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EPA

National Emission Standards for Hazardous Air Pollutants;

Proposed Standards for Hazardous Air Pollutants from Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills

U. S. ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 63

[AD-FRL-]

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS; PROPOSED STANDARDS FOR HAZARDOUS AIR POLLUTANTS FROM CHEMICAL RECOVERY COMBUSTION SOURCES AT KRAFT, SODA, SULFITE, AND STAND-ALONE SEMICHEMICAL PULP MILLS

AGENCY: Environmental Protection Agency (EPA)

ACTION: Proposed Rule and Notice of Public Hearing

SUMMARY: This action proposes national emission standards for hazardous air pollutants (NESHAP) for the pulp and paper production source category under section 112 of the Clean Air Act as amended (CAA). The proposed standards focus on reducing hazardous air pollutants (HAP's) from new and existing sources used in chemical recovery processes at kraft, soda, sulfite, and stand-alone semichemical pulp mills. The intent of the proposed standards is to protect the public health and the environment by reducing HAP emissions to the level corresponding to the maximum achievable control technology (MACT). The proposed standards would reduce HAP emissions by about 2,600 megagrams per year (Mg/yr) (2,800 tons per year [tons/yr]). In addition, emissions of criteria pollutants

such as particulate matter (PM) and volatile organic compounds (VOC's) would be reduced by about 56,400 Mg/yr (62,100 tons/yr).

DATES: Comments. The EPA will accept written comments on the proposed rule until [insert 60 days after publication in the FEDERAL REGISTER].

Public Hearing. If requested, EPA will hold a public hearing concerning the proposed rule beginning at 10 a.m. on [contact Ms. Cathy Coats at (919) 541-5422 for date to be inserted in the FEDERAL REGISTER notice] at the EPA Office of Administration Auditorium, Research Triangle Park, North Carolina. Requests to present oral testimony must be made by [insert date 3 weeks after publication in the FEDERAL REGISTER]. These requests should be submitted to Ms. Cathy Coats, Minerals and Inorganic Chemicals Group (MD-13), Emission Standards Division, U. S. Environmental Protection Agency, Research Triangle Park, NC 27711, telephone number (919) 541-5422. Persons interested in attending the hearing should call Ms. Coats to verify that a hearing will be held.

ADDRESSES: Comments. Interested parties may submit written comments (in duplicate, if possible) to Public Docket No. A-94-67 at the following address: U. S. Environmental Protection Agency, Air and Radiation Docket and Information Center, 401 M Street, SW., Washington, D.C. 20460. The EPA requests that a separate copy of the comments also be sent to the contact person listed below in the "FOR FURTHER INFORMATION CONTACT" section.

Comments may also be submitted electronically by sending electronic mail (e-mail) to: a-and-r-docket@epamail.epa.gov. Electronic comments must be submitted as an ASCII file avoiding the use of special characters and any form of encryption. Comments will also be accepted on diskette in WordPerfect 5.1 or ASCII file format. All comments in electronic form must be identified by the docket No. A-94-67. No confidential business information should be submitted through e-mail. Electronic comments may be filed online at many Federal Depository Libraries.

Docket. The docket (No. A-94-67) is available for public inspection and copying from 8:30 a.m. to noon and from 1 to 3 p.m., Monday through Friday at EPA's Air and

Radiation Docket and Information Center, Waterside Mall, Room M-1500 (ground floor), 401 M Street, SW., Washington, D.C. 20460. The following documents and other supporting materials related to this rulemaking are available for review in the docket center: Technical Support Document: Chemical Recovery Combustion Sources at Kraft and Soda Pulp Mills (docket No. II-A-31); Technical Support Document: Chemical Recovery Combustion Sources at Sulfite Pulp Mills (docket No. II-A-28); Profile of U.S. Stand-Alone Semichemical Pulp Mills Memo (docket No. II-B-70); Nationwide Baseline HAP Emissions for Combustion Sources at Stand-Alone Semichemical Pulp Mills Memo (docket No. II-B-67); Nationwide Costs, Environmental Impacts and Cost-Effectiveness of HAP Control Options for Combustion Sources at Stand-Alone Semichemical Mills Memo (docket No. II-B-69); the Nationwide Costs, Environmental Impacts, and Cost-Effectiveness of Regulatory Alternatives for Kraft, Soda, Sulfite, and Semichemical Combustion Sources Memo (docket No. II-B-63); the Economic Analysis for the National Emission Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production; Effluent Limitations Guidelines, Pretreatment Standards, and New Source

Performance Standards: Pulp, Paper, and Paperboard Category--Phase I (docket No. II-A-32); the State of Washington PM Data for Kraft Recovery Furnaces, Smelt Dissolving Tanks, and Lime Kilns Memo (docket No. II-B-59); and the State of Washington PM Data for Sulfite Combustion Units Memo (docket No. II-B-40). Also, copies of this information may be obtained from the Air Docket upon request by calling (202) 260-7548 or sending a FAX to (202) 260-4000. A reasonable fee may be charged for copies of docket materials.

The preamble and the regulatory text for this proposed NESHAP for chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semichemical pulp mills also are available on the Technology Transfer Network (TTN), one of EPA's electronic bulletin boards. The TTN provides a forum for technological and regulatory exchange in various areas of air pollution control. The service is free, except for the cost of a phone call. Dial (919) 541-5742 for up to a 14,400 baud rate modem. If more information on the TTN is needed, call the TTN help line at (919) 541-5384.

FOR FURTHER INFORMATION CONTACT: Mr. Jeff Telander, Minerals and Inorganic Chemicals Group, Emissions Standards Division (MD-13), U. S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5427.

SUPPLEMENTARY INFORMATION: Regulated entities. Entities potentially regulated by this proposed rule are those kraft, soda, sulfite, and stand-alone semichemical pulp mills with chemical recovery processes that involve the combustion of spent pulping liquor. Regulated categories and entities are listed below in Table 1.

TABLE 1. REGULATED CATEGORIES AND ENTITIES

Category	Examples of regulated entities
Industry	kraft pulp mills soda pulp mills sulfite pulp mills stand-alone semichemical pulp mills

Table 1 is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to regulated by this action. Table 1 lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not

listed in the table could also be regulated. To determine whether your facility is regulated by this action, you should carefully examine the applicability criteria in § 63.860. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding "FOR FURTHER INFORMATION CONTACT" section.

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I. Statutory Authority

The statutory authority for this proposal is provided by sections 101, 112, 114, 116, and 301 of the Clean Air Act, as amended (42 U.S.C. 7401, 7412, 7414, 7416, and 7601).

II. Introduction

A. Background

On February 23, 1978, EPA promulgated new source performance standards (NSPS) to limit emissions of PM and total reduced sulfur (TRS) compounds from new, modified, and reconstructed kraft pulp mills under authority of section 111 of the Act (43 FR 7568). In addition, EPA issued retrofit guidelines in 1979 for control of TRS emissions at existing kraft pulp mills not subject to the NSPS. The NSPS for kraft pulp mills limit TRS emissions from recovery furnaces, smelt dissolving tanks (SDT's), lime

kilns, digesters, multiple effect evaporators, black liquor oxidation (BLO) systems, brownstock washers, and condensate strippers that were constructed, modified, or reconstructed after September 24, 1976. The standards also limit PM emissions from recovery furnaces, SDT's, and lime kilns that were constructed, modified, or reconstructed after September 24, 1976. As required under section 111(a) of the Act, these standards reflected the application of the best technological system of continuous emission reduction that the Administrator determined had been adequately demonstrated (taking into consideration the cost of achieving such emission reduction, and any nonair quality health and environmental impacts and energy requirements).

Revisions to these standards were promulgated on May 20, 1986 (51 FR 18538). The revisions exempted BLO systems from the TRS standards; revised the existing TRS limit and format of the standard for SDT's; deleted the requirement to monitor the combustion temperature in lime kilns, power boilers, and recovery furnaces; changed the frequency of excess emission reports from quarterly to semiannually; and exempted diffusion washers from the TRS standard for brownstock washers. The revisions also

required that monitored emissions be recorded and specified the conditions [§ 60.284(e)] under which excess emissions would not be deemed a violation of § 60.11(d). Today's action does not revise or change the TRS requirements of the NSPS. However, today's standards do include PM emission limits, as a surrogate for measuring PM HAP emissions, for combustion sources (existing and new) in the chemical recovery area of the mill.

On December 17, 1993, EPA proposed (1) effluent limitations guidelines and standards for the control of wastewater pollutants for the pulp and paper industry and (2) NESHAP for noncombustion sources in the pulp and paper industry (58 FR 66078), otherwise referred to as "MACT I." The emission points covered in the proposed NESHAP for noncombustion sources were limited to process units in the pulping and bleaching processes (e.g., digesters, bleaching towers, and associated tanks) and in the associated wastewater collection and treatment systems at mills that chemically pulp wood fiber using kraft, sulfite, soda, or semichemical methods. In March 1996, EPA proposed to include for regulation additional noncombustion operations and mills not covered under the December 17, 1993 proposal

(e.g., mechanical pulping, pulping of secondary fiber by nonchemical means, nonwood pulping, and paper machines), otherwise referred to as "MACT III" (61 FR 9383). The NESHAP for noncombustion sources and the effluent guidelines are being promulgated as part of today's integrated rule, "NESHAP for Source Category: Pulp and Paper Production; Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Pulp, Paper, and Paperboard Category." This proposed NESHAP for chemical recovery combustion sources at kraft, soda, sulfite and stand-alone semichemical pulp mills, otherwise referred to as "MACT II," does not revise or change the requirements of the NESHAP for noncombustion sources that is being promulgated today.

B. NESHAP for Source Categories

Section 112 of the Act provides a list of 189 HAP's and directs EPA to develop rules to control HAP emissions from both new and existing major sources. The Act requires that the rules be established by categories of emission sources considering all HAP's emitted, rather than establishing rules based on the emission of a single pollutant from a source category. The statute also requires that the

standards reflect the maximum degree of reduction in emissions of HAP's that is achievable, taking into consideration the cost of achieving such emission reduction and any nonair quality health and environmental impacts and energy requirements. This level of control is commonly referred to as MACT.

In addition, the Act sets out specific criteria to be considered for establishing a minimum level of control and criteria (incremental cost, energy impacts, etc.) for evaluating control options more stringent than the minimum level of control. This minimum level of control is commonly referred to as the MACT "floor." The MACT floor for new sources, as specified by the Act, is "the emission control that is achieved in practice by the best controlled similar source." The MACT floor for existing sources, as specified by the Act, is the average emission limitation achieved by the best performing 12 percent of existing sources in each category or subcategory of 30 or more sources (CAA section 112(d)(3)). For smaller categories or subcategories, the Act specifies that standards shall not be less stringent than the average emission limitation achieved by the best performing five sources in the category or

subcategory. These floor determinations are based on data available to the Administrator at the time the standards are developed. The statutory provisions do not limit how the standard is set, beyond requiring that it be applicable to all sources in a category or subcategory and at least as stringent as the MACT floor. The emission standards are to be reviewed and revised as necessary no less often than every 8 years. Also, EPA may later promulgate more stringent standards to address any unacceptable health or environmental risk that remains after the imposition of controls resulting from today's standards (CAA section 112(f)).

C. Health Effects of Pollutants

The Clean Air Act was created in part "to protect and enhance the quality of the nation's air resources so as to promote the public health and welfare and the productive capacity of its population" (CAA section 101(b)(1)). Title III of the Act establishes a technology-based control program to reduce stationary source emissions of HAP's. The goal of section 112(d) is to apply such control technology to reduce emissions and thereby reduce the hazard of HAP's emitted from stationary sources.

This proposed rule is technology-based (i.e., based on MACT). The MACT strategy avoids dependence on a risk-based approach as a pre-requisite for regulating air toxics. Such risk assessments are limited by incomplete information on what HAP's are emitted, what level of emissions is occurring, what health and safety benchmarks are available to assess risk, what health effects may be caused by certain pollutants, and how best to model these effects, among other things. Because of these issues, a quantitative risk assessment of potential effects from all of the HAP's emitted from pulp and paper combustion sources is not included in this rulemaking. However, as described in section IV.D.3.d of this preamble, an exposure assessment was conducted to determine if current emissions of hydrogen chloride (HCl) from pulp and paper combustion sources result in exposures that provide an ample margin of safety.

The EPA does recognize that the degree of adverse effects to health can range from mild to severe. The extent and degree to which health effects may be experienced is dependent upon (1) ambient concentrations observed in the area, (2) duration of exposures, and (3) characteristics of exposed individuals (e.g., genetics, age, pre-existing

health conditions, and lifestyle) which vary significantly with the population. Some of these factors are also influenced by source-specific characteristics (e.g., emission rates and local meteorological conditions) as well as pollutant-specific characteristics.

Available emission data, collected during development of this proposed rule, show that metals, various organic compounds, and HCl are the most significant HAP's emitted from pulp and paper combustion sources. Following is a summary of the potential health and environmental effects associated with exposures, at some level, to these emitted pollutants.

Almost all metals appearing on the section 112(b) list are emitted from pulp and paper combustion sources. These metals can cause a range of effects, including mucous membrane effects (e.g., bronchitis, decreased lung function), gastrointestinal effects, nervous system disorders (from cognitive effects to coma or even death), skin irritation, and reproductive and developmental disorders. Additionally, several of the metals accumulate in the environment and in the human body. Cadmium, for example, is a cumulative pollutant that can cause kidney

effects after cessation of exposure. Similarly, the onset of effects from beryllium exposure may be delayed by months to years. Further, some of the metal compounds have been classified by EPA as known (e.g., arsenic and chromium (VI)) or probable (e.g., cadmium and beryllium) human carcinogens.

All forms of mercury, a volatile metal, may be characterized as quite toxic, with different health effects associated with different forms of the pollutant. Methyl mercury is the most toxic form of mercury to which humans and wildlife generally are exposed. Exposure to methyl mercury occurs primarily through the aquatic food chain. The target organ for methyl mercury toxicity in humans is the nervous system. The range of neurotoxic effects can vary from subtle decrements in motor skills and sensory ability to tremors, inability to walk, convulsions, and death. Exposure to inorganic mercury is associated with renal impairment. Some forms of mercury have also been classified as possible human carcinogens. Exposure to mercury compounds can also cause effects in plants, birds, and nonhuman mammals. Reproductive effects are the primary concern for avian mercury poisoning.

Organic compounds emitted from pulp and paper combustion sources include acetaldehyde, benzene, formaldehyde, methyl ethyl ketone, methyl isobutyl ketone, methanol, phenol, styrene, toluene, and xylenes. These organic compounds have a range of potential health effects associated with exposure at some level. Some of the effects associated with short-term inhalation exposure to these pollutants are similar and include irritation of the eyes, skin, and respiratory tract in humans; central nervous system effects (e.g., drowsiness, dizziness, headaches, depression, nausea, irregular heartbeat); reproductive and developmental effects; and neurological effects. Exposure to benzene and methyl isobutyl ketone at extremely high concentrations may lead to respiratory paralysis, coma, or death. Human health effects associated with long-term inhalation exposure to the organic compounds listed above may include mild symptoms such as nausea, headache, weakness, insomnia, intestinal pain, and burning eyes; effects on the central nervous system; disorders of the blood; toxicity to the immune system; reproductive disorders in women (e.g., increased risk of spontaneous abortion);

developmental effects; gastrointestinal irritation; liver injury; and muscular effects.

In addition to the noncancer effects described above, some of the organic HAP's emitted from pulp and paper combustion sources have been classified by EPA as either known (e.g., benzene) or probable (e.g., acetaldehyde and formaldehyde) human carcinogens.

Hydrogen chloride is an inorganic HAP which is highly corrosive to the eyes, skin, and mucous membranes. Short-term inhalation of HCl by humans may cause coughing, hoarseness, inflammation and ulceration of the respiratory tract, as well as chest pain and pulmonary edema if exposure exceeds threshold concentrations. Long-term occupational exposure of humans to HCl has been reported to cause inflammation of the stomach, skin, and lungs, and photosensitization.

The health and environmental effects associated with exposure to PM and ozone are described in EPA's Criteria Documents, which support the national ambient air quality standards (EPA 1996, "Air Quality Criteria for Ozone and Related Photochemical Oxidants," EPA-600/P-93-004, RTP, NC; EPA 1996, "Air Quality Criteria for Particulate Matter,"

EPA-600/P-95-001, RTP, NC). Briefly, PM emissions have been associated with aggravation of existing respiratory and cardiovascular disease and increased risk of premature death. Volatile organic compounds are precursors to the formation of ozone in the ambient air. At ambient levels, human laboratory and community studies have shown that ozone is responsible for the reduction of lung function, respiratory symptoms (e.g., cough, chest pain, throat and nose irritation), increased hospital admissions for respiratory causes, and increased lung inflammation. Animal studies have shown increased susceptibility to respiratory infection and lung structure changes.

Studies have shown that exposure to ozone can cause foliar injury and disrupt carbohydrate production and distribution in plants. The reduction in carbohydrate production and allocation can lead to reduced root growth, reduced biomass or yield production, reduced plant vigor (which can increase susceptibility to attack from insects and disease and damage from cold), and diminished ability to successfully compete with more tolerant species. These effects have been observed in native vegetation in natural

ecosystems and in a selected number of commercial trees and agricultural crops.

D. Industry Profile

There are currently 122 kraft, 2 soda, 15 sulfite, and 14 stand-alone semichemical pulp mills in the United States. The majority (52 percent) of kraft mills are located in the Southeastern United States. The two soda pulp mills are located in Tennessee and Pennsylvania. The majority of sulfite mills (67 percent) are located in Washington and Wisconsin. Half of all stand-alone semichemical pulp mills are located in the Midwestern United States.

The kraft process is the dominant pulping process in the United States. The kraft and soda processes account for approximately 82 percent of all domestic pulp production; sulfite and stand-alone semichemical processes account for approximately 2 and 6 percent of the domestic pulp production, respectively.

Numerous HAP compounds are emitted from combustion sources in the chemical recovery area at kraft, soda, sulfite, and stand-alone semichemical pulp mills. The HAP compounds emitted in the largest quantities are methanol and

HCl. Methanol and HCl account for approximately 70 percent of the total HAP's emitted from the chemical recovery area.

All of the kraft, soda, sulfite, and stand-alone semichemical pulp mills are believed to be major HAP emission sources (i.e., emissions greater than or equal to 9.1 Mg/yr [10 tons/yr] for an individual HAP or 23 Mg/yr [25 tons/yr] for total HAP's). In most cases, HAP emissions from combustion sources in the chemical recovery area alone are sufficient to characterize these mills as major sources.

III. Summary of Proposed Standards

A. Applicability

The proposed standards apply to all existing and new kraft, soda, sulfite, and stand-alone semichemical pulp mills with chemical recovery processes that involve the combustion of spent pulping liquor. Specifically, the sources that are regulated by today's proposed standards are (1) nondirect contact evaporator (NDCE) recovery furnaces, direct contact evaporator (DCE) recovery furnace systems, SDT's, and lime kilns at kraft and soda pulp mills; (2) sulfite combustion units at sulfite pulp mills; and (3) semichemical combustion units at stand-alone semichemical pulp mills.

All existing kraft and soda pulp mills have chemical recovery processes that involve the combustion of spent pulping liquor. However, several existing sulfite and stand-alone semichemical pulp mills do not recover pulping chemicals by combusting spent liquor. Three of the 15 sulfite mills use a calcium-based sulfite process and do not have chemical recovery combustion units and, thus, would not be impacted by this proposed rule. One of the 14 stand-alone semichemical pulp mills burns spent liquor in a power boiler and does not have chemical recovery; therefore, that mill also would not be impacted by this proposed rule.

B. Emission Limits and Requirements

Today's proposed standards would regulate PM HAP emissions and/or total gaseous organic HAP emissions for chemical recovery combustion sources in the pulp and paper source category. The proposed emission standards are summarized in Table 2.

TABLE 2. SUMMARY OF PROPOSED EMISSION STANDARDS[a]

Subcategory	Emission point	PM HAP standard		Alternate PM HAP standard ("bubble")		Total gaseous organic HAP standard	
		Existing	New	Existing	New	Existing	New
Kraft and soda	Recovery furnaces (NDCE and DCE)	PM ≤ 0.10 gr/dscm (0.044 gr/dscf) at 8% O_2 OR PM HAP ≤ 1.00E-03 kg/Mg (2.01E-03 lb/ton) BLS	PM ≤0.034 g/dscm (0.015 gr/dscf) at 8% O_2	Mill-specific PM or PM HAP emission limit [kg/Mg (lb/ton) BLS] based on calculated value of the sum of the individual emission limits for recovery furnaces, smelt dissolving tanks, and lime kilns. See equations 1 and 2 in section III.B.1.	No "bubble" alternate standard for new sources	No standard	Total gaseous organic HAP ≤ 0.012 kg/Mg (0.025 lb/ton) BLS (as measured by methanol)
	Smelt dissolving tanks	PM ≤ 0.10 kg/Mg (0.20 lb/ton) BLS OR PM HAP ≤ 6.20E-05 kg/Mg (1.24E-04 lb/ton) BLS	PM ≤ 0.06 kg/Mg (0.12 lb/ton) BLS			No standard[b]	No standard[b]
	Lime kilns	PM ≤ 0.15 g/dscm (0.067 gr/dscf) at 10% O_2 OR PM HAP ≤ 6.33E-03 kg/Mg (1.27E-02 lb/ton) CaO	PM ≤ 0.023 g/dscm (0.010 gr/dscf) at 10% O_2			No standard[b]	No standard[b]
Sulfite	Sulfite combustion units	PM ≤ 0.092 g/dscm (0.040 gr/dscf) at 8% O_2	PM ≤ 0.046 g/dscm (0.020 gr/dscf) at 8% O_2	Not applicable	Not applicable	No standard[b]	No standard[b]
Stand-alone semi-chemical	Semichemical combustion units recovery combustion units	No standard	No standard	Not applicable	Not applicable	Total gaseous organic HAP ≤ 1.49 kg/Mg (2.97 lb/ton) BLS (as measured by THC) OR 90% reduction	Total gaseous organic HAP ≤ 1.49 kg/Mg (2.97 lb/ton) BLS (as measured by THC) OR 90% reduction

[a]BLS = black liquor solids; CaO = calcium oxide (lime); THC = total hydrocarbons; gr/dscf = grains per dry standard cubic foot; g/dscm = grams per dry standard cubic meter; kg/Mg = kilograms per megagram; lb/ton = pounds per ton; O_2 = oxygen.
[b]Emissions of total gaseous organic HAP's from these sources are regulated as part of the NESHAP for noncombustion sources at pulp and paper mills.

Hazardous air pollutants are proposed only for existing recovery furnaces, SDT's, and lime kilns at kraft and soda pulp mills. Limits for total gaseous organic HAP emissions are proposed for new kraft and soda recovery furnaces and existing and new semichemical combustion units. Either methanol or total hydrocarbons (THC), depending on the subcategory, is used as a surrogate for total gaseous organic HAP emissions. The emission standards for each subcategory are discussed in the following sections by the pollutant regulated.

1. PM HAP Standards for Kraft and Soda Pulp Mills

Today's rule proposes PM HAP emission limits for existing recovery furnaces, SDT's, and lime kilns at kraft and soda pulp mills. In addition, PM emission limits are proposed as a surrogate for PM HAP emission limits for both new and existing affected sources at kraft and soda pulp mills. The EPA is using the term "PM HAP" in this preamble to refer to the standards which can be measured either on a total PM basis or on a HAP component of PM basis. For existing kraft and soda recovery furnaces, SDT's, and gas-fired lime kilns, the proposed PM emission limits are the same as the New Source Performance Standards for Kraft Pulp

Mills (43 FR 7568). Under today's proposed standards, existing oil-fired lime kilns would be subject to a more stringent PM standard than the NSPS requirements.

The proposed standards also would allow the use of a "bubble compliance alternative" for determining compliance with the PM HAP standard for existing sources at kraft and soda pulp mills. The bubble compliance alternative would allow mills to set PM or PM HAP emission limits for each existing affected source at the mill such that, if these limits are met, the total emissions from all existing affected sources would be less than or equal to a mill-specific bubble limit. This mill-specific bubble limit is calculated based on the proposed emission limits (referred to as reference concentrations or reference emission rates) for each affected source and mill-specific gas flow rates and process rates. Equation 1, below, would be used to calculate the bubble limit based on PM emissions.

$$EL_{PM} = [(C_{ref,RF})(Q_{RFtot}) + (C_{ref,LK})(Q_{LKtot})](F1)/(BLS_{tot}) + ER1_{ref,SDT} \qquad \text{Eq. (1)}$$

where:

EL_{PM} = overall PM emission limit for all existing affected sources at the kraft or

soda pulp mill, kg/Mg (lb/ton) of black liquor solids fired.

$C_{ref,RF}$ = reference concentration of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen for existing kraft or soda recovery furnaces.

Q_{RFtot} = sum of the average gas flow rates measured during the performance test from all existing recovery furnaces at the kraft or soda pulp mill, dry standard cubic meters per minute (dscm/min) (dry standard cubic feet per minute [dscf/min]).

$C_{ref,LK}$ = reference concentration of 0.15 g/dscm (0.067 gr/dscf) corrected to 10 percent oxygen for existing kraft or soda lime kilns.

Q_{LKtot} = sum of the average gas flow rates measured during the performance test from all existing lime kilns at the kraft or soda pulp mill, dscm/min (dscf/min).

F1 = conversion factor, 1.44 minutes•kilogram/day•gram (min•kg/d•g) (0.206 minutes•pound/day•grain [min•lb/d•gr]).

BLS_{tot} = sum of the average black liquor solids firing rates of all existing recovery furnaces at the kraft or soda pulp mill measured during the performance test, megagrams per day (Mg/d) (tons per day [tons/d]) of black liquor solids fired.

$ER1_{ref,SDT}$ = reference emission rate of 0.10 kg/Mg (0.20 lb/ton) of black liquor solids fired for existing kraft or soda smelt dissolving tanks.

Equation 2, below, would be used to calculate the total bubble limit based on PM HAP emissions.

$$EL_{PMHAP} = ER_{ref,RF} + (ER_{ref,LK})(CaO_{tot}/BLS_{tot}) + ER2_{ref,SDT} \qquad \text{Eq. (2)}$$

where:

EL_{PMHAP} = overall PM HAP emission limit for all existing affected sources at the kraft or

soda pulp mill, kg/Mg (lb/ton) of black liquor solids fired.

$ER_{ref,RF}$ = reference emission rate of 1.00E-03 kg/Mg (2.01E-03 lb/ton) of black liquor solids fired for existing kraft or soda recovery furnaces.

$ER_{ref,LK}$ = reference emission rate of 6.33E-03 kg/Mg (1.27E-02 lb/ton) of CaO produced for existing kraft or soda lime kilns.

CaO_{tot} = sum of the average lime production rates for all existing lime kilns at the kraft or soda pulp mill measured as CaO during the performance test, Mg CaO/d (ton CaO/d).

BLS_{tot} = sum of average black liquor solids firing rates of all existing recovery furnaces at the kraft or soda pulp mill measured during the performance test, Mg/d (ton/d) of black liquor solids fired.

$ER2_{ref,SDT}$ = reference emission rate of 6.20E-05 kg/Mg (1.24E-04 lb/ton) of black liquor solids

fired for existing kraft or soda smelt dissolving tanks.

Owners or operators that choose to comply with the PM HAP standards using the proposed bubble compliance alternative would be allowed to meet either the PM bubble limit determined in Equation 1 or the PM HAP bubble limit determined in Equation 2, but would not be required to meet both bubble limits. The proposed bubble compliance alternative would not be applicable to new sources. All new affected sources at kraft and soda pulp mills would be required to meet the individual emission limitations set for those sources. Also, owners or operators of existing sources subject to the NSPS for kraft pulp mills would be required to continue to meet the PM emission limits of that rule, regardless of which option they choose for complying with today's PM HAP standard.

Owners or operators that choose to comply with the PM HAP standards using the proposed bubble compliance alternative would be required to submit preliminary emission limits to the applicable permitting authority for approval for each existing kraft or soda recovery furnace, SDT, and lime kiln at the mill. Before the preliminary PM or PM HAP

emission limits would be approved, the owner or operator would be required to submit documentation demonstrating that if the preliminary emission limits for each emission source are met, the entire group of affected sources would be in compliance with the mill-wide allowable emission level. The allowable emission level would be determined from the applicable bubble equation using the reference concentrations and reference emission rates for each emission source and source-specific factors for exhaust gas flow rates and process rates. Once approved by the applicable permitting authority, the emission limits would be incorporated in the operating permit for the mill. Thereafter, the owner or operator of the kraft or soda pulp mill would demonstrate compliance with the standards by demonstrating that each recovery furnace, SDT, and lime kiln emitted less than or equal to the approved emission limit for that source. In addition, the PM emission limits for any existing recovery furnace, SDT, and lime kiln subject to the NSPS for kraft pulp mills must be at least as stringent as the PM emission limits established in the NSPS. An example of how the bubble compliance alternative can be used

to establish emission limits for affected sources at an example mill is provided in the docket (Docket No. II-B-75).

With one exception, owners or operators that choose to comply with the PM HAP standards using the proposed bubble compliance alternative must include all existing sources in the bubble. Any existing affected source that can be classified as a stand-by unit (i.e., a source that operates for less than 6,300 hours during any calendar year) could not be included as part of a bubble. Owners or operators of stand-by units must accept either the proposed PM or proposed PM HAP emission limits shown in Table 2 for those units. The EPA requests comments on the proposal to exclude stand-by units from the proposed bubble compliance alternative. Some have argued that stand-by units--especially units operating less than 20 percent of the year--may be relatively expensive to control. Thus, inclusion of stand-by units within a compliance bubble may yield important cost savings by allowing a more stringent control of other units to offset the relatively high cost emissions from the stand-by unit. The EPA also requests comment on the proposed definition of a stand-by unit as a unit operating less than 6,300 hours in a calendar year.

2. Total Gaseous Organic HAP Standards for Kraft and Soda Pulp Mills

There are no standards under the proposed rule for total gaseous organic HAP's for existing NDCE recovery furnaces or DCE recovery furnace systems. All new recovery furnaces at kraft and soda pulp mills would be required to meet a total gaseous organic HAP limit, as measured by methanol, of 0.012 kg/Mg (0.025 lb/ton) of black liquor solids fired.

3. PM Standards for Sulfite Pulp Mills

Existing sulfite combustion units would be required to meet a PM emission limit of 0.092 g/dscm (0.040 gr/dscf) corrected to 8 percent oxygen. New sulfite combustion units would be required to meet a PM emission limit of 0.046 g/dscm (0.020 gr/dscf) corrected to 8 percent oxygen.

4. Total Gaseous Organic HAP Standards for Stand-Alone Semichemical Pulp Mills

All existing and new stand-alone semichemical pulp mills with chemical recovery combustion units would be required to reduce total gaseous organic HAP emissions (measured as THC) from these units by 90 percent, or meet a

total gaseous organic HAP emission limit (measured as THC) of 1.49 kg/Mg (2.97 lb/ton) of black liquor solids fired.

C. Performance Test Requirements

The following discussion identifies the test methods to be used for compliance determinations.

Test Method 5, "Determination of Particulate Emissions from Stationary Sources" [40 CFR part 60, appendix A]--in conjunction with either the integrated sampling techniques of Test Method 3, "Gas Analysis for the Determination of Dry Molecular Weight" [40 CFR part 60, appendix A] or Test Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources" [40 CFR part 60, appendix A]--is the test method for determining compliance with the PM emission standards for new and existing kraft and soda recovery furnaces, SDT's, and lime kilns and for new and existing sulfite combustion units. Test Method 17, "Determination of Particulate Emissions from Stationary Sources (In-Stack Filtration Method)" may be used as an alternative to Test Method 5 if a constant value of 0.009 g/dscm (0.004 gr/dscf) is added to the results of Test Method 17 and the stack temperature is no greater than 205 degrees Centigrade (°C) [400 degrees Fahrenheit (°F)].

Test Method 29, "Determination of Metals Emissions from Stationary Sources" [40 CFR part 60, appendix A] is the test method for determining compliance with the PM HAP emission standards for existing kraft and soda recovery furnaces, SDT's, and lime kilns. Test Method 29 also may be used as an alternative to Test Method 5 for measuring PM emissions. The Agency also will allow operators or owners the option of measuring all of the PM HAP's (except mercury) with Test Method 29 and making a separate measurement of the mercury using Test Method 101A, "Determination of Particulate and Gaseous Mercury Emissions from Sewage Sludge Incinerators" [40 CFR part 61, appendix A].

Test Method 308, "Procedure for Determination of Methanol Emissions from Stationary Sources" is being promulgated today as part of the final NESHAP for noncombustion sources at pulp and paper mills and is the test method for determining compliance with the total gaseous organic HAP emission limit for new kraft and soda NDCE recovery furnaces that are not equipped with dry electrostatic precipitator (ESP) systems and for DCE recovery furnace systems.

Test Method 25A, "Determination of Total Gaseous Organic Concentration using a Flame Ionization Analyzer" [40 CFR part 60, appendix A] is the test method for determining compliance with the total gaseous organic HAP emission limit for new and existing combustion sources at stand-alone semichemical pulp mills.

D. Monitoring Requirements and Compliance Provisions

Each owner or operator of an affected source would be required to install, operate, calibrate, and maintain a continuous monitoring system for each affected source. The owner or operator also would be required to establish a range of values for each operating parameter (associated with a process operation or with an emission control device) to be monitored based upon values recorded during the initial performance test or during qualifying previous performance tests using the required test methods. If values from previous performance tests are used to establish the operating parameter range, the owner or operator would be required to certify that the control devices and processes had not been modified subsequent to the testing upon which the data used to establish the operating ranges were obtained. The owner or operator could conduct multiple

performance tests to establish ranges of operating parameters. The owner or operator also could establish expanded or replacement ranges during subsequent performance tests. An exceedance of the operating parameters would occur when the measured operating parameter levels, averaged over a specified time period, are outside the established range for a predetermined duration. However, with the exception of opacity exceedances, no more than one exceedance would be attributed to an affected source during any given 24-hour period. The following paragraphs describe (1) the operating parameters to be monitored, (2) the averaging periods and frequency with which these parameters should be monitored, (3) when corrective action is required to return operating parameters to levels that are within the established range, and (4) when operating parameter exceedances constitute a violation of the standards.

Owners or operators of existing kraft or soda recovery furnaces that are equipped with an ESP for PM or PM HAP control would be required to install, calibrate, maintain, and operate continuous opacity monitoring systems (COMS). The COMS would be required to perform at least one cycle of sampling and analysis for each successive 10-second period

and one cycle of data recording for each successive 6-minute period. If 10 consecutive 6-minute average values of opacity exceed 20 percent, the owner or operator would be required to initiate the corrective actions contained in the mill's startup, shutdown, and malfunction (SSM) plan. A violation would occur when 6 percent of the 6-minute average opacity values recorded during any 6-month reporting period are greater than 35 percent.

Owners or operators of new kraft or soda recovery furnaces and new or existing kraft or soda lime kilns that are equipped with ESP's for PM or PM HAP control would also be required to install, calibrate, maintain, and operate COMS. The COMS would be required to perform at least one cycle of sampling and analysis for each successive 10-second period and one cycle of data recording for each successive 6-minute period. If 10 consecutive 6-minute average values of opacity are greater than 20 percent, the owner or operator would be required to initiate the corrective actions contained in the facility's SSM plan. A violation would occur when 6 percent of the 6-minute average opacity values within any 6-month reporting period are greater than 20 percent.

Owners or operators using wet scrubbers to meet the PM or PM HAP emission limits for any kraft or soda recovery furnace, smelt dissolving tank, or lime kiln or the PM limit for sulfite combustion units would be required to install, calibrate, maintain, and operate a continuous monitoring system capable of determining and permanently recording the pressure drop and scrubbing liquid flow rate at least once for each successive 15-minute period. If any 3-hour average of the pressure drop or scrubbing liquid flow rate falls outside the established range, the owner or operator would be required to initiate the corrective actions included in the facility's SSM plan. A violation would occur when six 3-hour average values of either parameter are outside the established range during any 6-month reporting period.

Owners or operators using regenerative thermal oxidizers (RTO's) to comply with the total gaseous organic HAP emission standard for chemical recovery combustion units at stand-alone semichemical mills would be required to establish a minimum RTO operating temperature that indicates (1) at least a 90 percent reduction in HAP emissions (measured as THC) or (2) outlet HAP emissions (measured as THC) of less than or equal to 1.49 kg/Mg (2.97 lb/ton) of

black liquor solids. To ensure ongoing compliance, the owner or operator would be required to install, calibrate, maintain, and operate a monitoring system to measure and record the RTO operating temperature for each successive 15-minute period. If any 1-hour average of the operating temperature falls below the minimum established temperature, the owner or operator would be required to initiate the corrective actions contained in the facility's SSM plan. A violation would occur when any 3-hour average of the RTO operating temperature falls below the minimum established temperature.

The owner or operator of an affected source that uses a wet scrubber, ESP, or RTO to comply with today's standards may monitor alternative operating parameters subject to prior written approval by the applicable permitting authority.

The owner or operator of an affected source that is complying with today's proposed standards through operational changes or by a control device other than those described above would be required to submit a plan proposing parameters to be monitored, parameter ranges, and monitoring frequencies to be used to determine ongoing compliance,

subject to approval by the applicable permitting authority. If any 3-hour average value of a monitored parameter falls outside the established range, the owner or operator would be required to initiate the corrective actions included in the facility's SSM plan. A violation would occur when six 3-hour average values of a monitored parameter are outside the established range during any 6-month reporting period.

Owners or operators complying with the total gaseous organic HAP standard for new kraft and soda recovery furnaces through the use of an NDCE recovery furnace equipped with a dry ESP system would not be required to perform any continuous parameter monitoring for gaseous organic HAP's; however, each owner or operator would be required to maintain onsite a certification statement signed by a responsible mill official that an NDCE recovery furnace equipped with a dry ESP system is in use.

E. Recordkeeping and Reporting Requirements

In addition to all of the recordkeeping and reporting requirements outlined in § 63.10 of the General Provisions (subpart A of 40 CFR part 63), owners or operators of kraft, soda, sulfite, and stand-alone semichemical pulp mills would be required to maintain the following records for each

affected source: (1) records of the black liquor solids firing rates for all recovery furnaces at kraft and soda pulp mills and spent liquor solids firing rates for all chemical recovery combustion units at sulfite and stand-alone semichemical pulp mills; (2) records of the lime production rates, calculated as CaO, for all kraft and soda lime kilns; (3) records of all parameter monitoring data; (4) records and documentation of supporting calculations for compliance determinations; (5) records of the established monitoring parameter ranges for each affected source; and (6) records of all certifications made in order to determine compliance with the total gaseous organic HAP standards. All records would have to be maintained for a minimum of 5 years.

IV. Rationale

This section describes the rationale for the decisions made by the Administrator in determining the proposed MACT floors for each source category and in selecting the proposed standards.

A. Selection of Source Category

The list of source categories was published in the Federal Register on July 16, 1992 and includes pulp and

paper mills as major sources of HAP's (57 FR 31576). Standards for the pulp and paper production source category are being developed in phases. In December 1993, EPA proposed the first set of emission standards for the source category (i.e., a proposed NESHAP for noncombustion sources in the pulp and paper industry, otherwise referred to as MACT I) as part of a "cluster rule" that also included proposed effluent guidelines and standards for the control of wastewater pollutants (58 FR 66078). In March 1996, EPA proposed to include for regulation additional noncombustion operations and mills not covered under the December 1993 proposal (i.e., MACT III) (61 FR 9383). The NESHAP for noncombustion sources, as well as the effluent guidelines and standards, are being promulgated as part of today's cluster rule. An additional set of standards for the source category is covered by today's proposed NESHAP for chemical recovery combustion sources (i.e., MACT II). Today's proposed "combustion sources" NESHAP covers (1) combustion units in the chemical recovery area at kraft, soda, sulfite, and stand-alone semichemical pulp mills, (2) SDT's at kraft and soda pulp mills, and (3) BLO systems at kraft pulp mills. Although kraft and soda SDT's and kraft BLO systems

are not combustion sources, these equipment are included in today's proposed "combustion sources" NESHAP because they are closely associated with the chemical recovery combustion equipment. For the purposes of today's proposed standards, the combustion units, SDT's, and BLO systems are collectively referred to as "chemical recovery combustion sources." Specifically, the chemical recovery combustion sources are defined as (1) kraft and soda NDCE recovery furnaces and DCE recovery furnace systems (which include BLO systems), (2) kraft and soda SDT's, (3) kraft and soda lime kilns, (4) sulfite combustion units, and (5) semichemical combustion units.

B. Selection of Emission Points

The following section identifies the HAP emission points for kraft, soda, sulfite and stand-alone semichemical pulp mills that were examined by the Agency for control under the proposed rule. General descriptions of the chemical recovery process and equipment also are included in this section. More detailed information on the emission points and chemical recovery process can be found in the technical support documents listed under the "ADDRESSES" section.

1. Emission Points--Kraft Pulp Mills

Emission points at kraft pulp mills that were examined by the Agency for control under the proposed standards are NDCE recovery furnaces and DCE recovery furnace systems, SDT's, and lime kilns. These emission points are integral parts of the kraft chemical recovery process, in which cooking liquor chemicals (i.e., sodium hydroxide [NaOH] and sodium sulfide [Na_2S]) are recovered from spent cooking liquor. Cooking liquor, which is used in the pulping process, is commonly referred to as white liquor; spent cooking liquor is commonly referred to as black liquor.

a. NDCE Recovery Furnaces and DCE Recovery Furnace Systems. There are an estimated 209 recovery furnaces operating at U.S. kraft pulp mills. The kraft recovery furnace is essentially a chemical recovery unit and steam generator that uses black liquor as its fuel. More specifically, the kraft recovery furnace (1) recovers inorganic pulping chemicals from black liquor as smelt by reducing sodium sulfate (Na_2SO_4) to Na_2S and (2) combusts organic compounds in black liquor to produce steam for mill processes.

Kraft recovery furnaces can be classified based on the type of final-stage evaporator used to increase the solids content of black liquor prior to firing in the furnace. The final-stage evaporator, which follows the multiple-effect evaporator (MEE), may be either an NDCE or DCE. Direct contact evaporators use flue gases from the recovery furnace to concentrate the black liquor. In the 1970's, as energy costs increased and Federal and State regulations were passed that limited TRS emissions from kraft pulp mills, the use of NDCE's (or concentrators) became more prevalent. By using an NDCE, the heat that was formerly used to concentrate black liquor in the DCE can be used to produce steam by extending the economizer section of the furnace, and the TRS emissions (associated with the DCE) will be decreased. For newer recovery furnaces, all of which use NDCE's, the NDCE is often considered an integral part of the MEE. Approximately 61 percent of kraft recovery furnaces are NDCE recovery furnaces, and 39 percent are DCE recovery furnace systems. For the purposes of today's proposed rule, an "NDCE recovery furnace" is defined as a recovery furnace that is equipped with an NDCE that concentrates black liquor by indirect contact with steam. A "DCE recovery furnace

system" is defined to include a DCE recovery furnace and any BLO system, if present, at the pulp mill; a "DCE recovery furnace" is defined as a recovery furnace that is equipped with a DCE that concentrates strong black liquor by direct contact between the hot recovery furnace exhaust gases and the strong black liquor.

All kraft recovery furnaces have a PM control device, typically an ESP. The PM collected in the ESP, which is predominantly Na_2SO_4, is returned to the concentrated black liquor that is fired in the recovery furnace. The mechanism for returning the PM to the black liquor may be a dry system or may use either black liquor or process water.

In DCE recovery furnace systems, black liquor is oxidized prior to evaporation in the DCE. Black liquor oxidation reduces emissions of TRS compounds, which are stripped from black liquor in the DCE when the black liquor contacts hot flue gases from the recovery furnace. Black liquor can be oxidized using either air or pure (molecular) oxygen. Air-sparging units operate by bubbling air through the black liquor using multiple diffuser nozzles. Air-sparging units have from one to three tanks (or stages) that operate in series and a corresponding number of emission

points. At two mills, vent gases from air-sparging BLO units are routed to a power boiler to reduce TRS emissions via incineration. Molecular oxygen BLO systems resemble pipeline reactors and require relatively short residence times (i.e., 30 seconds to 5 minutes compared to 1 or more hours for air-sparging units). Because all of the oxygen is consumed in the reaction, no system vent is required with molecular oxygen BLO in-line reactors, and therefore, no emission point is associated with these systems. There are an estimated 46 BLO systems operating at kraft pulp mills. Mills with multiple DCE recovery furnaces have one BLO system. At present, only four mills (with seven DCE recovery furnaces) use a molecular oxygen BLO system.

The emission potential for DCE recovery furnace systems is higher than that for NDCE recovery furnaces because of the increased opportunity to strip HAP compounds from the black liquor in the process equipment. In the DCE recovery furnace system, gaseous organic HAP compounds can be stripped from the black liquor in the air-sparging BLO system and in the DCE. Similarly, the emission potential for NDCE recovery furnaces with ESP's that use black liquor

or HAP-contaminated process water in the ESP bottom or PM return system is higher than that for NDCE recovery furnaces that have dry ESP systems (i.e., dry-bottom ESP's and dry PM return systems). As with the air-sparging BLO systems and DCE's, stripping of gaseous organic HAP compounds can occur if black liquor or HAP-contaminated process water is used in the bottom of the ESP or in the PM return system.

In addition to the criteria pollutants (i.e., PM, NO_x, SO_2, CO, and VOC [ozone precursor]) and TRS, the compounds emitted in the largest quantities from NDCE recovery furnaces and DCE recovery furnace systems are methanol and HCl. For a given process emission rate, the total gaseous organic HAP emissions from DCE recovery furnace systems are, on average, approximately 14 times higher than NDCE recovery furnaces with dry ESP systems. Also, for a given process emission rate, the total gaseous organic HAP emissions from NDCE recovery furnaces with wet ESP systems (i.e., ESP's that use black liquor or HAP-contaminated process water in the ESP bottom or PM return system) are, on average, approximately 3.5 times higher than NDCE recovery furnaces with dry ESP systems. Of the total gaseous organic HAP's emitted, methanol emissions account for approximately

67 percent of emissions from DCE recovery furnace systems and 13 percent of emissions from NDCE recovery furnaces with dry ESP systems.

For a given process emission rate, HCl emissions are approximately equivalent for both NDCE recovery furnaces and DCE recovery furnace systems. Hydrogen chloride emissions account for approximately 19 percent of the total gaseous HAP emissions from DCE recovery furnace systems and 76 percent of the total gaseous HAP emissions from NDCE recovery furnaces with dry ESP systems.

Particulate matter HAP's account for approximately 0.2 percent of the PM emissions and 0.3 percent of the total HAP emissions from recovery furnaces. Although the PM inlet loadings to the PM control devices for NDCE recovery furnaces are higher than for DCE recovery furnaces due to removal of 20 to 40 percent of the PM in the DCE unit, equivalent outlet PM emissions can be achieved with the use of add-on controls.

b. Smelt Dissolving Tanks. There are an estimated 227 SDT's at U.S. kraft pulp mills. This estimate is higher than the estimated number of recovery furnaces because some furnaces have two SDT's. The SDT is a large, covered vessel

located below the recovery furnace and is the discharge point for molten smelt, which is the main product from the combustion of black liquor. Smelt, which is predominantly sodium carbonate (Na_2CO_3) and Na_2S, filters through the char bed at the bottom of the recovery furnace and is continuously discharged through water-cooled spouts into the SDT. As the smelt exits the water-cooled spouts, the smelt stream is shattered with medium-pressure steam so that it can be safely dissolved in the SDT. In the SDT, smelt is dissolved in weak wash water from the recausticizing area to form unclarified green liquor, an aqueous solution of Na_2CO_3 and Na_2S.

Large volumes of steam are generated when the smelt is quenched in the SDT. Residual water vapor and PM generated during quenching are drawn off the tank through a venturi scrubber or other PM control device using an induced-draft fan. Particulate matter HAP's account for approximately 0.06 percent of the PM emissions from SDT's. The water used in the scrubber, which is typically weak wash, drains directly into the SDT. Gaseous organic HAP compounds (primarily methanol) also are emitted from SDT's as a result of the use of weak wash in the SDT and PM control device.

Because of the elevated operating temperature of the SDT, gaseous organic HAP compounds present in the weak wash can volatilize and subsequently be released to the atmosphere.

c. Lime Kilns. An estimated 190 lime kilns operate at U.S. kraft pulp mills. The lime kiln is part of the recausticizing process in which green liquor from the SDT is converted to white liquor. Specifically, Na_2CO_3 in the green liquor is converted to NaOH, a main constituent of white liquor, by adding reburned lime (CaO) from the lime kiln. The resulting white liquor solution contains NaOH, Na_2S, and calcium carbonate (Ca_2CO_3) precipitate (referred to as "lime mud"). Lime mud is removed from this solution in a white liquor clarifier. The lime mud is then washed, dewatered, and calcined in a lime kiln to produce reburned lime, which is recycled back to the green liquor.

Most kilns in use at kraft pulp mills are large rotary kilns (98 percent); a few fluidized-bed calciners are also used. Natural gas or fuel oil typically provides the energy for the calcining process. The majority of lime kilns at kraft pulp mills also burn noncondensible gas streams (NCG's) from various process vents, such as digester and evaporator vents.

Lime kiln exhaust gases consist of combustion products, carbon dioxide released during calcination, water vapor evaporated from the mud, and entrained lime dust. Particulate in the exhaust gases is mainly CaO, Ca_2CO_3, and sodium salts. Approximately 1.4 percent of the PM emissions from lime kilns is PM HAP's. Exhaust gases are routed through a PM control device prior to being discharged to the atmosphere. Venturi scrubbers and ESP's are the two most common types of PM control devices used to control PM emissions from lime kilns.

As with SDT's, gaseous organic HAP compounds (primarily methanol) also are emitted from lime kilns due primarily to the use of weak wash as the scrubbing liquor in the PM control device and lime mud washer. Because of the elevated gas stream temperature, gaseous organic HAP compounds present in the weak wash can volatilize and subsequently be released to the atmosphere.

2. Emission Points--Soda Pulp Mills

Emission points at soda pulp mills that were examined by the Agency for control under today's proposed standards are recovery furnaces, SDT's, and lime kilns. The processes and equipment used in the chemical recovery areas of soda

and kraft pulp mills are similar, except that the soda process, because it is a nonsulfur process, does not require black liquor oxidation. With the exception of sulfur-containing compounds, the types and quantities of compounds emitted from soda pulp mills are comparable to the types and quantities of compounds emitted from kraft pulp mills. There are only two soda pulp mills in the United States, and no new soda mills are expected to be constructed. There are a total of two recovery furnaces (one NDCE and one DCE), two SDT's, and two lime kilns at the soda mills.

3. Emission Points--Sulfite Pulp Mills

The emission point at sulfite pulp mills that was examined by the Agency for control under the proposed standard is the chemical recovery combustion unit. The chemical recovery combustion unit is an integral part of the chemical recovery process, which recovers cooking liquor chemicals from spent cooking liquor (also called red liquor). The types of chemical recovery combustion units used at sulfite mills are recovery furnaces, fluidized-bed reactors, and combustors. There are 18 recovery furnaces, 2 fluidized-bed reactors, and 1 combustor operating at sulfite pulp mills. For the purposes of today's proposed

rule, these various combustion units are collectively referred to as "sulfite combustion units."

The process and equipment used to recover sulfite cooking liquor chemicals depend on the chemical base of the cooking liquor. Sulfite cooking liquors use one of four chemical bases--magnesium (Mg), ammonia (NH_3), calcium (Ca), or sodium (Na). Cooking liquor chemicals can be recovered for the Mg-, NH_3-, and Na-based sulfite processes. Recovery of cooking liquor chemicals is not practical for the Ca-based sulfite process, and, therefore, no sulfite combustion units are used at the existing Ca-based sulfite mills. Additionally, there are currently no operating Na-based sulfite mills. There are currently six Mg-based sulfite mills and six NH_3-based sulfite mills. Information on the sulfite combustion units at Mg- and NH_3-based sulfite pulp mills follows.

At the six Mg-based sulfite mills, red liquor is fired in a recovery furnace or fluidized-bed reactor. There are nine recovery furnaces and two fluidized-bed reactors. Multiple-effect evaporators, which may be followed by a DCE or NDCE, are used to increase the solids content of the red liquor prior to firing in the combustion unit. Magnesium-

based sulfite combustion units differ from kraft recovery furnaces in that there are no smelt beds. Combustion of the spent liquor produces both heat for steam generation and exhaust gases that contain magnesium oxide (MgO) particulate and SO_2 gas. When a recovery furnace is used, the major portion of the MgO is recovered as a fine white powder from the exhaust gases using multiple cyclones. When a fluidized-bed reactor is used, MgO from the exhaust gases is collected in a cyclone and from the bed of the reactor as pulverized bed material. The MgO from the recovery furnace or fluidized-bed reactor is then slaked with water to form magnesium hydroxide ($Mg(OH)_2$), which is used as circulating liquid in a series of absorption towers and/or venturi scrubbers designed to recover SO_2 from combustion gases. In the absorption towers/venturi scrubbers, SO_2 is recovered by reaction with $Mg(OH)_2$ to form a magnesium bisulfite solution. The magnesium bisulfite solution is then fortified with makeup SO_2 and subsequently used as cooking liquor. Some mills have installed air pollution control devices, such as a fiber-bed demister system or an educted venturi scrubber, downstream of the SO_2 absorption equipment, to further reduce PM and/or SO_2 emissions.

At the six NH_3-based sulfite pulp mills, red liquor is fired in a recovery furnace or combustor. There are nine recovery furnaces and one combustor. The solids content of the red liquor is increased using MEE's, which may be followed by a DCE or NDCE. Combustion of the spent liquor produces both heat for steam generation and combustion gases that contain recoverable SO_2. The ammonia base is consumed during combustion, forming nitrogen and water. A small amount of ash is produced and periodically removed from the furnace bottom. (There are no smelt beds.) Sulfur dioxide is recovered from cooled flue gas in an acid-gas absorption tower to form an ammonium bisulfite solution. Fresh aqueous NH_3 is used as the circulating liquor in the absorption system. The ammonium bisulfite solution is fortified with makeup SO_2 and used as cooking liquor. Exit gases from the absorption system are typically routed to a fiber-bed demister system for PM removal and mist elimination prior to being discharged to the atmosphere. Some mills have installed a scrubber or mesh-pad mist eliminator upstream of the fiber-bed demister system for additional PM and SO_2 emission control and to improve the efficiency and operation of the fiber-bed demister system.

4. Emission Points--Stand-alone Semichemical Pulp Mills

The emission point at stand-alone semichemical pulp mills that was examined for control under today's proposed standards is the chemical recovery combustion unit. The combustion unit is used in the chemical recovery process to recover the inorganic cooking chemicals, produce steam, and remove the organic compounds in the black liquor by combustion. Cooking liquor chemicals are recovered as either smelt or ash, which is dissolved in water and mixed with make-up cooking chemicals to form white liquor.

There are 14 chemical recovery combustion units currently operating at stand-alone semichemical pulp mills. Five different types of chemical recovery combustion units are in operation: fluidized-bed reactors, recovery furnaces, smelters, rotary liquor kilns, and pyrolysis reactors. For the purposes of today's standards, these various combustion units are collectively referred to as "semichemical combustion units."

a. Fluidized-Bed Reactors. Seven fluidized-bed reactors are currently in use at seven stand-alone semichemical pulp mills. Fluidized-bed reactors are used

extensively because the recovered chemicals are in the form of solid pellets, which can be stored in silos until the chemicals are needed to make fresh cooking liquor. This practice requires less storage space than when recovered chemicals are routed directly to a dissolving tank and stored in solution.

In the fluidized-bed reactor, concentrated black liquor is fired from a single spray gun located at the top of the reactor. As the liquor falls towards the bed, evaporation and some combustion occurs, causing the liquor to pelletize. Fluidizing gas rises through the bed of solid pellets, setting the bed in fluid motion. The soda ash (Na_2CO_3) pellets are recovered from the reactor and stored in silos.

b. Recovery Furnaces. Two NDCE recovery furnaces are currently in use at two stand-alone semichemical pulp mills. Semichemical recovery furnaces, like kraft recovery furnaces, are used to recover cooking liquor chemicals by burning concentrated black liquor and to produce process steam with the heat of combustion. Semichemical and kraft recovery furnaces are similar in design.

c. Smelters. Two smelters are currently in use at a nonsulfur-based, stand-alone semichemical pulp mill.

Smelters operate in a manner similar to recovery furnaces, except that smelters do not produce excess steam for mill processes and are actually net users of heat. The units currently in use are actually converted small kraft recovery furnaces.

d. Rotary Liquor Kilns. Two rotary liquor kilns are currently in use at two nonsulfur-based, stand-alone semichemical pulp mills. Unlike lime kilns used in the kraft chemical recovery process, rotary liquor kilns are used for the combustion of black liquor at semichemical pulp mills. In the kiln, fuel oil is burned in the lower end. An induced-draft fan at the upper end draws combustion air into the lower end and draws combustion gases through the kiln. Approximately halfway between the lower and upper ends, black liquor is fired into the kiln. Sodium carbonate ash created from contact between black liquor and combustion gases falls to the lower end of the kiln, then is routed to an ash dissolving tank. The combustion gases are routed to a waste heat boiler to produce steam.

e. Pyrolysis Reactor. One pyrolysis reactor is currently in use at a stand-alone semichemical pulp mill. "Pyrolysis" means chemical change caused by heat, not by

combustion. In the pyrolysis reactor, fuel oil or propane is burned to provide the heat for pyrolysis. Black liquor is injected under high pressure in a finely atomized spray through several nozzles arranged around the wall of the pyrolysis chamber. The hot combustion gases travel downward at high velocity and contact the liquor sprays at high turbulence and rapid mixing. Pyrolysis reactions occur, converting the sodium in the liquor into a solid ash powder composed mainly of soda ash (Na_2CO_3), and the other constituents into a gaseous mixture of hydrogen sulfide (H_2S) mixed with CO, carbon dioxide (CO_2), hydrogen (H_2), methane (CH_4), nitrogen (N_2), and water vapor.

f. <u>HAP Emissions from Semichemical Combustion Sources</u>. Test data indicate that chemical recovery combustion units at stand-alone semichemical pulp mills are significant sources of gaseous organic HAP emissions. The major HAP compounds emitted from chemical recovery combustion units are methanol, benzene, methyl ethyl ketone, formaldehyde, and toluene. The fluidized-bed reactors emit the highest quantities of HAP's, while emissions from other semichemical combustion unit types (e.g., recovery furnaces and rotary liquor kilns) are much lower. For example, based on

available HAP emissions data, the fluidized-bed reactors have total HAP emissions approximately 20 to 75 times higher per ton of black liquor solids fired than the other semichemical combustion unit types. Some of the other semichemical combustion unit types (e.g., recovery furnaces and rotary liquor kilns) are inherently lower-emitting because they achieve more complete combustion of organic compounds. (No HAP emission data were available for the pyrolysis unit; however, that unit is scheduled to be decommissioned by 1998 due to operational difficulties, and no more pyrolysis units are expected to be installed at stand-alone semichemical pulp mills.) Unlike kraft recovery furnaces, most of the HAP's emitted from fluidized-bed reactors at stand-alone semichemical pulp mills are formed in the reactor due to incomplete combustion, not from contact of the exhaust stream with black liquor or HAP-contaminated water in the DCE or wet ESP systems. Carbon monoxide emissions, an indicator of combustion efficiency, have been measured from fluidized-bed reactors at levels as high as 50,000 parts per million by volume (ppm_v); by contrast, kraft recovery furnaces typically emit less than 1,000 ppm_v of CO. No add-on control devices are currently

being used to control total gaseous organic HAP emissions from combustion sources at stand-alone semichemical pulp mills; however, at least one RTO will be installed to control emissions from a fluidized-bed reactor at a semichemical mill by the end of 1997.

C. Selection of Definition of Affected Source

Most industrial plants consist of numerous pieces or groups of equipment that emit HAP and that may be viewed as emission "sources." The Agency, therefore, uses the term "affected source" to designate the equipment within a particular kind of plant that is chosen as the "source" covered by a given standard. For today's rulemaking, EPA is proposing to define the affected source as each individual process unit within the chemical recovery area at kraft, soda, sulfite, and stand-alone semichemical pulp mills. For kraft and soda pulp mills, each recovery furnace and its associated SDT('s) are considered together as an affected source. The Agency decided to consider these emission points as one source because recovery furnaces and SDT's are generally sold as one unit, although the emissions from the recovery furnace and the SDT are treated separately in nearly all cases. In today's proposed rulemaking, five

process units are examined: (1) kraft and soda NDCE recovery furnaces (and associated SDT's), (2) kraft and soda DCE recovery furnace systems (and associated SDT's), (3) kraft and soda lime kilns, (4) sulfite combustion units, and (5) semichemical combustion units.

D. Selection of Pollutants

For purposes of this rule, the HAP's emitted from combustion sources at pulp mills have been divided into three categories: (1) PM HAP's, (2) total gaseous organic HAP's, and (3) HCl. The EPA proposes to regulate emissions of PM HAP's and gaseous organic HAP's.

1. PM HAP's

Available emission data indicate that PM HAP's are emitted from kraft and soda recovery furnaces, SDT's, and lime kilns and sulfite combustion units. Particulate matter HAP's represent approximately 0.2 percent of the PM emitted from these combustion sources. Particulate matter was selected as a surrogate for HAP metals emitted in the form of particulate. Available data on PM control device performance indicate that control systems that control PM also control the HAP portion of the PM. (See Technical Support Document: Chemical Recovery Combustion Sources at

Kraft and Soda Pulp Mills, Chapter 3; docket No. II-A-31.) However, as a means of maximizing compliance flexibility, the proposed rule also includes a PM HAP emission limit for existing affected sources at kraft and soda mills that choose to measure PM HAP's directly, as opposed to measuring PM.

2. Total Gaseous Organic HAP's

Available emission data indicate that the following gaseous organic HAP's are emitted from kraft and soda NDCE recovery furnaces and DCE recovery furnace systems and semichemical combustion units: acetaldehyde, benzene, formaldehyde, methyl ethyl ketone, methyl isobutyl ketone, methanol, phenol, styrene, toluene, and xylenes. Methanol is the predominant gaseous organic HAP emitted from kraft and soda NDCE recovery furnaces and DCE recovery furnace systems.

Methanol was selected as a surrogate for gaseous organic HAP compounds for demonstrating compliance with the total gaseous organic HAP limits for new kraft and soda NDCE recovery furnaces and DCE recovery furnace systems because methanol is the predominant HAP emitted from these sources, and controls in place for methanol also would result in the

control of other gaseous organic HAP compounds. (See Technical Support Document: Chemical Recovery Combustion Sources at Kraft and Soda Pulp Mills, Chapter 2; docket No. II-A-31.) For example, the major emission mechanism for the release of gaseous organic HAP compounds is the stripping of the compounds from the black liquor in the BLO unit, the DCE, and some ESP systems. Reducing contact between the gas streams and the black liquor in these units reduces not only methanol emissions but also emissions of other gaseous organic HAP's. In addition, performance tests are more expensive when a range of organic compounds must be measured. The measurement of methanol as a surrogate for gaseous organic HAP's reduces compliance costs. Therefore, the Agency selected methanol as a surrogate for total gaseous organic HAP emissions for new kraft and soda NDCE recovery furnaces and DCE recovery furnace systems.

For new and existing semichemical combustion units, THC emissions were selected as a surrogate for total gaseous organic HAP emissions. Emissions from semichemical combustion units are primarily the result of incomplete combustion, and THC emissions were found to correlate with

HAP emissions. (See Correlation of THC Emissions with HAP Emissions Memo; docket No. II-B-71.)

3. HCl

The Agency proposes not to regulate HCl emissions from recovery furnaces. Under the authority of section 112(d)(4), the Agency has determined that no further control is necessary because HCl is a "health threshold pollutant," and HCl levels emitted from recovery furnaces are below the threshold value within an ample margin of safety. The following discussion provides the basis for the Agency's decision not to regulate HCl emissions from recovery furnaces. Specifically, this section discusses (1) the statutory authority for considering the health threshold when establishing standards, (2) the determination of HCl as a threshold pollutant, (3) the exposure assessment modeling of HCl emissions from recovery furnaces, (4) an ecological assessment of HCl, and (5) the Agency's conclusions.

a. Statutory Authority. The Act includes certain exceptions to the general statutory requirement to establish emission standards based on the performance of MACT. Of relevance here, section 112(d)(4) provides EPA with authority, at its discretion, to develop risk-based

standards for HAP's "for which a health threshold has been established", provided that the standard achieves an "ample margin of safety." (The full text of the section 112(d)(4): "[w]ith respect to pollutants for which a health threshold has been established, the Administrator may consider such threshold level, within an ample margin of safety, when establishing emission standards under this subsection.")

The EPA presumptively applies section 112(d)(4) only to HAP's that are not carcinogens because Congress clearly intended that carcinogens be considered nonthreshold pollutants. (Staff of the Senate Committee on Environment and Public Works, A Legislative History of the Clean Air Act Amendments of 1990, Vol. 1 at 876, statement of Senator Durenberger during Senate Debate of October 27, 1990: "With respect to the pollutants for which a safe threshold can be set, the authority to set a standard less stringent than maximum achievable control technology is contained in subsection (d)(4). With respect to carcinogens and other non-threshold pollutants, no such authority exists in subsection (d) or in any other provision of the Act.") The legislative history further indicates that if EPA invokes this provision, it must assure that any emission standard

results in ambient concentrations less than the health threshold, with an ample margin of safety, and that the standards must also be sufficient to protect against adverse environmental effects (S. Rep. No. 228, 101st Cong. at 171). Costs are not to be considered in establishing a standard pursuant to section 112(d)(4) (*Ibid.*).

Therefore, EPA believes it has the discretion under section 112(d)(4) to develop risk-based standards for some categories emitting threshold pollutants, which may be less stringent than the corresponding "floor"-based MACT standard would be. If EPA decided to develop standards under this provision, it would seek to assure that emissions from every source in the category or subcategory are less than the threshold level to an individual exposed at the upper end of the exposure distribution. The upper end of the exposure distribution is calculated using the "high end exposure estimate," defined as "a plausible estimate of individual exposure for those persons at the upper end of the exposure distribution, conceptually above the 90th percentile, but not higher than the individual in the population who has the highest exposure" (EPA Exposure Assessment Guidelines, 57 FR 22888, May 29, 1992). The EPA believes that assuring

protection to persons at the upper end of the exposure distribution is consistent with the "ample margin of safety" requirement in section 112(d)(4).

The EPA emphasizes that use of section 112(d)(4) authority is wholly discretionary. As the legislative history described above indicates, cases may arise in which other considerations dictate that the Agency should not invoke this authority to establish less stringent standards, despite the existence of a health effects threshold that is not jeopardized. For instance, EPA does not anticipate that it would set less stringent standards where evidence indicates a threat of significant or widespread environmental effects, although it may be shown that emissions from a particular source category do not approach or exceed a level requisite to protect public health with an ample margin of safety. The EPA may also elect not to set less stringent standards where the estimated health threshold for a contaminant is subject to large uncertainty. Thus, in considering appropriate uses of its discretionary authority under section 112(d)(4), EPA intends to consider other factors in addition to health thresholds, including

uncertainty and potential "adverse environmental effects," as that phrase is defined in section 112(a)(7).

b. Health Effects Assessment. Several factors are considered in the Agency's decision of whether a pollutant should be categorized as a health threshold pollutant for the purposes of section 112(d)(4). These factors include evidence and classification of carcinogenic risk and evidence of noncarcinogenic effects. The following discussion focuses on these factors.

Consideration is given to any evidence of human carcinogenic risk associated with the pollutant. Based on Congress's intent, for the purposes of section 112(d)(4), the Administrator presumptively concludes that HAP's classified as either Group A (known carcinogen), Group B (probable carcinogen), or Group C (possible carcinogen) (as defined under the EPA's 1986 Carcinogen Risk Assessment Guidelines (51 FR 33992; September 24, 1986)) should not be categorized as threshold pollutants (as per section 112(f)(2)(A) of the Act, which requires EPA to consider residual risk standards for pollutants classified as "known, probable, or possible human carcinogens"). The EPA recognizes that advances in risk assessment science and

policy, as incorporated in future EPA risk assessment guidelines, may affect the way EPA differentiates between threshold and non-threshold HAP's. The EPA's draft Guidelines for Carcinogen Risk Assessment (public review draft, April, 1996) suggest that carcinogens be assigned non-linear dose-response relationships where data warrant. It is possible that dose-response curves for some substances may reach zero risk at a dose greater than zero, creating a threshold for carcinogenic effects. The EPA will consider both the state of the science and legislative intent in future rulemaking under section 112(d)(4). Under EPA's current guidelines, the Agency considers the data on carcinogenicity in humans and/or animals for pollutants with A, B, or C classifications adequate support for consideration of a HAP as a nonthreshold pollutant.

By definition, the Agency does not have enough evidence available to conclude whether HAP's with the weight of evidence classification of Group D (as defined under the EPA's 1986 Carcinogen Risk Assessment Guidelines [51 FR 33992; September 24, 1986]) pose a human cancer risk. Thus, the Agency will determine, on a case-by-case basis, whether the available evidence is sufficient to conclude whether a

"safety threshold for exposure" exists for each HAP that is classified as a Group D pollutant. For the purposes of this action, the Agency believes it is reasonable to classify HCl as a Group D pollutant (see Health Assessment Document for Chlorine and Hydrogen Chloride, Review Draft; EPA-600/8-87/041A, August 1994). This classification is based on only one animal study, and no human data are available for review. In the animal study, no carcinogenic response was observed in rats exposed via inhalation. Based on the limited negative carcinogenicity data, and on EPA's knowledge of how HCl reacts in the body and its likely mechanism of action (discussed further below), the Agency presumptively considers HCl to be a threshold pollutant.

Under current EPA science policy, HAP's classified as Group E pollutants (evidence of noncarcinogenicity for humans) are presumptively considered by the Agency, for the purposes of section 112(d)(4), to have a "safety threshold of exposure." Therefore, Group E pollutants are considered threshold pollutants, unless there is adequate evidence to the contrary. The EPA has developed new risk assessment guidelines for reproductive effects (see http://www.epa.gov/ORD/WebPubs/repro), and is in the process

of developing others (e.g., developmental effects and neurotoxicity) that may influence determinations of thresholds for specific pollutants.

For pollutants such as HCl that are considered to have a "threshold of safety" below which adverse effects are not expected, the information on noncarcinogenic effects must be evaluated to determine the potential hazards associated with exposure to the pollutant. One approach for determining potential hazards of a pollutant is to use its Inhalation Reference Concentration (RfC). The RfC is defined as an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure that, over a lifetime, would not likely result in the occurrence of noncancer health effects in humans. A health benchmark such as the RfC can be established by applying uncertainty factors to the critical toxic effect derived from the lowest or no-adverse-effect level of a pollutant (see EPA-600/8-90-066F, October 1994, Methods for Derivation of Inhalation Reference Concentrations and Applications of Inhalation Dosimetry). The confidence in the RfC (which is given a qualitative ranking of either high, medium, or low)

is based on the number of studies available and the quality of the data base, among other things.

The RfC for HCl is based on a single animal study, which used only one dose and had limited toxicological measurements. In that study, laboratory rats exposed to 15,000 $\mu g/m^3$ HCl for 6 hours per day, 5 days per week for life, developed an increased incidence of hyperplasia of the larynx and trachea, compared to controls (Health Assessment Document for Chlorine and Hydrogen Chloride, Review Draft; EPA-600/8-87/041A, August 1994). Effects on laboratory animals exposed to even higher concentrations of HCl for 90 days included damage to the organs of the respiratory system, but not to more distant organs. Chronic exposure studies involving lower concentrations (less than 15,000 $\mu g/m^3$) have not been done, nor have comprehensive epidemiological studies of humans (Health Assessment Document for Chlorine and Hydrogen Chloride, Review Draft; EPA-600/8-87/041A, August 1994).

The RfC for HCl is 20 $\mu g/m^3$ (EPA, 1995, Integrated Risk Information System (IRIS), Reference Concentration (RfC) for Inhalation Exposure for Hydrogen Chloride. National Center for Environmental Assessment, Cincinnati, OH. On-Line).

This concentration is a low confidence RfC with an uncertainty factor of 300 applied to the lowest adverse effect level noted in animals (*Ibid*).

Generally, information on developmental and reproductive effects would provide additional confidence in the adequacy of the health benchmark for characterizing health risk. No information is available on the developmental or reproductive effects associated with HCl exposure in humans or animals. However, no additional uncertainty is applied for the lack of these studies because HCl that deposits in the lung is not expected to have any effects at sites distant from the lung. Hydrogen chloride, in solution, quickly dissociates to H^+ (which, in small doses, is buffered in the tissue or blood) and Cl^- (which is ubiquitous in the body). Therefore, HCl is expected to have only local effects at the site of initial deposition. Furthermore, HCl is not thought to be directly genotoxic (Health Assessment Document for Chlorine and Hydrogen Chloride, Review Draft; EPA-600/8-87/041A, August 1994).

Based on the information presented above, the Administrator has determined that HCl is a health threshold pollutant for the purpose of section 112(d)(4) of the Act.

The Administrator also concludes that, in this case, the RfC is an appropriate threshold value for assessing risk to humans associated with exposure to this pollutant through inhalation.

c. Exposure Assessment. Based on emission tests of 14 kraft recovery furnaces, uncontrolled HCl emissions from DCE and NDCE recovery furnaces range from 0 to 923 Mg/yr (0 to 1,016 tons/yr); however, the concentrations of HCl in recovery furnace exhaust gases (0.3 to 95.6 ppm_v) are relatively low due to the high volume of the exhaust gases. Chlorides enter the liquor cycle primarily through the wood used for pulping and the caustic used as makeup chemical during white liquor preparation, although mill process water can also be a significant contributor. A small portion of the chlorides in the black liquor fed to the recovery furnace can be emitted from the furnace as HCl gas. The remaining chlorides in the black liquor exit the recovery furnace as inorganic alkali salts, either as particulate in the exhaust gases or as a constituent of the smelt.

For sulfite combustion units, HCl emissions are negligible because acid-gas absorption systems are an integral part of the sulfite chemical recovery process.

Hydrochloric acid emissions data are available for only one sulfite combustion unit; HCl emissions from this unit were approximately 1 ppm_v following the acid-gas absorption system. No data are available on HCl emissions prior to the acid-gas absorption systems. No HCl emission data are available for semichemical combustion units. However, neither process nor technical considerations indicate that HCl emissions would be significant.

Inputs for the exposure assessment model were developed for kraft and soda recovery furnaces, which have the higher HCl emissions. The inputs were developed using available test data and mill-specific process data. Estimated HCl emission rates were based on the highest available HCl emission factors (in units of kilograms [kg] of HCl per kg of black liquor solids fired) for both NDCE and DCE recovery furnaces. Because the HCl emission rates were based on mill-specific process data (e.g., black liquor solids firing rate), each recovery furnace type at each mill had a unique set of emissions estimates. Stack parameters (i.e., height, diameter, temperature and velocity) were based on information obtained from the AIRS data base; average values from AIRS were assigned to those sources for which AIRS data

were not available. For mills with multiple recovery furnaces (e.g., two NDCE recovery furnaces), HCl emissions from the furnaces were summed, and the stack parameters for those recovery furnaces were averaged.

This exposure assessment was conducted following the principles described in the Agency's Exposure Assessment Guidelines (57 FR 22888, May 29, 1992). There is no expectation that the population will be exposed to higher long-term levels of HCl than those predicted by the model. In this case, a screening analysis was used to determine if emissions of HCl could result in exposures above Agency-established health threshold concentrations. The assessment was conducted for 106 mills. The applied approach incorporates into the analysis ranges of values for those variables meeting the following criteria: where mathematical distributions are available; where the variables are independent; and, most importantly, where the variables are believed to significantly influence the results of the analysis. This probabilistic procedure uses Monte Carlo simulation to produce distributions with associated probability estimations (e.g., there is a 95 percent probability that the estimated exposure to the

most exposed population group (census block) is less than the RfC for HCl).

The distributions used in the Monte Carlo analysis were taken primarily from EPA sources (such as the Exposure Factors Handbook; EPA/600/8-89/043, July 1989) and the literature. Best judgments were used in selecting the distributions and, in some cases, in using only portions of the distributions that are provided in the Handbook. Use of other distributions may result in different final outcomes for the Monte Carlo analysis.

The results of this analysis show that, at the 95 percent confidence interval, the maximum concentration predicted to which people are estimated to be exposed is 0.3 $\mu g/m^3$, 60 times less than the inhalation reference concentration.

In addition, terrain (e.g., hills and valleys) is known to affect concentration estimates predicted near facilities with elevated pollutant releases (e.g., stacks). The effect of terrain on estimated HCl concentrations was investigated by including terrain in the modeling of the ten recovery furnaces that produced the highest estimated HCl concentrations at census blocks in the exposure assessment

described above. The terrain analysis and a Monte Carlo assessment similar to that described above resulted, at the 95 percent confidence interval, in a maximum concentration to which people are expected to be exposed of 2 $\mu g/m^3$, which is 10 times less than the inhalation reference concentration.

d. Ecological Assessment. The standards for emissions must also protect against significant and widespread adverse environmental effects to wildlife, aquatic life, and other natural resources. Approaches to ecological risk assessments are being developed and applied by EPA for several areas of concern regarding the effects of pollutants. For HCl emitted by these source categories, a formal ecological risk assessment as such has not been made. However, publications in the literature have been reviewed to determine if there would be reasonable expectation for serious or widespread adverse effects to natural resources.

Aspects of pollutant exposure and effects that should be considered are: toxicity effects from acute and chronic exposures to expected concentrations around the source (as measured or modeled), persistence in the environment, local

and long-range transport, and tendency for bio-magnification with toxic effects manifest at higher trophic levels.

No research has been identified for effects on terrestrial animal species beyond that cited in the development of the RfC. The evidence available to date, discussed in section IV.D.3.b of this preamble, indicates that HCl is a threshold pollutant for the purposes of section 112(d)(4) of the Act. Modeling calculations indicate that there is little likelihood of chronic or widespread exposure to HCl at concentrations above the threshold around pulp and paper mills. Based on these considerations, EPA believes that the RfC can reasonably be expected to protect against widespread adverse effects in other animal species as well.

Plants also respond to airborne HCl levels. Chronic exposure to about 600 $\mu g/m^3$, can be expected to result in discernible effects, depending on the plant species. Plants respond differently to HCl as an anhydrous gas than to HCl aerosols. Relative humidity is important in plant response; there appears to be a threshold of relative humidity above which plants will incur twice as much damage at a given dose (Medical and Biological Effects of Environmental Pollutants:

Chlorine and Hydrogen Chloride, National Academy of Sciences, 1976). Effects include leaf injury and decrease in chlorophyll levels in various species given acute, 20-minute exposures of 6,500 to 27,000 $\mu g/m^3$ (Health Assessment Document for Chlorine and Hydrogen Chloride, Review Draft; EPA-600/8-87/041A, August 1994). A field study reports different sensitivity to damage of foliage in 50 species growing in the vicinity of an anhydrous aluminum chloride manufacturer. American elm, bur oak, eastern white pine, basswood, red ash and several bean species were observed to be most sensitive. Concentrations of HCl in the air were not reported. Chloride ion in whole leaves was 0.2 to 0.5 percent of dry weight; sensitive species showed damage at the lower value, but tolerant species displayed no injury at the higher value. Injury declined with distance from the source with no effects observed beyond 300 meters (Harper and Jones, 1982, "The relative Sensitivity of Fifty Plant Species to Chronic Doses of Hydrogen Chloride," Phytopathology 72: 261-262).

Prevailing meteorology strongly determines the fate of HCl in the atmosphere (Health Assessment Document for Chlorine and Hydrogen Chloride, Review Draft;

EPA-600/8-87/041A, August 1994). However, HCl is not considered a strongly persistent pollutant, or one where long range transport is important in predicting its ecological effects. In the atmosphere, HCl can be expected to be absorbed into aqueous aerosols, due to its great affinity for water, and removed from the troposphere by rainfall. In addition, HCl will react with hydroxy ions to yield water plus chloride ions. However, the concentration of hydroxy ions in the troposphere is low, so HCl may have a relatively long residence time in areas of low humidity. No studies are reported of HCl levels in ponds or other small water bodies or soils near major sources of HCl emissions. Toxic effects of HCl to aquatic organisms would likely be due to the hydronium ion, or acidity. Aquatic organisms in their natural environments often exhibit a broad range of pH tolerance. Effects of HCl deposition to small water bodies and to soils will primarily depend on the extent of neutralizing by carbonates or other buffering compounds (Health Assessment Document for Chlorine and Hydrogen Chloride, Review Draft; EPA-600/8-87/041A, August 1994). Chloride ions are essentially ubiquitous in natural waters and soils, so minor increases due to deposition of dissolved

HCl will have much less effect than the deposited hydronium ions. Deleterious effects of HCl on ponds and soils, where such effects might be found near a major source emitting to the atmosphere, likely will be local rather than widespread, as observed in plant foliage.

Effects of HCl on tissues are generally restricted to those immediately impacted and are essentially acidic effects. The rapid solubility of HCl in aqueous media releases hydronium ions, which can be corrosive to tissue when above a threshold concentration. The chloride ions may be concentrated in some plant tissues, but may be distributed throughout the organism, as most organisms have chloride ions in their fluids. Leaves or other tissues exposed to HCl may show some concentration above that of their immediate environment; that is, some degree of bioconcentration can occur. However, long-term storage in specific organs and biomagnification of concentrations of HCl in trophic levels of a food chain would not be expected. Thus, the chemical nature of HCl results in deleterious effects, that when present, are local rather than widespread.

e. Conclusions. The results of the exposure assessment modelling showed exposure levels to HCl emissions from kraft and soda recovery furnaces below the health threshold value. Furthermore, the threshold value, for which the RfC was determined to be an appropriate value, was not exceeded when taking into account an ample margin of safety. Finally, no significant or widespread adverse environmental effects from HCl are anticipated. Therefore, the Agency, under authority of section 112(d)(4), has determined that further control of HCl emissions from kraft and soda recovery furnaces and sulfite and semichemical combustion units is not necessary.

E. Determination of Subcategories and MACT Floors

The first step in establishing MACT floors is to determine whether the source category warrants subcategorization. In evaluating the chemical recovery process for subcategorization, the Agency took into consideration the type of equipment used in the process, the emission potential of each emission point, and any variations in the process due to pulp type. The Agency determined that the chemical recovery areas at kraft and soda pulp mills do not warrant subcategorization because the

recovery areas are comparable in processes, equipment, and HAP emissions. The Agency determined that separate subcategories are warranted for sulfite and stand-alone semichemical pulp mills because the recovery processes used at sulfite and stand-alone semichemical pulp mills are specifically different from each other and from those used at kraft and soda pulp mills.

The proposed MACT floors for each category were established on an emission point basis. For existing sources at kraft and soda pulp mills, the MACT floor was established by examining the emission level achievable by the control technology used by the source at the 94th percentile (i.e., the median emission limitation achieved by the top 12 percent of sources). Because there are fewer than 30 sulfite combustion units nationwide, the proposed MACT floor for existing sources at sulfite pulp mills was established by examining the emission level achieved by the control technology used by the best-performing five existing sources at sulfite pulp mills. The MACT floor approach used for existing sources at sulfite pulp mills was also used for existing sources at stand-alone semichemical pulp mills because there are fewer than

30 semichemical combustion sources. The MACT floor technologies for new sources at kraft, soda, sulfite, and stand-alone semichemical pulp mills are based on the best-performing similar source for each subcategory. The control technologies and corresponding emission levels that represent the proposed MACT floors were determined based on technology and emission data that were available to the Administrator.

1. MACT Floors--Kraft and Soda Pulp Mills

This section provides a brief description of the MACT floor determinations for kraft and soda NDCE recovery furnaces, DCE recovery furnace systems, lime kilns, and SDT's.

a. NDCE Recovery Furnaces. An estimated 128 NDCE recovery furnaces operate at 96 U.S. kraft and soda pulp mills. Information regarding the furnace type, size, and add-on control devices is available for approximately 88 percent of these recovery furnaces. Ninety-seven percent of NDCE recovery furnaces are equipped with an ESP, 2 percent are equipped with an ESP followed by a wet scrubber, and the remaining 1 percent are equipped with two

wet scrubbers in series. The add-on control devices were installed primarily for control of PM emissions.

The following paragraphs describe the proposed MACT floor control technologies for new and existing kraft and soda NDCE recovery furnaces for both PM/PM HAP and total gaseous organic HAP control and the emission levels achievable with each proposed MACT floor technology.

(1) PM and PM HAP MACT Floors. Properly designed and operated ESP's used on kraft recovery furnaces routinely achieve PM removal efficiencies of 99 percent or greater. Although emission test data from recovery furnace ESP's on PM HAP performance are limited, available data on ESP performance indicate that those systems that achieve the greatest PM removal show the best performance for the HAP portion of the PM. (See Technical Support Document: Chemical Recovery Combustion Sources at Kraft and Soda Pulp Mills, Chapter 3; docket No. II-A-31.) Therefore, PM can be used as a surrogate for PM HAP's.

The NSPS for kraft pulp mills requires that PM emissions from recovery furnaces constructed, reconstructed, or modified after September 24, 1976 be less than or equal to 0.10 g/dscm (0.044 gr/dscf) of flue gas corrected to

8 percent oxygen. Approximately 39 percent of NDCE recovery furnaces are subject to the NSPS, and even more (80 percent) reportedly achieve the NSPS limit.

Long-term (monthly) PM emission data are available for eight NDCE recovery furnaces. Particulate matter emissions from each of these eight NDCE recovery furnaces varied significantly from month to month; however, PM emissions from seven of the eight NDCE recovery furnaces consistently met the NSPS limit of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen over a 4- to 6-year period. Collectively, emissions from these seven NDCE recovery furnaces ranged from 0.002 to 0.10 g/dscm (0.001 to 0.044 gr/dscf), corrected to 8 percent oxygen. (See State of Washington Data Memo, docket No. II-B-59.) Thus, the long-term data demonstrate that NDCE recovery furnaces equipped with ESP's can meet the NSPS level of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen on a long-term basis. Because greater than 6 percent of NDCE recovery furnaces are capable of meeting the NSPS limit on a long-term basis with ESP's, the proposed MACT floor PM control technology for existing kraft and soda NDCE recovery furnaces is an ESP capable of meeting the NSPS, which

typically has a specific collecting area (SCA) of 100 $m^2/(m^3/sec)$ (530 $ft^2/1,000$ acfm). The application of the proposed MACT floor PM control technology is represented by a PM emission level of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen.

The proposed MACT floor control technology for PM HAP is the same as the proposed MACT floor control technology for PM and is represented by a PM HAP emission level of 1.00E-03 kg/Mg (2.01E-03 lb/ton) of black liquor solids fired. The proposed MACT floor PM HAP emission level is based on available test data and is equivalent to the average PM HAP emission factor for recovery furnaces with PM emissions that achieve the NSPS level of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen.

With respect to MACT for new sources, the best-performing PM control system of the eight NDCE recovery furnaces for which long-term PM emission data are available is an ESP with an operating SCA between 110 and 130 $m^2/(m^3/sec)$ (570 and 670 $ft^2/1,000$ acfm) followed by a cross-flow, packed-bed scrubber. Monthly PM emissions data from the NDCE recovery furnace with this control system varied from 0.002 to 0.025 g/dscm (0.001 to 0.011 gr/dscf)

corrected to 8 percent oxygen over a 6-year period. Taking the variability of the data into consideration, a PM emission level of 0.034 g/dscm (0.015 gr/dscf) was selected to represent the MACT floor PM emission level for new NDCE recovery furnaces. Therefore, the proposed MACT floor PM control technology for new kraft and soda NDCE recovery furnaces is an ESP capable of achieving a PM emission level of 0.034 g/dscm (0.015 gr/dscf) corrected to 8 percent oxygen (i.e., an ESP with a typical SCA between 110 and 130 $m^2/[m^3/sec]$ [570 and 670 $ft^2/1,000$ acfm]) followed by a packed-bed scrubber.

Although the proposed MACT floor PM control technology for new NDCE recovery furnaces includes both the ESP and the cross-flow, packed-bed scrubber, the scrubber was installed as a heat recovery device and for SO_2 control and is not expected to provide much, if any, additional PM control. Because of the high PM removal efficiencies achievable with newer ESP's, the proposed MACT floor PM emission level of 0.034 g/dscm (0.015 gr/dscf) corrected to 8 percent oxygen for new NDCE recovery furnaces could be achieved with the application of the ESP alone.

A PM HAP emission level was not established for new NDCE recovery furnaces because insufficient PM HAP data are available from NDCE recovery furnaces representing MACT for new sources.

(2) Total Gaseous Organic HAP MACT Floors. The ESP systems applied to existing NDCE recovery furnaces conform to one of two designs: wet ESP systems or dry ESP systems. A wet ESP system uses unoxidized black liquor or water in the ESP bottom or in the PM return system. A dry ESP system includes both a dry-bottom ESP and a dry PM return system. Wet ESP systems that use black liquor or HAP-contaminated water emit higher levels of gaseous organic HAP's than dry ESP systems due to the stripping of gaseous organic HAP's from the black liquor or HAP-contaminated water in the ESP bottom or PM return system. Based on the available emission data, NDCE recovery furnaces with dry ESP systems emit, on average, approximately 72 percent less total gaseous organic HAP's than NDCE recovery furnaces with wet ESP systems.

Although information is available to classify almost all (99 percent) of NDCE recovery furnace ESP's as wet- or dry-bottom, little information is available regarding the use of black liquor or HAP-contaminated water in the

recovery furnace ESP PM return systems. Based on the limited available information on ESP return systems, approximately 5 percent of NDCE recovery furnaces are estimated to be equipped with dry ESP systems. Because the estimated percentage of NDCE recovery furnaces equipped with dry ESP systems is less than 6 percent, the proposed MACT floor control technology for total gaseous organic HAP emissions from existing kraft and soda NDCE recovery furnaces is a wet ESP system, and, thus, no control of total gaseous organic HAP's is achieved at the floor. However, because NDCE recovery furnaces equipped with dry ESP systems represent the best-controlled source for total gaseous organic HAP emissions, the proposed MACT floor total gaseous organic HAP control technology for new kraft and soda NDCE recovery furnaces is a dry ESP system. Emission data from three NDCE recovery furnaces equipped with dry ESP systems indicate that a total gaseous organic HAP emission level, as measured by methanol, of 0.012 kg/Mg (0.025 lb/ton) of black liquor solids fired or less is achievable. The methanol emission level corresponds to the highest three-run average obtained for a dry ESP system on an NDCE recovery furnace plus an additional amount to account for the variability in

the dry ESP system data set and the lack of long-term data. Therefore, the total gaseous organic HAP emission level, as measured by methanol, associated with the proposed MACT floor control technology (i.e., a dry ESP system) is 0.012 kg/Mg (0.025 lb/ton) of black liquor solids fired.

b. DCE Recovery Furnace Systems. The DCE recovery furnace system includes the recovery furnace, DCE, and the BLO system. An estimated 83 DCE recovery furnaces are in operation at 48 U.S. kraft and soda pulp mills. An estimated 46 BLO systems are in operation at these 48 pulp mills. Of the two mills without BLO systems, one is a soda pulp mill, and the other is a kraft pulp mill. Information regarding the furnace type, size, and add-on control devices and the associated BLO systems is available for approximately 93 percent of DCE recovery furnace systems.

Like NDCE recovery furnaces, all DCE recovery furnaces are equipped with some type of add-on control device to reduce PM emissions from the furnace. In the case of DCE units, 90 percent are controlled with an ESP, 8 percent are controlled with an ESP followed by a wet scrubber, and the remaining 2 percent are controlled with two ESP's in series. As with NDCE recovery furnaces, MACT floor control

technologies for DCE recovery furnace systems were selected for both PM/PM HAP and total gaseous organic HAP emissions. The following paragraphs describe the proposed MACT floor control technologies for new and existing kraft and soda DCE recovery furnace systems and the emission levels achievable with each proposed MACT floor technology.

(1) PM and PM HAP MACT Floors. As discussed above for NDCE recovery furnaces, properly designed and operated ESP's used on kraft recovery furnaces routinely achieve PM removal efficiencies of 99 percent or greater. Using installation dates to determine NSPS applicability, three DCE recovery furnaces (i.e., 4 percent of the DCE recovery furnace population) are subject to the NSPS emission limit of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen for kraft recovery furnaces. Long-term (monthly) PM emission data are available for an additional four DCE recovery furnaces that are not subject to the NSPS but have consistently met the NSPS emission level of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen over a 3- to 6-year period, even though PM emissions from each of these four DCE recovery furnaces varied significantly from month to month. Collectively, the PM emissions from these four

DCE recovery furnaces varied from 0.011 to 0.10 g/dscm (0.005 to 0.044 gr/dscf) corrected to 8 percent oxygen over the 3- to 6-year period. (See State of Washington Data Memo; docket No. II-B-59.) The combination of those DCE recovery furnaces subject to the NSPS and those for which data show an ability to achieve the NSPS level on a long-term basis represent a total of seven DCE recovery furnaces, or 9 percent of the DCE recovery furnace population.

Because greater than 6 percent of DCE recovery furnaces are capable of meeting the NSPS PM limit on a long-term basis with ESP's, the proposed MACT floor PM control technology for existing kraft and soda DCE recovery furnace systems is an ESP capable of meeting the NSPS, which typically has an SCA of 90 $m^2/(m^3/sec)$ (430 $ft^2/1,000$ acfm). The application of the proposed MACT floor PM control technology is represented by a PM emission level of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen.

The proposed MACT floor control technology for PM HAP is the same as the proposed MACT floor control technology for PM and is represented by a PM HAP emission level of 1.00E-03 kg/Mg (2.01E-03 lb/ton) of black liquor solids

fired. As with existing NDCE recovery furnaces, the proposed MACT floor PM HAP emission level is equivalent to the average PM HAP emission factor for kraft and soda recovery furnaces with PM emissions that achieve the NSPS level of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen.

The best-performing PM control system for both NDCE and DCE recovery furnaces is an ESP with an operating SCA between 110 and 130 $m^2/(m^3/sec)$ (570 and 670 $ft^2/1,000$ acfm) followed by a cross-flow, packed-bed scrubber. Monthly PM emissions data from the recovery furnace with this control system varied from 0.002 to 0.025 g/dscm (0.001 to 0.011 gr/dscf) corrected to 8 percent oxygen over a 6-year period. Taking the variability of the data into consideration, a PM emission level of 0.034 g/dscm (0.015 gr/dscf) was selected to represent the MACT floor PM emission level for new DCE recovery furnaces. Therefore, the proposed MACT floor PM control technology for all new kraft and soda DCE recovery furnaces is an ESP capable of achieving a PM emission level of 0.034 g/dscm (0.015 gr/dscf) corrected to 8 percent oxygen (i.e., an ESP

with a typical SCA between 110 and 130 $m^2/[m^3/sec]$ [570 and 670 $ft^2/1,000$ acfm]) followed by a packed-bed scrubber.

Although the proposed MACT floor PM control technology for new kraft and soda DCE recovery furnaces includes both the ESP and the cross-flow, packed-bed scrubber, the scrubber was installed as a heat recovery device and for SO_2 control and is not expected to provide much, if any, additional PM control. Because of the high PM removal efficiencies achievable with newer ESP's, the proposed MACT floor PM emission level of 0.034 g/dscm (0.015 gr/dscf) corrected to 8 percent oxygen for new DCE recovery furnaces could be achieved with the application of the ESP alone.

The EPA is not proposing a MACT floor PM HAP emission level for new kraft and soda DCE recovery furnaces for the same reason stated above for new NDCE recovery furnaces.

(2) Total Gaseous Organic HAP MACT Floors. Four of the estimated 46 BLO systems in operation are pipeline molecular oxygen-based systems, which have no emission points. No emission data are available from DCE recovery furnaces with molecular oxygen BLO systems for comparison with DCE recovery furnaces with air-based BLO systems. Therefore, the effect of molecular oxygen BLO systems on

total emissions from the DCE recovery furnace system is uncertain. With air-based BLO systems, gaseous organic HAP's are stripped from the black liquor and emitted to the atmosphere as the air bubbles and black liquor make contact. Unlike air-based systems, molecular oxygen systems use pure oxygen, and, thus, no diluents are introduced that could strip organic compounds from the black liquor; consequently, organic compounds not released from the black liquor during the oxidation process could be subsequently stripped, in theory, from the oxidized black liquor when the black liquor enters the direct contact evaporator. For this reason, molecular oxygen BLO systems are not viewed by the Agency as a control option for DCE recovery furnace systems.

The gaseous organic HAP emissions from 2 of the estimated 42 air-based BLO systems are controlled via incineration in power boilers; the remainder are uncontrolled. However, the two air-based BLO units with controlled emissions represent less than 6 percent of DCE recovery furnace systems. Therefore, the proposed MACT floor for total gaseous organic HAP control for existing kraft and soda DCE recovery furnace systems is no control.

The DCE recovery furnace systems emit more gaseous organic HAP's than NDCE recovery furnaces because more opportunities exist for gaseous organic HAP compounds to be stripped from the black liquor. In DCE systems, gaseous organic HAP compounds can be stripped from the black liquor in the BLO system, the DCE, and the ESP system. Based on the available emission data, NDCE recovery furnaces with dry ESP systems emit approximately 93 percent less total gaseous organic HAP's than DCE recovery furnace systems.

The NDCE recovery furnaces with dry ESP systems also have lower TRS emissions compared to DCE recovery furnace systems. The need for TRS emission reductions and the need for additional recovery furnace capacity have resulted in mills converting older and smaller DCE units into larger NDCE units. Approximately 24 percent of the existing NDCE recovery furnaces are converted DCE recovery furnaces. For these reasons, and also because NDCE recovery furnaces are more energy efficient than DCE recovery furnaces, all new recovery furnace installations are of the NDCE design. Because of its lower HAP emission potential, an NDCE recovery furnace equipped with a dry ESP system was selected as the MACT floor total gaseous organic HAP control

technology for all new kraft and soda NDCE recovery furnaces and DCE recovery furnace systems. This proposed MACT floor control technology is capable of achieving a total gaseous organic HAP emission level, as measured by methanol, of 0.012 kg/Mg (0.025 lb/ton) of black liquor solids fired.

c. Lime Kilns. An estimated 192 lime kilns operate at 124 U.S. kraft and soda pulp mills. Information regarding the lime kiln type, size, and add-on control devices is available for approximately 85 percent of these lime kilns. All of the add-on control systems in place on lime kilns are for the control of PM or TRS emissions. No add-on controls designed to remove gaseous organic HAP's are applied to lime kilns.

Gaseous organic HAP emissions from lime kilns are primarily attributable to the use of HAP-contaminated process waters in the lime mud washers and lime kiln scrubbers. Therefore, gaseous organic HAP emissions from lime kilns can be minimized by reducing the HAP content of process waters used in the lime mud washers and scrubbers. These process waters are being regulated as part of the final NESHAP for noncombustion sources at pulp and paper mills. Therefore, no MACT floor has been established for

total gaseous organic HAP's for new and existing kraft and soda lime kilns as part of this proposed NESHAP. The following paragraphs describe the proposed MACT floor PM/PM HAP control technologies and the associated emission levels for existing and new kraft and soda lime kilns.

Particulate matter emissions from most (90 percent) of the lime kilns are controlled by wet scrubbers. Venturi scrubbers are the most common type of wet scrubber in use on lime kilns. Particulate matter emissions from the remaining 10 percent of lime kilns are controlled by ESP's (9 percent) or the combination of an ESP and wet scrubber (1 percent). Properly designed and operated venturi scrubbers and ESP's used on kraft lime kilns are capable of reducing PM emissions by greater than 99 percent.

The NSPS for kraft pulp mills requires that PM emissions from gas-fired lime kilns constructed, reconstructed, or modified after September 24, 1976 be less than or equal to 0.15 g/dscm (0.067 gr/dscf) of flue gas corrected to 10 percent oxygen. Approximately 19 percent of lime kilns are subject to the NSPS limit for gas-fired lime kilns, and even more (i.e., 64 percent of all lime kilns,

including oil-fired lime kilns) have reported average PM emissions less than the gas-fired NSPS limit.

Long-term (monthly) PM emission data are available for four gas-fired lime kilns that are subject to the NSPS PM limit for gas-fired lime kilns. No long-term data are available for oil-fired lime kilns. Two of the four lime kilns for which long-term PM emission data are available are equipped with venturi scrubbers, and two are equipped with ESP's. Particulate matter emissions from the four lime kilns varied from 0.002 to 0.15 g/dscm (0.001 to 0.067 gr/dscf) corrected to 10 percent oxygen over a 4- to 7-year period. The long-term data demonstrate that existing lime kilns equipped with either venturi scrubbers or ESP's can meet an emission level of 0.15 g/dscm (0.067 gr/dscf) corrected to 10 percent oxygen on a long-term basis. Because greater than 6 percent of lime kilns are capable of meeting the gas-fired NSPS limit on a long-term basis with venturi scrubbers or ESP's, the proposed MACT floor control technology for existing kraft and soda lime kilns is either a venturi scrubber or an ESP. The application of these proposed MACT floor PM control technologies is represented by a PM emission level of 0.15 g/dscm (0.067 gr/dscf)

corrected to 10 percent oxygen. The proposed MACT floor control technology for PM HAP is the same as the proposed MACT floor control technology for PM and is represented by a PM HAP emission level of 6.33E-03 kg/Mg (1.27E-02 lb/ton) of CaO produced. The proposed MACT floor PM HAP emission level is equivalent to the average PM HAP emission factor for lime kilns with outlet PM emissions that achieve the NSPS level of 0.15 g/dscm (0.067 gr/dscf) corrected to 10 percent oxygen.

Of the four lime kilns for which long-term PM emission data are available, the best-performing PM control system is an ESP with an operating SCA of 220 $m^2/(m^3/sec)$ (1,120 ft^2/1,000 acfm), which is substantially higher than the typical SCA for an ESP designed to meet the NSPS (i.e., 90 $m^2/[m^3/sec]$ [460 ft^2/1,000 acfm]). The monthly PM emissions from the best-performing lime kiln varied from 0.002 to 0.018 g/dscm (0.001 to 0.008 gr/dscf) corrected to 10 percent oxygen over a 7-year period. To account for the variability in the data, a PM emission level of 0.023 g/dscm (0.010 gr/dscf) was selected to represent the MACT floor PM emission level for new lime kilns. Therefore, the proposed MACT floor PM HAP control technology for new kraft and soda

lime kilns is an ESP capable of achieving a PM emission level of 0.023 g/dscm (0.010 gr/dscf) corrected to 10 percent oxygen (i.e., an ESP with a typical SCA of 220 $m^2/[m^3/sec]$ [1,120 $ft^2/1,000$ acfm]).

A MACT floor PM HAP emission level was not established for new lime kilns for the same reasons stated above for new NDCE recovery furnaces.

d. Smelt Dissolving Tanks. An estimated 227 SDT's operate at 124 U.S. kraft and soda pulp mills. Information regarding the SDT size and add-on control devices is available for approximately 83 percent of the SDT's. The add-on control systems in place on SDT's are for control of PM emissions. No add-on controls designed to remove gaseous organic HAP's are applied to SDT's.

As discussed above for lime kilns, gaseous organic HAP emissions from SDT's are primarily the result of the use of HAP-contaminated process waters. The HAP-contaminated process waters are typically used in the SDT scrubbers as makeup water to the SDT. Therefore, gaseous organic HAP emissions from SDT's can be minimized by reducing the HAP content of process waters used in the SDT and SDT scrubber. However, as stated above for lime kilns, the control of HAP

emissions from process waters is being regulated as part of the final NESHAP for noncombustion sources at pulp and paper mills. Therefore, no MACT floor has been established for total gaseous organic HAP emissions for new and existing kraft and soda SDT's as part of this proposed NESHAP.

Particulate matter emissions from most (87 percent) of the SDT's are controlled by wet scrubbers. Particulate matter emissions from the majority of the remaining SDT's are controlled by mist eliminators. Based on the available performance data for wet scrubbers and mist eliminators installed on SDT's, wet scrubbers are more effective at controlling PM emissions from SDT's than mist eliminators. (See Technical Support Document: Chemical Recovery Combustion Sources at Kraft and Soda Pulp Mills, Chapter 3; docket No. II-A-31.) Properly designed wet scrubbers used on kraft SDT's are capable of reducing PM emissions by greater than 99 percent.

The NSPS for kraft pulp mills require that PM emissions from SDT's that are constructed, modified, or reconstructed after September 24, 1976 be less than 0.10 kg/Mg (0.20 lb/ton) of black liquor solids fired. Approximately 29 percent of SDT's are subject to the NSPS PM limit, and

even more (75 percent) have reported average PM emissions less than the NSPS PM limit. Although no long-term PM emission data are available for SDT's equipped with wet scrubbers that are subject to the NSPS limit of 0.10 kg/Mg (0.20 lb/ton) of black liquor solids fired, the prevalence of wet scrubbers on SDT's and the high PM removal efficiencies achieved with this technology are sufficient to establish wet scrubbers as the proposed MACT floor PM control technology for existing kraft and soda SDT's. The application of this control technology is represented by a PM emission level of 0.10 kg/Mg (0.20 lb/ton) of black liquor solids fired. The proposed MACT floor control technology for PM HAP is the same as the proposed MACT floor control technology for PM and is represented by a PM HAP emission level of 6.20E-05 kg/Mg (1.24E-04 lb/ton) of black liquor solids fired. The proposed MACT floor PM HAP emission level is equivalent to the average PM HAP emission factor for SDT's with outlet PM emissions that achieve the NSPS PM level of 0.10 kg/Mg (0.20 lb/ton) of black liquor solids fired.

Long-term (monthly) PM emission data are available for three SDT's equipped with wet scrubbers designed to meet a

PM permit limit (0.06 kg/Mg [0.12 lb/ton] of black liquor solids fired) that is more stringent than the NSPS. The high-efficiency wet scrubbers installed on these three SDT's represent the best-performing PM control systems installed on kraft and soda SDT's. Collectively, monthly PM emissions from these three SDT's varied from 0.0045 to 0.055 kg/Mg (0.009 to 0.11 lb/ton) of black liquor solids fired over a 2- to 6- year period. (See State of Washington Data Memo, docket No. II-B-59.) The long-term data demonstrate that SDT's equipped with high-efficiency wet scrubbers can achieve a maximum outlet PM level of 0.06 kg/Mg (0.12 lb/ton) of black liquor solids fired on a long-term basis. Therefore, the proposed MACT floor PM HAP control technology for new kraft and soda SDT's is a high-efficiency wet scrubber capable of achieving a PM emission level of 0.06 kg/Mg (0.12 lb/ton) of black liquor solids fired.

2. MACT Floors--Sulfite Pulp Mills

An estimated 21 combustion units operate at sulfite pulp mills. Information regarding the chemical recovery equipment and add-on control devices is available for approximately 95 percent of these combustion units. Because there are less than 30 sulfite combustion units, the MACT

floor for existing sources is based on the 5 best-performing sources. Thirteen of the 21 sulfite combustion units (62 percent) are equipped with fiber-bed demister systems. The remainder of the combustion units are equipped with venturi scrubbers or packed-bed scrubbers. These add-on control devices were installed on sulfite combustion units for PM control and additional SO_2 control. All sulfite combustion units are equipped with absorption towers prior to the PM control device to recover SO_2 for reuse in the pulping process.

Long-term PM emission data are available for two sulfite combustion units equipped with fiber-bed demister systems. Based on these long-term data and additional long-term data for sulfite combustion units equipped with wet scrubbers, fiber-bed demister systems are more effective than wet scrubbers at controlling PM emissions from sulfite combustion units. Monthly PM emission data from the two sulfite combustion units equipped with fiber-bed demister systems ranged from 0.005 to 0.088 g/dscm (0.002 to 0.038 gr/dscf) corrected to 8 percent oxygen over a 6- to 7-year period. Because the fiber-bed demister system represents the best-performing control technology and at

least five sources are equipped with fiber-bed demister systems, this technology was selected to represent the proposed MACT floor control technology for existing sulfite combustion units. To account for variability in the data, a PM emission level of 0.092 g/dscm (0.040 gr/dscf) corrected to 8 percent oxygen was selected to represent the MACT floor PM emission level for existing sulfite combustion units.

Monthly PM emission data from the best-performing sulfite combustion unit equipped with a fiber-bed demister system ranged from 0.009 to 0.039 g/dscm (0.004 to 0.017 gr/dscf) corrected to 8 percent oxygen over a 6-year period. This sulfite combustion unit also is equipped with a wet scrubber between the SO_2 absorption towers and the fiber-bed demister system. The scrubber was added to the system for additional PM and SO_2 control. Because the best-performing source is equipped with a wet scrubber and fiber-bed demister system, the combination of these technologies was selected to represent the proposed MACT floor control technology for new sulfite combustion units. To account for the variability in the data, a PM emission level of 0.046 g/dscm (0.020 gr/dscf) corrected to 8 percent oxygen

was selected to represent the MACT floor PM emission level for new sulfite combustion units.

3. MACT Floors--Stand-Alone Semichemical Pulp Mills

An estimated 14 chemical recovery combustion units operate at 13 U.S. stand-alone semichemical pulp mills. Information regarding the design and operation of chemical recovery combustion units is available for all of these units. Although chemical recovery combustion units at stand-alone semichemical pulp mills are equipped with a variety of PM control devices, insufficient PM data and no PM HAP data are available to establish MACT floors for PM or PM HAP. In addition, none of the existing semichemical mills are currently controlling gaseous organic HAP emissions from semichemical combustion sources. Therefore, no control of total gaseous organic HAP emissions is achieved at the MACT floor for existing or new sources.

However, the Agency has selected a beyond-the-floor option to represent MACT for gaseous organic HAP control for existing and new semichemical combustion sources. The beyond-the-floor option is based on the use of an RTO preceded by a wet ESP. (A wet ESP or other PM control device is necessary because the RTO requires a high degree

of PM control for proper operation.) Pilot study results at a stand-alone semichemical mill indicate that an RTO is well-suited to reducing gaseous organic HAP emissions from fluidized-bed reactors, which emit the highest known quantities of HAP's of the combustion technologies currently in use at semichemical pulp mills. The semichemical mill that conducted the pilot study is currently installing a full-scale RTO based on the results of the pilot study.

During the pilot study, the RTO reduced THC emissions from the mill's fluidized-bed reactor by an average of 97 percent. However, because the RTO has not yet been demonstrated full-scale at a semichemical mill, EPA estimated the total gaseous organic HAP emission level that corresponds to MACT using the average THC emission reduction (90 percent) achieved during the pilot study test run with the lowest level of control. The estimated 90 percent THC emission reduction was applied to the average uncontrolled THC emissions (measured as carbon) from a fluidized-bed reactor. Based on the results of the calculation, the application of an RTO preceded by a wet ESP is estimated to be representative of either a total gaseous organic HAP emission level of 1.49 kg/Mg (2.97 lb/ton) of black liquor

solids fired, or a 90 percent reduction in total gaseous organic HAP emissions. (Total gaseous organic HAP's are measured as THC, as carbon, in both cases.)

F. Discussion of Regulatory Alternatives

The proposed standards were selected based on a review of the regulatory alternatives developed for the affected sources. Table 3 presents the regulatory alternatives examined for existing affected sources at kraft and soda pulp mills; Tables 4 and 5 present the regulatory alternatives for existing affected sources at sulfite and stand-alone semichemical pulp mills, respectively. For existing affected sources, regulatory alternative I (RA I) represents the proposed MACT floor, and additional regulatory alternatives represent beyond-the-MACT-floor options. The regulatory alternatives are increasingly more stringent in terms of total HAP emission reduction requirements. The most stringent regulatory alternative examined for existing sources is representative of MACT for new sources. A discussion of the regulatory alternatives is provided below.

TABLE 3. REGULATORY ALTERNATIVES FOR EXISTING AFFECTED SOURCES AT KRAFT AND SODA PULP MILLS

Regulatory alternatives (RA)	Basis of alternative			
	Recovery furnace systems		Smelt dissolving tanks	Lime kilns
	NDCE	DCE		
RA I (MACT floor for existing sources)	NDCE recovery furnace with ESP_1	DCE recovery furnace with ESP_1	Wet $scrubber_1$	ESP_1 or wet $scrubber_1$
RA II	NDCE recovery furnace with ESP_1	DCE recovery furnace with ESP_1 plus BLO vent controlled by incineration	Wet $scrubber_1$	ESP_1 or wet $scrubber_1$
RA III	NDCE recovery furnace with dry ESP_1 system	NDCE recovery furnace with dry ESP_1 system	Wet $scrubber_1$	ESP_1 or wet $scrubber_1$
RA IV (MACT floor for new sources)[a]	NDCE recovery furnace with dry ESP_2 system and packed-bed scrubber	NDCE recovery furnace with dry ESP_2 system and packed-bed scrubber	Wet $scrubber_2$	ESP_2

[a]Tighter PM control is achieved for new sources through the use of a more efficient ESP design (ESP_2) or scrubber design (wet $scrubber_2$) than that used under regulatory alternatives I through III (ESP_1 or wet $scrubber_1$) for existing sources.

TABLE 4. REGULATORY ALTERNATIVES FOR EXISTING AFFECTED SOURCES AT SULFITE PULP MILLS

Regulatory alternatives (RA)	Basis of alternative
RA I (MACT floor for existing sources)	Fiber-bed demister system
RA II (MACT floor for new sources)	Wet scrubber followed by fiber-bed demister system

TABLE 5. REGULATORY ALTERNATIVES FOR EXISTING AFFECTED SOURCES AT SEMICHEMICAL PULP MILLS

Regulatory alternatives (RA)	Basis of alternative
RA I (MACT floor for existing and new sources)	No control
RA II (Beyond-the-MACT floor for existing and new sources)	Wet ESP followed by regenerative thermal oxidizer

1. Kraft and Soda Pulp Mills

As shown in Table 5, four regulatory alternatives were considered for MACT selection for affected sources at kraft and soda pulp mills. The first regulatory alternative (RA I) represents the proposed MACT floor for existing affected sources, and the other three alternatives (RA II, RA III, and RA IV) represent beyond-the-MACT-floor options. Each of these regulatory alternatives is discussed below by emission point.

a. NDCE Recovery Furnaces. For NDCE recovery furnaces, the regulatory alternatives are based on two levels of PM HAP control and two levels of total gaseous organic HAP control, as measured by methanol. Under RA I (proposed MACT floor for existing sources), PM HAP emissions would be controlled through the application of an ESP with a typical operating SCA of 100 $m^2/(m^3/sec)$ (530 ft^2/1,000 acfm); the ESP would reduce PM HAP emissions by greater than 99 percent.

The regulatory alternatives RA II and RA III are based on the same PM HAP control equipment specifications for the NDCE recovery furnace as RA I (the proposed MACT floor); therefore, no further reduction in PM HAP emissions would be

achieved under RA II and RA III than that achieved at the floor. However, under RA III, total gaseous organic HAP emissions would be controlled to levels beyond the proposed MACT floor through the application of a dry ESP system (i.e., a dry-bottom ESP with a dry PM return system). The use of a dry ESP system would result in a reduction in total gaseous organic HAP emissions from those mills currently using wet ESP systems (i.e., wet-bottom ESP's or dry-bottom ESP's with wet PM return systems). Wet ESP systems emit greater quantities of gaseous organic HAP's because these compounds are stripped from the black liquor in the bottom of the ESP and in the PM return system.

The most stringent beyond-the-floor regulatory alternative (RA IV) combines the conversion of the ESP system with more stringent PM HAP control requirements for the furnace. The more stringent PM HAP control would be obtained through the application of an ESP followed by a packed-bed scrubber; the typical operating SCA of the ESP would be between 110 and 130 $m^2/(m^3/sec)$ (570 and 670 $ft^2/1,000$ acfm). Although the packed-bed scrubber is capable of reducing HCl emissions from the NDCE recovery furnace by as much as 99 percent, as stated in

section IV.E.1.a of this preamble, the ESP could be used alone to meet the PM emission limit for new NDCE recovery furnaces because the scrubber removes little, if any, of the PM remaining in the gas stream exiting the ESP. Because the PM HAP control costs for RA IV are based on an ESP followed by a packed-bed scrubber, those costs are overstated. Regulatory alternative IV is representative of the best-controlled similar source for NDCE recovery furnaces.

b. DCE Recovery Furnace Systems. For DCE recovery furnace systems, the regulatory alternatives are based on two levels of PM HAP control and three levels of total gaseous organic HAP control, as measured by methanol. Under the proposed MACT floor regulatory alternative RA I, PM HAP emissions would be reduced through the application of an ESP with a typical operating SCA of 90 $m^2/(m^3/sec)$ (430 $ft^2/1,000$ acfm).

The beyond-the-floor regulatory alternative RA II is based on the same PM HAP control equipment specifications for the DCE recovery furnace as RA I; however, total gaseous organic HAP emissions also would be reduced by controlling the vent gases from air-based BLO systems to a beyond-the-floor level via incineration. The use of an incineration

device such as a power boiler or thermal oxidizer could achieve total gaseous organic HAP emission reductions of 98 percent or greater from air-based BLO systems, which would translate to a 38 percent reduction of total gaseous organic HAP emissions from the entire DCE recovery furnace system.

The beyond-the-floor regulatory alternative RA III is based on the conversion of the DCE recovery furnace to an NDCE recovery furnace equipped with a dry ESP system with a typical operating SCA of 100 $m^2/(m^3/sec)$ (530 ft^2/1,000 acfm). The conversion of the DCE recovery furnace would reduce total gaseous organic HAP emissions from the DCE recovery furnace system by approximately 93 percent. No further reduction in PM HAP emissions would be achieved under RA III than that achieved at the floor (RA I) for DCE recovery furnaces.

The most stringent beyond-the-floor regulatory alternative (RA IV) combines the conversion of the DCE recovery furnace with more stringent PM HAP control requirements for the furnace. The more stringent PM HAP control requirements are based on an ESP with a typical operating SCA between 110 and 130 $m^2/(m^3/sec)$ (570 and

670 ft^2/1,000 acfm) followed by a packed-bed scrubber. Although the packed-bed scrubber is capable of reducing HCl emissions from the DCE recovery furnace by as much as 99 percent, as stated in section IV.E.1.a of this preamble, the ESP could be used alone to meet the PM emission limit for new recovery furnaces because the scrubber removes little, if any, of the PM remaining in the gas stream exiting the ESP. Because the PM HAP control costs for RA IV are based on an ESP followed by a packed-bed scrubber, those costs are overstated. Regulatory alternative IV is representative of the best-controlled similar source for DCE recovery furnace systems.

c. Smelt Dissolving Tanks. For SDT's, the regulatory alternatives are based on two levels of PM HAP control. Regulatory alternatives I through III are based on the use of a wet scrubber designed to meet the NSPS PM emission level. The beyond-the-floor regulatory alternative RA IV is based on the use of a high-efficiency wet scrubber designed to reduce PM emissions from SDT's. Based on current information, no controls more stringent than the use of high-efficiency wet scrubbers are being applied to SDT's.

d. Lime Kilns. Two PM HAP control levels were considered for lime kilns. Under regulatory alternatives I through III, the PM control level is based on the level achievable with a wet scrubber or an ESP designed to meet the NSPS. Under the beyond-the-floor regulatory alternative RA IV, increased PM control is obtained through the application of an ESP with a typical operating SCA of 220 $m^2/(m^3/sec)$ (1,120 ft^2/1,000 acfm).

2. Sulfite Pulp Mills

As shown in Table 4, two regulatory alternatives were considered for sulfite combustion units. Both of these alternatives would reduce PM HAP emissions from the sulfite combustion unit. Regulatory alternative I represents the proposed MACT floor for existing sulfite combustion units and is based on the use of a fiber-bed demister system. Regulatory alternative II is more stringent than the proposed MACT floor option and is based on the use of a wet scrubber followed by a fiber-bed demister system.

3. Stand-alone Semichemical Pulp Mills

As shown in Table 5, two regulatory alternatives for total gaseous organic HAP's were considered for combustion sources at stand-alone semichemical pulp mills. Regulatory

alternative I represents the MACT floor for existing sources, which is no control. Regulatory alternative II is more stringent than the MACT floor option and is based on the use of a wet ESP followed by an RTO to reduce HAP emissions from the semichemical combustion units.

G. Selection of Proposed Standards for Existing and New Sources

1. Existing Sources

The proposed standards for each emission point are based on the emission level achievable when MACT is applied to that source. For existing sources, MACT was determined by evaluating the regulatory alternatives presented in Tables 3 through 5. The Agency selected RA I, or the MACT floor alternative, as MACT for existing sources at kraft, soda, and sulfite pulp mills. The decision to select RA I was based on a comparison of the costs and benefits of the regulatory alternatives for existing sources at kraft, soda, and sulfite pulp mills. The Agency concluded that the benefits of additional controls beyond the MACT floor for kraft, soda, and sulfite pulp mills do not outweigh the high capital costs (shown in Tables 6 and 7).

TABLE 6. NATIONWIDE COSTS ASSOCIATED WITH REGULATORY ALTERNATIVES FOR KRAFT AND SODA AFFECTED SOURCES

Regulatory alternatives (RA)	Total capital investment, $	Total annual cost, $/yr
RA I (MACT floor for existing sources)	219,000,000	23,000,000
RA II (Beyond the floor for existing sources)	343,000,000	57,000,000
RA III (Beyond the floor for existing sources)	1,450,000,000	64,400,000
RA IV (Beyond the floor for existing sources; MACT floor for new sources)	2,080,000,000	152,000,000

TABLE 7. NATIONWIDE COSTS ASSOCIATED WITH REGULATORY ALTERNATIVES FOR SULFITE AFFECTED SOURCES

Regulatory alternatives (RA)	Total capital investment, $	Total annual cost, $/yr
RA I (MACT floor for existing sources)	11,400,000	5,120,000
RA II (Beyond the floor for existing sources; MACT floor for new sources)	19,600,000	8,770,000

TABLE 8. NATIONWIDE COSTS ASSOCIATED WITH REGULATORY ALTERNATIVES FOR SEMICHEMICAL AFFECTED SOURCES

Regulatory alternatives (RA)	Total capital investment, $	Total annual cost, $/yr
RA I (MACT floor for existing and new sources)	0	0
RA II (Beyond the floor for existing and new sources)	28,100,000	6,860,000

The Agency selected RA II, or the beyond-the-floor alternative, as MACT for existing sources at stand-alone semichemical pulp mills. The decision to select RA II was based on (1) the suitability of RTO technology for use with fluidized-bed reactors, which emit the highest quantities of gaseous organic HAP's of the chemical recovery combustion technologies currently in use at stand-alone semichemical pulp mills; (2) the plans of one semichemical mill to install a full-scale RTO system (preceded by a wet ESP) following a successful RTO pilot study; and (3) the low cost-effectiveness value associated with a combination wet ESP and RTO. (The cost-effectiveness value is less than $2,800/Mg HAP's [$2,500/ton HAP's] based on conservative cost estimates.) Table 8 presents the costs associated with the regulatory alternatives for existing sources at stand-alone semichemical pulp mills.

Information on the costs and environmental impacts of each alternative can be found in the memorandum entitled "Nationwide Costs, Environmental Impacts, and Cost-Effectiveness of Regulatory Alternatives for Kraft, Soda, Sulfite, and Semichemical Combustion Sources" (docket No. II-B-63). The economic impacts of each alternative are

discussed in "Economic Analysis for the National Emission Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production; Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Pulp, Paper, and Paperboard Category--Phase I" (docket No. II-A-32), hereafter referred to as the "Economic Analysis Document."

2. New Sources

The most stringent regulatory alternatives examined for existing sources (RA IV for kraft and soda pulp mills; RA II for sulfite pulp mills; and RA II for stand-alone semichemical pulp mills) are representative of MACT for new sources. The proposed standards are equivalent to the emission level achieved by the application of MACT. The proposed new source MACT for kraft and soda pulp mills is represented by (1) an NDCE recovery furnace equipped with a dry ESP system with an SCA between 110 and 130 $m^2/(m^3/sec)$ (570 and 670 ft^2/1,000 acfm) followed by a packed-bed scrubber for both NDCE and DCE recovery furnaces, (2) a wet scrubber designed to meet a PM emission limit of 0.06 kg/Mg (0.12 lb/ton) of black liquor solids fired for SDT's, and (3) an ESP with an SCA of 220 $m^2/(m^3/sec)$

(1,120 ft^2/1,000 acfm) for lime kilns. The proposed new source MACT for sulfite combustion units is represented by a wet scrubber followed by a fiber-bed demister system. The proposed new source MACT for semichemical combustion units is represented by a wet ESP followed by an RTO.

H. Selection of Format of the Standards

1. PM HAP Standards for Kraft and Soda Pulp Mills

In selecting the type and format of the proposed PM HAP standard for kraft and soda pulp mills, the Agency took into consideration the fact that the HAP fraction of the PM emitted was small (approximately 0.25 percent). Consequently today's proposed standards provide owners and operators of existing affected sources at kraft and soda pulp mills several alternatives for meeting the proposed PM HAP standards. Owners or operators of existing affected sources would be allowed to comply with either the PM or the PM HAP emission limit set for each source. In addition, as an alternative to meeting either the PM or PM HAP emission limits for each existing affected source, the proposed rule would allow owners or operators to comply with the PM HAP standards by using a bubble compliance alternative that groups PM or PM HAP emissions from all existing sources

together. Under the proposed bubble compliance alternative, owners or operators could control PM or PM HAP emissions more than required at one emission point, where control costs are relatively low, in return for a comparable relaxation of controls at a second emission point where control costs are higher. This approach allows the owner or operator the maximum degree of flexibility in developing the PM or PM HAP control strategy for existing sources in the chemical recovery area while reducing HAP emissions to the same levels that would be achieved through the application of MACT for each affected source.

The proposed bubble compliance alternative only applies to existing sources at kraft and soda pulp mills. New sources must meet the applicable PM emission limits proposed for new sources. The use of the bubble was limited to existing sources because (1) new sources historically have been held to stricter standards than existing sources, and (2) state-of-the-art equipment design and add-on controls can be integrated and installed most cost effectively during construction of new sources.

The PM emission limits are provided in units of g/dscm (gr/dscf) for kraft recovery furnaces and lime kilns and

units of kg/Mg (lb/ton) of black liquor solids fired for SDT's to be consistent with the NSPS for kraft pulp mills. The PM HAP emission rates are provided in units of kg/Mg (lb/ton) of black liquor solids fired because of the low PM HAP concentrations present in exhaust gases from affected sources at kraft and soda pulp mills.

2. PM Standards for Sulfite Pulp Mills

In selecting the type and format of the proposed PM standard for sulfite pulp mills, the Agency took into consideration the limited amount of PM HAP data available for sulfite combustion units. Because very little PM HAP data are available from sulfite combustion units, PM is used as a surrogate for PM HAP, and an alternate PM HAP standard is not provided. In addition, because (1) emissions from multiple sulfite combustion units at the same sulfite mill are typically controlled by the same equipment and (2) sulfite combustion units are the only affected source at sulfite mills, a "bubble" equation was not developed for sulfite pulp mills. The PM emission limits for both new and existing sulfite combustion units are based on available long-term PM emission data for sulfite combustion units in the State of Washington. The State of Washington data are

expressed as PM concentrations [e.g., g/dscm (gr/dscf)], corrected to 8 percent oxygen. Therefore, the PM emission limits for new and existing sulfite combustion units are in concentration units, corrected to 8 percent oxygen.

3. Total Gaseous Organic HAP Standard for Kraft and Soda Pulp Mills

In selecting the type and format of the proposed total gaseous organic HAP standard for new kraft and soda NDCE recovery furnaces and DCE recovery furnace systems, the Agency considered the following facts: (1) methanol is the primary HAP for which emission data are available, (2) the emission mechanism for methanol is the same as for other gaseous organic HAP's, and (3) emissions of methanol from well-controlled sources are low (less than 5 ppm_v). Consequently, the Agency elected to use methanol as a surrogate for total gaseous organic HAP's and establish a methanol emission limit in the form of a mass emission rate (i.e., kg/Mg [lb/ton] of black liquor solids fired).

4. Total Gaseous Organic HAP Standard for Stand-Alone Semichemical Pulp Mills

In selecting the type and format of the proposed total gaseous organic HAP standard for semichemical combustion

sources, the Agency considered the following facts: (1) approximately half of the affected sources at stand-alone semichemical pulp mills would require add-on controls to reduce HAP emissions, while the other half likely could meet the total gaseous organic HAP limit without add-on controls and/or could reduce HAP emissions through process changes, and (2) emissions from semichemical combustion units are highly variable. Therefore, the Agency elected to allow affected sources to meet either an emission limit (in units of kg/Mg [lb/ton] of black liquor solids fired) or a percent reduction to provide flexibility and to accommodate the expected differences in emission levels and control strategies at stand-alone semichemical pulp mills. The emission limit and percent reduction are both based on measurements of THC (measured as carbon) as a surrogate for total gaseous organic HAP's because THC data correlate with available HAP data.

I. Selection of Monitoring Requirements

To ensure compliance with today's proposed PM HAP standards, owners or operators of recovery furnaces and lime kilns equipped with ESP's would be required to maintain opacity levels below a specified level. Owners or operators

of affected sources equipped with control devices other than ESP's would be required to establish control device or process operating parameter ranges that indicate the control device or process is being operated and maintained in accordance with good air pollution control practices. Owners or operators complying with the proposed total gaseous organic HAP limit for new kraft and soda recovery furnaces that use an NDCE recovery furnace with a dry ESP system are exempt from monitoring requirements for gaseous organic HAP's because the use of this equipment ensures continuous compliance with the emission limit.

Today's standards include two levels of monitoring. Each monitoring level specifies maximum opacities (ESP's only) and a maximum frequency with which the opacity or monitored parameters may exceed established levels. If the conditions of the first monitoring level are exceeded, the owner or operator would be required to implement the corrective actions contained in their SSM plan to bring the operating parameter or opacity levels back to established levels. Exceedance of the conditions of the second level would constitute a violation of the standard. The purpose of the two-level monitoring appproach is to prevent a

violation from occurring by requiring the owner or operator to correct operating parameter or opacity excursions before the threat of a violation arises.

Owners or operators of kraft and soda SDT's and lime kilns and sulfite combustion units equipped with wet scrubbers would be required to establish a range of values for scrubber pressure drop and liquid flow rate that indicate compliance with today's PM HAP standards. The Agency selected the proposed monitoring parameters for wet scrubbers because these parameters are reliable indicators of PM and PM HAP control device performance.

For consistency with the NSPS for kraft pulp mills, the Agency adopted the following requirements from the NSPS: (1) the use of continuous opacity monitors to monitor PM emissions from ESP's; (2) the opacity level (i.e., 35 percent) indicating a violation of PM or PM HAP emission limits for existing kraft and soda recovery furnaces equipped with ESP's; and (3) the maximum allowable opacity exceedance frequency of 6 percent of the semiannual reporting period. For new kraft and soda recovery furnaces, a 6-minute average opacity level of 20 percent was selected as the opacity level that, if exceeded for 10 consecutive

6-minute periods, would require corrective action by the owner or operator. An opacity level of 20 percent was chosen because the kraft recovery furnace that represents the new source MACT floor for PM control is subject to a State opacity limit of 20 percent.

Although the proposed PM emission limit for existing kraft and soda lime kilns is equivalent to the NSPS PM emission limit for gas-fired lime kilns, the monitoring requirement for determining compliance with the proposed PM emission limit is not equivalent to the NSPS monitoring requirement. The NSPS does not include an opacity limit for lime kilns. Under the proposed rule, the Agency selected 20 percent as the opacity level that, if exceeded for 10 consecutive 6-minute periods, would require corrective action by the owner or operator, and if exceeded for more that 6 percent of any semiannual reporting period, would constitute a violation of the standard. An opacity level of 20 percent was chosen because a number of newer existing lime kilns equipped with ESP's are currently subject to State opacity limits of 20 percent.

The Agency selected temperature as the operating parameter to be monitored and recorded for sources complying

with the total gaseous organic HAP emission standard for semichemical combustion units through the use of an RTO because the temperature of the RTO is an indicator of total gaseous organic HAP control.

The Agency selected a 3-hour averaging time for calculating monitoring parameter values for the purpose of determining possible violations of the standard because (1) EPA test methods referenced in today's proposed rule require the owner or operator to perform a minimum of three 1-hour test runs, and (2) the limits of the established range of parameter values would be based on the average values obtained using all test data obtained during the performance test.

J. Selection of Test Methods

The following discussion identifies the test methods that are to be used for compliance determinations.

Test Method 5, "Determination of Particulate Emissions from Stationary Sources" [40 CFR part 60, appendix A]--in conjunction with either the integrated sampling techniques of Test Method 3, "Gas Analysis for the Determination of Dry Molecular Weight" [40 CFR part 60, appendix A] or Test Method 3A, "Determination of Oxygen and Carbon Dioxide

Concentrations in Emissions from Stationary Sources" [40 CFR part 60, appendix A]--is the selected test method for determining compliance with the PM emission standards for kraft and soda recovery furnaces, SDT's, and lime kilns and sulfite combustion units. Test Method 5 was used to collect the PM emission data that form the basis of the PM standards proposed for kraft, soda, and sulfite combustion sources and also is the required test method for measuring PM from sources subject to the NSPS for kraft pulp mills.

Test Method 17, "Determination of Particulate Matter Emissions from Stationary Sources (In-Stack Filtration Method)," may be used as an alternative to Test Method 5 if a constant value of 0.009 g/dscm (0.004 gr/dscf) is added to the results of Test Method 17 and the stack temperature is no greater than 205°C (400°F). Owners and operators of sources subject to the NSPS for kraft pulp mills are allowed to use Test Method 17 as an alternative to Test Method 5 for demonstrating compliance with the PM standards of the NSPS, and, therefore, today's proposed rule makes the same allowance to be consistent with the NSPS.

Test Method 29, "Determination of Metals Emissions from Stationary Sources" [40 CFR part 60, appendix A] is the

selected test method for determining compliance with the PM HAP emission standards for kraft and soda recovery furnaces, SDT's, and lime kilns. Test Method 29 can also be used as an alternative to Test Method 5 for measuring PM emissions. The PM HAP data upon which the PM HAP emission limits for kraft and soda combustion sources are based were collected before Test Method 29 was proposed using a variety of test methods that are similar or identical to Test Method 29. Test Method 29 collects mercury in part with impingers filled with a solution of potassium permanganate. Because manganese, a component of potassium permanganate, is also a target analyte for Test Method 29, extreme caution should be used to ensure that the potassium permanganate used to collect mercury does not contaminate the portions of the sample that will be analyzed for manganese. To eliminate the possibility of contamination, the Agency will allow operators or owners the option of measuring all of the target PM HAP's, except mercury, with Test Method 29 and making a separate measurement of the mercury using Test Method 101A, "Determination of Particulate and Gaseous Mercury Emissions from Sewage Sludge Incinerators" [40 CFR part 61, appendix A].

Test Method 308, "Procedure for Determination of Methanol Emissions from Stationary Sources" [40 CFR part 63, appendix A] is being promulgated today as part of the final NESHAP for noncombustion sources in the pulp and paper industry and is the test method for determining compliance with the total gaseous organic HAP emission limit for new kraft and soda NDCE recovery furnaces and any new DCE recovery furnace systems. The methanol data upon which the total gaseous organic HAP emission limit for new kraft and soda NDCE recovery furnaces and new DCE recovery furnace systems is based were collected using a test method developed by the National Council of the Paper Industry for Air and Stream Improvement that served as the basis for Test Method 308. Performance testing using Test Method 308 (or any other approved test method for methanol emissions from kraft and soda recovery furnaces) would only be required for those new sources that choose to comply with total gaseous organic HAP emission limit for new kraft and soda recovery furnaces by using equipment other than an NDCE recovery furnace equipped with a dry ESP system.

Test Method 25A, "Determination of Total Gaseous Organic Concentration using a Flame Ionization Analyzer"

[40 CFR part 60, appendix A] is the selected test method for determining compliance with the total gaseous organic HAP emission limit for semichemical combustion units. The THC data upon which the total gaseous organic HAP emission limit for semichemical combustion units is based were collected using Test Method 25A.

K. Selection of Reporting and Recordkeeping Requirements

The owner or operator of any kraft, soda, sulfite or stand-alone semichemical pulp mill subject to these standards would be required to fulfill the reporting and recordkeeping requirements outlined in § 63.10 of the General Provisions. These requirements include those associated with startup, shutdown, or malfunctions; operation and maintenance records; compliance monitoring system records; performance test data and reporting; quarterly reports of no excess emissions; and quarterly reports of exceedances of the emission limits. The owner or operator of any kraft, soda, sulfite or stand-alone semichemical pulp mill subject to these standards would be required to submit quarterly reports of any exceedances of monitored operating parameter values required under the

proposed rule. These quarterly reports must contain the monitored operating parameter value readings for the periods constituting exceedances and a description and timing of steps taken to address the cause of the exceedances.

L. Relationship to other Regulations

This section of the preamble discusses the interrelationship between today's proposed regulation and other federal regulations covering pulp mills. The purpose of this section is to document the Agency's evaluation of pertinent rules in an effort to minimize the burden on the industry and enforcement authorities. The Agency is interested in hearing from all interested parties on specific suggestions for reducing the overall burden of the rule without jeopardizing the enforceability of the rules or the Agency's overall emission reduction goals.

1. Noncombustion Source Rule and Chemical Recovery Combustion Source Rule

As mentioned previously in this notice (See section II-A, BACKGROUND), EPA is promulgating effluent limitations guidelines and standards for the control of wastewater pollutants, as well as NESHAP for noncombustion sources in the pulp and paper industry as part of today's cluster rule.

During the development of today's proposed chemical recovery combustion source NESHAP, the Agency examined both the chemical recovery combustion source rule and the noncombustion source rule to identify areas where the reporting and recordkeeping requirements of the rules could be minimized. Once the combustion source NESHAP has been promulgated, any of the initial notifications required by § 63.7(b) of subpart A can be combined for both NESHAP and a single notification submitted to the appropriate authority. However, some reporting and recordkeeping requirements are specific to the individual regulations because the rules cover different emission points at the pulp mill. To minimize the overall burden on the industry, the Agency made an effort to ensure that today's proposed NESHAP for chemical recovery combustion sources contains only the minimum amount of recordkeeping necessary to demonstrate compliance with the rule.

2. NSPS (Subpart BB of Part 60) and Chemical Recovery Combustion Source Rule

The NSPS for kraft pulp mills and the chemical recovery combustion source rule proposed today are closely related because both rules cover some of the same emission points.

As noted in section III.B of this preamble, today's proposed rule allows the use of PM as a surrogate for PM HAP. Both of the rules regulate PM emissions from recovery furnaces, lime kilns, and SDT's at kraft pulp mills. In addition, the proposed PM emission limits for existing kraft and soda recovery furnaces, SDT's and lime kilns are the same as the NSPS limits for kraft recovery furnaces, SDT's and gas-fired lime kilns. However, the proposed NESHAP regulates emissions from both new and existing affected sources, and, therefore, would regulate emissions from affected sources not currently impacted by the NSPS.

The PM emission limits in today's proposed rule for new and reconstructed affected sources at kraft pulp mills are more stringent than the NSPS PM limits. Also, today's proposed rule provides alternate PM HAP standards for existing affected sources. In addition, unlike the NSPS, today's proposed rule would allow owners or operators of existing kraft or soda pulp mills to meet an overall PM or overall PM HAP emission limit that includes all existing affected sources at the mill (i.e., the proposed bubble compliance alternative). However, owners or operators that choose to comply with the PM HAP standards of this proposed

NESHAP by using the proposed bubble compliance alternative must continue to comply with the NSPS for kraft pulp mills by ensuring that existing affected sources subject to the NSPS continue to meet the NSPS PM limits specified for those sources.

Today's proposed rule adopts many of the monitoring requirements in the NSPS. (See section III.D, Monitoring Requirements and Compliance Provisions.) Requirements adopted from the NSPS include those specifying the parameters to be monitored and frequency of monitoring, the level of opacity for existing recovery furnaces, and the required accuracy of monitoring equipment.

In addition to requirements adopted from the NSPS, today's proposed rule would require owners or operators of control systems other than ESP's to establish ranges of monitored parameters during initial compliance testing and to operate control systems within the established range. Today's proposed rule also sets intermediate opacity levels and frequencies of exceedances of established operating parameter ranges and opacity levels that would not indicate a violation of the standard but that would require the owner or operator to initiate the corrective actions identified in

their SSM plan. Today's proposed rule also would require owners or operators of new recovery furnaces or new or existing lime kilns at kraft and soda pulp mills to monitor opacity levels and would specify a maximum opacity level of 20 percent rather than 35 percent, as is specified in the NSPS for kraft recovery furnaces.

The recordkeeping burden is different for the NSPS and today's proposed rule. Under the NSPS, the monitored values must be recorded once per shift. In today's proposed rule, the monitored values would be required to be recorded on a continuous basis, with the possible exception of when a source is controlled by a device or system other than an ESP, wet scrubber, or RTO. In such cases, the owner or operator would be required to obtain approval from the applicable permitting authority for a monitoring plan that proposes less frequent monitoring.

Another area where the two rules differ is the reporting requirements. For example, the General Provisions to part 60 (followed in the NSPS for kraft pulp mills) require only a 30-day prior notice before the performance test date; however the General Provisions to part 63 (i.e., the General Provisions for NESHAP) require notification

60 days prior to the performance test date. Unless stated otherwise, today's proposed rule follows the General Provisions to part 63.

3. New Source Review/Prevention of Significant Deterioration Applicability

The proposed level of gaseous organic HAP control for stand-alone semichemical combustion sources is based on the use of an RTO. The Agency expects that owners or operators of sources that cannot meet the total gaseous organic HAP emission limit (as THC) without add-on controls would install an RTO to comply with the proposed NESHAP. However, as demonstrated during a pilot study, RTO's can generate NO_x emissions during normal operation. The emission increases of NO_x may be of such magnitude to trigger the need for preconstruction permits under the nonattainment new source review (NSR) or prevention of significant deterioration (PSD) program (hereinafter referred to as major NSR).

In a similar situation regarding the MACT standards for noncombustion sources in the pulp and paper industry that are being promulgated today as part of the pulp and paper industry cluster rule, industry and some States have commented extensively that in developing the proposed rule,

EPA did not take into account the impacts that would be incurred in triggering major NSR. Commenters indicated that major NSR would: (1) cost the pulp and paper industry significantly more for permitting and implementation of additional SO_2 or NO_x controls than predicted by EPA; (2) impose a large permitting review burden on State air quality offices; and (3) present difficulties for mills to meet the proposed NESHAP compliance schedule of 3 years due to the time required to obtain a preconstruction permit. Industry commenters have stated that the pollution control project (PCP) exemption allowed under the current PSD policy provides inadequate relief from these potential impacts and recommended including specific language in the proposed rule exempting MACT compliance projects from NSR/PSD.

In a July 1, 1994 guidance memorandum issued by the EPA (available on the TTN; see "Pollution Control Projects and New Source Review (NSR) Applicability" from John S. Seitz, Director, OAQPS, to EPA Regional Air Division Directors), the EPA provided guidance for permitting authorities on the approvability of PCP exclusions for source categories other than electric utilities. In the guidance, the EPA indicated that add-on controls and fuel switches to less polluting

fuels qualify for an exclusion from major NSR. To be eligible to be excluded from otherwise applicable major NSR requirements, a PCP must, on balance, be "environmentally beneficial," and the permitting authority must ensure that the project will not cause or contribute to a violation of the national ambient air quality standards (NAAQS) or PSD increment, or adversely affect visibility or other air quality related values (AQRV) in a Class I area, and that offsetting reductions are secured in the case of a project which would result in a significant increase of a nonattainment pollutant. The permitting authority can make these determinations outside of the major NSR process. The 1994 guidance did not void or create an exclusion from any applicable minor source preconstruction review requirements in an approved State Implementation Plan (SIP). Any minor NSR permitting requirements in a SIP would continue to apply, regardless of any exclusion from major NSR that might be approved for a source under the PCP exclusion policy.

In the July 1, 1994 guidance memorandum, the EPA specifically identified the RTO as an example of an add-on control that could be considered a PCP and an appropriate candidate for a case-by-case exclusion from major NSR. For

the purposes of today's proposed standards for chemical recovery combustion sources at stand-alone semichemical pulp mills, the EPA considers the application of the RTO to reduce total gaseous organic HAP emissions to be a PCP because the RTO is an add-on control device that would be installed specifically to comply with MACT and will reduce emissions of hazardous organic air pollutants. Furthermore, EPA considers the installation of the RTO to be environmentally beneficial because it would significantly reduce emissions of VOC's and CO as well as the emissions of the targeted pollutants (total gaseous organic HAP's). However, EPA recognizes that incidental formation of NO_x will occur during operation of the RTO. Consistent with the 1994 guidance, the permitting authority should confirm that, in each case, the resultant increase in NO_x emissions would not cause or contribute to a violation of a NAAQS, PSD increment, or adversely affect an AQRV.

The EPA believes that the current guidance on pollution control projects adequately provides for the exclusion from major NSR of air pollution control projects in the pulp and paper industry resulting from today's proposed rule. Such projects would be covered under minor source regulations in

the applicable SIP, and permitting authorities would be expected to provide adequate safeguards against NAAQS and increment violations and adverse impacts on AQRV in Federal Class I areas. Only in those areas where potential adverse impacts cannot be resolved through the minor NSR programs or other mechanisms would major NSR apply.

The EPA recognizes that, where there is a potential for an adverse impact, some small percentage of mills located near Class I PSD areas might be subject to major NSR, i.e., the permitting authority determines that the impact or potential impact cannot be adequately addressed by its minor NSR program or other SIP measures. If this occurs, there is a question whether MACT and NSR compliance can both be done within the respective rule deadlines. Although too speculative to warrant disposition in this rule, EPA is alert to this potential problem and will attempt to create implementation flexibility on a case-by-case basis should a problem actually occur.

M. Solicitation of Comments

The EPA seeks full public participation in arriving at its final decisions and encourages comments on all aspects of this proposal from all interested parties. Full

supporting data and detailed analyses should be submitted with comments to allow EPA to make maximum use of the comments. All comments should be directed to the Air and Radiation Docket and Information Center, Docket No. A-94-67 (see ADDRESSES). Comments on this notice must be submitted on or before the date specified in the "DATES" section.

Commentors wishing to submit proprietary information for consideration should clearly distinguish such information from other comments and clearly label it "Confidential Business Information" (CBI). Submissions containing such proprietary information should be sent directly to the Emission Standards Division CBI Office, U. S. Environmental Protection Agency (MD-13), Research Triangle Park, North Carolina 27711, with a copy of the cover letter directed to Mr. Jeff Telander of the Minerals and Inorganic Chemicals Group (see the "FOR FURTHER INFORMATION CONTACT" section for the address). Confidential business information should not be sent to the public docket. Information covered by such a claim of confidentiality will be disclosed by EPA only to the extent allowed and by the procedures set forth in 40 CFR part 2. If no claim of confidentiality accompanies the submission

when it is received by EPA, it may be made available to the public without further notice to the commentor.

V. Impacts of Proposed Standards

A. Number of Impacted Sources

An estimated 211 recovery furnaces, 227 SDT's, and 192 lime kilns currently operate at kraft and soda pulp mills in the United States and would be affected by today's proposed standards. The EPA estimates that 52 of the recovery furnaces, 56 of the SDT's, and 77 of the lime kilns would be required to upgrade or replace add-on controls to reduce emissions of PM HAP's under the proposed standards. (These estimates and the impacts estimates in the following sections were determined based on control of PM or PM HAP emissions without using the proposed bubble compliance alternative.)

An estimated 21 sulfite combustion units and 14 semichemical combustion units currently operate in the United States and would be affected by today's proposed standards. Under the proposed standards, an estimated eight sulfite combustion units would be required to upgrade or replace add-on controls to reduce emissions of PM HAP's; an estimated seven semichemical combustion units would be

required to add controls to reduce emissions of total gaseous organic HAP's.

B. Environmental Impacts

Nationwide HAP emissions from combustion sources at pulp mills are estimated to be 32,400 Mg/yr (35,700 tons/yr) at the current level of control. The proposed standards are estimated to reduce total HAP emissions by about 2,600 Mg/yr (2,800 tons/yr). In addition to the HAP reductions, the proposed standards would result in the reduction of criteria air pollutants, such as PM and VOC. After implementation of the proposed standards, PM emissions from combustion sources at pulp mills are estimated to decrease by about 23,800 Mg/yr (26,200 tons/yr) from a baseline level of 64,400 Mg/yr (71,000 tons/yr); VOC emissions from combustion sources at stand-alone semichemical pulp mills are estimated to decrease by about 32,600 Mg/yr (35,900 tons/yr) from a baseline level of 36,600 Mg/yr (40,300 tons/yr); carbon monoxide (CO) emissions from combustion sources at stand-alone semichemical pulp mills are estimated to decrease by about 57,700 Mg/yr (63,600 tons/yr) from a baseline level of 62,800 Mg/yr (69,200 tons/yr); and emissions of nitrogen oxides (NO_x) from combustion sources at stand-alone

semichemical pulp mills are estimated to increase by about 476 Mg/yr (525 tons/yr) from a baseline level of 278 Mg/yr (306 tons/yr).

The quantity of PM collected will increase when recovery furnace PM control devices are upgraded or replaced to comply with the proposed standards. However, no increases in solid waste disposal are expected because existing mills have sufficient capacity within the chemical recovery process to recycle the additional PM collected.

If owners or operators choose to replace wet scrubbers with ESP's to comply with the proposed PM HAP standards for lime kilns, the generation of wastewater will be reduced. The significance of the reduction in wastewater will depend on whether the scrubber discharge had previously been recycled and reused. If wet scrubbers are replaced by ESP's (and there was no prior recycle or reuse of scrubber discharge), EPA estimates that wastewater discharge will decrease nationwide by about 36 billion liters per year (L/yr) (9.5 billion gallons per year [gal/yr]) following implementation of the proposed standards.

C. Energy Impacts

The overall energy demand (i.e., electricity plus natural gas) is expected to decrease by about 46.7 million megajoules per year (MJ/yr) (44.3 billion British thermal units per year [Btu/yr]) nationwide under the proposed standards. Electricity requirements are expected to decrease by about 17,200 megawatt-hours per year (MWh/yr) under the proposed standard. This net decrease in electricity requirements includes (1) an expected increase of about 41,400 MWh/yr when PM control devices on kraft and soda recovery furnaces and SDT's and sulfite combustion units are upgraded or replaced, (2) an expected increase of 18,900 MWh/yr when total gaseous organic HAP control devices are added to semichemical combustion units, and (3) an expected decrease of about 77,500 MWh/yr if wet scrubbers are replaced by ESP's to provide increased control of PM emissions from lime kilns. Natural gas requirements are expected to increase by about 0.4 million cubic meters per year (m^3/yr) (14 million cubic feet per year [ft^3/yr]) when total gaseous organic HAP controls are added to semichemical combustion units.

D. Cost Impacts

The estimated capital costs of control for the proposed standards are $258 million. The capital costs of the proposed standards include the costs to purchase and install both the control equipment and monitoring equipment. Most (85 percent) of the capital costs can be attributed to PM controls for kraft and soda combustion sources (recovery furnaces, lime kilns, and SDT's). The kraft and soda PM control costs are estimated based on ESP upgrades for recovery furnaces, replacement of existing wet scrubbers with ESP's for lime kilns, and replacement of existing wet scrubbers with new wet scrubbers for SDT's. The proposed bubble compliance alternative was not considered in estimating the capital PM control costs, and, therefore, the capital costs may be overstated.

The incremental annual costs of the proposed standards are $35.2 million/yr. The annualized costs account for the year-to-year operating expenses associated with the control equipment and the monitoring equipment, in addition to the capital recovery expense associated with the equipment purchases. Most (81 percent) of the annual costs can be attributed to the PM controls for kraft and soda recovery

furnaces and SDT's. The annual costs for lime kiln PM controls are cost savings, based on the lower operating costs for ESP's compared to wet scrubbers. The proposed bubble compliance alternative was not considered in estimating the annual PM control costs, and, therefore, the annual costs may be overstated. The total average costs for annual recordkeeping and reporting required by the proposed standards are $6.8 million/yr over the first 3 years after implementation of the standards.

E. Economic Impact

The economic impacts of today's proposed NESHAP (i.e., MACT II) and the NESHAP for noncombustion sources (i.e., MACT I and II) and effluent limitations guidelines being promulgated today are collectively discussed in section VIII of the integrated preamble for "NESHAP for Source Category: Pulp and Paper Production; Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Pulp, Paper, and Paperboard Category," hereafter referred to as the integrated preamble.

F. Benefits Analysis

Implementation of the proposed regulation is expected to reduce emissions of HAP's, PM, VOC, SO_2, and CO, while it

is expected to slightly increase emissions of NO_x. The air quality benefits expected to result from the above emission reductions will be a decrease in adverse health effects associated with inhalation of the above pollutants as well as improved welfare effects, such as improved visibility and crop yields. The benefits analysis is able to quantify and monetize the health and welfare benefits associated with some of these emission reductions. Total monetized benefits of the proposed regulatory alternative for VOC, PM, and SO_2 emission reductions range from approximately $302 million to $384 million. (Refer to the integrated preamble, and the Economic Analysis Document for a detailed description of the methodology used to monetize the benefits.)

Benefit categories that are monetized were compared to annualized control costs of the regulatory alternatives to determine net benefits. In general, the regulatory alternative with the greatest net benefits is optimal from an efficiency standpoint and will be the most beneficial to society. Net benefits of the proposed regulatory alternative ($270 million to $352 million) are greater than the net benefits of all other regulatory alternatives, except those that combine the most stringent control options

for kraft and soda mills. However, economic impact and distributional issues must be considered in conjunction with the cost-benefit analysis in the choice of proposed regulatory alternative.

The control costs of the MACT II regulation increase significantly between regulatory options one and four for kraft and soda mills (see section IV.F of this notice). Capital costs increase approximately 850 percent and annualized costs 560 percent when comparing the costs of option one versus four for kraft and soda mills. The estimated increase in the price of unbleached kraft pulp that will result from the MACT II rule differs greatly under the different regulatory options as well. Specifically, prices for unbleached kraft pulp are estimated to increase from 1.4 percent with the least stringent option to 7.4 percent with the more stringent regulatory option for kraft and soda mills.

Based on the economic impact analysis conducted, the increased emission control costs associated with the most stringent kraft and soda MACT II option are predicted to result in one or more company bankruptcies in the pulp and paper industry. Although the EPA can not determine with

certainty the economic costs associated if one or more large firms experience bankruptcy, the EPA has reason to believe that these impacts would likely be significant. Economic impacts and distributional effects associated with bankruptcies may include issues involving changes in the ownership of the firm, loss in investment values for existing investors in the firm, potentially higher financing costs, possible mill closures, and probable job losses. These factors were not directly considered in the cost-benefit analysis conducted for the regulation.

While the cost-benefit analysis seems to indicate that the net benefits of the most stringent regulatory alternative exceed the net benefits of the proposed alternative, the economic impact and distributional effects associated with the most stringent option for kraft and soda mills have not been considered directly in this analysis. These economic impact and distributional issues lead to the conclusion that the regulatory alternatives involving the most stringent option for kraft and soda mills are less than optimal.

VI. Administrative Requirements

A. Docket

The docket is an organized and complete file of all information considered by EPA in developing this proposed rule. The principal purposes of the docket are (1) to allow interested parties to readily identify and locate documents so that they can effectively participate in the rulemaking process, and (2) to serve as the record in case of judicial review. (See section 307(d)(7)(A) of the CAA).

B. Public Hearing

A public hearing will be held, if requested, to discuss the proposed standards in accordance with section 307(d)(5) of the Act. Persons wishing to make oral presentations on the proposed standards should contact the EPA (see DATES for contact person and address). If a publice hearing is requested and held, EPA will ask clarifying questions during the oral presentation but will not respond to the presentation of comments. To provide an opportunity for all who wish to speak, oral presentations will be limited to 15 minutes each. Any member of the public may file a written statement on or before [insert date 60 days from FR publication]. Written statements should be addressed to the

Air and Radiation Docket and Information Center (see ADDRESSES) and refer to Docket No. A-94-67. Written statements and supporting information will be considered with equivalent weight as any oral statement and supporting information subsequently presented at a public hearing, if held. A verbatim transcript of the hearing and written statements will be placed in the docket and will be available for public inspection and copying, or will be mailed upon request, at the Air and Radiation Docket and Information Center (see ADDRESSES).

C. Executive Order 12866

Under Executive Order 12866 (58 FR 51736, October 4, 1993), the Agency must determine whether the regulatory action is "significant" and, therefore, subject to review by the Office of Management and Budget (OMB) and the requirements of the Executive Order. The Executive Order defines "significant regulatory action" as one that is likely to result in a rule that may:

1. Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity,

competition, jobs, the environment, public health or safety, or State, local, or Tribal governments or communities;

2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

3. Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, OMB has notified EPA that this action is a "significant regulatory action" within the meaning of the Executive Order. For that reason, this action was submitted to OMB for review. The regulatory impact assessment (RIA) is detailed in the Economic Analysis Document (docket No. II-A-32). Changes made in response to OMB suggestions or recommendations will be documented in the public record.

D. Enhancing the Interdepartmental Partnership Under Executive Order 12875

In compliance with Executive Order 12875, the Agency has involved State regulatory experts in the development of

this proposed rule. No Tribal governments are believed to be affected by this proposed rule. State and local governments are not directly impacted by the rule, i.e., they are not required to purchase control systems to meet the requirements of the rule. However, they will be required to implement the rule; e.g., incorporate the rule into permits and enforce the rule. They will collect permit fees that will be used to offset the resources burden of implementing the rule. Comments have been solicited from States and have been carefully considered in the rule development process. In addition, all States are encouraged to comment on this proposed rule during the public comment period, and the EPA intends to fully consider these comments in the development of the final rule.

E. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), P.L. 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal

mandates" that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant

Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

The EPA has determined that this rule contains a Federal mandate that may result in expenditures of $100 million or more for State, local, and Tribal governments, in the aggregate, or the private sector in any one year. Accordingly, EPA has prepared under section 202 of the UMRA a written statement which is summarized below.

1. Statutory Authority

As discussed in section I of this preamble, the statutory authority for this rulemaking is section 112 of the CAA. Title III of the CAA Amendments was enacted to reduce the amount of nationwide air toxic emissions. Section 112(b) lists the 189 chemicals, compounds, or groups of chemicals deemed by Congress to be HAP's. These toxic air pollutants are to be regulated by NESHAP. Hazardous air pollutant emissions from the pulp and paper production source category are being regulated under section 112(d) of the CAA. The NESHAP requires existing and new major sources to control emissions of HAP's using the maximum achievable control technology (MACT).

The pulp and paper production source category includes all mills that produce pulp and/or paper. The NESHAP for the source category are being developed in phases. This proposed NESHAP, referred to as MACT II, regulates chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semichemical pulp mills. The final NESHAP for noncombustion sources regulates noncombustion processes at mills that (1) chemically pulp wood fiber (using kraft, sulfite, soda, and semi-chemical methods) (MACT I), and (2) mechanically pulp wood fiber (e.g., groundwood, thermomechanical, pressurized), pulp secondary fibers (deinked and nondeinked), and pulp nonwood (MACT III).

Compliance with section 205(a): Regarding the EPA's compliance with section 205(a), the EPA did identify and consider a reasonable number of alternatives; a summary of these alternatives is provided in section IV.F of this preamble. Additional information on the costs and environmental impacts of the regulatory alternatives is presented in the Nationwide Costs, Environmental Impacts, and Cost-Effectiveness of Regulatory Alternatives for Kraft, Soda, Sulfite, and Semichemical Combustion Sources Memo (docket No. II-B-63).

The chosen alternative represents the MACT floor for chemical recovery combustion sources at kraft, soda and sulfite pulp mills and is the least costly and least burdensome alternative for those sources. The chosen alternative also includes an option more stringent than the MACT floor for chemical recovery combustion sources at semichemical pulp mills. However, the EPA considers the cost-effectiveness of the more stringent option for semichemical chemical recovery combustion sources (less than $2,800/Mg HAP's, based on conservative cost estimates) acceptable, especially when measured against the environmental benefits of reducing emissions of both HAP's and non-HAP's. Therefore, the EPA concludes that the chosen alternative is the least costly and least burdensome alternative that achieves the objectives of section 112, as called for in section 205(a).

2. Social Costs and Benefits

The regulatory impact analysis prepared for the proposed NESHAP for MACT I, including the Agency's assessment of costs and environmental benefits, is detailed in the "Regulatory Impact Assessment of Proposed Effluent Guidelines and NESHAP for the Pulp, Paper, and Paperboard

Industry," (EPA 821-R93-020). The regulatory impact assessment document has been updated for the final rule for MACT I and III and the proposed rule for MACT II and is referred to as the Economic Analysis Document (docket No. II-A-32). Social costs and benefits also are discussed in section V of this preamble.

3. Future and Disproportionate Costs

The Unfunded Mandates Act requires that EPA estimate, where accurate estimation is reasonably feasible, future compliance costs imposed by the rule and any disproportionate budgetary effects. The EPA's estimates of the future compliance costs of this rule are discussed in section V.D of this preamble.

The EPA does not believe that there will be any disproportionate budgetary effects of the rule on any particular areas of the country, particular governments or types of communities (e.g., urban, rural), or particular industry segments.

4. Effects on the National Economy

The Unfunded Mandates Act requires that EPA estimate the effect of this rule on the national economy. To the extent feasible, EPA must estimate the effect on

productivity, economic growth, full employment, creation of productive jobs, and international competitiveness of the U.S. goods and services, if and to the extent that the EPA in its sole discretion determines that accurate estimates are reasonably feasible and that such effect is relevant and material.

Estimates of the impact of this rule on the national economy are described in section VIII of the integrated preamble to the final rule for MACT I and III and the effluent guidelines that are being promulgated today. The nationwide economic impact of the rule is based on the Economic Analysis Document (docket No. II-A-32).

5. Consultation with Government Officials

The Unfunded Mandates Act requires that EPA describe the extent of the agency's prior consultation with affected State, local, and tribal officials, summarize the officials' comments or concerns, and summarize EPA's response to those comments or concerns. In addition, section 203 of the Act requires that EPA develop a plan for informing and advising small governments that may be significantly or uniquely impacted by a proposal. Although this rule does not affect any State, local, or Tribal governments, EPA has consulted

with State and local air pollution control officials. The Agency also has held numerous meetings on these proposed integrated rules with many of the stakeholders from the pulp and paper industry, including the American Forest and Paper Association (AF&PA), the National Council of the Paper Industry for Air and Stream Improvement (NCASI), numerous individual companies, environmental groups, consultants and vendors, labor unions, and other interested parties. The EPA has added materials to the Air and Water docket to document these meetings.

F. Regulatory Flexibility

The Regulatory Flexibility Act (RFA)(5 U.S.C. 601 et seq., Pub. L. 96-354), amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), requires the Agency to examine the potential economic impact of regulatory action on small entities. The Agency has recently established guidelines to help analysts comply with RFA requirements, and to determine if a substantial number of small businesses are significantly impacted. The Agency has estimated the economic impact of the integrated regulatory alternative on small companies involved in pulp, paper, and paperboard manufacturing, and these impacts are

discussed in the integrated preamble to the final rule for MACT I and III and the effluent limitations guidelines being promulgated today and in the Economic Analysis Document (docket No. II-A-32). As explained there, the CAA rule does not have a significant economic impact on a substantial number of small entities, within the meaning of section 605(b) of the Regulatory Flexibility Act. In making this finding, the Agency explicitly considered the potential impacts of this proposal in combination with both the final CAA rules, and also the final CWA rule. The EPA adopts the same analysis here, and, thus, certifies that this proposed rule does not have a significant impact on a substantial number of small entities.

G. Paperwork Reduction Act

The information collection requirements in this proposed rule have been submitted for approval to OMB under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. An Information Collection Request (ICR) document has been prepared by EPA (ICR No.1805.01), and a copy may be obtained from Sandy Farmer, OPPE Regulatory Information Division (2136); U. S. Environmental Protection Agency (2136); 401 M Street SW.; Washington, D.C. 20460, or by calling

Federal departments and agencies. Pursuant to section 112(f), this regulation will be reviewed 8 years from the date of promulgation. This review will include an assessment of such factors as evaluation of the residual health risks, any overlap with other programs, the existence of alternative methods, enforceability, improvements in emission control technology and health data, and reporting and recordkeeping requirements.

List of Subject in 40 CFR Part 63

Air pollution control, Hazardous air pollutants, Pulp and paper mills, Reporting and recordkeeping requirements.

Date

Carol M. Browner, Administrator

It is proposed that part 63, chapter I, title 40 of the Code of Federal Regulations be amended as follows:

PART 63 - [AMENDED]

1. The authority citation for part 63 continues to read as follows:

Authority: 42 U.S.C. 7401 et seq.

2. By adding a new subpart MM, consisting of §§ 63.860-63.868, to read as follows:

Subpart MM -- National Emission Standards for Hazardous Air Pollutants; Proposed Standards for Hazardous Air Pollutants from Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills.

Sec.

63.860 Applicability and designation of affected source.

63.861 Definitions.

63.862 Standards.

63.863 Compliance dates.

63.864 Monitoring requirements.

63.865 Performance test requirements and test methods.

63.866 Recordkeeping requirements.

63.867 Reporting requirements.

63.868 Delegation of authority.

§ 63.860 Applicability and designation of affected source.

(a) This subpart applies to the NDCE recovery furnaces, DCE recovery furnace systems, smelt dissolving tanks, and lime kilns at kraft and soda pulp mills; the sulfite combustion units at sulfite pulp mills; and the semichemical combustion units at stand-alone semichemical pulp mills.

(b) Affected sources. The affected sources to which the provisions of this subpart apply are:

(1) Each NDCE recovery furnace and associated smelt dissolving tank(s) located at a kraft or soda pulp mill.

(2) Each DCE recovery furnace system and associated smelt dissolving tank(s) located at a kraft or soda pulp mill.

(3) Each lime kiln located at a kraft or soda pulp mill.

4) Each sulfite combustion unit located at a sulfite pulp mill.

(5) Each semichemical combustion unit located at a stand-alone semichemical pulp mill.

(c) The owner or operator of an affected source subject to the provisions of this subpart must also comply

with the requirements of subpart A of this part, according to the applicability of subpart A to such affected sources, as identified in Table 1.

§ 63.861 Definitions.

All terms used in this subpart are defined in the Act, in subpart A of this part, or in this section. For the purposes of this subpart, if the same term is defined in subpart A or any other subpart of this part and in this section, it shall have the meaning given in this section.

TABLE 1. GENERAL PROVISIONS APPLICABILITY TO SUBPART MM

General provisions reference	Summary of requirements	Applies to subpart MM	Comments
63.1(a)(1)	General applicability of the General Provisions.	Yes	Additional terms defined in § 63.861; when overlap between subparts A and MM of this part, subpart MM takes precedence.
63.1(a)(2)-(14)		Yes	
63.1(b)(1)	Initial applicability determination.	No	Subpart MM specifies the applicability in § 63.860
63.1(b)(2)	Title V operating permit - see part 70.	Yes	All major affected sources are required to obtain a title V permit.
63.1(b)(3)	Record of the applicability determination.	No	All affected sources are subject to subpart MM according to the applicability definition of subpart MM.
63.1(c)(1)	Applicability of subpart A after a relevant standard has been set.	Yes	Subpart MM clarifies the applicability of each paragraph of subpart A to sources subject to subpart MM.
63.1(c)(2)	Title V permit requirement.	Yes	All major affected sources are required to obtain a title V permit. There are no area sources in the pulp and paper mill source category.
63.1(c)(3)	[Reserved]	NA	
63.1(c)(4)	Requirements for existing source that obtains an extension of compliance.	Yes	
63.1(c)(5)	Notification requirements for an area source that increases HAP emissions to major source levels.	Yes	
63.1(d)	[Reserved]	NA	
63.1(e)	Applicability of permit program before a relevant standard has been set.	Yes	

General provisions reference	Summary of requirements	Applies to subpart MM	Comments
63.2	Definitions.	Yes	Additional terms defined in § 63.861; when overlap between subparts A and MM of this part occurs, subpart MM takes precedence.
63.3	Units and abbreviations.	Yes	
63.4	Prohibited activities and circumvention.	Yes	
63.5(a)	Construction and reconstruction - applicability.	Yes	
63.5(b)(1)	Upon construction, relevant standards for new sources.	Yes	
63.5(b)(2)	[Reserved]	NA	
63.5(b)(3)	New construction/reconstruction.	Yes	
63.5(b)(4)	Construction/reconstruction notification.	Yes	
63.5(b)(5)	Construction/reconstruction compliance.	Yes	
63.5(b)(6)	Equipment addition or process change.	Yes	
63.5(c)	[Reserved]	NA	
63.5(d)	Application for approval of construction/reconstruction.	Yes	
63.5(e)	Construction/reconstruction approval.	Yes	
63.5(f)	Construction/reconstruction approval based on prior State preconstruction review.	Yes	
63.6(a)(1)	Compliance with standards and maintenance requirements - applicability.	Yes	
63.6(a)(2)	Requirements for area source that increases emissions to become major.	Yes	
63.6(b)	Compliance dates for new and reconstructed sources.	Yes	
63.6(c)	Compliance dates for existing sources.	Yes	Subpart MM specifically stipulates the compliance schedule for existing sources.

General provisions reference	Summary of requirements	Applies to subpart MM	Comments
63.6(d)	[Reserved]	NA	
63.6(e)	Operation and maintenance requirements.	Yes	
63.6(f)	Compliance with nonopacity emission standards.	Yes	
63.6(g)	Compliance with alternative nonopacity emission standards.	Yes	
63.6(h)	Compliance with opacity and visible emission (V.E.) standards	Yes	Subpart MM does not contain any opacity or V.E. standards; however, § 63.864 specifies opacity monitoring requirements.
63.6(i)	Extension of compliance with emission standards.	Yes	
63.6(j)	Exemption from compliance with emission standards.	Yes	
63.7(a)(1)	Performance testing requirements - applicability	Yes	§ 63.864(a)(6) specifies the only exemption from performance testing allowed under subpart MM.
63.7(a)(2)	Performance test dates.	Yes	
63.7(a)(3)	Performance test requests by Administrator under section 114.	Yes	
63.7(b)(1)	Notification of performance test.	Yes	
63.7(b)(2)	Notification of delay in conducting a scheduled performance test.	Yes	
63.7(c)	Quality assurance program.	Yes	
63.7(d)	Performance testing facilities.	Yes	
63.7(e)	Conduct of performance tests.	Yes	
63.7(f)	Use of an alternative test method.	Yes	
63.7(g)	Data analysis, recordkeeping, and reporting.	Yes	
63.7(h)	Waiver of performance tests.	Yes	§ 63.864(a)(6) specifies the only exemption from performance testing allowed under subpart MM.

General provisions reference	Summary of requirements	Applies to subpart MM	Comments
63.8(a)	Monitoring requirements - applicability.	Yes	See § 63.864
63.8(b)	Conduct of monitoring.	Yes	
63.8(c)	Operation and maintenance of CMS.	Yes	
63.8(d)	Quality control program.	Yes	
63.8(e)(1)	Performance evaluation of CMS.	Yes	
63.8(e)(2)	Notification of performance evaluation.	Yes	
63.8(e)(3)	Submission of site-specific performance evaluation test plan.	Yes	
63.8(e)(4)	Conduct of performance evaluation and performance evaluation dates.	Yes	
63.8(e)(5)	Reporting performance evaluation results.	Yes	
63.8(f)	Use of an alternative monitoring method.	Yes	
63.8(g)	Reduction of monitoring data.	Yes	
63.9(a)	Notification requirements - applicability and general information.	Yes	
63.9(b)	Initial notifications.	Yes	
63.9(c)	Request for extension of compliance.	Yes	
63.9(d)	Notification that source subject to special compliance requirements.	Yes	
63.9(e)	Notification of performance test.	Yes	
63.9(f)	Notification of opacity and V.E. observations.	Yes	Subpart MM does not contain any opacity or V.E standards; however, § 63.864 specifies opacity monitoring requirements.
63.9(g)(1)	Additional notification requirements for sources with CMS.	Yes	
63.9(g)(2)	Notification of compliance with opacity emission standard.	Yes	Subpart MM does not contain any opacity or V.E. emission standards; however, § 63.864 specifies opacity monitoring requirements.

General provisions reference	Summary of requirements	Applies to subpart MM	Comments
63.9(g)(3)	Notification that criterion to continue use of alternative to relative accuracy testing has been exceeded.	Yes	
63.9(h)	Notification of compliance status.	Yes	
63.9(i)	Adjustment to time periods or postmark deadlines for submittal and review of required communications.	Yes	
63.9(j)	Change in information already provided.	Yes	
63.10(a)	Recordkeeping requirements - applicability and general information.	Yes	See § 63.866
63.10(b)(1)	Records retention.	Yes	
63.10(b)(2)	Information and documentation to support notifications and demonstrate compliance.	Yes	
63.10(b)(3)	Records retention for sources not subject to relevant standard.	Yes	Applicability requirements are given in § 63.860.
63.10(c)	Additional recordkeeping requirements for sources with CMS.	Yes	
63.10(d)(1)	General reporting requirements.	Yes	
63.10(d)(2)	Reporting results of performance tests.	Yes	
63.10(d)(3)	Reporting results of opacity or V.E. observations.	Yes	Subpart MM does not include any opacity or visible emission standards; however, § 63.864 specifies opacity monitoring requirements.
63.10(d)(4)	Progress reports.	Yes	
63.10(d)(5)	Periodic and immediate startup, shutdown, and malfunction reports.	Yes	
63.10(e)	Additional reporting requirements for sources with CMS.	Yes	
63.10(f)	Waiver of recordkeeping and reporting requirements.	Yes	
63.11	Control device requirements for flares.	No	The use of flares to meet the standards in subpart MM is not anticipated.

General provisions reference	Summary of requirements	Applies to subpart MM	Comments
63.12	State authority and delegations.	Yes	
63.13	Addresses of State air pollution control agencies and EPA Regional Offices.	Yes	
63.14	Incorporations by reference.	Yes	
63.15	Availability of information and confidentiality.	Yes	

Black liquor means spent cooking liquor that has been separated from the pulp produced by the kraft, soda, or semichemical pulping process.

Black liquor oxidation (BLO) system means the vessels used to oxidize the black liquor, with air or oxygen, and the associated storage tank(s).

Black liquor solids (BLS) means the dry weight of the solids in the black liquor that enters the recovery furnace or semichemical combustion unit.

Black liquor solids firing rate means the rate at which black liquor solids are fed to the recovery furnace or the semichemical combustion unit.

Chemical recovery combustion source means any source in the chemical recovery area of a kraft, soda, sulfite or stand-alone semichemical pulp mill that is an NDCE recovery furnace, a DCE recovery furnace system, a smelt dissolving tank (SDT), a lime kiln, a sulfite combustion unit, or a semichemical combustion unit.

Direct contact evaporator (DCE) recovery furnace means a kraft or soda recovery furnace equipped with a direct contact evaporator that concentrates strong black liquor by

direct contact between the hot recovery furnace exhaust gases and the strong black liquor.

Direct contact evaporator (DCE) recovery furnace system means a direct contact evaporator recovery furnace and any black liquor oxidation system, if present, at the pulp mill.

Dry electrostatic precipitator (ESP) system means an electrostatic precipitator with a dry bottom (i.e., no black liquor, water, or other fluid is used in the ESP bottom) and a dry particulate matter (PM) return system (i.e., no black liquor, water, or other fluid is used to transport the collected PM to the mix tank).

Kraft pulp mill means any stationary source that produces pulp from wood by cooking (digesting) wood chips in a solution of sodium hydroxide and sodium sulfide. The recovery process used to regenerate cooking chemicals is also considered part of the kraft pulp mill.

Kraft recovery furnace means a recovery furnace that is used to burn black liquor produced by the kraft pulping process, as well as any recovery furnace that burns black liquor produced from both the kraft and semichemical pulping processes, and includes the direct contact evaporator, if applicable.

Lime production rate means the rate at which dry lime, measured as calcium oxide (CaO), is produced in the lime kiln.

Lime kiln means the combustion unit (e.g., rotary lime kiln or fluidized-bed calciner) used at a kraft or soda pulp mill to calcine lime mud, which consists primarily of calcium carbonate, into quicklime, which is CaO.

Method detection limit means the minimum concentration of an analyte that can be determined with 99 percent confidence that the true value is greater than zero.

Modification means, for the purposes of §63.862(a)(1)(ii)(E)(*1*), any physical change (excluding any routine part replacement or maintenance) or operational change (excluding any operational change that occurs during a start-up, shutdown, or malfunction), that is made to the air pollution control device that could result in an increase in PM emissions.

Nondetect data means, for the purposes of this subpart, any value that is below the method detection limit.

Nondirect contact evaporator (NDCE) recovery furnace means a kraft or soda recovery furnace that burns black

liquor that has been concentrated by indirect contact with steam.

Particulate matter (PM) means total particulate matter as measured by EPA Method 5, EPA Method 17 (see § 63.865(b)(1)), or EPA Method 29.

PM hazardous air pollutant (HAP) means the sum of all emissions of antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, and selenium as measured by EPA Method 29 and with treatment of nondetect data as specified in § 63.865(b)(2).

Recovery furnace means an enclosed combustion device where concentrated black liquor produced by the kraft or soda pulping process is burned to recover pulping chemicals and produce steam.

Regenerative thermal oxidizer (RTO) means a thermal oxidizer that transfers heat from the exhaust gas stream to the inlet gas stream by passing the exhaust stream through a bed of ceramic stoneware or other heat-absorbing medium before releasing it to the atmosphere, then reversing the gas flow so the inlet gas stream passes through the heated bed, raising the temperature of the inlet stream close to or at its ignition temperature.

Semichemical combustion unit means any equipment used to combust or pyrolyze black liquor at stand-alone semichemical pulp mills for the purpose of chemical recovery.

Smelt dissolving tank (SDT) means a vessel used for dissolving the smelt collected from a kraft or soda recovery furnace.

Similar process units means all DCE and NDCE recovery furnaces, all smelt dissolving tanks, or all lime kilns at a kraft or soda pulp mill.

Soda pulp mill means any stationary source that produces pulp from wood by cooking (digesting) wood chips in a sodium hydroxide solution. The recovery process used to regenerate cooking chemicals is also considered part of the soda pulp mill.

Soda recovery furnace means a recovery furnace used to burn black liquor produced by the soda pulping process, and includes the direct contact evaporator, if applicable.

Stand-alone semichemical pulp mill means any stationary source that produces pulp from wood by partially digesting wood chips in a chemical solution followed by mechanical

defibrating (grinding) and has an onsite chemical recovery process that is not integrated with a kraft pulp mill.

Sulfite pulp mill means any stationary source that produces pulp from wood by cooking (digesting) wood chips in a solution of sulfurous acid and bisulfite ions. The recovery process used to regenerate cooking chemicals is also considered part of the sulfite pulp mill.

Sulfite combustion unit means a combustion device, such as a recovery furnace or fluidized-bed reactor, where spent liquor from the sulfite pulping process (i.e., red liquor) is burned to recover pulping chemicals.

Total hydrocarbons (THC) means the sum of organic compounds measured as carbon using EPA Method 25A.

§ 63.862 Standards.

(a) Standards for PM HAP: existing sources.

(1) Each owner or operator of an existing kraft or soda pulp mill shall comply with the requirements of either paragraph (a)(1)(i) or paragraph (a)(1)(ii) of this section.

(i) Each owner or operator of a kraft or soda pulp mill shall comply with either the PM or PM HAP emission limits in paragraphs (a)(1)(i)(A) through (C) of this section.

(A) The owner or operator of each existing kraft or soda recovery furnace shall ensure that:

(1) The concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen; or

(2) The PM HAP emissions discharged to the atmosphere are less than or equal to 1.00E-03 kg/Mg (2.01E-03 lb/ton) of black liquor solids fired.

(B) The owner or operator of each existing kraft or soda smelt dissolving tank shall ensure that:

(1) The concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.10 kg/Mg (0.20 lb/ton) of black liquor solids fired; or

(2) The PM HAP emissions discharged to the atmosphere are less than or equal to 6.20E-05 kg/Mg (1.24E-04 lb/ton) of black liquor solids fired.

(C) The owner or operator of each existing kraft or soda lime kiln shall ensure that:

(1) The concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to

0.15 g/dscm (0.067 gr/dscf) corrected to 10 percent oxygen; or

(2) The PM HAP emissions discharged to the atmosphere are less than or equal to 6.33E-03 kg/Mg (1.27E-02 lb/ton) of CaO produced.

(ii) As an alternative to meeting the requirements of § 63.862(a)(1)(i), each owner or operator of a kraft or soda pulp mill may establish PM or PM HAP emission limits for each existing kraft or soda recovery furnace, smelt dissolving tank, and lime kiln that operates 6,300 hours per year or more by:

(A) Establishing an overall PM emission limit for all affected existing sources at the kraft or soda pulp mill using the methods in § 63.865(a)(1)(i); or

(B) Establishing an overall PM HAP emission limit for all affected existing sources at the kraft or soda pulp mill using the methods in § 63.865(a)(1)(ii).

(C) The emission limits for each kraft recovery furnace, smelt dissolving tank, and lime kiln that are used to establish the overall PM limit in paragraph (a)(2)(ii)(A) of this section shall not be less stringent than the emission limitations required by § 60.282 of part 60 for any

kraft recovery furnace, smelt dissolving tank, or lime kiln that is subject to the requirements of § 60.282.

(D) Each owner or operator of an existing kraft or soda recovery furnace, smelt dissolving tank, or lime kiln shall ensure that the PM or PM HAP emissions discharged to the atmosphere from each of these sources are less than or equal to the applicable PM or PM HAP limits, established using the methods in § 63.865(a)(1)(i) or (ii), that are used to establish the overall PM or PM HAP limit in paragraphs (a)(2)(ii)(A) or (B) of this section.

(E) Each owner or operator of an existing kraft or soda recovery furnace, smelt dissolving tank or lime kiln must reestablish the emission limits determined in paragraphs (a)(1)(ii)(A) or (B) of this section if either of the following actions are taken:

(1) The air pollution control system for any existing kraft or soda recovery furnace, smelt dissolving tank, or lime kiln for which an emission limit was established in paragraphs (a)(1)(ii)(A) or (B) is modified (as defined in §63.861) or replaced; or

(2) Any kraft or soda recovery furnace, smelt dissolving tank, or lime kiln for which an emission limit

was established in paragraphs (a)(1)(ii)(A) or (B) is shut down for more than 60 consecutive days.

(iii) Each owner or operator of an existing kraft or soda recovery furnace, smelt dissolving tank, or lime kiln that operates less than 6,300 hours per year shall comply with the applicable PM or PM HAP emission limit for that source provided in paragraph (a)(1)(i) of this section.

(2) The owner or operator of each existing sulfite combustion unit shall ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.092 g/dscm (0.040 gr/dscf) corrected to 8 percent oxygen.

(b) Standards for PM HAP: new sources.

(1) The owner or operator of any new kraft or soda recovery furnace shall ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.034 g/dscm (0.015 gr/dscf) corrected to 8 percent oxygen.

(2) The owner or operator of any new kraft or soda smelt dissolving tank shall ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less

than or equal to 0.06 kg/Mg (0.12 lb/ton) of black liquor solids fired.

(3) The owner or operator of any new kraft or soda lime kiln shall ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.023 g/dscm (0.010 gr/dscf) corrected to 10 percent oxygen.

(4) The owner or operator of any new sulfite combustion unit shall ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.046 g/dscm (0.020 gr/dscf) corrected to 8 percent oxygen.

(c) Standards for total gaseous organic HAP.

(1) The owner or operator of any new recovery furnace at a kraft or soda pulp mill shall ensure that the concentration of total gaseous organic HAP, as measured by methanol, discharged to the atmosphere is no greater than 0.012 kg/Mg (0.025 lb/ton) of black liquor solids fired.

(2) The owner or operator of each existing or new semichemical combustion unit shall ensure that:

(i) The concentration of total gaseous organic HAP, as measured by total hydrocarbons reported as carbon,

discharged to the atmosphere is less than or equal to 1.49 kg/Mg (2.97 lb/ton) of black liquor solids fired; or

(ii) The total gaseous organic HAP emissions, as measured by total hydrocarbons reported as carbon, are reduced by at least 90 percent prior to discharge of the gases to the atmosphere.

§ 63.863 Compliance dates.

(a) The owner or operator of an existing affected source shall comply with the requirements in this subpart no later than 3 years after the effective date.

(b) The owner or operator of a new affected source that has an initial startup date after the effective date of these standards shall comply with the requirements in this subpart immediately upon startup of the affected source, except as specified in § 63.6(b) of subpart A of this part.

§ 63.864 Monitoring requirements.

(a) General.

(1) The owner or operator of each affected kraft or soda recovery furnace or lime kiln equipped with an ESP shall install, calibrate, maintain, and operate a continuous opacity monitoring system that can be used to determine opacity at least once every successive 10-second period and

calculate and record each successive 6-minute average opacity using the procedures in §§ 63.6(h) and 63.8 of subpart A of this part.

(2) The owner or operator of each affected kraft or soda lime kiln, sulfite recovery furnace, or kraft or soda smelt dissolving tank equipped with a wet scrubber shall install, calibrate, maintain, and operate a continuous monitoring system that can be used to determine and record the pressure drop across the scrubber and the scrubbing liquid flowrate at least once every successive 15-minute period using the procedures in § 63.8(c) as well as the following:

(i) The monitoring device used for the continuous measurement of the pressure drop of the gas stream across the scrubber shall be certified by the manufacturer to be accurate to within a gage pressure of ±500 pascals (±2 inches of water gage pressure); and

(ii) The monitoring device used for continuous measurement of the scrubbing liquid flowrate shall be certified by the manufacturer to be accurate within ±5 percent of the design scrubbing liquid flowrate.

(3) The owner or operator of each affected semichemical combustion unit equipped with an RTO shall install, calibrate, maintain, and operate a continuous monitoring system that can be used to determine and record the operating temperature of the RTO at least once every successive 15-minute period using the procedures in § 63.8(c). The monitor shall compute and record the operating temperature at the point of incineration of effluent gases that are emitted using a temperature monitor accurate to within ±1 percent of the temperature being measured.

(4) The owner or operator of each affected source that uses a control device listed in paragraphs (a)(1) through (a)(3) of this section may monitor alternative control device operating parameters subject to prior written approval by the Administrator.

(5) The owner or operator of each affected source that uses an air pollution control system other than those listed in paragraphs (a)(1) through (a)(3) of this section shall monitor the parameters as approved by the Administrator using the methods and procedures in § 63.865(f).

(6) The owner or operator of each affected source complying with the total gaseous organic HAP emission limitations of § 63.862(c)(1) through the use of an NDCE recovery furnace equipped with a dry ESP system is not required to conduct any performance testing or any continuous monitoring to demonstrate compliance with the total gaseous organic HAP emission limitation.

(b) Initial compliance determination.

(1) The owner or operator of each affected source subject to the requirements of this subpart is required to conduct an initial performance test using the test methods and procedures listed in § 63.7 of subpart A of this part and § 63.865, except as provided in paragraph (b)(3) of this section.

(2) Determination of operating ranges.

(i) During the initial performance test required in paragraph (b)(1) of this section, the owner or operator of any affected source shall establish operating ranges for the monitoring parameters in paragraphs (a)(2) through (a)(5) of this section, as appropriate; or

(ii) The owner or operator may base operating ranges on values recorded during previous performance tests or

conduct additional performance tests for the specific purpose of establishing operating ranges, provided that test data used to establish the operating ranges are or have been obtained using the test methods required in this subpart. The owner or operator of the affected source shall certify that all control techniques and processes have not been modified subsequent to the testing upon which the data used to establish the operating parameter ranges were obtained.

(iii) The owner or operator of an affected source may establish expanded or replacement operating ranges for the monitoring parameter values listed in paragraphs (a)(2) through (a)(5) of this section and established in paragraphs (b)(2)(i) or (ii) of this section during subsequent performance tests using the test methods in § 63.865.

(3) An initial performance test is not required to be conducted in order to determine compliance with the emission limitations of § 63.862(c)(1) if the affected source includes an NDCE recovery furnace equipped with a dry ESP system.

(4) After the Administrator has approved the PM or PM HAP limits for each kraft or soda recovery furnace, smelt

dissolving tank, and lime kiln, the owner or operator complying with an overall PM or overall PM HAP emission limit established in § 63.862(a)(1)(ii) shall demonstrate compliance with the PM HAP standard by demonstrating compliance with the approved PM or PM HAP emission limits for each affected kraft or soda recovery furnace, smelt dissolving tank, and lime kiln, using the test methods and procedures in § 63.865(b).

(c) On-going compliance provisions.

(1) Following the compliance date, owners or operators of all affected sources are required to implement corrective action, as specified in the startup, shutdown, and malfunction plan prepared under § 63.866(a) of this subpart if the following monitoring exceedances occur:

(i) For a new or existing kraft recovery furnace or lime kiln equipped with an ESP, when 10 consecutive 6-minute averages result in a measurement greater than 20 percent opacity;

(ii) For a new or existing smelt dissolving tank, lime kiln, or sulfite combustion unit equipped with a wet scrubber, when any 3-hour average parameter value is outside

the range of values established in paragraph (b)(2) of this section.

(iii) For a new or existing semichemical combustion unit equipped with an RTO, when any 1-hour average temperature falls below the temperature established in paragraph (b)(2) of this section;

(iv) For an affected source equipped with an alternative emission control system approved by the Administrator, when any 3-hour average value is outside the range of parameter values established in paragraph (b)(2) of this section; and

(v) For an affected source that is monitoring alternative operating parameters established in paragraph (a)(4) of this section, when any 3-hour average value is outside the range of parameter values established in paragraph (b)(2) of this section.

(2) Following the compliance date, owners or operators of all affected sources are in violation of the standards of § 63.862 if the following monitoring exceedances occur:

(i) For an existing kraft or soda recovery furnace equipped with an ESP, when opacity is greater than

35 percent for 6 percent or more of the time within any 6-month reporting period;

(ii) For a new kraft or soda recovery furnace or a new or existing lime kiln equipped with an ESP, when opacity is greater than 20 percent for 6 percent or more of the time within any 6-month reporting period;

(iii) For a new or existing smelt dissolving tank, lime kiln, or sulfite combustion unit equipped with a wet scrubber, when six or more 3-hour average parameter values within any 6-month reporting period are outside the range of values established in paragraph (b)(2) of this section;

(iv) For a new or existing semichemical combustion unit equipped with an RTO, when any 3-hour average temperature falls below the temperature established in paragraph (b)(2) of this section;

(v) For an affected source equipped with an alternative air pollution control system approved by the Administrator, when six or more 3-hour average values within any 6-month reporting period are outside the range of parameter values established in paragraph (b)(2) of this section; and

(vi) For an affected source that is monitoring alternative operating parameters established in paragraph (a)(4) of this section, when six or more 3-hour average values within any 6-month reporting period are outside the range of parameter values established in paragraph (b)(2) of this section.

(3) For purposes of determining the number of nonopacity monitoring exceedances, no more than one exceedance shall be attributed in any given 24-hour period.

§ 63.865 Performance test requirements and test methods.

(a) The owner or operator of an affected source seeking to comply with a PM or PM HAP emission limit under § 63.862(a)(1)(ii)(A) or (B) shall use the following procedures:

(1) Determine either the overall PM limit or overall PM HAP limit for the mill.

(i) The overall PM limit for the mill shall be determined as follows:

$$EL_{PM} = [(C_{ref,RF})(Q_{RFtot}) + (C_{ref,LK})(Q_{LKtot})](F1)/(BLS_{tot}) + ER1_{ref,SDT} \quad \text{Eq. (1)}$$

where:

EL_{PM} = overall PM emission limit for all existing affected sources at the kraft or

soda pulp mill, kg/Mg (lb/ton) of black liquor solids fired.

$C_{ref,RF}$ = reference concentration of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen for existing kraft or soda recovery furnaces.

Q_{RFtot} = sum of the average gas flow rates measured during the performance test from all existing recovery furnaces at the kraft or soda pulp mill, dry standard cubic meters per minute (dscm/min) (dry standard cubic feet per minute [dscf/min]).

$C_{ref,LK}$ = reference concentration of 0.15 g/dscm (0.067 gr/dscf) corrected to 10 percent oxygen for existing kraft or soda lime kilns.

Q_{LKtot} = sum of the average gas flow rates measured during the performance test from all existing lime kilns at the kraft or soda pulp mill, dscm/min (dscf/min).

F1 = conversion factor, 1.44 minutes•kilogram/day•gram (min•kg/d•g) (0.206 minutes•pound/day•grain [min•lb/d•gr]).

BLS_{tot} = sum of the average black liquor solids firing rates of all existing recovery furnaces at the kraft or soda pulp mill measured during the performance test, megagrams per day (Mg/d) (tons per day [tons/d]) of black liquor solids fired.

$ER1_{ref,SDT}$ = reference emission rate of 0.10 kg/Mg (0.20 lb/ton) of black liquor solids fired for existing kraft or soda smelt dissolving tanks; or

(ii) The overall PM HAP limit for the mill shall be determined as follows:

$$EL_{PMHAP} = ER_{ref,RF} + (ER_{ref,LK})(CaO_{tot}/BLS_{tot}) + ER2_{ref,SDT} \quad \text{Eq. (2)}$$

where:

EL_{PMHAP} = overall PM HAP emission limit for all existing affected sources at the kraft or

soda pulp mill, kg/Mg (lb/ton) of black liquor solids fired.

$ER_{ref,RF}$ = reference emission rate of 1.00E-03 kg/Mg (2.01E-03 lb/ton) of black liquor solids fired for existing kraft or soda recovery furnaces.

$ER_{ref,LK}$ = reference emission rate of 6.33E-03 kg/Mg (1.27E-02 lb/ton) of CaO produced for existing kraft or soda lime kilns.

CaO_{tot} = sum of the average lime production rates for all existing lime kilns at the kraft or soda pulp mill measured as CaO during the performance test, Mg CaO/d (ton CaO/d).

BLS_{tot} = sum of average black liquor solids firing rates of all existing recovery furnaces at the kraft or soda pulp mill measured during the performance test, Mg/d (ton/d) of black liquor solids fired.

$ER2_{ref,SDT}$ = reference emission rate of 6.20E-05 kg/Mg (1.24E-04 lb/ton) of black liquor solids

fired for existing kraft or soda smelt dissolving tanks.

(2) Establish a preliminary emission limit for each kraft or soda recovery furnace ($C_{EL,RF}$), smelt dissolving tank ($C_{EL,SDT}$), and lime kiln ($C_{EL,LK}$); and, using these emission limits, determine the overall PM or overall PM HAP emission rate for the mill using the procedures in § 63.865(a)(2)(i) through (v), such that the overall PM or overall PM HAP emission rate calculated in § 63.865(a)(2)(v) is less than or equal to the overall PM or overall PM HAP emission limit determined in § 63.865(a)(1), as appropriate.

(i) The following equation shall be used to determine the PM or PM HAP emission rate from each affected recovery furnace:

$$ER_{RF} = (F1)(C_{EL,RF})(Q_{RF})/(BLS) \qquad \text{Eq. (3)}$$

where:

ER_{RF} = emission rate from each recovery furnace, kg/Mg (lb/ton) of black liquor solids.

F1 = conversion factor, 1.44 min•kg/d•g (0.206 min•lb/d•gr).

$C_{EL,RF}$ = preliminary PM or PM HAP emission limit proposed by owner or operator for the recovery

furnace, g/dscm (gr/dscf) corrected to 8 percent oxygen.

Q_{RF} = average volumetric gas flow rate from the recovery furnace measured during the performance test, dscm/min (dscf/min).

BLS = average black liquor solids firing rate of the recovery furnace measured during the performance test, Mg/d (ton/d) of black liquor solids.

(ii) The following equation shall be used to determine the PM or PM HAP emission rate from each affected smelt dissolving tank:

$$ER_{SDT} = (F1)(C_{EL,SDT})(Q_{SDT})/(BLS) \qquad \text{Eq. (4)}$$

where:

ER_{SDT} = emission rate from each SDT, kg/Mg (lb/ton) of black liquor solids fired.

F1 = conversion factor, 1.44 min•kg/d•g (0.206 min•lb/d•gr).

$C_{EL,SDT}$ = preliminary PM or PM HAP emission limit proposed by owner or operator for the smelt dissolving tank, g/dscm (gr/dscf) corrected to 8 percent oxygen.

Q_{SDT} = average volumetric gas flow rate from the smelt dissolving tank measured during the performance test, dscm/min (dscf/min).

BLS = average black liquor solids firing rate of the associated recovery furnace measured during the performance test, Mg/d (ton/d) of black liquor solids fired. If more than one SDT is used to dissolve the smelt from a given recovery furnace, then the black liquor solids firing rate of the furnace shall be proportioned according to the size of the SDT's.

(iii) The following equation shall be used to determine the PM or PM HAP emission rate from each affected lime kiln:

$$ER_{LK} = (F1)(C_{EL,LK})(Q_{LK})(CaO_{tot}/BLS_{tot})/(CaO_{LK}) \qquad \text{Eq. (5)}$$

where:

ER_{LK} = emission rate from each lime kiln, kg/Mg (lb/ton) of black liquor solids.

F1 = conversion factor, 1.44 min•kg/d•g (0.206 min•lb/d•gr).

$C_{EL,LK}$ = preliminary PM or PM HAP emission limit proposed by owner or operator for the lime kiln, g/dscm (gr/dscf) corrected to 10 percent oxygen.

Q_{LK} = average volumetric gas flow rate from the lime kiln measured during the performance test, dscm/min (dscf/min).

CaO_{LK} = lime production rate of the lime kiln, measured as CaO during the performance test, Mg/d (ton/d) of CaO.

CaO_{tot} = sum of the average lime production rates for all existing lime kilns at the mill measured as CaO during the performance test, Mg/d (ton/d).

BLS_{tot} = sum of the average black liquor solids firing rates of all recovery furnaces at the mill measured during the performance test, Mg/d (ton/d) of black liquor solids.

(iv) If more than one similar process unit is operated at the kraft or soda pulp mill, the following equation shall be used to calculate the overall PM or overall PM HAP emission rate from all similar process units at the mill and

shall be used in determining the overall PM or overall PM HAP emission rate for the mill:

$$ER_{PUtot} = ER_{PU1}(PR_{PU1}/PR_{tot}) + \ldots\ldots + (ER_{PUi})(PR_{PUi}/PR_{tot}) \qquad \text{Eq. (6)}$$

where:

ER_{PUtot} = overall PM or overall PM HAP emission rate from all similar process units, kg/Mg (lb/ton) of black liquor solids fired.

ER_{PU1} = PM or PM HAP emission rate from process unit No. 1, kg/Mg (lb/ton) of black liquor solids fired, calculated using equation (3), (4), or (5).

PR_{PU1} = black liquor solids firing rate in Mg/d (ton/d) for process unit No. 1, if process unit is a recovery furnace or SDT. The CaO production rate in Mg/d (ton/d) for process unit No. 1, if process unit is a lime kiln.

PR_{tot} = total black liquor solids firing rate in Mg/d (ton/d) for all recovery furnaces at the kraft or soda pulp mill if the similar process units are recovery furnaces or SDT's, or the total CaO production rate in Mg/d (ton/d) for all

lime kilns at the mill if the similar process units are lime kilns.

ER_{PUi} = PM or PM HAP emission rate from process unit No. i, kg/Mg (lb/ton) of black liquor solids fired.

PR_{PUi} = black liquor solids firing rate in Mg/d (ton/d) for process unit No. i, if process unit is a recovery furnace or SDT. The CaO production rate in Mg/d (ton/d) for process unit No. i, if process unit is a lime kiln.

i = number of similar process units located at the kraft or soda pulp mill.

(v) The following equation shall be used to calculate the overall PM or overall PM HAP emission rate at the mill:

$$ER_{tot} = ER_{RFtot} + ER_{SDTtot} + ER_{LKtot} \qquad \text{Eq. (7)}$$

where:

ER_{tot} = overall PM or overall PM HAP emission rate for the mill, kg/Mg (lb/ton) of black liquor solids fired.

ER_{RFtot} = PM or PM HAP emission rate from all kraft or soda recovery furnaces, calculated using equation (3) or (6), where

applicable, kg/Mg (lb/ton) of black liquor solids fired.

ER_{SDTtot} = PM or PM HAP emission rate from all smelt dissolving tanks, calculated using equation (4) or (6), where applicable, kg/Mg (lb/ton) of black liquor solids fired.

ER_{LKtot} = PM or PM HAP emission rate from all lime kilns, calculated using equation (5) or (6), where applicable, kg/Mg (lb/ton) of black liquor solids fired.

(3) For purposes of determining the volumetric gas flow rate used in this section for each kraft or soda recovery furnace, smelt dissolving tank, and lime kiln, Methods 1 through 4 of appendix A, part 60 of this chapter shall be used.

(4) Process data measured during the performance test shall be used to determine the black liquor solids firing rate on a dry basis and the CaO production rate.

(b) The owner or operator seeking to determine compliance with § 63.862(a) shall use the following procedures:

(1) For purposes of determining the concentration of PM emitted from each kraft or soda recovery furnace, sulfite combustion unit, smelt dissolving tank or lime kiln, Method 5 or 29 in appendix A of part 60 of this chapter shall be used, except that Method 17 in appendix A of part 60 may be used in lieu of Method 5 or Method 29 if a constant value of 0.009 g/dscm (0.004 gr/dscf) is added to the results of Method 17, and the stack temperature is no greater than 205°C (400°F). The sampling time and sample volume for each run shall be at least 60 minutes and 0.90 dscm (31.8 dscf). Water shall be used as the cleanup solvent instead of acetone in the sample recovery procedure.

(i) For sources complying with § 63.862(a)(1) or (2), the PM concentration shall be corrected to the appropriate oxygen concentration using the following equation:

$$C_{corr} = C_{meas} \times (21-X/21-Y) \qquad \text{Eq. (8)}$$

where:

C_{corr} = the measured concentration corrected for oxygen, g/dscm (gr/dscf).

C_{meas} = the measured concentration uncorrected for oxygen, g/dscm (gr/dscf).

X = the corrected volumetric oxygen concentration (8 percent for kraft or soda recovery furnaces and sulfite combustion units and 10 percent for lime kilns).

Y = the measured average volumetric oxygen concentration.

The integrated sampling and analysis procedure of Method 3B shall be used to determine the oxygen concentration. The gas sample shall be taken at the same time and at the same traverse points as the particulate sample.

(2) For purposes of determining the PM HAP emitted from each kraft or soda recovery furnace, smelt dissolving tank, or lime kiln, Method 29 in appendix A of part 60 of this chapter shall be used. Method 101A in appendix B of part 61 may be used as an alternative to Method 29 for determining mercury emissions. When determining the PM HAP emission rate, all nondetect data, as defined in § 63.861, shall be treated as one-half of the method detection limit. The sampling time and sample volume for each run shall be at least 60 minutes and 1.27 dscm (45 dscf).

(i) The following equation shall be used to determine the PM HAP emission rate from each recovery furnace:

$$ER_{RF\text{-}PMHAP} = (PMHAP_{meas})/(BLS) \qquad \text{Eq. (9)}$$

where:

$ER_{RF\text{-}PMHAP}$ = PM HAP emission rate from each recovery furnace, kg/Mg (lb/ton) of black liquor solids fired.

$PMHAP_{meas}$ = measured PM HAP mass emission rate, kg/hr (lb/hr).

BLS = average black liquor solids firing rate, Mg/hr (ton/hr); determined using process data measured during the performance test.

(ii) The following equation shall be used to determine the PM HAP emission rate from each smelt dissolving tank:

$$ER_{SDT\text{-}PMHAP} = (PMHAP_{meas})/(BLS) \qquad \text{Eq. (10)}$$

where:

$ER_{SDT\text{-}PMHAP}$ = PM HAP emission rate from each smelt dissolving tank, kg/Mg (lb/ton) of black liquor solids fired.

$PMHAP_{meas}$ = measured PM HAP mass emission rate, kg/hr (lb/hr).

BLS = average black liquor solids firing rate of the associated recovery furnace, Mg/hr

(ton/hr); determined using process data measured during the performance test.

(iii) The following equation shall be used to determine the PM HAP emission rate from each lime kiln:

$$ER_{LK\text{-}PMHAP} = (PMHAP_{meas})/(CaO) \qquad \text{Eq. (11)}$$

where:

$ER_{LK\text{-}PMHAP}$ = PM HAP emission rate from each lime kiln, kg/Mg (lb/ton) of black liquor solids fired.

$PMHAP_{meas}$ = measured PM HAP mass emission rate, kg/hr (lb/hr).

CaO = average lime production rate, Mg/hr (ton/hr); measured as CaO and determined using process data measured during the performance test.

(c) The owner or operator seeking to determine compliance with the total gaseous organic HAP standard in § 63.862(c)(1) without using an NDCE recovery furnace equipped with a dry ESP system shall use Method 308 in Appendix A of part 63 of this chapter. The sampling time and sample volume for each run shall be at least 60 minutes and 0.014 dscm (0.50 dscf), respectively.

(1) The following equation shall be used to determine the emission rate from any new NDCE recovery furnace:

$$ER_{NDCE} = (MR_{meas})/(BLS) \qquad \text{Eq. (12)}$$

where:

ER_{NDCE} = methanol emission rate from the NDCE recovery furnace, kg/Mg (lb/ton) of black liquor solids fired.

MR_{meas} = measured methanol mass emission rate from the NDCE recovery furnace, kg/hr (lb/hr).

BLS = average black liquor solids firing rate of the NDCE recovery furnace, Mg/hr (ton/hr); determined using process data measured during the performance test.

(2) The following equation shall be used to determine the emission rate from any new DCE recovery furnace system:

$$ER_{DCE} = [(MR_{meas,RF})/BLS_{RF}] + [(MR_{meas,BLO})/BLS_{BLO}] \qquad \text{Eq. (13)}$$

where:

ER_{DCE} = methanol emission rate from each DCE recovery furnace system, kg/Mg (lb/ton) of black liquor solids fired.

$MR_{meas,RF}$ = average measured methanol mass emission rate from each DCE recovery furnace, kg/hr (lb/hr).

$MR_{meas,BLO}$ = average measured methanol mass emission rate from the black liquor oxidation system, kg/hr (lb/hr).

BLS_{RF} = average black liquor solids firing rate for each DCE recovery furnace, Mg/hr (ton/hr); determined using process data measured during the performance test.

BLS_{BLO} = the average mass rate of black liquor solids treated in the black liquor oxidation system, Mg/hr (ton/hr); determined using process data measured during the performance test.

(d) The owner or operator seeking to determine compliance with the total gaseous organic HAP standards in § 63.862(c)(2), (standards for semichemical combustion units) shall use Method 25A in appendix A of part 60 of this chapter. The sampling time shall be at least 60 minutes.

(1) The following equation shall be used to determine

the emission rate from any new or existing semichemical combustion unit:

$$ER_{SCCU} = (THC_{meas})/(BLS) \qquad \text{Eq. (14)}$$

where:

ER_{SCCU} = THC emission rate from each semichemical combustion unit, kg/Mg (lb/ton) of black liquor solids fired.

THC_{meas} = measured THC mass emission rate, kg/hr (lb/hr).

BLS = average black liquor solids firing rate, Mg/hr (ton/hr); determined using process data measured during the performance test.

(2) If the owner or operator of the semichemical combustion unit has selected the percentage reduction standards for THC, under § 63.862(c)(2)(ii) of this subpart, the percentage reduction in THC emissions ($\%R_{THC}$) is computed using the following formula, provided that E_i and E_o are measured simultaneously:

$$(\%R_{THC}) = \left(\frac{E_i - E_o}{E_i} \right) \times 100 \qquad \text{Eq. (15)}$$

where:

$\%R_{THC}$ = percentage reduction of total hydrocarbons emissions achieved.

E_i = measured THC mass emission rate at the THC control device inlet, kg/hr (lb/hr).

E_o = measured THC mass emission rate at the THC control device outlet, kg/hr (lb/hr).

(e) The owner or operator seeking to comply with the continuous parameter monitoring requirements of § 63.864(b)(2) shall continuously monitor each parameter and determine the arithmetic average value of each parameter during each 3-run performance test. Multiple 3-run performance tests may be conducted to establish a range of parameter values.

(f) The owner or operator of an affected source seeking to demonstrate compliance with the standards in § 63.862 using a control technique other than those listed in § 63.864(a)(1) through (a)(3) shall provide to the Administrator a monitoring plan that includes a description of the control device, test results verifying the performance of the control device, the appropriate operating parameters that will be monitored, and the frequency of

measuring and recording to establish continuous compliance with the standards. The monitoring plan is subject to the Administrator's approval. The owner or operator of the affected source shall install, calibrate, operate, and maintain the monitor(s) in accordance with the monitoring plan approved by the Administrator. The owner or operator shall include in the information submitted to the Administrator proposed performance specifications and quality assurance procedures for their monitors. The Administrator may request further information and shall approve acceptable test methods and procedures.

§ 63.866 Recordkeeping requirements.

(a) Startup, shutdown, and malfunction plan. The owner or operator shall develop and implement a written plan as described in § 63.6(e)(3) of this part that contains specific procedures to be followed for operating the source and maintaining the source during periods of startup, shutdown, and malfunction and a program of corrective action for malfunctioning process and control systems used to comply with the standard. In addition to the information required in § 63.6(e) of this part, the plan shall include

the requirements in paragraphs (a)(1) and (a)(2) of this section.

(1) The startup, shutdown, and malfunction plan shall include procedures for responding to any process parameter level that is inconsistent with the level(s) established under § 63.864(b)(2), including:

(i) Procedures to determine and record the cause of an operating parameter exceedance and the time the exceedance began and ended; and

(ii) Corrective actions to be taken in the event of an operating parameter exceedance, including procedures for recording the actions taken to correct the exceedance.

(2) The startup, shutdown, and malfunction plan also shall include:

(i) A maintenance schedule for each control technique that is consistent with, but not limited to, the manufacturer's instructions and recommendations for routine and long-term maintenance; and

(ii) An inspection schedule for each continuous monitoring system required under §63.864 to ensure, at least once in each 24-hour period, that each continuous monitoring system is properly functioning.

(b) The owner or operator of an affected source shall maintain records of any occurrence when corrective action is required under § 63.864(c)(1), and when a violation is noted under § 63.864(c)(2).

(c) In addition to the general records required by § 63.10(b)(2) of this part, the owner or operator shall maintain records of the following information:

(1) Records of black liquor solids firing rates in units of megagrams/day or tons/day for all recovery furnaces and semichemical combustion units;

(2) Records of CaO production rates in units of megagrams/day or tons/day for all lime kilns;

(3) Records of parameter monitoring data required under § 63.864, including any period when the operating parameter levels were inconsistent with the levels established during the initial performance test, with a brief explanation of the cause of the deviation and the corrective action taken;

(4) Records and documentation of supporting calculations for compliance determinations made under §§ 63.865(a) through (e);

(5) Records of monitoring parameter ranges established for each affected source;

(6) Records certifying that an NDCE recovery furnace equipped with a dry ESP system is used to comply with the total gaseous organic HAP standard in § 63.862(c)(1).

§ 63.867 Reporting requirements.

(a) Notifications. The owner or operator of any affected source shall submit the applicable notifications from subpart A of this part, as specified in Table 1 of this subpart.

(b) Additional reporting requirements for PM HAP standards.

(1) Any owner or operator of a group of affected sources at a mill complying with the PM HAP standards in § 63.862(a)(1)(ii) shall submit the PM or PM HAP emission limits determined in § 63.865(a) for each affected kraft or soda recovery furnace, smelt dissolving tank, and lime kiln to the Administrator for approval. The emission limits shall be submitted as part of the notification of compliance status required under subpart A of this part.

(2) Any owner or operator of an affected source complying with the PM or PM HAP standards in

§ 63.862(a)(1)(ii) shall submit the calculations and supporting documentation used in § 63.865(a)(1) and (2) to the Administrator as part of the notification of compliance status required under subpart A of this part.

(3) After the Administrator has approved the emission limits for any affected source, the owner or operator of an affected source must notify the Administrator before any of the following actions are taken:

(i) The air pollution control system for any affected source is modified or replaced;

(ii) Any kraft or soda recovery furnace, smelt dissolving tank, or lime kiln at a kraft or soda pulp mill complying with the PM or PM HAP standards in § 63.862(a)(1)(ii) is shut down for more than 60 consecutive days;

(iii) A continuous monitoring parameter or the value or range of values of a continuous monitoring parameter for any affected source is changed; or

(iv) The black liquor solids firing rate for any kraft or soda recovery furnace during any 24-hour averaging period is increased by more than 10 percent above the level measured during the most recent performance test.

(4) An owner or operator of a group of affected sources at a mill complying with the PM or PM HAP standards in § 63.862(a)(1)(ii) and seeking to perform the actions in paragraphs (b)(3)(i) or (ii) of this section shall recalculate the overall PM or overall PM HAP emission limit for the group of affected sources and resubmit the documentation required in paragraph (b)(2) of this section to the Administrator. All modified PM and PM HAP emission limits are subject to approval by the Administrator.

(c) Excess emissions report. The owner or operator shall report quarterly if measured parameters meet any of the conditions specified in § 63.864(c)(1) or (2). This report shall contain the information specified in § 63.10(c) of this part as well as the number and duration of occurrences when the source met or exceeded the conditions in § 63.864(c)(1)and the number and duration of occurrences when the source met or exceeded the conditions in § 63.864(c)(2).

(1) When no exceedances of parameters have occurred, the owner or operator shall submit a semiannual report stating that no excess emissions occurred during the reporting period.

(2) The owner or operator of an affected source subject to the requirements of this subpart and subpart S of this part may combine excess emission and/or summary reports for the mill.

§ 63.868 Delegation of authority.

(a) In delegating implementation and enforcement authority to a State under section 112(d) of the Act, the authorities contained in paragraph (b) of this section shall be retained by the Administrator and not transferred to a State.

(b) Authorities which will not be delegated to States: No authorities are retained by the Administrator.