operating.

(4) All periods recorded under § 60.565(e) in which the flare or pilot flame was absent.

(5) All periods recorded under § 60.565(a)(8) when the 14-day rolling average exceeded the standard specified in § 60.562-1(c) (1)(ii)(B), (1)(ii)(C), (2)(ii)(B), or (2)(ii)(C), as applicable.

(6) Any change in process operations that increases the uncontrolled emission rate of the process line in which the affected facility is located, as recorded in § 60.565(h).

(7) Any change in process operations that increases the uncontrolled annual emissions or the VOC weight percent of the individual stream, as recorded in § 60.565(h).

(l) Each owner or operator subject to the provisions of this subpart shall notify the Administrator of the specific provisions of § 60.562, § 60.560(d), or § 60.560(e), as applicable, with which

the owner or operator has elected to comply. Notification shall be submitted with the notification of initial startup required by § 60.7(a)(3). If an owner or operator elects at a later date to use an alternative provision of § 60.562 with which he or she will comply or becomes subject to § 60.562 for the first time (i.e., the owner or operator can no longer meet the requirements of this subpart by complying with the uncontrolled threshold emission rate cutoff provision in § 60.560 (d) or (e)), then the owner or operator shall notify the Administrator 90 days before implementing a change and, upon implementing a change, a performance test shall be performed as specified in § 60.564.

(m) The requirements of this subsection remain in force until and unless EPA, in delegating enforcement authority to a State under section 111(c) of the Act, approves alternative reporting requirements or means of compliance surveillance adopted by such State. In that event, affected sources within the State will be relieved of the obligation to comply with this subsection, provided that they comply with the requirements established by the State.

#### § 60.566 Delegation of authority.

(a) In delegating implementation and enforcement authority to a State under section 111(c) of the Act, the authority contained in paragraph (b) of this section shall be retained by the Administrator and not transferred to a State.

(b) Authority which will not be delegated to States: § 60.562-2(c).

3. Section 60.17(a) is amended by revising paragraphs (a)(6), (a)(38), and (a)(40) and by adding paragraphs (a)(60) and (a)(61) to read as follows:

#### § 60.17 Incorporations by reference.

(a) . . .

(6) ASTM D1948-77, Standard Method for Analysis of Reformed Gas by Gas Chromatography, IBR approved for §§ 60.45(f)(5)(i), 60.18(f), 60.614(d)(2)(ii), 60.614(d)(4), 60.664(d)(2)(ii), 60.664(d)(4) and 60.564(f).

(38) ASTM D2382-76, Heat of Combustion of Hydrocarbon Fuels by Bomb Calorimeter [High-Precision Method], IBR approved for §§ 60.18(f), 60.485(g), 60.614(d)(4), 60.664(d)(4), and 60.564(f).

(40) ASTM D86-78, Distillation of Petroleum Products, IBR approved for § 60.593(d), § 60.633(h), and § 60.562-2(d).

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(60) ASTM D2908-74, Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas Chromatography, IBR approved for § 60.564(j).

(61) ASTM D3370-76, Standard Practices for Sampling Water, IBR approved for § 60.564(j).

[FR Doc. 90-28755 Filed 12-10-90; 8:45 am]

BILLING CODE 6560-60-M

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