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Revised Standards for Basic Oxygen Process Furnaces - Background Information for Promulgated Standards

Emission Standards and Engineering Division

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

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ENVIRONMENTAL PROTECTION AGENCY

Background Information
Final Environmental Impact Statement
Revised Standards of Performance
for Basic Oxygen Process Furnaces

Prepared by:

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(Date)

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1. The promulgated standards of performance would limit secondary emissions of particulate matter from new, modified, and reconstructed basic oxygen process steelmaking facilities. The final standards implement Section 111 of the Clean Air Act (42 U.S.C. 7411) and are based on the Administrator's determination that the previously promulgated standards for BOPF's no longer reflect application of the best demonstrated technology (BDT) for these facilities.

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

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TABLE OF CONTENTS

Section		Page
1.0	SUMMARY	1-1
	1.1 Summary of Changes Since Proposal	1-1
	1.1.1 Subpart Na Rules	1-1
	1.1.2 Subpart N Amendments	1-5
	1.2 Summary of Impacts of Promulgated Action	1-10
	1.2.1 Alternatives to Promulgated Action	1-10
	1.2.2 Environmental Impacts of Promulgated Action	1-10
	1.2.3 Energy and Economic Impacts of Promulgated Action	1-11
	1.2.4 Other Considerations	1-11
2.0	SUMMARY OF PUBLIC COMMENTS	2-1
	2.1 Emission Data	2-1
	2.1.1 Particulate Matter Test Reports	2-1
	2.1.2 Teeming Emission Factor	2-3
	2.2 Affected Facilities	
	2.2.1 Definition of Affected Facilities	2-3
	2.2.2 Definition Clarification	2-6
	2.2.3 Selection of Affected Facilities	2-7
	2.2.4 Teeming and Hot Metal Desulfurization	2-10
	2.3 Best Demonstrated Technology	
	2.3.1 Demonstration of Operating Practices	2-12
	2.3.2 Roof-mounted Electrostatic Precipitators	2-13
	2.3.3 Fume Suppression	2-14
	2.3.4 Capture Efficiency of Auxiliary Hooding for Bottom-Blown Furnaces	2-17
	2.3.5 Capture Efficiency of Building Evacuation Systems	2-18
	2.4 Numerical Emission Limits	2-18
	2.4.1 Mass Standard for Secondary Emission Collection Devices	2-18
	2.4.2 Closed Hood Furnace Primary Control Device Emission Limit	2-19
	2.4.3 Allowance for Oxygen Blowing During Bottom-Blown Vessel Turndown	2-20
	2.4.4 Opacity Limit for Bottom-Blown Furnaces	2-21

Table of Contents (concluded)

Section		Page
2.5	Visible Emission Standards	2-22
2.5.1	Reference Method 9	2-22
2.5.2	Three-Minute Average	2-27
2.5.3	Alternative Mass Emission Limits	2-33
2.5.4	Ancilliary Operations	2-34
2.6	Emission Testing and Monitoring	
2.6.1	Revised Test Time for Primary Emissions	2-35
2.6.2	Revised Steel Production Cycle	2-36
2.6.3	Secondary Emissions Performance Test	2-37
2.6.4	Secondary Control Device Monitoring	2-38
2.6.5	Process Monitoring	2-39
2.6.6	Secondary Emission Steel Production Cycle	2-40
2.7	Equipment, Design, and Operating Specifications	2-41
2.7.1	Operating Practices	2-41
2.7.2	Operating Specifications	2-43
2.7.3	Consideration of Baghouse Pressure Drop Monitoring	2-44

LIST OF TABLES

Title		Page
2-1	List of Commenters on Proposed Standards	2-2
2-2	Hot Metal Transfer Flame Suppression Evaluation for the BOPF New Source Performance Standard (NSPS) Revision . . .	2-16
2-3	Observer Error for 3-Minute and 6-Minute Opacity Averaging.	2-29
2-4	Standard Deviation of Error (Between-Observer Precision) for Different Averaging Times (By Location and Smoke Color)	2-32

1. SUMMARY

On January 20, 1983, the U.S. Environmental Protection Agency (EPA) proposed standards of performance for basic oxygen process furnaces (BOPF's) under authority of Section 111 of the Clean Air Act (48 FR 2658). Public comments were requested on the proposal in the Federal Register. A total of five sets of public comments were received. Four commenters were industry representatives; also commenting was one private environmental engineering firm. The comments that were submitted, along with responses to these comments, are summarized in this document. The summary of comments and responses serves as the basis for revisions made to the standards between proposal and promulgation.

1.1 SUMMARY OF CHANGES SINCE PROPOSAL

The proposed rules for BOPF's were contained in two Subparts of 40 CFR Part 60--Subparts Na and N. The following two sections describe the proposed and final rules.

1.1.1 Subpart Na Rules

As proposed, Subpart Na applied to secondary emissions from top-blown and bottom-blown BOPF's and to hot metal transfer and skimming stations. Visible emissions from the BOPF shop roof monitor or other building openings were limited to no more than 10 percent opacity during the operation of any top-blown BOPF, except that an opacity greater than 10 percent but less than 20 percent could occur once per steel production cycle. Visible emissions from the BOPF shop roof monitor or other building openings were limited to no more than 30 percent opacity during the operation of any bottom-blown BOPF, except that an opacity greater than 30 percent but less than 60 percent could occur twice per steel production cycle. Mass emissions of particulate

matter exiting a control device were limited to no more than 23 mg/dscm (0.010 gr/dscf). The opacity of visible emissions exiting the control device was limited to no more than 5 percent. Compliance with the proposed visible emission standards was determined by Reference Method 9 through 3-minute averages. Compliance with the proposed mass standard for the collection device was determined with the use of Reference Method 5.

A roof-mounted electrostatic precipitator (RMESP) used to control secondary emissions from an affected facility was exempted from the mass and opacity standards for secondary emission control devices. A device used to control both primary and secondary emissions also was exempted from the secondary emission control device mass and opacity standards.

A number of changes have been made to Subpart Na since proposal. The most significant change is in the applicability of the final standards resulting from the withdrawal of the roof monitor opacity standard for bottom-blown BOPF's. The rationale for this change is discussed in Chapter 2, Section 2.4, entitled "Numerical Emission Limits."

The final rules apply to secondary emissions of particulate matter from top-blown BOPF's and hot metal transfer and skimming stations used with bottom-blown or top-blown BOPF's that have been constructed, modified, or reconstructed after January 20, 1983. Visible emissions from shop roof monitors (or other building openings) may not exhibit more than 10 percent opacity during the steel production cycle of a top-blown BOPF and during hot metal transfer or skimming for a bottom-blown BOPF, except that an opacity greater than 10 percent but less than 20 percent may occur once per steel production cycle. Visible emissions from the shop roof monitor during the bottom-blown furnace cycle (i.e., the steel production cycle excluding hot metal transfer and skimming) are not subject to the roof monitor opacity standard. Mass emissions from a secondary emission collection device are limited to 23 mg/dscm (0.010 gr/dscf). Control device opacity is limited to 5 percent. These emission limits also apply to top-blown

BOPF's and to hot metal transfer stations or skimming stations used with a bottom-blown or a top-blown BOPF. Under the final rules, fume suppression systems are exempt from the mass and opacity limits for the secondary emission collection device, as is any device used to control primary and secondary emissions. RMESP's are not exempt from the final mass and opacity standards for secondary emission collection devices.

Numerous clarifying changes also have been made to §60.141a, which includes definitions for terms used in the secondary emission standards. For example, the definition of "hot metal transfer" was expanded to include the transfer of molten iron from the torpedo car to the charging ladle, or from the torpedo car to an intermediate vessel and from the intermediate vessel to the charging ladle. Definitions proposed for "primary emissions" and "secondary emissions" also were expanded and a new definition for "primary emission control system" was added, as were definitions for new technologies, such as fume suppression systems. The definition of "startup" was deleted from the final rule because the General Provisions of 40 CFR Part 60 now include a definition for this term. Additionally, the definition of "steel production cycle" was expanded to include preheating (when used) and vessel turnup, as well as vessel turndown, during sampling operations.

The monitoring requirements for the secondary emission control system were also modified. As proposed, §60.143a required the use of a monitoring device that continuously records the various exhaust ventilation rates through the secondary emission control system for each phase of each steel production cycle. The final rule specifies that the owner or operator install, calibrate, operate, and maintain a monitoring device that continually measures and records for each steel production cycle the various exhaust ventilation rates or levels of exhaust ventilation through each duct of the secondary emission control system for each phase of each steel production cycle. The final monitoring provisions also include a requirement for the semiannual reporting of monitoring measurements over any 3-hour period that

averages more than 10 percent below the average levels maintained during the most recent performance test for demonstrating compliance with the mass standard for secondary emission collection devices. A similar provision also was added to require semiannual reporting if a scrubber primary emission control device is used for secondary emission collection. Operating requirements were also added to §60.143a for the use of strip chart recorders. The rationale for these changes is discussed in Chapter 2, Section 2.7, entitled "Equipment, Design, and Operating Specifications."

Several clarifying changes were made to §60.144a regarding test methods and procedures. First, §60.144a(b)(1), which provided for the aggregation of visible emission observations from multiple exit points, was deleted from the final rule. A new provision was added that provides instructions for comparing the velocity readings obtained by Reference Method 2 to the step changes recorded by a device that monitors the level of exhaust ventilation. The sampling requirements for secondary emissions by Reference Method 5 were also modified. The proposed rule specified that the sampling for each run is to continue for a sufficient number of steel production cycles to ensure a total sample volume of at least 2.27 dscm (80 dscf) for each run. The final rule increases the requirement for total sample volume to 5.67 dscm (200 dscf). A new provision was also added that allows shorter sampling times and smaller sample volumes, subject to approval by the Administrator, when necessitated by process variables or other factors. This revision is discussed in Chapter 2, Section 2.6, entitled "Emission Testing and Monitoring."

Many of the compliance provisions proposed under §60.145a were expanded or clarified. Sections 60.145a(a) and (b) were clarified specifically to allow an owner or operator of a BOPF shop that normally operates two furnaces with overlapping cycles to shut down one furnace during compliance tests for both mass and visible emissions. A new provision also was added that requires the owner or operator to operate the secondary emission control system for the furnace being tested at exhaust ventilation rates (or levels) through each duct of the system

that are appropriate for single-furnace operation. Following the compliance test, the owner or operator must operate the system so that exhaust ventilation rates (or levels) through each duct of the secondary system are no lower than 90 percent of the exhaust ventilation rates (or levels) established for each duct during the most recent compliance test. The rationale for this change is discussed in Chapter 2, Section 2.7, entitled "Equipment, Design, and Operating Specifications."

Section 60.145a was also clarified to define specifically the period for hot metal transfer or skimming visible emission observations. For both hot metal transfer and skimming, visible emission observations begin with the start of the operation and terminate 3 minutes after completion of the operation. The final rules also require that for visible emission compliance tests, all visible emission observations are to be identified and recorded in conjunction with the starting times and stopping times of regulated operations in the steel production cycle. The final rules require the use of 3-minute averages for visible emission observations by Reference Method 9.

Section 60.145a also was expanded to include instructions for determining compliance with the 5-percent opacity standard and the 0.010-gr/dscf concentration standard for the secondary emission collection device. To determine compliance with the opacity standard, the owner or operator would construct consecutive 3-minute averages for each steel production cycle. Compliance would be achieved if no 3-minute average exceeded 5 percent. To determine compliance with the mass standard, the owner or operator would determine the concentration of particulate matter in exhaust gases exiting the secondary emission collection device, according to Reference Method 5. Compliance would be achieved if the measured value did not exceed 23 mg/dscm (0.010 gr/dscf). Additionally, instructions for determining compliance with the proposed roof monitor opacity standard for bottom-blown furnaces were deleted from the final rules.

1.1.2 Subpart N Amendments

Subpart N contains standards of performance that regulate primary emissions of particulate matter from BOPF's constructed, reconstructed,

or modified after June 11, 1973. On January 20, 1983, minor amendments were proposed for Subpart N BOPF's constructed, reconstructed, or modified between June 11, 1973, and January 20, 1983. These proposed amendments did not revise the existing emission limit of 50 mg/dscm (0.022 gr/dscf) for mass emissions of particulate matter from the primary emission control device or the existing opacity limit for visible emissions exiting the primary emission control device. The existing standard limits visible emissions exiting the primary emission control device to an opacity of less than 10 percent, except that an opacity greater than 10 percent but less than 20 percent may occur once per steel production cycle. Additionally, no changes were proposed to the existing monitoring or reporting requirements. The proposed amendments did revise the test method instructions for sampling of mass emissions by Reference Method 5. The existing standard required a sampling rate of at least 0.9 dscm/hr (0.53 dscf/min); the proposed amendments required a minimum sample volume of at least 0.9 dscm (32 dscf). It should be noted that the minimum sample volume of 9.9 dscm (32 dscf) proposed under subparagraph (b)(1) was the result of a Federal Register misprint; a minimum sample volume of 0.9 dscm (32 dscf) was intended. With the exception of the sample volume requirement, no other changes to the test methods and procedures for determining compliance with the mass or visible emission standards were proposed for these Subpart N BOPF's.

The proposed amendments also expanded the definition of a "basic oxygen furnace" to exclude specifically open hearth, blast, or reverberatory furnaces. No other definitional changes applicable to Subpart N BOPF's were proposed.

A number of changes have been made since proposal to the final standards for these Subpart N BOPF's. The proposed minimum sample volume requirement has been increased to at least 1.5 dscm (53 dscf). This revision is discussed in Chapter 2, Section 2.6, entitled "Emission Testing and Monitoring." With the exception of this increased sample volume requirement, no changes have been made to the existing test methods and procedures for determining compliance with the mass and opacity limits for primary emission control device by these Subpart N BOPF's.

Since proposal on January 20, 1983, EPA has become aware of a difference in furnace cycle time between top-blown and bottom-blown furnaces that may impact measured emission concentrations for those facilities regulated under Subpart N. Bottom-blown furnaces in general have shorter oxygen blowing periods than top-blown furnaces. The testing provisions for those BOPF's constructed, reconstructed, or modified after June 11, 1973, but on or before January 20, 1983, allow testing from the beginning of the oxygen blow, or scrap preheat if practiced, until just prior to tapping. The bulk of the particulate emissions occur during the oxygen blow, however. With a shorter oxygen blowing period and roughly the same length nonblowing period as top-blown furnaces, the bottom-blown furnaces are allowed a greater proportion of test time during nonblowing periods, thus tending to dilute the measured particulate concentration more than is allowed for top-blown furnaces. To remedy this inequity due to furnace cycle differences, EPA intends to propose revised sample period requirements and mass standards as may be appropriate for top-blown and bottom-blown furnaces under Subpart N as part of the 4-year NSPS review cycle.

No changes were proposed to the monitoring requirements specified in §60.143 of the existing standards. The final rules would continue these requirements with certain minor changes. Under §60.143(b)(2), a monitoring device is required for the continuous measurement of the water supply pressure to the control equipment, and the pressure sensor or tap must be located close to the water discharge point. The existing standards then state that the Administrator may be consulted for approval of alternative locations for the pressure sensor or tap. Under the final rules, alternative locations for the pressure sensor or tap must be approved in advance by the Administrator. Also, the word "continuous" was changed to "continually" to avoid confusion with continuous monitoring system requirements specified under the General Provisions of 40 CFR Part 60. Section 60.143 of the existing standards also requires quarterly reports of all monitoring measurements over any 3-hour period that averages more than 10 percent below the average

levels maintained during the most recent performance test for demonstrating compliance with the mass standards. The final standards reduce the reporting frequency from quarterly to semiannually.

No changes to the definition for a BOPF have been made since proposal. However, §60.141 of the final rules includes a revised definition of "steel production cycle" for Subpart N BOPF's and a new definition for "primary emissions." For Subpart N BOPF's (i.e., constructed, reconstructed, or modified after June 11, 1973, but on or before January 20, 1983), the existing definition of "steel production cycle" has been expanded to include sampling (vessel turndown and turnup) operations. "Primary emissions" means particulate matter emissions from the BOPF generated during the steel production cycle and captured by the primary emission control system. Also, the definition of "startup" was deleted from §60.141 because a definition is now included in the General Provisions of 40 CFR Part 60.

Also on January 20, 1983, amendments to Subpart N were proposed to regulate BOPF's constructed, reconstructed, or modified after January 20, 1983. These proposed standards adjusted the mass emissions limits and the test methods and procedures for determining compliance. For BOPF's with a closed hood primary emission control system, the proposed amendments limited mass emissions of particulate matter to no more than 68 mg/dscm (0.030 gr/dscf), as measured for the primary oxygen blow. For BOPF's with an open hood primary emission control system, mass emissions of particulate matter were limited to no more than 50 mg/dscm (0.022 gr/dscf), as measured for the primary oxygen blow. The proposed amendments to the test methods and procedures for sampling of mass emissions by Reference Method 5 specified that sampling for each run must continue for an integral number of primary oxygen blows with a total duration of at least 60 minutes. A minimum sample volume requirement of 0.9 dscm (32 dscf) also was proposed.

No changes were proposed to the existing opacity standard for primary emission control devices. Under the proposed amendments, visible emissions from control devices for open or closed hood primary control systems were limited to no more than 10 percent opacity, except that an opacity greater than 10 percent but less than 20 percent

could occur per steel production cycle. No changes to the test methods and procedures for determining compliance with the opacity limit were proposed.

A proposed definition for "primary oxygen blow" also was added to §60.141. The proposed definition defined "primary oxygen blow" as the period in the steel production cycle of a BOPF during which a high volume of oxygen-rich gas is introduced to the bath of molten iron by means of a lance inserted from the top of the vessel or through tuyeres in the bottom or the bottom and sides of the vessel. Reblows were excluded from the proposed definition, as was the introduction of nitrogen through tuyeres in the bottom or bottom and sides of the vessel.

The final Subpart N standards for BOPF's constructed, reconstructed, or modified after January 20, 1983, continue the proposed requirements with few exceptions. No changes to the adjusted limits for mass emissions from open or closed hood primary control systems have been made since proposal, although a new operational requirement has been added. During and after any compliance test, the owner or operator must operate the gas cleaning device during any reblow in a manner identical to operation during the primary oxygen blow. The final rules require these BOPF's to determine compliance with the adjusted mass emission limits by sampling during the primary oxygen blow. No changes to the proposed definition of "primary oxygen blow" have been made since proposal. Except for an increased sample volume requirement, no changes to the Reference Method 5 test methods and procedures for determining compliance with adjusted mass emission limits have been made since proposal. The proposed minimum sample volume requirement of 0.9 dscm (32 dscf) has been increased to at least 1.5 dscm (53 dscf). This change is discussed in Chapter 2, Section 2.6, entitled "Emission Testing and Monitoring." As proposed, shorter sampling times and smaller sample volumes are permitted when necessitated by process variables or other factors, subject to approval by the Administrator.

No changes have been made to the visible emission limit applied to these BOPF's. As proposed, visible emissions from control devices for open or closed hood primary control systems are limited to no more

than 10 percent opacity except that an opacity greater than 10 percent but less than 20 percent may occur once per steel production cycle. Under the final rules, compliance with the visible emission standard is determined according to the provisions of the existing primary standard. However, the definition of "steel production cycle" for these BOPF's has been revised since proposal to include specifically sampling (vessel turndown and turnup) and deslagging operations.

BOPF's constructed, reconstructed, or modified after January 20, 1983 also are subject to the amended monitoring and reporting requirements. As discussed previously, §60.143 has been clarified to require advance approval by the Administrator for alternative locations for the monitoring device pressure sensor or tap. The final standards also reduce the frequency of reporting requirements from quarterly to semiannually.

1.2 SUMMARY OF IMPACTS OF PROMULGATED ACTION

1.2.1 Alternatives to Promulgated Action

The regulatory alternatives are discussed in Chapter 6 of the background information document (BID) for the proposed standards. These regulatory alternatives reflect the different levels of emission control from which one is selected that represents best demonstrated technology (BDT), considering costs, nonair quality health, and environmental and economic impacts for secondary emission control of BOPF's. Regulatory Alternative II, the alternative selected as the basis of the proposed secondary emission standards, was revised to account for withdrawal of the roof monitor opacity standard for bottom-blown furnaces. As revised, Regulatory Alternative II includes BDT controls for top-blown furnaces and for hot metal transfer stations and skimming stations used with bottom-blown or top-blown furnaces.

1.2.2 Environmental Impacts of Promulgated Action

The regulatory alternatives and their environmental impacts are discussed in Chapters 6 and 7 of the BID for the proposed standards. The environmental impacts remain unchanged since proposal. Withdrawal of the proposed roof monitor opacity standard for secondary emissions

from bottom-blown furnaces would not affect the environmental impacts because impacts for the period 1981 through 1986 were based on estimates of increased capacity projected for top-blown furnaces.

Comments received from the Office of Water indicate that the gas cooling and conditioning system used with an electrostatic precipitator (ESP) must be designed as a total evaporation system because the steel industry effluent regulation (40 CFR 420, May 27, 1982) specifies no discharge from these systems. Text from the BID for the proposed standards also has been revised to include a further discussion of the water pollution impact of Regulatory Alternative III if a wet or semiwet ESP were used in lieu of other control systems. A detailed discussion of these revisions may be found as Item IV-B-7 in Docket No. A-79-6. With the changes noted in this docket submission, the analysis of environmental impacts in Volume I of the BID is now considered the final environmental impact statement (EIS) for the promulgated standards.

1.2.3 Energy and Economic Impacts of Promulgated Actions

Energy and economic impacts are discussed in Chapters 7, 8, and 9 of the BID for the proposed standards. These estimated nationwide impacts have remained unchanged since proposal.

Further analysis of secondary emission control technologies indicates that the cost effectiveness of the control technologies that can be used to comply with the standards ranges from $1,665 to $3,727 per ton of particulate matter removed for furnace emissions and from $1,755 to $3,100 per ton of particulate matter removed for hot metal transfer stations. In addition, new BOPF's may be able to employ lower cost, innovative hot metal transfer controls. However, the aggregated cost effectiveness of $2,245 per ton for secondary emission controls has not been revised since proposal.

1.2.4 Other Considerations

1.2.4.1 Irreversible and Irretrievable Commitment of Resources. None of the regulatory alternatives examined would result in the irreversible or irretrievable commitment of resources in that a tradeoff is made between short-term environmental gains at the expense of long-term environmental losses or vice versa.

The final regulations are standards of performance and therefore do not require the use of any particular control technology with which to achieve compliance. The regulatory alternative selected as the basis of the standards (Regulatory Alternative II) would allow the continued use of both types of primary control systems (open and closed hood) currently favored by the industry. In addition, the standards would not preclude the use of any other technology capable of achieving the emission limits and would encourage the use of innovative technology such as fume suppression systems.

1.2.4.2 Environmental and Energy Impacts of Delayed Standards. Delay of promulgated secondary emission standards for this source category was not considered a regulatory alternative because adequately demonstrated control technology exists upon which the final standards can be based. Also, construction, modification, or reconstruction of three BOPF shops is estimated to commence during the 5-year period following proposal of the standards. Nationwide uncontrolled secondary and controlled primary emissions of particulate matter at these shops would total about 3,221 Mg/yr (3,551 ton/yr) in the absence of the proposed standards. These emissions would be in addition to the uncontrolled secondary emissions from existing shops.

1.2.4.3 Urban and Community Impacts. The promulgated standards will have a beneficial urban and community impact. Reduction in particulate matter will reduce health risks for workers and the communities surrounding new BOPF steelmaking facilities and improve the overall environmental quality.

2. SUMMARY OF PUBLIC COMMENTS

A total of five letters commenting on the proposed standards and the background information document (BID) were received. A public hearing was not requested during the prescribed period; consequently, no public hearing was held. A list of the commenters, their affiliations, and the U.S. Environmental Protection Agency (EPA) docket numbers assigned to their correspondence is given in Table 2-1.

For the purpose of orderly presentation, the comments have been categorized under the following topics:

1. Emission Data
2. Affected Facilities
3. Best Demonstrated Technology
4. Numerical Emission Limits
5. Visible Emission Standards
6. Emission Testing and Monitoring
7. Equipment Design and Operating Specifications

The comments, the issues they address, and EPA's responses are discussed in the following sections of this chapter.

2.1 EMISSION DATA

2.1.1 Comment: (IV-D-2) One commenter suggested that particulate matter emission factor reports for tests of basic oxygen process furnace (BOPF) hot metal charging and tapping at Republic Steel Corporation, Kaiser Steel Company, and Inland Steel Company be included in the data analysis of Volume I of the BID. He also believed that a report on particulate mass and particle size measurements for the hot metal desulfurization plant at Kaiser Steel Company should have been included.

TABLE 2-1. LIST OF COMMENTERS ON PROPOSED STANDARDS FOR THE BOPF NEW SOURCE PERFORMANCE STANDARD (NSPS) REVISION

Docket item number[a]	Commenter and affiliation
IV-D-1	E. F. Young, Jr. American Iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036 Date: March 15, 1983
IV-D-2	Jim Steiner Pape and Steiner Environmental Services 5801 Norris Road Bakersfield, CA 93308 Date: April 4, 1983
IV-D-3	D. A. Woodring Republic Steel Corporation P.O. Box 6778 Cleveland, OH 44101 Date: April 4, 1983
IV-D-4	David M. Anderson Bethlehem Steel Corporation Bethlehem, PA 18016 Date: April 4, 1983
IV-D-5	Frank P. Partee Compliance and Liaison Department Ford Motor Company One Parklane Boulevard Dearborn, Michigan 48126 Date: April 13, 1983

[a]The docket number for this project is A-79-6. Dockets are on file at EPA Headquarters in Washington, DC, and at the Office of Air Quality Planning and Standards (OAQPS) in Durham, NC.

Response: Not all of the reports named by the commenter had been finalized and distributed at the time emission data were being analyzed. Emission factor data used in the BID were taken from "Particulate Emission Factors Applicable to the Iron & Steel Industry" (EPA-450/4-79-028), which contains material similar to that in the emission factor reports named by the commenter (II-A-46). This earlier report was the source for revised emission factors published in "Supplement Number 11 for Compilation of Air Pollutant Emission Factors, Third Edition," AP-42, published by EPA, October 1980. Information in the test reports named by the commenter and not used in this review of the BOPF standard will be evaluated during the next 4-year review of the BOPF standard. The selection of emission factors used in the development of the standards is further discussed in the response to comment 2.2.3.

2.1.2 Comment: (IV-D-2) One commenter suggested that the teeming emission factor of 35 g/Mg (0.07 lb/ton) of steel is based on unleaded heats and that leaded heats have an emission factor of 0.81 lb/ton, 72 percent of which is of inhalable particle size. He also recommended that secondary emissions from teeming be included in the proposed rulemaking.

Response: The commenter is correct in suggesting that an unleaded heat emission factor was used to assess teeming emissions. While the leaded heat emission factor is considerably larger, available information suggests that leaded heats comprise only a small portion of the total number of BOPF heats. In the absence of specific information to the contrary, a determination was made that the emission factor for unleaded heats would be more representative of normal industry practice. The rationale for not controlling teeming at present is discussed in the response to comment 2.2.4.

2.2 AFFECTED FACILITIES

2.2.1 Comment: (IV-D-1 and IV-D-4) Two commenters questioned the proposed definitions of the BOPF vessel, hot metal transfer station, and skimming station as separate, affected facilities. The commenters believe that construction, modification, or reconstruction of a hot

metal transfer or skimming station could subject an existing BOPF shop to the proposed secondary emission opacity standard. They also pointed out that because opacity readings are taken at shop openings, vents, and monitors (where they could be intermingled with emissions from unregulated operations in the shop), enforcement officials could require compliance from the entire existing shop.

Response: The choice of the affected facility for this standard is based on interpretation of Section 111 of the Act and judicial construction of its meaning. Under Section 111, the NSPS must apply to "new sources." "Source" is defined as "any building, structure, facility, or installation which emits or may emit any air pollutant" [111(a)(3)]. Most industrial plants, however, consist of numerous pieces or groups of equipment that emit air pollutants and that might be viewed as "sources." The term "affected facility" is used, therefore, to designate the equipment, within a particular kind of plant, which is chosen as the "source" covered by a given standard.

When the affected facility is chosen, a decision must be made concerning which pieces or groups of equipment are the appropriate units for separate emission standards in the particular industrial context involved. This decision is made by examining the situation in light of the terms and purpose of Section 111. One major consideration in this examination is that the use of a narrower definition results in bringing replacement equipment under the NSPS sooner; if, for example, an entire plant were designated as the affected facility, no part of the plant would be covered by the standard unless the plant as a whole is "modified." If, on the other hand, each piece of equipment is designated as the affected facility, as each piece is replaced, the replacement piece will be a new source subject to the standard. Because the purpose of Section 111 is to minimize emissions by application of the best demonstrated control technology (considering cost, other health and environmental effects, and energy requirements) at all new and modified sources, the presumption is that a narrower designation of the affected facility is proper. This designation ensures that new emission sources within plants will be brought under

the coverage of the standard as they are installed. It was for this reason that the emission sources were defined as separate, affected facilities.

As explained in 48 FR 2658, the proposed standards of performance for secondary emissions would apply only to a BOPF, hot metal transfer station, or skimming station that commenced construction, modification, or reconstruction after January 20, 1983. (Note that the final rules apply only to top-blown BOPF's and to hot metal transfer stations or skimming stations used for bottom-blown or top-blown BOPF's.) It should be noted that although a plant may contain both affected facilities and existing, nonaffected facilities, the modification or reconstruction of an existing, nonaffected facility would not subject any other existing nonaffected facility to the requirements of the proposed regulation. Only the facility constructed, modified, or reconstructed would become subject to the standards of performance. For example, the addition of a new furnace to an existing shop would subject only the new furnace to the secondary emission standards; an existing hot metal transfer or skimming station would not be affected unless it was also modified or reconstructed. The effects of new construction, modifications, and reconstructions on affected and nonaffected facilities are discussed further in Chapter 5 of the BID for the proposed standards.

The proposed standards also recognize that, at times, visible emissions from the shop roof monitor (or other building openings) may occur from unaffected facilities or unregulated ancilliary operations. For this reason, the final rules allow the owner or operator to operate only one furnace during compliance testing for mass and visible emission limits. The owner or operator also may choose to suspend all unaffected shop operations during the test. The final regulation also requires that all visible emissions be identified in conjunction with the starting and stopping times of regulated process operations. Consequently, the use of a process observer is encouraged. A process observer inside the shop during the testing can reduce substantially the possibility that emissions from unaffected facilities or operations

are included in the opacity observations. These provisions are adequate to ensure that emissions from other operations or facilities are not adversely incorporated in the opacity observations.

2.2.2 Comment: (IV-D-4) One commenter requested clarification of the definitions for the affected facilities. This commenter indicated a potential discrepancy between §60.140a(a) of the regulation, which cites the affected facilities, and §60.142a(a), which contains the proposed secondary emission limits. The proposed emission limits appear to apply only to BOPF secondary emissions (i.e., emissions escaping the BOPF primary control system). Consequently, the proposed emission limits would not apply to hot metal transfer and skimming stations.

Response: Under §60.140a(a), the BOPF, hot metal transfer station, and skimming station are designated as the affected facilities subject to the proposed secondary emissions standards. Section 60.142a specifies the proposed emission limits for secondary emissions from affected facilities. The hot metal transfer station and the skimming station, as affected facilities, are subject to the proposed standards for particulate matter under §60.142a.

The proposed standards define secondary emissions as "particulate emissions that escape capture from the BOPF primary control system." Hot metal transfer and skimming operations do not generally occur in proximity to the furnace. Consequently, emissions from these operations are not captured by the BOPF primary control system. Because these emissions escape capture by the furnace control system, they are considered secondary emissions. Therefore, the proposed standards for secondary particulate matter apply to secondary emissions from the furnace, in combination with "secondary" emissions from hot metal transfer and skimming operations. The final rule clarifies the definition of "secondary emissions" by specifically including emissions from hot metal transfer and skimming. Also included in the final definition are particulate matter emissions that escape from openings in the primary emission control system, such as from lance hole openings, gaps or tears in the ductwork of the primary emission control system,

or leaks in hoods. Similar clarifying changes were also made to the definition of "primary emissions," and new definitions for "primary emission control system" and "secondary emission control system" also were added to the final rule.

2.2.3 Comment: (IV-D-4) One commenter questioned the selection of affected facilities, based on "over-stated" emission factors and, in one case, lack of supporting data. He pointed out that the emission factors for uncontrolled secondary emissions of particulate matter from hot metal transfer and BOPF charging are considerably higher than are emission factors used in two more recent reports, "Particulate Emission Factors Applicable to the Iron and Steel Industry" (EPA-450/4-79-028) and "Fugitive Dust Emission Factor Update for AP-42" (Draft). The commenter also stated that uncontrolled emissions from hot metal transfer and charging emissions from top-blown vessels are insignificant compared to BOPF primary (oxygen blowing) emissions. In addition, the commenter questioned the legal justification for controlling skimming emissions when no data were available regarding the magnitude of these emissions and when no attempt was made to quantify these emissions.

Response: The BOPF, hot metal transfer station, and skimming station were selected for regulation in the proposed rules because adequately demonstrated control technology exists, considering costs, upon which the proposed standards can be based, and because these facilities account for about 1,355 ton/yr of uncontrolled secondary emissions of particulate matter for a typical BOPF shop operating two 272-Mg (300-ton) top-blown furnaces.

The emission factors used to estimate uncontrolled secondary emissions were the most current factors available at the time of the data analysis. It should be noted that AP-42 (Supplement 11) provided one set of emission factors for selected operations. However, a review of these emission factors revealed that they were based on tests for bottom-blown vessels. The source of these AP-42 emission factors was the 1979 EPA report, "Particulate Emission Factors Applicable to the Iron and Steel Industry" (EPA-450/4-79-028). Because this

latter report also included the best emission factors currently available for top-blown furnaces, these top-blown furnace emission factors were used in the data analysis.

Uncontrolled secondary emissions from hot metal transfer at a typical shop are estimated at 286 ton/yr for top-blown furnaces, based on an emission factor of 0.19 lb/ton hot metal poured. Controls (local hooding ducted to a baghouse) are available for the hot metal transfer station at a reasonable cost per ton of emission reduction. For these reasons, the hot metal transfer station was selected for control as an affected facility.

The skimming operation in new plants is generally performed at the hot metal transfer station, or immediately adjacent to it, following the hot metal transfer operation. No emission factor for skimming had been reported in AP-42 or in "Particulate Emission Factors Applicable to the Iron and Steel Industry" at the time of the data analysis. However, visible emissions from this operation have been observed at two plants based on Reference Method 22 (II-A-50, II-A-51). Because these emissions can be controlled by the same capture and collection system as used for hot metal transfer emissions, at no significant additional cost, the skimming station also was selected as an affected facility.

The vast majority of BOPF secondary emissions are attributable to the various operations comprising the steel production cycle of the BOPF vessel. These operations include scrap charging, hot metal charging, blowing, turndown, and tapping. No emission factors were available at the time of the data analysis to quantify secondary emissions from scrap charging, the primary blow, or vessel turndown. However, visible emissions from these operations have been observed at the roof monitors of several shops through Reference Method 22 (II-A-50, II-A-52, II-A-53, and II-A-54).

Emission factors are available to estimate secondary emissions from hot metal charging and tapping. Based on the highest quality emission factor for top-blown furnaces provided in "Particulate Emission Factors Applicable to the Iron and Steel Industry" (0.4 lb/ton of hot

metal poured), secondary emissions from hot metal charging are estimated at 603 ton/yr for a typical shop. Secondary tapping emissions are estimated at 466 ton/yr for top-blown furnaces at a typical shop, based on the emission factor of 0.291 lb/ton of steel as reported in "Particulate Emission Factors Applicable to the Iron and Steel Industry."

It is true that uncontrolled secondary emissions from hot metal transfer and charging in top-blown vessels are only about 3.5 percent of BOPF primary (oxygen blowing) emissions. The emission factor for the blow, 28.6 lb/ton, can be compared to an emission factor of about 1 lb/ton for the combined effect of uncontrolled emissions from hot metal transfer and charging. However, uncontrolled secondary emissions from these operations combined total about 1,355 ton/yr at a typical shop. These are significant emissions for a typical shop and are considered even more significant on a nationwide basis. Uncontrolled secondary emissions of particulate matter from these operations constitute a major emission source, even when considered separate operations. Data are available with which to quantify these emissions and controls are available at a reasonable cost with which to reduce these emissions. Consequently, these operations were selected for regulation based on their own merits.

Uncontrolled secondary emissions emanating from furnace operations during the steel production cycle constitute the bulk of the secondary emissions from the BOPF steelmaking process. Emission factors are available to quantify secondary emissions from charging and tapping--the operations wherein emissions are most likely to escape capture by the primary hood. For top-blown furnaces, secondary emissions from charging and tapping combined total about 1,069 ton/yr. Controls are available for these emissions at a reasonable cost. These controls will also capture and collect secondary emissions from some other furnace operations at no additional cost. For these reasons, the BOPF was selected as an affected facility under the proposed standards, as were the hot metal transfer station and skimming station.

The affected facilities identified in the proposed rules have been revised since proposal. Under the final rules, the affected

facilities are the top-blown BOPF and hot-metal transfer and skimming stations used for a bottom-blown or a top-blown BOPF. The rationale for this change is discussed in response to comment 2.4.4.

2.2.4 Comment: (IV-D-2) One commenter disagreed that the cost of controlling ancillary operations not subject to the proposed standards would be highly disproportionate to the amount of particulate collected. The commenter indicated that teeming and hot metal desulfurization produce significant quantities of particulates compared to regulated secondary emission sources and that the same control technology (local hooding ducted to a baghouse) is also applicable to these unregulated ancillary operations. These ancillary operations may be located in proximity to the hot metal transfer station, allowing the use of one common control system. The commenter provided uncontrolled emission factors for hot metal desulfurization, based on a total of 10 recent tests on torpedo cars at Kaiser Steel. He further questioned the estimate for the quantity of emissions resulting from these unregulated ancillary operations (8 percent of identified fugitive emissions from BOPF shops). This commenter recommended that tests be performed to quantify emissions from these ancillary operations and that the control of these unregulated ancillary operations be considered under the proposed rulemaking.

Response: As explained at 48 FR 2660 and 2661, certain ancillary operations were not selected for regulation under the proposed secondary emission standards. These operations include hot metal desulfurization, dekishing, teeming, slag handling, ladle maintenance, and flux handling.

Prior to proposal of the secondary emission standards, no Reference Method 9 visible emission data were available with which to characterize emissions from hot metal desulfurization operations, although visible emissions were observed at one plant according to Reference Method 22 procedures (II-A-51, II-B-51, II-B-52, and II-B-54). Consequently, visible emission testing by Reference Method 9 was conducted at a second plant. Mass emission test data also were collected at this plant, but the results of the mass emission testing have been received only recently and currently are undergoing review. It should be noted

that the emission factors supplied by the commenter were based on this same mass test. However, preliminary review has indicated that additional test data are required to portray emissions from this operation accurately, because hot metal desulfurization methods vary widely from plant to plant and may not be applied to all types of metal produced. For these reasons, this operation was not selected for control under the proposed standards at present. Rather than delay promulgation of the proposed standards to incorporate an evaluation of hot metal desulfurization, control of these emissions will be considered during the next 4-year review of the primary and secondary emissions standards.

Remaining ancillary operations not directly associated with the BOPF vessel (other than hot metal transfer and skimming) include teeming, dekishing, slag handling, ladle maintenance, and flux handling. Except for teeming, no emission factors are available to quantify uncontrolled particulate matter emissions from these operations, although low-level visible emissions from these operations have been observed. Based on a review of the estimate contained in the preamble (that ancillary operations contribute about 8 percent of total BOPF fugitive emissions at a typical shop), it is agreed that particulate emissions from these sources may be greater than previously estimated. However, the lack of quantitative emission data, coupled with the absence of good demonstrated control technology, prevented the selection of these operations for control at present. Should additional data become available, these operations will also be evaluated during the next 4-year review of the primary and secondary standards.

For teeming operations, AP-42 (Supplement 11) reported an emission factor of 0.07 lb/ton of steel, applicable to both top- and bottom-blown furnaces. Based on this emission factor, uncontrolled secondary emissions of a typical shop are estimated at 112 ton/yr. Even though these emissions are not insignificant, observations of visible emissions did not indicate measurable levels at BOPF shop roof monitors. Although controls are used for teeming of leaded steel, leaded steel represents a relatively small percentage of total steel production. Application of these controls on the scale required to fit teeming of all steel produced needs further study before a decision to regulate can be

made. Furthermore, many BOPF shops are installing continuous casting facilities. The general trend is toward this energy and labor saving production step that will reduce the amount of steel teemed (IV-J-1). For the above reasons, teeming was not selected as an emission source for regulation at present. However, this operation also will be reviewed and considered for control during the next 4-year review of the primary and secondary standards.

2.3 BEST DEMONSTRATED TECHNOLOGY (BDT)

2.3.1 Comment: (IV-D-2) One commenter disagreed with the preamble statement (p. 2661) that certain operating practices (e.g., clean scrap, slow pouring, careful positioning of the hot metal ladle, and proper furnace tilt angle) have been demonstrated only for top-blown furnaces. He stated that during testing of the Republic Steel bottom-blown furnace (Q-BOP), these practices were used and appeared to generate few or no fugitive emissions that escaped the secondary control system. This control was achieved despite the improper operating condition of the control system (one fan on primary hood and one on secondary hood, rather than two on secondary) during the test. Consequently, roof monitor opacity reached a maximum of 15 percent but averaged less than 10 percent over the period of hot metal addition. However, according to the commenter, these conditions were not achieved consistently during the test program.

Response: As the commenter pointed out, periods existed during which the indicated operating practices were accompanied by few or no fugitive emissions that escaped the secondary control systems. As he also pointed out, these conditions were not achieved consistently. In our engineering judgment, this lack of consistency indicates that the operating practices mentioned by the commenter are not demonstrated for bottom-blown furnaces. Therefore, the operating practices were not included as an element of BDT upon which the proposed standard for Q-BOP's was based. This lack of consistency was a contributing factor to our conclusion that the Republic Steel System does not truly represent BDT for bottom-blown controls. The rationale for withdrawal of the proposed Q-BOP standard is discussed further in response to comment 2.4.4.

2.3.2 Comment: (IV-D-2) One commenter questioned the conclusion that performance of roof-mounted electrostatic precipitators (RMESP's) may be equivalent to or better than BDT for secondary emission collection when no data were available to assess RMESP performance. The commenter also questioned why a Japanese RMESP was not evaluated to support the proposed standards. This commenter pointed out that a baghouse can handle secondary emissions containing hard-to-precipitate kish particles and significant amounts of fine particulate emitted in large bursts more efficiently than can an RMESP. Although the commenter supported the possible RMESP waiver for innovative technology, he suggested that the conclusion that the RMESP may be equivalent to (or better than) BDT at a lower cost should be verified.

Response: Section 111(j) of the Clean Air Act provides that an owner or operator of an affected facility may request a waiver from one or more requirements of the standards to encourage the use of the innovative control system. Findings that the technology has not been demonstrated adequately and that it has either a substantial likelihood of achieving greater emission reduction than required by the NSPS or of achieving equivalent emission reduction at lower cost (including energy and nonair environmental costs) are necessary for an owner or operator to obtain an innovative technology waiver for other requirements of the standard. Once a waiver has been issued, its terms must include: (1) assurance that the source emissions will not prevent attainment and maintenance of national ambient air quality standards (NAAQS's); (2) assurance that the technology will function properly; (3) a time limit for testing the technology not to exceed 7 years from issuance, 4 years from startup, or until the technology proves unworkable; and (4) a restriction to that portion of the source on which the technology is used. The commenter is correct in noting that no data were available to quantify the performance, costs, and other impacts associated with the use of RMESP's. However, as indicated in the proposed rulemaking, there were qualitative indications that RMESP's have the potential to be at least as efficient as, and more cost effective than, capture

hoods ducted to a particulate collection device, which is the technology on which the numerical standard is based. Some of this qualitative information was obtained from RMESP's in Japan. Unfortunately, the Japanese companies using the RMESP's would not permit the quantitative evaluation of their control technologies.

The final rule in Subpart Na applying to visible emission opacity from roof monitors represents the minimum level of control for secondary emissions needed to comply and was based on data taken from plants with best demonstrated conventional technology. Because there may be an emission flow volume difference between the discharge of an RMESP and the discharge of the more conventional BDT secondary systems, it is not clear that RMESPs are necessarily equivalent to best technology. Therefore, during any required case-by-case reviews, RMESP design will also be considered.

Under the terms negotiated for any waiver granted, provisions would be included to ensure that any RMESP installed to comply with the NSPS would be designed and operated properly. Data collected during the term of the waiver would be used to verify RMESP performance and costs. Should the performance and costs be demonstrated as equivalent to or better than BDT, the inclusion of provisions specific to RMESP's would be considered during the next 4-year review of Subpart Na.

2.3.3 Comment: (IV-D-1 and IV-D-3) Two commenters pointed out that, while the proposed standards do not require the use of a specific technology to meet the proposed emission limits, a steel producer could experience difficulties in permit approval if the producer desired to implement a technology not examined or discussed in the preamble or BID for the proposed or promulgated rule. In this regard, both commenters pointed to fume suppression, a relatively new technology, which could provide the potential for eliminating or reducing the need for particulate capture techniques. One commenter stated that the cost to implement and operate this technology can be substantially less than other control alternatives, with fume suppression providing an equivalent performance. Accordingly, the commenters recommended that this technology be examined as a viable alternative control technique.

Response: Before responding to the commenter's point, it is important to note that permit approval is not required for NSPS's. Any permit that would be required would be for State or local agencies. It is agreed that in such cases the source may need to provide a basis for concluding that compliance is probable. Data regarding fume suppression were not available when Volume I of the BID was being prepared. Since proposal, however, new information and data have been obtained to support further the conclusion that fume suppression systems may provide, at a lower cost, performance equivalent to that of other control alternatives (IV-B-4). Because the standards of performance for hot metal transfer stations are expressed as numerical emission limits, an owner or operator may choose to install a fume suppression system to control hot metal transfer emissions so long as it can achieve compliance with the numerical limit.

Suppression techniques reduce iron oxide fuming above molten metal or slag baths by inhibiting oxidation of the iron at the surface of the bath. Oxidation is inhibited by blanketing the bath surface with flame, steam, wet sand, or wet slag. To date, these techniques have been applied experimentally to: (1) blast furnace iron tapping, (2) blast furnace slag tapping, (3) open hearth tapping, (4) electric furnace tapping, (5) hot metal transfer, (6) BOPF charging, (7) BOPF tapping, and (8) BOPF lance hole emissions.

Preliminary data quantifying the performance of flame suppression on a BOPF hot metal transfer station at U.S. Steel's Gary plant indicate that opacity is reduced significantly with the use of flame suppression. These data are provided in Table 2-2. Thus, while these techniques are not yet demonstrated for other portions of the BOPF production cycle, it appears that flame suppression (one of the several fume suppression techniques) is capable of achieving emission reduction at least equal to requirements of the proposed regulation during hot metal transfer.

Moreover, because flame suppression eliminates the need for capture and control devices, emission reductions may be achieved at costs significantly below those of the BDT on which the standards are

TABLE 2-2. HOT METAL TRANSFER FLAME SUPPRESSION EVALUATION

	Percentage of total hot metal transfers observed			
	No. 1 BOPF shop		No. 2 BOPF shop	
Number of 15-second readings >20 percent opacity observed per hot metal transfer	Without flame suppression[a]	With flame suppression[b]	Without flame suppression[c]	With flame suppression[d]
0	54.3	96.0	68.3	89.2
1 to 5	11.4	4.0	15.1	5.6
6 to 10	14.3	0	8.6	5.2
11 to 15	11.4	0	4.3	0
16 to 20	5.7	0	2.6	0
>20	2.9	0	1.1	0

[a]Based on 70 hot metal transfers observed.
[b]Based on 50 hot metal transfers observed.
[c]Based on 65 hot metal transfers observed.
[d]Based on 85 hot metal transfers observed.

based. The cost effectiveness of fume suppression applied to hot metal transfer emissions is estimated at $633/ton of particulate matter removed. Depending on the control scenario applied, this can be compared to a cost effectiveness of $1,755/ton for a baghouse collecting furnace secondary and hot metal transfer emissions and $3,104-ton for a baghouse collecting only hot metal transfer emissions.

As described in the response to comment 2.3.2, for the purposes of this NSPS, an innovative technology waiver may be granted to an owner or operator desiring to install a fume suppression system to meet the standards.

Under the negotiated terms of an innovative technology waiver, the owner or operator would be granted an extended time period to meet the visible emission standard. Fume suppression systems are exempt from the mass and opacity emission limits for secondary emission control devices because use of the fume suppression technique eliminates

the need for other capture and collection equipment. Provisions would be included in any waiver agreement to ensure that a fume suppression system installed to meet the NSPS would be designed and operated properly. Data collected during the term of the waiver would be used to document the performance and costs of fume suppression for particulate emission control. Should the performance and costs be equivalent to or better than BDT, the inclusion of provisions specific to fume suppression systems may be considered during the next 4-year review of Subpart Na.

The final standards also contain a definition for fume suppression systems. A fume suppression system is defined as "the equipment comprising any system used to inhibit the generation of emissions from steelmaking facilities by means of an inert gas, flame, or steam blanket applied to the surface of molten iron or steel."

2.3.4 Comment: (IV-D-2) One commenter questioned the estimated capture efficiency of 90 percent or more for auxiliary hooding and the application of this estimated capture efficiency to bottom-blown furnaces. He referred to tests conducted on the Republic Steel Q-BOP, stating that: (1) this furnace did not have an auxiliary hood for tapping, and the secondary control system demonstrated much less than 90 percent capture for tapping emissions; (2) at least seven mechanical failure incidents occurred during the test (bell damper problems); and (3) a capture effectiveness of 90 percent or more was demonstrated on occasion (emphasis added by commenter) for hot metal addition emissions. This commenter indicated that the preamble incorrectly implied (p. 2661) that 90 percent capture had been demonstrated on a continual basis at the time of the test program.

Response: The commenter's concern that 90 percent capture is not continually attained rests on his observations during testing at the Republic Steel Q-BOP. He correctly points out that the Republic facility has no tapping hood.

The last two sentences of the Federal Register notice paragraph to which the commenter refers are, "An enclosure with hoods located over the charging and tapping areas may achieve a capture effectiveness of 90 percent or better. This control system has been demonstrated

for both top and bottom blown furnaces" (emphasis added). The first sentence is meant to imply that there is a possibility rather than a probability of 90 percent capture given sufficient hooding. Because the Republic facility has no tapping hood, a capture efficiency of less than 90 percent would be expected. The last sentence of the paragraph is meant as a summarizing sentence for the entire paragraph rather than as a continuation of the preceding sentence. The selection of the Republic system as BDT for bottom-blown furnaces is further discussed in the response to comment 2.4.4.

2.3.5 Comment: (IV-D-2) One commenter, in referring to the preamble discussion of the capture efficiency of building evacuation systems (p. 2661), asked if the system discussed (the roof monitor evacuation system with baghouse controls at the No. 2 BOPF shop of Inland Steel, East Chicago) handles only a portion of the total shop emissions (i.e., those generated by the most recent furnace installation) or if it handles emissions from the entire building.

Response: The capture system in question is a partial building evacuation system applied only to the furnace charging aisle. A curtain wall is installed between the charging aisle and the furnace aisle to prevent substantial movement of charging emissions to the furnace aisle. The system is used in conjunction with local hoods within the furnace enclosure. Visual observation shows that the evacuation rate for this partial building evacuation system (130 acms or 275,000 acfm) is less than is required to prevent leakage from the enclosed portion of the building even with the assistance of the local hoods. For this reason, the Inland facility was not considered BDT for secondary emission control.

2.4 NUMERICAL EMISSION LIMITS

2.4.1 Comment (IV-D-2) One commenter asserted that the proposed mass emission standard for secondary emission collection devices (0.010 gr/dscf) did not reflect the performance of baghouses, which was selected as BDT for this application. The commenter argued that a properly designed, operated, and maintained baghouse controlling emissions from hot metal transfer, skimming, and other operations can achieve an outlet emission rate of 0.005 gr/dscf.

Response: The numerical emission limit of 0.010 gr/dscf proposed for secondary emission collection devices is based on the data available at proposal. The data base for the emission limit, as proposed, includes data from hot metal transfer, partial building evacuation for BOPF's, and full-cycle data for electric arc furnaces (EAF's). Other operations that generate secondary BOPF emissions are not included in the data base. While the commenter correctly states that certain operations can be controlled to achieve an emission rate of 0.005 gr/dscf, control of all pertinent operations has not been demonstrated adequately at that level.

The data supporting the proposed standard do not support a lower limit. It is agreed that new data, coupled with the transfer of technology from EAF's, might support the lower limit recommended by the commenter. However, without the benefit of public comment and because it is not clear whether other data reflect technology different from the data on which the 0.010-gr/dscf limit is based, the final rules do not revise the standard for secondary emission collection devices. Revising the standard to reflect the higher performance level will be considered during the next 4-year review of Subparts N and Na.

2.4.2 Comment: (IV-D-2) One commenter believes the numerical emission limit for the proposed revision to the existing particulate standard for a closed hood furnace primary control device outlet should not be raised to 68 mg/dscm (0.030 gr/dscf). The commenter stated that two of three plants tested emitted particulates at or below the current standard of 50 mg/dscm (0.022 gr/dscf) and one plant was found to be just above the standard at 55 mg/dscm (0.024 gr/dscf). The commenter asked why the proposed standard was raised to 68 mg/dscm (0.030 gr/dscm) when the majority of the plants tested (two out of three) met the existing standard.

Response: Selection of numerical emission limits must take into account variability of control system performance and performance measurements. Without accounting for this variability, the plants using BDT, even those used as the basis for the standard, could frequently be found to be violating the standard. One means of taking

this variability into account is to use a statistical analysis approach. Statistical analysis was used to aid in the selection of the proposed revised standard, 68 mg/dscm (0.030 gr/dscf). The means and standard deviations of the three test averages were computed for comparison, after which an upper 95-percent prediction limit was computed based on the standard deviation computed for the 15 individual test runs. The numerical emission limit selected, 68 mg/dscm, was just above the upper 95-percent prediction limit, 66 mg/dscm. Although the proposed numerical limit is less stringent than the original, it nevertheless requires application of BDT.

Data presented in Table 4-12 of the BID suggest that a lower concentration limit for open hood furnaces may be possible. These data show performance levels better than performance measured during testing to support the existing NSPS limit of 50 mg/dscm (0.022 gr/dscf). Determination of the equipment design, operating criteria, and process variables responsible for producing lower emission concentrations from the open hood furnaces will be examined during the next 4-year NSPS review for consideration of a change in the concentration limit.

2.4.3 Comment: (IV-D-1) One commenter pointed to unique problems with Q-BOP's (bottom-blown furnaces) when certain grades of metallurgical steel are made. Oxygen blowing as the vessel is turned down is required for these types of steel, which results in emissions even greater than during nitrogen blowing during typical vessel turndown. For this reason, the commenter recommended that this issue be addressed and that increased opacity limits for Q-BOP's be allowed when metallurgical grades of steel that require oxygen blowing during vessel turndown are made.

Response: The issue raised by the commenter, although not specifically mentioned in the BID, was addressed during testing of the Republic Steel Q-BOP system. Metallurgical steels with oxygen blowing during turndown were made during some of the heats made during the test periods. The opacity readings from these heats have been summarized in the BID and have been considered part of the data base used to propose the opacity limit for bottom-blown vessels. The impact of oxygen blowing during turndown was adequately considered during analysis

of this data base. The Republic system as the basis of the proposed Q-BOP standard is further discussed in the response to the following comment.

2.4.4 Comment: (IV-D-2) One commenter criticized the selection of the proposed opacity limits for Q-BOP (bottom-blown) vessels. This commenter stated that the proposed 60-percent opacity limit does not reflect BDT because the Republic Steel Q-BOP system (upon which the proposed emission limit is based) is inadequate for the following reasons: (1) failure of the system to achieve 90 percent capture effectiveness consistently during the testing program because of secondary emission control system mechanical (bell damper) failures; (2) poor design; and (3) poor maintenance. Rather, he recommended a bottom-blown regulatory alternative consisting of an enclosure with local hot metal addition (HMA) and tapping hoods exhausted to a baghouse (or equivalent device) that can handle 600,000 acfm or the gas volumes handled by the Bethlehem and J&L plants.

Response: The opacity limit proposed for bottom-blown vessels was consistent with data for bottom-blown furnaces that were available at proposal. The effect of the commenter's recommendation would be the establishment of an emission limit at a level that has not been observed in practice for bottom-blown furnaces. It is agreed that the performance of controls on other sources, such as top-blown furnaces, suggests that better performance should be achievable for bottom-blown furnaces and raises doubt as to whether the proposed limits reflect the performance of BDT. The commenter also correctly implied that capture and control of emissions from these vessels have not been demonstrated at a level consistent with top-blown vessels. A more stringent limit based on transfer of technology was not considered warranted in the case of bottom-blown vessels because of the wide range of conditions under which the vessels operate and the correspondingly wide range of emissions from the vessels (see the preceding comment and response as an example).

Based on this comment and further review, it has been determined that better control will likely become available before the next 4-year review of the primary and secondary standards, and that the

proposed opacity standard, if promulgated, would probably not reflect BDT. In particular, it should be noted that revised State opacity regulations adopted pursuant to the requirements of 40 CFR Part 52 are much more stringent than the proposed standard. Because of these findings, the proposed roof-monitor opacity limit for bottom-blown vessels is being withdrawn from the final rules.

The requirement for limiting the opacity of visible emissions produced by hot metal transfer and skimming in bottom-blown furnace shops, however, is being retained. There are no significant process differences between hot metal transfer and skimming in bottom-blown furnace shops as opposed to top-blown furnace shops. Likewise, equipment used to perform these processes is not necessarily different in bottom-blown versus top-blown shops. Therefore, there is no reason to believe that any significant difference should exist in emission potential, either controlled or uncontrolled. For the above reasons, the roof monitor opacity limit for hot metal transfer and skimming in top-blown furnace shops is extended to apply to hot metal transfer and skimming in bottom-blown furnace shops. The provisions of Subpart Na, §60.145a, allow the owner or operator of an affected facility to suspend shop operations not subject to Subpart Na during compliance testing. These provisions are a means of avoiding interference from bottom-blown furnace emissions during compliance testing of hot metal transfer and skimming operations. By similar reasoning, the proposed concentration and opacity standards for secondary emission collection devices in bottom-blown furnace shops also are retained.

2.5 VISIBLE EMISSION STANDARDS

2.5.1 Comment: (IV-D-3, IV-D-4) Two commenters opposed a provision of the proposed standards [at §60.144a(b)(3)] that changes the way Method 9 visible emission data from BOPF shops are analyzed. The commenters noted that Method 9 requires an opacity value to consist of the average of 24 consecutive visible emission observations taken at 15-second intervals and that the proposed standards alter this requirement to produce an opacity value based on an average of 12 consecutive visible emission observations.

Both commenters contended that the public was not afforded sufficient opportunity to comment on the proposed changes. One commenter concluded that the changes constitute ad hoc rulemaking and noted that such procedures have been invalidated by Donner Hanna Coke Corp. v. Costle, 464 F. Supp. 1295 (W.D.N.Y. 1979). The commenter believes that "The 'Donner Hanna' Court decision clearly demonstrates that the test method used to evaluate compliance with a regulation is as important as the regulation itself. Merely specifying the test method is not enough when the accuracy and precision of the method are unknown in the prescribed application."

The commenters also believe that the proposed 3-minute average contradicts previously articulated policy about how Method 9 should be used. In support of this, one commenter noted that "In previous instances, EPA has suggested that there is no known basis for altering the procedures and methodology established under Method 9. For example, on November 24, 1982, while reconsidering the Illinois State implementation plan (SIP), the Administrator stated:

> 'There is no means, using Method 9, to account for plumes less than 6 minutes in duration (noncontinuous). There is also no means, using the averaging techniques of Method 9, to account for exemption periods other than 6 minutes or for aggregation of any duration. (47 FR 5300, 5302).'"

The second commenter noted that "In the past, EPA has recognized that [Method 9] cannot be used for intermittent non-stack sources."

Response: Examining first the question of whether the public has had opportunity to comment on the proposed changes, we conclude that both the general public and steelmaking facilities with BOPF's have had ample opportunity to participate in and comment on the proposed changes. Prior to proposal, representatives of public interest groups and steel companies were provided several opportunities to comment on the 3-minute average. For example, the 3-minute average was discussed at the National Air Pollution Control Techniques Advisory Committee (NAPCTAC) meetings of December 2-3, 1980, and September 22-23, 1981 (II-C-24, II-E-23). The 3-minute average was also discussed at two meetings held with representatives of the American Iron and Steel Institute (AISI) November 12, 1980 (II-E-15), and September 17, 1981

(II-E-25). Review drafts were specifically provided to AISI for distribution to member companies September 4, 1981 (II-C-40), and November 12, 1981 (II-C-42). In no case were written comments provided by industry representatives or other interested parties prior to proposal. At proposal, the preamble to the regulations discussed testing and data reduction procedures used to establish the visible emission standards and the procedures that would be followed to determine compliance (48 FR 2662). Comments received on these procedures are being taken into account in this rulemaking.

In addition to the information provided in the forums noted above, an analysis of the effects of the proposed changes on the scientific reliability of Method 9 was included in the docket that accompanied the proposed rule (II-B-92). The information in this analysis demonstrates that the precision and accuracy of the proposed changes to the Method 9 data reduction procedure for visible emission observations of BOPF's are equivalent to the precision and accuracy in the current Method. (This analysis is discussed in detail in the response to comment 2.5.2.) Moreover, no new data or information on the visible emission standards that contradicts the findings of our analysis was included with the public comments. Therefore, the public has been provided sufficient opportunity to comment on the proposed performance testing and data analysis procedures.

We note that in citing the Illinois SIP reconsideration, the commenter suggested that statements about the use of Method 9 in its present form should limit how the Method might be modified. This suggestion, however, is without merit. Rather, the validity of modifications to standards and test methods (and the relationship between these) set forth in 40 CFR 60 must be evaluated and must be supported on their own merits.

As to the question of whether Reference Method 9 can be used for intermittent nonstack sources, it should be noted that since its promulgation December 23, 1971 (36 FR 24895), Method 9 has been amended to observe visible emissions from both control device exhaust stacks and nonstack sources (39 FR 39872, November 12, 1974). (See, for example, Subparts AA and BB.) Indeed, the Method, at paragraph 2.1,

specifically includes procedures to be used in determining visible emissions from nonstack sources such as roof monitors. Often, both control devices and nonstack sources such as roof monitors intermittently emit plumes of varying opacity; i.e., visible emissions vary with process or control device operation and are observed only during part of the time the emission source is operating. Reference Method 9 can be applied accurately to both categories of emission points by following the procedures of paragraph 2.1 and by recording visible emission observations of zero percent opacity when no visible emissions are evident.

The passage from Method 9 cited by the Court in Donner Hanna does not state that Method 9 is inappropriate for characterizing visible emissions from all points of intermittent emissions:

> EPA recognizes that certain types of opacity violations that are intermittent in nature require a different approach in applying the opacity standards. . . . (39 FR 39873)

The passage cited by the Court indicates that Method 9 (with the 6-minute averaging technique) may not characterize the performance of capture or control technologies adequately in certain cases. This can be illustrated by the hypothetical example of a source that exhibits zero opacity for 23 out of 24 readings and 25 percent on the 24th reading. On a 6-minute average basis, the opacity would be calculated as 1 percent. On a 15-second basis, opacity would simply be 23 periods of zero and 1 period of 25 percent. It is obvious that this latter method of presenting the visible emission data is much more descriptive of the emission characteristics in this case than is the 6-minute 1-percent opacity average. In the broader context, this hypothetical example illustrates how shorter averaging periods more accurately reflect the character of short-duration plumes. (It also shows how general opacity standards that are commonly used in SIP's do not account for plumes of short duration.) For this reason, a shorter averaging time and a higher numerical visible emission standard were proposed for BOPF's. A 6-minute averaging period could have been selected to analyze BOPF visible emission data. If this option had

been selected and implemented, the numerical level of the standard would have been about one-half the numerical level proposed in conjunction with the 3-minute averaging period. However, BOPF secondary emissions are typically of short duration, and a 3-minute averaging period more closely characterizes the performance of the capture systems used to control the emissions than a 6-minute averaging period.

Finally, it is agreed that the test method used to determine compliance with a standard is very important in establishing the stringency or effect of a standard. For this reason, the basis for the standard, including not only the data base but also both the test method used to develop the data base and the test method used for compliance, must be considered in establishing a standard. This is discussed further in response to comment 2.5.2.

In conclusion, it is noteworthy that this proposed rulemaking does not affect Method 9 data reduction procedures or application of Method 9 to all sources regulated in 40 CFR Part 60. Rather, it only establishes procedures for BOPF's that commence construction, modification, or reconstruction after January 20, 1983. Use of a 3-minute average was proposed in paragraph 2.5, "Test Methods and Procedures" in Subpart Na, rather than as amendments to Reference Method 9. This was done because 3-minute average opacity values are considered appropriate for and are intended to be applicable only for BOPF shop emissions. In this way, Method 9 as it applies to other sources is not affected by this rulemaking. This approach is consistent with the intended use of the test methods in Appendix A (40 CFR Part 60). The intent is detailed in the introduction to Appendix A, which states, in part:

> Within each standard of performance, a section titled 'Test Methods and Procedures' is provided to (1) identify the test methods applicable to the facility subject to the respective standard and (2) identify any special instructions or conditions to be followed when applying a method to the respective facility. Such instructions . . . are to be used either in addition to, or as a substitute for, procedures in a reference method.

Therefore, it is appropriate to alter--after analysis and public comment--the data reduction procedures for BOPF visible emission observations within the provisions of Subpart Na.

2.5.2 Comment: (IV-D-1, IV-D-3, IV-D-4, and IV-D-5) Several commenters questioned the scientific reliability of the proposed 3-minute averages for Reference Method 9 opacity computations of visible emissions from BOPF's. The commenters contended that the modified averaging procedure will produce average opacity values that are less accurate and more subject to error than the 6-minute opacity values. The commenters stated that the proposed secondary standards require the improper use of Reference Method 9 for observing roof monitor visible emissions because the method was promulgated originally for observation of stacks, with specified data reduction procedures for 6-minute averages. The commenters stated that quantitative conclusions regarding the accuracy of the method were valid only for emissions from stacks. One commenter also maintained that modifications to Method 9 should be thoroughly evaluated to determine the accuracy and precision of any deviations and recommended that Method 9, unmodified, be used for the proposed regulation or that the proposed roof monitor opacity standard be deleted until an appropriate method is developed. One commenter further asserted that the proposed changes are not supported by any analysis of the effects of the changes on the scientific reliability of Method 9.

Response: We share the commenters' concerns that knowledge of the precision and accuracy of a test method--and consideration of these factors for the public record--is important in developing and enforcing standards. Prior to responding to these concerns, it is appropriate to review the general procedure followed to establish a standard of performance and to understand the role of the test method to establish and determine compliance with the standard. Typically, a standard is expressed as a numerical emission limit that quantifies the performance of BDT for emission control. A data base is gathered to establish an emission limit that is achievable for the emission source being regulated. The data base is obtained with either an existing or new test method that has been devised for the pollutant and source being regulated. If the method used to develop the data base differs from the method that would be used to determine compliance,

the mathematical relationship between these methods must be known. In either case, the test method is proposed and promulgated according to the procedures outlined in §307(d) of the Clean Air Act as amended and is found either in Appendix A or in the subparts of 40 CFR Part 60. In the proposed and final standards, the accuracy and precision of the test method are documented and considered carefully.

When the visible emission standards were developed for BOPF's, a large number of visible emission observations were gathered according to the procedures of Reference Method 9. These data, which consist of more than 100 hours of observations, indicate that plumes from the roof monitors of BOPF shops are of short duration and that the performance of BDT for controlling these emissions is best characterized with an average opacity value based on a shorter, 3-minute averaging period instead of the 6-minute averaging period specified in the data reduction procedures contained in paragraph 2.5 of the reference method.

Therefore, a visible emission standard was proposed that would be based on the BOPF visible emission data base and on average opacity values calculated from 12 consecutive 15-second visible emission observations recorded by following the procedures of Reference Method 9. The proposed and final performance test procedures are also based on observing and recording visible emissions with Reference Method 9 and on calculating a 3-minute opacity average from the visible emission data.

Before 3-minute rather than 6-minute averages were proposed, the question of whether 3-minute averages are less accurate or precise than 6-minute averages was addressed. (Note that the accuracy and precision of 6-minute averages have been established and are not an issue here.) This involved analyzing and comparing the frequency of occurrence of differences between Method 9 observations (observer mean) and mean values calculated from transmissometer readings (instrument mean) for both 3- and 6-minute averaging periods. This analysis, which was included in the docket prior to proposal (II-B-92), is based on a July 1976 report that also was included in the docket prior to proposal (II-A-22). The results of this analysis are summarized in Table 2-3.

TABLE 2-3. OBSERVER ERROR FOR 3-MINUTE AND 6-MINUTE OPACITY AVERAGING[a]
(percent of total observations)

Source	3-minute average			6-minute average		
	Opacity range, %			Opacity range, %		
	0 - 5	5 - 10	10 - 15	0 - 5	5 - 10	10 - 15
Smoke generator, black smoke	36.5	1.9	0.0	35.3	0.8	0.0
Smoke generator, white smoke	36.0	8.0	0.3	31.8	7.1	0.0
Riverbend Steam Station	41.7	5.2	1.0	43.8	4.2	1.0

[a]Observer error is defined as deviation of observed average opacity from reference (transmissometer) average opacity.

SOURCE: "Examining the Properties of Qualified Observer Opacity Readings Averaged over Intervals of Less than Six Minutes," Research Triangle Institute, July 1976 (II-A-22).

The results are reported as the percentage of the total number of measurements that fall within a particular range of observer error. For example, 36.5 percent of the total number of 3-minute averages calculated for the smoke generator black smoke had an observer error of between 0 and 5 percent opacity. Note that only positive errors are reported in the table. Examination of this table reveals that the distribution of errors for 3-minute averaging is about the same as for 6-minute averaging (e.g., for generator black smoke, 36.5 percent of the calculated 3-minute averages had an observer error of 0 to 5 percent opacity as compared to 35.3 percent of the calculated 6-minute averages). Thus, the average opacities calculated on a 3-minute basis are no more subject to error than the average opacities calculated on a 6-minute basis.

With regard to the applicability of Method 9 to plumes from both stacks and roof monitors, a review of opacity theory demonstrates that quantitative conclusions about the accuracy and precision are equally valid for each.

The major factors influencing plume opacity are: particle characteristics (particle size distribution, particle density, and refractive index), particulate concentration, the background against which the emissions are viewed, the observer's position relative to the sun, and the light path length through the emission plume. Particle characteristics and particulate concentration are determined by the process operation and the emission control technology. In the steel industry, plumes are released at elevated points such as stacks and roof monitors. As a result, the background for reading the opacity of visible emissions is the same for both types of sources, generally consisting of sky, horizon, or other structures. Thus, the ability to read opacity of visible emissions from roof monitors compared to the ability to read visible emissions from stacks is not influenced by background.

While the geometry of stacks and roof monitors does differ, Reference Method 9 explicitly accounts for opacity readings from roof monitors. Stacks are generally circular and, as a result, the path length through the plume is essentially the same in all directions. Roof monitors tend to be rectangular with a long and short dimension. The light path length through the plume is different depending on whether the observer sights along the long dimension or the short dimension. When the opacity of visible emissions from roof monitors is read, paragraph 2.1 of Reference Method 9 specifically requires that observations be taken approximately perpendicular to the long dimension of the roof monitor (i.e., across the short dimension of the plume), which ensures that observed opacity is minimized. When the visible emission standards for BOPF's were developed, visible emission observations were taken from existing furnace shops with typical roof monitor designs. We have no data or other information that indicates that future roof monitor designs would be modified to cause plume path length, and thus observed opacity, to increase. Thus, the effect of path length on opacity was taken into account during development of the standards, and paragraph 2.1 of Reference Method 9 ensures that compliance with the standards is determined by reading plumes across the shorter path length.

The position of the visible emission observer with respect to the sun and the plume does affect perceived opacity due to the light-scattering effects of plumes. However, this light-scattering interference is nullified as the observer is positioned with his back to the sun as described in paragraph 2.1 of the Reference Method. This paragraph provides explicit instructions that position the observer with respect to both stacks and rectangular openings such as roof monitors. Thus, the effect of position on opacity is taken into account during development of visible emission standards.

The ability to read the opacity of visible emissions, therefore, does not depend on whether these emissions are released from stacks or roof monitors. Reference Method 9 is as applicable to plumes from roof monitors as it is to plumes from stacks.

After proposal of Subpart Na, statistical analyses of visible emission observations recently taken from roof monitors and stacks were performed to validate this conclusion further. These analyses are summarized in a memorandum entitled "Opacity Error for Different Averaging Times" (IV-B-6), which reports the results of statistical analyses of visible emissions from fugitive emission sources. The fugitive emission data were obtained mostly from iron and steel sources with BOPF shops and roof monitors being major contributors to the data base.

One statistical analysis examined the precision of observations of the opacity of a fugitive emission plume made simultaneously by two visible emission observers. For average opacity values calculated with a 6-minute averaging period, the standard deviation was 2.1 percent opacity with 93 percent of the runs having a difference between observer readings less than or equal to 7.5 percent opacity. For average opacity values calculated with a 3-minute averaging period, the standard deviation was essentially the same--2.4 percent opacity with 92 percent of the runs having a difference between observer readings less than or equal to 7.5 percent opacity. This analysis of visible emission observations of fugitive emissions therefore supports the conclusion that between-observer precision is the same for average opacity values calculated with 3- and 6-minute averaging periods.

Table 2-4, taken from the same memorandum, can be used to compare the between-observer precision of fugitive emission observations with that of stack emission observations. The stack standard deviations range from 4.3 to 9.8 percent for 3- and 6-minute averages compared to the 2.1 percent and 2.4 percent reported above for the fugitive sources. Thus, it is concluded that the variability between observers in reading opacity from roof monitors is similar to that between observers reading opacity from stacks.

TABLE 2-4. STANDARD DEVIATION OF ERROR (BETWEEN-OBSERVER PRECISION) FOR DIFFERENT AVERAGING TIMES (BY LOCATION AND SMOKE COLOR)

Averaging time	Error standard deviation (percent opacity)						
	Riverbend[a]	Florida 1[b]		Florida 2[c]		RTP[d]	
	White	Black	White	Black	White	Black	White
6 minutes	5.0	6.7	6.5	9.3	6.4	4.3	5.9
3 minutes	5.1	6.8	6.8	9.8	7.0	4.7	6.2

[a]Fossil-fuel-fired electric utility.

[b]Smoke generator--continuous plume.

[c]Smoke generator--slowly changing plume.

[d]Smoke generator--rapidly changing plume.

SOURCE: "Memorandum, P. Piserchia and J. Crowder, Research Triangle Institute, to K. Foster and B. Burton, EPA:SSCD, September 8, 1983, Opacity Error for Different Averaging Times. (IV-B-6).

In summary then, analyses performed both before and after proposal of the visible emission standard demonstrate the scientific reliability of the 3-minute averageing technique. These analyses show that average opacities calculated on a 3-minute basis are no more subject to error than opacities calculated on a 6-minute basis. Therefore, the 3-minute averaging technique is retained in the final standards.

2.5.3 Comment: (IV-D-1 and IV-D-4) Two commenters recommended the inclusion of alternative mass emission limits in the proposed standard

for roof monitors as allowed under 40 CFR 60.11(e). One commenter stated that a recently published procedure would allow measurement of mass particulate emissions from roof monitors. It was recommended that if process fugitive emissions fail to meet visible emission limits, the source should be allowed, as an alternative, to comply with measured mass emission rate estimates on which the visible emission limit is based. However, the second commenter pointed out that the option available under 40 CFR 60.11(e) is not available to BOPF shop roof emissions because the standards do not contain mass emission limits or a means for allowing the exemption.

This commenter believes that the need for such an exemption is recognized by the EPA:

> In the preamble of the proposal (p. 2666), EPA states that "Because of wide differences in operating procedures, such as the length of the steel production cycle, control technologies, vessel capacities, and other operating parameters between BOPF shops, a single emission rate that is uniformly applicable to the industry or a specific type of vessel is not practicable." This same difference applies to visible emissions and highlights the need for alternative limits.

Response: Measurements of mass emission rates from roof monitors have been performed and reported in published technical literature on several occasions. However, research to verify the accuracy and precision of a test method based on this concept would be necessary and costly. In contrast, as discussed in the response to comment 2.5.2, the use of Reference Method 9 to determine the opacity of fugitive particulate matter emissions is accurate, reliable, and relatively simple for ensuring not only the installation of BDT, but also the proper operation and maintenance of BDT.

Turning now to the comment about alternative opacity provisions of §60.11(e), the commenter is correct in noting that they do not apply to visible emission standards for BOPF's. In this instance and similar instances in other NSPS's, the standard of performance is expressed in terms of opacity without an accompanying mass emission standard. In these instances, the visible emission standard is adequate to ensure that BDT is installed and properly operated and maintained.

Section 60.11(e) applies to, and was intended to cover, situations where both mass and visible emission standards are needed to characterize the performance of BDT. In these situations, the mass emission standards are, in effect, the primary standards used to quantify the performance of BDT. The visible emission standards in these situations are established to provide a timely and inexpensive procedure to ensure that BDT is properly operated and maintained. Thus, in these situations, visible emission standards are established at a numerical level that is no more stringent than their associated mass emission standards. Section 60.11(e) was established to achieve this intent by providing a means through which a source may obtain a higher ad hoc visible emission standard when the source demonstrates compliance with the mass emission standard but is not in compliance with the visible emission standard.

In summary, the visible emission standards for BOPF's are adequate to reflect performance of BDT. Thus, for these standards--as with other single performance standards (e.g., SO_2, NO_x)--there is no basis for allowing case-by-case relaxations of the standards.

2.5.4 Comment: (IV-D-2) One commenter suggested that visible emission data presented under "Emission Testing" for Bethlehem Steel Corporation, Kaiser Steel Company, and J&L Steel Corporation may be misleadingly high because of the contributions from ancillary operations.

Response: The purpose of the roof monitor visible emissions standard is to ensure proper operation and maintenance of devices used to capture fugitive emissions from charging, tapping, hot metal transfer, hot metal skimming, and furnace operations. The data collected in support of the proposed standards were based on combined emissions escaping capture from the above sources and ancillary operations such as ladle repair, skull burning, and teeming that occurred randomly during the test program. However, the contribution of these ancillary operation emissions to observed roof monitor opacity was minimal. The reason that visible emissions from nonaffected facilities were included is that it is difficult during normal shop operations to isolate the affected facilities from nonaffected facilities. However, the intention

is not to regulate existing facilities by this means. This is evident from the provisions of §60.145a of the final rules, which permit shop operations not subject to Subpart Na to be suspended during compliance testing (for both mass and visible emissions).

As noted in the proposed rulemaking (p. 2668), Method 9 readings were taken for top-blown furnaces during the operation of these unaffected facilities. Because the visible emission standard is based on these data, compliance can be demonstrated while these operations continue. This permits compliance testing without the disruption of normal shop operations. However, the regulation does permit the shutdown of unaffected operations so that compliance can be based only on emissions from affected operations.

2.6 EMISSION TESTING AND MONITORING

2.6.1 Comment: (IV-D-4) One commenter stated that the reduced testing time for top-blown BOPF primary emissions is a strong disincentive for owners to modernize existing top-blown BOPF equipment because, then, the existing gas-cleaning device may also have to be improved. The commenter also noted that effects of primary gas-cleaning system operating parameter modification on secondary emissions were not addressed. The commenter recommended that the primary emission standard for top-blown BOPF's specified in §60.144(b)(2) be limited to newly constructed furnaces and that the effects of primary gas-cleaning system changes on secondary emissions be addressed.

Response: The intent is not to discourage the modernization of existing BOPF equipment. Modernization taking the form of modifications not increasing total particulate emissions and not exceeding the reconstruction fixed capital cost limitation of 40 CFR 60.15 may be made without subjecting the facility to the requirements of §60.144(b)(2); 40 CFR 60.14(e) also lists some physical or operational changes that are not considered modifications, irrespective of any changes in the emission rates. Beyond this, however, the intent of Section 111 is to require new, modified, or reconstructed facilities to apply BDT.

The commenter's assertion that changes in the primary control system operating parameters may affect secondary emissions is correct.

Fugitive emissions from furnace operations, not captured by the primary hood, may increase or decrease depending on the changes in primary control device operating parameters. However, the modification or reconstruction that makes the facility subject to §60.144(b)(2) also causes the facility to be subject to Subpart Na for control of secondary emissions. Compliance with both provisions of the regulation may be achieved in a number of ways, some of which do not require changes in the primary system operating parameters that would adversely affect secondary furnace emissions. It is up to the owner or operator of the facility to select the most economical means of achieving compliance for the particular situation.

2.6.2 Comment: (IV-D-2) One commenter cited §60.144(b)(1) of the primary standard, which states, "A cycle shall start at the beginning of either the scrap preheat or the oxygen blow and shall terminate immediately prior to tapping." The commenter believes a contradiction exists between this section and a statement under "Review of the Primary Standard" that says reblows would not be considered part of the primary oxygen blow under the proposed revision. He also indicated that the minimum sample volume of 32 dscf for §§60.144(b)(1) and (2) proposed for the primary standard (Subpart N) is too small and recommended a minimum volume of 60 dscf.

Response: The paragraph on page 2669 of the Federal Register proposal notice referring to reblows not being considered part of the primary oxygen blow refers to the proposed revisions to existing Subpart N for primary emissions from BOPF's. It is the intent that the revisions discussed under "Review of the Primary Standard," which require mass testing only during the primary blow, apply only to facilities that commence construction, modifications, or reconstruction after January 20, 1983, as stated in §60.144(b)(2). Affected facilities commencing construction, modifications, or reconstruction on or before January 20, 1983, must sample in accordance with the provisions as described in §60.144(b)(1), which require testing during the steel production cycle, including reblows. Therefore, no contradiction exists.

As a result of a review of the proposed minimum sample volume specified in §60.144(b)(1) and 60.144(b)(2) of the primary standard, the required minimum sample volume has been increased from 0.9 dscm (32 dscf) to 1.5 dscm (53 dscf). The minimum sample volume was revised to provide an allowance for a 50-mg particulate catch on the sampling train filter, taking into account collection of particulate matter in the nozzle and on the walls of the sampling probe. This increase in minimum sample volume is needed to maintain test precision. The minimum sample volume was not increased to 60 dscf because 1.5 dscm (53 dscf) was judged to be sufficient to provide the 50-mg particulate catch without unnecessarily increasing the test length and the cost of performance testing. These revised sample volume requirements are applicable to facilities constructed, modified, or reconstructed after January 20, 1983, and to existing affected facilities subject to Subpart N (i.e., those BOPF's constructed, modified, or reconstructed after June 11, 1973, but on or before January 20, 1983). As proposed, shorter sampling times and smaller sample volumes would be allowed, subject to approval by the Administrator, when necessitated by process variables or other factors.

2.6.3 Comment: (IV-D-2) One commenter suggested that performance tests for secondary mass emission limitations should be performed only during portions of the production cycle that include a specific secondary emission activity; e.g., hot metal charging. The commenter stated that inclusion of other low-emitting portions of the production cycle, such as scrap charge, dilutes the sample. To accommodate his suggested change, the commenter recommended the use of a high-volume Method 5 sampler to compensate for the difficulty of obtaining sufficient sample from operations of such short durations. If high-volume Method 5 samplers are not required, the commenter recommended that the minimum sampling volume be increased from 80 dscf to 160 dscf to minimize sample recovery errors and to maintain reasonable precision from test to test.

Response: The possibility of sampling the secondary emission controls system only during the occurrence of high-emission operations,

such as hot metal charging, tapping, and hot metal transfer, was considered during the development of the proposed standard. However, most of the test data available on particulate concentrations at the outlet from fabric filters serving secondary emission sources were not obtained in this manner, but rather by sampling over both high- and low-emitting portions of the cycle.

Because the secondary emission operations of hot metal transfer and skimming may occur independently of furnace operations and be ducted to the same secondary control device, limiting emission testing to just the typically high-emitting secondary operations unnecessarily complicates the performance tests. For both of these reasons, sampling was proposed over the entire steel production cycle. Because it is believed that sampling over the entire steel production cycle is appropriate, no further consideration was given to the use of high-volume Method 5 sampling trains. However, the minimum required sampling volume for each sample run has been increased from 2.27 dscm (80 dscf) to 5.67 dscm (200 dscf). This change has been made to ensure that adequate particulate matter is sampled to maintain test precision. A new provision was also added to the final rules, which allows shorter sampling times and lower sample volumes when necessitated by process variables or other factors, subject to approval by the Administrator.

In regard to Method 5, it should be recognized that a new Method 5d was proposed recently for use with positive-pressure baghouses (48 FR 37354, August 17, 1983). Although the final standards cannot require the use of Method 5d until the Method is promulgated, owners and operators of positive-pressure baghouses may choose to take advantage of §60.13(i) of the NSPS General Provisions, which allows the use of alternative test methods.

2.6.4 Comment: (IV-D-2) One commenter stated that if it is agreed that emissions from the secondary control device should be sampled only during high-emitting portions of the production cycle, EPA Reference Method 2 should be revised. The basis for this comment is that velocity readings provided by noncontinuous sampling would not yield accurate flow rate data. The commenter believes that accurate flow

rate data, while not essential to the proposed concentration standard, will be necessary to calculate emission rates for State or local agency standards. The commenter also recommended a continuous flow rate monitoring device to assist in determination of mass emission rates.

Response: For the reasons stated in the response to the previous comment, disagreement exists concerning the commenter's view that secondary emission sampling should be conducted only during high-emitting portions of the steel production cycle. It is believed that velocity readings obtained continuously during Method 5 sampling will provide an adequate basis for estimating the mass emission rate from the secondary control device over the entire production cycle. The proposed regulation would not preclude State or local agencies from adopting their own requirements for flow rate measurements needed to determine compliance with their emission standards.

The monitoring provisions of §60.143a require the owner or operator to install a monitoring device or devices to continually monitor and record the various rates or levels of exhaust ventilation through each duct of the secondary emission control system for each phase of each steel production cycle. The monitoring and recording of ventilation rates or levels will ensure proper operation and maintenance of the secondary emission capture system. Other revisions made to the monitoring requirements since proposal are discussed in the response to comment 2.7.3. The commenter's suggestion that the continuous flow rate monitor can be used to determine volumetric flow rate during a stack test and subsequent calculation of mass emission rate may be useful to State or local agencies with mass emission rates rather than concentration standards.

2.6.5 Comment: (IV-D-2) One commenter agreed that process monitoring should be required during all compliance testing but believed a list of process variables and control device variables that could affect the results of a test should be included for use during testing.

Response: We agree that such a list would be helpful to monitor the process and control device operations properly during performance

testing. However, the variety of emission control system designs and the variation of process equipment and operations in plants make the development of a universally applicable and comprehensive list a difficult task. Furthermore, the use of a universally applicable list suggests that information may be requested from a plant that will not be useful in its specific case, therefore increasing the associated testing burden for the owner or operator of this facility. For these reasons, it was decided not to publish a list of recommended or required process and control device variables to be monitored.

2.6.6 Comment: (IV-D-2) One commenter suggested that the steel production cycle should not be used to characterize BOPF secondary visible emissions from hot metal charging, tapping, hot metal transfer, and skimming. The commenter suggested using those individual operations as the basis for characterization. He stated that this would provide more realistic data on the effectiveness of controls for these specific operations, rather than the visible emission effects of unregulated ancillary operations.

Response: In the initial analyses of roof monitor visible emission test data, the characterization of the data on the individual operation basis was considered, as suggested by the commenters. Other approaches to characterizing the data were considered as well. Use of the steel production cycle as the basis for characterization was selected for two reasons. One reason was that the secondary emission control systems may be used to control emissions from several secondary sources, especially in newer plants when closed hood primary control systems are selected. With such a secondary system, several secondary process operations may occur simultaneously, sometimes related to two furnace vessels, hampering the effort to obtain visible emission data for separate secondary emission processes. The second reason was that roof monitor visible emissions lag behind the actual process operation that generates them. Determining when to cease observations because all emissions from the particular secondary operations have left the roof monitor is difficult. The fact that five potential secondary emission sources exist, including puffing emissions escaping the

primary hood, compounds this problem. Using the steel production cycle to characterize these secondary emissions minimizes or eliminates the above difficulties.

The commenter's point about the effect of unregulated ancillary operations on observed secondary visible emissons from regulated sources is addressed in the response to comment 2.5.4.

2.7 EQUIPMENT, DESIGN, AND OPERATING SPECIFICATIONS

2.7.1 Comment: (IV-D-2) One commenter agreed with the preamble (p. 2661) that the use of operating practices conducive to lesser fume generation is very important in reducing secondary emissions. These practices include the use of clean scrap, slow pouring techniques, careful positioning of the hot metal ladle, and proper furnace tilt angle. However, this commenter questioned why these practices are not required by the proposed standards to ensure successful secondary emissions control.

Response: Section 111(h)(1) of the Clean Air Act provides that, "If in the judgment of the Administrator, it is not feasible to prescribe or enforce a standard of performance, he may instead promulgate a design, equipment, work practice, or operational standard, or combination thereof, which reflects the best technological system of continuous emission reduction that (considering the cost of achieving such emission reduction and any nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated . . . ."

The phrase "not feasible to prescribe or enforce" means "any situation in which the Administrator determines that (A) a pollutant or pollutants cannot be emitted through a conveyance designed and constructed to emit or capture such pollutant, or that any requirement for, or use of, such a conveyance would be inconsistent with any Federal, State, or local law, or (B) the application of measurement methodology to a particular class of sources is not practicable due to technological or economic limitations" [111(h)(1)-(2)].

As explained at 48 FR 2658, the proposed standards of performance were based on BDT for BOPF's and hot metal transfer and skimming

stations. For secondary emissions from a top-blown furnace, the open hood primary emission control system that also controls secondary emissions was selected as BDT. For hot metal transfer and skimming stations, local hooding ducted to a baghouse was selected as BDT.

For each affected facility, particulate matter can be captured via the primary or secondary hood. Measurement methodology (Reference Method 5) is available to ascertain the concentration of particulate matter at the outlet of the collection device. Because it is feasible to prescribe and enforce a standard of performance for this source category, an emission limit format was selected for BOPF collection devices in lieu of specifying work practice or equipment, design, and operational requirements. Opacity limits are also included as a supplement to the concentration limits because visible emissions act as a good indicator of the secondary emission control system performance and as an indicator of proper operation and maintenance of the device.

While it is true that the application of these practices is conducive to lesser fume generation, the total impact of these practices on resulting emission reductions for all types of BOPF's is not clear. Many of the work practices were observed at the J&L/Aliquippa and Bethlehem/Bethlehem shops, both of which use a primary hood to control secondary emissions from top-blown furnaces. Application of these practices appeared beneficial in secondary emission control for these systems. However, it is not clear that these practices resulted in a significant impact on secondary emission control at the top-blown/closed hood system at Kaiser/Fontana.

Because the impact of these practices on the secondary control system for each type of furnace or control system cannot be fully quantified in terms of the resulting emission reductions, the standard does not require their application to supplement the secondary emission control afforded by the application of BDT. Consequently, the implementation of these practices may not be necessary to achieve the emission limits, whether concentration or opacity. This should not imply that any good operating practices consistent with minimizing emissions should not be applied to the extent practicable, as required

under §60.11(d). For example, these practices may have a significant impact for open hood primary systems used to control secondary emissions; and although the degree of impact on other types of systems is unclear, the application of these practices is encouraged for each BOPF facility, whether or not subject to the standards of performance.

2.7.2 Comment: (IV-D-2) One commenter agreed with the preamble (p. 2661) that a separate capture and collection system is necessary for a closed hood primary system controlling secondary emissions from the furnace in order for the closed hood system to achieve a control efficiency similar to that of the open hood system. The proposed capture system for closed hood systems consists of a furnace enclosure evacuated by auxiliary hooding ducted to a high-efficiency collection device, such as a baghouse. The commenter recommended that minimum guidelines for hood size and extensions and for fan evacuation capacity be established, based on data from existing systems that meet the proposed standards.

Response: As explained in the response to comment 2.7.1, a numerical emission limit was selected as the format of the standard in lieu of work practices or equipment, design, and operating specifications. This approach offers certain advantages compared to equipment and design specifications (e.g., hood size and fan evacuation capacity) because any equipment capable of meeting the emission limits can be used to achieve compliance. In addition, the operating parameters of the equipment can be tailored to meet the needs of the particular facility. Designs and operating specifications for secondary emission control systems are expected to vary according to the type of vessel and the differences in operating parameters and procedures among existing shops. For example, shop structure could influence the size or location of auxiliary hooding. Also, fan evacuation capacity specifications may vary, depending on the amount of dilution air entrained into the system. Because of the differences in design and operating parameters among BOPF shops, the establishment of equipment and design specifications based on data from existing shops could limit the flexibility needed by BOPF owners and operators, particularly

in retrofit situations. For these reasons, equipment, design, or operational requirements are not included in the promulgated standards.

2.7.3 Comment: (IV-D-2) This commenter agreed that the exhaust ventilation rate is an important monitoring parameter to determine if the secondary capture system is operating effectively. However, he suggested that a baghouse pressure drop monitoring device also be considered. The addition of this device would ensure that the baghouse is being properly cleaned and is working at the design air-to-cloth ratio for the effective removal of captured emissions.

Response: As explained at 48 FR 2667, Clean Air Act requirements relating to the operation and maintenance of a source are generally included in new source standards of performance in the form of monitoring requirements. The operating parameters selected for monitoring requirements should be related to the performance of the emission control system and should be parameters that can be monitored without an unreasonable burden on the owner or operator.

Both exhaust ventilation rate and baghouse pressure drop are considered good indicators of the effectiveness of the secondary emission control system. However, a drop in exhaust ventilation rate is the better indicator of the control system performance, while baghouse pressure drop is the better indicator of the performance of the collection device. Exhaust ventilation rate or level was selected as the monitoring parameter because it provides a better indicator of overall secondary emission control system performance.

In regard to the secondary emission collection device, however, the opacity limit of 5 percent serves to supplement the monitoring requirement for exhaust ventilation rate or level. The opacity limit is also a good indicator of the effectiveness of the secondary emission collection device because degredation in baghouse performance will result in increased opacity. The monitoring of exhaust ventilation rate or level, coupled with the opacity limit, would provide a good indication of both the control system performance and the effectiveness of the collection device. Consequently, it appears unnecessary to require the continual monitoring and recording of both exhaust

ventilation rate and baghouse pressure drop. Also, most new baghouse systems are equipped with pressure drop indicators. Although these indicators do not provide a continual record, they are considered sufficient to signal potential operating or maintenance needs for a baghouse before increased opacity results.

Review of the requirement for monitoring of exhaust ventilation rate as the secondary emissions monitoring parameter resulted in an examination of new monitoring systems for application to BOPF's. New, inexpensive systems are now available that allow the owner or operator to measure and record changes in the level of exhaust ventilation through the system. The cost of the entire monitoring and recording system is estimated at less than $2,000, with backpurge, for each installation. For this reason, the final regulation was modified to require the monitoring and recording of the various exhaust rates or the monitoring and recording of the exhaust levels through each duct of the system.

The compliance provisions were also expanded in the final rules to require that during compliance testing of a single furnace at a shop that normally operates two furnaces with overlapping cycles, the owner or operator must maintain an exhaust ventilation rate or level in each duct of the secondary emission control system that is appropriate for single-furnace operation. After the compliance test, the owner or operator must maintain for each duct exhaust ventilation rates or levels that are no lower than 90 percent of the values established during the most recent compliance test. Monitoring records indicating lower rates (or levels) through the ducts may indicate improper operation or maintenance of the system. The owner or operator must also report, on a semiannual basis, all measurements over any 3-hour period that average more than 10 percent below the average levels maintained during the most recent compliance test for determining compliance with the mass standard for secondary emission collection devices. A similar provision requiring semiannual reporting also was added to the final standards for monitoring results of scrubber pressure drop. This requirement would apply if a scrubber primary emission control device were used to collect secondary emissions.

Other revisions to the monitoring requirements since proposal include the use of the term "continual" monitoring rather than "continuous" monitoring to avoid confusion with the type of continuous monitoring system defined under §60.2 of NSPS General Provisions. Also, a new provision was added to the final standards that requires the owner or operator to place the monitoring device (or devices) at capture points for the secondary emission control system; alternative locations for the monitoring device(s) must be approved in advance by the Administrator. The final standards also include a provision for the use of a strip chart recorder, the most common form of recordkeeping. This provision would require that if a strip chart recorder is used, it must be operated at a minimum chart speed of 3.8 cm/hr (1.5 in./hr).

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15. SUPPLEMENTARY NOTES

16. ABSTRACT

A New Source Performance Standard for secondary emissions of particulate matter from basic oxygen process furnace (BOPF) steelmaking shops is being promulgated under authority of Section 111 of the Clean Air Act. This final action is applicable to secondary emissions from any top-blown BOPF and to any hot metal transfer station or skimming station used for a bottom-blown or top-blown BOPF, for which construction, reconstruction, or modification commenced after January 20, 1983. The purpose of the final standard is to minimize BOPF secondary particulate emissions to the level attainable with the best demonstrated technology. Amendments to the existing BOPF primary standard (40 CFR 60.140, Subpart N) are also being promulgated. These amendments to Subpart N apply to primary emissions from BOPF's constructed, reconstructed, or modified after June 11, 1983, and for BOPF's constructed, reconstructed, or modified after January 20, 1983.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
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