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Agency

Office of Air Quality
Planning and Standards
Research Triangle Park NC 27711

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# Reactor Processes in the Synthetic Organic Chemical Manufacturing Industry-- Background Information for Promulgated Standards

Final EIS

NSPS

EPA-450/3-90-016b

# Reactor Processes in the Synthetic Organic Chemical Manufacturing Industry - Background Information for Promulgated Standards

Emission 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
March 1993

U. S. ENVIRONMENTAL PROTECTION AGENCY

Background Information
and Final Environmental Impact Statement
for Volatile Organic Compound Emissions
from Reactor Processes in
Synthetic Organic Chemical Manufacturing

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(Date)

1. The promulgated standards of performance will limit emissions of volatile organic compounds from new, modified, and reconstructed reactor processes. Section 111 of the Clean Air Act (42 U.S.C. 7411), as amended, directs the Administrator to establish standards of performance for any category of new stationary source of air pollution that ". . . causes or contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare."

2. Copies of this document have been sent to the following Federal Departments: Labor, Health and Human Services, Defense, Transportation, Agriculture, Commerce, Interior, and Energy; the National Science Foundation; State and Territorial Air Pollution Program Administrators; EPA Regional Administrators; Local Air Pollution Control Officials; Office of Management and Budget; and other interested parties.

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# 1.0 SUMMARY

On June 29, 1990, the Environmental Protection Agency (EPA) proposed standards of performance for reactor processes in the synthetic organic chemical manufacturing industry (SOCMI) (55 FR 26953) under the authority of Section 111 of the Clean Air Act (CAA). Public comments were requested on the proposal in the Federal Register. Fifteen commenters, most of whom were industry representatives, submitted written comments during the comment period. Two of these commenters submitted additional comments after the comment period had ended. Comments were also received from a State environmental protection department. The comments that were submitted, along with responses to these comments, are summarized in this document. The comments and subsequent responses serve as the basis for the revisions made to the regulation between proposal and promulgation.

## 1.1 SUMMARY OF CHANGES SINCE PROPOSAL

Several changes and clarifications were made in the regulation as a result of the review of public comments. These changes and clarifications were made in the following areas: (a) applicability of the standards; (b) standardization of the total resource effectiveness (TRE) equation; (c) flow indicators; (d) primary fuel systems; (e) vent streams fired through a secondary burner or with combustion air; (f) temperature monitoring in firebox; (g) carbon bed cool down temperature; and (h) definition of total organic compounds (TOC).

### 1.1.1 Applicability of the Standards

In order to clarify the applicability of the standards, several exemptions have been added to the reactors NSPS. An exemption has been added to the standards for those reactor processes subject to the distillation NSPS, those reactor processes producing beverage alcohols, and those reactor processes subject to the NSPS for polymer manufacturing. A

definition for "relief valve" has been added to clarify that relief valves are not covered by the reactors NSPS. Lastly, an exemption from emission control has been added for those reactor processes with vent stream concentrations of TOC less than 300 ppmv as measured by Method 18 or less than 150 ppmv (or 0.50 x 300 ppmv) as measured by Method 25A. For demonstrating applicability, Method 25A will be allowed as an alternate screening method to Method 18 for those owners or operators seeking this exemption.

### 1.1.2 Standardization of the Total Resource Effectiveness Equation

Table 1 of the regulation for reactor processes presents the coefficients associated with the TRE index equation. The TRE coefficients that were proposed for the reactors NSPS differ slightly from those promulgated for the distillation NSPS (55 FR 26947)and air oxidation NSPS (55 FR 269[illegible]) because the derivations were based on different cost years. The difference, however, is insignificant. To reduce confusion and to ensure consistency in calculating the TRE values, the TRE coefficients are being standardized in the final reactors rule.

### 1.1.3 Flow Indicators

Because flow indicators located in the vent pipe between the emission source and the control device prior to being joined with another vent stream may be insufficient to meet the intent of the standard, the flow indicator position is being altered. The new location would be at the entrance to any bypass line that could divert the vent stream to the atmosphere before it reaches the control device. In addition, the frequency of recording the flow indicator results will be changed to at least once every 15 minutes rather than once per hour. More frequent collection of flow/no flow data is appropriate when the purpose of the monitoring is to detect flow to the atmosphere rather than to a control device. Further, an alternate provision is being added for those facilities that use a car-seal or a lock-and-key type configuration to maintain the bypass line closed during normal

operations. A once per month visual inspection will be required.

### 1.1.4 Primary Fuel Systems

The proposed standard required performance testing and monitoring for boilers and process heaters with heat input capacities less than 44 MW (150 million Btu/hr). The final standards do not require testing and monitoring for boilers and process heaters when the reactor proces vent stream is mixed with the primary fuel. When the vent stream passes through the flame front it would, on average, be combusted at higher temperatures than if introduced with combustion air. Also, emission factor calculations (AP-42) and submitted test results indicate the expected efficiency would be greater than 99.99 percent for primary fuel use. This information indicates that a vent stream combusted as a primary fuel would achieve greater combustion efficiency than the 98 percent level required by the proposed standards. For this reason, performance testing and temperature monitoring for these boilers are being deleted. Also, owners or operators who are using a control device to comply with the standards must maintain a schematic diagram of the affected vent stream, collection system, fuel system, control device(s), and bypass systems.

### 1.1.5 Vent Streams Fired as a Secondary Fuel or Introduced with Combustion Air

For those affected vent streams that are fired as a secondary fuel or introduced with combustion air prior to being combusted in a process heater or boiler, an initial performance test using Method 18 will still be required. However, a requirement is being added to the standards that these sources test the combined streams (including the fuel plus the affected vent stream) to determine if total TOC (minus methane and ethane) is reduced by 98 percent or to 20 ppmv.

### 1.1.6 Temperature Monitoring in Firebox

To clarify placement of the temperature monitoring device for the firebox, a change has been made to the incinerator monitoring provisions. It may be difficult to install the

monitoring device in the firebox because of radiant heat from the flame; therefore, an alternate provision is being added that allows the temperature monitor to be placed in the ductwork immediately downstream of the firebox in the incinerator.

### 1.1.7 Carbon Bed Cool Down Temperature

To avoid penalizing those owners or operators who are operating their carbon beds at lower, more efficient temperatures, a minimum cool down temperature within 5°C of the temperature achieved during the performance test is being added as an alternative to the proposed requirement. The proposed requirement allows a cool down temperature within 10 percent of the temperature achieved during the performance test.

### 1.1.8 Definition of Total Organic Compounds

To clarify the definition of TOC, the current list of *Federal Register* citations identifying compounds that the Administrator has determined contribute to the formation of ozone will be listed in the preamble. However, the definition of TOC in the standards will retain the language ". . . those compounds that the Administrator has determined do not contribute appreciably to the formation of ozone are to be excluded." The specific compounds will not be listed because they may be updated periodically. By defining TOC in this manner, any changes that the Administrator makes to the list of compounds would be automatically incorporated into the definition of TOC in the standard.

## 1.2 SUMMARY OF IMPACTS OF PROMULGATED ACTION

### 1.2.1 Alternatives to Promulgated Action

The regulatory alternatives are discussed in Chapter 6.0 of the proposal BID. These regulatory alternatives reflect the different estimated percentages of facilities required to reduce emissions by 98 weight-percent or to 20 parts per million by volume (ppmv) under a particular cost-effectiveness cutoff. These regulatory alternatives were used for selection of the best demonstrated technology (BDT), considering the estimated cost impacts, nonair quality health impacts, environmental impacts,

and economic impacts associated with each alternative. These alternatives have not been changed.

1.2.2 Environmental Impacts of Promulgated Action

The changes in the regulation will have a negligible impact on the air quality impacts, water quality impacts, and solid waste impacts attributed to the standards as originally proposed. These impacts are described in Chapter 7.0 of the proposal BID and now constitute the final Environmental Impact Statement for the promulgated standards.

1.2.3 Energy and Economic Impacts of Promulgated Action

Section 7.5 of the proposal BID describes the energy impacts and Chapter 9.0 describes the economic impacts of the proposed standards. The changes in the regulation described above will have a negligible effect on these impacts.

1.2.4 Other Considerations

1.2.4.1 Irreversible and Irretrievable Commitment of Resources. Chapter 7.0 of the proposal BID concludes that other than fuels required for the operation of volatile organic compounds (VOC's) control equipment, there is no apparent irreversible or irretrievable commitment of resources associated with the standards. The use of the TRE concept encourages the use of recovery techniques or process changes to recover pollutants as products. The control of VOC emissions using recovery techniques or process changes might be an alternative to adding combustion controls for some reactor process facilities. This would result in the conservation of both chemicals and fuels. The changes in the regulation described above will have no impact on the commitment of resources.

1.2.4.2 Environmental and Energy Impacts of Delayed Standards. Table 1-1 in the proposal BID contains a summary of the estimated environmental and energy impacts associated with promulgation of the standards. If the standards were delayed, adverse impacts on air quality could result. A delay in promulgation would mean that affected facilities would be controlled to the level specified in the appropriate State

implementation plan (SIP). Emission levels would consequently be higher than would be the case if the standards were in effect.

## 2.0 SUMMARY OF PUBLIC COMMENTS

A total of 17 letters (2 commenters submitted 2 letters) commenting on the proposed standards were received. A public hearing on the proposed standards was not requested. The 17 comment letters have been recorded and placed in the docket. The list of commenters, their affiliation, and the U. S. Environmental Protection Agency (EPA) docket number for each of the comments are shown in Table 2-1. The docket reference is indicated in parentheses in each comment. Unless otherwise noted, all docket references are part of Docket No. A-83-29, Category IV. The comments have been organized into the following 9 categories:

- Applicability of the Standards
- Definitions
- Selection of Best Demonstrated Technology
- Format of the Standards
- Modification and Reconstruction
- Monitoring
- Performance Testing and Measurement Methods
- Reporting and Recordkeeping
- General

### 2.1 APPLICABILITY OF THE STANDARDS

#### 2.1.1 Comment

Two commenters (IV-D-01, IV-D-11) requested that a specific exemption be added for reactor processes that do not discharge a vent stream directly or indirectly into the atmosphere. One commenter (IV-D-01) stated that those reactors discharging directly into a distillation unit subject to Subpart NNN should

TABLE 2-1. LIST OF COMMENTERS ON THE PROPOSED STANDARDS OF PERFORMANCE FOR REACTOR PROCESSES IN THE SYNTHETIC ORGANIC CHEMICAL MANUFACTURING INDUSTRY

Docket Number A-83-29, IV

| Addressee | Docket reference |
|---|---|
| Mr. L. A. Mattioli<br>Manager, Pollution Control<br>Allied-Signal, Incorporated<br>Post Office Box 1017<br>Marcus Hook, Pennsylvania 19061 | D-1 |
| Mr. Brian L. Taranto<br>Environmental Affairs Department<br>Exxon Chemical Americas<br>Post Office Box 3272<br>Houston, Texas 77253-3272 | D-2 |
| Ms. Mary J. Legatski<br>Manager, Government Affairs<br>Synthetic Organic Chemical<br>Manufacturers Association, Incorporated<br>1330 Connecticut Avenue, NW<br>Washington, D.C. 20036-1702 | D-3 |
| Mr. John Stein<br>Director, Environmental Engineering<br>and Site Services<br>Anheuser-Busch Companies, Incorporated<br>17761 I Street, NW<br>Washington, D.C. 20006 | D-4 |
| Mr. Paul F. Cash<br>Manager, Environmental Control<br>Safety, Health and Environmental Affairs<br>Mobil Chemical Company<br>Post Office Box 1037<br>Princeton, New Jersey 08543-1037 | D-5 |
| Mr. Richard L. Waters<br>Armstrong, Teasdale, Schlafly,<br>Davis & Dicus<br>One Metropolitan Square<br>St. Louis, Missouri 63102-2740 | D-6 |

(continued)

TABLE 2-1. (Continued)

| Addressee | Docket reference |
|---|---|
| Mr. Gary M. Nateman<br>Vice President-General Counsel<br>Beer Institute<br>1225 Eye Street, NW<br>Washington, D.C. 20005 | D-7 |
| Mr. Charles D. Malloch<br>Director, Regulatory Management<br>Environmental Policy Staff<br>Monsanto Company<br>800 North Lindbergh Boulevard<br>St. Louis, Missouri 63167 | D-8 |
| Ms. Lynne J. Omlie<br>General Counsel<br>Distilled Spirits Council of the United States, Incorporated<br>1250 Eye Street, NW<br>Washington, D.C. 20005 | D-9 |
| Dr. Thomas A. Robinson<br>Manager, Regulatory Affairs<br>Vulcan Chemicals<br>Post Office Box 530390<br>Birmingham, Alabama 35253-0390 | D-10 |
| Mr. David W. Gustafson<br>Environmental Quality<br>Dow Chemical U.S.A.<br>2030 Building<br>Willard H. Dow Center<br>Midland, Michigan 48674 | D-11 |
| Dr. Geraldine V. Cox<br>Vice President-Technical Director<br>Chemical Manufacturers Association<br>501 M Street, NW<br>Washington, D.C. 20037 | D-12 |

(continued)

TABLE 2-1. (Continued)

| Addressee | Docket reference |
|---|---|
| Mr. Albert F. Appleton<br>Commissioner<br>City of New York Department of Environmental Protection<br>2358 Municipal Building<br>New York, New York 10007 | D-13 |
| Ms. Vivian M. McIntire<br>Environmental Affairs<br>Eastman Chemical Company (Kodak)<br>Post Office Box 511<br>Kingsport, Tennessee 37662 | D-14 |
| Mr. Paul M. King<br>Corporate Counsel, Environment, Health & Safety<br>PPG Industries, Incorporated<br>One PPG Place<br>Pittsburgh, Pennsylvania 15272 | D-15 |
| Mr. C. Bruce Barbre<br>Environmental Coordinator<br>Baton Rouge Chemical Plant<br>Exxon Chemical Americas<br>Post Office Box 241<br>Baton Rouge, Louisiana 70821-0241 | G-1 |
| Mr. Richard Sigman<br>Associate Director, Air Programs<br>Chemical Manufacturers Association<br>2501 M Street, NW<br>Washington, D.C. 20037 | G-2 |

be exempt from this standard. This commenter pointed out that monitoring and recordkeeping requirements for such units would be redundant and unnecessary.

A second commenter (IV-D-11) remarked that the regulation is written as if all reactor processes create a vent stream requiring downstream controls. This commenter called for a specific exemption in Section 60.700(c) to eliminate confusion for those reactor processes that do not emit a vent stream directly or indirectly into the atmosphere.

Response

The EPA agrees that a reactor process vent stream routed through a distillation unit subject to 40 CFR 60, Subpart NNN for distillation operations before it is released to the air would be subject to the provisions of Subpart NNN rather than Subpart RRR for reactor processes. To avoid confusion with possible overlap concerning applicability of these two standards, an additional exemption is being added to Section 60.700(c)(5) which states:

> If the vent stream from an affected facility is routed to a distillation unit subject to Subpart NNN and has no other releases to the air except for a pressure relief valve, the facility is exempt from all provisions of this subpart except for recordkeeping and reporting in Section 60.705(r).

Recordkeeping and reporting requirements are being revised to eliminate redundant reporting. These reactor processes are required only to submit an initial notification of this particular process design and to maintain a schematic of the overall process design for the life of the equipment. No other records or reports would be required unless process design changes are made. Provided the process design change does not change the applicability status to the reactor or distillation new source performance standards (NSPS), the owner or operator would only need to submit the process design change to the Administrator and maintain documentation of the change for the life of the equipment.

Recordkeeping and reporting requirements in Section 60.705(r) for these operations will be revised to read as follows:

> Each owner or operator who seeks to demonstrate compliance with Section 60.700(c)(5) shall submit to the Administrator a process design description as part of the initial report. This process design description shall be retained for the life of the process. No other records or reports would be required unless process changes are made.

2.1.2 Comment

One commenter (IV-D-01) stated that the proposed regulation was unclear concerning those reactors that only vent through relief valves during emergencies. This commenter felt that reactors venting through relief valves only during emergencies should be exempt from the regulations.

Response

Most reactors typically do possess relief valves for purposes of relieving pressure buildup. It is not the intent of the proposed reactors NSPS to cover pressure relief valve discharges. In the proposed rule, relief valve discharges were specifically excluded from coverage under the definition of "vent stream." This definition has been retained in the final rule. In addition, a definition for "relief valve" has been added to Section 60.701 to clarify this term as follows:

> Relief valve means a valve used only to release an unplanned, nonroutine discharge. A relief valve discharge results from an operator error, a malfunction such as a power failure or equipment failure, or other unexpected cause that requires immediate venting of gas from process equipment in order to avoid safety hazards or equipment damage.

2.1.3 Comment

Two commenters (IV-D-02, IV-D-08) expressed concern about the list of chemicals covered by the reactors NSPS. One commenter (IV-D-02) stated that some of the chemicals listed in the standard for reactors are used in processes covered by other NSPS besides the one for distillation operations. The commenter

stressed that this overlap is confusing and that dual applicability of the standards needs to be avoided.

In reviewing the list of chemicals in Section 60.707, one commenter (IV-D-08) noted an overlap with the chemicals listed in the air oxidation NSPS. This commenter reviewed its processes for air oxidation applicability and determined that several of the chemicals shown on the air oxidation list were not produced by air oxidation processes, but were produced via the reactor process route. This commenter also found that the converse was true. This commenter pointed out that on page 3-6 of Table 3-2 in the "Reactor Processes in Synthetic Organic Chemical Manufacturing Industry--Background Information for Proposed Standards" (Proposal BID for Reactors) it is stated that "26 chemicals are produced 'solely' by nonreactor processes, specifically by air oxidation, distillation, or other nonreactor processes." The commenter felt that including these chemicals on the list of 173 chemicals in Section 60.707 would confuse the regulated community. The commenter recommended that these 26 chemicals be removed from the list or, alternatively, a provision be included stating that where one of the chemicals listed in Section 60.707 is produced by a process other than a reactor process, that process is not subject to the standards.

Response

In addition to the proposed reactors NSPS, there are two other final NSPS that cover process vents: the air oxidation NSPS (40 CFR 60, Subpart III) and the distillation NSPS (40 CFR 60, Subpart NNN). Each NSPS includes a separate list of chemicals. In some cases, the listed chemicals overlap between the three SOCMI NSPS. This overlap exists because various chemicals can potentially be manufactured via different processes. The type of process by which the chemical is produced will determine to which of the three SOCMI NSPS a particular process vent would be subject. Most SOCMI product processes would be covered by two NSPS--the distillation NSPS and either the air oxidation NSPS or reactors NSPS. However, in no case

would a particular process vent stream be regulated by more than one of the three SOCMI NSPS.

The standard is clear that if a facility produces a chemical listed in Section 60.707 by a reactor process, then production of that chemical is subject to the reactors NSPS. As described in Section 60.700(b), if an affected facility does not produce any of the 173 chemicals listed in Section 60.707 via one or more reactor processes, then that facility is not subject to the reactors NSPS. The list of 173 chemicals was developed based on all chemical production routes that are currently used and expected to remain competitive in the future for synthetic organic chemicals produced by reactor processes. The list in Section 60.707 may include chemicals currently produced by nonreactor processes. However, these chemicals were included on the list because available data indicated that some have in the past been produced by reactor processes, and that they may, at some time in the future, be produced by reactor processes.

2.1.4 Comment

Four commenters (IV-D-04, IV-D-06, IV-D-07, IV-D-09) expressed concern about the applicability of this NSPS to ethanol created by the natural breakdown of sugars, a process used in the production of food and beverage alcohols. These commenters noted that the intended scope of this rule is virtually identical to the distillation NSPS and that production of beverage alcohols is specifically exempt from the distillation NSPS. To remain consistent with previous rulemakings, these commenters urged that the regulation of beverage alcohol be specifically exempt from the reactors NSPS. One commenter (IV-D-09) also pointed out that the Proposal BID for reactors expressly excludes ethanol produced for human consumption from the scope of the reactors NSPS. One commenter (IV-D-06) added that the description of affected facilities and the definition of "reactor processes" are broad enough to encompass ethanol generated directly and indirectly from food manufacturing.

Response

The EPA agrees with the commenter that the intended scope of the reactors NSPS is very similar to the distillation NSPS and that neither NSPS is intended to apply to ethanol created by the natural production of beverage alcohols. These sources are not included on the priority list of sources for which standards are to be promulgated and, as indicated in the notice announcing EPA's promulgation of the NSPS Priority List (44 FR 49222), are not within the scope of the SOCMI source category. For this reason, an exemption similar to the one that appears in the distillation NSPS will be added to Section 60.700(c)(6) in the reactors NSPS. This provision will specifically exempt the production of beverage alcohols from the reactors NSPS.

Similarly, it is not the intent of the reactors NSPS to regulate ethanol that is generated either directly or indirectly during food manufacturing. Ethanol generated during baking or other food manufacturing processes is produced neither for sale nor for further use. Based on the definition of "product" in Section 60.611, ethanol generated during food manufacturing would not be considered a product and, therefore, would not be subject to the reactors NSPS.

2.1.5 Comment

One commenter (IV-D-05) stated that if the definition of "product" in the regulation includes raw materials, then those facilities that use raw materials listed under Section 60.707 and that are subject to the provisions of the NSPS for polymer manufacturing (Subpart DDD), should be exempt from the reactors NSPS. This commenter suggested an exemption which reads: "Any reactor process that is subject to the provisions of Subpart DDD is not an affected facility."

Response

It is not the intent of the reactors NSPS to regulate process vents that are subject to the NSPS for polymer manufacturing under 40 CFR 60, Subpart DDD (55 FR 51010). To ensure that these facilities are not subject to both standards, an exemption identical to the one that appears in the

distillation NSPS will be added to Section 60.700(c)(7) of the reactors NSPS. This exemption will exclude from regulation under the reactors NSPS any reactor process that is subject to the provisions of Subpart DDD for polymer manufacturing.

2.1.6 Comment

One commenter (IV-D-11) indicated that an exemption or a minimum emission rate should be added to the low flow provision to exclude vent streams that are greater than the minimum flow rate of 0.011 scm/min (0.39 scfm) but that contain relatively low concentrations of total organic compounds (TOC). The commenter felt that this exemption is needed because it is conceivable that a concentrated stream with a low flow rate [less than 0.011 scm/min (0.39 scfm)] could contain higher emissions (greater than 20 ppm) than a dilute vent stream with a large flow rate, making the control cost significant.

Response

In reevaluating the applicability criteria of the reactors NSPS, a low concentration cutoff of 300 ppmv has been added to the standard. The low concentration exemption was established so sources would not have to bear the unnecessary cost of determining the TRE index value. The cutoff was set such that the TRE index value would not be less than 1.0 for this low concentration stream even if the stream heat content and flow were worst case. Below this concentration level, the owner or operator would not be required to make an assessment of the TRE index value for a vent stream. This level was set as the minimum concentration level below which the TRE index value would always be expected to exceed a value of 1.0. Measurement of the concentration level of a vent stream could be made using Reference Method 18. If the resulting concentration value is less than 300 ppmv TOC, then a TRE calculation is not needed and combustion is not required. The basis for this 300 ppmv level is documented in a memorandum entitled, "Selection of the Low Concentration Cutoff" (Docket No. A-83-29, Item No. IV-B-1). Alternatively, Reference Method 25A could be used as a screening method in lieu of Method 18. However, if Method 25A is used, the

measured concentration of TOC must be less than 150 ppmv to qualify for the exemption. See Comment 2.7.4 for further discussion.

The total cost of control per unit of VOC removed could vary considerably among the different types of reactor process vent streams due to variations in the vent stream characteristics of flow rate, heat content, and concentration of organic compounds. For this reason, the efficiency of controlling a particular vent stream is taken into consideration in the regulation by the TRE calculation. An additional cutoff based on minimum emission is not needed.

The standard also contains a mechanism for exempting any vent stream for which compliance would be unreasonably costly. This means of measuring the cost of control is embodied in the total resource effectiveness (TRE) index. Equations are included in the regulation for determining the TRE index of a vent stream from an affected facility.

2.1.7 Comment

One commenter (IV-D-15) stated that Section 60.707 should be amended to delete phosgene from the list of chemicals affected by Subpart RRR. The commenter felt that it has been adequately demonstrated to the Agency in past industry studies that phosgene is not photochemically reactive.

Response

Phosgene is included on EPA's list of photochemically reactive chemicals. Phosgene is also included on the list of chemicals subject to the reactors NSPS in Section 60.709. Because air emissions of phosgene could result from reactor processes, it will remain on EPA's list of chemicals subject to the reactors NSPS. In addition, phosgene is a highly toxic compound. No additional supporting information is available that warrants removal of phosgene from the reactors NSPS chemicals list. Phosgene will be retained on the list of chemicals subject to the reactors NSPS.

2.1.8 Comment

One commenter (IV-G-01) questioned whether a vent stream that is mixed and used as a primary fuel in a fuel gas system comprised of boilers and process heaters rather than as a product in subsequent chemical processes would be subject to the reactors NSPS.

Response

For any chemical listed in Section 60.707 that is being produced as a product by reactor processes, the resulting vent stream is required to be controlled to a level sufficient to meet the standard regardless of whether that resulting vent stream is routed for further use as a primary fuel. However, as discussed later in response to Comment 2.7.7, performance testing and temperature monitoring requirements are being deleted from the standards for those affected vent streams being combusted as primary fuel in boilers and process heaters. To distinguish between fuel types, definitions for primary fuel and secondary fuel will be added to Section 60.702 as follows:

> Primary fuel means the fuel fired through a burner or a number of similar burners. The primary fuel provides the principal heat input to the device, and the amount of fuel is sufficient to sustain operation without the addition of other fuels.
>
> Secondary fuel means a fuel fired through a burner other than a primary fuel burner. The secondary fuel may provide supplementary heat in addition to the heat provided by the primary fuel.

2.2 DEFINITIONS

2.2.1 Comment

One commenter (IV-D-01) requested a clarification to ensure consistency in the definition of TOC. This commenter pointed out that the definition of TOC in Section 60.701 of the reactors NSPS excludes ". . . those compounds that, in the future, the Administrator has determined do not contribute appreciably to the formation of ozone . . . ." This commenter speculated that EPA is intending to exclude new hydrofluorocarbons and hydrochlorofluorocarbons that were mentioned in 54 FR 1988,

published on January 18, 1989. The commenter pointed out that the definition of TOC in the distillation NSPS does not include the compounds mentioned in 54 FR 1988.

Response

The EPA did intend to exclude from the definition of TOC in Section 60.701 specific compounds that the Administrator has determined do not contribute appreciably to the formation of ozone. The current list of exempt compounds, which is identified in separate Federal Register notices (54 FR 1988, 42 FR 35314, 44 FR 32042, 45 FR 32424, 45 FR 48941), is as follows: methane; ethane; 1,1,1-trichloroethane; methylene chloride; trichlorofluoromethane; dichlorodifluoromethane; chlorodifluoromethane; trifluoromethane; trichlorotrifluoroethane; dichlorotetrafluoroethane; chloropentafluoroethane; dichlorotrifluoroethane; tetrafluoroethane; dichloroethane; and chlorodifluoroethane. As the commenter noted, the list of specific compounds that the Administrator has determined do not contribute appreciably to the formation of ozone may be updated periodically. If, in the future, the Administrator adds to the list of chemicals defining TOC, these added chemicals will be identified in future Federal Register notices. The current definition of TOC in the reactors NSPS will be retained to reference but not specifically list those compounds that the Administrator has determined do not contribute appreciably to the formation of ozone. Finally, by defining TOC in this manner, any changes that the Administrator makes to the list of compounds would be automatically incorporated into the definition of TOC in the reactors NSPS.

2.2.2 Comment

Six commenters (IV-D-02, IV-D-05, IV-D-08, IV-D-11, IV-D-12, IV-D-14) objected to the definition of "product." Two commenters (IV-D-02, IV-D-12) felt that the definition is confusing for determining the applicability of the reactors NSPS. Four commenters (IV-D-02, IV-D-08, IV-D-12, IV-D-14) recommended that the definition of "product" in the distillation NSPS be used, with the necessary revision to reference the reactor process list

of chemicals in Section 60.707. These commenters objected to the phrase "or is used for the production of other chemicals or compounds." These commenters were concerned that this language could be interpreted to expand applicability of this NSPS to all facilities that use any of the 173 listed chemicals in their production processes, even if they do not manufacture any of the 173 compounds as a product, by-product, or co-product.

One commenter (IV-D-05) stated that the definition of "product" is unclear and it could be interpreted to include those chemicals listed in Section 60.707 which are purchased as raw materials in the production of other chemicals or compounds. This commenter felt that the definition should be identical to the one in the air oxidation NSPS and recommended the following definition: "Product means any compound or chemical listed in Section 60.707 that is produced for sale as a final product as that chemical or is produced for use in a process that needs that chemical for the production of other chemicals in another facility. By-products, co-products, and intermediates are considered to be products." (The underlined phrases indicate the changes suggested by the commenter.)

Response

The EPA agrees with the commenters that the language in the definition of "product" in Section 60.701 of the proposed standards could be misleading and could expand applicability of the reactors NSPS to facilities that were not intended to be impacted by this regulation. The definition of "product" similar to the one found in the distillation NSPS has been included in the reactors NSPS. It states that a "product" is "any compound or chemical listed in Section 60.707 that is produced for sale as a final product as that chemical, or for use in the production of other chemicals or compounds." This definition is consistent with EPA's intent of coverage under the reactors NSPS.

2.2.3 Comment

Two commenters (IV-D-11, IV-D-12) requested further clarification of the definition of the phrase "product, co-product, by-product, or intermediate." These commenters

recommended that wording similar to that found in the preamble of the distillation NSPS should be included in the reactors NSPS preamble to clarify the intent.

Response

As suggested by the commenters, the following language is presented to clarify the intent of the definition of "product." The EPA considers it appropriate for the reactors NSPS to apply to any reactor process facility within a process unit producing any of the listed chemicals as a product, by-product, co-product, or intermediate. The standards were developed from data on reactor processes within process units that produce the chemicals listed in Section 60.707 in any of the forms listed above. The cost of controlling emissions from the production of a listed chemical as a by-product, co-product, or intermediate is similar to the cost of controlling emissions from the production of that chemical as a product. Furthermore, the application of the standards to facilities producing any of the listed chemicals was found to be reasonable. Therefore, EPA considers the word "product" to also represent by-products, co-products, and intermediates.

The standards are also applicable to reactor processes that are used to recover waste or feedstock components as long as the facility is within a process unit producing any of the listed chemicals as a product. The main factor in determining if a listed chemical is produced as a product is the use of the chemical after the process unit. The EPA considers either of the following downstream uses as indicative of the production of a listed chemical as a product: (1) Production for sale as that listed chemical, or (2) use in another process where that listed chemical is needed. However, if a listed chemical is only part of a mixed stream exiting a process unit and cannot be sold or used in another process as the listed chemical, then that chemical is not considered to be produced as a product.

2.2.4 Comment

Two commenters (IV-D-05, IV-D-08) indicated that the definition of "by-product" is unclear. One commenter (IV-D-05)

questioned whether the term by-product includes those compounds that are unintentionally created as a result of a chemical reaction and that are contained within a final product. To avoid confusion, the commenter recommended establishing a de minimis level (i.e., less than one percent) to exclude a contaminant from the definition of by-product.

The other commenter also requested clarification for by-products that are produced during reactor processes but are not pure enough for sale and, generally, are disposed of as waste. This commenter felt that it is not the intent of the reactors NSPS to regulate these by-products because they are neither intended for sale nor used in the production of other chemicals.

Response

If a mixture is produced in a reactor process as a "product" and contains a chemical listed in Section 60.707 that is intentionally included in the mixture for use of its chemical characteristics, the process would be subject to Subpart RRR. A mixture would not be subject if the listed chemical is included only as a contaminant, that is, the chemical is not included in the process for its chemical characteristics. To further clarify this distinction, sometimes a listed chemical can be formed during the reaction process as a contaminant from side reactions as a consequence of producing other chemicals that are not listed. These contaminants would not be considered to be produced by the reactor process if they are not recovered to be sold or used in the production of a final product.

The EPA has decided that for the purpose of these standards, it is more appropriate to determine applicability according to whether a listed chemical is produced as a product, instead of setting a minimum concentration level of a listed chemical as a means of defining what may constitute production as a product. It is not feasible to set any one concentration limit for listed chemicals below which the chemical is always an impurity or waste. It is not feasible because the necessary concentration or purity for a listed chemical to be considered a product can vary

from site to site. For example, a chemical that is produced as 90 percent pure from one process may only be 80 percent pure to be considered a product for another process. Due to diversity of the SOCMI, it would not be practicable for EPA to establish different concentration limits for all of the processes covered by the standards. Therefore, the applicability of the standards is determined according to whether a listed chemical is produced as a product.

2.2.5 Comment

One commenter (IV-D-11) stated that the definition of "vent stream" is difficult to interpret and needs additional clarification. This commenter pointed out that the definition of vent stream also applies to any gas stream emitted from a reactor that indirectly discharges to the atmosphere after being diverted through other process equipment. This commenter noted that nearly all product streams leave a reactor process for further handling as a vapor but are not considered a vent stream at the point when they exit from the reactor process. The commenter felt that the proposed definition for "vent stream" could result in an overlap in regulations if the vent stream is ultimately discharged from a distillation unit that is covered by the recent distillation NSPS.

Response

As previously discussed in the response to Comment 2.1.1, if a vent stream is discharged exclusively to a distillation unit subject to the distillation NSPS, then that vent stream would not be subject to the control provisions in the reactors NSPS. Typically, a vent stream is routed directly through a recovery device such as an absorber, a condenser, or a carbon adsorber. In some cases, however, the vent stream may be diverted first through other process equipment before being routed indirectly through a recovery device. For example, in a typical fixed bed, regeneration carbon adsorption system, the process offgases pass through a filtering and cooling system before entering the carbon bed. (The filtering process prevents bed contamination and the cooling process allows the bed to be maintained at the optimum

operating temperature and prevents fires or polymerization of the VOC.) Even though this vent stream is routed through a filtering and cooling system before reaching the recovery device, it is still subject to the standard.

## 2.3 SELECTION OF BEST DEMONSTRATED TECHNOLOGY

### 2.3.1 Comment

One commenter (IV-D-01) stated that a cryogenic unit, although not specifically considered a condenser but nonetheless capable of achieving 98 percent or greater reduction of emissions, should be considered a condenser for the purposes of an exemption from the provisions of Section 60.703(e).

Response

A cryogenic unit, such as the one mentioned by the commenter, would be considered a condenser for the purposes of the reactors NSPS and, therefore, would be subject to the condenser requirements under this regulation. The owner or operator would be required to maintain a TRE index value greater than 1.0 at the outlet of the condenser. Otherwise, if the TRE is less than or equal to 1.0, the stream's emissions must be reduced by 98 percent or to 20 ppmv. Monitoring of process parameters outlined in the regulation would be required unless the owner or operator elected to demonstrate compliance with an alternative process parameter allowed under Section 60.703(e).

### 2.3.2 Comment

One commenter (IV-D-10) requested that although the preamble discussion states that "any control can be used as long as it can be demonstrated that it is at least as effective as BDT at reducing VOC emissions," this stipulation should also be specifically spelled out in Section 60.702 of the regulation.

Response

Because the standards is expressed in terms of an emission limitation and not an equipment standard, the EPA believes that the wording in Section 60.702(a) is clear in its intent that any control device can be used to achieve the emission limitation. Any VOC control device, including an incinerator, boiler, process heater, or other combustion device, can be used to comply with

this requirement. Alternatively, a flare can be used to comply with Section 60.702(b). In addition, any VOC recovery device, including an absorber, condenser, carbon adsorber, or other recovery device, can be used to comply with Section 60.702(c) to maintain the TRE index greater than 1.0. It should be noted that the TRE value for a vent stream is determined at the point that the stream exits the final VOC recovery device and before it enters a VOC control device.

If an owner or operator elects to use a control device other than an incinerator, boiler, process heater, or flare; or a recovery device other than an absorber, condenser, or carbon absorber, that facility would be required to provide information to the Administrator describing the device and the process parameter(s) that would indicate proper operation. The documentation should be submitted to the appropriate enforcement officer. As necessary, EPA Headquarters may be consulted to determine the adequacy of monitoring alternative process parameters.

## 2.4 FORMAT OF STANDARDS

### 2.4.1 Comment

Three commenters (IV-D-08, IV-D-12, IV-D-14) stated that the use of the TRE index value as a standard is appropriate; however, these commenters recommended that the TRE equations be standardized in 40 CFR Part 60, Subpart III, Subpart NNN, and Subpart RRR. One commenter (IV-D-08) pointed out that an important feature of the TRE index value noted in the reactors NSPS preamble is that "it is independent of cost changes over time so that it is not necessary to periodically revise the calculation to reflect current year dollars." Two commenters (IV-D-08, IV-D-12) noted that the only change to the TRE equation between the distillation NSPS and air oxidation NSPS and the proposed reactors NSPS was a revision of the coefficients to account for various cost changes from a 1978 to a 1982 base year. Both of these commenters noted that the purpose for changing the coefficients seems to contradict the rationale for developing the TRE index format.

Two commenters (IV-D-12, IV-D-14) pointed out that for a given process vent, the revised coefficients result in TRE index values that are about 3 percent greater. Both commenters recommended that the TRE equation coefficients be standardized. Both commenters noted that by standardizing the coefficients in all three regulations, applicability and compliance determinations for many facilities would be simplified without appreciably changing the impact of the rules. One commenter (IV-D-12) argued that although the change in the coefficients is minimal, it creates needless complication for a facility that must use one set of coefficients to determine the compliance status of one process vent while using another set of coefficients to determine the compliance status of a second process vent. This commenter also pointed out that in standardizing the TRE coefficients, considerable time would be saved in developing process vent regulations in the future that incorporate the TRE index format.

Response

The TRE equation developed for the SOCMI regulations was derived from an algebraic reduction based on a cost algorithm. However, the utility prices and the labor rates used in the derivation of the two TRE equations were extracted from different base cost years. The TRE coefficients in the air oxidation NSPS and distillation NSPS were based on actual 1978 rates, whereas the TRE coefficients in the reactors NSPS were based on actual 1982 rates. It would appear that when the annual rate increases are computed, the numerator and denominator of the TRE equation would increase by the same factor so that no net change is reflected in the final TRE index value. However, this is not the case. The utility prices and labor rates did not increase uniformly from the 1978 base year to the 1982 base year so that a slight difference in the resultant TRE index value is noted when comparing the calculation of the TRE index value based on the 1978 coefficients with the calculation of the TRE index value based on 1982 coefficients. This difference in the resulting TRE values is documented in a memorandum entitled "Comparison of

Total Resource Effectiveness (TRE) Index Values using 1978 and 1982 TRE Coefficients" (Docket No. A-83-29, Item IV-B-3).

The EPA agrees that the TRE coefficients in the reactors NSPS should be identical to those used in the air oxidation and distillation NSPS and has made this change to the final reactors NSPS. This standardization is important to reduce confusion and add consistency in calculating TRE values, especially in those cases where a facility has several vent streams subject to different SOCMI NSPS. The resulting difference in the computed TRE values would be insignificant using the adjusted TRE coefficients.

2.4.2 Comment

Two commenters (IV-D-11, IV-D-15) cited difficulties with using the TRE index. One commenter (IV-D-11) felt that the practical application of the TRE index is cumbersome. The commenter pointed out that with the regulations, it is difficult to determine exactly where the reactor process and the associated internal optimization ends, and the recovery device begins, for determining the TRE index.

The commenter pointed out that, in many cases, the primary condenser on a downstream column is adequate to achieve and maintain a TRE index greater than 1.0 without additional emission controls because of the properties of the material involved. The commenter added that the reactors NSPS refers to the final recovery system and not a primary condenser. The commenter recommended that clarification is needed to specify when the TRE index calculation should be performed.

The other commenter (IV-D-15) stated that he was unable to understand the rationale behind the TRE equation. The commenter suggested that a simplified calculation be included with a clear, concise explanation of how it is designed to achieve its purpose.

Response

The EPA believes that application of the TRE index is straightforward. It also allows flexibility for the owner or operator to choose a method of compliance and provides an incentive for product recovery. The owner or operator can elect

to do one of the following: use a VOC combustion device and reduce TOC by 98 percent or to 20 ppmv; combust the vent stream in a flare; or maintain a TRE index greater than 1.0 at the outlet of the final recovery device. If the TRE index is less than 1.0 at the point of measurement, the owner or operator could elect either to install an additional recovery device that results in a TRE index greater than 1.0 or to control the vent stream.

A recovery device is defined as an individual unit of equipment, such as an absorber, carbon adsorber, or condenser, capable of and used for the purpose of recovering chemicals for use, reuse, or sale. The TRE index should be calculated following the last recovery device but prior to a VOC control device. A VOC control device is a device such as a flare or an incinerator. For example, if the vent stream from a reactor process is routed through two condensers in series, the TRE index would be calculated at the outlet of the final condenser. If the calculated TRE index is 1.0 or lower, the owner or operator can elect to upgrade the VOC removal efficiency of existing recovery devices, install additional recovery devices, or add a control device.

## 2.5 MODIFICATION/RECONSTRUCTION

### 2.5.1 Comment

One commenter (IV-D-08) stated that the discussion of modification/reconstruction considerations found in 55 FR 26965 and in Chapter 5.0 of the BID does not reflect the decision by the United States Court of Appeals for the 7th Circuit, in Wisconsin Electric Power Company v. Reilly (WEPCO), 893 F.2d 901 (7th Cir. 1990). The commenter stated that it would be appropriate to include in the final reactors NSPS preamble a discussion of "like-kind" replacements and other issues raised in the WEPCO decision.

Response

In the WEPCO decision, the Court agreed with EPA, inter alia, that nonroutine renovations to existing plants that extend their life expectancy and increase the rate of emissions to the atmosphere are "modifications" for NSPS purposes as defined in Section 60.14 of the General Provisions. The Court pointed out that in Section 111 of the CAA, "modification" is defined as any physical change in a source that results in increased emissions and not only physical changes that are made through basic plant alterations. The Court also upheld EPA's determination that WEPCO's proposed life-extension project was not exempt from the NSPS under the routine maintenance, repair, or replacement exemption found at 40 CFR 60.14(e). The Court also agreed with EPA's interpretation that for NSPS purposes, an increase in emissions is not determined by looking at the original design capacity of the unit, but at the current maximum achievable capacity of the unit.

The like-kind replacement issue in the WEPCO case pertains to determining applicability to the Prevention of Significant Deterioration (PSD) program. The PSD program considers the actual past operating history in establishing applicability, unlike the NSPS, which bases applicability on the readily achievable capacity of the equipment. The Court's conclusion to consider like-kind replacements only affected determinations of applicability under PSD. The Court upheld EPA's methodology of determining applicability under NSPS in its entirety. Thus, it is not necessary for EPA to address like-kind replacements for establishing applicability to NSPS in this rulemaking. Whether a particular replacement is "like-kind" for PSD purposes requires a specific factual case-by-case determination and cannot be addressed generally.

2.5.2 Comment

Two commenters (IV-D-12, IV-D-14) requested that the types of process equipment changes that qualify as modifications to existing facilities should be clarified. These commenters referred to the examples of process equipment changes mentioned

in the proposal preamble that would be considered modifications. The commenters pointed out that, in addition to these examples, it is conceivable that minor process equipment changes, such as addition of a valve, could result in an increase in the emission rate to the atmosphere.

The commenters believe that it is not the intent of the reactors NSPS to trigger modification for these types of process equipment changes that result in insignificant increases of fugitive emissions. To clarify this intent, the commenters recommend that the following statement be added to the preamble:

> For purposes of this regulation, a modification is defined as any physical or operational change to an existing facility which results in an increase in the emission rate <u>from one or more reactor process vents</u> to the atmosphere.

(The commenter's suggested wording is underlined.)

<u>Response</u>

The modification provisions, which are outlined in 40 CFR 60.14 of the General Provisions, would apply to any affected facility making a physical or operational change to a facility that results in an increase in emission rate to the atmosphere of any pollutant to which the NSPS applies. The intent of the reactors NSPS is to control VOC emissions from process vents only and not equipment leaks. The VOC emissions from equipment leaks are regulated elsewhere by an NSPS for fugitive emissions in the SOCMI (48 FR 48328). Because regulation of fugitive emissions is clearly beyond the scope of this NSPS, no wording change is needed.

## 2.6 MONITORING

### 2.6.1 <u>Comment</u>

One commenter (IV-D-01) stated that according to Section 60.705(g)(3)(ii), an exceedance is based on a 10 percent greater temperature (in degrees Celsius $^{o}C$) for carbon bed regeneration compared to the most recent performance test. This commenter felt that this requirement is overly restrictive and would penalize facilities that choose to operate at lower and more efficient temperatures. This commenter recommended a

temperature range, to be determined by EPA, instead of a percentage value.

Response

The EPA does not intend to penalize those owners or operators who are operating their carbon beds at lower, more efficient temperatures. The commenter is correct in pointing out that by allowing a 10 percent variation in temperature from the performance test for the carbon bed following regeneration, some inequities may result. To eliminate possible inequities, a minimum temperature difference of 5°C will be added as an alternative to the 10 percent provision in Section 60.705(f)(3)(ii). As discussed in the memorandum entitled, "Documentation of Carbon Adsorber Cool Down Temperature" (Docket No. A-83-29, Item IV-B-2), the minimum value of 5°C is derived from 10 percent of 50°C, a typical carbon bed cool down temperature. To reflect this addition, Section 60.705(f)(3)(ii) will be revised to read as follows:

> All carbon bed regeneration cycles during which the temperature of the carbon bed after regeneration [and after completion of any cooling cycle(s)] was more than 10 percent or 5°C greater, whichever is less stringent, than the carbon bed temperature (in degrees Celsius) during the most recent performance test.

This alternative provides more flexibility to those owners or operators who are operating their carbon beds at lower, more efficient temperatures. As an example, an owner or operator may be able to achieve a carbon bed cool down temperature of 5°C when conducting the performance test. However, using the 10 percent provision to maintain compliance with the regulation, the owner or operator must cool the carbon bed down to at least 5.5°C. The alternative added to the regulation would allow the owner or operator to cool the carbon bed down to 10°C.

2.6.2 Comment

Three commenters (IV-D-11, IV-D-12, IV-D-14) expressed concern about the requirement for flow indicators. One commenter (IV-D-11) requested that flexibility be included in the final regulation to allow an affected facility to use any means

available to indicate vent stream flow. He cited several monitoring techniques that were not mentioned in the regulation, including a computer signal that utilizes either a flow or a no flow indication signal to assess whether a system is venting, or a flow indicator on the inlet feed stream or other process parameters. This commenter felt that flexibility is needed to allow a flow indicator to be located in a place other than the point closest to the inlet of the control device.

The second commenter (IV-D-12) stated that the requirement for facilities to determine the presence of vent stream flow before the stream is combined with other streams should be deleted. This commenter pointed out that existing reactor process vent streams are frequently combined with other vent streams in a vent header prior to being routed to a combustion device. This commenter noted that in these cases, conventional design provides for flow indicators to be placed only at a point close to the control device and downstream from all individual vents. The commenter observed that the logic for this arrangement is related to total flow. This commenter recommended that facilities be allowed to comply with the flow indication requirement by using existing instrumentation that is located close to the control device and after the affected facility vent stream has been joined by other vent streams.

The third commenter (IV-D-14) noted that the specification for locating a flow indicator to check the operation of a control device as explained in the preamble is inconsistent with the provisions specified in the standard. This commenter pointed out that good engineering design and the efficient operation of control devices are related to total flow. The commenter believed that the provisions in the preamble, which state that the "flow indicator would be required to be installed at the combustion device inlet", are more appropriate than the provisions specified in Section 60.702 (a), (b), and (c) which require that:

> The flow indicator shall be installed in the vent stream from each affected facility at a point closest

to the inlet of each incinerator and before being joined with any other vent stream.

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 in the reactors NSPS was to provide a means for indicating when vent streams were bypassing the flare or other control device. In the June 29, 1990 proposed rule for reactor processes, flow indicators were proposed to be installed in the vent stream from the affected facility at a point closest to the inlet of the control device and before being joined with any other vent stream. The presence of flow was to be recorded at least once every hour. The flow indicators envisioned by EPA were to provide an indication of flow/no flow, and not to provide quantitative estimates of flow rates.

The EPA has reevaluated the use of flow indicators in reactor process vent streams as proposed in light of the comments received. Because flow indicators located on the vent stream between the emission source and the control device may be insufficient to meet the intent of the standard (although this is what was proposed), EPA has decided to alter the flow indicator location. The new flow indicator location would be at the entrance to any bypass line that could divert the vent stream before it reaches the control device. This location would indicate those periods of times when uncontrolled emissions are being diverted to the atmosphere. In those instances when the vent stream is rerouted to another control device, the second control device must also conduct a performance test and meet the requirements of the standard. The flow indicator required in each bypass line to the atmosphere can be used in conjunction with any type of seal mechanism to ensure that flow is not diverted.

In some situations, there may be no bypass lines that could divert the vent stream to the atmosphere. In these cases, there will be no flow indicator requirement. In addition, engineering

records that show an emission stream is hardpiped to a control device are sufficient to demonstrate that the entire flow will be vented to the control device. Other piping arrangements can be used, but flow indicators located in any bypass line that could divert a portion of the flow to the atmosphere, either directly or indirectly, become necessary.

Considering the above conclusions, EPA is now requiring in Section 60.705(s) of the reactors regulation that engineering records be retained that describe the piping arrangement for venting the affected vent streams to a control device. This requirement will further ensure that each reactor process vent stream of the affected facility is being continuously vented to the control device. If the piping arrangement for the reactor process changes, then the facility must revise and retain the information. Little or no additional burden would be expected from this requirement since engineering design specifications that describe the piping arrangements are already being maintained.

At proposal, EPA required that hourly recordings of flow to the control device be taken. However, the Agency believes that more frequent collection of flow/no flow data is appropriate when the purpose of the monitoring is to detect flow to the atmosphere rather than to a control device. Thus, the final reactors NSPS requires flow indicators to be equipped to indicate and record whether or not flow exists at least once every 15 minutes (rather than once every hour). Because the monitor collects flow/no flow data on a continuous basis, this additional recording would not be an additional burden. If an owner or operator believes that an alternative frequency or placement of a flow indicator is equally appropriate, then the owner or operator can petition the Administrator, as provided by the General Provisions, to use an alternative monitoring scheme.

Other flow monitoring systems, such as the computer signal technique suggested by the commenter, would also be allowed so long as they are used in conjunction with the flow indicator and readings are taken at least once every 15 minutes.

2.6.3 Comment

Three commenters (IV-D-08, IV-D-11, IV-D-12) requested that alternate methods be allowed for determining vent stream flow/no flow for an affected facility. One commenter (IV-D-08) cited difficulties in meeting compliance with installation of a "flow indicator" on the vent stream to the control device. This commenter mentioned that one of his facilities seeking compliance with a similar provision in the distillation NSPS found it necessary to ask for permission to use an alternative method for ensuring that the vent stream flow reached the control device (in this case, a flare). This commenter's system had a continuous nitrogen purge on its vent stream to the flare header to keep it from plugging up with organics. This nitrogen system was used to avoid an upset that could result in a possible release of organics to the atmosphere. However, the commenter pointed out that this continuous nitrogen purge precluded accurate measurement of vent stream flow to the flare.

The commenter also explained that each column in his system has a manual vent valve used for initial purging at startup to remove oxygen from the system and to prevent a flammable mixture in the flare header. According to the commenter, the alternative that this facility requested was to lock the manual vent valves in the closed position during normal operations, with periodic visual checking to ensure no release to the atmosphere. The manual vent valve lock suggested by the commenter would be secured in place with a lock and key. The key to the lock would be kept in the custody of the foreman or chief operator. Alternatively, the commenter explained that the valves could be locked electronically with a remote control valve on a control panel, or computer-activated. The commenter felt that this type of problem was not an isolated case and recommended adding a provision to Section 60.703 which allows an appropriate administrative compliance alternative method for flow measurement, with a direct reference to Section 60.13(i) of the General Provisions as the means by which a source could seek approval.

Response

As discussed in the response to Comment 2.6.2, the position of the flow indicator has been changed to the entrance to any bypass line that could divert the vent stream to the atmosphere before it reaches the control device. In addition to this change, EPA agrees with the commenters that alternate provisions should be allowed for indicating vent stream flow/no flow for an affected facility. An alternate provision is being added to the reactors NSPS for those facilities that use a car-seal or a lock-and-key type configuration to maintain the bypass line closed. This alternate provision would require all lines that allow emissions to bypass to the atmosphere from the control device to be car-sealed closed or secured with a lock-and-key type configuration. For clarification purposes, a definition for car-seal is being added to Section 60.702 as follows:

> Car-seal means a seal that is placed on a device that is used to change the position of a valve (e.g., from opened to closed) in such a way that the position of the valve cannot be changed without breaking the seal.

For those affected facilities that use any other alternate type of locking mechanism (such as a computer-activated electronic locking system), those affected facilities would be required to install a flow indicator in the bypass line.

This alternative is being added to the reactors NSPS to ensure that the vent streams are not routinely bypassed to the atmosphere rather than being routed to the control device. If the owner or operator elects to comply with this alternative, a visual inspection of the seal mechanism and valves would be required at least once per month to report and record any time the seal mechanism is broken or lock is open, and to report and record any time the valve position has changed and the duration of the release to the atmosphere.

If at any time a flow indicator positioned in any bypass line to the atmosphere indicates gas flow, this shall constitute a violation under Section 60.702(a), except during periods of startup, shutdown, or malfunction. For purposes of determining

compliance, malfunctions shall be events deemed to occur infrequently, unforseeably, and unavoidably. Consequently, recurring instances of flow through any bypass line to the atmosphere shall not constitute a malfunction under this standard.

2.6.4 Comment

One commenter (IV-D-11) observed that the requirement to install temperature monitoring devices in the "firebox" of an incinerator should be modified to allow for additional flexibility. This commenter remarked that with many incinerators, the technology does not exist to maintain a reliable temperature monitor inside the firebox. The commenter noted that, in practice, most temperature monitors are installed in the exhaust gas downstream of the firebox. The commenter thought that flexibility should be allowed in the final regulation to allow for the placement of the temperature monitor in an appropriate location to address situations where it is not practical or where the technology does not exist to install these devices in the firebox.

Response

For purposes of measuring the firebox temperature in an incinerator, EPA considers it appropriate to locate the temperature monitor in a position before any substantial heat exchange is encountered. For the purposes of this regulation, the location of the temperature monitoring device will be allowed in the ductwork immediately downstream of the firebox. To reflect this clarification, the language in Section 60.703(a)(1)(i) will be revised to read as follows:

> Where an incinerator other than a catalytic incinerator is used, a temperature monitoring device shall be installed in the firebox or in the ductwork immediately downstream of the firebox in a position before any substantial heat exchange is encountered.

2.6.5 Comment

Two commenters (IV-D-08, IV-D-12) do not believe that continuous organic monitoring devices are proven technologies and, therefore, believe that it is inappropriate to recommend

their use in the reactors NSPS. These commenters cited a discussion of the results of a survey on hydrocarbon monitoring which is found in the preamble to the proposed rule for hazardous waste-burning in boilers, published on April 27, 1990 (55 FR 17887). These commenters noted that only six incinerators were attempting to use these continuous monitoring devices and all of them were using conditioned systems rather than heated systems. These commenters reported that limited data about continuous monitoring systems indicate that heated systems would detect two to four times the mass of organic compounds than would be detected by conditioned systems. These commenters felt that heated systems have a number of operating problems which have not been resolved.

One commenter (IV-D-08) felt that continuous organic monitoring devices are unreliable and, therefore, should not be referenced as an allowable technology in the reactors NSPS. The other commenter felt that facilities should not be required to use continuous organic monitoring devices for demonstrating compliance with the reactors NSPS. One commenter (IV-D-08) recommended that all references to this technology be removed from the reactors NSPS until the devices can be proven reliable and accurate. If at some time in the future these devices become proven technologies, these commenters suggested that EPA could issue a notice stating that this alternative mode of monitoring compliance would be acceptable.

Response

The performance of organic monitors is not relevant to the reactors NSPS because these monitors are not required for use on combustion sources. However, organic monitors are allowed as an alternative for monitoring the performance of VOC recovery devices. The EPA is aware that these devices are currently available and has no reason to preclude their use for certain applications. In each case where an organic monitor is allowed in the reactors NSPS, an alternate monitoring device is also specified. For example, use of either a scrubbing liquid temperature monitor or an organic monitor can be used to

demonstrate the performance of an absorber. In each case, the reactors NSPS allows the owner or operator to select the device that is most appropriate for the situation. Although the reactors NSPS does not require continuous organic monitors, these monitors will continue to be allowed as a method for demonstrating compliance.

## 2.7 PERFORMANCE TESTING AND MEASUREMENT METHODS

### 2.7.1 Comment

Four commenters (IV-D-08, IV-D-11, IV-D-14) requested that guidance be provided for the performance test requirements for facilities that are constructed, reconstructed, or modified between the date of proposal and the date of promulgation. All four commenters felt that the timing requirement of 60 days for the initial performance test was unrealistically tight. They recommended allowing a minimum of 120 days for the initial performance test. Three commenters (IV-D-08, IV-D-12, IV-D-14) do not believe that facilities can anticipate the final rule because changes are likely to occur after proposal as a result of public comments. One commenter (IV-D-14) pointed out that even subtle changes can affect the applicability of the regulations to a facility so that companies must review the final regulations thoroughly before scheduling compliance methods and procedures. All three of these commenters explained that it usually takes several weeks before copies of a final regulation as printed in the Federal Register are available to the regulated public. One commenter (IV-D-08) noted that his facility had a difficult time in meeting the compliance dates for the distillation NSPS and air oxidation NSPS.

All four commenters stated that considerable time is needed to perform the requisite analyses and tests. One commenter (IV-D-12) stated that those affected facilities electing to comply with the TRE index format would have to perform stack tests, which would take 10 to 12 weeks and, therefore, have an extremely difficult time in meeting the 30-day notification deadline. Two commenters (IV-D-12, IV-D-14) pointed out that

many steps are involved when conducting a performance test, including setup, testing, and sample analysis. One commenter (IV-D-14) added that in many cases, a facility must contract outside help to conduct its performance testing. The commenter elaborated that projects must be scoped, contractors must be contacted, bids must be received and studied, contracts must be negotiated, work must be scheduled, production schedules must be manipulated, analytical determination sometimes requires off-site work, and results must be related to the applicability or compliance determination. Both of these commenters agreed that 120 days provides a more reasonable time to complete testing.

Response

In regard to performance tests, the owner or operator must conduct performance tests and submit a written report of the results of such tests to EPA within 60 days after achieving the maximum production rate at which the facility will be operated, but not later than 180 days after initial startup of the facility. In some instances, however, the initial startup of a facility may occur before the date of promulgation. As stated for monitoring requirements, EPA has a policy of allowing facilities to conduct and report the results of performance tests within 60 days from the date of promulgation, unless maximum production has not been achieved. In the latter case, the facility must conduct and submit the results of a performance test no later than 180 days after the date of promulgation. It is believed that this is a reasonable amount of time for the owner or operator of a reactor process unit to achieve compliance. All sources subject to the NSPS must meet these general requirements.

2.7.2 Comment

Four commenters (IV-D-08, IV-D-11, IV-D-12, IV-D-14) expressed concern about the provision which requires facilities that are built, modified, or reconstructed between proposal and promulgation that have not achieved maximum operating capacity before promulgation to conduct their performance test within 180 days of promulgation. Two commenters (IV-D-11, IV-D-12)

pointed out that Section 60.704(a) clearly states that facilities must be run at full operating conditions and flow rates during performance tests. Three commenters (IV-D-11, IV-D-12, IV-D-14) stated that if a facility does not achieve maximum operating conditions within 180 days of promulgation, then it cannot conduct a performance test without violating the provisions of Section 60.704(a). These three commenters recommended that facilities either be allowed to conduct their performance test after the maximum operating rate has been achieved, or that Section 60.704(a) be revised to accommodate facilities that have not yet achieved their maximum operating rate.

One commenter (IV-D-08) stated that the initial performance test required in Section 60.702 may not be achievable within 180 days after the initial startup. This commenter supported his statement by saying that as chemical processing facilities become more complex, contain more sophisticated equipment and procedures, it may not always be possible to achieve full production rates and capacity operations within 180 days. This commenter further explained that where there are changes, even small changes, between proposal and promulgation, facilities may need to purchase and install new equipment to run the performance tests. For these reasons, this commenter felt that guidance must be provided in the final rule as to how the performance test requirement should be handled in the event that a facility is unable to achieve full capacity operation within 180 days.

Response

The requirement for the initial performance test to be conducted within 180 days following initial startup will remain unchanged. If, however, a facility foresees a problem in achieving compliance (i.e., if the facility is unable to achieve maximum capacity within 180 days), then the owner or operator of that facility must notify the State, which has been delegated implementation authority, or the appropriate EPA Regional Office at the earliest possible time.

2.7.3 Comment

One commenter (IV-D-08) expressed concern about the expected cost and the amount of time required by a source to run Reference Method 18's future validation method. This commenter stated that each vent stream possesses its own set of unique characteristics so that each vent stream will require a separate test once the new validation protocol is issued. This commenter requested some discussion and guidance in the final reactor processes preamble on possible ways to reduce this time and cost burden.

Response

The protocol mentioned by the commenter has been published as EPA Method 301: entitled "Field Validation of Emission Concentrations from Stationary Sources," in Appendix A to 40 CFR Part 63. This method is not a mandatory procedure for complying with the Method 18 requirements specified in the reactors NSPS. Rather, it is intended for use in validating results of emission testing, particularly when there is no performance test method specified. Because Method 18 is specified in the reactors NSPS, Method 301 is not required by the NSPS. but may prove useful in some situations. To use Method 301, the owner or operator would have to request and receive approval for its use under the alternative methods provisions found in Section 60.13(i) of the General Provisions.

2.7.4 Comment

Two commenters (IV-D-11, IV-D-14) felt that the use of Reference Method 18 to determine the concentration of TOC would be extremely labor intensive, especially if there are a number of compounds present. One commenter (IV-D-11) pointed out that Reference Method 18 does not specify chemicals to be analyzed and that extensive efforts could be expended quantifying trace components to ensure that compliance with the method is achieved. This commenter recommended that the analytical burden could be reduced by stating that for purposes of achieving compliance, the analytical efforts should focus only on the compounds expected to be present. This commenter suggested that expected compounds could be determined by knowledge of the process or by an initial analytical screening. The second commenter (IV-D-14) suggested

that Reference Method 25 would be a more adequate method for this determination.

Response

Reference Method 18 includes performance specifications, which are internal to the method. These specifications offer guidance on the steps needed to measure approximately 90 percent of the total gaseous organic compounds that are present in the vent stream. However, before implementing Reference Method 18, it is necessary to have some preknowledge of the source. When designing the analytical scheme for conducting the Method 18 performance test, it is necessary to have some prior knowledge of the identity and concentration of species that are present. It is also necessary to be familiar with the chemical process being tested and to perform an initial analytical screening. As discussed in Reference Method 18, presurvey sampling and analysis is required to confirm the identities and approximate concentrations of the organic emissions.

In response to the suggested use of Reference Method 25 as an appropriate method, this method is not suitable at levels as low as 20 ppmv. Because the 20 ppmv level is specified in the reactors NSPS for compliance with the combustion device control, Reference Method 25 is not considered appropriate for compliance testing purposes.

As discussed in Comment 2.1.6, a low concentration cutoff of 300 ppmv (measured using Reference Method 18) has been added to the standards. Reference Method 25A is allowed as an alternate screening method for those owners or operators seeking an exclusion for vent streams with low concentration levels. Although Method 25A does not identify speciated compounds, when calibrated to the primary constituent in the vent stream it can provide a sufficiently accurate measurement of TOC for comparison to the low concentration applicability cutoff. However, because vent streams are often composed of a mixture of multiple organic compounds, and some are more easily detected by Method 25A than others, the regulation includes certain procedures for using Method 25A.

Reference Method 25A can only be used if one organic compound accounts for over 50 percent of the vent stream TOC. This compound is referred to as the primary constituent. The primary organic constituent may be determined by either process knowledge or test data collected using an appropriate EPA Reference Method. Examples of information that could constitute process knowledge include calculations based on material balances, process stoichiometry, or previous test results provided the results are still relevant to the current reactor process vent stream conditions. The primary constituent must be used as the calibration gas for Method 25A. The span value for Method 25A must be set at 300 ppmv. Note that use of Method 25A is acceptable only if the response from the high-level calibration gas is at least 20 times the standard deviation of the response from the zero calibration gas when the instrument is zeroed on the most sensitive scale.

Because the compound to which the method is calibrated may be only half of the total TOC, the TOC concentration measured by Method 25A must be less than 150 ppmv (or 0.50 x 300 ppmv) to demonstrate compliance with the low concentration cutoff. This 300 ppmv cut-off level was selected as described in the memorandum entitled, "Selection of the Low Concentration Cutoff" (Docket No. A-83-29, Item IV-B-1). This requirement accounts for some organics that may not be well detected when the method is calibrated to the primary constituent. Method 25A measurements include methane and ethane.

2.7.5 Comment

One commenter (IV-D-10) acknowledged that Section 60.705 includes a provision that if at a later date the owner or operator elects to use an alternative provision of Section 60.702 to achieve compliance, then the Administrator must be notified 90 days before implementing the change. Upon implementing the change, a performance test must be performed within 180 days. The commenter expressed confusion about when performance tests should be conducted in this situation. The commenter explained that one might presume that performance tests should be conducted

in this situation. The commenter explained that although we might presume that performance tests should be conducted within 180 days of startup, it would eliminate any questions relative to compliance if the regulations specifically stated when the performance test is required.

Response

The requirements of Section 60.705(a) explicitly state that when an owner or operator wishes to change the method of compliance to a different provision of Section 60.702, then that owner or operator must notify the Administrator within 90 days and conduct a performance test within 180 days of implementing the change. Further, the requirements of the General Provisions apply unless alternate provisions are spelled out in the regulation. It is stated in Section 60.8(a) of the General Provisions that the performance test should be conducted not later than 180 days after initial startup. Therefore, there is no need to repeat this language in the reactors NSPS.

2.7.6 Comment

One commenter (IV-D-11) requested clarification for the flare requirement in Section 60.705(b)(3). The commenter thought that instead of stating that the requirements for the demonstration of compliance on a flare should be made during the performance test, it could be clarified that the determination should be made "for the purposes of complying with Section 60.18."

Response

When using a flare to meet the standard, the owner or operator of the affected facility must comply with the requirements of Section 60.18 of the General Provisions. Reference to Section 60.18 for flares is specifically given in Section 60.702(b) of the reactors NSPS. For this reason, it is not necessary to include a specific reference requiring compliance with Section 60.18 in Section 60.705(b)(3).

2.7.7 Comment

Two commenters (IV-G-01, IV-G-02) cited problems applying performance tests and monitoring requirements set out in the

regulation to fuel systems that collect and mix affected reactor vent streams with natural gas or other fuel gas for use as a primary fuel source. One of the commenters (IV-G-01) indicated that his plant-wide fuel system provides fuel for numerous (100 or more) process heaters and boilers.

One commenter (IV-G-01) stated that although the monitoring and testing requirements set out in the regulation may be appropriate for incinerators combusting waste vent streams, they are not appropriate for fuel gas systems such as this. This commenter pointed out that for such a fuel system, the required temperature monitoring parameter does not correlate to VOC removal. This commenter explained that it would be difficult and costly to demonstrate that each of the boilers or process heaters in the system is achieving the required 98 percent reduction efficiency.

This commenter added that as long as the process heaters and boilers in the system are operating properly and ignition is maintained, the 98 percent reduction efficiency required by the NSPS would be greatly exceeded. This commenter further stated that for process and safety reasons, fuel flow to the boiler or process heater is always stopped if a flame is not present. This commenter felt that due to the ability of these boilers and process heaters to achieve the 98 percent destruction efficiency, these fuel systems should be able to monitor operating parameters appropriate to their particular operations to ensure that sufficient combustion is being achieved.

One commenter (IV-G-01) stated that at least 98 percent destruction efficiency based on good combustion practices, including adequate residence time, temperature, and mixing, was reported for the example operations. Examples of these operations were cited by the commenter. The commenter requested that EPA allow facilities that combust reactor vent gases in boilers and heaters to identify an appropriate operating parameter for each combustion device to monitor as an indicator that combustion is present. Because normal monitoring of combustion devices is essential to ensure proper operation, the

commenter stated that facilities generally have in place appropriate monitoring procedures to enable the identification and control of combustion process malfunctions such as flame loss.

Response

The EPA agrees that when a vent stream is combusted as primary fuel, the fuel gas is passing through the flame front and, on average, it is combusted at a higher temperature than if it were being introduced into the flame with combustion air. Based on emission calculations for natural gas fuel combustion, it has been demonstrated that boilers and process heaters with design capacities ranging from 10 to 100 million British thermal units per hour (MM BTU/hr) achieve greater than 99.99 percent combustion efficiency. In general, it is expected that SOCMI chemicals affected by this standard would be easier to combust than natural gas. One commenter submitted results of a Reference Method 25A performance test conducted on a unit with design capacity of 70 MM BTU/hr. The results of this test demonstrated that TOC was reduced by greater than 99.99 percent. The above information supports the commenter's claim that an affected vent stream combusted in a boiler or process heater as primary fuel would achieve greater combustion efficiency than the 98 percent level required by the standards.

It is also in the best interest of the owner or operator to achieve the greatest combustion efficiency possible when using the vent stream as primary fuel. The process heaters and boilers in the fuel system are operated to produce steam or heat, so that greater combustion efficiency would minimize the amount of supplemental fuel required and reduce operating costs.

In addition, for safety reasons, the fuel flow to a unit in a fuel system of the type described by the commenter would be shut down immediately if the combustion device fails to operate. Fuel collecting inside a unit in the absence of combustion could result in a highly flammable and dangerous situation once the flame is reinstated. The EPA believes that, to avoid an explosion, the owner or operator would ensure that any vent

stream being used as fuel does not pass through the combustion device without a flame present. In a case such as this, the vent stream would be diverted to another control device that would have to comply with NSPS requirements.

For the above reasons, EPA has determined that performance testing and temperature monitoring for those boilers and process heaters combusting vent streams as primary fuel is not warranted; furthermore, based on the performance of these types of units, it is believed that they would already be achieving the levels required by the standards. In view of this, the performance testing and temperature monitoring requirements are not deemed necessary to ensure compliance with the standards. The EPA, therefore, is deleting performance testing and temperature monitoring requirements for those affected vent streams combusted as primary fuel in process heaters and boilers. However, performance testing and monitoring is required for all incinerators, and for boilers and process heaters with design capacity less than 150 MM Btu/hr that are not combusting their vent streams as primary fuel.

To demonstrate that affected vent streams are being routed to appropriate control devices, EPA is adding a requirement for any type of control device used, that the owner or operator retain a schematic diagram of the affected vent stream, collection system, fuel system, combustion device(s), and any bypass systems. To demonstrate where or how the affected vent stream is being controlled, EPA is adding a requirement for all affected vent streams being controlled in a control device. The requirement specifies that the owner or operator retain a schematic diagram of the affected vent stream, collection system, fuel system, control devices, and any bypass systems. The EPA expects no additional burden associated with this requirement. Retaining a schematic diagram on site would provide an enforcement mechanism to ensure that the affected vent stream is being routed to an appropriate control device. The schematic diagram would also indicate whether or not the vent stream is

being diverted to the atmosphere or to an additional control device.

2.7.8 Comment

One commenter (IV-G-01) questioned the usefulness of flow indicators on the type of fuel gas system where the vent stream that is used as primary fuel is never vented to the atmosphere.

Response

As discussed previously, EPA has reevaluated the use of flow indicators and has decided to alter the position of the flow indicator so that it would provide an indication of those times when the vent stream is being diverted to the atmosphere. See the response to Comment 2.6.2. If no bypass lines to the atmosphere are present, then flow indicators would not be required. However, if a vent stream is diverted to another control device, such as a flare, that device must also comply with the standards.

The proposed requirement for monitoring periods of boiler or process heater operation is not included in the final standards. As explained in the previous response, boilers or process heaters are typically operated continuously, and due to safety reasons a vent stream is not expected to be introduced into a boiler or process heater without a flame present. Any bypass of the combustion device would be recorded due to the flow indicator requirements. Therefore, a requirement to monitor periods of operation of the boiler or process heater is unnecessary.

2.7.9 Comment

One commenter (IV-G-02) was aware of 1) the use of process vent streams as fuel gas in separate burners in process heaters and boilers, and 2) the combustion of a vent stream combined with combustion air and routed to a heater or boiler.

Response

Although this commenter was aware of situations in which process vent streams are combusted as a secondary fuel in a separate burner or are combined with combustion air, the commenter did not provide any performance test data or emission

calculations indicating that 98 percent organics reduction efficiency was being met in these situations.

The EPA is concerned about situations in which vent streams represent a small percentage of the total fuel input to a boiler or process heater and are not mixed with the primary fuel. When vent gases are fed into the combustion system through a separate burner, the potential exists for unstable burner operation and burner "flame-out." When vent gases are mixed with combustion air prior to entering the burners, the potential exists for the vent gases to bypass the main flame zone due to poor adjustment of burner air registers.

Based on discussion with combustion system operators and review of other information, EPA concluded that the potential for significant bypass of vent gases around the combustion zone of larger boilers and process heaters is small due to (1) the residence time, temperature, and turbulence associated with the flame zone in larger combustion systems, (2) the use of burner management systems on most large combustion systems that reduce the potential for undetected flame-outs, and (3) the presence of operating staffs that would detect a problem if it occurred. Therefore, as at proposal, performance testing and temperature monitoring are not required for boilers or process heaters with capacities of 150 MM Btu/hr or greater.

The situation for smaller boilers and process heaters is different, however. For example, many small combustion systems are not equipped with flame scanner systems that automatically stop the flow of vent gases used as a secondary fuel in the event of a burner flame-out. Also, the smaller devices do not have the residence time or temperature of the larger combustion systems. Furthermore, as stated above, no data were provided by the commenter to assure such systems would achieve 98 percent reduction of organics. As a result, the requirements for performance testing and temperature monitoring are being retained for vent streams being used as secondary fuels or combined with combustion air in boilers and process heaters smaller than 150 MM Btu/hr.

2.7.10 Comment

One commenter (IV-G-02) indicated that it would be difficult to determine the organics destruction efficiency of vent streams that represent a small fraction of the total fuel input to a combustion system.

Response

After further review, EPA agrees that it may be difficult for boilers and process heaters in which vent streams are secondary fuels to determine the destruction efficiency specifically for the vent gases. As a result, a provision has been added to the rule clarifying that Method 18 should be used to demonstrate that the reduction in TOC emissions (minus methane and ethane) by 98 percent or to 20 ppmv should be based on the combined stream (the vent stream plus the primary fuel and all secondary fuels), rather than on the vent gases only.

2.8 REPORTING AND RECORDKEEPING

2.8.1 Comment

One commenter (IV-D-08) recommended that an annual performance test be included as an alternative to the extensive reporting requirements set out in Section 60.705(b)(4). Based on results from implementing the requirements set out in the air oxidation NSPS and distillation NSPS, this commenter felt that the requirements of the reactors NSPS would pose a significant recordkeeping burden. This commenter noted that although performance testing is expensive, there will be some situations where it may be less costly to a complex plant than maintaining an extensive amount of records.

Response

Conducting an annual performance test in lieu of the required reporting requirements is not an appropriate alternative to monitoring a process parameter. An annual performance test would not indicate compliance through the year. The reporting and recordkeeping requirements provide a means of documenting monitoring compliance on a continuous basis and allow the source to demonstrate a continuous ability to meet the standard.

2.8.2 Comment

One commenter (IV-D-08) recommended that to eliminate confusion, Section 60.705 should directly reference the recordkeeping time period from Section 60.7(d) of the General Provisions, which states that "the file shall be retained for at least 2 years following the date of such measurements, maintenance, reports, and records."

Response

As stated in two previous responses (see Comments 2.7.5 and 2.7.7), unless alternative requirements are given in the regulation, the General Provisions would apply. Section 60.7(d) of the General Provisions states that records "shall be retained for at least 2 years following the date of such measurements, maintenance, reports, and records." Therefore, records kept for compliance purposes for the reactors NSPS are required to be retained for at least 2 years. There is no need to repeat this language in the reactors NSPS.

2.8.3 Comment

One commenter (IV-D-11) stated that the requirements for reporting and recordkeeping are very detailed and should be simplified in cases where the intent can be satisfied by an alternative means. The commenter further explained that to avoid the possibility of numerous reports on a scattered basis, these reporting and recordkeeping requirements should be summarized into a semiannual report to be submitted, for example, in January and July of each year.

Response

The compliance procedures seem complicated because there are several different routes to comply with the reactors NSPS. For example, the owner or operator may elect to comply with the NSPS by installing an additional condenser or by combusting emissions in a flare or other device. In each case, specific monitoring, reporting, and recordkeeping provisions must be specified in the final regulation. These requirements are nearly identical to the requirements in the distillation and air oxidation NSPS. To remain consistent and because industry has become familiar with

these requirements, the monitoring, reporting, and recordkeeping provisions will not be revised. However, Tables 2-2 through 2-4 are provided to give a general summary of the monitoring, reporting, and recordkeeping requirements. This general summary should assist the owner or operator in identifying and locating the applicable requirements and locating these requirements in the regulation for reactor processes.

Semiannual reports for each affected facility are required under Section 60.705(l) of the reactors NSPS. The semiannual report should include the following types of information:

- any exceedances of monitored parameters;
- any periods of time when the vent stream is diverted to the atmosphere from the control device;
- any periods of time and duration when the pilot flame of a flare is absent;
- any change made in equipment or process operations that increases the operating vent stream flow rate above the low flow exemption level;
- any recalculation of the TRE index;
- any periods of time and duration when the seal mechanism is broken or the by-pass line valve position changes; and
- any change made in equipment or process operations that increases the vent stream concentration above the low concentration exemption level.

An exact month for submitting the report is not specified. The initial report would be submitted 6 months following the startup date of the affected facility, and subsequent reports would be submitted in 6-month intervals following that date.

2.8.4 Comment

Four commenters (IV-D-08, IV-D-11, IV-D-12, IV-D-14) requested that guidance be provided for the initial notification requirements for facilities that are constructed, reconstructed, or modified between the date of proposal and the date of promulgation of the reactors NSPS. One commenter (IV-D-12) noted

TABLE 2-2. MONITORING AND REPORTING/RECORDKEEPING REQUIREMENTS FOR COMPLYING WITH 98 WEIGHT-PERCENT REDUCTION OF TOTAL ORGANIC COMPOUND EMISSIONS OR A LIMIT OF 20 ppmv

| Type of control device used for compliance | Monitoring equipment required[a] | Parameters to be monitored | Recordkeeping requirements | Parameter boundary exceedances to report |
|---|---|---|---|---|
| Thermal incinerator | Temperature monitoring device (installed in firebox or ductwork immediately downstream) equipped with a continuous recorder [60.703(a)(1)(i)] | Average firebox temperature | Continuous records | All 3-hour periods of operation when average combustion temperature is >28°C (50°F) below the average value measured during the most recent performance test [60.705(c)(1)] |
| | Flow indicator at entrance to bypass line equipped with a continuous recorder [60.703(a)(2)(i)][b] | Presence of flow away from incinerator, at least once every 15 minutes | Continuous records; schematic diagram | Periods when the vent stream is diverted from the combustion device [60.705(l)(2)] |
| Catalytic incinerator | Temperature monitoring device (installed in gas stream immediately before and after catalyst bed) equipped with a continuous recorder [60.703(a)(1)(ii)] | Average temperature upstream and downstream of the catalyst bed | Continuous records | All 3-hour periods of operation when the average temperature of vent stream upstream of the catalyst bed is >28°C (50°F) below the average value from the most recent performance test [60.705(c)(2)] |
| | | | | All 3-hour periods of operation when the average temperature difference across the catalyst bed is 80 percent of the average temperature difference measured during the most recent performance test [60.705(c)(2)] |
| | Flow indicator equipped with a continuous recorder [60.703(a)(2)][b] | Presence of flow away from incinerator, at least once every 15 minutes | Continuous records; schematic diagrams | Periods when the vent stream is diverted from the combustion device [60.705(l)(2)] |
| Boiler or process heater | Flow indicator equipped with a continuous recorder [60.703(c)(1)(i)][b] | Presence of flow away from boiler or process heater, at least once every 15 minutes | Continuous records; schematic diagrams | Periods when the vent stream is diverted from the combustion device [60.705(l)(2)] |
| Boiler or process heater (design heat input capacity <44 MW, except where vent stream used as primary fuel) | Temperature monitoring device with continuous recorder [60.703(c)(2)] | Average combustion temperature | Continuous records | All 3-hour periods of operation when average combustion temperature is >28°C (50°F) below the average value from the most recent performance test where the vent stream is introduced with combustion air or as a secondary fuel [60.705(c)(3)] |

[a]Regulatory citations are listed in brackets.

[b]Where the by-pass line is secured in the closed position with a car-seal or lock-and-key type configuration, a flow indicator is not required. Visual inspection is required at least once per month.

TABLE 2-3. MONITORING AND REPORTING/RECORDKEEPING REQUIREMENTS FOR AFFECTED FACILITIES COMPLYING WITH FLARE SPECIFICATIONS

| Type of control device used for compliance | Monitoring equipment required[a] | Parameters to be monitored | Recordkeeping requirements | Parameter boundary exceedances to report |
|---|---|---|---|---|
| Flare | Heat sensing device [60.703(b)(1)] | Presence of a flame at the pilot light | Continuous records | All periods when the pilot flame is absent [60.705(l)(3)] |
| | Flow indicator[b] [60.703(b)(2)(i)] | Presence of flow diverted away from flare, at least once every 15 minutes | Continuous records; schematic diagrams | Periods when the vent stream is diverted from the combustion device [60.705(l)(2)] |

[a]Regulatory citations are listed in brackets.

[b]Where the by-pass line is secured in the closed position with a car-seal or lock-and-key type configuration, a flow indicator is not required. Visual inspection is required at least once per month.

TABLE 2-4. MONITORING AND REPORTING/RECORDKEEPING REQUIREMENTS FOR MAINTAINING A TOTAL RESOURCE EFFECTIVENESS INDEX VALUE >1.0

| Final recovery device | Monitoring equipment required[a] | Parameters to be monitored | Recordkeeping requirements | Boundary exceedances to report[a] |
|---|---|---|---|---|
| Absorber | Scrubbing liquid temperature monitor equipped with a continuous recorder [60.703(d)(1)(i)] | Average exit temperature of the absorbing liquid | Continuous records | All 3-hour periods of operation when average temperature is >1°C (20°F) above the average value from the most recent performance test [60.705(f)(1)(i)] |
| | Specific gravity monitor equipped with a continuous recorder [60.703(d)(1)(i)] | Exit specific gravity (or alternative parameter that measures the degree of absorbing liquid saturation, if approved by the (Administrator) | Continuous records | All 3-hour periods of operation when average liquid specific gravity is >0.1 unit above or below the average value from the most recent performance test [60.705(f)(1)(ii)] |
| | Organic monitoring device equipped with continuous recorder [60.703(d)(1)(ii)][b] | Concentration level or reading indicated by the organic monitoring device at the outlet of the absorber | Continuous records | All 3-hour periods of operation showing >20 percent of the amount measured by the monitoring device during the most recent performance test [60.705(f)(4)] |
| Condenser | Condenser exit temperature monitoring device equipped with continuous recorder [60.703(d)(2)(i)] | Average exit (product side) temperature | Continuous records | All 3-hour periods of operation when average temperature is >6°C (11°F) above the average value from the most recent performance test [60.705(f)(2)] |
| | Organic monitoring device equipped with continuous recorder [60.703(d)(2)(ii)][b] | Concentration level or reading indicated by the organic monitoring device at at the outlet of the condenser | Continuous records | All 3-hour periods of operation showing >20 percent of the amount measured by the monitoring device during the most recent performance test [60.705(f)(4)] |
| Carbon adsorber | Integrating steam flow monitoring device and carbon bed temperature monitoring device, each equipped with a continuous recorder [60.703(d)(3)(i)] | Total steam mass flow during carbon bed regeneration cycle(s) | Continuous records | When <10 percent below the value measured during most recent performance test [60.705(f)(3)(i)] |

(continued)

TABLE 2-4. (Continued)

| Final recovery device | Monitoring equipment required[a] | Parameters to be monitored | Recordkeeping requirements | Boundary exceedances to report[a] |
|---|---|---|---|---|
| Carbon adsorber (continued) | | Temperature of the carbon bed after regeneration [and within 15 minutes of completing any cooling cycle(s)] | Continuous records | When >10 percent or 5°C more than the value measured during the most recent performance test [60.705(f)(3)(ii)] |
| | Organic monitoring device equipped with continuous recorder [60.703(d)(3)(ii)][b] | Concentration level or reading indicated by the organic monitoring device at the outlet of the carbon adsorber | Continuous records | All 3-hour periods of operation showing >20 percent of the amount measured by the monitoring device during the most recent performance test [60.705(f)(4)] |

[a]Regulatory citations are listed in brackets.

[b]The organic concentration level may be monitored as an alternative to monitoring the other parameter(s) listed for this device.

that the requirement in 40 CFR 60.7 specifies the timetable for facilities to submit initial notification to EPA; however, no specific provision is given for facilities that are constructed, modified, or reconstructed between proposal and promulgation. All four commenters felt that the timing requirement of 30 days for initial notification is unrealistically tight. They recommended allowing a minimum of 90 days after promulgation for the initial notification.

Response

The owner or operator of an affected source must submit a notification of the anticipated date of initial startup of the facility no more than 60 days nor less than 30 days prior to such date [Section 60.7(a)(2)], and a notification of the actual date of initial startup of the affected facility within 15 days after such date [Section 60.7(a)(3)]. In some instances, however, the initial startup of the facility may occur before the date of promulgation. In cases such as this, EPA has a policy of allowing these facilities to make initial notification within 30 days after promulgation.

2.8.5 Comment

One commenter (IV-D-08) requested that the reactors NSPS address exceedances that occur during startup or shutdown. The commenter also pointed out that Section 60.8(c) of the General Provisions states that such exceedances would not be considered a violation unless specified in the applicable standard. The commenter suggested that Section 60.705 of the reactors NSPS be modified to address startup/shutdown exceedances.

Response

Section 60.8(c) of the General Provisions specifies that emissions in excess of the level of the applicable emission limit during periods of startup and shutdown are not considered a violation of the applicable emission limit. This means that emission levels during these periods are not counted as violations if they exceed the levels specified in the standards. Because exceedances are not addressed in the reactors NSPS, the language of Section 60.8(c) applies. Because the commenter neither provided information on controls that would be applicable

in this situation nor indicated knowledge of any such technology, no basis exists for modifying the standard to require emissions control during the startup or shutdown period. Because exceedances are not addressed in the reactors NSPS, the language of Section 60.8(c) applies. Therefore, exceedances that occur during startup or shutdown should not be reported as violations.

## 2.9 GENERAL

### 2.9.1 Comment

One commenter (IV-D-15) requested that in the regulation, English measurements be included in parentheses following the currently expressed metric measurements. The commenter recognized that EPA is committed to using the metric measurement system; however, the commenter pointed out that many members of the regulated community are still somewhat unfamiliar with it. The commenter cited an illustration saying that measurements such as 1 gigagram are not immediately recognizable to a significant number of members of the regulated community.

Response

The EPA agrees with the commenter that, in some cases, certain English measurements may be more commonly used than their metric equivalents. For this reason, EPA will include in the regulation English conversions for the less well known metric measurements, such as gigagram per year and megajoules per kilocalorie.

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15. SUPPLEMENTARY NOTES This document presents the background information used by the U.S. Environmental Protection Agency in developing final new source performance standards for emissions of volatile organic compounds from reactor processes in the synthetic organic chemical manufacturing industry.

16. ABSTRACT


Standards of performance for the control of volatile organic compound (VOC) emissions from reactor processes in the synthetic organic chemical manufacturing industry (SOCMI) are being promulgated under the authority of Section 111(b) of the Clean Air Act. These standards apply to new, modified, or reconstructed SOCMI reactor processes, the construction or modification of which began on or after the date of proposal. This document contains a summary of comments received during the public comment period following proposal and responses to those comments including the rationale for any changes made to the standards since proposal.


17. KEY WORDS AND DOCUMENT ANALYSIS

| a. DESCRIPTORS | b. IDENTIFIERS/OPEN ENDED TERMS | c. COSATI Field/Group |
|---|---|---|
| Air pollution<br>Standards of performance<br>SOCMI<br>Organic chemical industry<br>National impacts<br>Reactor processes<br>Volatile organic compounds | Air pollution control | |

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