United States
Environmental Protection
Agency

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

EPA-453/R-93-050b
October 1997

Air

EPA

Pulp, Paper, and Paperboard Industry - Background Information for Promulgated Air Emission Standards

Final
EIS

Manufacturing Processes at Kraft, Sulfite, Soda, Semi-Chemical, Mechanical, and Secondary and Non-wood Fiber Mills

NESHAP

EPA-453/R-93-050b

Pulp, Paper, and Paperboard Industry - Background Information for Promulgated Air Emission Standards

Manufacturing Processes at Kraft, Sulfite, Soda, Semi-Chemical, Mechanical, and Secondary and Non-wood Fiber Mills

Emission Standards Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Ofiice of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711
October 1997

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U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

Background Information
and Final
Environmental Impact Statement
for Hazardous Air Pollutant Emissions
From the Pulp, Paper, and Paperboard Industry

Prepared by:

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Director, Emission Standards Division
U.S. Environmental Protection Agency
Research Triangle Park, N.C. 27711

10/22/97
(Date)

1. National emission standards for hazardous air pollutants (NESHAP) are being promulgated for the pulp and paper industry under authority of Section 112(d) of the Clean Air Act as amended in 1990. The promulgated NESHAP requires controls for hazardous air pollutant emissions from wood pulping and bleaching processes at pulp mills and integrated mills (i.e., mills that combine on-site production of both pulp and paper).

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

3. For additional information contact:

   Ms. Penny Lassiter
   Waste and Chemicals Process Group (MD-13)
   U.S. Environmental Protection Agency
   Research Triangle Park, NC 27711
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4. Paper copies of this document may be obtained from:

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   5285 Port Royal Road
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   U.S. Environmental Protection Agency
   Research Triangle Park, NC 27711
   Telephone: (919) 541-2777

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1.0 SUMMARY

1.1 INTRODUCTION

On December 17, 1993 (58 FR 66078), the U.S. Environmental Protection Agency (EPA) jointly published proposed National Emission Standard for Hazardous Air Pollutants (NESHAP) and Effluent Guidelines (December 17, 1993 proposed rule) for the pulp and paper industry. The rule proposed standards for MACT I sources, which include kraft, soda, sulfite, and semi-chemical pulping mills. On March 17, 1994 (59 FR 12567) EPA published a correction notice to the proposed NESHAP and Effluent Guidelines (March 17, 1994 correction notice). On February 22, 1995 (60 FR 9813) EPA published a Notice of Data Availability (NODA) that would be considered for developing the promulgated NESHAP. On March 8, 1996 (61 FR 9383), EPA published a supplemental notice (March 8, 1996 supplemental notice) that presented EPA's assessment of the additional data and information obtained after proposal and announced potential changes to the proposed rule. As part of the March 8, 1996 supplemental notice, EPA also proposed standards for MACT III sources (papermaking systems, mechanical pulping mills, secondary fiber pulping [deinked and non-deinked] mills, and non-wood mills, and asked for additional information on these mills). MACT II sources (combustion sources) are covered under a separate rulemaking.

In the March 8, 1996 supplemental notice, EPA solicited additional data and comments on proposed changes to the December 17, 1993 proposed rule. Data added to Air Docket A-92-40 since the March 8, 1996 supplemental notice are located in section IV of the docket. These items include additional information on sulfite mills (IV-Dl-98, IV-Dl-100) comments on definitions (IV-Dl-97, IV-Dl-99, IV-Dl-104), comments on the emission factor document (IV-Dl-102), clarification of the 1992 MACT survey responses (IV-Dl-lOl), and other information.

The public comment period for the December 17, 1993 proposed rule was from December 17, 1993 to March 17, 1994. Approximately 155 comment letters were received on the December 17, 1993 proposed rule. The public comment period for the supplemental notice was from March 8, 1996 to April 8, 1996. Approximately 33 comment letters were received on the March 8, 1996 supplemental notice, including letters received on the MACT III sources. Comments were provided by industry representatives, governmental entities, environmental groups, and private citizens.

1.2 ORGANIZATION OF THIS DOCUMENT

This introduction includes the list of commenters on the December 17, 1993 proposed rule and notices. In order to present the comments in a logical manner, the comments and EPA's responses have been divided into 18 categories. The categories and respective chapter numbers in this background information document are as follows:

2.0 INDUSTRY CHARACTERIZATION
3.0 SUBCATEGORIZATION
4.0 BASIS OF STANDARDS
5.0 PULPING AREA
6.0 BLEACHING AREA

7.0 PROCESS WASTEWATER AREA
8.0 MONITORING
9.0 TEST METHODS AND PROCEDURES
10.0 RECORDKEEPING AND REPORTING
11.0 COST/ECONOMIC IMPACTS
12.0 BENEFITS
13.0 EMISSIONS AVERAGING
14.0 DEFINITIONS
15.0 CLUSTER RULE INTERACTION
16.0 INTERACTION WITH OTHER RULES
17.0 SCHEDULE ISSUES
18.0 MACT III
19.0 MISCELLANEOUS COMMENTS
20.0 ENVIRONMENTAL IMPACT STATEMENT

The environmental impact statement is chapter 20 of this document.

The following section, section 1.3, includes tables listing the commenters, their affiliation, and assigned comment number.

Numerous acronyms appear throughout this document. The following is provided for reference.

Acronyms Used in this Document

Act	Clean Air Act
ADP	Air-dried pulp
ADTP	Air-dried ton of pulp
AF&PA	American Forest and Paper Association (formerly the American Paper Institute)
AP-42	Compilation of Air Pollutant Emission Factors, 5th edition, Volume 1: Stationary Point and Area Sources
API	American Paper Institute
AQRV	Air quality related value

BAT	Best available technology (under the Effluent Limitation Guidelines and Standards of the Clean Water Act)
BACT	Best available control technology
BID	Background information document
BIF	Boilers and industrial furnaces
BLO	Black liquor oxidation
BMP	Best management practices
BOD	Biochemical oxygen demand
BOD_5	Biochemical oxygen demand 5-day test
BPT	Best practicable control technology
Btu	British thermal unit
CEMS	Continuous Emissions Monitoring Systems
CCA	Clean condensate alternative
CFR	Code of Federal Regulations
ClO_2	Chlorine dioxide
CO	Carbon monoxide
CO_2	Carbon dioxide
CTG	Control Technology Guidance
CWA	Clean Water Act
EA	*Economic Analysis for the National Emission Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production; Effluent Limitations and Guidelines, Pretreatment Standards and New Source Performance Standards; Pulp, Paper, and Paperboard Category - Phase I*

EPA	U.S. Environmental Protection Agency
FOIA	Freedom of Information Act
FLM	Federal land manager
FR	Federal Register
GC/FID	Gas chromatography/flame ionization detection
GRM	Gallons per minute
HAP	Hazardous air pollutant
HCl	Hydrogen chloride
HON	Hazardous organic NESHAP
HVLC	High volume, low concentration collection system
IRIS	Integrated Risk Information System
lb/ODTP	Pound per oven-dried ton of pulp
kg	Kilograms
LAER	Lowest achievable emission rate
LVHC	Low volume, high concentration collection system.
MACT	Maximum achievable control technology.
Mg	Megagram
NAA	Non-attainment Area
NAAQS	National Ambient Air Quality Standards
NCG	Noncondensible gas
NCASI	National Council of the Paper Industry for Air and Stream Improvement

NESHAP	National Emission Standard for Hazardous Air Pollutants
NIOSH	National Institute Occupational Safety and Health
NOCEPM	NCASI Organic Compound Elimination Pathway Model
NODA	Notice of Data Availability
NO_x	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
NSR	New Source Review
OAQPS	Office of Air Quality, Planning and Standards
OCCM	OAQPS Control Cost Manual
ODP	Oven-dried pulp
ODTP	Oven-dried ton of pulp
OMB	Office of Management and Budget
ORD	Office of Research and Development
OSHA	Occupational Safety and Health Administration
OTR	Ozone Transport Region
OW	Office of Water
PCP	Pollution control project
PM	Particulate matter
PM_{10}	Particulate matter less than 10 microns mean aerodynamic diameter
ppmv	parts per million by volume

ppmw	parts per million by weight
PSD	Prevention of Significant Deterioration
PSES	Pretreatment Standards for Existing Sources
PSNS	Pretreatment Standards for New Sources
RACT	Reasonable Attainable Control Technology
RCRA	Resource Conservation and Recovery Act
RIA	Regulatory Impacts Analysis
SCR	Selective catalytic reduction
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SNCR	Selective non-catalytic reduction
SO_2	Sulfur dioxide
SOCMI	Synthetic Organic Chemical Manufacturing Industry
TCF	Totally chlorine free
SCF	Secondarily chlorine free
TRE	Total resource effectiveness
TRS	Total reduced sulfur
VOC	Volatile organic compounds

1.3 SUMMARY OF PUBLIC COMMENTS

Approximately 188 written comments were received on the proposed standards and subsequent notices. A list of the commenters on the December 17, 1993 proposed rule, their affiliations, and the EPA docket number assigned to their correspondence is given in table l-l. Table l-2 lists all persons submitting general written comments on the March 8, 1996 supplemental notice, their affiliations, and the docket item number assigned to each correspondence. Table l-3 lists separately all persons submitting written comments on the MACT III sources (papermaking systems, mechanical pulping mills, secondary fiber pulping mills, and non-wood mills), their affiliation, and the docket item number assigned to each correspondence.

1.4 SUMMARY OF CHANGES SINCE PROPOSAL

In response to comments received on the proposed standards, several changes were made to the final rule. While some of these changes are clarifications designed to make the Agency's intent clearer, a number of them are significant changes to the proposed standard requirements. A summary of the substantive comments and changes made since the proposal are described in this section. Detailed Agency responses to public comments are presented in chapters 2.0 through 19.0 of this document. The revised analyses for the final rule are in the public docket.

1.4.1 Definition of Source

The December 17, 1993 proposed rule presented a broad source definition which included pulping processes, bleaching processes, and pulping and bleaching process condensates. The Agency specifically requested comment on the source definition (i.e., broad versus narrow) in the proposal. After considering comments, EPA adopted the broad definition in the final rule.

The EPA determined that the affected source is all emission points in the pulping and the bleaching systems (including oxygen delignification and the pulping condensate system). The final rule explicitly defines the new source MACT applicability by

TABLE l-l. LIST OF COMMENTERS ON THE DECEMBER 17, 1993 PROPOSED RULE

Office of Water docket control number	Commenter and affiliation
20,000	Tom Burgess Chemetics International, Inc. Vancouver, British Columbia, Canada
20,001	Wayne E. Glenn United Paperworkers International Union Nashville, Tennessee
20,002 Attachment 20,002Al	Gordon D. Strickland Chemical Manufacturers Association Washington, DC
20,003	Richard M. Harvey Florida Department of Environmental Protection Tallahassee, Florida
20,004	David W. Schmutzler Niagara of Wisconsin Paper Corporation Niagara, Wisconsin
20,005	David A.C. Carroll Maryland Department of the Environment Baltimore, Maryland
20,006	Citizen Nat Hendricks Putney, Virginia
20,007	Carl W. Ehmann RJ Reynolds Tobacco Company Winston Salem, North Carolina
20,008	Robert C. Steidel Environmental Manager City of Hopewell Hopewell, Virginia
20,009	Dianne M. Reid State of North Carolina Department of Environment, Health, and Natural Resources Raleigh, North Carolina

TABLE l-l. LIST OF COMMENTERS ON THE DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,010	John W. Walton State of Tennessee Department of Environment and Conservation Nashville, Tennessee
20,011	Gregory J. Hollod Riverwood International Atlanta, Georgia
20,012 Attachment 20,012Al	David J. Lutrick Simpson Paper Company Anderson, California
20,013	Paul A. Walker Hollingsworth & Vose Company East Walpole, Massachusetts
20,014 Attachment 20,014Al	A.D. Whitford Longview Fibre Company Longview, Washington
20,015	Thomas R. Hewitt CRS Sirrene Environmental Raleigh, North Carolina
20,016 Attachments 20,016Al - 20,016A6	Kathy E. Gill Northwest Pulp & Paper Bellevue, Washington
20,017	Seattle Audubon Society Seattle, Washington
20,018 Attachments 20,018Al - 20,018A2	Kimberly A. Hughes Weyerhaeuser Tacoma, Washington
20,019	J.R. Nein Chesapeake Paper Products Company West Point, Virginia

TABLE l-1. LIST OF COMMENTERS ON THE
DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,020 Attachment 20,020Al	Robert G. Smerko The Chlorine Institute Washington, DC
20,021	Kenneth L. Wendell Westvaco Luke, Maryland
20,022	Marianne Dugan Western Environmental Law Center, Inc. Eugene, Oregon
20,023	Herbert C. Scribner Van Leer Packaging Keyes Fibre Company Waterville, Maine
20,024	Josephine S. Cooper American Forest and Paper Association Washington, DC
20,025 Attachments 20,025Al - 20,025Al0	Josephine S. Cooper American Forest and Paper Association Washington, DC
20,026 Attachments 20,026Al - 20,026A51	American Forest and Paper Association Washington, DC
20,027 Attachments 20,027Al - 20,027A32	American Forest and Paper Association Washington, DC
20,028	Guy R. Griffin Potlatch Corporation San Francisco, California
20,029	Michael J. Wax Institute of Clean Air Companies Washington, DC

TABLE l-l. LIST OF COMMENTERS ON THE DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,030	William Robert Neff The Upper Potomac River Commission Westernport, Maryland
20,031	C.L. Missimer P.H. Glatfelter Company Spring Grove, Pennsylvania
20,032	Douglas C. Pryke Alliance for Environmental Technology Ontario, Canada
20,033	George A. Schmitt 3M Industrial & Consumer Sector St. Paul, Minnesota
20,034 Attachments 20,034Al - 20,034A6	Robert B. Burns Jr. Albert H. Toma III Fort Howard Corporation Green Bay, Wisconsin
20,035	C.F. Bledsoe Alabama Pulp and Paper Council Montgomery, Alabama
20,036 Attachment 20,036Al	Nicholas J. Lardieri Scott Paper Company Philadelphia, Pennsylvania
20,037	Leslie Ritts Counsel for American Forest and Paper Association Chadbourne & Parke Washington, DC
20,038	Wilson Blackburn Lake Superior Paper Industries Duluth, Minnesota
20,039	J. Carter Fox President and CEO Chesapeake Richmond, Virginia

TABLE l-l. LIST OF COMMENTERS ON THE DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,040	Douglas A. Hall Minnesota Pollution Control Agency St. Paul, Minnesota
20,041	Raymond J. Connor Technical Director Manufacturers of Emission Controls Association Washington, DC
20,042	L.J. Achee, Jr. Jackson City Port Authority Pascagoula, Mississippi
20,043	Robert J. Sistko, PhD, Sr. Environmental Specialist Rayonier Shelton, Washington
20,044 Attachment 20,044Al	Kurt N.W. Soderberg Western Lake Superior Sanitary District Duluth, Minnesota
20,045	M.T. Fisher Proctor & Gamble Cincinnati, Ohio
20,046 Attachments 20,046Al - 20,046A2	R.E. Cannon Buckeye Florida Perry, Florida
20,047 Attachment 20,047Al	R.E. Cannon Buckeye Cellulose Corporation Memphis, Tennessee
20,048 Attachment 20,048Al	Kenneth T. Hood Simpson Paper Company Anderson, California

TABLE l-l. LIST OF COMMENTERS ON THE DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,049 Attachments 20,049Al - 20,049A2	Jessica C. Landman Natural Resources Defense Council Washington DC
20,050	Lindsay M. Lancaster International Paper Company Mobile, Alabama
20,051	Luigi Terziotti Alabama River Pulp Company Perdue Hill, Alabama
20,052 Attachment 20,052Al	Luigi Terziotti Alabama River Pulp Company Perdue Hill, Alabama
20,053 Attachment 20,053Al	James Miller Louisiana-Pacific Corporation Samoa, California
20,054 Attachments 20,054Al - 20,054A5	Richard Diforio Champion International Stamford, Connecticut
20,055	Erick Tokar Rayonier Shelton, Washington
20,056 Attachments 20,056Al - 20,056A3	Duane Marshall Union Camp Savannah, Georgia
20,057 Attachments 20,057Al - 20,057A22	Thomas Jorling International Paper Company Purchase, New York
20,058	Catherine Marshall American Forest and Paper Association Washington, DC

TABLE l-l. LIST OF COMMENTERS ON THE DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,059	Deborah A. Sheiman Natural Resources Defense Council Washington, DC
20,060	Jerry Pardilla Penobscot Indian Nation Old Town, Maine
20,061	David Lutrick Simpson Paper Company Seattle, Washington
20,062	Robert Collez Augusta Newsprint Augusta, Georgia
20,063	Peter Washburn Natural Resources Council of Maine Augusta, Maine
20,064 Attachments 20,064Al - 20,064A3	Greenpeace Washington, DC
20,065	Joe Thornton Greenpeace Washington, DC
20,066 Attachments 20,066Al - 20,066A4	Charles Ackel Stone Container Corporation Tucker, Georgia
20,067	Roger Stone Stone Container Corporation Chicago, Illinois
20,068 Attachments 20,068Al - 20,068A7	Dana Dolloff Rayonier Stamford, Connecticut

TABLE l-l. LIST OF COMMENTERS ON THE
DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,069 Attachments 20,069Al - 20,069Al0	Douglas Walsh Lincoln Pulp & Paper Company Lincoln, Maine
20,070 Attachments 20,070Al - 20,070A15	Kathleen Bennett James River Corporation Richmond, Virginia
20,071 Attachments 20,071Al - 20,071A13	Dale Phenicie Georgia-Pacific Atlanta, Georgia
20,072 Attachments 20,072Al - 20,072All	Jerome Tatar Mead Chillicorne, Ohio
20,073	Russell Frye Chadbourne & Parke Washington, DC
20,074	Steve Mason Mead Dayton, Ohio
20,075 amends 20,057	Alan Lindsay International Paper Memphis, Tennessee
20,076 amends 20,045	Henry Clifford Proctor & Gamble Cincinnati, Ohio
20,077 Attachments 20,077Al - 20,077A7	Corrine Goldstein Covington & Burling Washington, DC

TABLE l-l. LIST OF COMMENTERS ON THE DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,078	Greg Sorlie Washington Department of Ecology Olympia, Washington
20,079 Attachments 20,079Al - 20,079A4	Charles Bridges Van Leer Packaging Waterville, Maine
20,080	Mary O'Brien Environmental Research Foundation Annapolis, Maryland
20,081 Attachments 20,081Al - 20,081A2	Rick Montanari Ecotech St. Petersburg, Florida
20,082	Martin Visnosky Erie County Environmental Coalition Erie, Pennsylvania
20,083	Steve Kilpatrick Dow Midland, Michigan
20,084	Gordon Strickland Chemical Manufacturers Association Washington, DC
20,085	Norman Anderson American Lung Association of Maine Augusta, Maine
20,086	Darrell Jeffries Wausau Papers Brokaw, Wisconsin
20,087	Brian Benson Roy F. Weston, Inc. Auburn, Alabama

TABLE 1-1. LIST OF COMMENTERS ON THE DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,088 Attachment 20,088A1	Kenneth Gilbreath Chesapeake Paper Products West Point, Virginia
20,089	David Buente Sidley & Austin Washington, DC
20,090	Ted Strong Columbia River Inter-Tribal Fish Commission Portland, Oregon
20,091 Attachments 20,091A1 - 20,091A5	Donna Hayes Dickinson Citizens for Clean Air Norway, Michigan
20,092	David Driesen Natural Resources Defense Council Washington, DC
20,093	Bharat Shah Wisconsin Tissue Menasha, Wisconsin
20,094	Art Vosburg Pope & Talbot Halsey, Oregon
20,095 Attachments 20,095A1 - 20,095A9	Reid A. Miner National Council of Paper Industry for Air and Stream Improvement New York, New York
20,096 Attachments 20,096A1	Dick Brown Gulf Coast Waste Disposal Authority Houston, Texas
20,097	Joe Mayhew Chemical Manufacturers Association

TABLE l-l. LIST OF COMMENTERS ON THE DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,098 Also A-92-40 IV-Dl-18	John Pinkerton National Council of Paper Industry for Air and Stream Improvement New York, New York
20,099 Attachments 20,099Al - 20,099A2	G.W. Zielinski City of St. Helens, Oregon *attachments not sent to OAQPS*
20,100	Stewart Thomas Newsprint South Inc. Grenada, Mississippi
20,101	Stacy Palamatary Oxychem Dallas, Texas
20,102	Robert Colby STAPPA/ALAPCO Washington, DC
20,103	Susan Sylvester Wisconsin Department of Natural Resources Madison, Wisconsin
20,104	William Nicholson No company affiliation disclosed Ross, California
20,105	Nicholas J. Lardieri Scott Paper Company Philadelphia, Pennsylvania
20,106	Corinne Goldstein Covington & Burling on behalf of Finch Pruyn & Company Glensfalls, New York
20,107	Reid A. Miner National Council of Paper Industry for Air and Stream Improvement New York, New York

TABLE l-l. LIST OF COMMENTERS ON THE
DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,108	Guy Griffin Potlatch Corporation San Francisco, California
20,109	Paul Wiegard National Council of Paper Industry for Air and Stream Improvement New York, New York
20,110	Peter Baljet American Lung Association Washington, DC
20,111 Attachment 20,lllAl	Dennis Keschl Maine Department of Environmental Protection Augusta, Maine
20,112 Attachments 20,112Al - 20,112All	John Festa American Forest and Paper Association Washington, DC
20,113 Attachment 20,113Al	Terry Cole St. Joe Forest Products Comapny City of Port St. Joe, Florida
20,114 Attachment 20,114Al	Kenneth A. Strassner Kimberly-Clark Washington, DC
20,115 Attachments 20,115Al - 20,115A5	James Beason Appleton Papers Inc. Appleton, Wisconsin
20,116 Attachments 20,116Al - 20,116A2	John Festa American Forest and Paper Association Washington, DC
20,117 Attachment 20,117Al	John Millican Florida Pulp & Paper Association Tallahassee, Florida

TABLE l-l. LIST OF COMMENTERS ON THE DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,118	Anthony Gammie Bowater, Inc. Greenville, South Carolina
20,119	Robert C. Kaufmann American Forest and Paper Association Washington, DC
20,120 Attachments 20,120Al - 20,120A88	Josephine S. Cooper American Forest and Paper Association Washington, DC
20,121	Washington Toxics Coalition and 41 other Environmental Organizations in the Pacific Northwest
20,122 Attachments 20,122Al - 20,122A7	Prepared by Carol Dansereau, J.D. Director of Washington Toxics Coalition Seattle, Washington
20,123 Attachments 20,123Al - 20,123A7	Dale Phenicie Georgia-Pacific Corporation Atlanta, Georgia
20,124	Frank Pate City of Port St. Joe, Florida
20,125	Catherine Marshall American Forest and Paper Association Washington, DC
20,126	Jessica C. Landman, Senior Attorney; Diane M. Cameron, Environmental Engineer; Brian L. Doster, Legal Associate Natural Resources Defense Council New York
20,127 Attachment 20,127Al	Joy Cummings HOPE in Taylor Company Perry, Florida

TABLE l-l. LIST OF COMMENTERS ON THE
DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,128	Frank Molen Commonwealth of Virginia Senate New Hope, Virginia
20,129	Edward Sullivan New York State Department of Environment and Conservation Albany, New York
20,130 Attachments 20,130Al - 20,130A5	David Lutrick Simpson Paper Company Anderson, California
20,131	Duane Marshall Union Camp Savannah, Georgia
20,132	Mr. and Mrs. James J. Sloan Salinas, California
20,133	Phillir Chaudoir Green Bay, Wisconsin
20,134	Albert Toma Fort Howard Green Bay, Wisconsin
20,135 Attachment 20,135Al	Kathleen M. Bennett James River Co. Richmond, Virginia
20,136 Attachments 20,136Al - 20,136A14	Mark Haley City of Hopewell, Virginia
20,137	Alan D. Whitford Longview Fibre Company Longview, Washington

TABLE l-l. LIST OF COMMENTERS ON THE
DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,138	Chester Williams FUSE, Inc. Texarkana, Arkansas-Texas
20,139	James W. Riley Cumberland, Maryland
20,140	Jim Anders Anders Real Estate & Timber Co., Inc. Blountstown, Florida
20,141	Karey Shaw Columbia River United Hood River, Oregon
20,142	Stuart I. Gansell Pennsylvania Department of Environmental Resources
20,143	Joy Huber Rivers Council of Washington Seattle, Washington
20,144	Robert H. Collom, Jr. Georgia Department of Natural Resources Atlanta, Georgia
20,145	Randy Thurman Arkansas Environmental Federation Little Rock, Arkansas
20,146	J.D. Weinbauer Consolidated Papers, Inc. Wisconsin Rapids, Wisconsin
20,147	Bruce W. Beckstrom A.H. Lundberg Associates, Inc. Bellevue, Washington
20,148	Richard A. Samp Washington Legal Foundation Washington, DC

TABLE l-l. LIST OF COMMENTERS ON THE
DECEMBER 17, 1993 PROPOSED RULE (Continued)

Office of Water docket control number	Commenter and affiliation
20,149	Paul Gerbec Minnesota Pollution Control Agency St. Paul, Minnesota
20,150	Bob Jackman and Frank Ossiander Citizens for a Clean Columbia Kettle Falls, Washington
20,151	Randal S. Telesz Michigan Department of Natural Resources Lansing, Michigan
20,152	Stephen B. Letendre Tennessee Department of Environment and Conservation Nashville, Tennessee
20,153	Samuel N. Penney Nez Perce Tribal Executive Committee Lapwai, Idaho
20,154	Paul C. Martyn Los Angeles County Sanitation Districts Whittier, California
20,155	Yogesh M. Mehta Brown & Root U.S.A., Inc. Houston, Texas
20,156	Edward Mudd, Jr. Birmingham, Alabama
25,538	Josephine S. Cooper American Forest & Paper Association Washington, DC

TABLE 1-2. LIST OF COMMENTERS ON MARCH 8, 1997 SUPPLEMENTAL NOTICE

Item number in Docket A-92-40	Commenter and affiliation
IV-D2-2	Keith M. Bentley Georgia Pacific Savannah, Georgia
IV-D2-3	Duane W. Marshall Union Camp Atlanta, Georgia
IV-D2-4	Donald F. Theiler STAPPA/ALAPCO Washington, DC
IV-D2-5	William O. Dameworth Pope & Talbot Halsey, Oregon
IV-D2-6	Robert J. Sistko Rayonier Shelton, Washington
IV-D2-7	Gregory J. Hollod Riverwood International Atlanta, Georgia
IV-D2-8	Kathleen M. Bennett James River Corporation Richmond, Virginia
IV-D2-9	K.E. Lewis Proctor & Gamble Cincinnati, Ohio
IV-D2-10	Dan Pearson Texas Natural Resource Defense Council Austin, Texas
IV-D2-11	Thomas C. Jorling International Paper Purchase, New York
IV-D2-12	Phillip J. Arthur Finch Pruyn & Co., Inc. Glen Falls, New York

TABLE l-2. LIST OF COMMENTERS ON MARCH 8, 1997
SUPPLEMENTAL NOTICE (Continued)

Item number in Docket A-92-40	Commenter and affiliation
IV-D2-13	Josephine Cooper American Forest and Paper Association Washington, DC
IV-D2-14	Sara S. Kendall Weyerhaeuser Tacoma, Washington
IV-D2-15	Robert C. Kaufmann American Forest and Paper Association Washington, DC
IV-D2-16	Richard C. Abrams Kimberly-Clark Everett, Washington
IV-D2-17	Dana B. Dolloff Rayonier Stamford, Connecticut
IV-D2-18	R.E. Cannon Buckeye Florida Perry, Florida
IV-D2-19	Larry Tenth Chemitics Vancouver, British Columbia, Canada
IV-D2-20	Duane W. Marshall Union Camp Savannah, Georgia

TABLE 1-3. LIST OF COMMENTERS ON MACT III SOURCES[a]

Item number in Docket A-95-31	Commenter and affiliation
IV-D-1	K.E. Lewis The Proctor & Gamble Company Cincinnati, Ohio
IV-D-2	J. Grumet and W. Cass Northeast States for Coordinated Air Use Management Boston, Massachusetts
IV-D-3	R.H. Colby and D.F. Theiler State and Territorial Air Pollution Programs Administrators/Association of Local Air Pollution Control Officials Washington, DC
IV-D-4	K.M. Bennet James River Corporation Richmond, Virginia
IV-D-5	G.J. Hollod Riverwood International Atlanta, Georgia
IV-D-6	J. Brooks State of Maine Augusta, Maine
IV-D-7	J.S. Cooper American Forest & Paper Association Washington, DC
IV-D-8	R.C. Kaufmann American Forest & Paper Association Washington, DC
IV-D-9	R.E. Cannon Buckeye Cellulose Corporation Memphis, Tennessee
IV-D-10	T. Mattson Environmental Technology - Air Fort Howard Green Bay, Wisconsin

TABLE 1-3. LIST OF COMMENTERS ON MACT III SOURCES[a]
(Continued)

Item number in Docket A-95-31	Commenter and affiliation
IV-D-11	C. Ackel Stone Container Corp. Tucker, Georgia
IV-D-12	S.S. Kendall Weyerhauser Corp. Taucoma, Washington
IV-D-13	R.A. Ellis, J.H. Lewis, R.J. Hampson, L.J. Barry (et al.), P.J. Luciano, W.J. Schulz, L. Gill, and R.J. Ellithorpe. Letters to Elaine Manning (OAQPS/EPA)

[a]MACT III sources include papermaking systems, mechanical pulping mills, secondary fiber pulping mills, and non-wood mills.

specifying the control requirements for (1) greenfield sites, (2) the addition of new equipment at existing sources, and (3) changes to existing equipment that could trigger reconstruction. By designating the exact equipment to be controlled at new and existing sources, the rule reduces confusion and misinterpretation over what actions trigger new source requirements. This approach preserves the advantages of a broad source definition for compliance by existing sources while ensuring that new and reconstructed equipment are regulated as new sources consistent with Section 112(a) and 112(d) of the Clean Air Act (Act).

The final rule also provides for an alternative definition of source for use with the clean condensate alternative (CCA). For mills using the CCA (see section 1.4.4.2) to comply with the standards, the broad definition includes all the pulping, bleaching, causticizing, and paper making systems. These additions were made to the definition of affected source to encourage pollution prevention since the paper making and causticizing systems typically receive recycled or reused condensates.

1.4.2 Subcategories

In the proposed rule, no distinction was made between the different types of pulping processes. The standards for control of hazardous air pollutant (HAP) emissions from vents and wastewater sources (i.e., pulping process condensates) were the same for kraft, semi-chemical, soda, and sulfite pulping processes. After evaluating public comments and data received following proposal, EPA established separate subcategories for kraft, semi-chemical, soda, and sulfite pulping processes due to differences in process emissions and applicable control techniques. As in the proposed rule, the final standards for kraft, semi-chemical, and soda pulping processes in the final rule are based on combustion. For sulfite pulping processes, the final rule is based on absorption technologies.

1.4.3 Control Applicabilitv Determination

The proposed rule prescribed applicability cutoff values (i.e., volumetric flow rate and mass flow rate) as a way to specify the vent and condensate streams that would be required to meet the rule. Since proposal, the pulp and paper industry submitted additional data that allowed EPA to better characterize the vent and condensate streams that should be controlled.

In the final rule, the applicability cutoff values contained in the December 17, 1993 proposed rule have been replaced in favor of specifically naming the vent and condensate streams that would be required to meet the rule for each subcategory, with the exception of decker, knotter, and screen systems at kraft pulping mills. For these systems, the rule specifies applicability cutoffs in the form of emission limits (knotter and screen systems) and HAP concentration in process condensates (decker systems) to identify the systems that should be controlled at new and existing mills.

The different approach used in the final rule does not significantly change the stringency or scope of the December 17, 1993 proposed rule. The emission points and condensate streams that are being controlled in the final rule are fundamentally the same emission sources that EPA intended to be controlled in the December 17, 1993 proposed rule. The revised approach is easier and less costly to implement, for both the affected industry and the enforcement officials, since extensive emission source testing is not required to identify the vent and condensate streams to be controlled.

1.4.4 Kraft Standards

1.4.4.1 Applicabilitv for Existinq Pulping Kraft Sources. In the December 17, 1993 proposal all pulping vent emission points were, with some exceptions, required to be enclosed and vented to a closed-vent system and routed to a control device that achieves 98 percent destruction. The exceptions were for deckers and screens at existing mills and small vents below specified volumetric and mass flow rates. Pulping wastewater streams with HAP concentrations below 500 parts per million by weight (ppmw) and flow rates below 1.0 liter per minute did not require control.

In the final rule, specific vent and condensate streams are required to be controlled. For existing sources, the vent emission sources include: the low volume, high concentration collection (LVHC) system, pulp washing system, decker system, oxygen delignification system, knotter system, and screening system. The EPA based its decisions to require these systems to be controlled on information presented in responses to industry surveys used to characterize controls that are installed at existing mills and in comments to the proposed rule.

Based on analysis of additional information provided by industry, the final rule does not require the control of existing weak black liquor storage tanks or control of decker systems that use clean water or process water from papermaking systems ("white water"). These types of process water are defined as streams with HAP concentrations less than or equal to 400 ppmw.

Also, in the final rule, existing sources are required to control knotters with mass emission rates greater than 0.1 pounds of HAP per oven dried ton of production (lb/ODTP)(0.05 kilograms per megagram), screens with mass emission rates greater than 0.2 lb/ODTP (0.10 kilograms per megagram), or combined knotter and screen systems with emissions greater than 0.3 lb/ODTP (0.15 kilograms per megagram). New sources are required to control all decker, knotter, and screen systems and weak black liquor storage tanks.

Condensate Segregation. The proposed standards for process wastewater required that all pulping wastewaters that met the applicability criteria had to be treated by one of several specified control options. Comments and data submitted to EPA indicated that kraft mills typically steam strip the condensates from the digester, turpentine recovery, LVHC, and high volume, low concentration collection (HVLC) system, and certain evaporator system condensates. The data also indicated that mills that use steam strippers also practice varying degrees of condensate segregation in order to reduce treatment costs by minimizing the flow rate and maximizing the methanol mass of streams sent to treatment.

To allow this cost saving option, the final rule requires that the entire volume of condensate generated from the named pulping process equipment must be treated unless the condensates from the digester system, turpentine recovery system, and the weak liquor feed stages in the evaporator system are segregated. If these condensates are adequately segregated, only the high-HAP fraction stream from these systems, along with the condensates from the LVHC and HVLC collection systems, must be sent to treatment.

The final rule contains two options for demonstrating compliance with the segregation requirements. The first option is to isolate 65 percent of the total HAP mass that was present in the specified system condensate streams prior to segregation. The second option specifies that a minimum HAP mass from the digester, turpentine recovery, evaporator, LVHC collection, and HVLC collection systems be sent to treatment.

1.4.4.2 Clean Condensate Alternative. The December 17, 1993 proposed rule did not contain any provisions for emissions averaging. Industry comments on the proposal indicated support for incorporating an emission averaging approach in the final rule. After the public comment period, industry submitted a report comparing the emission reductions that could be achieved using the option developed by industry and emission reductions that could be achieved using the proposed MACT standards. Specifically, the industry option is based on comparing the HAP emission reductions achieved by implementing the alternative technology with the baseline HAP emission reductions that would have been achieved by implementing the MACT standards. The industry option formed the basis for what is referred to as the CCA in the final rule.

The CCA is an option for compliance with kraft pulping standards for the HVLC system. As an alternative to combustion of HVLC vent emissions, a mill may reduce the HAP concentration in process water that is used in the HVLC process equipment and in other areas throughout the mill, such as the paper making and causticizing systems. By reducing the HAP loading in the process water, less HAP will be available to be emitted to the atmosphere. The final rule specifies that the determination of the baseline HAP emission reductions and the reductions achieved by the alternative strategy must be determined by emissions testing data.

1.4.4.3 Biological Treatment. At proposal, one of the compliance options for process wastewaters was to destroy at least 90 percent HAP by weight by hard piping the process wastewater streams to biological treatment. For the performance test, owners or operators were required to measure inlet and outlet methanol concentrations using Method 305, and determine the mass flow rate of total HAP or methanol entering the biological treatment system. The biological treatment system's destruction efficiency was determined by dividing the difference of the outlet and inlet mass flow rates by the inlet mass flow rate and multiplying by the fraction of methanol removed in the biological treatment system. The site-specific fraction of methanol removed in the biological treatment system was determined using EPA's WATER7 model.

The continuous monitoring requirements specified that total HAP or methanol concentration be measured at the inlet and outlet of the biological treatment system every 30 days. Additionally, the standard required monitoring of appropriate operating parameters as specified in the operating permit and demonstrated to the Administrator's satisfaction.

In the final rule, biological treatment systems may still be used to comply with the pulping process condensate standards, however, the monitoring procedures have been revised. In the final rule, mills using a biological treatment system to treat pulping process condensates must monitor, on a daily basis, samples of outlet soluble biochemical oxygen demand 5-day test (BOD_5) concentration (maximum daily and monthly averages), inlet liquid flow, mixed liquor volatile suspended solids, liquid temperature, and the horsepower of aerator units. Additionally, inlet and outlet grab samples from each biological treatment system unit must be collected and stored for 5 days. These samples must be collected and retained since some of the monitoring parameters (e.g., soluble BOD_5) can not be determined within a short period of time. These samples are to be used in conjunction with the WATER8 emissions model to demonstrate compliance if any of the monitoring parameters (except the liquid temperature and inlet flow) fall outside the range established during the initial performance test. Additionally, quarterly percent reduction tests must be performed using the WATER8 model and site-specific inputs. The first quarter test must be performed for total HAP while the remaining quarterly tests may be performed for methanol only.

1.4.5 Sulfite Standards

At proposal, all pulping vent streams from sulfite processes were required to be enclosed and routed to a control device achieving 98 percent reduction in emissions. In the March 8, 1996 supplemental notice, the Agency discussed in detail its determination that the sulfite standards should be based on absorption technology and apply to the total emissions from specific vents and any wastewater emissions associated with HAP emission control devices. The specific vents are associated with the digester, evaporator, and pulp washing systems.

Several commenters objected that the proposed emission limits were not appropriate because they were based on limited data that did not reflect the variability of emission from sulfite pulping processes. The commenters provided the Agency with emissions test data that illustrated fluctuations in the methanol mass emissions over an extended time period due to variations in products and process conditions.

The Agency evaluated the information provided by the commenters and subsequently agreed with the commenters regarding process variability at sulfite mills. For sodium- and calcium-based sulfite pulping processes, the final emission limit is 0.89 lb/ODTP. For ammonium- and magnesium-based sulfite pulping processes, the final emission limit is 2.2 lb/ODTP. Because the emission limits were statistically derived to reflect process variability, these emission limits and corresponding monitoring parameters are never-to-be-exceeded values.

1.4.6 Soda and Semi-Chemical Mill Standards

The proposed standards required the owners or operators of new or existing semi-chemical and soda mills to comply with the same pulping standards as kraft mills. As a consequence of subcategorizing the pulp and paper industry by pulping type, different MACT control requirements were developed for soda and semi-chemical mills. The final rule requires existing soda and semi-chemical mills to control the digester and evaporator systems (LVHC system). New soda and semi-chemical mills are required to control the LVHC and the pulp washing systems.

1.4.7 Bleaching System Standards

In the December 17, 1993 proposed rule, all HAP emissions from bleach plants were required to be reduced by 99 percent using a caustic scrubber. The Agency proposed to control chlorinated HAP emissions only, using chlorine as a surrogate for chlorinated HAP. As an alternative to the percent reduction standard, the Agency proposed a 10 parts per million by volume (ppmv) HAP caustic scrubber outlet concentration (measured as chlorine). The Agency also proposed that chloroform emissions be controlled by using 100 percent chlorine dioxide (ClO_2) substitution and eliminating hypochlorite use or by complying with the requirements of the Effluent Limitation Guidelines and Standards of the Clean Water Act (CWA). In addition, the Agency proposed different control requirements for paper-grade and dissolving-grade bleaching systems. The Agency also solicited comments on providing a mass emission limit alternative to the percent reduction and the outlet concentration standards.

The final rule continues to require chlorinated HAP emissions (not including chloroform) to be reduced by 99 percent (based on caustic scrubbing). As an alternative, bleach plants can achieve an outlet concentration limit of 10 ppmv total chlorinated HAP or a mass emission limit of 0.001 kg of total chlorinated HAP (not including chloroform) per Mg ODP produced (0.002 lb/ODTP) (not including chloroform) for the following bleaching systems: systems that use chlorine; systems at kraft, sulfite, or soda pulping processes that use any chlorinated compounds; and systems that use ClO_2 to bleach pulp from mechanical wood pulping processes or from any process using secondary or non-wood fibers. A bleaching system that does not use any chlorine or chlorinated compounds is exempt from controls. The mill may use chlorine as a surrogate for chlorinated HAP other than chloroform.

All bleaching systems are also required to control chloroform emissions by using 100 percent ClO_2 substitution and eliminating hypochlorite use or by complying with the effluent limitation guidelines and standards. For dissolving-grade bleaching systems, the effective date of compliance with all the bleaching standards has been stayed until the effluent limitation guidelines and standards for dissolving-grade mills are promulgated.

1.4.8 Compliance Schedule

In the December 17, 1993 proposed rule, the compliance schedule for all pulping and bleaching processes was 3 years. The final rule allows a total of 8 years to comply with the HVLC vent standards at kraft pulp mills. Since the industry will be implementing both water and air rules essentially at the same time, the extended compliance schedule was adopted to allow the necessary time to fully consider all pollution control options including pollution prevention. Given the engineering requirements, permitting requirements, and resources necessary to implement the standards, the Agency decided that additional compliance time for kraft HVLC sources is appropriate. The 3-year compliance schedule is retained for semi-chemical, sulfite, and soda pulping processes the LVHC kraft pulping vent standards, and bleaching systems at paper-grade mills. Standards for the pulping process condensates apply to streams that are typically not recycled or reused in the pulping process without prior treatment. Therefore, the Agency did not consider it necessary to extend the additional compliance time to pulping wastewater streams. Dissolving-grade mills are required to comply with the bleaching system standards no later than 3 years after promulgation of the effluent limitation guidelines and standards for dissolving-grade mills under 40 CFR 430, subpart D.

In addition, the final rule sets out a two-phased standard for paper-grade bleach plants at a limited number of mills which elect to control wastewater discharges to levels surpassing the Advanced Technology Incentives Program in the effluent limitation guidelines and standards portion of the final rule. The first phase for existing source MACT requires no increase in the existing HAP emission levels from the paper-grade bleaching system (i.e., no backsliding) during the interim period when the mill is working toward meeting their advanced technology (Best available technology (under the Effluent Limitation Guidelines and Standards of the Clean Water Act) (BAT) requirements. The effective date of the first phase requirements is 60 days from the date of publication in the Federal Register of the final rule. The second phase requires compliance with revised MACT based on baseline BAT requirements for all parameters, or 100 percent ClO_2 substitution and elimination of hypochlorite, for bleached paper-grade kraft and soda mills. The compliance date of the second phase of existing source MACT would be 6 years after publication of the standards in the Federal Register.

The final rule also includes requirements for kraft mills to submit a non-binding control strategy report along with the initial notification. The purpose of the control strategy report is to provide the Agency and the permitting authority with a means for measuring a mill's progress towards compliance. The control strategy report contains information such as a description of the emission controls or process modifications selected for compliance with the control requirements and compliance schedule. The information in the control strategy report must be revised or updated every two years until the mill is in compliance with the standards of § 63.443.

1.4.9 Test Methods

At proposal, the Agency required that Methods 308 and 26A be used to test for compliance with the provisions of the rule. Method 308 is used to measure methanol in vent streams. Method 26A is used to measure chlorine in vent streams. Method 305 is used to measure methanol in wastewater streams.

Since proposal, Method 308 has been validated using Method 301 validation criteria. Method 308 has also been revised to incorporate the technical comments received after proposal. The Agency evaluated the commenter's claims regarding the appropriateness of Method 26A and agrees that ClO_2 is a potential interferant to the method. In the final rule the Agency decided to incorporate modifications to Method 26A, based on the industry chlorine test method.

In March of 1997, industry communicated to EPA that Method 305 was not used by National Council of the Paper Industry for Air and Stream Improvement (NCASI) to obtain the data used to evaluate steam stripper system performance. Consequently, industry asserted that Method 305 should not be specified in the final rule for determining compliance with the pulping process condensate standards. However, the method originally used by NCASI has not been validated using the Method 301 procedures.

The Agency has considered the industry argument and has decided to proceed with specifying Method 305 in the final rule. However, EPA may amend the rule with a supplemental Federal Register notice to allow this method to be used as either an alternative or a replacement for Method 305 pending satisfactory completion of the Method 301 validation procedures.

1.4.10 Control Device Downtime

At proposal, emission limits were required to be met at all times, except during startup, shutdown, or malfunction. No allowance for control devices or collection system downtime was specified in the rule.

The EPA re-evaluated the need to incorporate downtime or excess emissions allowances for LVHC, HVLC, and steam stripper systems. Based on the information collected in the 1992 voluntary MACT survey (A-92-40, IV-B-8) EPA has concluded that 100 percent compliance is not achievable at a well-designed and operated system in this industry. The data indicate that some allowance for excess emissions is part of the MACT floor level of control. In the final rule, EPA established excess emissions allowances to approximate the level of downtime and number of backup control devices that exist at the best-performing mills. The excess emissions allowances are designed to account for periods when the control device is inoperable and when the operating parameter values established during the initial performance test cannot be maintained due to problems with the process.

The excess emissions allowance for LVHC system control devices is 1 percent of the operating hours on a quarterly basis. For the HVLC system control devices or for control devices that reduce both LVHC and HVLC system vent gases, the excess emissions allowance is 4 percent. For LVHC and HVLC systems, the excess emissions allowances do not include scheduled maintenance activities malfunctions, startups, and shutdowns. Malfunctions, startups, and shutdowns must comply with the part 63 general provisions.

The excess emissions allowance for steam stripper systems is 10 percent. This downtime allowance includes all periods when the stripper systems are inoperable including scheduled maintenance.

1.4.11 Equipment Enclosures, Closed-Vent Svstems, and Control Equipment

1.4.11.1 Requirements for Closed-Vent Systems. At proposal, the Agency required specific standards and monitoring requirements for closed-vent systems. The standards required: (1) maintaining a negative pressure at each opening, (2) ensuring enclosure openings that were closed during the performance test be closed during normal operation, (3) designing and operating closed-vent systems to have no detectable leaks, (4) installing flow indicators for bypass lines, and (5) securing bypass line valves. Monitoring requirements included visually inspecting seal/closure mechanisms and closed-vent systems and demonstrating no detectable leaks in the closed-vent system.

The Agency evaluated comments on these provisions and made several changes to the closed-vent system requirements. The Agency agreed with the commenters that most closed-vent systems will be under negative pressure. Any leaks, therefore, would pull air into the collection system rather than release HAP's to the atmosphere. Therefore, the Agency revised the requirement for demonstration of negative pressure and no detectable emissions to apply only to enclosures/hoods and portions of the closed-vent system operated under positive pressure. The Agency also agreed that requiring a lock and key type seal on bypass lines would be burdensome and could potentially pose a safety hazard. The intention of the requirements was to prevent circumvention of the control device by venting directly to the atmosphere. The Agency believes that this assurance can be achieved using car-seals or seals that could easily be broken, to indicate when a valve has been turned. The Agency revised the bypass line requirements to allow the use of car-seals but require log entries recording valve position, flow rate, and other parameters. The Agency has modified the enclosure requirements to allow for short-term openings for pulp sampling and maintenance.

The final rule retains the visual monitoring requirements. These requirements can be conducted at a reasonable cost and are necessary to ensure proper operation of collection systems.

1.4.11.2 Concentration Limit for Combustion Devices and Design Incinerator Operating Parameters. At proposal, the rule required vent streams to be controlled in a combustion device that achieves 98 percent reduction of HAP's or a thermal oxidizer that achieves an outlet HAP emission concentration of 20 ppmv corrected to 3 percent oxygen. Alternatively, mills could comply with the control requirements by routing vent streams to a design incinerator operating at 1,600 ^{O}F with a residence time of 0.75 seconds or to a boiler, lime kiln, or recovery furnace. In the final rule, EPA maintained the design incinerator operating requirements.

The EPA re-evaluated the 3 percent correction factor in order to ensure that it is appropriate for the pulp and paper industry. Based on industry data and thermodynamic models, EPA decided to revise the oxygen correction factor to 10 percent in the final rule. Therefore, the final rule allows thermal oxidizers to be in compliance if they reduce HAP concentrations to 20 ppmv corrected to 10 percent oxygen.

1.4.12 Interaction With The Resource Conservation and Recovery Act (RCRA)

Following proposal, industry presented an approach for recovering the energy contained in steam stripper condensates. The condensates exhibit characteristics that would lead to its classification as a hazardous waste under the Resource Conservation and Recovery Act (RCRA).

After review of the characteristics of the condensate, the Agency concluded that no additional control under RCRA is warranted since combustion of these condensates will not increase environmental risk, would reduce secondary impacts, and would provide a cost savings. Therefore, the final rule contains a direct final notice that amends RCRA to allow the on-site combustion of condensates derived from steam stripping systems used to comply with the pulping process condensate standards.

1.5 SUMMARY OF IMPACT OF FINAL STANDARDS

This section summarizes the emissions, energy, cost, and economic impacts for the final NESHAP.

1.5.1 Emission Impacts

This NESHAP will reduce nationwide emissions of HAP from pulp and paper mills by 139,000 Mg/yr (154,000 tpy), which represents a 67 percent reduction by 2005 compared to the emissions that would result in the absence of standards. Emissions of volatile organic compounds (VOC) will be reduced by 409,000 Mg/yr (450,000 tpy), which represents a 49 percent reduction by 2005 compared to emissions that would result in the absence of standards. Emissions of total reduced sulfur (TRS) compounds will be reduced by 78,500 Mg/yr (86,500 tpy), which represents a 54 percent reduction by 2005 compared to the emissions that would result in the absence of the standards.

1.5.2 Energy Impacts

The national energy usage required to comply with the NESHAP is expected to increase by 33 x 10^{12} British thermal units (Btu's) per year. The additional energy includes electricity required to power fans and blowers to transport vent streams to an emission control device, additional steam required for steam stripping of pulping condensates, and auxiliary fuel required for incineration of pulping area vent streams.

1.5.3 Secondary Environmental Impacts

Secondary environmental impacts of the NESHAP include increased emissions of carbon monoxide (CO), nitrogen oxide (NO_X), sulfur dioxide (SO_2), and particulate matter (PM). Secondary impacts are generated from combustion of fuel used to power pollution control equipment and as a by-product of the destruction of HAP's in combustion devices. Sulfur dioxide emissions are expected to increase by approximately 94,500 Mg annually. Sulfur dioxide emissions are generated primarily from the combustion of sulfur-containing compounds (such as TRS) in the vent streams at kraft mills. The CO emissions are expected to increase by approximately 8,660 Mg annually. The NO_X emissions are expected to increase by approximately 5,230 Mg annually. The PM emissions are expected to increase by approximately 83 Mg annually.

1.5.4 Cost Impacts

The implementation of this NESHAP is expected to result in an annualized national cost of $130 million/year. This estimate includes a cost of $123 million/year for air pollution control devices and operational changes, and a monitoring, recordkeeping, and reporting cost of $7 million/year. Table l-4 presents the national control cost impacts for the NESHAP at mills that pulp wood using the kraft, semi-chemical, soda and sulfite processes. No significant costs from mills that mechanically pulp wood, pulp secondary fibers or non-wood are anticipated.

1.5.5 Economic Impacts and Benefits

Utilizing the estimated annualized cost of this NESHAP, an evaluation of the economic impacts and distributional effects to the pulp and paper industry is performed. The final rule when evaluated independently of other regulatory requirements for air and water pollution, is not expected to have a substantial impact on the industry. Estimated price increases are less than 0.5 percent for bleached paper-grade kraft and sulfite, dissolving-grade kraft and sulfite, and semi-chemical pulp and paper products, while unbleached kraft pulp is estimated to have a price increase of almost 5 percent. The costs imposed on affected facilities do not result in any mill or firm closures, thus, the rule assessed individually is not expected to alter employment, shipments, or exports for the industry by appreciable amounts.

Implementation of the final rule is expected to reduce emissions of HAP's, VOC, and TRS, but increase emissions of PM, SO_2, CO, and NO_x. The benefits (damages) that accrue as a result of the standard result from changes in human health effects

TABLE l-4. NATIONAL COST IMPACTS FOR NESHAP[a]

Cost category	Total capital investment (million $)	Total annualized cost[b] (million $/yr)
Control Equipment Costs		
Kraft	452	117
Sulfite	23	5
Semi-chemical	11	1
Soda	2	0.2
Recordkeeping and Reporting Costs	8	7
Total	496	130

[a]Impacts are for controlling air emissions after the CWA effluent guidelines are implemented.

[b]Amortized capital costs plus operation and maintenance costs.

associated with inhalation of the above pollutants, as well as, changes in welfare effects, such as: visibility and crop yields, materials soiling and corrosion. The EPA is not able to place a monetary value on all of the benefits achieved by the rule. Values are obtained for changes in VOC, PM, and SO_2 emissions only. Total benefits for these pollutants range in value from ($1,040) million to $1,054 million for the NESHAP, and ($727) million to $1,493 million for the entire cluster rule.

2.0 INDUSTRY CHARACTERIZATION

2.1 ADEQUACY OF DATA FOR STANDARDS DEVELOPMENT

Comment: One commenter (20,059) contended that the data base was unrepresentative of actual control levels because it did not take into account best available control technology (BACT) or lowest achievable emission rate (LAER) determinations. The commenter (20,059) asserted that the Act requires EPA to include all BACT determinations and all but the most recent LAER determinations in determining the floor levels of control for MACT standards. The commenter (20,059) asserted that Congress intended for EPA to gather actual emissions data from a sample likely to represent the top performers in order to determine the floor level of control, and that a data gathering program must be sufficient to ensure that EPA does not miss any sources that have superior levels of emissions control. The commenter (20,059) contended that EPA claimed to have reviewed BACT and LAER in the BID (A-92-40, II-A-35) but had not provided any data or analyses in the BID. Therefore, the commenter (20,059) concluded that EPA had not collected or evaluated the data needed to identify the average emission limitation achieved by the best-performing 12 percent of sources as required by the statute.

Response: BACT is the level of control required in attainment areas undergoing Prevention of Significant

Deterioration (PSD) review. LAER is the control level required in nonattainment areas undergoing New Source Review. Both are determined on a case-by-case basis. In establishing the MACT level of control, EPA evaluated existing controls at all mills, including the BACT/LAER controls in place as a result of PSD/NSR review (although in some circumstances, EPA may not consider LAER level of control to be MACT; see Act section 112(d)(3)(A)). The BACT and LAER determinations are accounted for in the control devices that were reported in the MACT survey responses. These controls were used to calculate the baseline emissions and baseline level of control.

2.2 EMISSION FACTORS

2.2.1 Data and Approach Used

Comment: Several commenters on the proposed rule (20,011, 20,043, 20,054, 20,056, 20,071, 20,102, 20,103, 20,115) expressed concerns over the use of general models and liquid-based emission factors for a mill-wide characterization because: (1) it was unreasonable and insupportable to base decisions in the rulemaking on emission factors for vent streams developed from models and from liquid stream concentrations, and (2) actual measured data should have been used to develop the emission factors.

Two commenters (20,011, 20,027) asserted that EPA models did not have the capability to accurately predict emissions. One of the commenters (20,027) asserted that: (1) the emission factors used in the model process units were based on several assumptions for which they could find no scientific or technical basis (the commenter provided several examples of erroneous assumptions), (2) the models for estimating air emissions from HAP concentrations tested in process wastewater incorrectly assumed that equilibrium was reached between the water and air components, and (3) they were not aware of data pertaining to liquid-phase HAP concentrations entering or exiting bleach plant equipment that would be sufficient for developing reliable air emission rates for standards development.

Two commenters (20,102, 20,129) recommended that EPA develop more specific emission factors for various emissions from the pulping area. One of the commenters (20,129) indicated that EPA should summarize the air emission data from NCASI Technical Bulletin No. 650 into emission factors dealing with the MACT regulation and for Compilation of Air Pollutant Emission Factors, 5th edition, Volume 1: Stationary Point and Area Sources (AP-42) emission inventory purposes. After reviewing the industry data, one commenter (20,054A2) pointed out that there appear to be differences in various process emissions, which if properly understood, may provide options for less expensive controls.

One commenter (20,071) concluded that the approach that EPA used to characterize the HAP emissions of over 160 diverse chemical pulping mills (including bleached kraft, unbleached kraft, sulfite, and semi-chemical processes) was inadequate for a regulation with such significant financial impact on the industry. The commenter (20,071) stated that EPA should not have relied on limited data and the extrapolation of these data through mathematical models to develop emission factors.

Response: At proposal, EPA developed emission factors for each type of individual emission point typically found at pulp and paper mills. The emission factors were developed from measured air emissions at process vents and from air emissions estimates extricated from liquid stream data, assuming equilibrium conditions. This information was the best data available to EPA.

Based on test data received after proposal, EPA changed the approach from individual emission point factors to emission factors based on mill systems. Availability of these data was announced in the Federal Register on February 22, 1995 and proposed changes to emission factors were announced in the March 8, 1996 Federal Register supplemental notice.

The EPA concluded that the system approach is the best approach because it provides a more objective comparison of mills and lessens the problems associated with the nomenclature assigned to individual process components. The EPA believes that the revised system emission factors provide the best data to characterize emissions from the pulp and paper industry.

The EPA concluded that the liquid-based model used at proposal provided an adequate estimate of emissions when compared to the actual test data. However, the system emission factors used in the final rule were not based on the liquid-based equilibrium models, but on actual data received from industry after proposal. Since most of the standards in the final rule remain at the MACT floor level, the significance of emission factors is somewhat reduced.

Comment: One commenter (20,122) expressed concern about the chloroform releases that occur even with ClO_2 substitution. To support their concern, the commenter (20,122) reported an estimated chloroform emission factor of 0.22 tons per 1,000 tons of pulp for market bleached kraft mills using ClO_2 substitution.

Response: Emission information submitted to EPA from several facilities provides an emission factor of 0.39 lb chloroform per oven-dried ton of pulp (ODTP) for bleaching systems operating with 100 percent ClO_2 substitution and a hypochlorite bleaching stage. This emission factor reduces to 0.012 lb of chloroform per ODTP for bleaching systems operating with 100 percent ClO_2 substitution and no hypochlorite bleaching stage. The emission factor submitted by the commenter (20,122) for chloroform of 0.22 tons of chloroform per 1,000 tons of pulp converts to 0.44 lb of chloroform per ton of pulp, which is comparable to the emission factor of 0.39 lb chloroform per ODTP for bleaching systems operating with 100 percent ClO_2 substitution and a hypochlorite bleaching stage.

The MACT floor level of control at bleaching systems is caustic scrubbing and process modifications (100 percent substitution and no hypochlorite use). The effluent limitation guidelines and standards requirements for paper-grade bleaching are also 100 percent substitution of ClO_2 and no hypochlorite (EPA is evaluating requirements for dissolving-grade bleach mills). The EPA considers the effluent limitation guidelines and standards requirements to be at least as stringent as the floor-level process modifications. Therefore, the final rule requires compliance with the effluent limitation guidelines and standards requirements to control chloroform in the bleaching system or certification that no hypochlorite or chlorine is used for bleaching. This requirement will significantly reduce chloroform emissions from bleaching systems because chloroform emissions are related to using hypochlorite as a bleaching agent.

2.2.2 Emission Factor Document

Comment: After evaluating the draft Chemical Pulping Emission Factor Development Document (A-92-40, IV-A-6), one commenter (IV-Dl-102) provided suggestions and comment on the development of emission factors. In particular, the commenter disagreed with the HAP ratio procedure used. The commenter (IV-Dl-102) perceived two flaws with the approach: (1) EPA ignored results where a compound was tested but the results were below the detection limit, and (2) EPA assumed, in the absence of data, that the ratios between specific HAP compounds and methanol were constant for a given type of source (e.g., brownstock washers or weak black liquor tanks).

Response: Generally, the scope of the emissions tests were limited to a select group of compounds. In the draft emission factor document, the method used to estimate emission factors was based on the assumption that the ratio of a compound's concentration in a vent to the concentration of methanol in the same vent is similar to the ratio in vents of similar systems. Based on industry comments, the data were re-evaluated and a system-unit approach to estimating emission factors was adopted in place of the previous HAP-ratio approach.

The system-unit approach consists of sorting the data for each HAP species into the same mill-system groupings used to develop the methanol emission factor, as described in the revised Chemical Pulping Emission Factor Development Document (A-92-40, IV-A-8). Where sufficient data to characterize a HAP compound by mill system were not available, the unit approach was used for that compound. In the unit approach, equipment-specific emission factors were developed. Then, mill system equivalent emission factors were generated for these compounds by assuming that mill systems are typically made up of certain equipment configurations (e.g., the typical pulp washing system consists of three washer hood vents and one filtrate tank vent).

The system-unit approach accounted for results below the detection limit. For compounds for which a detection limit was reported, one half of the detection limit was used. If no detection limit was recorded in the test report, that test was not used. The EPA believes that the system-unit approach to analyzing the industry test data provides an accurate characterization of emissions by incorporating results below the detection limit and avoiding assumptions of constant ratios across different sources.

Comment: One commenter (IV-Dl-102) disagreed with EPA's contention in the draft emission factor document (A-92-40, IV-A-6) that the summary of results presented in the NCASI Technical Bulletin No. 701 (IV-J-31) fall within the ranges developed in the draft emission factor document and will not significantly alter the results. The commenter (IV-Dl-102) agreed that the methanol results would not be significantly different but argued that the summary of HAP emissions would need to be revised upon incorporating the Technical Bulletin No. 701 data.

Response: The data presented in NCASI Technical Bulletin No. 701 are a summary of the same data that EPA used to revise the emission factors; they are not new or separate test data. The EPA agrees that the methanol emissions would not be significantly different by including of the NCASI Technical Bulletin No. 701 data. The EPA also agrees that the approach to determining total HAP used in NCASI Technical Bulletin No. 701 would result in significantly lower total HAP emissions for the mill systems. The approach used to develop speciated HAP emission factors for the final rule has been revised and is more consistent with the results in the Technical Bulletin No. 701 summary. (See previous discussion regarding the mill system-unit approach.)

Comment: One commenter (IV-Dl-102) noted two problems with the appropriateness of the model plant approach: the lack of neutralization units in some models, and the lack of a diffused aeration model plant. The commenter (IV-Dl-102) also questioned the number of mills assigned to the model plants.

Response: Because neutralization occurs in units besides strict "neutralization basins," EPA does not believe that the absence of explicit neutralization units in some models is inconsistent with the models having neutralization units. Also, the available data do not support creating a diffused aeration model or making changes to the mill assignments. Since no new data were provided, EPA maintains that the model plants and mill assignments used are an accurate representation of the industry.

Comment: One commenter (IV-Dl-102) disagreed with three aspects of the WATER8 modules: the model plant B settling pond, the assumption that in the model plant C that neutralization occurs in stabilization basins following the clarifier, and the model plant D non-aerated basin. The commenter (IV-Dl-102) expressed concern over the length of settling basin residence time in model plant B. The commenter (IV-Dl-102) also objected to having neutralization follow the model plant C clarifier and to having the model plant D polishing basin as non-aerated.

Response: The residence time for the model plant B settling basin is based on a settling pond at one kraft paper mill. The WATER8 outputs for that mill (based on the assumed residence time) agree with the test data.

In model plant C, no neutralization was assumed to occur in the basins following the clarifier. Neutralization was assumed to occur between the bar screen and the clarifier.

The non-aerated basin in model plant D was determined to be improperly labeled as aerated. The current basin is a composite of the ten model plant D mills with non-aerated systems and the 11 mills with aerated systems. The EPA does not believe that revising the WATER8 inputs would yield a significant change, but the labels and documentation of the approach have been updated.

Comment: Eight specific WATER8 input parameters (e.g., concentrations, temperatures) were rated by one commenter (IV-Dl-102) as inconsistent, inaccurate, or unreasonable.

Response: The EPA evaluated the commenter's concerns and data characterizing the industry. The results of the evaluation show that the parameters used in the WATER8 model accurately reflect the industry based on comparison with industry data. Based on EPA's analysis of the commenter's concerns and suggestions, EPA maintains that only minor changes would result from altering the input parameters as suggested by the commenter (A-92-40, IV-B-101).

Comment: One commenter (IV-Dl-102) asserted that the WATER8 primary clarifier module overestimates emissions.

Response: Validation of the WATER8 primary clarifier module is documented in a memorandum included in the revised emission factor document (A-92-40, IV-A-8). The EPA maintains that the WATER8 primary clarifier module adequately estimates emissions.

Comment: One commenter (IV-Dl-102) supplied WATER8 outputs using modified input parameters, and suggested updating the emission factor document to reflect emission estimates based on the modified input parameters.

Response: The EPA reviewed the industry-derived emission factors for methanol and chloroform. Although the revised methanol results were lower, the revised chloroform results were higher than those obtained by the Agency's model. The EPA believes that the current model adequately characterizes emissions from wastewater treatment and did not incorporate the industry-derived emission factors since the factors had little effect on overall HAP emission estimates.

Comment: One commenter (IV-Dl-102) noted the following specific concerns about using kraft mill system emissions as defaults for non-kraft mill systems where data were not available:

- Oxygen delignification systems at sulfite mills are configured differently from kraft oxygen delignification systems and should have a different emission factor based on typical equipment.

- Stand-alone semi-chemical mills should have refiners rather than knotters and screens, and the causticizing area at a stand-alone semi-chemical mill would not have a lime kiln, lime mud washer, or slaker.

- Kraft digester and evaporator numbers should not be used for other types of pulping because of the different liquor characteristics and cooking conditions.

- Semi-chemical pulping wastewater has considerably lower methanol concentrations than kraft pulp mill wastewater, so it does not seem appropriate to use average kraft mill values.

Response: In response to these specific concerns, EPA made the following revisions to the emission factor document:

- No data were supplied in relation to oxygen delignification systems at sulfite mills; therefore no revisions were made.

- The knotter and screening systems at stand-alone semi-chemical mills were correctly identified by the "refiner" terminology; however, no data were available to suggest that the emissions from the pre-washing screening area are different at semi-chemical mills.

- The equipment that is not present at a stand-alone semi-chemical mill causticizing area were removed.

- Kraft digester and evaporator numbers were not used for semichemical and sulfite mills. The HAP emissions at soda mills are expected to be similar to the non-TRS HAP emissions from kraft mills. Therefore, the soda numbers were based on kraft emissions.

- Semi-chemical pulping wastewater emission characteristics were developed separately from the kraft characteristics.

The revised emission factor document (A-92-40, IV-A-8) contains more detail regarding emission factor development, assumptions, and applications.

Comment: One commenter (IV-Dl-102) asserted that the boiler methanol emission factor in the draft emission factor document (A-92-40, IV-A-6) is too high and that the Agency has not adequately documented why 0.5 lb methanol/ODTP from a boiler, especially one without a wet scrubber, is typical of the industry.

Response: Emissions from boilers are not addressed under this rule and the boiler methanol emission factor does not impact the final rulemaking. Since it was not relevant to this standard, EPA did not revise the emission factor for the NESHAP. The boiler emission factor is discussed and evaluated in further detail in the revised emission factor document (A-92-40, IV-A-8).

Comment: One commenter (IV-Dl-102) stated that the reason for the difference in chloroform generation in the bleach plants is largely a function of chlorine use. The commenter (IV-Dl-102) stated that the difference should not be attributed to the presence or absence of oxygen delignification.

Response: The EPA agrees with the commenter that other parameters besides the presence of oxygen delignification have greater impact on chloroform emissions from the bleach plants. The presence of a hypochlorite stage in the bleach sequence and the degree of ClO_2 substitution have both been determined to significantly affect bleach plant chloroform emissions. Greater detail and data analysis pertaining to this issue are presented in the revised emission factor document (A-92-40, IV-A-8).

2.3 MODEL PROCESS UNITS

Comment: Two commenters (20,027, 20,086) stated that EPA should not have used model process units to evaluate the range of possible control options and the ability to achieve the proposed MACT standards; they should have evaluated these things on a "real world" mill-by-mill basis. Another commenter (20,011) argued that invalid process models led to mischaracterized pulp mill and wastewater emissions.

One commenter (20,027) cautioned that the models used for semi-chemical mills and sulfite mills were incorrect. The commenter (20,027) contended that for semi-chemical mills, EPA incorrectly assumed that there were digester relief gases and digester blow evaporators. The commenter (20,027) recommended that mill Q from the industry test program be used as the basis for the semi-chemical model mill rather than EPA's models P9 and P10. The commenter (20,027) also claimed that the sulfite pulping model mill developed by EPA did not accurately reflect the process emissions points because several of the emission points in the sulfite model (P7) were inappropriately taken from the kraft model (P2). The commenter (20,027) did not provide alternative points.

Another commenter (20,072) indicated that their model developed for a soda mill was more effective at estimating the effects of process changes at soda mills than a model which uses kraft TRS control technology. The commenter (20,072) provided a report on this mathematical model.

Response: Based on comments and data received after proposal, EPA has re-evaluated the methodology used to estimate national impacts for the pulp and paper industry. The impacts estimated in the final rule were determined for each mill using mill-specific data provided by industry after proposal. Therefore, the MACT floor analyses and impacts analyses were based on actual processes and controls at each of the mills and were not based on models.

Where information was missing, average characteristics of mills with similar pulping types were used to complete the data base. Through this revised analysis, EPA has more accurately estimated emissions from non-kraft mills. (Kraft models are not assigned to semi-chemical, sulfite, or soda mills because actual mill-specific data was used in place of model mills.) The revisions to the national impacts analyses are discussed in detail in chapter 20 of this document.

3.0 SUBCATEGORIZATION

Comment: Several commenters to the December 17, 1993 proposed rule (20,001, 20,011, 20,018, 20,027, 20,054A2, 20,072A8, 20,086) requested that EPA subcategorize mills by pulp type because different pulp types have different emission characteristics, baseline controls, and retrofit costs. One commenter (IV-D2-15) on the March 8, 1996 supplemental notice supported the decision to subcategorize by pulping type.

Two commenters (20,027, 20,072A8) supported their argument to subcategorize by noting that section 112(c)(l) of the Act requires MACT standards to be consistent with the list of source categories established in section 111. The commenters (20,027, 20,072A8) contended that section 111 New Source Performance Standards (NSPS) source categories only include kraft pulping mills, and do not include semi-chemical, soda, or sulfite pulping mills. Therefore, the commenters concluded that EPA should have treated kraft mills separately from other mill types. The commenters also suggested that sources other than kraft mills not be included in the regulation.

Two commenters (20,059, 20,103) recommended no subcategorization, agreeing with the consolidation of subcategories proposed by EPA and suggesting no further division or combination of subcategories. One commenter (20,059) on the

December 17, 1993 proposed rule indicated that the industry has not provided data to support subcategorization. Another commenter (20,011) contended that the lack of air and wastewater emissions data for sulfite, soda, and semi-chemical mills prevented a balanced assessment of the need for subcategories.

Response: Section 112 of the Act requires NESHAP for categories of major sources of HAP. On July 16, 1992, EPA published a list of source categories for the 189 listed HAP's (57 FR 31576). Pulp and paper production was listed as a major source of HAP emissions. Soda, semi-chemical, and sulfite mills are major HAP sources and, therefore, are being regulated as a part of this source category. The final standards are based on evaluation of all available data for potential controls and the best opportunity for integration with effluent guidelines.

In the March 8, 1996 supplemental notice, EPA presented the rationale for establishing separate subcategories based on pulping type (kraft, soda, sulfite, or semi-chemical). The establishment of the subcategories was based on comments received and review of additional emissions information submitted after proposal of the standards.

The information obtained after proposal indicated that as a result of the differences in digestion methods, mills utilizing different types of pulping systems produce different emissions, and as a result, achieve different degrees of control with different applicable control technologies. At proposal, EPA understood that the four types of mills differ in the way they digest wood to make pulp, but did not have the data to determine the extent to which these differences influence potential emission control strategies. The information received after proposal indicated the significant extent of these differences. The commenters are referred to the March 8, 1996 supplemental notice for a detailed discussion of the differences between the pulping types and rationale for the decision to establish each of the subcategories.

Where two or more subcategories are located at the same mill site and share a piece of equipment, that piece of equipment would be considered a part of the subcategory with the more stringent MACT requirements for that piece of equipment. For example, the pulping process condensates from an evaporation set processing both kraft weak black liquor and spent liquor from a semi-chemical process would have to comply with the kraft subcategory requirements for pulping process condensates. This more stringent requirement is appropriate because there is no viable way to isolate the emissions for each pulping source to determine compliance separately.

Comment: One commenter (20,043) indicated that separate subcategories should be established for dissolving-grade and non-dissolving (paper-grade) sulfite mills based on significant differences that exist between dissolving- and paper-grade sulfite mills. The commenter (20,043) urged EPA to accurately characterize the emissions, control technology, and the costs of controlling emissions at dissolving-grade sulfite mills.

Response: The EPA believes the commenter's point is valid for the bleaching systems at all mills, not just sulfite mills. In characterizing the bleaching system, there are greater differences between the paper-grade bleaching process and dissolving-grade bleaching process than between the type of pulp mill that proceeds the bleaching systems. The EPA evaluated the differences between paper-grade and dissolving-grade bleaching systems and determined the appropriate MACT requirements for each.

The average emission limitation of the best-controlled paper-grade and dissolving-grade mills is control of chlorinated HAP's using a caustic scrubber and control of chloroform using process modifications. For paper-grade mills, the effluent limitation guidelines and standards were determined to be at least as stringent as the process modifications evaluated (100 percent ClO_2 substitution and no hypochlorite use). Therefore, the MACT requirements for paper-grade bleaching systems is caustic scrubbing for control of chlorinated HAP, other than chloroform, and compliance with the effluent limitation guidelines and standards or certification that no hypochlorite or chlorine is used for bleaching for control of chloroform.

The EPA at present lacks sufficient information to establish effluent limitation guidelines and standards at dissolving-grade mills, and also lacks information to reliably ascertain what a MACT floor standard for chloroform air emissions would be for this unit operation. The EPA is continuing to evaluate potential limitations for dissolving-grade mills and is deferring establishing MACT standards for chloroform until effluent limitation guidelines and standards are established. Therefore, dissolving-grade mills are required to comply with the bleaching system chloroform standards no later than 3 years after publication of the wastewater effluent limitation guidelines and standards under 40 CFR 430, subparts A and D.

In a related action, EPA is also delaying MACT requirements for chlorinated HAP's other than chloroform from dissolving-grade bleaching operations until 3 years after publication of the wastewater effluent limitation guidelines and standards under 40 CFR 430, subparts A and D. The Agency is doing so in order to avoid imposition of Act requirements that would be inconsistent with, or superseded by, forthcoming CWA regulations. A more detailed discussion of bleaching system compliance times is presented in section 17.2.

4.0 BASIS OF STANDARDS

4.1 STATUTORY INTERPRETATION

4.1.1 88th percentile vs. 94th percentile Interpretation

Comment: Several commenters (20,027, 20,037, 20,046, 20,046A2, 20,056, 20,070Al, 20,083, 20,089, 20,092, 20,102, 20,103, IV-D2-15, IV-D2-7) objected to EPA's interpretation that the 94th percentile represents "the average emission limitation of the best-performing 12 percent of existing sources." These commenters contended that: (1) the MACT floor level of control should be set at the 88th percentile rather than the 94th percentile, and (2) the 94th percentile interpretation was impractical; irrational; not allowed by the Act; significantly more costly than the 88th percentile interpretation [Case law cited: Chevron, U.S.A. v. NRDC, 467 U.S. 837 (1984)]; and likely more stringent than that achieved by any existing source. Several commenters (20,027, 20,054A2, 20,057A2, 20,070Al) advised that using the 88th percentile interpretation would have significant consequences regarding which pieces of equipment must be controlled, asserting that brownstock washers, oxygen delignification units, and weak black liquor storage tanks are not enclosed or controlled at the 88th percentile.

One commenter (20,054A2) indicated that the method for determining the floor level of control was applied inconsistently between components that were controlled at greater than 12 percent and those controlled at less than 12 percent. The commenter (20,054A2) stated that if the component was not controlled by at least 12 percent of mills, EPA determined what the top 6 percent of mills were doing.

One commenter (20,122) supported EPA's interpretation that the MACT floor level of control effectively equaled the 94th percentile control technology, and one commenter (20,059) indicated that the interpretation was immoral because it was set below the minimum legal stringency for protecting human health.

Several industry commenters (20,057A2, 20,059, 20,092, 20,102, 20,149) agreed with the interpretation of averaging the top 12 percent, but they did not agree with using the median to represent the average performance of these sources. Some commenters (20,057A2, 20,059) indicated that an arithmetic mean should be used regardless of corresponding control technologies, while others (20,092, 20,102) indicated that the floor should be set at the next most stringent corresponding technology.

One commenter (20,103) expressed support for EPA's use of the median of the top 12 percent, stating that the arithmetic mean may place too much emphasis on either the best or worst performing of the top 12 percent.

<u>Response</u>: In the June 6, 1994 <u>Federal Register</u> (59 FR 29196) EPA presented its final decision regarding the interpretation of section 112(d) (3) (A) of the Act for purposes of the Hazardous Organic NESHAP (HON). As presented in 59 FR 29196, EPA concluded that section 112(d)(3)(A) is best interpreted to require EPA to first determine the emission limitation achieved by sources within the best-performing 12 percent, and then

average these limitations. This interpretation of the statute has been referred to as the "Higher Floor Interpretation." The Agency adheres to that interpretation in this rule. The Agency notes, however, that while the interpretation presented in 59 FR 29196 sets a precedent, it is not binding since EPA believes the Agency retains discretion in establishing floors for MACT standards depending on the circumstances of each source category.

The EPA has the discretion to use its best engineering judgment in collecting and analyzing the data, and in assessing the data's comprehensiveness, accuracy, and variability in order to determine which sources achieve the best emission reductions. The EPA fully considered all comments regarding the proper interpretation of section 112(d)(3)(A) of the Act in the context of the pulp and paper rulemaking. For this rulemaking, EPA held to the "Higher Floor Interpretation" (average of the best-performing 12 percent).

Commenters on the December 17, 1993 proposal provided additional emissions and control information to be evaluated in determining the floor levels of control and characterizing the industry. After review of the data, EPA revised several aspects of the proposal. These changes are discussed in the March 8, 1996 supplemental notice. Specific changes to the rule and associated rationale are presented in the notice. In general, EPA determined that it was appropriate to subcategorize the pulp and paper industry based on pulping type (e.g., kraft, soda, semi-chemical, sulfite). Revisions were made to recalculate the floor level of control for regulated emission points within each subcategory. Additionally, emission points were grouped together to form mill systems in order to better characterize emissions from this industry. In determining the best-performing sources from which to compute the floor level of control, EPA calculated the emission controls for emission points within each system. In most cases, EPA relied on the arithmetic average of the best-performing sources. Whenever the resulting value did not correspond to an emission limitation that was achievable by any particular technology, the median of the best-performing sources was used in order to develop a standard in fact reflecting achievable performance (see section 112(d)(2)).

The EPA believes that the changes to the rule presented in the March 8, 1996 supplemental notice result in floor determinations that are appropriate and reasonable for all mills within each subcategory.

4.1.2 <u>MACT Floor on a "Per Unit" vs. "Whole Mill" Basis</u>

<u>Comment</u>: Several commenters (20,027, 20,045, 20,051, 20,057A2, 20,066A3, 20,114, 20,118, 20,145, IV-D2-7) disagreed with EPA's use of the "best-performing individual emission units" to determine the MACT floor level of control, rather than considering the integrated mill performance. The commenters (20,027, 20,045, 20,051, 20,057A2, 20,066A3, 20,114, 20,118, IV-D2-7) suggested that EPA overstated the MACT floor level of control, because it did not consider the interrelationship of the different processes used to produce bleached and unbleached kraft pulp, and the commenters indicated that this interpretation led to a floor level of control that exists at less than the top six percent of mills. The commenters (20,027, 20,045, 20,057A2, 20,066A3, 20,118, 20,145, IV-D2-7) asserted that this approach

proved that EPA did not use a correct interpretation of section 112 of the Act.

Response: The Act does not define "source." A source may be a facility, a kind of emission point, or a collection of emission points. The definition chosen for each MACT standard is dependent on the characteristics of the source category being regulated, and the information available to characterize emissions. The EPA has chosen to define a source in the pulp and paper rule as a collection of emission points (i.e., pulping system, bleaching system, pulping process condensates). The floor level of control was then determined for each emission point. This method is referred to as the "per unit" approach. The approach the Agency used to determine the floor level of control based on emission points was the most appropriate because this approach represents the best use of the data available. The data available at proposal consisted of responses from a 1992 voluntary MACT survey, a field test program of air and liquid samples from four kraft mills and one sulfite mill (the "EPA 5-mill study") and some limited industry data used to supplement the EPA 5-mill study. Based on comments and data received after proposal (A-92-40, IV-Dl-29, IV-Dl-29a, IV-Dl-31, IV-Dl-33, IV-Dl-34, IV-Dl-35, IV-Dl-38, IV-Dl-39, and IV-Dl-41), EPA re-evaluated the approach and established the MACT floor by subcategories (i.e., kraft, soda, semi-chemical, sulfite). The EPA, however, retained the "per unit" approach to setting the MACT floor by adopting MACT standards for specifically defined equipment systems (pulping, bleaching) and associated wastewater streams within each subcategory.

The EPA elected to determine MACT floors on a per unit basis because sufficient information was not available to determine the MACT floor on a mill basis. Due to the differences in control technologies used in processes and systems in a mill, the MACT floor for a whole mill could not be based on a type of control technology, but would need to be based on emissions or percent reductions from the mills. Computing emission levels or percent reductions of the whole mill would require accurate site-specific knowledge of the emission levels of each process at each mill being regulated (i.e., emission source tests). At proposal EPA did not have sufficient data to establish a mass emission limit or a mass emission reduction percentage across each mill.

Since proposal, EPA obtained site-specific information that was used to develop emission factors for various systems at a mill. However, these emission factors represent average or typical systems and are not specific to each mill. While EPA believes such information may be used to estimate national impacts, it is not adequate to determine the MACT floor level of control (i.e., the factors are not representative of the actual emissions at each mill but may be used to represent typical emissions from all mills). Actual mass emission levels or mass emission reductions would still be required. Information on the controls for various systems at each mill was available to EPA. Therefore, EPA decided to develop MACT floors on a unit (i.e., system) basis.

Additionally, the day-to-day variability of the pulp and paper processes would preclude establishing mill-wide emission or percent reduction limits. These process variabilities include swings in production depending on the wood species available and products being produced, as well as other variables associated with using a natural feedstock such as wood.

4.1.3 Legal Requirement to Base MACT Floor on Actual Data

Comment: Several commenters (20,027, 20,061, 20,146) maintained that EPA is legally required to base the MACT floor on what is actually achieved by sources or sources technically similar. The levels achieved must be determined based on reliable data and analyses rather than on predictions or projections. One commenter (20,027) asserted that EPA must redetermine the MACT floor based on actual data.

Response: Section 112(d)(3)(A) of the Act requires that the maximum degree of reduction in emissions be calculated from "the average emission limitation achieved by the best-performing 12 percent of the existing sources (for which the Administrator has emissions information) . . ." (emphasis added). The EPA agrees with the commenters that the MACT standards should be based on the best data available to the Administrator and EPA contends that the data available at proposal was used properly. The EPA made all reasonable efforts to gather available data using literature, State regulations, previous studies, sampling tests, and a voluntary industry survey. Additionally, EPA worked with the pulp and paper industry to gather data and used data the industry submitted. Where information was lacking, average values from the data base were used to fill in gaps.

Also, in the proposal of December 17, 1993, EPA acknowledged that industry had air emissions sampling and data collection underway. However, the data results were not expected to be available until after proposal. Therefore, the proposal stated that EPA would analyze and any data that became available before promulgation of the NESHAP. After proposal, commenters and industry representatives submitted additional data including results of sampling tests to EPA (A-92-40, IV-Dl-29, IV-Dl-29a, IV-Dl-31, IV-Dl-33, IV-Dl-34, IV-Dl-35, IV-Dl-38, IV-Dl-39, and IV-Dl-41). This information was evaluated and, where appropriate, changes were made to the proposed rule accordingly. A detailed discussion of EPA's evaluation and these proposed changes as well as EPA's plans to address some other concerns raised by the commenters are presented in the March 8, 1996 supplemental notice.

Comment: One commenter (20,011) indicated that the use of a model pulp mill improperly extended the MACT floor beyond the statutory definitions.

Response: Model pulp mills were not used by EPA to determine the MACT floor. Rather, the MACT floor was based on data collected in the 1992 voluntary MACT survey of the industry. At proposal, model mills were used to estimate emissions and other regulatory impacts corresponding to the specific control options considered by the Agency. For the final rule, data from each mill were used to estimate emissions and regulatory impacts.

4.1.4 Legal Requirement to Re-propose

Comment: One commenter (20,027) contended that EPA is legally required to re-propose the standards after actual data is obtained in order to give the public the opportunity to comment on the new data and EPA's method for making the MACT determination. [Case law cited: National Lime Assoc. v. EPA, 627 F.2d 418, 433, 452-53 (D.C. Cir. 1980); Weyerhauser Co. v. Costle, 590 F.2d 1011, 1030 (D.C. Cir. 1978); Portland Cement Assoc. v. Ruckelhaus, 486 F.2d 375, 392-93 (D.C. Cir. 1973);

Sierra Club v. Costle, 657 F.2d 298, 334 (D.C. Cir. 1981); Solite Core v. EPA, 952 F.2d 473, 484 (D.C. Cir. 1991) quoting Connecticut Light & Power v. NRC, 673 F.2d 525, 530-31 (D.C. Cir. 1982); Fertilizer Institute v. EPA, 935 F.2d 1303, 1311 (D.C. Cir. 1991) .]

One commenter (20,057A2) stated that the MACT standards should be re-proposed with EPA's proposed combustion source MACT standards. (A-92-40, II-I-13 and 11-I-18. Data provided: Appendix MACT 6.)

Response: The EPA's position is that re-proposal is not required because notices of data availability for data received after the original proposal, EPA's assessment of the data, and proposed changes to the original proposal were published in the Federal Register February 22, 1995 (60 FR 9813) and on March 8, 1996. The March 8, 1996 supplemental notice provided the public the opportunity to comment on the new information and on the approach under consideration by EPA in developing the final standards.

These subsequent notices provided ample notice and opportunity to comment on all key elements of the standard, including data, potential floor levels of control, and potential standards. In addition, EPA notes that it has provided actual notice and opportunity to comment to many key parties to the proceeding, including the pulp and paper industry and key environmental groups (A-92-40, section E). This ongoing dialogue again fully satisfies notice and comment obligations as to all persons having actual notice. The EPA cites Small Lead Refiners Phase Down Task Force v. EPA, 705 F.2d 506, 549 (D.C. M 83).

The combustion MACT is a separate action and was proposed at promulgation of the pulp and paper mill rule. The EPA acknowledges that there are interrelations between this rule and the combustion MACT rulemaking. The EPA evaluated those interrelationships for the final rule (see chapter 16). The EPA maintains it is unnecessary to incorporate the combustion sources in this pulp and paper rule.

4.1.5 Control Devices Were Not Installed to Reduce HAP

Comment: Several commenters (20,011, 20,027, 20,043, 20,118) listed control devices (steam strippers and scrubbers) that should not have been considered MACT floor level of control technologies because they were not installed for the reduction of HAP. Several commenters (20,027, 20,043, 20,118) pointed out that because steam strippers have never been calibrated or operated for the continuous emission reduction of HAP's, they should not have been considered a floor technology for HAP reduction from process wastewater. One commenter (20,027) also noted that because scrubbers have not been installed in bleach plants to control methanol or total HAP's other than chlorine, they should not have been considered as the floor technology, as defined in section 112(d) (3) (A) of the Act.

Response: Any technology that achieves HAP emission reduction can be considered a potential MACT control option regardless of whether or not the technology was installed for the purpose of HAP reduction. There is no language in section 112(d)(3) even suggesting that intent (i.e., the purpose for installing air pollution control devices) is relevant for purposes of establishing MACT floors. All that matters is the "emission limitation achieved." In addition, as stated in section 112(d)(2) of the Act, "Emission standards . . . shall require the maximum degree of reduction in emissions of the hazardous air pollutants that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable for new or existing sources . . . through application of measures, processes, methods, systems, or techniques . . ." Again, there is no suggestion that the purpose for which existing controls were installed is of any relevance.

4.1.6 Authority to Regulate Process Wastewater

Comment: Two commenters (20,027, 20,146) stated that the Act does not give EPA the authority to determine applicability for process wastewater provisions of the rule at the point of generation. Rather, emissions may only be regulated at the first air/water interface. The commenters (20,027, 20,146) contended that EPA has an obligation to state its theory on this issue, and support with data any arguments made to indicate that the HAP content in wastewater is indicative of air emissions that warrant regulation. Another commenter (20,011) stated that the regulation of process wastewater at "point of generation" is illegal unless EPA can demonstrate that it is infeasible to set an emission limit, and also prove that concentration-based limits are work practice standards under section 112(h) of the Act. One commenter (20,146) indicated EPA's conclusions that the control of HAP's from process wastewater was either a "floor" industry practice or was needed to protect public health or welfare was incorrect.

Response: The Act does not place any restrictions on the Administrator as to where within the affected source the applicability determinations are made or where the controls are applied to achieve the desired emission reductions. (Indeed, controls can even be based on process changes, i.e., before a point of wastewater generation (see Act 112 (d)(2) (A)). Regarding air emissions from process wastewater, EPA's position on this issue has been presented in several places including the proposal BID (A-92-40, II-A-35) and the March 8, 1996 draft Chemical Pulping Emission Factor Development Document (draft emission factor document) (A-92-40, IV-A-6). Additionally, the methodology of estimating air emissions associated with volatilization of compounds from process wastewater has been well documented in models such as EPA's WATER8. In general, EPA believes that pollutants volatize from wastewater upon contact with the atmosphere. This is consistent with standard laws of physics. Therefore, wastewater streams need to be controlled at the point of generation (i.e., at the first air-water interface) if HAP emissions from wastewater are to be adequately controlled. Additionally, EPA has found that the best controlled mills reduce the pollutant loading in the process wastewater streams prior to being recycled to process equipment or sent to subsequent treatment.

4.2 DEFINITION OF SOURCE

4.2.1 Plant-wide Definition of Source

Comment: Several commenters (20,027, 20,049A3, 20,054A2, 20,056, 20,057A2, 20,059, 20,086, 20,089, 20,102, 20,103, IV-D2-15) provided input on the definition of source.

Several commenters (20,027, 203-210, 20,054A2, 20,056, 20,057A2, 20,086, 20,089, 20,103, 20,146, IV-D2-14, IV-D2-3) supported a broad definition, stating that EPA should adopt a plant-wide definition of source to allow for integrated compliance with the proposed rule and to best comply with Act section 112(g) provisions. Additionally, another commenter (IV-D2-15) agreed with the broad single source definition which includes the pulping processes, the bleaching processes, the pulping and bleaching wastewater streams, paper machines, and causticizing equipment. This definition, according to the commenter (IV-D2-15), reflects the physical realities of pulp and paper mills which consist entirely of technically and economically interdependent activities.

One commenter (20,056) suggested a narrow definition would cause too many sources to become subject to the rule for minor modifications, which would cause continual tinkering with the emission control systems. Three commenters (20,049A3, 20,059, 20,102) indicated that the definition of source used by EPA was lax and would enable facilities to undertake major modernization projects without having to comply with the proposed standards. One commenter (20,059) stated that a broad source definition would delay by two years the date that new and reconstructed sources would have to comply with new source MACT.

One commenter (20,092) supported the proposed narrow source definition. The commenter (20,092) stated that the final rule should clarify that the narrow source definition applies to new and modified area sources. Additionally, one commenter (20,102) suggested that the proposed definition be modified such that the source is defined as each of the process lines: pulping processes, bleaching processes, and wastewater processes.

Response: The definition of affected source is used to distinguish: (1) the collection of equipment or groups of equipment that is subject to the emission limitations in the rule; (2) equipment that is subject to the new source MACT requirements; and (3) equipment considered in determining reconstructed sources.

At proposal, EPA defined a single broad source for both existing and new source MACT. That single source included the pulping processes, the bleaching processes, and the pulping and bleaching process wastewater streams at a pulp and paper mill. The EPA also considered and solicited comments on the concept of multiple smaller sources that would be subject to the existing and new source MACT requirements.

In defining the source at proposal, EPA considered the impact of the definition on mills making changes to existing facilities. In general, the narrower the definition of source, the more likely it is that changes to existing facilities would be deemed "new sources" under the Act. With limited exceptions, these new sources must be in compliance with new source standards on the date of startup (or date the standards are promulgated, whichever is later). However, the Act and the CWA differ regarding applicability requirements and compliance deadlines for new sources. As such, EPA was concerned that a pulp and paper mill planning to construct or reconstruct a source of HAP's between proposal and promulgation of these integrated regulations would find it necessary to plan for compliance with the rule (required on the date of promulgation) without knowing the requirements of the effluent guidelines for the industry. This situation appeared to be inconsistent with one objective of the integrated rulemaking: allowing facilities to do integrated compliance planning. The EPA thus determined that the best solution to these concerns was to define a single broad source at proposal in order to reduce the applicability of new source MACT.

In the March 8, 1996 supplemental notice, EPA indicated a continuing inclination for a broad, single source definition. The EPA also discussed broadening the source definition further to include paper making systems and causticizing equipment and solicited comments on these additions. The EPA's reason for considering the addition of these two equipment systems was to facilitate implementation of the clean condensate alternative for kraft mills. Commenters on the December 17, 1993 proposal and on the March 8, 1996 supplemental notice largely agreed with the broad, single source definition.

In considering how best to define the source, EPA did not want to define it so narrowly that changes to or additions of individual pieces of equipment would be subject to new source MACT and be required to be in compliance with new source MACT at startup. In fact, EPA was concerned that to do so could discourage mills from implementing pollution prevention changes as soon as practicable after promulgation of the proposed rule. Such changes might include replacing an existing rotary vacuum washer system with a low-flow washer system or installing an oxygen delignification system, both of which if subject to existing source requirements, would get the 8-year compliance time (see chapter 16). Once mills are complying with the existing source MACT requirements, it also did not seem reasonable that they should have to tear out and rebuild that vent collection system to accommodate small equipment changes in the future unless those changes occurred along with other substantial changes that would justify rebuilding the vent collection system.

However, EPA also agrees with the commenter that at some point, changes to an existing mill are substantial enough that new source MACT should apply.

For the final regulation, EPA is defining the affected source to which existing MACT requirements apply to include the total of all HAP emission points in the pulping and bleaching systems (including pulping condensates). In considering how mills might engineer their vent collection systems and control devices, EPA has concluded that the following construction actions occurring after proposal are substantial enough that new source MACT requirements will apply:

- A pulping or bleaching system at an existing mill is constructed or reconstructed; or
- A new pulping line or bleaching line is added to an existing mill.

The proposal date for mills that chemically pulp wood is December 17, 1993. The proposal date for mills that mechanically pulp wood, pulp secondary fibers, or pulp non-wood materials is March 8, 1996. In selecting these actions, EPA determined that the costs of complying at startup are reasonable and will not discourage mills from implementing pollution prevention options to comply with the proposed rule.

The final rule resolves the concerns of possible circumvention of new source MACT applicability by specifying the control requirements for (1) greenfield sites, (2) the addition of new equipment at existing sources, and (3) changes to existing equipment that could trigger reconstruction. By designating the exact equipment to be controlled at new and existing sources, the rule reduces confusion and misinterpretation over what actions trigger new source requirements. This approach preserves the advantages of the broadest source definition for compliance by existing sources while ensuring that new and reconstructed equipment are regulated as new sources consistent with section 112(a) and 112(d) of the Act. For example, under the final rule a weak black liquor storage tank is not regulated at an existing source. Nor would replacement of an existing tank be regulated. But a new tank would be regulated at a greenfield site or at an existing site if the new tank was installed contemporaneously with the construction or reconstruction of a new pulping system or an additional pulping line.

The final regulation also provides for an alternative definition of source to facilitate implementation of the clean condensate alternative. For mills using the alternative to comply with the kraft pulping standards, the final regulation defines a single broad source that includes the total of all pulping, bleaching, causticizing, and paper making systems. These additions were made to the definition of affected source to allow for the application of advanced technologies to paper making and causticizing systems that typically receive recycled or reused condensates. This broader definition allows increased compliance flexibility while ensuring an equivalent level of HAP control on a mill-wide basis.

4.2.2 Definition Should Be Limited Within Each Subcategory

Comment: One commenter (IV-D2-14) cautioned that the definition of source should be limited within each subcategory. For example, a major change to a kraft mill should not draw a co-located thermomechanical pulping mill into the new source MACT standards. The commenter (IV-D2-14) suggested redefining source by using the major subcategory rather than the artificial divisions created within MACT I, MACT II, and MACT III.

Response: The proposed rule defined the affected source as all pulping, bleaching, and wastewater components at a mill, in combination. The final rule has been restructured to define the affected source within each of six subcategories. The subcategories are kraft, soda, sulfite, semi-chemical, mechanical (wood), and secondary or non-wood fiber pulping. The MACT new source provisions would be applied within each of these subcategories independently. For example, an affected source would be all the emission points in the pulping and bleaching systems of a kraft pulping system. If a sulfite-based pulping system was co-located at the same mill, then a second affected source would be all the pulping and bleaching emission points within the sulfite process. Under these definitions, no construction activities at the kraft system would affect the applicability of new or reconstructed source provisions to the sulfite system (and vice versa).

The proposed MACT II rule covers the chemical recovery section of a pulping mill and would always be co-located with a MACT I or MACT III source. The MACT II affected source covers different equipment than the pulping and bleaching system standards under MACT I and III. The affected source definitions do not overlap, and new source provisions of both rules, therefore, apply independently. For example, no construction activities on a kraft pulping or bleaching system would affect the applicability of new or reconstructed source provisions within the chemical recovery section of a kraft pulp mill (and vice versa).

4.2.3 Woodpiles, Power Systems, and (Methanol) Recovery

Comment: One commenter (IV-D2-3) suggested including the wood handling, power, and recovery components in the definition of source to ensure they are not included in 112(g). Another commenter (IV-D2-16) agreed with EPA's decision to exclude woodpiles from the definition of source because woodpiles are not significant HAP emission sources, emission controls are not currently practiced, and collection schemes would be totally cost prohibitive.

Response: The EPA contends that it is unnecessary to include combustion devices in the source definition for this NESHAP because they are covered under a separate standard.

The EPA agrees with the commenters that certain emission points which are excluded from the definition of affected source in today's rule, or are subject to a determination that MACT for these operations is no control, should not be required to undergo Act section 112(g) review. The sources that have been so identified are wood yard operations (including wood piles), tall oil recovery systems, pulping systems at mechanical, secondary fiber, and non-wood fiber pulping mills, and paper making systems. With regard to wood yard operations, tall oil recovery systems, and pulping systems at mechanical, secondary fiber, and non-wood fiber pulping mills, EPA has determined that these sources do not emit significant quantities of HAP's and EPA is not aware of any reasonable technologies for controlling HAP's from these sources. For paper making systems, EPA has not identified any reasonable control technology, other than the clean condensate alternative, that can reduce HAP emissions attributable to HAP's present in the pulp arriving from the pulping and bleaching systems. Additionally, EPA has determined that the use of paper making systems additives and solvents do not result in significant emissions of HAP's (A-95-31, IV-B-5). Therefore, based on the applicability requirements of section 112(g) [40 CFR 63 part B, 63.40(b)], wood yard operations; tall oil recovery systems; pulping systems at mechanical, secondary fiber, and non-wood fiber mills; and paper making systems would not be required to undergo section 112(g) review. Any emission points that are specifically excluded from control in a section 112(d) standard would not be required to undergo section 112(g) or 112(j)(5) case-by-case MACT determinations. To qualify for this exclusion does not require that emission points be included in the affected source definition. It is sufficient that they are specifically addressed in the preamble or public record supporting the rule.

4.3 MACT

4.3.1 <u>MACT Floor Level of Control Technologies</u>

4.3.1.1 <u>General Comments</u>.

<u>Inadequate data used to determine the MACT floor level of control technologies</u>.

<u>Comment:</u> Two commenters (20,018A1, 20,122) disagreed about the information used to determine the MACT floor level of control technologies and the stringency of the resulting MACT floor. One

commenter (20,018Al) indicated that incomplete industry and technology data and an abbreviated evaluation process for existing technologies resulted in the selection of MACT floor technologies that are more stringent than those currently used at any single pulp and paper facility. The commenter (20,018Al) indicated that some existing mills using proposed MACT technology on certain vents in the mill would be unable to meet the standards for all emission points included in the proposed rule; the control technologies that EPA selected do not perform at the levels which EPA has set at the mills where they are currently installed. The commenter (20,018Al) suggested that EPA re-evaluate the proposed rule based on new industry data to better characterize control technology capabilities.

Response: At proposal, EPA delineated vent streams and pulping wastewater streams controlled at the floor level of control from those not controlled at the floor level of control with numerical applicability cutoffs. The EPA used data available at proposal, along with engineering evaluation calculations to determine the performance capabilities of the control equipment on which the floor level of control was based. The EPA solicited comments and additional data on applicability determinations and on control technologies and performance.

Since proposal, additional tests and studies were conducted by the pulp and paper industry to provide these data. The industry data received since proposal (A-92-40, IV-Dl-29, IV-Dl-29a, IV-Dl-31, IV-Dl-33, IV-Dl-34, IV-Dl-35, IV-Dl-38, IV-Dl-39, and IV-Dl-41) was considered by EPA and the Agency re-evaluated the MACT floor by subcategories. As a result of this data consideration, EPA has replaced the numerical cutoffs from proposal with specifically defined equipment systems and associated named vents and pulping condensates. The EPA believes these named streams more accurately identify the vents and condensates being controlled at the best controlled sources. The EPA has also used this additional data to evaluate the performance capabilities of the controls on which the floor level of control is based. A detailed discussion of many changes related to determining applicability of the MACT standard and control technology requirements are presented in the March 8, 1996 supplemental notice. Additional changes are discussed in this document. (Commenters on the March 8, 1996 supplemental notice supported EPA's decision to subcategorize, which resulted in different MACT floor determinations.) In instances where the commenters disagreed with the notice, in particular, for new subcategories or provided additional data, EPA re-evaluated the MACT floor level of control if new data were received. The EPA maintains that the MACT floor level of control determination is based on the best data available.

Cost-effectiveness is an improper criteria.

Comment: One commenter (20,059) stated that EPA used cost-effectiveness as the primary criteria for selecting control technology options, which they contended was improper.

Response: Cost-effectiveness was not the primary criteria used to develop the MACT level of control. In developing the MACT standard, EPA first determined the floor level of control as defined in section 112(d) of the Act. Costs were not considered in developing the MACT floor level of control. For knotter and screen systems, limited data were available to characterize emissions. Cost-effectiveness was used as a means of supporting the emission limits developed from the emissions information. Options more stringent than the floor level of control were then identified. In evaluating the options more stringent than the floor level of control, EPA considered a range of factors including cost, emission reduction, energy impacts, and other environmental impacts. Cost-effectiveness was only one of the factors considered. This is precisely the type of evaluation required by section 112(d)(2) and (3).

HAP-specific Effectiveness of Control Technology.

Comment: One commenter (20,059) stated that the prescribed control technologies in the proposed regulations are not effective for controlling all HAP's emitted from pulp and paper processes. The commenter (20,059) also suggested that the implications of control options on individual HAP's was not evaluated by EPA. As an example, the commenter (20,059) reported that bleach plant scrubbing works well for methanol but does not provide control for other pollutants, such as chloroform, formaldehyde, and carbon tetrachloride.

Response: The EPA recognizes that control devices may not reduce emissions of every compound equally. However, EPA asserts that the MACT standards for pulping vents and pulping wastewater streams (combustion and steam stripping followed by combustion, respectively) and bleaching vents (ClO_2 substitution, elimination of hypochlorite use, and use of a caustic scrubber) represent the maximum achievable control for the mixture of HAP's at pulp and paper mills. The EPA evaluated other control technologies (such as incineration of bleaching vent streams) and determined that although some of the technologies could obtain better control of some pollutants they would get worse control of others. The EPA also determined that it was not cost feasible to require these other technologies in place of or in addition to the floor levels of control (e.g., incineration of bleaching vents could achieve greater reduction of non-chlorinated HAP emissions, but applying a second technology in series with other controls would be cost-prohibitive). Detailed discussions of this issue are presented in section X.E. of the proposal, in the March 8, 1996 supplemental notice, and in chapter 20 of this document. The EPA made some changes in the promulgated rule for bleaching system control requirements. These changes were discussed in the March 8, 1996 supplemental notice and in the preamble to the final rule.

<u>General comment on new vs. existing floor level of control technology</u>.

<u>Comment</u>: One commenter (20,027) stated that data do not support any distinction between the floor level of control technologies for new and existing sources. On the other hand, one commenter (20,059) argued that it was not credible for EPA to establish standards for new sources that were virtually identical to existing source standards. New source MACT should reflect the emissions limitation achieved by the best-performing similar source.

<u>Response</u>: A discussion of the analysis used to determine new source MACT is contained in section F of the December 1993 proposal preamble. As presented in the preamble, EPA considered whether there were controls applicable to new sources beyond the floor level of control MACT standard but concluded at proposal that more stringent controls were not reasonable. The Act does not require new MACT standards to be significantly more stringent

than existing standards; the two standards can be virtually equal if the best controlled source or similar source is virtually identical to the average of the best-controlled 12 percent of existing sources.

Since proposal, EPA has based MACT floor decisions on specific named vents and wastewater streams controlled at each pulping subcategory. A discussion of changes in the existing and new source floor level of control determination since proposal is presented in the March 8, 1996 supplemental notice. Additional changes are discussed in section 4.3.1.2 of this document.

In the final rule, new source MACT differs from existing source MACT. New sources are required to control additional vents including: knotter and screening systems with mass emission rates less than 0.05 kilograms of HAP per megagram of ODP produced and 0.10 kilograms HAP per megagram ODP produced, respectively (or less than 0.15 kilograms HAP per megagram ODP produced combined), decker systems using process water other than fresh water or whitewater from paper machines or water with HAP concentrations less than 400 ppmw, and weak black liquor storage tanks at kraft mills; weak liquor tanks, strong liquor tanks, and acid condensate tanks at sulfite mills; and pulp washing systems at soda and semi-chemical mills.

4.3.1.2 Pulping Area.

MACT floor level of control needs to be determined by subcategories.

Comment: One commenter (20,027) agreed with the EPA's proposed floor level of 98 percent HAP control for pulping emissions from kraft mills. Several commenters (20,027, 20,071, 20,072, 20,073) disagreed with the floor level of control technologies established for mills other than kraft. Two commenters (20,027, 20,073) argued that the Act requires EPA to consider different technologies inherent in each process when determining the MACT floor level of control. The commenters (20,027, 20,073) noted that failure to subcategorize mills by pulping type and failure to recognize the different control technologies and efficiencies for different pulping types caused EPA to improperly establish the MACT floor level of control for each pulping type.

Response: Information available at proposal did not indicate a need to subcategorize the pulp and paper industry for the purpose of setting MACT standards. As a result of new operation, steam characterization, and control technology data received after proposal (A-92-40, IV-Dl-29, IV-Dl-29a, IV-Dl-31, IV-Dl-33, IV-Dl-34, IV-Dl-35, IV-Dl-38, IV-Dl-39, and IV-Dl-41), EPA established subcategories for mills according to pulping process (kraft, sulfite, semi- chemical, and soda). The data indicated that sufficient differences exist between kraft and sulfite, soda, and semi-chemical processes to warrant subcategorization. Accordingly, EPA revised the MACT floor level of control and MACT determinations for each subcategory. A discussion of development of pulping subcategories and respective floor level of control determinations is presented in the March 8, 1996 supplemental notice and received essentially unanimous support by commenters.

Kraft pulping MACT floor control technology.

Knotter and Screening Systems.

Comment: Several commenters (IV-D2-8, IV-D2-7, IV-D2-15) requested that knotter and screening vents preceding brownstock washing should not be controlled by the rule. One commenter (IV-D2-15) explained that based on an erroneous interpretation of the 1992 MACT survey data, EPA has incorrectly concluded that knotter and screening systems are controlled by 7 percent of the systems and are therefore part of the floor level of control. The commenter (IV-D2-15) stated that following proposal NCASI contacted those mills which had indicated that: (1) their knotters were not vented or (2) vent gases from the knotters were collected and incinerated. The commenter (IV-D2-15) asserted that only 4 percent controlled knotter system vents. There were no "not vented" systems. Therefore, the commenter (IV-D2-15) stated that the pre-washer knotting and screening systems are not controlled at the floor level.

Response: The EPA has reviewed available data on knotter and screen systems and has concluded that these systems are controlled sufficiently to establish a MACT floor level of control, and also that control more stringent than the floor level of control is not warranted. Data used to reach this conclusion include survey responses from the 1992 voluntary survey, follow-up telephone surveys conducted by the NCASI, and emissions data from the NCASI 16-mills study. Although the data indicates that many of these systems are currently controlled to some degree, the survey responses were not detailed enough in their equipment system descriptions and the test data were too limited for the Agency to use these two sources of information alone to develop the MACT control requirements. Because equipment designs, nomenclature, and control configurations vary across the industry, the Agency decided that a HAP emissions limit would be the best way for mills to determine which systems would require control. The EPA lacks sufficient data, however, to pinpoint any single value that represents the MACT floor level of control. Rather, based on the survey and test data, there are a range of values from which EPA could choose. The EPA further considered the costs of control in choosing from this zone of reasonable values.

Of the 171 knotter systems reported in the 1992 voluntary survey, 12 knotter systems at 5 mills were reported as controlled and ducted into the noncondensible gas (NCG) collection system and another 49 knotter systems at 23 mills were reported as having no vents. NCASI followed up by telephone surveys with these 28 mills (A-92-40, IV-Dl-112, IV-Dl-114). The follow-up surveys indicated a moderate amount of misreporting at these 28 mills. NCASI did not resurvey all 171 knotter systems. Therefore, the following knotter system floor determination assumes that the mills not resurveyed that originally reported no knotter system controls did not control any vents.

From the 28 mills resurveyed, it was determined that six knotter systems or 3.6 percent (6/171) route all vents into the NCG collection system; another two knotter systems or 1.2 percent (2/171) route all knotter hood vents into the NCG collection system; another eight knotter systems or 4.7 percent (8/171) use only pressure knotters; and another two knotter systems or 1.2 percent (2/171) route all vents to the smelt dissolving tank scrubber. Industry collected data at seven pressure/open (also referred to as pressure/vibrating) knotter systems and found the methanol emissions to range from 0.005-0.07 kilograms per megagram of ODP produced, and collected data at one pressure knotter system and found the methanol emissions to be 0.0034 kilograms per megagram ODP produced. Emissions data are summarized in the Chemical Pulping Emission Factor Document (A-92-40, IV-A-8). Because the pressure knotter system emissions were lower than the emissions at the pressure/open systems, pressure systems can be considered a type of controlled system. Therefore, 18 or 10.5 percent (18/171) of the knotter systems have some level of emissions control. The Agency believes this estimate of number of knotter systems controlled may be somewhat low because it is uncertain how many of the mills not resurveyed may have had the lower emitting pressure systems.

The 1992 voluntary MACT survey responses indicated that 96 screening systems out of the 199 reported are not vented. NCASI resurveyed by telephone 41 of these 96 mills. Assuming that the 55 mills not resurveyed look similar to the 41, the follow-up survey determined that 7 percent (6/41 x 96/199) route their vents to the NCG collection system and 41 percent (35/41 x 96/199) have closed screens that vent through auxiliary tanks. Therefore, 48 percent of the screening systems have some level of control.

Industry collected data at one closed screen system and one open screen system. The closed screen system tested had methanol emissions of 0.004 kilograms per megagram of ODP produced. The open screen system tested had methanol emissions of 0.22 kilograms per megagram of ODP produced.

The Agency considered how best to characterize the average emissions limitation achieved by the best controlled 12 percent of the knotter systems and screen systems given the wide variety of control scenarios present in the industry. Either collecting and controlling vents on an open system or using closed equipment result in lower air emissions. The Agency decided to select the emissions limitation using the test data from the closed and open equipment systems. The Agency's decision is due in part to the fact that the effluent limitation guidelines and standards being promulgated will require that screening areas be closed for water discharge, which will require mills to move toward wider use of the lower air emitting pressure systems.

Because there is only one test data point for the pressure knotter systems and that emissions value is similar to the low end of the range of data points for the pressure/open knotter systems, the Agency did not believe it would be appropriate to set the emission limit equal to the one pressure knotter system. Similarly, because there is only one test data point for closed screens, the Agency did not believe it would be appropriate to use that single data point to set the emission limit for screening systems. The Agency could have selected any emission limit within the range of all available data for knotters (i.e., 0.0042 to 0.07 kilograms per megagram of ODP produced) and screens (i.e., 0.004 to 0.22 kilograms per megagram of ODP produced). However, recognizing the limited data available, the Agency also considered the cost-effectiveness of controlling these systems to aid in setting the emission limits within the range of reasonable values (A-92-40, IV-B-21).

Based on consideration of all available data, the final rule requires that existing kraft sources are required to control all knotter systems with total mass emission rates greater than or equal to 0.05 kilograms of HAP per megagram ODP produced. Existing kraft sources are required to control all screening systems with total mass emission rates greater than or equal to 0.10 kilograms of HAP per megagram ODP produced. Since it is often difficult to distinguish between the knotter system and screening system at mills, a mill may also choose to meet a total emissions limit of 0.15 kilograms per megagram ODP produced across the knotting and screening combined system. New sources are required to control all knotter and screen systems, regardless of emissions level.

Brownstock Washers.

Comment: Several commenters (20,027, 20,054A2, 20,066A3, 20,070Al) indicated that EPA's determination of floor level of control technology for brownstock washer control was erroneous because it failed to recognize the distinctions among types of washers. One commenter (20,066A3) indicated that EPA included the following equipment in one group: red stock washers at sulfite mills, which are enclosed but routed to a scrubber; low emitting washers (such as diffusion washers that cannot be used with batch digesters); and drum washers which require a major expense to enclose because they emit high-volume low-concentration streams.

One commenter (20,054A2) stated that EPA failed to recognize the significant differences between vacuum, pressure, and diffusion washers when establishing the floor level of control for washers. One commenter (20,070Al) suggested that a distinction should be made in the regulation between newer washer systems and the older vacuum drum washers. One commenter (20,027) also noted that diffusion washers are excluded from the kraft NSPS due to low emission rates. The commenter (20,027) added that new washers are expected to be non-rotary vacuum design. One commenter (IV-D2-7) noted that because of the low level of emissions from improved washer systems and because of the lack of existing controls on such units (2 of 21 operational chemi-washers), the MACT floor for improved washers (pressure washers, diffusion washers, and horizontal belt washers) should be no control.

Response: The EPA recognizes the difference in emissions and flow characteristics among the different types of pulp washers. However, information collected in the 1992 voluntary MACT survey showed that greater than 25 percent of low flow washer systems (diffusion, pressure, chemi-) are controlled (A-92-40, IV-B-8). Based on these data EPA determined that the control of pulp washers was part of the floor level of control for all types of washers at kraft and sulfite mills. As discussed in the March 8, 1996 supplemental notice, EPA encouraged the use of low flow washer systems because of significant pollution prevention advantages and environmental benefits. The EPA has extended compliance with the kraft pulping standards for HVLC systems by 5 years in order to promote the use of low flow washer systems, as part of the strategy to encourage water pollution controls more stringent than BAT, and to provide sufficient time to design and construct these systems.

Deckers.

Comment: One commenter (IV-D2-15) stated that control of the decker was beyond the floor level of control. The commenter (IV-D2-15) said that all the deckers which were reported in the 1992 voluntary MACT survey as not being vented actually had vents somewhere in the system, either for the hood, for the filtrate tank, or for both. Vent gases from nine of the decker systems were collected and incinerated. Nine deckers represent less than 5 percent of the reported systems. Therefore, the commenter (IV-D2-15) asserted that decker vents are not controlled at the floor level.

The commenter (IV-D2-15) stated that industry will collect more information about the existing decker systems for the purpose of evaluating the cost-effectiveness of collecting and incinerating these vent gases. However, the commenter (IV-D2-15) speculated that it is not cost-effective to control emissions from the decker system.

Response: The EPA evaluated the information submitted by the commenter and concluded that there were 170 decker systems in mills responding to EPA's industry survey questionnaires. All the decker systems are associated with bleached mills. Of the 170 decker systems, 14 are controlled (8 percent) (A-92-40, IV-B-22). Therefore, control of decker systems is in the MACT floor.

The majority of decker systems controlled at the floor level of control (10 systems) are associated with oxygen delignification systems or are being used as an additional stage of pulp washing. The Agency believes that these types of decker systems are operated similarly to and have similar emissions as pulp washers. Decker systems used in this manner receive contaminated condensates or filtrates that may be recycled from other processes, such as the oxygen delignification system or combined condensate tanks. The process water may have a HAP concentration that would release significant amounts of HAP to the air from the air-water interface. The Agency characterized the emissions from this source to identify the types of decker systems with high emissions. Information supplied in NCASI Technical Bulletin No. 678 provided a relationship between air emissions and methanol concentrations in process water used in rotary vacuum drums. The EPA evaluated this relationship and determined that decker controls and higher HAP emission rates were associated with deckers that used process water with HAP concentrations greater than or equal to 400 ppmw, or that did not use fresh water or "whitewater" from paper making systems (A-92-40, IV-B-22).

Therefore, the Agency has determined that it is appropriate to make a distinction among types of decker systems at existing sources for the purpose of setting the MACT standard. Decker systems at existing sources using fresh water or "whitewater" from paper making systems, or using process water with HAP concentrations less than 400 ppmw, are not required to be controlled. Decker systems at new sources are required to be controlled regardless of the HAP concentration in the process water introduced into the decker.

Oxygen Delignification Systems.

Comment: Two commenters (20,027, 20,054A2) asserted that EPA improperly determined that the floor level of control includes control of oxygen delignification systems. One commenter (20,027) stated that less than 6 percent of these systems are controlled even if mills with oxygen delignification systems are considered their own subcategory. Additionally, the commenter (20,027) contended that oxygen delignification systems should be considered part of the bleach plant since oxygen acts as a bleaching agent similar to chlorine or ClO_2.

One commenter (IV-D2-5) asserted that requiring incineration of vent gases from oxygen delignification units is punitive to mills that have expended the extra effort to install these environmentally beneficial systems. The commenter (IV-D2-5) claimed that molecular oxygen is very effective at oxidizing pollutants such as TRS and organics such as methanol. The commenter (IV-D2-5) included data from their mill showing a low methanol emissions rate from their oxygen delignification system.

Response: The EPA disagrees with the commenters and has determined that control of oxygen delignification systems is part of the floor level of control (A-92-40, IV-B-16) based on the data collected in the 1992 voluntary MACT survey. An evaluation of the number of oxygen delignification systems constructed after proposal and their controls (A-92-40, IV-Dl-29, IV-B-16) indicates that greater than 6 percent of the oxygen delignification systems are controlled. Therefore, the MACT floor level of control is control of oxygen delignification systems.

With regard to the commenter's contention that oxygen delignification systems should be considered part of the bleach plant, information submitted to the Agency following proposal (A-92-40, IV-Dl-97, IV-Dl-104) indicated that several commenters from the industry have revised their position and recommend that oxygen delignification systems be considered part of the pulping process. The basis for this recommendation is that process waters from oxygen delignification systems are typically recycled or reused in other pieces of pulping equipment. Conversely, process waters originating in the bleach plant cannot be used in the pulping process without extensive treatment due to interferences in the chemical recovery process caused by the presence of chlorine and chlorinated compounds.

Regarding the issue raised by the commenter that it is punitive to control air emissions from the environmentally beneficial oxygen delignification systems, EPA recognizes that some mills have already committed to using oxygen delignification systems. But, based on industry emissions data submitted after proposal (A-92-40, IV-Dl-29 and IV-B-16) oxygen delignification systems appear to be a significant source of HAP emissions, and greater than 6 percent of the existing oxygen delignification systems are controlled. A floor level of control is mandated by the Act. The EPA does not think that MACT compliance (which will apply to all sources with oxygen delignification) will discourage introduction of the technology. In fact, to encourage the pulp and paper industry to consider the benefits of oxygen delignification, as discussed in the March 8, 1996 supplemental notice, the final rule grants kraft mills a compliance extension of 5 years. There are also significant incentives provided in the effluent guidelines portion of the final rule to encourage use of oxygen delignification (or superior) technology.

Weak Black Liquor Storage.

Comment: Several commenters (IV-D2-8, IV-D2-7, IV-D2-15) maintained that the MACT floor level of control for weak black liquor storage tanks is no control, noting that the cost of controlling these tanks far outweighs the environmental benefits and that add-on controls would threaten the structural integrity of these units. One commenter (IV-D2-15) explained that the NCASI survey provided ambiguous responses, which misrepresented the extent of control at existing weak black liquor storage tanks and that they are not part of the floor level of control. In order to resolve this ambiguity, NCASI contacted all the mills that had reported that vent gases from their weak liquor storage tanks were collected and incinerated. NCASI also sent a single page survey to 121 kraft mills in the industry and received 117 responses. From this information, the commenter (IV-D2-15) asserted that only 5 percent of weak black liquor storage tanks were controlled. Therefore, the commenter (IV-D2-15) asserted that weak black liquor storage tanks are not controlled at the floor level.

The commenter (IV-D2-15) stated that control of the weak black liquor storage tanks beyond the floor level of control would not be cost effective, and the emissions from these tanks based on NCASI's latest tests indicated that the quantity of emission is negligible. One commenter (20,027) asserted that EPA's assumption that tanks could withstand a vacuum for routing vents to a control device was inappropriate for older tanks because the vacuum may cause the tanks to collapse. One commenter (IV-D2-4) suggested that it is appropriate that any weak black liquor storage tank strong enough to withstand sufficient vacuum (based on engineering analysis or the age of the tank) should be subject to control. One commenter (IV-D2-10) agreed with EPA's position (as outlined in the March 8, 1996 supplemental notice) that the age and, therefore, the structural integrity of the weak black liquor storage tanks should be considered as one parameter for determining control applicability of tanks. Several commenters (IV-D2-14, IV-D2-8), however, disagreed that the age of a tank is a good parameter for determining the control applicability for tanks.

Response: The EPA evaluated the supplemental information submitted by NCASI (A-92-40, IV-Dl-101) and concurs that control of weak black liquor storage tanks is not in the existing source floor level of control. Information submitted by the commenters indicated that of the 597 weak liquor storage tanks in the survey only 28 (4.7 percent) actually had emissions routed to a control device (A-92-40, IV-D-106). Some respondents had previously included other types of controlled tanks, such as washer filtrate tanks, in their totals because EPA's original survey did not provide a definition of weak liquor storage tanks. The Agency, therefore, has concluded that the MACT floor level of control for weak liquor storage tanks at existing sources is no control. While some tanks are controlled, available information does not support the supposition that age is a good parameter for distinguishing structural integrity. No other parameter could be identified for distinguishing between controlled and uncontrolled tanks. Therefore, no basis for controlling existing sources was determined. In addition, the Agency evaluated the cost of going beyond the floor level of control to control weak liquor tanks. The results of EPA's analysis indicated that a significant cost would be incurred for a limited emission reduction. This analysis is presented in chapter 20 of the background information document for the promulgated rule. The EPA concurs with the comments that older tanks could not handle the vacuum caused by the closed-vent collection system without collapsing. Additionally, sweep-air systems that could be used to alleviate the vacuum problem are cost prohibitive for the amount of emissions reduction achieved by controlling the tanks.

Therefore, the Agency agrees with the commenters that control beyond the floor is not justified.

Although weak black liquor storage tanks are not controlled at the floor, the available data does indicate that some tanks are being controlled at some mills. Therefore, EPA has concluded that these tanks should be controlled at new sources since new tanks could be designed to withstand the slight vacuum associated with the collection system at a reasonable cost.

Comments on sulfite pulping MACT floor level of control technology.

Comment: One commenter (20,027) stated that EPA incorrectly concluded that control technologies common in mills with one pulping process would be applicable to other pulping processes. The commenter contended that incineration is the common control technology for total reduced sulfur compounds. However, 14 of the 15 sulfite mills do not practice any form of vent gas incineration. The commenter stated that scrubbing and SO_2 recovery should be considered as the floor level of control technology for pulping vents at sulfite mills. The commenter (20,027) stated that the sulfite process generates sulfur dioxide emissions which are typically recovered using scrubbers, for reuse as cooking acid makeup. The commenter (20,027) reasoned that since any HAP generated in a sulfite digester may pass through multiple process devices, each one capable of altering the HAP emission rate, the final HAP emission rate is a function of all of the equipment that exists between the point of generation and the eventual emission point. The commenter (20,027) contended that to ascribe a removal or control efficiency to the final scrubber would be to ignore the entire control process. The commenter (20,027) concluded that for this reason EPA should establish the pulping component standard for sulfite pulping at the exit of the control device.

Another commenter (20,151) suggested that the proposed rule should address emission control and discharge requirements on ClO_2 generating equipment and other replacement types of bleaching, such as hydrogen peroxide and ozone. The commenter (20,151) indicated that consideration should be given to appropriate controls and discharge requirements on strong waste ponds, cooling towers, and aeration ponds.

Response: Since proposal, EPA has established a separate subcategory for the sulfite process and has re-evaluated the floor determination for the sulfite process. The EPA agrees with the commenter that the floor level technology is scrubbing and SO_2 recovery. A discussion of the analysis for determining the level of the standard for the sulfite process is presented in the March 8, 1996 supplemental notice. In the March 8 notice, EPA provided a control efficiency requirement and an emission limit requirement. For calcium-based sulfite pulping processes, the emission limit presented was 0.65 lb methanol/ODTP and the percent reduction was 92 percent. For ammonium- and magnesium-based sulfite pulping processes, the emission limit was 1.10 lb methanol/ODTP, and the percent HAP reduction was 87 percent. The Agency developed applicability cutoffs based on methanol because only methanol emissions data were obtained for all of the equipment systems and wastewater streams considered for control at sulfite mills. The test data from sulfite mills also indicated that for the equipment systems tested for other HAP's, methanol comprised the majority of HAP emissions.

Therefore, the Agency believes that the maximum control of HAP emissions will be achieved by controlling methanol as a surrogate.

Since the supplemental notice was published, EPA has further evaluated the industry's data regarding process variability. The data indicates that methanol emissions from individual process vents varied significantly over time (A-92-40, IV-B-20). The industry data that were used to develop the initial emission limits cited in the March 8, 1996 supplemental notice were based on limited information that did not account for this process variability. One of the compliance options for sulfite mills is a numerical emissions limit. The EPA determined that the appropriate limit should incorporate the process variability inherent in normal operation. The EPA determined the amount of variability associated with a 99.9 percent confidence level in the data supplied by the industry. This amount of variability (confidence interval), therefore, was applied to the average emission limits from the best controlled mills to develop the final emission limit. After the close of the March 8, 1996, Federal Register supplemental notice comment period, additional information was provided to the Agency that indicated that the sodium-based sulfite pulping process is in use at some mills (A-92-40, IV-E-86, IV-E-94). No emissions information was available for this process. However, the Agency determined that due to the similarities in processes between calcium- and sodium-based sulfite pulping processes, the same limit developed for calcium-based mills would be applicable to sodium-based mills. For sodium- and calcium-based sulfite pulping processes, the final emission limit is 0.44 kilograms of methanol per megagram of ODP produced. For ammonium- and magnesium-based sulfite pulping processes, the final emission limit is 1.1 kilogram of methanol per megagram of ODP produced. Because the variability is included into the emission limits, these emission limits and corresponding monitoring parameters are never to be exceeded values.

Comment: One commenter (IV-E-91) indicated that a mill they are working for uses a sodium-based sulfite process and the March 8, 1997 Federal Register supplemental notice does not appear to address this specific process.

Response: This comment was submitted to EPA after the close of the comment period for the March 8 notice and shortly before promulgation; however, EPA has reviewed and evaluated the commenter's assertions. Based on a review of the information contained in the 1996 Lockwood-Post's Directory (A-92-40, IV-J-87) and discussions with mill operators (A-92-40, IV-E-94), EPA has decided that the pulping process used at the mill meets the definition of sulfite pulping proposed in the December 17, 1993 Federal Register notice (see 58 FR 66176). The March 8, 1996 supplemental MACT notice did not propose to amend the sulfite definition.

Although EPA does not have data specific to the sodium-based sulfite pulping process, EPA believes it is reasonable to group this process with the calcium-based sulfite pulping process for purposes of the MACT standard. This decision was made since the calcium- and sodium-based pulping process have similar equipment such as an acid making system and, unlike the ammonium- and magnesium-based sulfite processes, neither the calcium- nor the sodium-based sulfite process utilizes recovery furnaces.

Therefore, the final rule specifies that the calcium-based sulfite process methanol emission limits and percent reductions are applicable to the sodium-based sulfite pulping process.

The EPA believes that this is the only mill currently using a high-yield sodium-based sulfite pulping process, based on a review of the Lockwood-Post information. However, the information available to EPA also indicates that this mill utilizes some degree of mechanical refining in the pulping process and has a single peroxide bleaching stage. Based on this information, the Agency has assigned this mill to the semi-chemical pulping subcategory for purposes of the effluent limitation guidelines and standards, but is not setting revised effluent limits at this time for this subcategory in this promulgation.

The EPA believes that grouping this pulping process into separate subcategories within the MACT and effluent limitation guidelines and standards is consistent with the regulatory intent of the two EPA programs since the high-yield sodium-based sulfite pulping process has characteristics of both the sulfite and semi-chemical pulping processes (sulfite from an emissions standpoint and semi-chemical from a liquid discharge standpoint).

<u>Comments on semi-chemical pulping MACT floor control technology</u>.

<u>Comment:</u> Two commenters to the proposal (20,027, 20,071) maintained that the MACT floor level of control for pulping vent control at stand-alone semi-chemical mills should be no control, because none of the existing stand-alone semi-chemical mills are controlled.

Regarding the information contained in the March 8, 1996 supplemental notice, in which the Agency discussed separate MACT standards under consideration for semi-chemical mills, one commenter (IV-D2-15) agreed with EPA that the collection and control of LVHC vents is a cost-effective control option and represents the floor for existing stand-alone and co-located semi-chemical mills. The commenter (IV-D2-15) also agreed that new source MACT for semi-chemical mills should be the control of the LVHC system plus the control of emissions from the pulp washing system. The commenter (IV-D2-15) agreed that the MACT for semi-chemical wastewater is no control.

Response: Information provided by industry in survey responses and after proposal (A-92-40, IV-Dl-41, IV-Dl-80, IV-Dl-86, IV-Dl-89, IV-Dl-90, and IV-Dl-93) confirmed that the MACT floor level of control at semi-chemical mills is collecting and controlling LVHC vents. The Agency determined that it was not reasonable to control other emission points at existing semi-chemical mills (A-92-40, IV-B-12). New source MACT is based on the best controlled at sources. Data indicate that the best-controlled semi-chemical mills combust LVHC emissions and emissions from pulp washers. New sources, therefore, are required to control LVHC vents and emissions from the pulp washers. A detailed discussion of the level of the standards for semi-chemical processes is contained in the March 8, 1996 supplemental notice and in the docket (A-92-40, IV-B-12).

Comments on soda pulping MACT floor level of control technology.

Comment: Regarding the December 1993 proposal, one commenter (20,072) argued that since EPA has historically regulated kraft mills differently than soda mills, the MACT floor level of control would be significantly different between kraft and soda mills. The commenter (20,072) stated that by combining the two existing soda mills with over 100 kraft mills, the difference in the actual MACT floor was lost.

With regard to the information contained in the March 8, 1996 supplemental notice, in which the Agency discussed soda mill requirements, one commenter (IV-D2-15) agreed with EPA that both the existing and new source MACT for the soda mill subcategory is the collection and control of LVHC vents. The commenter agreed that the MACT for wastewater at soda mills is no control.

Response: Data available to EPA indicate that soda mills do not currently control any of the equipment that is subject to the MACT requirements for kraft mills. Therefore the floor level of control is no control. However, EPA has determined that the emissions from soda mills are similar to kraft mills (with the exception of TRS compounds) and control of LVHC vents is technically feasible and can be achieved at a reasonable cost. The EPA also determined that controlling additional vents beyond the LVHC vents at existing soda mills could not be achieved at a reasonable cost. However, controlling the pulp washing system at new soda mills could be achieved at a reasonable cost. Therefore, the final rule requires existing soda mills to collect and control LVHC vent streams and new mills to control LVHC vents and pulp washing system. The commenters are referred to the March 8, 1996 supplemental notice and (A-92-40, IV-B-12) for a detailed discussion of EPA's determination of soda mill requirements.

Closed-vent collection system.

Comment: Two commenters (20,027, 20,054A2) indicated that EPA did not evaluate the operational requirements and performance of the average of the best-performing 12 percent of sources when developing the proposed closed-vent collection system requirements. One commenter (IV-D2-15) requested that EPA re-evaluate the calculation of the floor level of control technology for enclosure of pulping component sources and associated gas conveyance systems. Another commenter (IV-D2-7) asserted that no total enclosures and closed-vent systems are currently in place in the industry, and that their addition would not be cost effective in any existing facility.

Two commenters (IV-D2-7, IV-D2-15) requested that EPA scale back the visual inspection and leak detection requirements for the gas conveyance systems since the proposed regime does not represent the floor. In addition, since most conveyance systems operate at negative pressure, there is no need for leak detection. One commenter (20,027) stated that the proposed visual inspections for closed-vent collection systems were unnecessary due to the design (limited use of flanges) and type of materials of construction (stainless steel) used in LVHC and HVLC collection systems. Another commenter (20,057A2) stated that there were no data to support the inclusion of no detectable leaks from pulping and bleaching process vent collection systems as part of the MACT floor.

One commenter (20,027) asserted that the best-performing 12 percent of sources do not seal or lock bypass vents.

Response: The EPA proposed requirements that the Agency deemed reasonable to ensure that the closed-vent collection systems are properly operated and that the affected vent emissions are conveyed to the control devices. The EPA has evaluated the comments submitted after the December 1993 proposal and the March 1996 supplemental notice, and several revisions were made to the closed-vent collection system requirements.

The requirement for demonstration of negative pressure has been revised to apply only to enclosures and hoods. The requirement for demonstration of no detectable leaks has been revised to apply only to positive pressure systems or portions of systems. The EPA concluded that the leak detection requirements are necessary to verify that enclosures are collecting all emissions from applicable emission points in these systems. The EPA agrees with the commenters that leak detection for negative pressure systems is not useful since any leaks in the collection system will draw air into these systems.

The bypass line requirements were also revised. The proposed rule language requiring lock-and-key type seals was replaced with language specifying car-seals or seals that can easily be broken in case of emergencies, yet still indicate when the bypass valve position has changed. Additionally, the final rule specifies the use of log entries to record valve position.

The EPA disagrees with the commenters that the visual inspections are not necessary. No changes were made to the proposed visual inspection requirements for closed-vent collection systems since the intention in the rule was to inspect for bypass valve position, clogged drains, broken fan belts, etc. These problems are not necessarily affected by the design or material of construction of the system. A related issue on downtime and back-up controls is discussed in section 4.3.4.

4.3.1.3 Bleaching.

Suggested alternative MACT floors for bleaching.

Comment: Several commenters (20,018A1, 20,027, 20,036A1, 20,045, 20,051, 20,056, 20,057, 20,115A2, IV-Dl-4, IV-Dl-8, IV-Dl-15, IV-Dl-16) discussed the floor level of control for chlorine, chlorinated HAP's, and non-chlorinated HAP's.

With regard to the December 1993 proposal, several commenters (20,027, 20,056) agreed that scrubbing is the correct control technology for bleach plants but that EPA did not correctly establish control efficiencies or pollutants controlled. Several commenters (20,018A1, 20,027, 20,036A1, 20,045, 20,051, 20,056) reasoned that because existing bleach plant scrubbers are not effective on any HAP except chlorine, the floor level of control for methanol and HAP's other than chlorine should be no control. One commenter (20,027) concluded that to go beyond the floor of no control, the cost-effectiveness should be evaluated. (Data provided: Table 10 p. MACT-190, Table 11 p. MACT-191, Table 12 p. MACT-194, and Appendix MACT 22.) Two commenters (20,056, 20,070Al) indicated that the control efficiency selected had not been shown to be achieved in practice by the best-performing 12 percent of mills. One commenter (20,115A2) argued that reduction of chlorine and methanol by 99 percent using a scrubber, as specified in the proposed regulations, would not be possible in the pulp and paper industry or any other industry. One commenter (20,057) stated that EPA failed to consider methanol generation rates or scrubber removal efficiencies when they established the proposed MACT standards for bleach plant vents.

Several commenters to the March 8, 1996 supplemental notice (IV-D2-15, IV-D2-16, IV-D2-8) agreed with EPA's conclusion that the data provided by NCASI supports the control of chlorinated HAP only in the bleaching component and the MACT floor should be control of only chlorinated HAP's.

Several commenters (20,018A1, 20,027, 20,080, 20,149, IV-Dl-3, IV-Dl-4, IV-Dl-8, IV-Dl-10, IV-Dl-15, IV-Dl-16, IV-Dl-17, IV-Dl-18) discussed the MACT floor based on process changes and effluent guidelines BAT requirements.

With regard to comments solicited on the MACT control technology basis for bleach plants in the December 1993 proposal, one commenter (20,018Al) indicated that complete ClO_2 substitution should be MACT for the bleaching component because the effluent guidelines required complete substitution of chlorine with ClO_2 for kraft bleaching, and ClO_2 bleaching has lower emissions of chlorine and ClO_2. Two commenters (20,027, 20,059) supported emission limits for chlorinated organic compounds set based on the reductions obtained by process changes. One commenter (20,071) suggested compliance for both chlorine and chloroform could be demonstrated by elimination of hypochlorite and complete ClO_2 substitution. Several commenters (20,049A2, 20,091, 20,102, 20,103, 20,127, 20,129) stated that chloroform emissions should be minimized by using process changes or through the use of advanced innovative technologies, such as biofiltration following gas scrubbing. One commenter (20,149) indicated that the proposed rules did not control chloroform emissions which they state posed a significant health risk. One commenter (20,118) suggested deferring the requirement to control chloroform emissions until the impact of 100 percent ClO_2

substitution and elimination of hypochlorite stages has been evaluated. Another commenter (20,027) reported that reliable data are not available regarding the effect of process changes on HAP emissions from bleach plant vents; consequently, it would not be appropriate to use a combination of process changes and gas scrubbing to set the MACT floor level of control for bleach plant vents. Several commenters (20,091, 20,138, 20,141, 20,143, 20,156) indicated that the rules should be written as a guide for a complete phaseout of processes using chlorine or ClO_2 compounds to bleach pulp. One commenter (20,091) indicated that if a complete phaseout is not possible, they prefer maximum ClO_2 substitution to alternatives that do less to reduce the formation of organochlorines.

Two commenters (20,027, 20,115A2) stated that a chloroform emissions limitation is not needed for the bleach plant because process modifications will reduce chloroform.

One commenter (20,031) suggested, however, that EPA rewrite the bleaching component standards to allow the continued use of hypochlorite as a bleaching agent on a site-specific basis to address other environmental concerns.

Regarding the information presented in the March 8, 1996 supplemental notice, several commenters (IV-D2-15, IV-D2-17, IV-D2-16, IV-D2-8) agreed with EPA's intent to consider compliance with the effluent guidelines BAT option equivalent to MACT compliance for chloroform. One commenter (IV-D2-4) supported the EPA Office of Water's requirements to eliminate hypochlorite bleaching through ClO_2 substitution for all paper grades where it is technically feasible.

Several commenters (IV-D2-18, IV-D2-10, IV-D2-3, IV-D2-8) agreed with the MACT floor level of control as outlined in the March 8, 1996 supplemental notice. In response to EPA's solicitation of comments on whether an alternative equivalent numerical limit for chloroform is needed, the commenters asserted that compliance with the BAT water standards will virtually eliminate chloroform emissions and that a numerical limit is neither needed nor desired.

One commenter (IV-D2-4) expressed concern over EPA's decision to move away from using methanol as a surrogate for organic HAP from bleaching processes and whether organic HAP's will be adequately controlled from the bleaching process. The commenter (IV-Dl-4) indicated that most of the organic HAP emissions that would remain after the elimination of hypochlorite originate from the use of dirty wash water and that organic HAP emissions could be reduced by limiting the organic HAP content of the wash water. The commenter urged EPA to clearly define how the chosen approach will control the organic HAP and TRS emissions from the bleaching process.

Response: In the March 8, 1996 supplemental notice, the Agency revised the proposal for the bleaching system requirements based on information and comments received after proposal. The new data indicated that caustic scrubbing reduces emissions of chlorinated HAP compounds (except chloroform), but does not control non-chlorinated HAP emissions. The Agency determined that no other option was feasible to control non-chlorinated HAP'S. Although chloroform emissions could not reasonably be reduced by use of one add-on air pollution control technology, chloroform emissions can be reduced using process modifications, such as ClO_2 substitution.

In the March 8, 1996 supplemental notice, the Agency proposed to require chlorinated HAP emissions other than chloroform to be controlled by 99 percent using a caustic scrubber (with chlorine as a surrogate for chlorinated HAP). As an alternative to the percent reduction standard, the Agency also proposed an emission limit of 10 ppmv HAP at the caustic scrubber outlet (with chlorine as a surrogate for chlorinated HAP). The Agency also solicited comments on providing a mass emission limit alternative to the percent reduction and the outlet concentration standards.

Commenters on the March 8, 1996 supplemental notice supported the changes to the scrubber requirements in the proposed rule. Several commenters also supported development of a mass emission limit alternative for the scrubber outlet. The Agency evaluated data supplied by the commenters and data in sampling tests. The results of the evaluation indicated that sufficient data exist to develop an appropriate mass emission limit (A-92-40, IV-B-29). Therefore, the final rule includes a mass emission limit alternative of 0.001 kg of total chlorinated HAP (not including chloroform) per Mg of ODP produced for bleaching system scrubbers.

After proposal, the Agency also evaluated the effect of process modifications on chloroform emissions. The results of this analysis indicated that the technology basis for MACT control of chloroform was 100 percent ClO_2 substitution and reduction of hypochlorite as a bleaching agent. These process modifications were determined to reduce chloroform emissions significantly. The technology basis for BAT under the effluent limitation guidelines and standards also require 100 percent ClO_2 substitution and elimination of hypochlorite. Since BAT and MACT are essentially the same, EPA therefore proposed in the March 8 notice that chloroform emissions be controlled by complying with the BAT requirements. No adverse comments were received to this proposal.

In the March 8, 1996 supplemental notice, the Agency solicited comments on whether an alternative numerical limit for chloroform (i.e., besides complying with BAT) was needed. Some commenters contended that a numerical limit for chloroform would be unnecessary because the BAT requirements would achieve the requisite reductions. The Agency did not receive any indication of any benefit from a numerical limit for chloroform. Additionally the Agency did not have sufficient data and did not receive any further data after the March 8 notice to develop a numerical limit. Therefore, the final rule does not include a numerical limit for chloroform.

Consequently, EPA has concluded that the existing and new source floor level of control for chlorinated HAP's is caustic scrubbing with 100 percent ClO_2 substitution and elimination of hypochlorite use. Compliance with the effluent guidelines BAT option is at least as stringent as the MACT floor level of control. Therefore, the final rule requires mills to comply with the BAT requirements in the effluent limitation guidelines and standards, or eliminate the use of hypochlorite and chlorine. For non-chlorinated HAP's, the existing source and new source floor is no control since no emission reduction from the current baseline for non-chlorinated HAP's is being achieved with the bleach plant control technology.

Because MACT for new sources is equivalent to MACT for existing sources, the new source MACT standards for bleaching systems require compliance with BAT/Pretreatment Standards for Existing Sources (PSES) requirements (or implementation of 100 percent substitution and elimination of hypochlorite). This requirement applies even if the mill or bleaching system also meets the definition of new source under the effluent guidelines limitations and standards, and thus is required to meet the more stringent new source effluent requirements of NSPS/Pretreatment Standards for New Sources (PSNS). Although the NSPS/PSNS may require installation of technologies that reduce effluent loading beyond what is achieved by 100 percent substitution and elimination of hypochlorite, EPA is not aware that these advanced technologies will provide air emission reductions beyond what the BAT/PSES requirements will achieve.

The EPA evaluated the cost of going beyond the floor to control non-chlorinated HAP's (see proposal preamble) using a scrubber or a combustion device but determined that these options had a substantial cost and environmental impact for limited emission reduction. Therefore, EPA determined these options were not warranted.

Comment: Three commenters (20,049A2, 20,080, 20,127) argued that zero use of chlorine compounds should be the baseline standard for MACT. In support of this position, one commenter (20,080) cited the fact that there is at least one place in the world where all grades of paper are produced using chlorine-free technology. One commenter (20,122) argued that EPA should have evaluated the top 12 percent of mills in other countries, not just the United States. The commenter (20,122) stated that totally chlorine free (TCF) technologies at paper-grade kraft mills in other countries were not reflected in the proposed rule. The commenter (20,122) contended that EPA should revise the proposed regulation and evaluate the appropriateness of TCF technologies.

One commenter (20,059) argued that the references in the Act to the elimination of emissions and its emphasis on elimination of dioxin emissions should have led EPA to select totally chlorine free technologies as the basis for the bleaching area MACT standard. The commenter (20,059) provided technical and legal support for their argument in their comments on the proposed effluent guidelines. One commenter (20,129) contended that in addition to TCF processes EPA should have also focused on emerging technologies, such as biofiltration, to minimize toxic HAP emissions.

Response: The EPA interprets the Act as requiring EPA to establish the MACT floor level of control based on available data from the source category to be regulated (best-performing 12 percent of the existing sources for which [EPA] has emissions information) ". Control devices or technologies in use in other countries may be evaluated for determining control options beyond the MACT floor level of control.

The use of TCF technologies in the U.S. is limited (currently only one mill has implemented the TCF process and this mill does not produce a full array of products). Therefore, it does not constitute the MACT floor level of control for existing sources. The use of TCF technology has not been sufficiently demonstrated to produce the wide variety of U.S. pulp and paper products for EPA to conclude that the technology can be used widely. Therefore, EPA determined that it was inappropriate for TCF technologies to be the new source MACT. A detailed discussion of TCF is presented in the effluent guidelines portion of the promulgation preamble (VI.B).

The installation and operation of the TCF bleaching process meets all the bleaching MACT standards for paper-grade bleaching and would constitute compliance with the final rule. Therefore, TCF bleaching is an alternative compliance option for the bleach plant. Also, the effluent guidelines portion of the final rule provides incentives for mills to adopt TCF technologies.

<u>The EPA should defer requirements for dissolving grade mills</u>.

<u>Comment:</u> One commenter (IV-D2-17) suggested that a separate MACT floor level of control for chloroform should be developed for dissolving-grade pulp production. The commenter (IV-D2-17) anticipated that the dissolving-grade MACT would be similar to EPA's requirements for paper-grade production (i.e., ClO_2 substitution and elimination of hypochlorite use in order to control chloroform, alkaline scrubbing for chlorinated HAP). The commenter (IV-D2-17) also anticipated that numerical emission limits for chlorinated HAP emissions would not be applied. Other commenters (IV-D2-15, 25,538) recommended that EPA defer chloroform control requirements for dissolving-grade mills until BAT is established for those mills.

<u>Response</u>: The EPA has concluded that MACT for chlorinated HAP's is caustic scrubbing and process modifications (100 percent substitution and elimination of hypochlorite) for paper-grade

mills. The effluent limitation guidelines and standards BAT requirements are at least as stringent as the MACT requirements. Therefore, the final rule requires bleach plants to control emissions using a caustic scrubber and comply with the BAT requirements or eliminate the use of chlorine and hypochlorite.

As stated in the July 15, 1996 Federal Register notice (61 FR 36835), EPA is evaluating new data on the technical feasibility of reducing hypochlorite usage and implementing high levels of ClO_2 substitution on a range of dissolving-grade pulp products. Therefore, EPA is deferring issuing effluent limitation guidelines and standards for dissolving-grade mills until the comments and data can be fully evaluated. The EPA expects to promulgate final effluent limitation guidelines and standards for dissolving-grade subcategories at a later date.

The EPA has decided to delay establishing these MACT standards for chloroform and for other chlorinated HAP's for dissolving-grade bleaching operations until promulgation of effluent limitation guidelines and standards for those operations, for the following reasons. With respect to the MACT standard for chloroform, first, as explained above and in the March 8, 1996 notice, the control technology basis for the effluent limitation guidelines and standards and the MACT requirements will be the same. Second, at present, the Agency is unsure what level of chlorine substitution and hypochlorite use is achievable for dissolving-grade mills. Thus, although EPA has a reasonably good idea what the technology basis of MACT and effluent limitation guidelines and standards is likely to be for dissolving-grade mills, the precise level of the standards remains to be determined. Consequently, at present, EPA is unable to establish what the MACT floor would be for chloroform emissions from bleaching systems at these mills, and there is no conceivable beyond-the-floor technology to consider. The EPA will make these determinations based on data being developed, and then promulgate for these mills effluent limitation guidelines and standards and, concurrently, MACT standards based on those effluent limitation guidelines and standards. Covered mills would therefore be required to comply with the MACT standards reflecting performance of the effluent limitation guidelines and standards no later than 3 years after the effective date of those standards, pursuant to Act section 112(i)(3)(A).

The basis for delaying MACT requirements for chlorinated HAP's other than chloroform (again, from dissolving-grade bleach operations only) differs somewhat. As noted above, the technology basis for control of these HAP's is use of a caustic scrubber. However, when plants substitute ClO_2 for chlorine and eliminate hypochlorite (in order to control chloroform emissions and discharges to water, as explained above), a different scrubber will be needed that can adequately control both the ClO_2 emissions for worker safety reasons and the emissions of chlorinated, non-chloroform HAP's. The Agency's concern (shared by the commenters who addressed this question) is that immediate control of the non-chloroform chlorinated HAP's could easily result in plants having to install and then replace a caustic scrubber system in a few years due to promulgation of effluent limitation guidelines and standards and MACT requirements for chloroform. This result is an inappropriate utilization of scarce pollution control resources.

The EPA notes that an affected bleached paper-grade mill must comply with the MACT requirements no later than 3 years from publication in the Federal Register, even if the mill's existing CWA National Pollutant Discharge Elimination System (NPDES) permit does not yet reflect the corresponding effluent limitation guidelines and standards because its existing terms have not expired or it has been administratively extended. Put another way, even if a mill's existing NPDES permit serves as a shield (until reissuance) against imposition of new limits based on new effluent limitation guidelines (see CWA section 402(k)), the MACT requirement for bleached paper-grade mills to control chloroform emissions through compliance with all parameter requirements in the effluent limitation guidelines and standards takes effect to satisfy the requirements of the Act. Similarly, if a bleached paper-grade mill's NPDES permit is reissued sooner than the expiration of the 3-year compliance schedule authorized for the chloroform MACT requirements and calls for immediate compliance with the BAT limitations, that deadline would prevail. The same principles will apply when effluent limitation guidelines and MACT standards are promulgated for dissolving-grade mills.

Incineration followed by scrubbing.

Comment: In the preamble to the proposed rule, EPA requested comment or data on the use of combustion followed by scrubbing to control emissions from the bleach plant. In response to EPA's request, one commenter (20,027) claimed they were not aware of any mill that used a combination of incineration followed by scrubbing to control bleach plant emissions; therefore, it should not be considered a floor level of control technology for bleaching vents. The commenter (20,027) further stated that combustion of certain gas streams followed by gas scrubbing of others would not be cost effective as a beyond-the-floor level of control technology for bleaching vents, based on a cost analysis presented in the submitted comments.

Response: The EPA agrees with commenters that the combination of incineration followed by scrubbing is a technology that is more stringent than the MACT floor. The EPA determined that combustion followed by scrubbing could be achieved at a cost-effectiveness greater than $8,000/Mg HAP (see proposal preamble). The EPA determined that the costs were not reasonable given the level of emission reduction and the additional environmental impacts (increased water discharge and use) from this option. Therefore, the technology was not adopted for MACT.

MACT floor for non-kraft mill bleach plants.

Comment: Two commenters on the proposed rule (20,053A1, 20,072) suggested alternative MACT floor levels of control for the bleaching area for mills other than kraft. Based on a project they undertook to understand methanol generation and control at a soda mill, one commenter (20,072) indicated that the MACT floor level of control for the bleaching component at soda mills should be equivalent to the proposed rules with the exception that the performance of the treatment device should be based on 95 percent removal of chlorine and ClO_2 rather than 99 percent removal of total HAP.

Response: Based on current data, EPA has decided not to create subcategories for the bleaching processes based on the type of pulping technology. The differences in the bleaching processes between mills using different pulping technologies does not appear to be great enough to warrant separate control requirements.

The final rule requires mills to control chlorinated HAP's using caustic scrubbing and by meeting the effluent limitation guidelines and standards BAT requirements or by eliminating hypochlorite and chlorine use. Regarding one commenter's concern about the bleach plant scrubber requirements, data reviewed by EPA (A-92-40, II-I-24) show that bleach plant scrubbers in pulp and paper mills achieve 99 percent control of chlorinated HAP's. The commenter did not provide support for requiring a lower percent reduction (95 percent). Therefore, the bleach plant scrubbers are required to achieve 99 percent control of chlorinated HAP's in the final rule (excluding chloroform).

4.3.1.4 Wastewater.

Steam strippers are not appropriate as floor level of control technology.

Comment: Several commenters (20,027, 20,051, 20,054A2, 20,146) disagreed with the conclusion that steam stripping is a floor level of control technology for process wastewater. The commenters (20,011, 20,027, 20,051, 20,054A2) explained that steam strippers currently in place were used for reducing odor and BOD loadings to the biological treatment plant, and for generating hot water for use in other process areas, but they were not used for HAP or VOC emissions control. The commenters (20,027, 20,051, 20,054A2) indicated that for these reasons, steam strippers have never been calibrated or operated for the type of continuous emission reduction that EPA has proposed. However, one commenter (20,059) supported EPA's proposal of steam stripping as the floor level of control technology for wastewater treatment. The commenter (20,059) cited the fact that the American Paper Institute (API)/NCASI survey identified 31 mills that currently use steam strippers to control emissions from wastewater as support for this position.

Two commenters (20,027, 20,066A4) indicated that steam stripping for the process wastewater component should be considered as beyond-the-floor level of control and must be cost justified. One commenter (20,146) stated that EPA vastly underestimated the costs of steam stripper installation and operation. According to one commenter (20,027), the cost-effectiveness of controlling wastewater components using steam stripping would not be reasonable based on EPA or industry cost and emission reduction estimates (A-92-40, 11-B-20, 11-B-28, 11-B-43, 11-C-10, 11-I-13, and 11-I-18).

Several commenters (20,027, 20,045, 20,066A4) claimed that because methanol is the principal HAP and biological treatment systems typically achieve greater than 90 percent reduction of methanol, biological treatment should be the floor level of control technology.

One commenter (20,027) stated that there are no sulfite mills that currently use steam strippers. However, one commenter (20,123A6) provided data on an existing steam stripper that is used to recover SO_2 at a sulfite mill. Two commenters (20,027, 20,076) declared that there are no sulfite mills that currently capture all emissions from process wastewater collection and treatment. One commenter (20,027) submitted that because of this, the MACT floor level of control for the process wastewater component at sulfite mills should be no control. Other commenters (20,045, 20,076) indicated that biological treatment should be the appropriate MACT floor control for sulfite mills. Two commenters (IV-D2-15, IV-D2-16) agreed with EPA's conclusion that the floor level of control for sulfite wastewater emissions is no control.

One commenter on the March 8, 1996 supplemental notice (IV-D2-7) agreed with EPA's conclusion that MACT for semi-chemical wastewater is no control. Another commenter (IV-D2-15) agreed with EPA's conclusion that MACT for bleaching wastewater is no control.

Response: The March 8, 1996 supplemental notice presented a detailed discussion of revisions made to the steam stripping requirements since proposal. The EPA concluded that steam stripping is the floor level of control for kraft wastewater streams. This conclusion was based on information collected in the 1992 voluntary MACT survey and other industry data submitted after proposal (A-92-40, IV-B-10, IV-Dl-3, IV-Dl-82, IV-Dl-91, and IV-J-32). Based on this information, EPA determined that greater than 20 percent of kraft mills practice steam stripping. Therefore, the MACT floor level of control for kraft wastewater is steam stripping.

For sulfite, semi-chemical and soda mills and bleaching processes, EPA has determined that process wastewater is not controlled at the floor level of control. Steam stripping is not required as a beyond-the-floor option due to the high cost required for a limited emission reduction.

With regard to the comment that steam strippers were not installed for HAP or VOC emissions reduction, the Act requires that EPA determine MACT based on the best-performing facilities (i.e., the facilities with the lowest achievable emissions rate; see discussion under section 4.1, Statutory Interpretation). The specific technologies in place at a best performing mill or the reasons for their existence are not relevant to the MACT determination.

The commenters' concern that steam strippers have never been calibrated or operated for the type of continuous emission reduction proposed by EPA is addressed in section 4.3.4 on downtime.

Enclosure of wastewater streams should not be in the floor level of control.

Comment: Several commenters (20,027, 20,018A1, 20,051, 20,054A2, 20,146) stated that EPA failed to demonstrate that any sources, much less 12 percent of sources, practice universal enclosure of all wastewater streams. One commenter (20,027) also stated that the use of covers in the industry was not sufficiently widespread enough to be considered a floor level of control technology; therefore, universal enclosure should be considered a beyond-the-floor option. In addition, the commenter (20,027) indicated that EPA did not provide any record of the costs or benefits associated with enclosing wastewater streams. Two commenters (20,027, 20,146) reasoned that since surface impoundments and clarifiers emit very small amounts of HAP's, the requirements to cover and control emissions from these units are totally unwarranted and should be removed from the final regulation.

One commenter (IV-D2-7) noted that covering and venting to a control system all the equipment and tanks associated with wastewater treatment would be costly, impractical, and completely unreflective of current industry practice. The commenter (IV-D2-7) believes that covering these units does not represent a floor level of control practice and that EPA has not provided a cost-effectiveness analysis to substantiate a "beyond-the-floor" level of control.

Response: As discussed previously in this section, EPA determined that steam stripping is the floor level of control for kraft mill condensates (A-92-40, IV-B-8). The EPA determined that a well-operated biological treatment system can achieve equivalent control if the wastewater conveyance system is enclosed to prevent volatilization of HAP's from the wastewater (A-92-40, IV-Dl-75). At proposal, the covering and enclosure requirements were set forth for mills that wanted to use their existing sewer system to convey the wastewater to the biological treatment system. Failure to enclose conveying pipes and trenches would vitiate the rules effectiveness, since volatile HAP's would be released by the time wastewater reaches the biological treatment unit. See 56 FR at 33495, 33530 (necessity of controlling volatile wastes at the point of generation). The final rule requires that mills choosing to use biological treatment must hardpipe the effluent to the treatment unit using a condensate collection system meeting the individual drain system requirements specified in subpart RR §§ 63.960, 63.961, 63.962, and 63.964.

4.3.2 MACT Floor Control Applicability

4.3.2.1 Named Stream Approach Versus Applicability Cutoffs.

Comment: Many commenters (20,027, 20,054A2, 20,056, 20,057, 20,057A2, 20,059, 20,07OAl, 20,074, 20,118, 20,146) disagreed with the levels chosen for the applicability criteria in the

December 1993 proposal for the pulping, bleaching, and process wastewater components. Most of the commenters (20,027, 20,054A2, 20,056, 20,057, 20,057A2, 20,070Al, 20,074, 20,118) objected that the de minimis levels for the applicability criteria were too low, did not represent the MACT floor level of control, and would result in sources being subject to the MACT standards beyond the floor level of control. One commenter (20,059) indicated the applicability level was set too high. Three of the commenters (20,027, 20,059, 20,146) objected that EPA lacked sufficient data and quantitative information to support the numerical values or cutoffs. One commenter (20,010) supported the proposal as set forth because it required the control of all significant emission points from the bleaching process.

One commenter (20,059) contended that EPA did not evaluate a range of applicability levels, nor did it assess the environmental implications of the proposed cutoff levels, or any alternatives. The commenter (20,059) was concerned that some LVHC concentration vents that should be controlled would not be. The commenter (20,059) suggested a sliding scale combination of flow and concentration to determine applicability rather than excusing a vent because either flow or concentration were low. Several commenters (20,027, 20,054A2, 20,056, 20,057A2, 20,066A4, 20,118) suggested specific levels for de minimis flow and concentration rates.

Several commenters (20,027, 20,056, 20,066A4) proposed approaches for re-determining the floor level of control applicability levels. One commenter (20,027) strongly recommended that EPA use the control and stream characterization information submitted by industry to set applicability levels

(A-92-40, II-B-20, II-B-21, II-F-27). Two commenters (20,027, 20,066A4) suggested that EPA establish de minimis flow and emission rates for pulping and bleaching process vents using the data from deckers and screens, sources for which the proposal determined to have no control at the floor level of control. One commenter (20,027) suggested limiting the use of de minimis criteria to the floor level of control emission points, revising the criteria to annual averages, and allowing for engineering evaluations to determine source applicability. The commenter (20,027) also suggested using a total resource effectiveness (TRE) equation to determine applicability as cited in the HON. The commenter's (20,027) rationale was that a TRE brings in a third parameter (i.e., cost-effectiveness) in determining applicability.

Several commenters (20,027, 20,046A2, 20,059, 20,07OAl, 20,071, 20,074, IV-D2-15) supported naming the emission points in the pulping component that must be controlled. One commenter (IV-D2-15) noted that this approach would make the rule easier for the regulated community to understand and implement, eliminate the need for widespread testing to determine applicability, and would guarantee the treatment of those streams with significant HAP concentrations. The commenter (IV-D2-15) also stated that this approach will simplify preparation, review, and enforcement of permits for pulp and paper mills, as well as result in significant reductions in implementation costs to mills while resulting in emission reductions equivalent to those proposed. One commenter (20,056) stated the only process equipment that should have been considered for control in the floor was as follows: (1) digester or NCG system; (2) digester relief system; (3) evaporator NCG and hotwell gases; (4) oxygen delignification unit (blow gases and washer); (5) foam breaker or filtrate tanks; and (6) weak black liquor storage tanks. The commenter (20,056) indicated that dewatering devices other than deckers should also be exempt from control.

One commenter (20,043) explained that for quality assurance purposes, samples are collected throughout the processing of pulp and paper and requested that the sample pots and their associated air and water emissions be considered de minimis in the final rule.

Response: At proposal, EPA had limited data to characterize some of the smaller emission points and condensate streams within the pulping component. In the absence of more specific data, the applicability values were identified as a way to distinguish between the emission points that were controlled at the floor level of control and those that were not. Since proposal, industry has submitted additional data (A-92-40, IV-Dl-29, IV-Dl-29a, IV-Dl-31, IV-Dl-33, IV-Dl-34, IV-Dl-35, IV-Dl-38, IV-Dl-39, IV-Dl-41, and IV-Dl-41). This new information allowed EPA to identify which vent and condensate streams are actually controlled at the floor level of control. The EPA reanalyzed the floor level of control based on these designations. The EPA then revised the format of the proposed rule to account for the new data and the results of the floor level of control analysis. The format for the final rule names specific streams to be controlled. The EPA also determined that applicability values were appropriate for decker, knotter, and screen systems. The EPA is not regulating all decker, knotter and screen systems because control of all these streams are not in the floor level of control, only the high emitting ones. No further control is justified. Commenters are referred to section 4.3.1.2 for a discussion of the applicability determinations for decker, knotter, and screen systems.

The different approach used in the final rule does not significantly change the number of emission points controlled from those intended to be controlled in the proposed rule. The emission points and condensate streams that are being controlled in the final rule are fundamentally the same emission sources that EPA intended to be controlled in the proposed rule. The EPA concluded that the revised approach is easier and less costly to implement, for both the affected industry and the enforcement officials, since extensive emission source testing is not required to identify the vent and condensate streams to be controlled.

MACT floor level of control applicability for condensate streams.

Comment: Regarding the December 17, 1993 proposal, one commenter (20,027) declared that the applicability format selected for wastewater streams presumed that all streams in the mill (except the bleach plant acid and caustic sewers) would require control unless they are tested to prove they are below the cutoff thresholds. The commenter (20,027) stressed that this format would require unnecessary testing and evaluation in areas of the mill where control is not warranted.

Two commenters (20,027, 20,056) suggested that EPA specify by name or class which wastewater streams are exempt and which streams must be sampled to prove they are de minimis. One commenter (20,027) suggested specific format changes for the process wastewater area.

One commenter (IV-D2-3) requested that the rule specifically allow stripped condensates or condensates not listed for control to be reused at any location in the mill or be sewered without additional control requirements.

Regarding EPA's approach of naming condensate streams subject to the MACT control applicability in the March 8, 1996 supplemental notice, one commenter (IV-D2-15) agreed with EPA's decision to name the specific pulping process wastewater streams that will be subject to control. The commenter (IV-D2-15) stated that this approach eliminates the need for an expensive open-ended sampling program to show what streams did not meet the concentration and flowrate applicability criteria. The commenter (IV-D2-15) stated that the control of the named streams will treat more HAP-containing water than is currently being treated; therefore it will provide a level of control beyond the floor. While the commenter (IV-D2-15) did not take exception to this particular requirement, the commenter felt it should be noted. The commenter (IV-D2-15) added that the rule should also state explicitly that the treated condensates should be available for reuse throughout the mill without any further restrictions.

One commenter (IV-D2-14) disagreed with EPA's decision in the March 8, 1996 supplemental notice to define pulping process wastewater streams requiring control as those achieving a 65 percent or greater methanol recovery. The commenter (IV-D2-14) noted that evaporator or condenser systems that do not currently achieve 65 percent methanol recovery cannot simply readjust the internal configuration of the equipment and that improved recovery would require extensive modification or replacement of equipment. The commenter (IV-D2-14) also suggested that newly installed systems may or may not be able to achieve the 65 percent methanol level and the commenter proposed to redefine pulping process wastewater streams to be controlled as those with a minimum of 50 percent methanol recovery.

Two commenters (IV-D2-3, IV-D2-20) agreed that pulping process wastewater to be controlled should contain 65 percent of the methanol present in the vapor from the first weak liquor feed stage(s). The commenters (IV-D2-3, IV-D2-20) suggested that because they aggregate pulping process wastewater on more than the weak liquor feed stage(s), the definition needs to be clarified or else the mill will have to cease collection of methanol from evaporator stages other than weak liquor feed stage(s). The commenters (IV-D2-3, IV-D2-20) recommended that the rule make it clear that the 65 percent requirement applies to the system as a whole and not to every individual evaporator stage where condensate segregation is practiced.

Response: In the final rule, EPA has decided to retain the approach of requiring named streams to be controlled. This approach is the most efficient method of specifying applicability of the rule and will eliminate unnecessary testing and compliance burden on the affected industry. The final rule requires that the entire volume of the named streams must meet MACT, expressed as one of several treatment options.

However, the rule includes an option for reducing the volume of condensate to be treated from specified streams. Most mills currently practice some degree of condensate segregation on the pulping process wastewater streams. Condensate segregation is the practice of generating, producing, or isolating a high-HAP concentration/low flow rate condensate stream from process vent vapors or gases in order to maximize the HAP mass and minimize the condensate volume sent to subsequent treatment. If a mill utilizes condensate segregation to produce the pulping process condensate streams, only the high-HAP fraction stream must be treated according to the options specified in the standards. If condensate segregation is not practiced, the entire volume of the pulping process condensate stream must be treated.

Based on the information obtained in the 1992 voluntary NCASI survey, the floor level of control for kraft pulping process condensates is 92 percent removal of total HAP (based on the performance of steam stripping) from the high-HAP fraction condensates from the digester, turpentine recovery, and evaporator systems. However, no standard definition (e.g., HAP concentration, flow rate, mass, etc.) exists for designating the high-HAP fraction condensate streams from these systems. Consequently, EPA developed the percent mass split criteria for designating the high-HAP fraction condensate streams. As discussed in the March 8, 1996 Federal Register supplemental notice (61 FR 9390), EPA determined that condensate segregation can generate a high-HAP fraction stream containing 65 percent of the overall HAP mass present in the process vapor stream.

The 65 percent mass split was developed based on information provided by industry during a meeting with EPA (A-92-40, IV-E-15). The information contained example mass balances for digester, turpentine recovery , and evaporator system condensates before and after condensate segregation was implemented. The before-and-after mass balances were used to estimate the typical mass split found in the high-HAP fraction condensate streams that was achievable using segregation.

In their comments on the March 8, 1996 Federal Register supplemental notice and in additional correspondence to EPA (A-92-4, IV-Dl-97), industry indicated their support for the definition of the high-HAP fraction condensate stream. However in correspondence to EPA regarding suggestions to the MACT standard definitions (A-92-40, IV-Dl-107), industry indicated that a high-HAP fraction condensate stream should be designated by a 50 percent mass split (instead of 65 percent). This revision was necessary, according to industry, since some of the mills with the best-performing steam stripper systems could not meet the 65 percent mass split, even though they were sending a large amount of HAP mass to the stripper system for treatment.

To resolve the discrepancy between the EPA and industry percent mass split designations, additional data were evaluated to confirm the percent mass split values presented in the March 8, 1996 notice (A-92-40, IV-B-24). Based on the evaluation, EPA disagrees with the percent mass split recommended by industry (50 percent), and has decided to keep the 65/35 percent mass split.

In their correspondence, industry also suggested that an additional option be added to the MACT standard that would allow for either the percent mass split to be achieved or for a minimum HAP mass be sent to treatment. Some commenters also indicated that they would not be able to achieve the 65/35 percent mass split without extensive and costly modifications to their existing equipment. Based on the analysis presented in this memorandum, EPA believes that achieving the minimum mass requirements would also achieve their intent of controlling only the low volume, high-HAP fraction condensate streams.

The minimum mass requirements were based on the steam stripper performance requirements (i.e., percent and mass removal) developed for the MACT standard. The development of the steam stripper performance requirements is presented in a separate memorandum (A-92-40, IV-B-10). For both bleached and unbleached mills, the final rule requires 92 percent removal of HAP. For bleached mills, the mass removal requirement is 5.5 kilograms or more of total HAP (measured as methanol) per megagram of oven-dried pulp (kg HAP/Mg ODP); for unbleached mills, the mass removal requirement is 3.6 kg HAP/Mg ODP (measured as methanol). The minimum mass requirements for each type of mill (bleached and unbleached) were obtained by dividing the required mass removal by the required percent removal. For example, the mass removal required for bleached mills (5.1 kg HAP/Mg ODP) divided by the percent removal (92 percent) yields a minimum mass removal of 5.5 kg HAP/Mg ODP. The minimum mass removal for unbleached mills (3.6 kg HAP/Mg ODP) was obtained using the same procedure.

<u>MACT floor level of control should be applicable to chlorine dioxide preparation equipment</u>.

<u>Comment:</u> One commenter (20,110) asserted that the proposed rule did not address ClO_2 preparation equipment. Two commenters (20,091, 20,110) asserted that the rule should require control of ClO_2 preparation equipment and emission points. One commenter (20,091) contended that ClO_2 is more toxic than chlorine and the generation of ClO_2 is likely to increase in the future as the use of ClO_2 substitution becomes more prevalent in the industry.

<u>Response</u>: The final rule does not require control of ClO_2 generation equipment. No information has been submitted to the Agency to suggest that ClO_2 generation is a significant source of HAP emissions (Cl02 is not a listed HAP) or that controls exist at the floor level of control. Based on an engineering review of process flow diagrams of ClO_2 generation processes supplied by commenters, EPA has concluded that these processes are essentially closed processes without significant atmospheric vents. Facilities storing over 1,000 pounds of ClO_2 would be subject to the 112(r) requirement of an approved accident prevention and response plan.

<u>Using applicability levels</u>.

<u>Comment:</u> One commenter (20,059) argued that the use of cutoffs or applicability levels based on cost-effectiveness considerations would be illegal in light of Congress' rejection of cost-benefit and cost-effectiveness as a basis for setting MACT standards. The commenter (20,059) suggested that EPA eliminate the cutoff applicability criteria that exempt emission points from control.

One commenter (20,114) contended that the cutoff level of 500 ppmv for capture and incineration of vent gases contained in the proposal should be increased. The commenter (20,114) argued that the 500 ppmv cutoff was apparently developed using data from the synthetic organic chemical industry. The commenter (20,114) argued that application of data from a different industry must be justified by EPA.

<u>Response</u>: In the proposed rule, the applicability criteria were not chosen on the basis of cost-effectiveness but rather to delineate between vents and wastewater streams that are

controlled at the MACT floor level of control. Section 112(d)(2) of the Act requires the Administrator to establish standards based on the maximum degree of reduction in emissions of HAP's "taking into consideration the cost of achieving such emission reduction. . ." This mandate was followed by EPA and the standard was set at the floor. Applicability cutoffs were used to distinguish between vents that were and were not controlled at the floor level of control. Regarding the comments on the 500 ppm cutoff, the commenter appears to be confused with regard to the applicability cutoffs specified at proposal. The 500 ppmw (not volume) cutoff in the proposed standard applied to process wastewater streams. Regarding the commenter's concern about applying data from different industries, EPA interprets this comment to address the 20 ppmv outlet concentration specified for incinerators used to comply with the pulping process standards. The EPA has concluded that the outlet concentration is achievable for well designed and operated incinerators (A-92-40, IV-B-19).

Since proposal, industry submitted additional data (A-92-40, IV-Dl-29, IV-Dl-29a, IV-Dl-31, IV-Dl-33, IV-Dl-34, IV-Dl-35, IV-Dl-38, IV-Dl-39, and IV-Dl-41) that was used by EPA to revise the format of the proposed rule. The format for the final rule names specific streams to be controlled. The EPA also determined that applicability values were appropriate for knotter and screen systems. A more detailed discussion of this issue is presented in the March 8, 1996 supplemental notice. Commenters are referred to section 4.3.1.2 for a discussion of the applicability determinations for knotter and screen systems.

<u>MACT floor level of control applicability for sulfite mills</u>.

<u>Comment:</u> One commenter (20,027) reasoned that the MACT

floor level of control at sulfite mills should exclude the control of nonhalogenated HAP's from hot caustic extraction stages, and the control of digester or evaporator condensates because sulfite mills do not control these processes.

Response: The EPA agrees with the commenter. As discussed in the March 8, 1996 supplemental notice, the available data supports the establishment of separate emission standards for bleaching at paper-grade and dissolving-grade pulping processes but not on the type of pulping process (e.g., kraft, soda, sulfite, or semi-chemical pulping). The data also indicated that bleach plant scrubbers are ineffective at removing non-chlorinated HAP's. In the final rule, sulfite mills are required to comply with the respective bleaching standards for paper-grade or dissolving-grade processes, which set requirements for chloroform and other chlorinated HAP's.

Regarding the control of digester or evaporator condensates, EPA concurs that no existing sulfite mills control these streams. Therefore, control of these streams is not included in the MACT floor level of control. Considering cost and impacts, the EPA considers the option to steam strip these streams beyond the floor level of control, to be unreasonable.

Comment: One commenter (IV-D2-14) asked that the identity of the specific vents to be included in the mill systems be more explicitly stated. The commenter (IV-D2-14) provided a list of sulfite mill vents proposed to be included in digester, evaporator, and redstock washer systems.

Response: The EPA appreciates the commenter's support for requiring specific named streams to be controlled. The EPA evaluated the types of equipment controlled at existing sulfite mills in developing the MACT floor level of control and MACT requirements (A-92-40, IV-B-8). The final rule requires existing sulfite sources to control digester systems, evaporator systems, and pulp washing systems. New sulfite sources are required to control the same equipment as existing sources plus weak liquor storage tanks, strong liquor storage tanks, and acid condensate storage tanks. The emissions from these named systems must be collected in a closed-vent system and routed to a control device. Both the total methanol emissions from these named systems and condensate streams from equipment used to reduce methanol emissions at sodium- and calcium-based sulfite processes are to meet an emission limit of 0.89 lb/ODTP or are to be reduced by 92 percent. Similarly, both the total methanol emissions from magnesium or ammonium-based sulfite processes are to meet an emission limit of 2.2 lb/ODTP or are to be reduced by 87 percent.

Wastewater reuse.

Comment: One commenter (20,057A2) stated that EPA improperly determined the floor level of control for brownstock washers to be collection and incineration of vent gases. The commenter (20,057A2) asserted that if condensates that are recycled to the washer are required to be treated, then the emissions from the washer will be reduced when the cleaner condensate is used. According to the commenter (20,057A2), requiring treatment of condensates and collection and incineration of brownstock washer vents is tantamount to going above the floor level of control. The commenter (20,057A2) indicated that EPA should perform a cost analysis for going beyond the floor.

One commenter (20,057A2) recommended that wastewater emission reductions be measured on a "mill-wide" basis because of the complex processes of recycle and reuse found throughout the mill.

Response: While EPA agrees with the commenter that reducing the HAP concentration of shower water will reduce atmospheric emissions from brownstock washers, EPA does not agree that steam stripping is a beyond the floor level of control option. Based on data submitted after proposal (A-92-40, IV-J-32), EPA concluded that the streams that are typically recycled to brownstock washers are not the same as the named streams that are required to be treated in the steam stripper by the final rule. Additionally, the final rule includes a control option allowing mills to recycle the named condensate streams, without subsequent treatment, to a controlled piece of process equipment. Since the final rule requires pulp washers to be controlled, condensate streams recycled to this piece of equipment are not required to be treated.

Comment: One commenter (20,027) commented critically that the prohibition of wastewater stream dilution would require wholesale repiping of established process water flow patterns in the industry in order to avoid the impermissible "dilution."

Response: The part 63 general provisions prohibit sources from circumventing the control requirements of the part 63 standards. The general provisions specifically prohibit circumventing standards by dilution. Therefore, EPA does not consider it necessary to include similar requirements in the rule, and the final rule does not include this language.

4.3.3 Beyond the MACT Floor Level of Control.

4.3.3.1 MACT Set Beyond the MACT Floor Level of Control.

Comment: Two commenters (20,027, 20,146) stated that while the Act allows EPA, in certain cases, to set MACT beyond floor levels of control, EPA did not establish a foundation for such a decision for the proposed standards. (Case law cited: Portland Cement Assoc. v. Ruckelhaus, National Lime Assoc. v. EPA, and Sierra Club v. Costle; A-92-40, II-C-10.)

Response: Based on information available at the time of proposal and the statutory interpretation of the MACT floor level of control, EPA did not propose requirements beyond the MACT floor level of control. The EPA agrees with the commenter that if controls beyond the level of the MACT floor level of control were proposed, then they must be supported by sufficient information on the balance of costs, energy, and environmental impacts.

In the final rule, the only MACT requirements for existing sources that are beyond the MACT floor level of control are for soda pulping processes. Data available to EPA from the 1992 voluntary MACT survey and information received after proposal indicate that soda mills do not currently control any of the equipment that is subject to the MACT requirements for kraft mills (A-92-40, IV-B-8). However, EPA has determined that the emissions from soda mills are similar to kraft mills and that the control costs are similar to stand-alone semi-chemical mills. Therefore, EPA considers going beyond the MACT floor level to control LVHC vent emissions at soda mills to be an appropriate level of control for MACT for these mills, taking into consideration the costs of achieving the controls as well as the other factors, such as energy and environmental impacts (A-92-40, IV-B-12).

4.3.4 Downtime and Back-up Control Technologies

Comment: Several commenters (20,027, 20,043, 20,054A2, 20,057, 20,066A3, 20,146) indicated that downtime of equipment is part of the natural variability of operation, and should have been considered by EPA when determining the MACT floor. One commenter (20,027) further stated that continuous compliance without downtime, as required by the proposed standards, would be beyond the MACT floor level of control since no mill currently operates with this type of continuous compliance. One commenter (20,102) contended that based on past experiences of controlling NCG and brownstock washer gases in power boilers and lime kilns, existing control devices may not even be capable of providing continuous compliance.

One commenter (20,027) indicated that if no allowance for excess emissions is provided in the final rule, EPA must conduct a cost-effectiveness analysis for the use of backup control devices, since these control devices would be needed and the costs and secondary impacts of backup control devices for combustion sources and steam strippers were not addressed in the proposed standards. Two commenters (20,027, 20,115A2) concluded that because the downtime occurrence (and therefore the emission reduction) would be small and the costs for backup control devices would be large, the use of these backup control systems cannot be justified as cost effective as a beyond-the-MACT-floor level of control.

One commenter (IV-Dl-15) stated that very few mills have HVLC controls and only a small percentage of those mills have backup controls; therefore, backup controls are not part of the MACT floor level of control for HVLC systems. One commenter (20,149) indicated that existing combustion devices are down enough that it is reasonable to expect a backup device. One commenter (20,150) requested that new backup controls be required by all mills using the ClO_2 bleaching process. One commenter (20,110) stated that the proposed rule should be amended to require backup incineration devices. The commenter (20,110) indicated that backup emissions controls are already in place in a portion of the industry.

Several commenters (20,027, 20,057A2) disputed whether the general provisions to part 63 would cover maintenance and troubleshooting downtime, since the industry and regulatory officials do not generally consider these events malfunctions. Another commenter (20,054A2) stated that EPA had assumed that the startup, shutdown, and malfunction allowance would cover those events that resulted in venting of LVHC and HVLC gases from closed-vent systems. The commenter (20,054A2) stated that not all of the maintenance downtime associated with lime kilns and power boilers necessarily cause a shutdown in pulp mill operation since facilities can continue to operate the pulp mill at various rates depending on liquor inventories and chemical make up systems. One commenter (IV-D2-2) noted that any time that both the mill and the NCG system are down should not be counted toward downtime. Two commenters (20,066A3, 20,146) requested that EPA specifically identify in the final rule which types of startup, shutdown, and malfunction events will not require compliance with the air emission standards. Another commenter (20,059) contended that the general provisions were too lenient in allowing the emissions associated upsets, startup, shutdown, and maintenance and urged EPA to close this loophole in the regulation.

Two commenters (20,027, 20,146) indicated that excess venting is an essential safety practice, and that it would occur even with transfer to a backup control device. One commenter (IV-D2-11) suggested that by-pass allowances are needed for unavoidable and safety venting events that are sometimes difficult to define in advance. Another commenter (20,151) indicated that uncontrolled pulping emission from bypass collection systems should be controlled.

Several commenters (20,027, 20,043, 20,054A2, 20,057, 20,057A2, 20,066A4, 20,070Al, 20,118, IV-D2-2) presented suggestions as well as estimated and measured downtime for certain processes and equipment at their facilities. Several commenters (20,027, 20,054A2, IV-Dl-15, IV-D2-15) requested a venting allowance for the pulping component standards ranging from 2 to 4 percent outside of startup, shutdown, and malfunction provisions in the general provisions; this would be similar to the allowance contained in the pulp and paper NSPS. One commenter (20,027) indicated that backup control devices would not be needed to comply with the rule if a 4 percent allowance is included.

One commenter (20,054A2) asserted that LVHC gas flows cannot be automatically diverted to backup devices due to explosion hazards. The commenter (20,054A2) stated that: (1) the burners used in the backup devices must go through startup checks that may result in venting for 15 to 30 minutes per episode; (2) the frequency for diverting to a backup device varies from 1 to 10 events in a quarter (e.g., 15 to 300 minutes of venting); and

(3) the operation of backup devices are checked by most mills at least once per month. Another commenter (IV-D2-11) recommended incorporating by-pass allowances of 2 percent for LVHC control systems.

One commenter (20,054A2) stated that their current primary source of combustion for LVHC gases was the lime kiln. The commenter (20,054A2) indicated that: (1) lime kilns typically require approximately 1.5 to 2 percent of the available annual operating hours for rebricking; and (2) operating variabilities (such as flame outs, ring formation, and problems with the product removal system and wet end processes) can result in additional downtime of 0.5 to 1 percent of the available annual operating hours. The commenter (20,054A2) further asserted that a minimum of one maintenance shut down per year (1 to 1.5 percent of the available annual operating hours) is required by the mill and that operating variables (such as variable steam load, fuel feed system problems) can result in venting of LVHC gases from 0.5 to 1 percent of the available annual operating hours.

One commenter (IV-Dl-15) stated the HVLC streams are vented to the atmosphere during boiler or recovery furnace downtime, which is normally down about 10 percent of the time the mill is in operation. One commenter (IV-D2-2) suggested that a downtime of 10 percent for HVLC systems is warranted, as these systems are typically single line/single combustion point systems as opposed to LVHC control systems. Another commenter (IV-D2-11) recommended incorporating a by-pass allowance of 5 percent for HVLC control systems.

Two commenters (20,027, 20,043) recommended an allowance of downtime for excess emissions from bleach plant scrubbers of approximately 2 percent.

One commenter (20,011) stated that the need for backup control devices to account for steam stripper downtime or biological treatment system upsets has not been addressed by EPA. One commenter (20,071) stated that all mills, even those with backup control devices, will vent steam stripper overheads for some percentage of the time. Another commenter (IV-D2-3) suggested an allowance of 5 percent of the operating year for steam stripper downtime. One commenter (IV-D2-2) suggested a downtime of 5 percent for more reliable stand-alone stripping systems but a downtime of 10 percent for integrated stripping systems. One commenter (IV-D2-3) noted that downtime should only be considered those periods when condensates are unable to be treated and must be sewered. The commenter (IV-D2-3) also requested that the rule explicitly state that sewering during periods of steam stripper downtime is acceptable. Another commenter (IV-Dl-15) also indicated that the rule should take into consideration steam stripper downtime and that mills currently route those streams to the sewer during periods when the stripper is not functioning and the stripper feed tanks are full.

One commenter (20,054A2) stated that the industry recommendation for a measure of continuous compliance is venting time for a closed-vent system with an allowance for short term venting which occurs due to inherent process variability. The commenter (20,054A2) provided information on how several States regulate continuous compliance, and indicated that the kraft pulp mill NSPS (subpart BB, 40 CFR part 60) allows two TRS exceedances per quarter excluding startup, shutdown, and malfunctions. One commenter (IV-D2-15) stated that excusable excursions are also need for parameter monitoring and should be determined on an annual basis as a percentage of the time that the process is in operation.

Response: Since proposal, EPA has re-evaluated the need to incorporate downtime or excess emissions allowances for LVHC, HVLC, and steam stripper systems into the final rule. Based on the information collected in the 1992 voluntary MACT survey, EPA concluded that some allowance for excess emissions is part of the MACT floor level of control. For the final rule, EPA established excess emissions allowances to approximate the level of downtime and backup control at the best performing mills and the associated period of time which no control device is available (A-92-40, IV-E-83). The excess emissions allowances in the final rule include periods when the control device is inoperable and when the operating parameter values established during the initial performance test are not maintained at the appropriate level.

Based on an analysis of the public comments and the available data regarding excess emissions and the level of backup control in the industry, EPA has determined that an appropriate excess emissions allowance for LVHC systems would be 1 percent of the operating hours on a semi-annual basis for the control devices used to reduce HAP emissions. The best-performing mills achieve a 1 percent downtime in their LVHC system control devices. For control devices used to reduce emissions from HVLC systems, EPA has concluded that an appropriate excess emissions allowance would be 4 percent. The best-performing mills achieve a 4 percent downtime in the control devices used to reduce emissions from their HVLC system to account for flow balancing problems and unpredictable pressure changes inherent in HVLC systems. For control devices used to control emissions from both LVHC and HVLC systems, the Agency has determined that a 4 percent excess emissions allowance is appropriate. This decision was made because the control device would be used for the HVLC system, which has the higher emissions allowance. For LVHC and HVLC system control devices, the excess emissions allowances do not include scheduled maintenance activities that are discussed in the part 63 general provisions. The allowances address normal operating variations in the LVHC and HVLC system control devices for which the equipment is designed. The variations would not be considered startup, shutdown, or malfunction under the part 63 general provisions (Air Docket A-92-40, IV-Dl-103, IV-Dl-110, IV-Dl-115, IV-E-83, and IV-E-85).

Although industry commenters suggested a downtime allowance of excess emissions from bleach plant scrubbers of approximately 2 percent, no data were provided to support their suggestion. The commenters did not address bleach plant scrubbers in their recommendation for control device downtimes in subsequent data submittals. Therefore, the final rule does not include downtime allowances for bleach plant scrubbers.

The Agency determined the appropriate excess emissions allowance for stand-alone and integrated steam stripper systems to be 10 percent. The allowance accounts for stripper tray damage or plugging, efficiency losses in the stripper due to contamination of condensate with fiber or black liquor, steam supply downtime and condition control device downtime. This downtime allowance includes all periods when the stripper systems are inoperable including scheduled maintenance and malfunctions, startup, and shutdowns. The stripper emissions allowances include the part 63 general provisions allowances because information was not available to differentiate these emissions from normal stripper operating emissions.

Regarding the commenters' discussion of whether the general provisions to part 63 would cover maintenance and troubleshooting downtime, EPA has taken public comment and is currently revising the requirements of the general provisions. Among the changes to the language, EPA intends to incorporate safety-related venting requirements into the general provisions. However, scheduled maintenance activities are not considered by EPA to qualify for excess emissions allowances. The EPA contends that the startup, shutdown, and malfunction plan provisions specified in the general provisions to part 63 should address the periods of excess emissions that are caused by unforeseen or unexpected events.

4.4 FORMAT OF THE STANDARDS

4.4.1 General Comments

4.4.1.1 A Percent Reduction Requirement is Unenforceable.

Comment: One commenter (20,059) objected to the use of a percent reduction requirement as an emissions standard since a reduction requirement cannot be enforced and verification cannot be determined without measurement both before and after control. The commenter (20,059) argued that non-complying companies could manipulate the estimate of pre-controlled emissions to avoid detection of violations. The commenter (20,059) indicated that

EPA should establish numerical, pound-per-hour emission rates on a continuous basis for the standards.

Response: The EPA disagrees with the commenter. Percent reduction formats were specified in the rule only in cases where it was not feasible to prescribe a numerical emission rate. The most common emission rate format generally is one expressed as mass-per-unit-of-production, since pound-per-hour rates vary with production capacity and utilization rate. For this rule, however, it was not always feasible to develop a mass-per-unit-of-production format because of lack of data or because of the degree of variability of uncontrolled emissions.

Since proposal, additional test data have been submitted to EPA (A-92-40, IV-Dl-29, IV-Dl-29a, IV-Dl-31, IV-Dl-33, IV-Dl-34, IV-Dl-35, IV-Dl-38, IV-Dl-39, and IV-Dl-41) to better characterize HAP emissions from the pulp and paper processes. Although the test data were a significant improvement over the data available at proposal, the data were not adequate for developing numerical emission standards for all pulping and bleaching processes at all pulping subcategory types.

The EPA disagrees that a percent reduction format is unenforceable. Percent reduction requirements have been included in numerous NSPS and NESHAP and have been demonstrated to work. State and Federal enforcement officials are accustomed to enforcing these types of standards. Additionally, the general provisions to part 63 specifically prohibit circumvention of the standard by the use of diluents to achieve compliance.

Surrogate for HAP.

Comment: Several commenters (20,027, 20,056, 20,057A2, 20,071, IV-Dl-15) supported the use of methanol as a surrogate measure for total HAP. One commenter (IV-Dl-15) also agreed with using methanol as a surrogate for total HAP for pulping and wastewater sources since methanol typically constitutes 90 percent or more of the total HAP's in these sources. For bleach plants, the commenter (IV-Dl-15) also agreed with EPA's intent to use chlorine as a surrogate for compliance determinations since only chlorinated HAP's are controlled by MACT technologies. Several commenters (20,102, 20,110, 20,111, 20,129) suggested that EPA establish pollutant-specific emissions limitations for bleaching equipment such as chloroform, chlorine, and ClO_2.

Several commenters (20,022, 20,049A3, 20,059, 20,090, 20,122, 20,132, 20,133) requested pollutant-specific limits on air pollutants. One commenter (20,110) indicated that EPA should ensure that HAP's other than methanol and chlorine, such as phenol and chloroform, are controlled to an efficiency of at least 90 percent. One commenter (20,102) indicated that EPA has the authority to implement pollution prevention opportunities such as source reduction through the MACT development process. The commenter (20,102) suggested EPA might improve that ability through some pollutant-specific limitations in addition to total HAP emissions.

One commenter (20,059) argued that EPA authorized a form of interpollutant trading by failing to establish emission limits for individual pollutants. The commenter (20,059) indicated that proposed process changes and control technologies differ in the amount of specific HAP's they reduce, yet EPA lumped all of the pollutants together regardless of toxicity. Two commenters (20,102, 20,103) stated that EPA should give special attention to chloroform due to its toxicity and because it is a carcinogen. The commenters (20,102, 20,103) requested that EPA provide more technical guidance on its evaluation and control. One commenter (20,129) stated that emissions of carcinogenic compounds from bleaching vents should be controlled to 10^{-5} to 10^{-6} inhalation risk levels with BACT air cleaning technology.

Response: The final rule is a technology-based standard with the MACT level of control based on the performance of technologies that achieve the greatest level of emissions reduction. The pulping process emits non-chlorinated HAP's (predominantly methanol) while the bleaching process emits chlorinated HAP's (such as chloroform, chlorine) and non-chlorinated HAP's.

Each of these types of HAP (non-chlorinated and chlorinated) has different applicable control technologies (i.e., combustion and caustic scrubbing, respectively). For this reason, EPA re-evaluated the floor level of control for each of these types of HAP as discussed in the March 8, 1996 supplemental notice. As a result, pulping standards were based on combustion with methanol as the surrogate compound. For the bleaching process, standards were developed for chloroform, and other chlorinated HAP's (with chlorine as the surrogate compound).

The EPA maintains that methanol is an appropriate surrogate for non-chlorinated HAP's since methanol is the majority of the non-chlorinated HAP's found in pulping process vents and wastewater based on the available data (A-92-40, IV-A-8). Chlorine was designated as a surrogate for chlorinated HAP's (other than chloroform) because the MACT floor level of control technology, caustic scrubber, was installed primarily for chlorine control. Therefore, control of chlorine should indicate proper operation of the caustic scrubber. Chloroform is controlled through process changes such as ClO_2 substitution and elimination of hypochlorite. The EPA contends that the control technologies selected for the pulping and bleaching processes and the surrogate compounds selected for measurement ensure the adequate control of total HAP compounds.

With regard to the commenters' discussion of pollutant-specific limits, EPA asserts that the level of the standards would not be significantly different, if at all, had the standard been based on specific HAP's. The rationale for this assertion is that EPA evaluated all of the reasonably applicable control technologies and determined that the technologies chosen in the final rule would achieve the maximum emission control of total HAP'S. Some other technologies (e.g., incineration of bleach plant vents) may achieve greater control of a specific HAP, but would achieve lesser control of other HAP's. The EPA determined that it was not cost feasible to require these technologies in addition to the floor level of control technologies. Additionally, EPA does not have sufficient data to establish pollutant specific limits for all HAP's from all emission sources. Regarding the relative toxicity between HAP's, EPA is not authorized under section 112(d) of the Act to establish MACT using any type of toxicity weighing. In any case, the MACT standards will control all HAP's.

The EPA does not believe that pollutant-specific emission limits are needed to encourage pollution prevention. The final rule contains provisions for a compliance alternative that focuses on achieving the required emissions reduction from process vent emissions by reducing the HAP content of process waters recycled or reused in various mill processes. The EPA contends that this alternative adequately encourages mills to pursue pollution prevention options since a specific control technology is not identified in the compliance option. Additionally, the effluent guidelines portion of the final rule provides incentives for adopting pollution prevention technologies.

Comment: One commenter (20,059) stated that EPA failed to indicate the time period over which the percent reductions specified in the standard are to be achieved. The commenter (20,059) also stated that the averaging times should be short to limit cumulative exposure and to protect the public from short-term exposure to highly toxic pollutants.

Response: The language in the final rule has been clarified to identify the averaging times for the specific parameters to be monitored. The final rule specifies that mills must conduct performance tests to determine the necessary operating parameters such that the specified emission reduction will always be achieved. Consequently, a violation of the parameter(s) becomes a violation of the standards.

Innovative pollution control systems as equivalent to MACT.

Comment: One commenter (20,102) stated that pollution prevention opportunities should be encouraged in the MACT standards. The commenter (20,102) indicated that a method to generate pollution credits by using a non-polluting technology might be a good incentive. The commenter (20,102) suggested that EPA allow mills to use a non-polluting technology to receive credit for a percentage of the pollution that would be emitted by a facility with the same capacity using conventional technology with emissions at the level of the MACT standards.

Response: The EPA welcomes innovative pollution control systems and does not prohibit sources from using a different method to achieve pollution prevention or reduction. In an effort to encourage pollution prevention and maximize the multi-media pollution prevention, EPA provided a 5-year compliance extension to kraft mills for controlling HVLC vents and oxygen delignification systems. Rationale for providing the extension was presented in the March 8, 1996 supplemental notice. A source may petition for equivalency based on the amount of pollution reduction it achieves. The EPA must, however, base its MACT standards on the reductions achievable by existing technologies and a source must be able to demonstrate those reductions for enforcement purposes.

Process modification should not be used as environmental control.

Comment: One commenter (20,039) stated that it was counter-productive to require process modifications as a means of environmental control if the existing manufacturing process can achieve the same environmental protection without the required modification. The commenter (20,039) also indicated that EPA should not set standards for points within operating systems as complex as those found in the pulp and paper industry. The commenter (20,039) added that standards should be established at the intersection of the emission or discharge and the environment.

Response: The EPA disagrees with the commenter's assertion that it was counter-productive to require process modifications as a means of environmental control if the existing manufacturing process can achieve the same environmental protection without the modification.

The process modification referred to by the commenter is BAT in the effluent limitation standards and guidelines for the paper-grade bleaching process. The BAT requires the substitution of ClO_2 and elimination of hypochlorite. The MACT level of control for paper-grade bleaching systems is control of chloroform and the other chlorinated HAP emissions through a combination of caustic scrubbing, 100 percent ClO_2 substitution, and eliminating the use of hypochlorite. The BAT requirements are at least equal to the MACT requirements. Therefore, this level of control is required for compliance. The EPA is not aware of any other control technology that would achieve the same level of control. The general provisions to part 63 [§ 63.6(g)], however, provide directions for obtaining approval of alternative control technologies.

<u>Limitations should be set in terms of total HAP per ton of production.</u>

<u>Comment</u>: Two commenters (20,027, 20,045) suggested that the emission standards should be stated in terms of a total HAP emissions rate per ton of production, which one commenter (20,045) stated would be similar to the effluent guidelines.

<u>Response</u>: The final rule contains compliance alternatives that include a total HAP per ton of production emission limitation for the sulfite pulping subcategory due to the complexity of these systems and the problems that may occur when testing these sources for compliance with the standard. The final rule also includes a total HAP per ton of production

emission limit for knotter and screen systems at kraft mills. This limit was included in the final rule because EPA did not have data other than mass emission rates to identify knotter and screen systems with high emissions. The EPA does not consider a total HAP per ton of production emission limitation to be necessary for other pulp and paper processes.

Regarding the commenter's suggestion of using the effluent guidelines to set total HAP emission rates, the effluent limits are set for one or two points. There are many more air emission points that need to be controlled. The EPA does not have sufficient data to set pound per ton standards in most cases.

<u>Support and comment on the named streams approach</u>.

<u>Comment</u>: Several commenters (IV-D2-14, IV-D2-10, IV-D2-3, IV-D2-8, IV-D2-7) agreed with the concept of selecting named vents and streams for control. One commenter (IV-D2-15) stated that EPA should list vents and streams for the sulfite pulping subcategory whose MACT floor level of control should be no control for non-halogenated HAP. The commenter (IV-D2-15) suggested the following: bleach stage washers, tower vents and seal tank vents, continuous digester steaming vessel, batch digester fill/evacuation vent, knotter vents, screen vents, decker (including thickeners and rewashers) vents, unwashed stock tanks vents, intermediate filtrate tank vents, evaporator condensate tank vents, spent sulfite liquor tanks, acid condensate storage tanks, evaporator condensates, digester blow gas condensates, digester relief gas condensates, and wastewater collection, storage, and treatment vents (except to determine the amount of methanol volatilized).

Response: The EPA appreciates the commenter's support for the approach of naming streams to be controlled. The EPA does not intend to identify streams and vents not requiring control. This would make the rule more confusing and is unnecessary. The final rule specifies exactly which streams are to be controlled.

Alternative compliance determinations.

Comment: One commenter (IV-D2-15) supported EPA's intention to allow sulfite mills to use any combination of controls to achieve either the specified percent reduction or emission limit, where applicable. Another commenter (IV-D2-16) agreed with EPA's decision to incorporate a mass emission rate in addition to a percent reduction standard into the final rule for sulfite mills.

Response: The EPA appreciates the commenters' support. As discussed in the March 8, 1996 supplemental notice, EPA did not intend to specify the technology to be used to satisfy the standards for sulfite mills. Rather, a mass emissions limit was established for selected vents and wastewater emissions. This format was intended to provide sulfite mills with flexibility in complying with the sulfite rule. The final rule also includes a percent mass reduction compliance option for additional flexibility.

Sulfite pulping - statistical arguments concerning emission limits and data variability.

Comment: One commenter (IV-D2-15) stated that EPA did not establish the mass emission limits for sulfite mills properly. The commenter stated that the mass limits are based only on "a handful of ballpark values" and not a rigorous assessment of emission rates. The commenter also stated that the variability of the processes and scrubbers must be considered because the sulfite mills use variations in process parameters to make a wide range of products.

The commenter provided several sets of data to support concerns about process variability. The commenter also provided several statistical analysis of the data and arrived at the conclusion that the mass emission limit for selected vents from magnesium and ammonium-based mills should be greater than 2.0 lb methanol/ODTP.

Two commenters (IV-D2-6, IV-D2-14) supported the argument that to take the variability inherent in the industry into account, the emission limit should not be set at the average emission level but at an upper confidence limit based on the relative standard deviation of the data sets.

Response: The EPA concurs with the commenters that process variability should be incorporated into the sulfite rule mass emission limit compliance option. Establishing the appropriate mass emission limit was critical for the sulfite subcategory since a reference control technology for these mills was not identified in the standard.

As discussed in the March 8, 1996 supplemental notice, EPA established mass emissions limits from selected vents and wastewater for sulfite mills. At the time the supplemental notice was published, the numerical mass limits were based on a limited amount of data. Since that time, EPA has received test data from several facilities (A-92-40, IV-Dl-96 and IV-Dl-100) documenting the variability of process emissions over time. These data were used to estimate the variability of the original data set used to develop the mass emission limits presented in the March 1996 supplemental notice.

The variability analysis was based on the 99.9 percent confidence interval of the data supplied by the pulp and paper industry. This amount of variability (confidence interval), therefore, was applied to the average emission limits from the best controlled mills to develop the final emission limit. After the close of the March 8, 1996, Federal Register supplemental notice comment period, additional information was provided to the Agency that indicated that the sodium-based sulfite pulping process is in use at some mills (A-92-40, IV-E-86, and IV-E-94). No emissions information was available for this process. However, the Agency determined, that due to the similarities in processes between calcium- and sodium-based sulfite pulping processes, the same limit developed for calcium-based mills would be applicable to sodium-based mills. For sodium- and calcium-based sulfite pulping processes, the final emission limit is 0.44 kilograms of methanol per megagram ODP produced. For ammonium- and magnesium-based sulfite pulping processes, the final emission limit is 1.1 kilograms of methanol per megagram ODP produced. Since the emission limits include the variability allowance, they are never-to-be exceeded values.

Calculation of mass percent reduction.

Comment: One commenter (IV-D2-14), noted that EPA had not determined how to measure and calculate the mass percent reduction for sulfite mills. The commenter (IV-D2-14) proposed the following approach:

$$\text{mass percent reduced} = \frac{100 * (\text{uncontrolled emissions} - \text{controlled emissions})}{\text{uncontrolled emissions}}$$

where:

uncontrolled emissions = the sum of methanol emitted from uncontrolled selected vents and control equipment vents for the selected vents, methanol in gases directed to combustion sources, and methanol in wastewater streams from selected vent control equipment; and

controlled emissions = the sum of methanol emitted from control equipment vents for the selected vents, and methanol emitted from wastewater treatment that can be attributed to wastewater streams from selected vent control equipment.

<u>Response</u>: In the March 8, 1996 supplemental notice EPA proposed to provide a mass emission limit and percent reduction option in the final rule. The EPA evaluated commenter's suggested equation and agreed the equation is appropriate for determining mass percent reduction at sulfite mills. The final rule incorporates this equation.

<u>Compliance should be determined on test and annual averages</u>.

<u>Comment</u>: One commenter (IV-D2-16) agreed that compliance for sulfite mills should be based on test averages and that compliance should not be based on the results of any one test. The commenter (IV-D2-16) also suggested that compliance with any pounds per ton emission limit should be expressed as an annual average to account for process and testing variability.

<u>Response</u>: The determination of compliance, conducted with the initial performance test, is based on the average of three

l-hour tests. During the initial performance test, the mill must select the appropriate parameters for monitoring compliance.

The EPA does not concur with the commenter that an annual average would be sufficient for demonstrating continuous compliance especially since the required reporting periods are typically semi-annual or quarterly.

4.4.2 Pulping System

4.4.2.1 Operating Scenario as Compliance Alternative.

Comment: One commenter (IV-D2-5) noted that their brownstock washers do not use condensates for washing, and as a result, the emissions are relatively low. The commenter included test data from the washers and requested that EPA allow this operating scenario as a control option in place of incineration.

Response: The EPA maintains there would be significant HAP emissions from these washers even if they did not use recycled condensates (see the final emission factor document, A-95-40, IV-A-8). In addition, the final rule contains a compliance option for a HAP outlet concentration for thermal oxidizers. If emissions from the brownstock washers are less than emissions specified in the rule, then they would not need to meet the percent reduction requirement.

4.4.3 Bleaching System

4.4.3.1 Alternative Compliance Determinations.

Comment: Several commenters on the proposal (20,027, 20,07OAl, 20,118) requested that EPA specify alternative compliance demonstrations for the bleaching component similar to the options given for pulping and wastewater components. Several commenters (20,027, 20,057A2, 20,059, 20,07OAl, 20,071) suggested the following alternatives in addition to the proposed standard (percent removal): outlet concentration-based limits, mass per unit production-based limits, design scrubber specifications, process changes and/or stipulation that bleaching without elemental chlorine constitutes compliance.

One commenter (20,071) indicated that an outlet concentration would be more desirable because the determination of scrubber efficiency could be difficult for devices run in series and/or parallel. Another commenter (20,057A2) suggested that EPA revise the bleach plant scrubber removal efficiency specification to a numerical limit of 5 ppmv chlorine. Two commenters (20,057A2, 20,071) indicated that the removal efficiency of 99 percent would be impossible to measure or achieve as the amount of chlorine is reduced due to ClO_2 substitution.

One commenter (20,070Al) stated that EPA should establish an alternative compliance demonstration for mills that do not use elemental chlorine. The commenter (20,070Al) argued that the proposed process changes would greatly reduce the concentration of elemental chlorine at the inlet to bleach plant scrubbers which would, in turn, make demonstrating the high removal efficiency for chlorine difficult.

One commenter on the March 8, 1996 supplemental notice (IV-D2-15) supported the bleach plant applicability requirements and agreed with EPA that an outlet concentration below 10 ppmv of HAP from the scrubber exhaust is equivalent to the 99 percent reduction standard. Three commenters (IV-D2-10, IV-D2-3, IV-D2-8) supported the concept of a concentration limit on the bleaching component for control of chlorinated HAP, noting that a concentration limit in place of a percent reduction limit would not require two sampling events (inlet and outlet) and would eliminate several potential problems in compliance determination if the inlet is of very low concentration. Additionally, one commenter (IV-D2-3) asked EPA to make clear that only elemental chlorine need be measured to demonstrate compliance with the "total chlorinated HAP" control requirement. Two commenters (IV-D2-14, IV-D2-15) recommended establishing an alternative mass standard for cases where low flow systems are used and would have difficulty meeting the concentration limit. One commenter (IV-D2-15) recommended an equivalent mass flow rate would be equal to or less than 0.01 kg/Mg air-dried pulp (ADP) (0.025 lbs/air-dried ton of pulp (ADTP)) and provided data to support this limit. The commenters (IV-D2-14, IV-D2-25) expressed concern that bleaching systems with new low-flow vent systems would not be able to meet either the percent reduction or the outlet concentration standards. Therefore, these standards would discourage the use of new low-flow bleaching vent technologies. Based on this concern, one commenter (IV-D2-15) advocated a chlorinated HAP mass emission limit for bleaching systems of 0.023 lb of chlorinated HAP (excluding chloroform) per ODTP produced. The commenter (IV-D2-15) claimed that a mass emission limit would not penalize new low-flow bleaching vent systems.

One commenter (IV-D2-14) noted that new bleaching sequences should not be measured against the performance standards of existing bleaching sequences. The commenter (IV-D2-14) also noted that the chlorine scrubbing technology proposed should not be required.

Response: At proposal, the bleach plant requirements were control of chlorinated HAP emissions (or chlorine as a surrogate) by 99 percent. This determination was based on industry data on scrubber performance (A-92-40, II-I-24) and irrespective of the effect of process changes also required by the proposed rule. After reviewing the comments on the proposal EPA analyzed the effect of ClO_2 substitution and elimination of hypochlorite use on emissions. Based on this analysis, EPA determined that, in some cases, emissions after process changes are enacted would be lowered such that 99 percent reduction could not be achieved. As stated in the March 8, 1996 supplemental notice, EPA determined that a standard of 10 ppmv of total chlorinated HAP (other than chloroform) is equivalent to the outlet of scrubbers achieving 99 percent removal (A-92-40, II-I-24). Chlorine may be used as a surrogate.

Regarding the commenter's request for a mass emission limit standard, EPA reviewed the information provided by the commenter and emission information from sampling tests conducted on bleaching systems. Based on available data, the Agency has concluded that low-flow bleaching vent systems can achieve the 99 percent reduction and the 10 ppmv outlet concentration requirements for total chlorinated HAP (other than chloroform). Based on a review of the information provided by the commenter and the available data on bleaching system emissions, the Agency has concluded that the commenters recommended mass emission limit of 0.023 lb of chlorinated HAP (excluding chloroform) per ODTP produced is too high. The Agency evaluated the available data used to develop the percent reduction and outlet concentration requirements for bleaching systems (A-92-40, II-I-24). From this evaluation, the Agency determined that a scrubber outlet mass emission rate of 0.001 kg of total chlorinated HAP (other than chloroform) per Mg ODP produced (0.002 lb/ODTP) would provide reductions equivalent to 99 percent reduction standard (A-92-40, IV-B-29). The mass emission limit of 0.001 kg of chlorinated HAP (other than chloroform) per Mg ODP produced represents a mass emission limit achievable by all units that also achieved 99 percent reduction of chlorine. Furthermore, the available data show that some of the scrubbers achieving the 99 percent chlorine reduction standard, and the 10 ppmv outlet concentration limit, were also operating on low-flow bleaching vent systems.

For the final rule, the Agency has provided a mass emission limit option for bleaching systems of 0.001 kg of chlorinated HAP (excluding chloroform) per Mg ODP produced (0.002 lb/ODTP). The Agency maintains that this option allows more flexibility for sources affected by this rule, does not penalize bleaching systems operating with low-flow technology, and will provide reductions in chlorinated HAP emissions (other than chloroform) equivalent to the 99 percent reduction standard.

4.4.4 Process Wastewater System

4.4.4.1 Design steam stripper

Comment: Two commenters (20,000, 20,056) recommended that a parametric design steam stripper not be specified in the standards. One commenter (20,000) indicated that if mills cannot install a steam stripper in the manner they determine to be most cost effective there will be a heavy penalty in energy costs and CO_2 emissions. The other commenter (20,056) recommended that each mill be allowed to develop engineering calculations or perform testing to indicate stripper operating ranges which correspond to 90 percent reduction.

Response: The EPA agrees with the commenters. In an effort to provide sources with flexibility to comply with the wastewater requirements the design steam stripper specified in the proposed regulation is not required in the final rule. Sources are free to design their own steam strippers as long as they are able to meet the required control level (92 percent reduction, mass removal, or outlet concentration).

Support for compliance alternatives.

Comment: One commenter (IV-D2-15) supported the inclusion of other compliance options for the treatment of pulping process condensates, namely, recycling to enclosed equipment or hard-piping to a mill's biological treatment plant. The commenter also supported EPA's decision to allow mills to choose any wastewater treatment device for compliance purposes as long as either the percent reduction, mass removal, or outlet concentration is met.

One commenter (IV-D2-16) suggested requiring all pulping and bleaching effluents be sent to a well-operated secondary treatment plant, realizing that a well controlled operation of this type will perform as well as possible to biodegrade methanol and related compounds.

Response: The EPA appreciates the commenters' support of compliance alternatives. Hardpiping the affected streams to biological treatment is a compliance option for kraft pulping wastewater streams in the final rule. The MACT floor level of control for non-kraft wastewater and bleaching systems wastewater is no control.

Miscellaneous clarifications to the wastewater rule.

Comment: One commenter (20,027) requested that EPA include the following requirements in the process wastewater standards for sulfite mills: (1) an enclosed transport system is not needed for a wastewater stream that has been treated to below 500 ppmw HAP by one of the proposed compliance options; and (2) after the mandated 90 percent HAP reduction has occurred, a treated process wastewater stream is acceptable for reuse anywhere within the mill or for disposal in open sewers.

Response: At proposal, EPA did not establish a sulfite subcategory. Sulfite mills were required to meet the kraft mill requirements, including wastewater. Since proposal, EPA has developed a sulfite subcategory. The EPA determined that control of sulfite wastewater was not in the MACT floor level of control, and it was cost infeasible to go beyond the floor level of control. Therefore, the final rule does not include wastewater requirements for sulfite mills. However, the HAP emissions from any effluent associated with any device used to reduce vent HAP emissions must be included in the selected vent emission limit.

Air emissions from biological treatment are unmeasurable.

Comment: One commenter (20,057A2) suggested that the 90 percent removal efficiency for biological treatment systems be modified to pertain only to a 90 percent efficiency in water, and should exclude de minimis air emissions. The commenter (20,057A2) indicated that procedures do not exist to measure de minimis air emissions from biological treatment.

Response: In the final rule, biological systems at kraft mills are required to remove 92 percent of HAP in the wastewater system. This efficiency was revised from 90 percent based on

EPA's re-analysis of steam stripping performance (A-92-40, IV-B-10). Kraft mills are required to demonstrate that the removal is actually destruction of the HAP's rather than HAP reduction due to volatilization to the air, adsorption, or HAP loadings lost in discharge. The EPA considers this a necessary requirement in order to ensure that kraft mills choosing the biological treatment option are achieving the requested HAP reduction.

Methanol from wastewater should not be included in overall emission requirements.

Comment: One commenter (IV-D2-16) strongly disagreed with EPA's proposal to include methanol emissions from the wastewater treatment plant in its overall emission requirements. The commenter (IV-D2-16) asserted that there is no practical or cost-effective way to change the methanol removal efficiency of the wastewater treatment system and noted that the only "measurement" of the system output is determined by a model. The commenter (IV-D2-16) requested that if a model is required, then the model parameters must be spelled out explicitly to that they will not change in the future.

Response: The wastewater control requirements are only for kraft mills. Biological treatment of kraft wastewater is not required in the final rule, but it is one of the control options a mill can choose. If a mill chooses the biological treatment option, it will need to account for the HAP emissions from the biological treatment system. The EPA did not specify parameters for estimating emissions using emission models because the parameters need to be developed on a site-specific basis.

Regarding the methanol removal efficiency of biological treatment systems, data analyzed by EPA (A-92-40, IV-Dl-75) indicate that a well-operated biological treatment system can easily achieve a methanol destruction greater than 92 percent. Therefore, the methanol removal efficiency of biological treatment systems does not need to be changed.

Site-specific basis for compliance determination.

Comment: One commenter (IV-D2-8), noting the site-specific variability in model inputs to determine volatilization rates, asserted that EPA must allow facilities to develop site-specific rates to determine compliance. The commenter (IV-D2-8) , noting the difficulty of such an implementation, recommended deleting the emissions limit requirement for wastewater systems. Another commenter (IV-D2-16) recommended that EPA only regulate process vents and not regulate wastewater treatment plants.

Response: The EPA disagrees with the commenters. A MACT floor level of control analysis conducted on the kraft pulping process condensate streams shows that the average emission limitation is control of specific condensate streams with a steam stripper (A-92-40, IV-B-8). Therefore, the kraft pulping process condensate streams from the digester system, turpentine recovery system, and the weak liquor feed stages in the evaporator system are required to be controlled. Additionally, EPA has decided to name streams to be controlled in the final rule (see March 8, 1996 supplemental notice for a detailed discussion); therefore, no concentration or flow cut-offs have been included in the rule. The EPA considers this change to simplify compliance determination.

The EPA also believes that it has provided sufficient alternatives in the wastewater requirements (hardpiping, steam stripping achieving 92 percent reduction, or mass limit or concentration limit) to provide sources with flexibility to meet the standard.

5.0 PULPING AREA

5.1 CONTROL OPTIONS

5.1.1 General

Comment: One commenter (20,081) objected to EPA's listing of preferential control technologies in the December 17, 1993 proposed rule. The commenter (20,081) contended that biofiltration should be included as a viable alternative and listed as one of the preferred technologies. The commenter (20,081A1, 20,081A2) provided several reasons why biofiltration should be used instead of incineration and condensation, and provided comparisons of cost for the technologies. The commenter (20,081A1, 20,081A2) also provided control efficiencies for a pilot-scale test of biofiltration.

Two commenters (20,029, 20,041) requested that other types of oxidizers be evaluated, such as regenerative thermal oxidizers and catalytic oxidizers for controlling emissions from the pulping area. The commenters (20,029, 20,041) claimed that these devices could achieve the same reduction in emissions as thermal incinerators and may be less costly.

Response: Based on test data, and information summarized from the 1992 voluntary MACT survey (A-92-40, IV-B-16), a level of control was selected as MACT for each pulping subcategory. These control levels were expressed as percent reductions or emission limits. Any control technology that can be demonstrated to meet the requirements specified in the rule can be used.

The rule provides several options for demonstrating compliance. For example, owners or operators of kraft, semi-chemical and soda mills may comply with the pulping provisions by controlling emissions from named streams by 98 percent, or by routing named vents to lime kilns, boilers, or to a thermal oxidizer meeting specified requirements. These control technologies are control options in the rule because they have been demonstrated to achieve at least 98 percent control when operated under the specified conditions. Compliance testing to demonstrate 98 percent reduction is not required when using these technologies. Therefore, specifying these technologies reduces the compliance burden. However, any alternative technology that can be demonstrated to achieve 98 percent control may be used to comply with the rule.

In cases where the rule specifies a design, equipment, or operating standard, 40 CFR 63.6(g) includes procedures for obtaining approval by the Administrator of the use of alternative control technologies that can be demonstrated to perform as well as, or better than, a technology specified in a rule.

Comment: One commenter (20,072) recommended that MACT for soda mill pulping components be limited to 95 percent methanol capture of digester blow gases, screen room closure, using mill water supply for the brownstock washers, and no internal recycling of digester and highly contaminated evaporator condensates which will be directed to a mill's wastewater treatment system. The commenter (20,072) provided estimates for their proposed control of soda mill pulping components, which they estimate would reduce emissions by 85 percent at an estimated capital cost of 4.1 million dollars. The commenter (20,072) stated that their cost estimates are substantially lower than EPA's estimate. The commenter (20,072) provided cost-effectiveness data.

Response: Data that EPA has collected on soda mills indicate that none are currently controlling pulping or wastewater vents. Information supplied since proposal of the rule has allowed EPA to characterize emissions and possible emission controls for soda mills. Based on this new information, EPA has determined that controlling the LVHC system is reasonable considering the cost and other impacts; controlling additional vent streams beyond the LVHC system or controlling the wastewater collection and treatment system is not reasonable considering costs and impacts. Information submitted by the industry supports EPA's conclusions (A-92-40, IV-Dl-77, IV-Dl-90). Therefore, the final rule requires that owners or operators of soda mills control only the LVHC vents at existing mills. Commenters are referred to supporting memorandum (A-92-40, IV-B-13) and chapter 20 of this document for a detailed discussion of the control options and impacts analyses.

Control cost estimates provided by the commenters outlined results for selected control scenarios based on using mill water supply for the pulp washers. This option would increase mill wastewater discharge and be counter to EPA's plan to achieve a "closed mill" from an effluent standpoint. The commenters' recommended controls did not address all equipment included in the LVHC system. Other equipment in the LVHC system, such as evaporators, may emit significant HAP's. The EPA lacked sufficient information to verify the commenter's claim that their control suggestions would achieve 85 percent reductions in HAP emissions. The EPA determined that control of the LVHC system (of which the digester flow gases are only a part) will result in a significant amount of HAP emission reduction at a reasonable cost (see discussion in March 8, 1996 supplemental notice).

Comment: Two commenters (20,053A1, 20,018) were opposed to the floor including control of HVLC vents in the pulping system, specifically citing brownstock washer vents, oxygen delignification vents, and vents in the bleaching process prior to the addition of chlorinated bleaching agents. (These bleaching stages were included in the pulping component definition at proposal.) Both commenters supported their argument by pointing out potential drawbacks of controlling these HVLC vents, citing secondary impacts such as SO_2 and NO_x emissions, plus additional fuel requirements for incinerator operation. One commenter (20,053Al) argued that the proposed emissions standards for the bleaching and wastewater components, combined with collection and incineration of LVHC gas streams within the pulping system, would result in substantial reductions in HAP emissions. One commenter (20,018) contended that the current state-of-the-art kraft mill does not collect and incinerate the oxygen stage vents.

Response: The NESHAP are required by the Act to reflect (at a minimum) the average emission limitation achieved by the best-controlled 12 percent of sources. As stated in the December 17, 1993 proposal, brownstock washers, oxygen delignification units, and bleach systems are controlled at the floor for kraft mills. A reevaluation of this floor determination was conducted using data received since proposal. These data indicated that the best-controlled kraft mills control HVLC vents, including vents on pulp washing systems, decker systems, oxygen delignification systems, and knotter and screen systems. The best-controlled mills control chlorinated HAP's from the bleaching system vents using caustic scrubbers and process modifications. Data indicate that the best-controlled bleaching systems do not control non-chlorinated HAP's; therefore, control of non-chlorinated HAP's at bleach stages is not required in the rule. Commenters are referred to supporting memoranda (A-92-40, IV-B-8, IV-B-16) and chapter 20 of this document for a detailed discussion of these analyses.

The Act requires cost and environmental impacts to be considered only when going beyond the floor level of control. Therefore, SO_2 and NO_x generation, and increased fuel use were not considered in determining the MACT floor level of control, but were considered when evaluating controls beyond the floor. Readers are referred to the economics assessment (A-92-40, V-A-2) for a detailed discussion of the benefits and impacts of the final rule.

Comment: Three commenters (20,027, 20,0531Al, 20,054A2) expressed concern over including oxygen delignification in the pulping system, rather than as part of the bleaching system. Two commenters (20,027, 20,054A2) stated that because oxygen is a bleaching agent, oxygen delignification may be more appropriately considered as part of the bleaching system. One commenter (20,053Al) stated that, based on the proposed bleaching system definition, TCF mills that do not apply chlorine or chlorine-containing compounds at any stage in the bleaching system do not have a bleaching component. Thus, all bleach plant emissions would apparently be regulated under the pulping system. The commenter (20,053Al) indicated that EPA should identify a point in the TCF bleaching process where the pulping system ends and the bleaching system begins.

Response: Oxygen delignification was included in the pulping component because of similar control technologies and condensate re-use practices (e.g., much of the emissions from the oxygen delignification system are attributable to pulping-area condensates applied to the post-oxygen delignification washers). For the final rule, oxygen delignification is still being defined as part of the pulping component. Information submitted by two commenters (A-92-40, IV-Dl-97, IV-Dl-71) after the close of the comment period on the proposed rule indicates that the commenters have reversed their position on this issue. The commenters agreed with EPA that oxygen delignification should remain in the pulping component due to the water recycling that occurs between the pulping component and the post-oxygen delignification washers.

The commenters' reaction to the proposed rule may have been due to the historical classification by the pulp and paper industry of oxygen delignification as part of the bleach plant. The inclusion of oxygen delignification in the pulping component may have caused confusion. The final rule specifies vent streams that are required to be controlled, including oxygen delignification system vents. Therefore, whether oxygen delignification is defined as part of the pulping system or bleaching system does not affect the control requirements.

The final rule sets standards only for chloroform and other chlorinated HAP's in the bleaching system; therefore, TCF mills would already be in compliance with the bleaching system standards.

For mills utilizing TCF bleaching processes along with an oxygen delignification stage, EPA defines the end of the pulping section as the screened stock chest that follows the oxygen delignification unit. Pulping processes upstream of the screened stock chest would be subject to NESHAP requirements for pulping processes, while processes downstream of the stock chest would be subject to NESHAP requirements for bleaching.

5.1.2 Existing Combustion Devices

Comment: Several commenters (20,011, 20,027, 20,018, 20,118) maintained that mills lack the existing combustion capacity to handle the quantities of gases that would require incineration under the December 19, 1993 proposed rule. One commenter (20,018) maintained that current combustion units are operating at their capacity. One commenter (20,027) indicated that combustion of HVLC streams would increase the sensible heat loss and therefore decrease steam production capacity in existing power boilers. One commenter (20,118) added that many mills are steam limited and would have to add new boiler or incinerator capacity to burn additional HAP's. The commenter (20,118) concluded that EPA must support their assumptions on existing combustion capacities with data. One commenter (20,027) supported the use of boilers, lime kilns, and recovery furnaces as appropriate combustion units for the destruction of HAP's. However, the commenter (20,027) did express concern over HVLC flow variations and how they would affect boiler stability. The commenter indicated that this was of greater concern in semi-chemical and soda pulp mills where no alternative combustion devices are present.

Response: The capacity concerns expressed by several commenters may have been due to the fact that the rule, as originally proposed, required the control of all vent streams except those with very low volume and low concentrations. Therefore, the commenters may have concluded that most streams in the pulping system were required to be controlled. The March 8, 1996 supplemental notice specifically defined the vent streams that are required to be controlled. The EPA has maintained the approach of naming specific systems to be controlled in the final rule. This approach will reduce confusion as to which equipment needs to be considered for control, and will alleviate many of the commenter's concerns on capacity.

An analysis of the effects of HVLC streams being combusted in an existing power boiler determined that a 5 percent increase in fuel usage was needed to control the HVLC (A-92-40, II-B-31). The results of this analysis were based on the assumption that the boiler would maintain the same level of heat release, thus the same level of steam production.

In response to comments received after proposal, EPA also conducted surveys with several mills regarding their capacity to combust additional vent streams at existing combustion devices. Results of the survey (A-92-40, IV-E-93) indicate that two-thirds of the surveyed mills have the capacity in the existing combustion devices to handle combustion of the named HVLC streams. The remaining one-third would construct a thermal oxidizer. The assumption that two-thirds of all mills will use existing combustion devices, and one-third will use new thermal oxidizers to control vent streams was used in determining the national cost and environmental impacts of the final rule (see chapter 20 of this document).

Regarding the commenter's concern about HVLC system vent flow variability, EPA does not expect there to be significant variability in HVLC system flows such that the operation of the power boiler or lime kiln would be disrupted. However, if a mill encounters significant HVLC system flow rate variability that would affect the performance of the boiler, these occurrences should be addressed in the downtime and malfunction allowances provided in the final rule. The final rule does not require control of HVLC vents at existing semi-chemical and soda mills. Currently, only LVHC systems at semi-chemical mills and soda mills are being controlled.

Comment: Two commenters (20,115A2, 20,054A2) contended that introducing LVHC gases into a recovery boiler could result in a smelt water explosion due to moisture entrained in the gases. One commenter (20,054A2) stated that combustion of LVHC gases in a recovery furnace is not recommended by the Black Liquor Recovery Boiler Advisory Committee.

Response: The EPA understands the commenters' concerns, and agrees that a possibility exists that introduction of some vent gases into the recovery boiler could have adverse results. However, information supplied in industry questionnaire responses indicates that some mills are successfully routing LVHC gases to recovery furnaces (A-92-40, IV-B-8, IV-B-16). The proposed and final rule do not require vent streams to be combusted in recovery furnaces. If a facility is concerned with the safety issues associated with controlling vent streams in a recovery furnace, the facility can choose to control the vent streams in the other acceptable control devices specified in the rule.

Comment: Several commenters (20,011, 20,027, 20,115A2, 20,118) opposed the proposed compliance option for existing combustion devices that required vent gases to be introduced with the primary fuel or into the flame zone. One commenter (20,027) asserted that this requirement did not accurately reflect the floor level of control since NCG systems utilize a separate burner or introduce the HVLC streams with the combustion air. Other commenters (20,011, 20,118) contended that the feasibility of introducing vent gases in the primary fuel or into the flame zone of a combustion device was not adequately evaluated and may not be appropriate in all cases. One commenter (20,118) cited their mill as an example; it introduced TRS compounds separately into boilers and lime kilns, not with primary fuels. One commenter (IV-D2-15) recommended allowing the HAP laden gas streams to be introduced with the "air supply" in order to control emissions via a combustion device, since most mills do not currently introduce such gases with the primary fuel or into the flame zone.

Response: The proposed rule provided owners or operators the option to achieve compliance with the combustion requirements by introducing vent streams with the primary fuel or into the flame zone. The intent of this stipulation in the proposed rule was to prevent circumvention of the combustion requirements by introducing the vent gases at a stage that would not allow for complete combustion. The requirement to introduce the vent streams with the primary fuel or into the flame zone is still necessary. Therefore, these requirements are included in the final rule. The EPA references "Reactor Processes in the Synthetic Organic Chemical Manufacturing Industry--Background Information for Promulgated Standards," EPA-450/3-90-016b, March 1993 to support this conclusion. This document provides information that shows when vent streams are introduced into the flame zone, over 98 percent reduction is achieved. However, when vent streams are not introduced into the flame zone, complete combustion is uncertain.

Comment: Several commenters (20,011, 20,059, 20,102) disagreed with the 98 percent control requirement for pulping vents. One commenter (20,011) stated that there were no data to indicate existing pulp mill combustion devices are capable of achieving 98 percent HAP removal efficiency or a 20 ppmv HAP incinerator outlet concentration.

One commenter (20,102) opposed using the 98 percent control requirement for incinerators for all toxic compounds because some HAP's may be more carcinogenic or more toxic than others and should be controlled more stringently.

One commenter (20,059) asserted that EPA provided no evidence to support the contention that a 98 percent control efficiency for vents is the highest that can universally be achieved by incineration. The commenter (20,059) contended that with proper operating procedures and maintenance, a higher level of emissions reductions is achievable. The commenter (20,059) also stated that EPA had not evaluated the relative effectiveness of alternate combustion devices such as flares, lime kilns, or chemical recovery furnaces. The commenter (20,059) contended that EPA had not explored variability in load size and composition common in the paper industry. The commenter (20,059) stated that this analysis could assess performance or establish more specific control requirements.

Response: Information from industry surveys showed that the best-controlled kraft mills route vent streams to combustion devices (A-92-40, IV-B-8, IV-B-16). Historically, EPA has conservatively assumed that combustion devices such as thermal oxidizers, power boilers, and lime kilns achieve 98 percent destruction of total organic compounds based on specified temperatures and residence times (A-79-32, II-B-31). Data provided by industry indicates that existing thermal oxidizers can achieve 98 percent destruction of HAP's or reduce HAP emissions to 20 ppmv at 10 percent oxygen (A-92-40, IV-B-18).

Some devices may achieve higher destruction efficiencies for some compounds depending on various mill-specific factors (such as operation, fuel use, manufacturer, etc.). These factors cannot generally be duplicated at all mills. Additionally, a study of VOC reduction in incinerators concluded that a 98 percent reduction of VOC is the highest control level that is consistently achievable by an incinerator considering the range of vent stream conditions that are likely to occur (A-79-32, II-B-31).

5.1.3 Design Incinerators

Comment: Several commenters (20,000, 20,011, 20,027, 20,041, 20,051, 20,056, 20,057A2, 20,070Al, 20,074, 20,118, 20,144, IV-D2-11) objected to the design incinerator specifications in the December 17, 1993 proposed rule. Most of the commenters (20,000, 20,011, 20,027, 20,041, 20,051, 20,057A2, 20,070A1, 20,074, 20,118) claimed that the incinerator requirements were erroneously based on the SOCMI industry incinerator requirements of 1600 °F and 0.72 seconds residence time rather than on the existing kraft pulp mill NSPS standards for TRS. Other commenters (20,041, 20,102, 20,129) claimed that the design incinerator parameters are inadequate to ensure high combustion of HAP's and should be more stringent.

Several commenters (20,027, 20,051, 20,056, 20,057A2, 20,07OAl, 20,074, 20,118, 20,144, IV-D2-11, IV-D2-3) contended that EPA should change the incinerator operating provisions to the NSPS requirements of 1200 °F and 0.5 seconds residence time. One commenter (20,057A2) recommended that the NSPS operating requirements and the alternative 20 ppmv HAP emissions limit be included in the rule to ensure that current incinerators can be used for continued control of LVHC gases. The commenter (20,057A2) stated that this would minimize new incinerator costs by maintaining the viability of existing equipment. One commenter (IV-D2-11) noted that if the 1600 °F and 0.75 second criteria are promulgated for LVHC incinerators, then the criteria should only apply to new units so existing incinerators will not have to be replaced.

Two commenters (20,000, 20,070Al) provided examples of incinerators that achieve high destruction efficiencies, while operating at a temperature of 815 °C (1500 °F) and a retention time of 0.15 seconds. One commenter (20,070Al) provided data from tests conducted at a mill that showed methanol destruction greater than 99 percent. The commenter (20,070Al) stated that preliminary results indicate that destruction efficiencies of 99 percent are being achieved for TRS and methanol on gas streams having significant concentrations. The commenter (20,070Al) referred to NCASI for further data on HAP control efficiencies. One commenter (20,000) claimed that the combustion efficiency was maintained in these incinerators by using a high-intensity combustion chamber. The chamber ensures that pollutants are thoroughly mixed into the flame.

Two commenters (20,102, 20,129) claimed that the design incinerator operating requirements do not offer a significant margin of safety for high combustion efficiency combustion of HAP'S. The commenters (20,102, 20,129) recommended requiring an incinerator temperature of 1800 °F and a residence time of 1 second. Another commenter (20,111) indicated that a temperature of 1600 °F does not provide an adequate margin of safety against the formation of dioxin and should therefore be re-evaluated. Three commenters (20,102, 20,129, 20,144) stated that a higher combustion efficiency should be specified, such as a minimum of 99.9 percent or 100 ppm CO corrected to 7 percent oxygen. One commenter (20,129) noted that these are the requirements for thermal destruction of HAP's in the RCRA regulations.

One commenter (20,144) suggested that the rule allow streams to be segregated, and require those streams containing chlorinated HAP's to have a higher temperature and residence time, but those that do not contain chlorinated HAP's to meet the NSPS required temperature and residence time. Another commenter (20,041) requested that the proposed design incinerator requirements be deleted from the final rule. The commenter (20,041) contended that the design incinerator operation provisions in the proposal were based on the average operating parameters for thermal incinerators and concluded that some HAP's would be destroyed while others would require higher time/temperature conditions to achieve the desired destruction rate. The commenter (20,041) cited methyl ethyl ketone as an example; methyl ethyl ketone requires 1 second and 1780 $^{\circ}F$ to achieve 99 percent destruction. The commenter (20,041) concluded that a properly designed thermal incinerator would reduce HAP emissions by 98 percent, but indicated that an incinerator meeting the proposed operating requirements would not.

Response: The final rule retains the incinerator operating parameters of 1600 $^{\circ}F$ and 0.75 seconds residence time. The EPA has decided not to change the proposed design incinerator operating parameters for the final rule because the parameters are necessary to meet the MACT floor level of control. The EPA would first like to clarify that the final rule does not limit owners or operators of incinerators to operate at the specified temperatures and residence times. Any control device that is demonstrated to achieve 98 percent destruction of HAP's or any thermal oxidizer that reduces HAP emissions to a concentration of 20 ppmv at 10 percent oxygen will comply with the rule. (The outlet concentration limit option has changed from 20 ppmv at 3 percent oxygen, at proposal, to 20 ppmv at 10 percent oxygen. This issue is discussed later in this section.) The 98 percent destruction requirement represents the control level achieved by well-operated combustion devices. The 20 ppmv limit represents the performance achieved by well-operated combustion devices on low concentration vent streams.

Second, EPA has made this part of the rule as flexible as possible while still achieving a level of control reflecting MACT. In the December 17, 1993 proposal and in this final rule, EPA developed compliance alternatives in order to reduce the compliance testing burden. The compliance alternatives (i.e., operating thermal oxidizers at a temperature of 1,600 °F and a residence time of 0.75 seconds) were developed to ensure that the thermal oxidizers perform at a level that would meet the destruction efficiency requirements.

Information in industry survey (A-92-40, IV-B-8, IV-B-16) responses indicates that the best-controlled sources are controlling vent streams using an existing boiler as a combustion device. Power boilers operate at much higher temperatures and residence times than the incinerators required in the kraft mill NSPS and can achieve at least 98 percent destruction of HAP's. The incinerator operating parameters of 1600 °F and 0.75 seconds residence time required in the proposed rule are based on previous Agency studies (A-79-32, II-B-31) which show that these conditions are necessary to achieve 98 percent destruction of HAP's. However, the NSPS operating parameters (1,200 °F and 0.5 seconds residence time) do not destroy HAP's to this extent.

The EPA's analysis indicates that while the NSPS requirements of 1200 °F and 0.5 seconds residence time are sufficient to achieve 98 percent destruction of TRS compounds, kinetic calculations for methanol (the majority of HAP in pulping vent gases) show that the NSPS criteria will not provide the required 98 percent reduction of HAP's (A-92-40, IV-B-18).

Additionally, EPA evaluated incinerator performance data submitted by industry (A-92-40, IV-J-33). The data indicated that the NSPS operating parameters were not sufficient for achieving 98 percent destruction of methanol. This conclusion was reached by EPA since the operating conditions (i.e., temperature and residence time) of the incinerators that achieved 98 percent methanol destruction were greater than the levels specified in the kraft NSPS. Therefore, the NSPS specifications will not meet the requirements of MACT for new and existing sources. Information supplied by industry does show that some existing thermal oxidizers are currently meeting the 98 percent reduction or 20 ppmv standard (A-92-40, IV-B-18).

Historically, the EPA has conservatively assumed that combustion devices such as incinerators, power boilers, and lime kilns achieve 98 percent destruction of total organic compounds based on specified temperatures and residence times (A-79-32, II-B-31). Some devices can achieve higher destruction efficiencies for some compounds due to various mill specific factors (such as operation, fuel use, manufacturer, etc.). Due to the variability of combustion devices, it would not be appropriate to require higher destruction efficiencies for all devices based on unique characteristics of control devices at some mills.

The EPA maintains that no significant amount of dioxin will be generated from the combustion of these vent gases. There is no significant level of chlorine in the pulping vents. The final rule does not require bleaching vents, which do contain chlorine, to be routed to a combustion device.

Comment: Three commenters (20,027, 20,07OAl, IV-D2-11) disagreed with the requirement to correct gas concentrations to 3 percent oxygen. Two commenters (20,027, 20,070Al) did not consider any oxygen correction factor (other than the normal oxygen content of the gas stream) to be justified for incineration. One commenter (20,027) stated that normal oxygen content was 10 percent. Two commenters (20,07OAl, IV-D2-11) stated that for HVLC streams, the oxygen content can be between 15 to 20 percent prior to incineration and methanol content can be less than 100 ppm. The commenters (20,07OAl, IV-D2-11) claimed that a correction to 3 percent oxygen could reduce the 20 ppmv standard for such streams to less than 5 ppmv after correction. One commenter (20,070Al) stated that for low concentration substances in high volume gas streams, such as HAP/methanol in brownstock washer hood gases, a 10 percent correction may be appropriate. The commenter (20,070Al) asserted that the correction to 3 percent oxygen would be appropriate for combustion units that efficiently operate at 3 percent oxygen and are burning other fuels, or in cases where the gas stream has a high Btu value.

Response: The final rule does not require mills to operate combustion devices at a specified percent oxygen content. The oxygen correction factor is used as a means of standardizing concentration measurements to demonstrate compliance. This standardization ensures that sources are not complying with the concentration limit by artificially reducing the concentration by introducing excess air into the vent stream.

The correction factor at proposal was based on previous EPA studies for other industries. The EPA has re-evaluated the 3 percent correction factor to ensure that it is appropriate for the pulp and paper industry. Based on thermodynamic calculations of excess air and flame temperature relations, EPA has decided to change the oxygen correction factor to 10 percent in the final rule (A-92-40, IV-B-19). Therefore, the final rule allows combustion devices to be in compliance if they reduce HAP concentrations to 20 ppmv at 10 percent oxygen.

5.1.4 Enclosures and Gas Collection Systems

Comment: One commenter (20,027) pointed out that the assumed closed vent system requirements for the pulping area are not practiced at any existing mill. The commenter stressed that brownstock washers could not be tightly sealed due to the need for frequent quality control sampling of brownstock. The commenter (20,027) reported that EPA overestimated the extent to which a brownstock washer can be enclosed and the amount of gas flow that will be conveyed to a combustion device.

Response: Information received from an industry survey (A-92-40, II-D-27) shows that several pulp mills have successfully enclosed brown stock washers (A-92-40, IV-B-8, IV-B-16). Based on this information, EPA has decided to keep the brownstock washer enclosure requirements in the final rule. The EPA does not intend to prevent pulp sampling activities with the enclosure requirement. Mills which have successfully enclosed brownstock washers have access areas to allow for pulp sampling. At mills with negative pressure enclosures, access areas do not present emission leak concerns; however, access areas on positive pressure enclosures will still have to pass the leak test requirements.

Comment: One commenter (20,115A2) claimed that there is no way to enclose the inlet to the lime kiln and simultaneously direct air through the product coolers, a necessary conservation step, while allowing the free flow of product lime out of the kiln.

Response: The commenter appears to have misinterpreted the enclosure requirement. Under this regulation, the lime kiln is not part of the pulping component and, therefore, not required to be enclosed. The lime kiln was listed as an alternative control device for vent stream gases in the pulping system.

Comment: One commenter (20,110) supported extending the gas collection techniques required for kraft mills to the non-kraft sector of the industry, particularly to control the potential for heavy sulfur dioxide emissions during batch digester blowdowns.

Response: The proposed rule requires that kraft, soda, semi-chemical, and sulfite mills comply with the gas collection requirements. Although EPA subcategorized mills by pulp type for the final rule, the gas collection and control requirements are still applicable to all sources that are required to be controlled, which includes batch digesters at sulfite mills.

5.2 COSTS

Comment: Two commenters (20,000, 20,070Al) contended that the proposed incinerator design criteria would increase costs unreasonably. One commenter (20,000) contended that proposed design criteria would require existing incinerators to be increased in size by a factor of five, thereby limiting improvements to existing methods, precluding development of other technologies to control HAP's, and adding unnecessary costs to incinerators. Another commenter (20,070Al) stated that the proposed design standards would require higher capital costs and fuel costs.

Response: The final rule does not limit owners or operators of incinerators to operate at the specified temperatures and residence times. The final rule allows any combustion device that can be demonstrated to achieve 98 percent destruction of HAP's or any thermal oxidizer that reduces HAP emissions to a concentration of 20 ppmv at 10 percent oxygen. Information supplied by the pulp and paper industry shows that many of the existing thermal oxidizers can meet either the 98 percent destruction option or the 20 ppmv outlet concentration (A-92-40, IV-J-33). Therefore, no additional cost or design is necessary for these thermal oxidizers.

The capacity concerns expressed by several commenters to the proposed rule may have been due to the fact that the proposed rule required all vent streams to be controlled, except those with very low flow and low concentrations. Therefore, the commenters may have concluded that all pulping vents were required to be controlled. The March 8, 1996 supplemental notice specifically defined the vent streams that are required to be controlled. The specific list will reduce initial estimates of gas volume routed for combustion.

Additionally, EPA conducted surveys (A-92-40, IV-E-93) with several mills regarding their capacity to combust additional vents streams at existing boilers. Results of the survey indicate that two-thirds of the surveyed mills have the capacity in the existing boilers to handle combustion of the named HVLC streams, and therefore, would not need to construct thermal oxidizers. The remaining one-third would construct thermal oxidizers. This information was used in determining the national cost impacts of the final rule (see chapter 20 of this document and A-92-40, IV-B-13).

<u>Comment:</u> Several commenters (20,011, 20,014, 20,027, 20,071, 20,123Al) claimed that EPA had significantly

underestimated the cost of controlling pulping emissions and should reassess the cost for the promulgation package. Several commenters (20,014, 20,027, 20,057A2, 20,123A1, 20,123A7) asserted that the costs for gas collection and treatment systems were significantly underestimated. Three commenters (20,014, 20,027, 20,123A7) specified that EPA had underestimated the cost of ductwork. These commenters (20,014, 20,027, 20,123A7) asserted that using stainless steel ductwork was standard for the industry and EPA underestimated the cost by not assuming the use of stainless steel duct work. Three commenters (20,027, 20,057A2, 20,118) contended that EPA incorrectly predicted that there would be no fuel penalty for combusting HVLC vent streams and did not include the costs of control valves for gas collection systems which are essential for pulp and paper operations.

Response: In response to public comments, the cost estimates for the gas collection systems were revised. The gas collection system used in estimating cost impacts of the final rule included stainless steel ductwork, fans, a mist eliminator, a condenser, flame arrestors, liquid sampling taps, a condensate storage tank, and rupture disks. Additional equipment (mist eliminator, condenser, condensate storage tank) was added for reducing moisture in the vent stream prior to combustion (A-92-40, IV-B-13).

The revised cost impacts also included the cost of 1,500 feet of stainless steel ductwork to an existing combustion device and 500 feet to a new stand-alone combustion device. The duct lengths were based on engineering judgement and information collected during several site visits to pulp and paper mills.

The EPA considers these duct lengths to sufficiently characterize the lengths of ducts at typical pulp and paper mills. Energy and auxiliary fuel costs were also accounted for in the revised impacts.

The costs and equipment designs were based on algorithms in the Office of Air Quality, Planning and Standards (OAQPS) Control Cost Manual (OCCM). These algorithms have been widely used in developing other NESHAP, and have been used by Federal, State, and local air pollution control agencies to estimate costs.

Comment: One commenter (20,123A7) stated that EPA's assumption that indirect costs are included in the vendor's cost estimate may be erroneous. The commenter (20,123A7) provided cost factors for installed cost and asserted that indirect costs are generally 35 to 50 percent of the total installed cost depending on the client and the type of estimate.

Response: For consistency, EPA estimates pollution control costs using standardized cost procedures specified in the OCCM. The EPA realizes that estimates made through the OAQPS Control Costs Manual may be different from actual costs at individual facilities. However, the procedure provides a reasonable estimate of control costs on a national basis. Indirect costs were not assumed to be included in the vendor's cost. Indirect costs are equipment specific and range from 30 to 57 percent of the total direct costs.

5.3 SECONDARY IMPACTS OF PULPING CONTROLS

Comment: Several commenters (20,053A1, 20,057A2, 20,059, 20,07OAl, 20,103, 20,114) opposed combustion as a means of controlling HAP's because the secondary emissions of other pollutants would increase. Several commenters (20,018, 20,053A1, 20,057A2, 20,059, 20,103) stated that EPA's approach to control HAP's by combustion would increase emissions of criteria pollutants regulated under the Act. One commenter (20,114) specifically noted that combustion of NCG containing reduced sulfur compounds would result in increased emissions of sulfur dioxide. Another commenter (20,010) supported using incineration to control emissions from pulping vents. However, the commenter (20,010) insisted that no exceedances of the existing sulfur dioxide emissions standard should be allowed from incinerating pulping off-gases.

One commenter (20,114) asserted that the costs and environmental impacts associated with the by-products resulting from combustion-based control equipment must be further assessed. The commenter (20,114) argued that the economics assessment erroneously indicated that the adverse effects of secondary impact increases cannot be quantified. The commenter (20,114) stated that EPA must explain such statements when combustion by-products are criteria pollutants for which there are existing ambient air quality standards. One commenter (20,103) questioned whether tradeoffs between HAP's and criteria pollutants had even been considered.

Response: In the final economics assessment, (A-92-40, V-A-2), EPA outlined the estimated emission reductions resulting from this rule (139,000 Mg/yr HAP's, 409,000 Mg/yr VOC's, 78,500 Mg/yr TRS compounds). Estimated increases in secondary emissions due to using combustion sources for HAP control were also presented (94,500 Mg/yr SO_2, 5,230 Mg/yr NO_x, 8,660 Mg/yr CO). The EPA judged that the secondary impacts, due to the use of combustion control for HAP's, were reasonable and were outweighed by the benefits of the HAP emission reductions achieved. The readers are referred to the economics assessment for a detailed discussion of the benefits analysis.

<u>Comment</u>: One commenter (20,053Al) contended that incineration of HVLC streams would increase energy requirements because HVLC streams do not contain compounds with sufficient heating value to support combustion. The commenter (20,053Al) added that increased energy consumption would have adverse environmental effects and increase mill operating costs. The commenter (20,053Al) concluded that these impacts were not incorporated into EPA's analysis.

<u>Response</u>: The EPA agrees that some of the named vent streams will not have sufficient fuel value to support combustion. The environmental and cost impacts for the final rule were revised to include increases in fuel and energy requirements (see chapter 20 of this document).

<u>Comment</u>: One commenter (20,011) contended that the secondary impacts (such as energy use) from back-up incinerators were not assessed in the proposal. The commenter (20,011) stated that these impacts should be addressed in the promulgation package.

<u>Response</u>: Impacts were calculated assuming that the primary combustion device was operating 100 percent of the time. The EPA considers that if the primary device was down and a backup device was used, similar energy and emissions would occur. Therefore, the impacts from backup devices have implicitly been incorporated into the impacts analysis.

<u>Comment</u>: One commenter (20,122) requested that EPA clarify whether chlorinated sludge may be incinerated. The commenter

(20,122) stressed that it is necessary to prevent the incineration of chlorinated compounds that form dioxins, furans, and other organochlorines.

Response: This NESHAP does not require the incineration of chlorinated sludge. Solid waste handling is addressed under RCRA regulations, and it is not in the scope of MACT regulations.

Comment: One commenter (20,027) stated that the economics of combusting HAP's in a boiler with an SO_2 scrubber are less favorable than combustion in a stand-alone combustion unit because the flue gas volume of a boiler is larger, which makes the cost of control greater.

Response: While the rule does not require SO_2 control on the boilers or incinerators used for HAP control, some existing boilers already have SO_2 control. To avoid adverse air quality impacts locally, some of these facilities may be required to install SO_2 control on the boilers or incinerators that are used for HAP control. The EPA agrees that SO_2 control costs on an incinerator may be less than SO_2 control costs on a boiler due to differences in flue gas volume. However, the rule allows a facility to control HAP's in a boiler or in an incinerator, and the facility can make the control option decision based on their preference.

The interaction between the NESHAP and other existing regulations associated with collateral emissions increases are addressed in chapter 16 of this document.

6.0 BLEACHING AREA

6.1 CONTROL OPTIONS

6.1.1 Scrubbers

Comment: Several commenters (20,027, 20,029, 20,054A2, 20,074, 20,118, 20,149) discussed the chlorine removal efficiency of existing bleach plant scrubbers. One commenter (20,027) argued that there were no data to support EPA's assumption that scrubbers can control 99 percent of chlorine emissions from the bleach plant on a continuous basis. The commenter (20,027) objected that EPA used NCASI Technical Bulletin No. 616 as the basis for specifying 99 percent removal because the data in that bulletin indicated that scrubbers occasionally attained the 99 percent control level, not continuously. Another commenter (20,074) suggested a continuous chlorine/$C10_2$ removal efficiency of 95 percent rather than the proposed value of 99 percent, and provided data on three existing bleach plant scrubbers to justify the recommendation.

Two commenters (20,118, 20,054A2) stated that removing 99 percent of chlorine emissions may not be possible at mills with 100 percent ClO_2 substitution due to low concentrations of chlorine that would enter the scrubber.

One commenter (20,029) supported EPA's assumption that the bleach plant chlorine scrubber could remove 99 percent of chlorine and ClO_2 emissions. The commenter (20,029) acknowledged scrubbers achieving as high as 99.9 percent control efficiency.

Response: As discussed in the March 8, 1996 Federal Register supplemental notice, data available to EPA (A-92-40, 11-I-24) support the 99 percent chlorinated HAP reduction requirement for existing bleach plant scrubbers that use a caustic medium and operate with high recirculation rates. The EPA reviewed the data submitted by commenter 20,074 and found three of the six bleach plant scrubbers analyzed by the commenter had estimated chlorine/ClO_2 reductions of 99 percent with the remaining three dropping off to a low of 50 percent. The three scrubbers that did not achieve 99 percent reduction were not caustic scrubbers and, therefore, not representative of MACT. Moreover, the data received from commenter 20,074 was not used to help justify the final rule because the reported reductions were estimated and not based on test results.

The EPA agrees that a continuous 99 percent reduction of chlorinated HAP's across a caustic scrubber may not be achievable on streams with low concentration levels of chlorine, such as when ClO_2 substitution is used. Therefore, in the final rule, EPA has included a chlorinated HAP (other than chloroform) outlet concentration limit of 10 ppmv and a chlorine mass emission limit of 0.001 kg total chlorinated HAP (other than chloroform) per Mg ODP produced as alternate compliance options. The EPA has concluded that these compliance alternatives will achieve chlorinated HAP reductions (other than chloroform) equivalent to the 99 percent reduction standard (A-92-40, IV-B-29).

Comment: In regard to the December 17, 1993 proposal, several commenters (20,024, 20,028, 20,036A1, 20,043, 20,057A2, 20,071, 20,074, 20,111, 20,114) stated that EPA incorrectly determined the level of control achieved by bleach plant scrubbers for HAP's other than chlorine. Several commenters (20,043, 20,057A2, 20,071, 20,074, 20,111, 20,114, 20,146) contended that data indicated that bleach plant scrubbers are ineffective at removing methanol from vent gases. One commenter (20,027) provided data to demonstrate that methanol and other non-chlorine HAP's are not removed by existing bleach plant scrubbers. In addition, the commenter (20,027) also presented data on the amount of methanol released from existing bleach plant scrubbers. Another commenter (20,028) reported a methanol removal efficiency of 40 percent with their existing bleach plant scrubber (using weak wash as the scrubbing medium).

One commenter (20,027) pointed out that bleach plant scrubbers typically use alkaline media rather than water as the scrubbing fluid. Two commenters (20,027, 20,071) stated that a second scrubber utilizing water as the scrubbing media could be installed to remove methanol; one commenter (20,027) provided cost information, but stated that such an option would not be cost effective.

In response to the proposed use of incineration following scrubbers, three commenters (20,057A2, 20,114, 20,146) claimed that incineration following bleach plant scrubbers would not be cost effective.

In response to the March 8, 1996 Federal Register supplemental notice, several commenters (IV-D2-8, IV-D2-10, IV-D2-15, IV-D2-16, IV-D2-17) agreed with EPA's decision to drop the control of non-chlorinated HAP's from the bleaching control requirements. However, one commenter (IV-D2-4) expressed concern over EPA's decision to only require chlorinated HAP control for the bleaching area:

Response: As discussed in the March 8, 1996 Federal Register supplemental notice, the proposed requirement for control of non-chlorinated HAP's from the bleaching system was dropped for the final rule. Evaluation of existing bleach plant scrubber performance data provided by industry indicated that existing scrubbers are not effective at removing non-chlorinated HAP'S. Other control scenarios, such as incineration followed by caustic scrubbing or a second scrubber for the control of methanol, were evaluated for reducing non-chlorinated HAP's, but EPA determined that these control techniques were cost prohibitive or had adverse environmental impacts (see proposal preamble). For example, the cost of adding a second scrubber for the control of methanol would not be reasonable considering the relatively low emission reduction achieved and the significant increased generation of process wastewater requiring treatment.

Comment: Two commenters (20,059, 20,091) claimed that the December 17, 1993 proposal may promote cross-media transfers of certain pollutants. For example, pollutants absorbed in scrubbing liquid may be released back to the atmosphere from the wastewater treatment process. One commenter (20,059) also claimed that although scrubbers may effectively remove 99 percent of highly soluble compounds, the overall reduction of these compounds is estimated at only 75 percent because these pollutants re-volatize in the wastewater treatment process. Similarly, the commenter (20,059) stated that scrubbers remove 60 percent of medium solubility compounds but the actual removal is only 35 percent because of re-volatilization.

Another commenter (20,091) expressed concern over emissions of bleach plant pollutants from spent white liquor that has been used as scrubbing media in the bleach plant. The commenter (20,091) questioned whether the spent scrubbing media would be sent to the white liquor storage tank where bleach plant pollutants could be emitted to the atmosphere.

Response: Based on an evaluation of the industry data collected in the 1992 NCASI voluntary questionnaire, the floor level of control for bleach plant vents was determined to be control of total chlorinated HAP's (other than chloroform) using caustic scrubbing and process modifications (elimination of hypochlorite and 100 percent substitution of chlorine). Bleach plant scrubbers typically use white liquor as a scrubbing media to remove chlorinated compounds. Data indicate that caustic scrubbing can control the emissions of chlorine by 99 percent or below 10 ppmv or to an emission limit of 0.001 kg per Mg ODP (A-92-40, IV-B-29). Re-volatilization of chlorinated HAP's is not considered a concern because chlorinated compounds react with the scrubber media to form a precipitate and would not be emitted from the spent caustic.

Typical industry practice for spent scrubbing media is to send the stream to the sewer followed by biological treatment. Other control devices were evaluated for reducing non-chlorinated HAP's but EPA determined that these control techniques were cost prohibitive. The EPA does not have data on chlorinated HAP emissions from white liquor storage tanks, but maintains that they are insignificant due to the reactions between the chlorinated compounds and the white liquor that form a precipitate.

6.1.2 Incineration

Comment: With regard to the December 17, 1993 proposal, several commenters (20,027, 20,059, 20,071, 20,114) expressed concerns over the potential requirement for incineration of emissions from bleach plant vents. Three commenters (20,027, 20,071, 20,114) maintained that the incineration of emissions from bleach plant scrubber overheads would not be cost effective due to energy penalties and large increases in collateral emissions. The commenters (20,027, 20,071, 20,114) also stated that this option would not be legally defensible because the cost-effectiveness of such a requirement could not be justified.

One commenter (20,027) stated that existing combustion devices could not be used to combust emissions from scrubber overhead vents because there would be periodic exposure to chlorinated streams if the scrubber experienced downtime, or continual exposure if the combustion device were installed prior to scrubbing. Therefore, the commenter (20,027) concluded that a stand-alone incinerator would have to be installed after the scrubber. The commenter (20,027) indicated additional fuel would be required for the incinerator, leading to collateral emission increases and energy penalties.

One commenter (20,059) supported a control option that would require combustion of scrubber off-gases to remove insoluble organic compounds such as chloroform. The commenter (20,059) contended that some pollutants in the bleaching vent streams would not be effectively reduced with a scrubber alone. The commenter (20,059) also asserted that EPA did not consider intermediate options, such as the combustion of selected vent streams with high organic content followed by scrubbing.

Response: As presented in section X.E.2 of the preamble to the December 17, 1993 proposal, EPA considered two options for incinerating bleach plant vent gases: (1) combustion of scrubber off-gases, and (2) combustion of emissions from bleach plant vents followed by scrubbing. However, EPA rejected these options because they were not reasonable considering the cost and environmental impacts. Cost data and comments received after proposal supported the conclusion that incineration of bleach plant vent gases is not a viable option (20,027).

The final rule requires caustic scrubbing for total chlorinated HAP's, other than chloroform, for both paper-grade and dissolving-grade mills. For paper-grade mills, the final rule requires process modifications (e.g., 100 percent ClO_2 substitution and elimination of hypochlorite) for chloroform emissions. The chloroform requirements for dissolving-grade mills are still under study and are being deferred. As indicated in the March 8, 1996 supplemental notice, compliance with the requirements of the effluent limitation guidelines and standards will constitute compliance with the air standards for chloroform emissions. The EPA recognizes that these requirements do not provide efficient control of non-chlorinated HAP's. However, additional technologies that could reduce non-chlorinated HAP's, such as incineration, were determined to not be reasonable based on their cost and impacts (see proposal preamble).

6.1.3 Process Modifications

Comment: One commenter (20,027) claimed that EPA did not systematically review industry data to predict the emission reductions of HAP's other than chloroform from process changes (e.g., peroxide reinforcement of the second bleaching stage, installation of oxygen delignification, extended digester delignification, improved brownstock washing, etc.). The commenter (20,027) concluded that, based on the ineffectiveness of scrubbers in controlling some species of HAP emissions, it would not be appropriate to include gas scrubbing in the development of the MACT floor level of control. However, the commenter (20,027) suggested that it may be appropriate to set emission limits based on reductions obtained through process changes.

Several commenters (20,054A2, 20,059, 20,071, 20,102, 20,144) suggested that the elimination of hypochlorite and 100 percent substitution of ClO_2 would reduce emissions of chloroform and other HAP's. Therefore, the commenters (20,054A2, 20,071) indicated that scrubbers would not be needed for HAP control.

Response: The EPA evaluated the industry test reports, including the NCASI report, and prepared a document that summarizes the calculated emission factors (A-92-40, IV-A-6). Evaluation of these data indicate that high levels of ClO_2 substitution and elimination of hypochlorite reduce chloroform emissions, but may not significantly reduce other non-chlorinated HAP'S.

Information obtained from the 1992 NCASI voluntary questionnaire (i.e., the MACT survey) indicated that the floor level of control for bleach plants is caustic scrubbing and process modifications (100 percent substitution and elimination of hypochlorite) to control chloroform emissions. The effluent limitation guidelines and standards will require (as a minimum) 100 percent ClO_2 substitution and no hypochlorite use. The EPA considers these requirements to be at least as stringent as the process modifications in the floor level of control. Therefore, as explained in detail in the March 8, 1996 Federal Register supplemental notice, the final rule for bleach systems is a combination of the effluent limitation guidelines and standards requirements (or MACT process modification requirements) and the bleach system vent scrubber requirements outlined in the proposed rule.

Comment: One commenter (20,059) recommended that EPA examine whether 100 percent ClO_2 substitution for dissolving kraft mills, as opposed to the 70 percent substitution recommended at proposal, could achieve greater reductions in chloroform and other HAP emissions. The commenter (20,059) asserted that if it is more effective, then EPA should require 100 percent substitution combined with oxygen delignification as the basis for controls in the dissolving kraft industry.

Response: The final rule contains standards for total chlorinated HAP's, other than chloroform, based on scrubbing and process modifications; either elimination of hypochlorite and 100 percent ClO_2 substitution or the effluent limitation guidelines and standards for paper-grade and dissolving-grade mills. However, as stated in OW's July 15, 1996 Federal Register notice, EPA is deferring issuing effluent limitation guidelines and standards for dissolving-grade mills until the comments and preliminary new data affecting dissolving-grade subcategories can be fully evaluated. Therefore, the compliance date for dissolving-grade mills to comply with the bleaching system standards has been delayed until the 3 years after the effluent limitation guidelines and standards are promulgated.

Oxygen delignification is not being required as MACT because it would not achieve significant additional air emission reductions in the bleaching system beyond those achieved by the final rule, and would increase emissions of HAP from the pulping area.

Comment: Several commenters (20,036A1, 20,059, 20,110, 20,121) stated that TCF bleach plants should be exempt from the proposed bleaching area control requirements. One commenter (20,036Al) agreed with the requirement for enclosures in the bleaching area if a mill uses a combination of chlorine and ClO_2 to bleach; but they argued if a mill uses a TCF bleaching process, enclosures should not be required.

One commenter (20,036Al) requested that the requirements for scrubbers to control chlorine/C102 emissions be eliminated if TCF bleaching is implemented.

Response: In the December 17, 1993 proposed rule, TCF bleach systems would have fallen under the pulping component definition, and therefore, would be required to control all vents. In the final rule, TCF systems are included in the bleaching system. Bleaching systems are only required to control total chlorinated HAP's. Since TCF systems do not use chlorinated HAP's, TCF bleach systems are not required to be controlled.

Comment: One commenter (20,138) requested that EPA ban the use of chlorine to bleach pulp, and require the use of oxygen delignification. The commenter (20,138) indicated that ClO_2 substitution may not be good enough. One commenter (20,110) objected to the requirement for ClO_2 substitution since it has a greater inhalation toxicity than chlorine and Occupational Safety and Health Administration (OSHA)/National Institute Occupational Safety and Health (NIOSH) exposure limits are one fifth those of chlorine.

Response: Based on an evaluation of industry data collected in the 1992 NCASI voluntary survey (A-92-40, IV-B-8), and data received after proposal, EPA determined that the MACT floor for bleach plant vents is scrubbing of total chlorinated HAP's, other than chloroform, 100 percent substitution with ClO_2, and elimination of hypochlorite. Therefore, substitution is required in the final rule. The data also show that bleaching substitution with ClO_2 reduces chloroform and other chlorinated HAP emissions. However, the data indicate that there are no significant increases in non-chlorinated HAP emissions. Readers are referred to the revised emission factor document (A-92-40, IV-A-8) for a more detailed discussion of this issue. While ClO_2 is a highly toxic compound, mills that use ClO_2 substitution also have scrubbers in place to control ClO_2 because of worker safety concerns.

6.2 MISCELLANEOUS BLEACHING COMMENTS

Comment: One commenter (20,029) advocated the possible use of catalytic oxidation units with appropriately formulated catalysts to control bleaching component halogenated VOC, citing their effectiveness in other industrial applications.

Response: A discussion of the rationale for determining the level of control for the bleach plant is presented in chapter 4.0 of this background information document. Other control devices than those specified in the rule can be used to meet the performance standard in place of the reference control technology. However, the alternate control device will still be required to meet the percent reduction or concentration limits for chlorinated HAP's specified in the rule.

7.0 PROCESS WASTEWATER AREA

7.1 DESIGN STEAM STRIPPER

Comment: Several commenters (20,000, 20,027, 20,059, 20,118, 20,147) contended that various aspects of the design specifications for the steam stripper required by the proposed rule were incorrect, and that some assumptions used in modeling the steam stripper control of process wastewater streams were incorrect. Two commenters (20,000, 20,147) reported that the specified steam stripper design would not achieve the desired results because the pressure was too high for the number of theoretical stages assumed. Two commenters (20,027, 20,118) criticized the use of a tray efficiency of 75 percent, stating that industry typically assumes a tray efficiency of 50 percent. The commenters (20,027, 20,118) also stated that the proposed inlet concentration for streams to be stripped was too high.

Two commenters (20,027, 20,118) claimed that the analysis for the proposed steam stripper appeared to be based on stripping compounds (e.g., butadiene, toluene, naphthalene, and butanol) unrelated to the pulp and paper industry. One commenter (20,027) contended that these compounds do not possess the hydrophilic properties of methanol. The commenter (20,027) also criticized the use of Henry's law instead of empirical data to predict liquid-gas interface relationships. The commenter (20,027) concluded that the result was that the stripper design was undersized.

One commenter (20,147) strongly criticized the design steam stripper parameters and indicated that EPA should simply designate what streams require stripping and at what efficiency and leave the design of the system to the experts.

Response: Based on comments received on the December 17, 1993 proposed rule and the March 8, 1996 supplemental notice, the requirements for a design steam stripper were removed from the final rule. Industry indicated that a design stripper would likely not be used. At proposal, industry commented that a mass removal target would be a more usable option. Prior to proposal, EPA lacked the data necessary to establish a mass removal target. However, additional data was submitted to EPA following the proposal and was used to determine the appropriate mass removal target (20,027A3). A discussion of this data was presented in the March 8, 1996 supplemental notice. Based on this data, EPA determined that the mass removal target is achievable (A-92-40, IV-B-l0). Additionally, information received from industry about specific design assumptions were considered in determining steam stripper costs (see section 7.6).

7.2 APPLICABILITY CUTOFFS

Comment: One commenter (20,027) advised that the proposed rule (with the 500 ppmw cutoff) would require stripping of streams with flow rates of 1,000 to 1,500 gallons per minute (GPM). The commenter (20,027) pointed out that no mill is known to operate a steam stripper capable of stripping streams with this high flow rate. The commenter (20,027) stated that the largest steam stripper used in the industry strips 500 GPM. The commenter (20,027) asserted that stripping at the levels proposed by EPA would require stand-alone steam strippers (A-92-40, II-B-20). One commenter (20,043) indicated that their steam stripper would be able to achieve about 90 percent removal of methanol if the applicability level were raised to 3,000 ppmw so that the large volume, dilute flows would not need to be stripped. However, one commenter (20,059) alleged that EPA relaxed the applicability cutoff in the final rule from 100 ppmw to 500 ppmw due to objections from industry and Office of Management and Budget (OMB). The commenter (20,059) argued that the cutoff limit for steam stripping wastewater (500 ppmw methanol) will virtually exempt all wastewater streams from steam stripping, and consequently, from control of atmospheric VOC emissions.

Two commenters (20,027, 20,118) asserted that steam stripping of streams that contain black liquor (even in dilute amounts) is not feasible due to foaming problems. As a solution, the commenters (20,027, 20,118) proposed the restriction of the definition of process wastewater streams to include only certain defined streams that do not come in contact with black liquor. This would allow condensates contaminated with liquor (carryover or spilled liquor) to be discharged to the wastewater treatment system.

Response: At the time of the proposal, EPA did not have sufficient data to identify the specific streams that are typically steam stripped. The applicability cutoffs were developed to distinguish between those streams that were steam stripped at the floor level of control and those that were not stripped. Following proposal, additional data was submitted to

EPA (A-92-40, IV-J-32) that identified the specific streams that are steam stripped and streams that are uncontrolled at the floor level of control. Control more stringent than the floor level is not warranted given the small concentrations of HAP's and the costs of controls. As discussed in the March 8, 1996 supplemental notice, EPA revised the format of the final rule for kraft and sulfite wastewater by replacing the applicability cutoffs with named pulping process condensate streams to be controlled. The EPA contends that the revised approach contained in the final rule more accurately reflects the floor level of control than the applicability cutoffs in the proposed rule.

With regard to the commenter's concern of stripping streams that contain black liquor, EPA does not have sufficient data to assess the magnitude of this problem. However, EPA contends that periods when condensates are untreatable should be addressed with the downtime allowances for stand-alone and integrated steam strippers specified in the final rule. Further discussion of downtime issues is given in section 4.3.4.

7.3 HARDPIPING AND BIOLOGICAL TREATMENT

Comment: In regard to the EPA's request for comments and data at proposal, several commenters (20,027, 20,039, 20,054A2, 20,067, 20,074, 20,111) supported biological treatment for the control of HAP's from wastewater. One commenter (20,054A2) stated that if other technologies, old or new, could achieve the same level of reduction, they should be allowed as alternatives. Two commenters (20,039, 20,067) stated that by not allowing biological treatment as an alternative to steam stripping, money and efforts would be wasted for no environmental benefit. One commenter (20,111) reported that test results obtained from a kraft mill have shown non-detectable levels of methanol in both the sludge and the effluent to the river, indicating that a properly operated biological treatment system would be a better environmental alternative than steam stripping.

One commenter (20,011) asserted that methanol's high solubility, low volatility, and affinity for biological destruction were not considered when EPA chose steam stripping as the reference control technology over biological treatment. The commenter (20,011) questioned why reference control technology criteria for biological treatment systems have not been established despite data demonstrating their efficient destruction of HAP's. Two other commenters (20,027, 20,115A2) also indicated that methanol is readily destroyed by biological treatment systems. One commenter (20,043) noted that the chemical characteristics of the HAP's found in pulp mill wastewater streams are correctly described as polar and these HAP's are not likely to volatilize readily.

Response: In both the December 17, 1993 proposal and the March 8, 1996 supplemental notice, EPA stated that steam stripping of pulping process condensate streams constitutes the floor level of control for kraft pulping. The EPA asserts that the MACT standards address total HAP emissions, not just emissions of methanol. While EPA agrees with the commenters that methanol is readily degraded in well-operated biological treatment systems, information detailing the overall effectiveness for destroying total HAP compounds is not available.

Based on the hydrophilic nature of methanol, EPA believes that a steam stripper removing 92 percent of methanol is achieving a substantially greater removal of total HAP (i.e., 92 percent removal of methanol in a steam stripper correlates to at least 92 percent removal of total HAP). This is not the case for biological treatment systems since methanol is preferentially degraded over other HAP compounds (i.e., 92 percent removal of methanol in biological treatment does not necessarily correlate to 92 percent removal of total HAP). While EPA has limited data indicating that some well-operated biological treatment systems could meet the standard (A-92-40, IV-Dl-75), EPA does not have sufficient data regarding total HAP removal to base the floor level of control on biological treatment.

In the proposal and final rule, methanol was selected as the surrogate compound for measuring total HAP for most control devices since it is the predominant compound in process vent and wastewater streams. However, the final rule specifies that compliance with the percent reduction standard must be demonstrated on a total HAP basis if a biological treatment system is used to comply with the pulping process condensate standard.

Although EPA based the floor level of control on the performance of steam stripping technology, the final rule contains several compliance options. The options include discharging condensates to a biological treatment system achieving 92 percent destruction of HAP, recycling the pulping process condensate streams to a piece of process equipment that is controlled according to the pulping vent standard, achieving a specified percent mass reduction, and achieving minimum mass removal targets. Any HAP removed during handling and treatment, with the exception of biological treatment, must be controlled according to the pulping vent standard.

Comment: One commenter (20,027) questioned whether sufficient data were available to determine biological treatment's destruction efficiency of HAP's and cautioned that neither they nor EPA have sufficient information to predict what the target treatment efficiency of "well operated treatment systems" are in general. The commenter (20,027) stated that the proposed effluent guidelines have the potential to reduce the BOD loadings to the biological treatment system and, consequently, to change the removal efficiency of the system. One commenter (20,067) reported a HAP removal efficiency of 98 percent by biological treatment systems.

Response: At proposal, EPA did not have sufficient data to characterize the total HAP removal efficiency of biological treatment systems. Following proposal, industry submitted data (A-92-40, IV-Dl-75) that detailed the removal efficiency of methanol in biological treatment systems. Based on this data, EPA concluded that a well operated treatment system can achieve methanol removal of 98 percent. However, methanol is preferentially degraded in biological treatment systems over other HAP compounds. Therefore, the final rule requires owners and operators using a biological treatment system to comply with the pulping condensate standard to demonstrate initially and annually that the system is achieving at least a 92 percent reduction in total HAP, not just methanol.

Regarding the commenter's (20,027) concern about the effect of reduced BOD loadings on biological treatment system removal efficiency, EPA maintains that using a biological treatment system to comply with the pulping process condensate standards is an appropriate option. If for any reason the biological treatment system cannot be operated to achieve a 92 percent HAP reduction on a continuous basis, then the biological treatment option could not be used.

7.4 WASTEWATER COLLECTION AND TRANSPORT SYSTEMS

Comment: Several commenters (20,027, 20,056, 20,059, 20,074, 20,115A2) discussed the enclosure of wastewater collection and biological treatment units. One commenter (20,027) stated that the requirement for enclosing and combusting the wastewater collection and transport system components was expensive, impractical, completely unreflective of current practice and of minimal environmental benefit. One commenter (20,056) supported the statement in the preamble to the proposed regulation that the release of HAP's from quiescent wastewater units are less significant than those from turbulent systems. The commenter (20,056) stated that control of quiescent tanks and impoundments would not be justified since the dominant HAP is methanol, which is extremely soluble in water and does not readily volatilize. Another commenter (20,115A2) stated that it would not be feasible to incinerate the large volume of air associated with an enclosed biological treatment system. One commenter (20,074) stated that enclosing the collection system until biological treatment is not needed to provide equivalence to steam stripping. The commenter (20,074) noted that steam strippers and incinerators are far more susceptible than wastewater plants to periods of excess emissions during startups, shutdowns, and malfunctions.

One commenter (20,059) stated that EPA should evaluate emissions from quiescent basins and biological treatment systems and require them to be covered and vented to a control device. The commenter (20,059) indicated that volatile toxics evaporate from uncovered segments of wastewater treatment and biological treatment lagoons. The commenter (20,059) further asserted that biological treatment of wastewaters is ineffective at controlling VOC emissions to the atmosphere.

Response: The EPA asserts that it was not the intent of the biological treatment compliance option specified in the proposed rule to enclose or cover and incinerate the biological treatment system emissions. The final rule was revised to make the requirements for the biological treatment system compliance option more clear. The EPA agrees with the commenter that enclosing treatment units and incinerating the emissions would be very costly for industry and would achieve minimal emissions reductions. This determination is based on an evaluation of the emissions from biological treatment units (A-92-40, IV-A-6) and the fact that biological treatment systems are typically not located near existing combustion devices (i.e., there would be costly gas collection/conveyance systems). In addition, no existing mills currently cover and vent their biological treatment systems to control devices.

The EPA adopted a similar approach in the recently promulgated rules controlling air emissions from hazardous waste surface impoundments that treat volatile hazardous wastes. As presented in the December 6, 1994 Federal Register notice (59 FR 62917) and 40 CFR part 265.1086(a), uncovered biological treatment systems may be utilized to comply with the rule's requirements provided that the treatment system achieves the specified mass removal efficiency.

The proposed requirements for enclosing the wastewater collection system were intended to prevent the volatilization of HAP compounds from the wastewater streams before the streams arrived at the treatment device (e.g., steam stripper or biological treatment system). The proposed rule contained requirements for tanks, containers, surface impoundments, and individual drain systems. Based on industry comments, the requirements for containers have been removed from the final rule since they are not used in the pulp and paper industry. Additionally the requirements for surface impoundments have been removed from the final rule since EPA concurs that collecting and incinerating emissions from these treatment units is not reasonable.

The final rule retains the requirements for tanks that are used to store or treat the pulping process condensates. The specific individual drain system requirements contained in the proposed rule have been removed in favor of referencing the individual drain system requirements specified in 40 CFR subpart RR §§ 63.960, 63.961, 63.962, and 63.964. The EPA compared the collection system requirements contained in the proposed rule with the requirements of subpart RR. Since the requirements are consistent with the intent of the proposed standards, EPA concluded that the requirements of subpart RR, when combined with a treatment option, constitute MACT for the pulp and paper industry.

7.5 SECONDARY IMPACTS OF WASTEWATER CONTROLS

Comment: Several commenters (20,000, 20,011, 20,018, 20,027, 20,057A2, 20,067, 20,111, 20,115A2) indicated that the collateral emissions and the waste heat load associated with steam stripping were not adequately characterized by EPA. Two commenters (20,027, 20,057A2) asserted that EPA did not consider that the waste heat from steam strippers would cause water pollution, and may impact NPDES permits. Several commenters (20,027, 20,057A2, 20,111) noted that there would be an increase in NO_x, SO_2, CO, and PM less than 10 microns mean aerodynamic diameter (PM_{10}) due to the extra energy needs from the proposed steam stripping option. Two commenters (20,000, 20,067) also stated that the increased need for steam, normally generated by burning fossil fuel, could lead to increased carbon dioxide (CO_2) emissions. Two commenters (20,011, 20,018) stated that the secondary impacts associated with routing stripper overheads to a combustion device have not been adequately characterized. One commenter (20,115A2) argued that incinerating the steam stripper overheads and discharging clean, hot water was counterproductive from an energy standpoint while achieving little more reduction of methanol emissions than biological treatment.

Response: For the proposed and final rules, secondary impacts (e.g., NO_X, SO_2, CO, PM, etc.) were estimated for the following areas associated with steam stripping: (1) overhead gas combustion, (2) steam generation, and (3) electricity use. These secondary impacts are included in the impacts analysis. A discussion of the analysis for estimating secondary impacts is presented in chapter 20 of this document. The commenters' concerns regarding secondary impacts increases were referring to the impacts generated by the proposed steam stripper. At proposal, the flow rate of condensate streams sent to the steam stripper was estimated to be approximately 1 GPM per ADTP production per day (GPM/tpd). Based on data received following proposal, the flow rate was revised to approximately 0.2 GPM per ADTP per day. Consequently, the energy demand required by the steam stripper and the secondary impacts were proportionately reduced.

Regarding overall energy concerns, the final rule specifies that mills can rectify the steam stripper overheads to produce a concentrated stream to be used as supplemental fuel in mill combustion devices. This action will substantially reduce the operating costs associated with steam stripping. Additionally, the treated condensate from the steam stripper could be used by mills in pulping process areas to reduce the overall demand for fresh or mill water. If a mill elects to discharge the treated stream to the biological treatment system, the contribution of this stream to the total mill effluent flow rate would be negligible (i.e., hundreds of gallons compared to millions of gallons per day).

7.6 COSTS

Comment: Several commenters (20,011, 20,014, 20,018, 20,027, 20,043, 20,057A3, 20,114, 20,118) claimed that EPA underestimated the cost of steam stripper installation because of inadequate design and that EPA also overlooked equipment requirements. Several commenters (20,014, 20,027, 20,057A2, 20,118) maintained that cooling towers will be needed to handle the increased heat load sent to wastewater treatment systems. Several commenters (20,011, 20,014, 20,018, 20,027, 20,057A2, 20,114, 20,118) were concerned that existing steam capacity will not be adequate for stripping the required streams. The commenters indicated that the construction of package power boilers would be required to generate the additional steam necessary to strip the high volumes of wastewater. One commenter (20,057A2) argued that the construction of new power boilers or modifications to existing ones would trigger PSD/NSPS review and permitting. The commenter (20,057A2) stated that EPA did not consider the capital costs associated with this need. One commenter (20,027) noted that the true cost of steam stripping depends on the water and heat balances at a given mill. The commenters indicated that these factors were not considered properly by EPA in developing costs. One commenter (20,014) reported that the additional steam needed to strip an estimated 1,700 GPM of condensates would cost approximately $3,500,000 per year.

One commenter (20,027) warned that the conclusion was incorrect that two-thirds of the industry strippers would be integrated with evaporators. The commenter (20,027) asserted that the proportion of integrated versus non-integrated steam strippers is not the 66/34 percent split (integrated vs. non-integrated) used by EPA, but closer to a 6/94 percent split (30 of 32 mills are non-integrated). The commenter (20,027) disagreed that integrated steam strippers are a viable option (A-92-40, II-B-28).

One commenter (20,043) indicated that because pulp mills generate larger and more dilute wastewater streams than the chemical industry, it would be cost prohibitive to transfer chemical manufacturers' wastewater technologies (i.e., steam strippers) to the pulp industry. One commenter (20,114) urged that the high cost of a stand-alone incinerator be considered since wastewater treatment systems are typically located in remote areas of the mill.

One commenter (20,027) indicated that the ASPEN model EPA used to develop steam stripper design, cost, and model plant parameters is used for simulating packed tower distillation columns, not steam strippers. Therefore, the commenter asserted that the model inputs and assumptions used at proposal were not correct for the pulp and paper industry. The commenter (20,027) favored projections of cost and performance made on actual industry data rather than on a predictive model for chemical industry equipment.

Response: The comments received regarding steam stripper costs were made in reference to the proposed steam stripper design. Although the cost estimation of steam stripping systems is not critical since stripping is a floor-level technology, EPA revised the design and performance parameters used to estimate the capital and annual costs associated with steam stripping (A-92-40, IV-B-17) based on comments and data received following proposal.

At proposal, the flow rate of condensate streams sent to the steam stripper was approximately 1 GPM per ADTP per day. Based on data received following proposal (20,027A3), the flow rate was revised to approximately 0.2 GPM per ADTP per day. Consequently, the capital and annual costs associated with steam stripping were proportionately reduced.

The EPA contends that the ASPEN model provides steam stripper cost estimates that are comparable to the estimates provided by industry. While some mills may encounter higher or lower capital and annual costs, EPA maintains that the cost estimates derived from the ASPEN model are appropriate for estimating the national impacts ass0ciate.d with steam stripping.

The costs associated with package boilers for additional steam capacity were not included in the steam stripper costs. The EPA maintains that the steam demand for the stripper system is not expected to be a significant portion of the overall mill steam generation capacity and that the affected mills will be able to meet the increased steam demand with existing systems. Additionally, the steam required for stripping may be generated from other sources besides fresh steam from power boilers or recovery furnaces (e.g., flash or waste heat sources).

The costs associated with cooling towers were not included in the steam stripper costs for the final rule. The EPA reviewed the data submitted by industry (A-92-40, IV-Dl-46) detailing the number of cooling towers existing in the pulp and paper industry. The data indicated that 13 cooling towers were being used. While some mills may need cooling towers to handle the waste heat load from the pulping and bleaching processes, EPA's judgement was that it was not appropriate to assign the costs for installing and operating cooling towers to all mills that would use steam stripping. This decision was based on the fact that the stripped pulping condensates are typically sent to the mill's hot water tank for distribution to other process areas and the contribution of the stripped condensate is not expected to be significant when compared to the total volume of mill wastewater sent to the biological treatment system.

7.7 OTHER

Comment: One commenter (20,115A2) stated that recycling pulping process condensates could potentially increase HAP emissions due to increased carryover to uncontrolled process equipment such as deckers and screens.

Response: The final rule contains a compliance option for kraft pulping system wastewaters that allows mills to recycle the specified pulping process wastewater streams to controlled pieces of equipment without treatment. Since the piece of equipment receiving the untreated condensate is controlled according to the capture and control requirements of the pulping vent standards, EPA contends that HAP emissions would not be increased.

8.0 MONITORING

8.1 GENERAL

Comment: One commenter (20,059) stated that the monitoring parameters in the December 17, 1993 proposal were insufficient. The commenter (20,059) stated that in order to show that an emission standard is enforceable, EPA must show that the monitoring standard is sensitive enough to (1) detect exceedances, (2) indicate the amount of time the source was out of compliance, (3) show the amount of emissions in excess of the standard, and (4) identify the pollutants emitted. The commenter (20,059) stated that monthly measurements would not be sufficient to track wastewater treatment performance. One commenter (20,150) requested monitoring equipment capable of detecting any discharge of organochlorine. The commenter (20,150) also wanted to disallow hourly averaging. One commenter (20,151) requested that the rule require monitoring and recordkeeping for the potential venting of HAP's from all potential discharge locations.

Response: This rule, as NSPS and NESHAP programs have traditionally done, requires a combination of performance testing and continuous monitoring of control device operating parameters instead of monitoring the actual emission levels. Continuous parameter monitoring is consistent with section 504(b) of the Act, which states that "continuous emission monitoring need not be required if alternative methods are available. . .for determining compliance." The "alternative method" presented in the rule is to monitor the control device parameters.

The EPA has concluded in previous standards (e.g., the HON) that there is sufficient evidence to prove that pollution control equipment, if operating properly, can achieve high levels of HAP destruction. Data received from industry indicate that operational parameters provide an accurate indication of HAP destruction and emission levels. Operation parameter levels that ensure compliance are established during the initial performance testing effort, and continuous monitoring of operating parameters ensures continued compliance. Continuous emissions monitors for individual HAP species would add significant costs and burden to the industry without producing any environmental gain since the standard is based on total HAP.

The parameter monitoring program contained in the final rule provides clear criteria for what is considered to be a violation. With the exception of biological treatment systems, a period of excess emissions (considered a violation of the standards) occurs when operating parameters that indicated compliance during the initial performance tests are exceeded. The monitoring approach for biological treatment systems is discussed later in this section.

The final monitoring provisions are sufficient to detect exceedances and to determine the duration and extent of non-compliance. Providing a legal basis for effectively enforcing these emission limits does not require quantification of specific pollutants and emission levels.

<u>Comment</u>: Three commenters (20,027, 20,036A1, 20,056) claimed that the monitoring requirements are too burdensome on the industry. One commenter (20,036Al) stated that once the required process technology is installed and properly operated in order to produce the desired pulp quality, the operator has little or no effect on pollutant discharge. One commenter (20,056) contended that unless EPA can demonstrate the need for the proposed inspection schedule, one inspection every 6 months is appropriate. The commenter (20,056) stated that EPA must allow a facility the flexibility to determine the appropriate inspection schedule considering site-specific shutdown schedules, length of duct work, and history of repairs.

One commenter (20,027) outlined several recommendations for changes to the proposed monitoring requirements which included not requiring chlorine monitoring from bleaching systems (since the effluent guidelines require ClO_2 substitution), exempting process monitors from the monitoring plan specified in § 63.8(b), specifying a monitoring plan consistent with manufacturer's recommendation for calibration and maintenance, and allowing a ten percent deviation range around the initial performance test operating parameters that determine compliance.

<u>Response</u>: The EPA has made every effort to reduce the monitoring burden and to require only those procedures that are necessary to determine continuous compliance. The continuous monitoring of control device parameters, as required by the NESHAP, is necessary to provide information that will satisfy the requirements of section 114(a)(3) of the Act for enhanced

monitoring, certification of compliance status, and determination of continuous or intermittent compliance. The EPA considers the level of monitoring specified in the rule appropriate and necessary for compliance and disagrees with the commenters' assertion that the level is unwarranted.

Most pollution control technologies specified in this rule (i.e., thermal oxidizers, caustic scrubbers, steam strippers, and closed vent systems) are not related to pulp quality. These systems are operated separately from the pulping and bleaching systems and must be operated such that the limits defined in this rule are met, regardless of what pulping and bleaching process adjustments need to be made to produce the desired pulp quality. For process equipment that is used to reduce emissions, appropriate monitoring parameters are required to be determined during the performance test. The initial performance test should be conducted during normal operation of the mill so that the monitoring parameters determined are indicative of continuous compliance. Process technologies that are outlined in the rule as pollution prevention measures (e.g., total chlorine free bleaching) satisfy the requirements of the rule when properly operated and no further measures would be needed for compliance.

The EPA contends that the inspection schedule in the final rule (i.e., monthly) is appropriate for ensuring continuous compliance and does not place an undue burden on the industry. A more frequent inspection schedule is not needed since EPA does not expect the closed-vent systems or closed collection systems to encounter significant breakdowns or defects that would be associated with problems that developed over a short period of time (e.g., one week). However, a less frequent inspection schedule is not appropriate since defects or potential problems would not be identified in a timely manner.

The monitoring requirements specified in § 63.8(b) will not be waived for this rule. A 10 percent allowance above the established operating parameter compliance level is not allowed in the final rule. With the exception of biological treatment systems, the operational parameter levels that are determined during the performance test represent compliance and any exceedance will be judged as non-compliance. However, in setting the specified operating parameter level for determining compliance, a mill will determine this level based on parameter data monitored during the performance test, supplemented by engineering assessments and manufacturers' recommendations. The rationale and supporting information for the selected operating parameter must be submitted to the Administrator for approval.

Comment: Several commenters (20,011, 20,027, 20,054A2, IV-D2-15) requested that EPA allow some excursions and exemptions from monitoring to add flexibility to the parameter monitoring provisions. One commenter (20,054A2) supported excluding violations during startups, shutdowns, malfunctions, and during the first 48 hours in a reporting period. One commenter (20,011) stated that emergency venting should be an excusable excursion from otherwise applicable continuous monitoring requirements. One commenter (20,027) argued that because of process variability and lack of experience regarding continuous parameter monitoring systems, EPA must provide some provision for a certain number of excused excursions per reporting period. The commenter (20,027) offered to cooperate with EPA on such a project.

Response: With the exception of biological treatment systems, monitoring excursions or exemptions during normal operation are not allowed in the rule (other than the allowed downtime allowances). The monitoring parameters identified during the initial performance test should be determined in a manner to account for process variability. If a facility believes that the initial monitoring parameters do not accurately demonstrate continuous compliance, the facility may retest, before any violation of the standard, and revise the monitoring parameters (i.e, revise their operating permit).

For biological treatment systems, the rule identifies parameters to be monitored on a daily basis. Daily inlet and outlet samples must also be collected and archived for 5 days. The archived samples are used to demonstrate that the biological treatment system is achieving 92 percent reduction of total HAP if a specified monitoring parameter is outside the range established during the initial performance test. Quarterly performance monitoring for total HAP removal is also required in the final rule. To reduce the burden of sampling for total HAP during all four quarters, a mill may (during the first quarter test) establish a methanol percent removal that corresponds to at least 92 percent HAP removal, and only test for methanol percent reduction during the remaining quarterly tests.

The general provisions allow for monitoring parameter excursions during periods of startup, shutdown, and malfunctions. The general provisions are being revised and will address the issue of venting episodes that occur due to safety-related concerns. It is important for the source to include all known malfunctions in the startup, shutdown, and malfunction plan since a venting episode or monitoring parameter excursion that is not included in the plan counts as a violation.

Comment: One commenter (IV-D2-15) recommended that the final rule include more than one model for determining whether a biological system is adequate, because models are updated and improved frequently. The commenter requested that EPA's recommended test method protocol also allow use of the NCASI Organic Compound Elimination Pathway Model (NOCEPM).

Response: The EPA recognizes the NCASI NOCEPM model as a credible biological degradation model; however, the WATER8 model, or updated versions, will be used to determine compliance because EPA has used WATER8 for demonstrating compliance with other rules and the NOCEPM model has several limitations (A-92-40, IV-B-23). However, industry has indicated that an updated version of NOCEPM is expected after promulgation. The EPA may amend the rule with a supplemental Federal Register notice to allow the use of the updated version of NOCEPM pending evaluation of the model.

Comment: One commenter (IV-D2-10) expressed concern over using emission factors to prove compliance with emission standards, noting that actual emissions data from the sources should be used whenever possible.

Response: Emission factors are not used for demonstrating compliance with the rule. Compliance with the pulping and bleaching standards is determined based on emissions test data with the following exceptions. An initial performance test is not required for a thermal oxidizer meeting the temperature and residence time specified in the rule, nor for power boilers, lime kilns, and recovery furnaces that are used for controlling pulping process emissions. An initial performance test is also not required for bleaching systems that use TCF technologies.

The initial and quarterly performance test for biological treatment systems used to comply with the pulping process wastewater standards requires that the destruction efficiency of the system be determined using a site-specific biodegradation rate factor calculated using EPA's WATER8 model (a system-specific emissions model). Inputs to the model are obtained from the biological treatment system's monitoring and operating parameters.

For determining compliance with the clean condensate alternative, emissions test data must be collected to determine the baseline HAP emissions and emission reductions that would have been achieved by implementing the MACT standards. The test data would also be used to substantiate the HAP emission reductions that are achieved using the alternative strategy.

8.2 CONTINUOUS EMISSIONS MONITORING

Comment: One commenter (20,049A2, 20,059) objected to EPA requiring parameter monitoring rather than continuous emissions monitoring systems (CEMS). The commenter (20,059) contended that EPA had not demonstrated that parameter monitoring is adequate for purposes of enforcement or protection of public health. The commenter (20,059) stated that EPA should require stringent monitoring of control devices so that operators have the incentive to properly maintain them and replace them before they deteriorate.

One commenter (IV-D2-12) supported EPA's view that vents and streams subject to the regulation should be specifically identified and that parameter monitoring is a better approach than CEMS. Another commenter, (IV-D2-16) agreed that the proposal for initial performance testing is reasonable because no continuous monitoring system for methanol is available.

Response: The use of CEMS is not necessary to demonstrate or assure compliance for certain pollutant and control strategy combinations. As demonstrated by the history of NSPS and NESHAP development, certain control devices are capable of achieving continuous levels of emission control, when they are well-designed, operated, and maintained. The EPA maintains that no additional environmental benefit would be gained by requiring CEMS in this rule.

Continuous parameter monitoring is consistent with section 504(b) of the Act, which states that "continuous emission monitoring need not be required if alternative methods are available... for determining compliance." The final rule requires that HAP emissions be controlled to a specified percent reduction, to a mass or concentration emission limit, or by applying specific equipment. A compliance demonstration is required for each emission point that demonstrates compliance by meeting a control device equipment specification or a percent reduction, mass, or concentration limit. Parameter monitoring provides the information needed to know whether control systems and other equipment are properly operated and maintained on a continuous basis.

Comment: Two commenters (20,049A2, 20,059, 20,085) contended that monitoring of specific pollutants should be required. One commenter (20,059) argued that speciated CEM data is needed in order to make sure that short-term averages are being achieved for all pollutants of concern. The commenter

(20,059) expressed concern that the emissions reductions promised by this proposal will be unenforceable because of the lack of monitoring requirements for measuring actual emissions of specific HAP's. One commenter (20,085) asserted that if the risks from air toxics are to be properly evaluated and controlled, a monitoring component for specific pollutants should be included in the rule. Otherwise, the commenter (20,085) contended that it is unclear how the effectiveness of the MACT rule will be evaluated or how determinations of residual risk will be made in any meaningful way. One commenter (20,049A2) claimed that parameter monitoring would result in an inadequate amount of data to set "health protection" standards required by the Act. The commenter (20,059) stated that if parameter monitoring is used, EPA should not allow sources to select their own measures of compliance, but EPA must identify the appropriate range for each monitored parameter.

One commenter (20,049A2 and 20,059) considered the rule inadequate because it allows monitoring of total HAP's rather than specific air pollutants. The commenter (20,049A2) stated that this would result in larger amounts of less toxic pollutants reduced while not reducing more toxic pollutants. The commenter (20,059) recommended that EPA investigate the applicability of NCASI's test methods and other EPA test methods for periodic monitoring of speciated emissions at pulp mills, and explore the applicability of monitoring methods used by industrial hygienists. The commenter (20,059) also asserted that speciation would also be needed to protect the public's right to know and to assess the seriousness of a violation.

Response: MACT standards are technology-based standards and are promulgated to achieve the maximum degree of reduction in HAP emissions considering the costs of achieving such emission reductions, any non-air quality health and environmental impacts, and energy impacts. While the Agency agrees that it would be advantageous to build a data base of specific HAP emissions for future consideration of section 112(f) for residual risk, the purpose of the monitoring requirements set forth in this rule is to ensure compliance with the MACT standards. The pulp and paper NESHAP reduces total HAP. Methanol is an appropriate indicator of total HAP since it is the dominant HAP present in pulping vents and condensates and since the control technologies identified in the rule do not remove HAP's preferentially. For bleaching vents, chlorine was designated as the surrogate for chlorinated HAP's (other than chloroform) because the MACT floor control technology, caustic scrubber, was installed primarily for chlorine control.

For most systems, parameter monitoring adequately ensures continuous compliance with the MACT standards. To require continuous or periodic emissions monitoring of specific HAP's is unnecessary and will not provide additional pollution reductions. Monitoring health risks, is outside the scope of this rule. For biological treatment systems, continuous compliance is demonstrated using parameter monitoring combined with emissions modeling. The monitoring parameters specified for biological treatment systems are appropriate indicators that the system is being operated properly. If one of the monitoring parameters is outside the range established during the initial performance test, then compliance with the standard is demonstrated using the

WATER8 emission model. This monitoring approach was developed since biological treatment systems and site-specific designs and may be achieving the HAP removal efficiency required by the standard even though one of the monitoring parameters is outside of the established range.

With regard to the commenter's suggestion to use the NCASI test methods for periodic monitoring, the samples collected using the NCASI test methods must be analyzed before an indication of emissions can be determined. Consequently, the use of NCASI test methods for periodic monitoring does not provide an instantaneous indicator of continuous compliance unlike parameter monitoring.

During the initial performance test, each facility must demonstrate compliance with applicable emission limits. At this time, the appropriate monitoring parameter values (i.e., those values recorded during the performance test when the source was achieving the MACT Standard) will be determined and specified in the source's permit. For the sulfite pulping and condensate segregation monitoring standards, EPA did not have sufficient information to specify the parameters that should be monitored to demonstrate continuous compliance. For those instances, or if an alternative parameter is chosen to be monitored instead of the parameter specified in the standard, then sufficient rationale must be submitted to the Administrator to justify the facility's assertion that the parameter chosen indicates that the control device or system is in compliance with the standard.

<u>Comment:</u> Two commenters (20,007, 20,059) disagreed with EPA's decision not to require CEMS to measure total HAP's. One commenter (20,059) contended that CEMS should be required whenever technically feasible and for all pollutants that can be

measured. The commenter (20,059) specifically stated that CEMS should be required for combustion sources at paper mills. One commenter (20,007) contended that they had demonstrated to EPA that an automated gas chromatographic system could be used to measure and speciate pertinent volatile HAP's. The commenter (20,007) supplied a chromatogram illustrating the separation of 14 HAP's in less than 5 minutes in the 10 ppmv range. The commenter (20,007) also claimed that such devices would increase the accuracy of compliance demonstrations and contended that EPA'S language in the rule regarding the technical impossibility of CEMS would limit technical advancement in the pollution monitoring field. The commenter (20,007) provided language to be included in the final rule that would allow CEMS.

One commenter (20,059) contended that EPA mentioned that flame ionization analyzer (FIA) technology offered promise as a monitoring technique but rejected this option because it did not measure speciated emissions. The commenter (20,059) stated that the standards did not regulate individual pollutants and therefore EPA may have disqualified this control option prematurely.

<u>Response</u>: The EPA has concluded that the use of CEMS is not technically feasible, does not provide any additional environmental benefit, and could significantly increase the cost and burden of demonstrating continuous compliance. The automated gas chromatographic system described by the commenter is used to comply with numerical limits for specific compounds identified in the facility's air permit. The proposed rule addresses total HAP emissions and does not establish numerical limits for individual HAP compounds. Therefore, an automated system for measuring

specific HAP compounds would not be applicable. Additionally, establishing emission limits for individual HAP compounds for demonstrating compliance would require extensive emissions testing which would significantly increase the costs associated with compliance without providing any environmental benefit over parameter monitoring.

As stated in the December 17, 1993 proposal, EPA believes that FIA technology would not increase the accuracy of compliance demonstrations and would place an undue burden on the affected industry. The EPA's position regarding FIA technology has not changed since proposal.

8.3 PARAMETER MONITORING

Comment: Two commenters (20,027, 20,054A2, IV-D2-15) recommended that EPA specify that § 63.8 of the general provisions is not applicable to process monitors for these standards, and that the monitoring and quality assurance plan for the control devices must be consistent with manufacturers' recommendations for calibration and maintenance.

One commenter (20,043) stated that maintenance and calibration of monitoring devices was not adequately addressed in the proposed rule. Therefore, the commenter (20,043) asserted that requirements in the general provisions could not be met in practice. For example, the commenter (20,043) stated that zero and span checks on magnetic flow devices only reflect the operation of the electronics and not the magnetic field itself. The commenter (20,043) stated that one type of flow monitoring device, a delta pressure cell, contains a critical orifice which must be visually monitored to determine if its size is changing and stated that a zero and span check would not indicate this change.

One commenter (IV-D2-15) asserted that unlike continuous monitors, the instruments used to measure pH, steam flow, and feed flow for steam strippers and scrubbers, cannot be checked by a standard and cannot be evaluated using daily zero and span checks. The commenter (IV-D2-15) recommended that monitoring requirements recognize these differences and that EPA also specify that § 63.8 of the general provisions is not applicable to these process monitors.

Response: The EPA disagrees with the commenters and believes that the specific sections in § 63.8 of the general provisions that apply to this rule are applicable to the required process monitors. However, if an owner or operator feels that the monitoring requirements in § 63.8 are not appropriate, the owner or operator may apply to the Administrator for an alternative monitoring method as outlined in § 63.8(f) of the general provisions to part 63.

Comment: One commenter (IV-D2-4) maintained that periodic performance testing is necessary to account for degradation of the process and control equipment, to determine if the operating and monitoring conditions initially set are still appropriate, and to adjust the surrogate parameters when necessary.

Response: The calibration checks specified in § 63.8 of the general provisions are intended to identify and account for drift of monitoring devices. If the compliance status of a facility is in question, section 114 of the Act authorizes the Administrator to conduct performance tests at any other time. If a facility believes that the parameter values selected during the initial performance test are no longer appropriate, the facility can modify their operating permit to revise the initial parameter values based on additional performance test data. If process operating conditions change, or operation of the control device changes from those existing during the initial performance tests, then additional performance tests must be conducted such that new, appropriate compliance parameters can be established.

Comment: One commenter (IV-D2-15) supported EPA's decision to use parameter monitoring and not to establish continuously enforceable sulfite limits. However, the commenter IV-D2-15) expressed concern that seasonal temperature changes and various pulp grade changes could require a lengthy period of time to establish which parameters need to be monitored in order to establish long-term compliance. The commenter suggested granting sulfite mills a compliance extension of 2 years to allow establishment of the monitoring parameters.

The commenter (IV-D2-15) expressed concern that other enforcement initiatives will subject sulfite mills to penalties and enforcement actions that are not intended by this rule. The commenter urged EPA to establish clearly that: (1) monitoring parameters are used only as an indication that a process change has occurred, (2) if a source operates outside a parameter, then no violation is presumed, and (3) if a facility operates outside a parameter, then the facility's only obligation, after reporting, is to reestablish compliance at the new conditions. The commenter requested that if EPA could not establish these allowances, it should develop an equipment work practice standard for sulfite mills.

One commenter (IV-D2-16) cautioned that existing sulfite recovery systems are designed to control sulfur dioxide, not methanol, and that there may be no practical parameter monitoring scheme to correlate methanol emissions. The commenter (IV-D2-16) suggested a joint industry study of methanol emission rates versus potential operating parameters, with the caveat in the rule that if the mill demonstrates during the test program that its emissions are consistently below the proposed emission rate or percent reduction requirement regardless of operating conditions, then no further routine testing or parameter monitoring will be required.

Response: The EPA recognizes that there may be some difficulty in establishing appropriate monitoring parameters for sulfite pulping processes. The compliance schedule for sulfite processes specified in the rule is 3 years after the effective date. The EPA maintains that this time frame is sufficient for conducting the initial performance test to determine appropriate monitoring of parameter values. However, if additional time is needed to establish appropriate parameters, the mill may petition the Administrator to extend the compliance schedule for one additional year.

The initial performance test should be executed during periods of normal operation. If a mill's processes are variable from an emissions standpoint, then the initial performance test should be conducted such that the parameters monitored are appropriate to indicate continuous compliance under all operating conditions that are likely to occur. If the facility later believes that compliance of the standard can be achieved at a different monitoring parameter value, the facility may conduct a performance test to demonstrate compliance and reestablish appropriate monitoring parameters (i.e., revise their operating permit) before any exceedance occurs.

<u>Comment</u>: Three commenters (20,011, 20,027, 20,054A2) disagreed with EPA's assertion that the monitoring of certain parameters was already being performed by industry and would not impose any additional costs on the industry. One commenter (20,054A2) explained that process monitors currently in use are not necessarily used for compliance monitoring, but for process information.

Two commenters (20,027, 20,054A2) contended that the inline process parameter monitors required by these standards are not similar to CEMS and continuous parameter monitoring would not be feasible. Two commenters (20,011, 20,027) indicated that continuous parameter monitoring would impose an additional cost to the industry due to the accuracy and importance of required information. One commenter (20,151) requested that EPA specify, or provide guidance on what would be appropriate parameters to monitor for biological treatment systems.

<u>Response</u>: Parameter values to be monitored by the continuous recording systems are chosen by the mill and submitted for approval by the Administrator after the initial performance tests. Feasibility of using continuous monitoring of parameters is based on: (1) the need to demonstrate continuous compliance, (2) technical feasibility of the continuous parameter monitor and (3) cost or burden imposed by such a requirement. The EPA maintains that existing equipment can be used in most cases to provide continuous parameter monitoring since most of the monitoring parameters specified in the rule (e.g., thermal

oxidizer temperature, steam stripper feed and steam application rates) are currently being tracked to provide an indication of proper operation. In other cases, new devices will need to be installed.

Comment: One commenter (20,059) contended that EPA needs to define combustion operating parameters to: (1) enable the establishment of a greater than 98 percent control efficiency requirement as MACT, and (2) ensure that the control device functions at the required levels. The commenter argued that the monitoring requirements were not sufficient to guarantee 98 percent HAP reduction.

Response: The EPA has concluded, based on previous Agency studies, that temperature and residence time sufficiently define the combustion operation with respect to HAP destruction (A-79-32, II-B-31). For boilers and lime kilns, combustion temperatures and residence times are more than sufficient to ensure at least 98 percent reduction of HAP's. For thermal oxidizers, EPA has outlined three compliance options; 98 percent HAP reduction, 20 ppmv (at 10 percent oxygen) outlet HAP concentration limit, or an operating level of 1,600 $^{\circ}$F and 0.75 seconds residence time.

Comment: Three commenters (20,027, 20,054A2, IV-D2-15) disagreed with EPA's assumption that it is common practice to monitor scrubber inlet gas flow. The commenters (20,027, 20,054A2, IV-D2-15) stated that the industry practice is to monitor pH and/or scrubber liquid flow to ensure good performance for chlorine and ClO_2 control, and some mills use oxidation/reduction potential as an alternate to pH.

One commenter (20,043) approved of using a pH threshold for monitoring compliance because each scrubber has a specific pH threshold above which acceptable efficiency is maintained. The commenter (20,043) recommended that the rule should allow each scrubber to establish its own pH threshold. The commenter (20,043) also asserted that maintenance on scrubber monitoring devices can only be performed by breaking the line. For all bleach plant scrubber monitors, the commenter (20,043) recommended placing the pH electrodes in a high flow region of the system (i.e., just downstream of the recirculating pump) to increase the reliability and decrease downtime. The commenter (20,043) recommended that the final rule allow the use of sample pots spliced off the main line to act as measurement points so that calibration and preventative maintenance can be performed with a minimum of lost material.

One commenter (20,043) contended that EPA should allow the use of the last stack test for a measure of air flow as permanently installed pitot tubes would be impossible to accurately maintain. The commenter (20,043) claimed that periodic scrubber media flow measurements only indicate non-compliance when the flow approaches zero and a drop in the flow rate is not expected to result in non-compliance. Therefore, the commenter (20,043) concluded that monitoring of the flow rate is useful as part of a preventative maintenance program but a drop in flow is not expected to indicate non-compliance.

Response: The EPA contends that monitoring of inlet gas flow rate is necessary to prevent circumvention of the standard. During the initial performance test, a range of flow rates should be determined that reflect normal operations so that periodic fluctuations in the flow rate would not trigger a violation of the standard. Previous stack data measurements of flow rate are not allowed in the final rule.

The rule specifies that the pH or oxidation/reduction potential of the scrubber effluent must be monitored. However, the facility has the flexibility to determine site-specific values.

Comment: One commenter (IV-D2-15) stated that mills that wish to demonstrate compliance with the percent reduction limit only be required to conduct a one-time performance test coupled with monitoring of scrubber parameters.

Response: The final rule specifies that during the initial performance test, appropriate parameter values are determined. For compliance purposes, only the parameter values need to be monitored and recorded.

Comment: One commenter (20,027) argued that EPA should revise the monitoring requirements for steam strippers. Two commenters (20,027, 20,054A2) stated that monitoring of the mass feed rate is not practiced in the industry, but the industry does monitor flow rates. Three commenters (20,027, 20,054A2, IV-D2-15) recommended monitoring the steam-to-flow ratio which has been demonstrated to have a direct relationship to stripper removal efficiency, rather than monitoring the mass feed rate. One commenter (20,043) indicated that the steam stripper monitoring devices are inline and are not readily accessible to routine maintenance and calibration.

Response: The EPA revised the steam stripper monitoring requirements to include feed flow rate, steam flow rate, and feed temperature. The EPA has concluded that monitoring these parameters will provide an acceptable indication of steam stripper performance and HAP reduction efficiency since the steam-to-feed ratio has the greatest influence in HAP removal.

Comment: One commenter (20,027) recommended monthly inlet and outlet methanol concentration tests for the compliance demonstration for mills using biological treatment. The commenter (20,027) acknowledged that daily or weekly soluble BOD_5 measurements could be used as an indicator of normal biological treatment system operation since methanol has an extremely high solubility. However, the commenter (20,027) recommended that soluble BOD not be used as a means of determining compliance with a MACT standard. One commenter (20,151) requested that EPA specify, or provide guidance on, what would be appropriate parameters to monitor for biological treatment systems.

In response to the March 8, 1996 supplemental notice, one commenter (IV-D2-15), disagreed with the use of soluble BOD_5 as a compliance measure for determining whether a biological treatment system is adequate. The commenter (IV-D2-15) supported measuring the inlet and outlet methanol concentrations to determine compliance. The commenter (IV-D2-15) claimed that, based on results of NCASI testing in 1995, the following monitoring scheme for biological treatment systems should be followed:

1. Monitoring of soluble BOD (in ppmw) into and out of the system on the same frequency as BOD is required to be monitored in the mill's NPDES permit.

2. Daily monitoring of methanol (in ppmw) into and out of the system commencing within 24 hours of determining that soluble BOD removal has dropped below 80 percent and continuing until greater than 90 percent methanol

removal or methanol outlet concentrations below 5 ppmw are measured for 3 consecutive days.

3. Non-compliance would be determined by measured methanol removal efficiencies below 90 percent with outlet concentrations in excess of 5 ppmw.

Another commenter (IV-D2-5) suggested that inhibited soluble BOD_5 be used instead of soluble BOD as a surrogate parameter for methanol removal efficiency because the suggested parameter (soluble BOD_5) ignores the effects of ammonia and looks only at hydrocarbons such as methanol. One commenter (20,076 and 20,045), however, suggested that measurement of soluble BOD_5 would be a good indicator of methanol removal efficiency and as a means of demonstrating compliance with the MACT rule.

One commenter (20,059) stated that EPA should require more frequent monitoring of the HAP content of the incoming and treated wastewater by sampling liquid streams and speciating their constituents.

Response: In the December 17, 1993 proposed rule, the monitoring parameters specified for biological treatment systems were inlet and outlet methanol concentrations determined every 30 days and appropriate parameters as specified in the operating permit and demonstrated to the satisfaction of the Administrator. The proposed monitoring requirements for biological treatment systems have been revised in the final rule to more accurately reflect the operation of these systems, based on comments and discussions with industry (A-92-40, IV-E-83, 84, 87). The final rule specifies the following monitoring parameters: (1) composite daily sample of outlet soluble BOD_5 concentration to compare to maximum daily and monthly averages, (2) inlet liquid flow, (3) mixed liquor volatile suspended solids,

(4) liquid temperature, and (5) average horsepower of aerator units. Also, daily inlet and outlet samples must be collected and archived. If the soluble BOD, mixed liquor volatile suspended solids, or the horsepower of the aeration units is outside of the range established during the initial performance test, then the archived samples must be used to demonstrate that the biological treatment system is achieving 92 percent reduction of total HAP.

The EPA asserts that no additional environmental benefit would be obtained by requiring monitoring of speciated HAP's entering the biological treatment system since the standard is based on total HAP.

Comment: One commenter (20,110) requested that EPA amend the rule to incorporate telemetering, alarm indications, and other administrative controls on non-incinerated venting of pulping component gas collection systems from dedicated bypass vents, rupture disks, and other potential discharge locations.

Response: The EPA maintains that mills already have indicators of venting and bypass anomalies to provide for worker safety. The EPA has concluded that a requirement of telemetering and alarms add unnecessary burden and do not provide an environmental benefit. The rule requires mills to report the date and duration of any venting anomalies.

8.4 LEAK DETECTION AND INSPECTION

Comment: The December 17, 1993 proposed rule required closed-vent systems to be visually inspected every 30 days and measured initially and annually to demonstrate no detectable leaks. Several commenters (20,011, 20,027, 20,054A2, 20,056, 20,118, 20,146, IV-D2-15) asserted that requirements for leak checks and visual inspections of closed-vent systems are costly and unnecessary and recommended that EPA provide an exemption from monitoring for enclosures and closed-vent systems operating under a vacuum. One commenter (IV-D2-15) stated that closed-vent systems are designed to operate under negative pressure, and visual inspection of negative pressure systems would not provide any additional benefits beyond current industry inspection methods. The commenter (IV-D2-15) suggested that visual inspections be required only for positive pressure systems. The commenter (IV-D2-15) also stated that when visual inspections are appropriate, an annual inspection would be sufficient.

One commenter (20,027) asserted that there should be annual and startup leak detection and initial and bi-annual visual inspection for positive pressure vent systems.

Two commenters (20,027, 20,054A2) recommended a work-practice standard that would only require visual inspections of positive-pressure closed vent systems. Two commenters (20,027, 20,054A2) explained that inspections should be conducted upon startup and upon at least two additional occasions annually. One commenter (20,059) contended that EPA should require a hydrocarbon analyzer be used instead of visual monitoring for detecting leaks in ductwork.

One commenter (20,036Al) contended that the monitoring requirements in the proposed rule, such as monitoring of negative pressures, leak detection with a portable hydrocarbon detector for leaks greater than 500 ppmv, and bypass line monitoring are unnecessary and illogical for sulfite mills where any loss of sulfur dioxide over one pound is a major upset and must be reported to the National Response Center. The commenter (20,036~) claimed that the lower odor threshold of sulfite mills, between 0.3 and 1 ppmv, makes the hydrocarbon analyzer requirement of 500 ppmv unnecessary.

Response: The final rule makes distinctions between positive and negative pressure portions of closed-vent systems. For positive pressure portions of the closed-vent system, the rule requires monthly visual inspections and initial and annual leak detection measurements. For negative pressure portions of the closed vent systems, the rule requires monthly visual inspections and annual demonstrations that each enclosure opening is maintained at a negative pressure.

The EPA concluded that leak measurements for negative pressure systems would not be necessary if a mill could annually document that its system was operating at a negative pressure. This decision to remove the leak test requirement from negative pressure systems was made because industry burden will be reduced without sacrificing environmental benefits since any leaks in a negative pressure closed-vent system would not cause a release of pollution but would draw air into the system.

Comment: Two commenters (20,102, 20,129) recommended a leak detection standard of 50 ppmv instead of 500 ppmv in the rule. The commenters (20,102, 20,129) contended that this requirement was reasonable because it is already used in New York and California for detecting fugitives from local exhaust ventilation systems from dry cleaning operations. The commenters (20,102, 20,129) proposed an alternative requirement of a local exhaust velocity of 50 ft/min or sufficient inward air flow as indicated by visible smoke tube tests to indicate proper inward air flow and negative pressures to properly capture HAP emissions from pulping equipment. The commenters (20,102, 20,129) claimed that these provisions are standard industrial hygiene ventilation provisions that are easily used.

Response: The EPA has concluded that the 500 ppmv leak detection standard provides an adequate level of leak prevention since this detection standard is consistent with other leak detection standards that EPA has promulgated. The 500 ppmv limit is associated with the accuracy limit of the detection device used in Method 21 (for more details see EPA Method 21). State implementation plans have the authority to lower the leak detection standard below 500 ppmv.

8.5 BYPASS VENTS

Comment: In the December 17, 1993 proposal, bypass line valves were required either to (1) have a flow indicator installed, calibrated, and maintained to indicate flow, or (2) to be closed with a car-seal or lock-and-key type configuration and to be visually inspected every 30 days. One commenter (20,027) considered the sealing of bypass vents to be an emission control requirement that must be evaluated as part of the floor. For safety reasons, several commenters (20,011, 20,027, 20,054A2, 20,146) stressed that bypass lines should not be sealed and enclosure openings should not be locked. The commenters (20,027, 20,054A2) recommended allowing other means of monitoring venting, such as manual log entries for manually operated by-pass valves, valve position, and flow indicators (where applicable).

Response: The purpose of establishing requirements for bypass vents is to minimize the events in which vent streams are released to the atmosphere. Monitoring requirements such as bypass line seals are an aspect of compliance and are not based on MACT floor determinations. Based on an evaluation of the industry's comments, EPA has revised the bypass line requirements to include log entries recording pertinent information such as valve position, flow rate, and flow direction. The requirements for a lock-and-key type seal have been revised to specify easily broken seals (i.e., car-seals) for bypass line valves due to safety concerns.

Comment: One commenter (20,054A2) contended that monitoring flow through bypass lines would not be of any benefit since the flow indicator cannot distinguish between inward and outward flow. Another commenter (20,056) stated that industry should be given the flexibility to utilize other devices such as temperature sensors and chemical sensors, and other methods such as manufacturers' recommendations, sound engineering practices, and professional judgement instead of specifying a flow measuring device be installed on bypass and vent lines. The commenter (20,056) stated that EPA may suggest compliance parameters that may be monitored but should allow for States to allow other parameters for source monitoring.

Response: The rule contains two sets of requirements for monitoring bypass lines. The first set of requirements is the installation of a flow indicator in the bypass line which provides a record of the presence of gas stream flow in the bypass line at least once every 15 minutes. The second set of requirements is the installation and maintenance of a bypass line valve, monthly log entries of valve inspections, and a seal on the valve mechanism that ensures that the valve or closure mechanism cannot be opened without breaking the seal. The EPA believes that flow into a closed-vent system from the bypass line is unlikely and that any flow in a bypass line would be outward.

If a mill does not wish to use the monitoring procedures specified in the rule, the mill may request that the Administrator allow an alternate monitoring method through the procedure outlined in § 63.8(f) of the general provisions to part 63.

9.0 TEST METHODS AND PROCEDURES

9.1 FIVE-MILL SAMPLING PROGRAM

<u>Comment:</u> Three commenters (20,011, 20,027, 20,056) contended that the data gathered from the five-mill sampling study should not have been used to develop the December 17, 1993 proposal because the test methods and data were suspect. One commenter (20,027) stated that EPA's main contractor had major concerns about the use of certain methods employed in the program, including draft Method 0011 for aldehydes and ketones and Method 26A for hydrogen chloride (HCl) in sources with chlorine and ClO_2 present. One commenter (20,056) stated that the laboratory performing Method 0011 analysis of aldehydes and ketones conceded that there was difficulty with contamination problems for process liquid samples. The commenter (20,056) asserted that the aldehyde and ketone data were suspect. The commenter (20,056) also stated that EPA's characterizations of chlorine and HCl emissions are questionable since the test method used (Method 26A) could produce positive bias when used in the presence of ClO_2.

One commenter (20,027) expressed concerns about the validity of the sampling results described in the BID (A-92-40, II-A-35), since there were conflicting results for the same compound when measured by different sampling procedures.

Response: At the time of proposal, the test methods used for the five-mill study were considered appropriate because they were the best available test methods for measuring the pollutants of interest at the time. The data from the five-mill study have since been supplemented by industry-supplied test data. The Agency recognizes the difficulties associated with the methods used in the five-mill study, and was cautious when incorporating the five-mill study results into the development of revised emission factors.

As discussed in chapter 2, the proposal data base relied on model process units derived from emission points. The emission points were characterized by the five-mill study. Based on comments and data received following proposal, the approach used to develop the emission factors has been revised from an emission point to a mill-system approach. In the revised approach, data from the five-mill study were only used where complete mill systems were tested (e.g., all emission points in a pulp washing system). This helped EPA to examine all the data on an equivalent basis. The five-mill test data generally fell within the range of the industry-supplied test data when evaluated on the mill-system basis. The analyses of these data are detailed in the revised emission factor document (A-92-40, IV-A-8).

Comment: One commenter (20,056) stated that the NCASI methanol impinger method utilized by EPA was believed to be susceptible to false high bias: entrained moisture (containing a higher concentration of methanol) is trapped due to the method's high sampling flow rate. The commenter (20,056) stated that the new industry testing program does not contain this bias since the heated SUMMA canister method was conducted concurrently with the NCASI impinger method for quality assurance.

Response: At four of the five sites tested, the NCASI methanol impinger method was not operated at a sampling rate high enough that would likely entrain liquid droplets. The methanol data collected at the fifth site may have been susceptible to the high bias. However, as stated earlier in this section, the data collected in the EPA five-mill study was supplemented with data collected by industry. The available data (both EPA and industry data) were evaluated using a mill-system approach and the data collected in the five-mill study was retained in the analysis since EPA data generally fell within the range of the industry-supplied data.

9.2 REQUIRED TEST METHODS

Comment: One commenter (20,011) claimed that Method 21 was inappropriate for methanol, TRS, and other volatile compounds.

Response: The EPA maintains that Method 21 is appropriate for methanol and VOC leak measurement because it is the accepted measurement method. Additionally, the leak measurements specified in the rule, based on Method 21, do not require the measurement of TRS compounds.

Comment: Two commenters (20,027, 20,056) indicated that ClO_2 has been shown to interfere with the accuracy of test Method 26A; thus, this method may not be appropriate for measuring emissions from bleach plant sources. One commenter (20,027) recommended modifying Method 26A by replacing the alkaline impinger with a potassium iodide impinger so that chlorine and ClO_2 can be measured accurately in bleach plant gases.

One commenter (IV-D2-15) asserted that ClO_2 is listed as a potential interferant to Method 26A, which was required at proposal to measure chlorine emissions. The commenter (IV-D2-15) concluded that it would not be appropriate to use Method 26A for measuring bleach plant emissions. The commenter (IV-D2-15) recommended an NCASI method which uses potassium iodide as an absorbing solution followed by dual pH titration. The commenter (IV-D2-15) stated that this method has been submitted to EPA for approval as a validated method for bleach plant sources.

Response: The EPA agrees with the commenters regarding the potential interference from ClO_2. Chlorine dioxide is a listed interferant in Method 26A. The final rule contains specific modifications to Method 26A to make the method appropriate for determining chlorine concentration in the presence of ClO_2.

Comment: Two commenters (20,027, 20,011) asserted that the proposed test method for sampling methanol, proposed Method 308, has not been evaluated using Method 301 validation criteria. The commenter (20,027) submitted several minor changes to the proposed Method 308 that should be made to allow additional flexibility in the method. Another commenter (20,087) specifically noted problems with sections 2.1.6, 2.1.9, 3.2.3, 3.2.4, 3.2.5, 4.1.2, 4.1.3, 4.2.1, 4.3.2.3, and 6.1 of proposed Method 308. The commenter (20,087) suggested language that would solve the problems.

Response: The proposed Method 308 has been validated using Method 301 validation criteria. The validation was conducted by the Atmospheric Research and Environmental Analysis Laboratory in EPA's ORD. The results of the validation were reported in the January 1995 issue of the Journal of the Air and Waste Management

Association. Method 308 was promulgated in this rulemaking and has been revised to incorporate the technical comments provided by the commenter.

Comment: One commenter (20,027) declared that EPA should recognize the applicability of the NCASI NOCEPM model and allow its use as an alternative to the WATER7 model since its applicability to the treatment of pulp and paper wastewaters is well accepted. The commenter (20,027) noted that the biological degradation kinetics in the WATER7 model are based on the two-parameter Monod kinetics; however, Method 304 (the required Method) provides a single rate parameter (first order) which cannot be used directly as an input to the WATER7 model. Rather, WATER7 must be "forced" to assume a first-order relationship in order to use the results obtained from Method 304.

Response: [Note: The WATER8 model is an update to the WATER7 model]. The EPA recognizes the NCASI NOCEPM model as a credible biological degradation model. However, the WATER8 model will be used to determine compliance because EPA has used WATER8 for demonstrating compliance with other rules and the NCASI NOCEPM model has the following limitations: inability to support Monod kinetics; inability to simulate plug-flow or sequential reaction; and inability to model recycle flow, clarifiers, collection system elements, screens, and trenches (A-92-40, IV-B-23). However, industry has indicated that an updated version of NOCEPM is expected after promulgation. The EPA may amend the rule with a supplemental Federal Register notice to allow the use of the updated version of NOCEPM pending evaluation of the model.

The WATER8 model still incorporates the two-parameter Monod kinetics; therefore, the WATER8 model will need to be set up properly if single rate parameters from Method 304 are used for WATER8 inputs. The EPA maintains that the WATER8 model provides acceptable results with the modified setup needed to incorporate Method 304 results.

Comment: One commenter (20,011) asserted that the Method 305 procedure for determining the HAP content of a waste stream is unnecessarily complex for methanol, and differs from the version proposed in the HON. The commenter (20,011) claimed that the method has not been validated or published for comment.

Response: Method 305 in the proposed rule is the same as the method specified for compliance testing under the HON. The method was published for comment with the proposed HON and was promulgated with the final HON. The method has been validated by Method 301 and was extensively evaluated in the laboratory before proposal with the HON.

In March 1997, industry informed EPA that it had not used Method 305 to obtain the methanol steam stripper performance data (which was used as the basis for the proposed pulping process condensate standards). Instead, a direct aqueous injection gas chromatography/flame ionization detection (GC/FID) method was used (NCASI Technical Bulletin No. 684, Appendix I). Consequently, the industry contends that Method 305 should not be specified in the final rule for determining compliance with the pulping process condensate standards. However, the NCASI test method has not been validated using EPA Method 301 procedures. If the Agency approves the Method 301 validation procedures for NCASI's GC/FID test method, this method may be referenced as either an alternative or a replacement for Method 305 (for determining methanol concentration only) with a supplemental Federal Register notice since it is unlikely that the test method validation would be completed before promulgation of the MACT standard.

Comment: One commenter (20,144) indicated that target compounds must be specified for Method 305, because the analytical methods are compound specific. The commenter (20,144) asked if the compounds specified in the preamble in section X.A.3 would constitute such a list.

Response: The final rule specifies that Method 305 must be used to determine the methanol or total HAP concentration in process liquid streams. In determining the total HAP concentration for use in the mass flow rate, mass per megagram of pulp produced, or the mass percent reduction requirements demonstrations, the final rule contains the criteria for excluding compounds. Compounds with concentrations at the point of determination that are below 1 ppmw or compounds with concentrations at the point of determination that are below the lower detection limit where the lower detection limit is greater than 1 ppmw are not required to be included in the total HAP concentration determination.

Comment: One commenter (20,011) stated that Method 25D for determining compliance with the wastewater requirements in the proposed rule was not employed during the testing program, and may be inappropriate for use on pulp mill sources. The commenter (20,011) requested that EPA clarify which test methods must be used to verify compliance when biological treatment systems are used.

Response: The rule does not specify the use of Method 25D. The rule requires the use of Method 305 for determining the methanol (surrogate for total HAP) concentration in wastewater streams.

For determining compliance with the biological treatment system, the fraction of methanol degraded in the system is determined by using the procedures specified in appendix C of part 63 (except that the inlet/outlet test can not be used for systems that are not well-mixed). The proposed rule incorrectly indicated that Method 304 was contained in appendix A of part 63. Method 304 is contained in appendix C of part 63. This change has been made in the final rule.

Comment: Two commenters (20,102, 20,129) requested that the test methods and procedures in § 63.451 include equations for combustion efficiency used in RCRA 40 CFR 264 to ensure adequate calculation and specification of combustion efficiency using CO and CO_2 emission values.

Response: The final rule specifies the equation for calculating the percent destruction on a mass basis. With regard to the commenters' suggestion to monitor CO and CO_2 to indicate combustion efficiency, EPA asserts that these monitoring requirements would place additional burden on the affected facilities without providing a substantive improvement in monitoring combustion device efficiency. For thermal oxidizers, the rule requires the facility to monitor the combustion device temperature. Since this parameter is determined during the initial performance test, EPA contends that this parameter is sufficient for monitoring thermal oxidizer efficiency. The rule also allows using power boilers, recovery furnaces, and lime kilns for controlling pulping process emissions. No monitoring requirements or initial performance tests are required for these devices since the HAP destruction efficiency should exceed the 98 percent required in the rule when the devices are properly operated.

Comment: One commenter (20,056) recommended allowing the mass of pulp produced during a sampling event (for determining the mass emission rate) to be determined over a longer period of time than proposed sampling period to allow for periods when the pulping process may be curtailed or even shut down while other processes may continue to run.

Response: The EPA disagrees with the commenter's suggestion. While some processes in the mill may have some degree of independence due to in-process storage, EPA asserts that periods of shutdown of all or part of the mill to which the commenter alludes, do not constitute normal operation with regard to any emissions testing program. The EPA recommends that any emissions testing be conducted when the pulp production process is in normal operation.

Comment: One commenter (20,070Al) stated that sampling procedures required to demonstrate compliance with percent destruction option for the combustion standards could expose personnel to safety hazards when sampling inlet gas streams.

Response: The EPA recognizes the safety concerns expressed by the commenter. In the final rule, several control options are provided for complying with the pulping process standards. The EPA's intent in providing compliance options was to allow mills flexibility in demonstrating compliance. If a mill does not feel comfortable with sampling inlet gas streams to demonstrate compliance with percent destruction requirements due to safety concerns, the mill may choose one of the other control options (e.g., outlet concentration).

<u>Comment</u>: One commenter (20,144) indicated that the rule does not allow for any vacillation around the monitored parameters (minimum or maximum) and, therefore, compliance with the rule would be impossible. The commenter (20,144) suggested that the rule specify an averaging time for each of the parameters specified in § 63.452.

<u>Response</u>: The final rule does not specify averaging times for monitoring parameters. Rather, the final rule specifies that the owner or operator shall provide for the Administrator's approval, the rationale for the selected operating parameter to be monitored, the monitoring frequency, and the averaging time.

10.0 RECORDKEEPING AND REPORTING

Comment: The reporting and recordkeeping requirements of the general provisions apply to all sources subject to the NESHAP unless a relevant standard specifically exempts or modifies those requirements. The December 17, 1993 proposal was issued prior to the final development of the general provisions. The proposal specifically required the recordkeeping requirements located in § 63.10(a), (b), and (c) for monitoring parameters. The proposal also required the reporting requirements found in the general provisions in the following reports:

- Initial Notification [§§ 63.9(a) through (d); 63.10(f)];
- Notification of Performance Tests [§§ 63.7; 63.9(g)];
- Notification of Compliance Status [§ 63.9(h)];
- Exceedance Reports [§ 63.10(e) (3) (i) through (v) and (viii)]; and
- Summary Reports (quarterly) [§ 63.10(e)(3)].

Several commenters (20,011, 20,027, 20,083, 20,102, 20,103) opposed the reporting time of 45 days for Initial Notification as being completely unrealistic in light of the realities of compliance planning. Several commenters (20,027, 20,056, 20,083) contended that the recordkeeping and reporting requirements were excessive and may be contrary to the Paperwork Reduction Act.

Two commenters (20,056, 20,102) indicated that the recordkeeping and reporting required may take as long as 1 year to develop and implement. One commenter (20,056) estimated that the industry-wide cost for implementing a digital-based reporting system to be between $500 million and $1 billion. Another commenter (20,083) stated that EPA's estimate that the recordkeeping and reporting burden of the proposed rule would require 923 to 1,797 man-hours or approximately between one half and one person-year per source to implement was considerable, but asserted that EPA's estimates of recordkeeping and reporting are only a small fraction of the true burden.

One commenter (20,018) agreed with industry recommendations to reduce the recordkeeping and reporting burden, and provided some additional recommendations including: eliminate the requirement to retain monitoring values if the values show routine compliance, retain only outlying monitoring values, eliminate the requirement to retain all records, retain only those records specifically identified by name, and eliminate the reporting of data that is already required under other EPA, State, or local rules.

One commenter (20,102) also stated that if EPA provides guidance to State and local agencies as to what is acceptable for notification of performance tests, then 75 calendar days for notification is sufficient.

One commenter (20,027) concluded that EPA must amend the monitoring, recordkeeping, and reporting requirements of the proposal to conform to the less stringent requirements adopted in the HON.

One commenter (IV-D2-15) contended that proposed reporting, recordkeeping, and monitoring requirements go well beyond what is reasonable or necessary.

Response: The recordkeeping and reporting requirements in the December 17, 1993 proposal were based on the requirements in the proposed general provisions. The final general provisions, which now have been promulgated, reduce some of the compliance burden relative to the proposed version. In addition, the final pulp and paper rule provides exemptions and modifications from some of the general provisions. The pulp and paper rule incorporates by reference specific sections of the general provisions for clarity.

In the final rule, EPA revised the recordkeeping and reporting requirements to reflect revisions to the general provisions and to respond to concerns expressed by commenters. Specific revisions include the following:

- Due date for Initial Notification was changed from 45 days to 1 year.
- Information required in Initial Notification report was greatly reduced.
- Changes were made regarding the need for, and frequency of, quarterly excess emission reports.
- Performance Test deadline was extended from 120 to 180 days, along with a change in the notification of test date from 75 to 60 days.
- Changes were in requirements for site specific test plans.
- Clarification of the difference between "performance test" and "performance evaluation."

- "Step-by-step" procedures in startup, shutdown, and malfunction plans were deleted.

- A non-binding control strategy report was added to be submitted with the Initial Notification and every 2 years, beginning 1 year following promulgation. This requirement is for owners or operators of sources selecting the extended compliance plan specified in § 63.440(d) (1) of the rule.

- An option was added for Regional EPA offices to waive duplicate submittal of notifications and reports.

- A requirement for owners or operators to maintain a record of their determination of their area source status was added to show that a relevant standard does not apply to them (assume this will not affect any of NESHAP pulp and paper mills).

In addition to these specific recordkeeping and reporting revisions, the final rule specifically names the process streams that are subject to control by the rule. This approach also will reduce the recordkeeping and reporting requirements, because characteristics of individual process streams will not have to be reported.

Comment: One commenter (20,056) objected to retaining records for 5 years but recommended keeping them for 2 years.

Response: The EPA disagrees with the commenter and does not believe that retaining records for 2 years is sufficient because it does not provide adequate detail on the history of the mill. The EPA believes that retaining records for 5 years (first 2 years on site, remaining 3 years off site) as specified in the general provisions is appropriate. The EPA maintains that 5 years of records are needed to provide adequate compliance history for each mill.

Comment: One commenter (20,110) suggested that the rule incorporate recordkeeping requirements and other administrative controls on the venting of non-incinerated vent streams (i.e., by-pass and emergency vents) from pulping component gas collection systems, from dedicated bypass vents, from rupture disks, and from other potential discharge locations.

Response: The EPA agrees with the commenter; however the rule already requires owners or operators to report venting of uncontrolled streams (i.e., by-pass and emergency vents) as specified in § 63.10.

Comment: One commenter (20,092) contended that the rule should require quarterly reporting until 2 years pass without an exceedance of any State or federal emission limitations applicable to the source. The commenter (20,092) stated that once this occurs, semi-annual reporting is acceptable, provided that any exceedance triggers a renewal of quarterly reporting.

Response: The EPA disagrees with the commenter's recommendation of requiring quarterly reports for the first 2 years. The EPA maintains that semi-annual requirements, as specified in the general provisions, is consistent with other rules and provides sufficient reporting frequency. An owner or operator is required to submit quarterly reports if any excess emissions occur during the reporting period. The commenter's recommendation would place undue reporting burden on the affected industry without achieving any significant environmental benefit.

11.0 COST/ECONOMIC IMPACTS

11.1 COST IMPACTS

Comment: Several commenters (20,014, 20,018, 20,027, 20,028, 20,039, 20,046, 20,067, 20,07OAl, 20,071) stated that EPA severely underestimated the compliance costs of the proposed MACT standards.

One commenter (20,039) stated that the final costs of compliance with the proposed rules may approach $20 billion as opposed to the $4 billion projected by EPA. One commenter (20,070Al) stated that the capital costs to comply with the cluster regulations could be at least $300 million, and may be twice this amount depending on the degree to which the final rule differs from the proposed rule.

One commenter (20,046) stated that EPA's compliance cost estimate used for their mill was less than half the cost of the estimate determined by the commenter and industry experts.

Another commenter (20,067) stated that an estimated $350 million will be spent on compliance modifications for 11 out of 12 mills and an additional $100 million may be spent depending on interpretation of several vague definitions, terms, and phrases in the proposed NESHAP. One commenter (20,014) indicated that EPA did not take into account the cost of lost production during construction or modification. One commenter (20,074) urged EPA to adopt the proposal made by the American Pulp and Paper Industry which met the stated goals of EPA for this rulemaking. The commenter (20,074) added that the cost of the industry proposal was $1 million compared to EPA's proposed rule at $2 million.

Another commenter (20,148) contended that EPA lacks sufficient data for development of this standard. The commenter (20,148) suggested that the true costs and benefits cannot be determined until sufficient data are obtained.

Response: After review of the comments on the proposed rule and additional data supplied by the commenters and pulp and paper industry representatives, EPA has made significant changes for the final pulp and paper NESHAP. Among the significant changes are: subcategorization of the industry, requiring only specific named vent and wastewater streams to be controlled, and providing several options for control.

By subcategorizing the industry, EPA has evaluated the level of control at existing kraft, soda, semi-chemical, and sulfite mills individually. As a result, the control requirements for soda and semi-chemical mills are significantly reduced from the requirements for kraft mills, and the control requirements for sulfite mills are specific to sulfite mills and not transferred from kraft mills. The final rule requires only specific named vent and wastewater streams to be controlled in each of the subcategories. Therefore, the number of emission points that are required to be controlled, and the cost of compliance, have been significantly reduced from proposal. The EPA believes these changes will reduce much of the commenter's concern about confusion in the rule.

The final rule also provides several options for controlling vents and wastewater that will allow the owner or operator the flexibility of choosing the best option for their mill. For example, kraft mills complying with the wastewater requirements can choose either to use a steam stripper or to hard-pipe wastewater to a well-operated biotreatment unit. Sulfite mills have the flexibility of complying with emission limits or percent reduction requirements with any technology that can meet the requirements. The EPA believes that these changes, as well as other changes to the final rule, will significantly reduce the compliance cost of the rule.

Additionally, EPA has revised the national cost impacts to incorporate new data supplied by commenters and representatives of the pulp and paper industry. The new data include: information to characterize vent streams (temperature, flow rate, and moisture content); description of equipment in vent gas treatment systems; updates to the data base characterizing the equipment and processes at pulp and paper mills, and cost information for condensate segregation and other controls. The commenters are referred to chapter 20 of this document and EPA's memorandum discussing the costing changes (A-92-40, IV-B-13). Changes made to the costs for the effluent guidelines are discussed in the preamble for the promulgated air and water rules. The EPA contends that the costs in the final impacts analysis represent an appropriate estimate of the cost of compliance with the final rule.

11.2 ECONOMIC IMPACTS

Comment: Two commenters (20,115A2, 20,117) argued that EPA did not properly evaluate the effect of the proposed rule on the nation's economy.

Response: Total impacts on employment and output, both direct and indirect, are estimated with final-demand national-level input-output multipliers from the U.S. Department of Commerce's Regional Input-Output Modeling System (RIMS II: Pigler 1993) which provides estimates of losses in employment, shipments, and Gross Domestic Product. These impacts are reported in 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 1* (A-92-40, I-A-2) (hereafter referred to as EA). These estimated effects on employment, output, and shipments relate to both direct and indirect economic impacts of the combined air and water pulp and paper rule.

Comment: One commenter (20,025) provided a number of comments concerning the market model used to estimate market impacts of the regulation at proposal. The comments included specific criticism of the supply and demand parameter assumptions of the model, the methods used to determine market equilibrium, and other alleged model deficiencies.

Response: The EPA used a market model and a financial model to estimate market impacts for proposal of the regulations. However for promulgation of the final rules, the EPA chose to use only the financial model with some modifications to estimate market impacts and to predict mill closures. The EPA concluded significant market changes have occurred since proposal that would necessitate an update of data used in the market model. These data updates could only be accomplished through an additional updated survey of all mills in the pulp and paper industry. Since such a survey would be burdensome to the industry and would require significant time and resources, the EPA elected to utilize the financial model with modifications for promulgation. Thus comments relating specifically to assumptions underlying the market model are moot for the economic analysis conducted for the final rules.

Comment: Several commenters (20,009, 20,057, 20,103, 20,104, 20,115A2, 20,117) indicated that the economic burden of the proposed rules will force some facilities to close. One commenter (20,115A2) stated that the proposed rule will close between 13 and 33 mills with little or no benefit to the environment or human health. The commenter (20,115A2) stated that EPA should determine the percentage of the total nationwide production capacity that will be lost due because of mill closings. The commenter (20,115A2) stated that if the demand for paper products approaches or exceeds the remaining production capacity of the mills then there would be a strong tendency for a run-up in prices. One commenter (20,057) indicated that the proposed regulation will close 33 mills and eliminate 21,800 jobs, based on an industry estimate. The commenter (20,057) stated that EPA's economic analysis would have concluded the same results if EPA had properly estimated the capital requirements of the proposed rule. One commenter (20,067) argued that EPA ignored the fact that compliance with the proposed regulations depends significantly on the ability of the affected facility owner to raise the capital necessary to conduct compliance modifications. One commenter (20,018) argued that the technological and financial impact of the proposed MACT rules was greatly underestimated by EPA and the proposed rules will have a negative impact on the ability of American pulp and paper companies to compete in the world market. One commenter (20,046) argued that an economic model that used true capital costs and inherently higher operating costs would clearly show that the proposed cluster rules are not affordable.

<u>Response</u>: The costs, economic impacts, and health and environmental benefits of the proposed air (MACT I) and water rules were evaluated and fully discussed in the *Regulatory Impact Assessment of Proposed Effluent Guidelines and NESHAP for the Pulp, Paper, and Paperboard Industry* (EPA-821-R-93-020). This assessment was updated for the final rule in the EA. In addition to assessing the impact of the MACT I final rule on the pulp and paper industry, the impact of the final MACT III, proposed MACT II, and the final water rules were evaluated individually and jointly. (Note that MACT III impacts are not reported in the EA because the MACT III rule is not expected to result in control costs or emission reductions for the pulp and paper industry.)

The EA estimates the costs and economic impacts of the regulation, evaluates the health and environmental benefits of the regulation, and compares the costs of the regulation to the benefits of the regulation. The EPA agrees with the commenter that based on the EA, there is the potential for facility closures to result from the regulations. Although no mill closures are predicted to result from the final MACT I regulation, it is anticipated that as many as three mills may close due to the combined final MACT I, proposed MACT II, and final water regulations. Comments that mill closures will exceed the EPA's estimate are based on the pulp and paper industry's estimate of the cost of emission controls. The EPA evaluated the industry estimate of the cost of emission controls and adjusted the cost analysis where appropriate. Based on the revised cost estimates resulting from commenters' input, as well as other elements of the impact analysis, the EPA reassessed the economic impacts for the final rule in the EA. Job losses, decreases in pulp and paper shipments, and decreases in exports associated with predicted mill closures are reported in the EA. In addition, the price increases anticipated for pulp and paper products are estimated and reported in the EA. The air and water rules are not expected to significantly impact the ability of the domestic pulp and paper industry to compete in the world market.

The economic analysis also considers the cost of financing emission control equipment and equipment necessary to meet the effluent guidelines. For most of the analyses conducted, a real cost of capital or financing (discount rate) of 7 percent is assumed. However, a sensitivity analysis of the cost of capital using company-specific cost of capital estimates is performed and these results are discussed in the EA. The impact of increased capital and operating costs because of environmental controls on the financial viability of mills affected by the regulations is fully evaluated and reported in the EA. With regard to the assertion that capital costs and associated operating costs are understated, EPA has revised cost estimates based on comments and data provided after proposal. Significant changes were also made to the requirements, such as requiring named systems to be controlled, which reduce the costs. The costs estimated for the promulgated rule incorporated all these changes and data. The EPA believes that the final rule costs appropriately characterize the costs for the industry.

Comment: One commenter (20,009) stated that EPA should try to distinguish between those mills that might close due to meeting new environmental control technologies and those that would close anyway due to market and/or production constraints and urged EPA not to dismiss technological options with large environmental benefits just because the costs "seem" high. One commenter (20,103) stated that EPA did not perform an adequate evaluation of the cost of compliance with this standard and the benefits to society and the environment. In particular, the commenter (20,103) asserted that the overall cost of shutdown of some facilities does not seem to have been addressed by EPA. Another commenter (20,104) contended that the proposed rules will force chlorine and caustic soda manufacturing facilities to close, including three chlorine and caustic soda manufacturing facilities in the Pacific Northwest.

Response: In the EA, the number of mills that are anticipated to close assuming baseline conditions (no additional environmental controls) are distinguished from the number of mill closures expected to close as a result of the environmental regulations. Economic impacts reported in the EA relate specifically to mill closures resulting from the environmental regulations. Estimates of the number of job losses anticipated to occur and potential price increases resulting from the regulations are reported in the EA. Job losses, decreases in shipments, and decreases in exports are not expected to be significant due to the level of mill closures expected. The cost of mill closures that may result from the regulations are measured in terms of lost production and potential job losses with the financial closure model. Lost production and potential job losses are measures of important costs of a mill shutdown. Estimates of the direct and indirect economic impacts of the regulations on the national economy are also reported. A comparison of the costs and benefits of the regulations is conducted in the EA. Many of the health and environmental benefits of the regulations are discussed qualitatively, and thus the monetized benefits are compared to annualized costs with recognition that the monetized benefits are likely understated.

The air rules are anticipated to have negligible impacts on the consumption of chlorine at pulp and paper mills. However, the effluent guidelines are anticipated to cause a decline in consumption of chlorine by the pulp and paper industry. In an article published in the November 1994 issue of *Chemical and Engineering News,* "Chlorine Industry Running Flat Out Despite Persistent Health Fears", the pulp and paper industry is reported to have consumed approximately nine percent of the total domestic production of chlorine in 1994. The level of chlorine consumption by the pulp and paper industry is anticipated to decline to approximately six percent of the total domestic chlorine production by the year 2000. Despite the anticipated decline in consumption of chlorine by the pulp and paper industry, the overall growth in domestic production for the industry is anticipated to occur at a rate of 0.8 to 1.5 percent per year suggesting that growth in chlorine consumption is anticipated to occur in industries other than the pulp and paper industry. *(Chemical Week.* Web page. 1996. <http://www.chemweek.com/marketplace/product_focus/1996 chlorine.html>). Since moderate growth is anticipated in domestic chlorine production for the future, it does not seem likely that environmental regulations for the pulp and paper industry will result in chlorine manufacturing facility closures.

Using the estimated annualized cost of this NESHAP, an evaluation of the economic impacts and distributional effects to the pulp and paper industry is performed. The final rule when evaluated independently of other regulatory requirements for air and water pollution, is not expected to have a substantial impact on the industry. Estimated price increases are less than 0.5 percent for bleached paper-grade kraft and sulfite, dissolving-grade kraft and sulfite, and semi-chemical pulp and paper products, while unbleached kraft pulp is estimated to have a price increase of almost 5 percent. The costs imposed on affected facilities do not result in any mill or firm closures, thus, the rule assessed individually is not expected to alter employment, shipments, or exports for the industry by appreciable amounts.

Implementation of the final rule is expected to reduce emissions of HAP, VOC, and TRS, but increase emissions of PM, SO_2, CO, and NO_X. The benefits that accrue as a result of the standard result from changes in human health effects associated with inhalation of the above pollutants, as well as changes in welfare effects such as visibility, crop yields, materials soiling, and corrosion. The EPA is not able to place a monetary value on all of the benefits achieved by the rule. Values are obtained for changes in VOC, SO_2, and PM emissions only. Total benefits for these pollutants range in value from $727 million to $1,493 million.

Comment: One commenter (20,061) contended that the compliance costs of the future MACT standards for combustion sources would make the cost to benefit ratio even less appealing to industry and society. One commenter (20,027) stated that EPA was obliged to have considered the costs and other impacts of the future combustion MACT standards when considering beyond-the-floor technologies.

Response: At proposal of the MACT standard for non-combustion sources, the Agency was preparing the combustion source MACT standard. The combustion source MACT standard was proposed concurrently with promulgation of the chemical pulping MACT standard. The economics and benefits analyses incorporated the impacts of both MACT standards, as well as the impacts of the effluent guidelines portion of the final rule.

Comment: One commenter (20,018) stated that EPA's cost-benefit analysis for emission controls should consider the technological differences between kraft, sulfite, and neutral sulfite pulp mills. One commenter (20,072) stated that the gap of non-competitiveness between soda and kraft mills will be further widened if the soda mills are required to comply with the same compliance regulations as kraft mills.

Response: In the final rule, EPA has subcategorized the pulp and paper industry by pulping type (kraft, soda, semi-chemical, and sulfite). As a result, the control requirements for soda and semi-chemical mills are significantly reduced from kraft mills. The control requirements for sulfite mills are specific to sulfite mills. Therefore, the cost of complying with the standard is different for kraft, soda, semi-chemical, and sulfite mills. These differences are incorporated in EPA's cost and economics analyses.

12.0 BENEFITS

Comment: Several commenters (20,027, 20,053A1, 20,088, 20,101, 20,129) argued that the generation of collateral emissions associated with combusting vent gases are more of a concern than methanol, the predominant HAP compound. One commenter (20,027) claimed that to generate the steam required for stripping will lead to significant collateral increases of NO_x, SO_2, PM, CO, and CO_2. The commenter (20,027) declared that it is a bad trade for the environment to pay this price for a control effort that can largely be described as methanol removal. One commenter (20,053Al) stated that the proposed requirements for the collection and control of high volume systems with low concentrations of HAP emissions suggest EPA has not fully considered the potential environmental trade-off between the minimal HAP reductions and the increased emissions of other pollutants. One commenter (20,101) said a drawback of the proposed rules is the increase in CO, nitrogen oxide, sulfur dioxide, and PM due to combustion controls. Another commenter (20,129) stated that the emissions from combustion sources may increase due to the need for increased boiler capacity for extended cooking times, ClO_2 generation, etc. However, the commenter (20,129) stated a demonstrative environmental gain will result in the reduction of chlorinated compound emissions from the bleach plant.

Response: MACT standards are required to be based on control of HAP emissions. Although methanol is the largest emitted HAP, there are a number of other HAP's emitted from pulp and paper mills that are substantially reduced due to the control requirements in the final rule, such as chloroform, o-cresol, etc. The final rule achieves a significant reduction in the emissions of total HAP, VOC, and TRS compounds. The Agency recognizes that some criteria pollutants (such as SO_2, PM, and NO_x) will be increased due to the control requirements (from combustion of vent gases and fuel for energy), and the Agency has accounted for these increases in the impacts analysis. However, these increases are much smaller in absolute value than the decreases in HAP, VOC, and TRS emissions. A detailed discussion of the benefits of the rule are presented in the preamble to the promulgated rule and in the Economic Analysis report (A-92-40, V-A-2).

Additionally, the Agency believes that in some cases, the impacts have over-estimated the emissions because some mills may be able to use existing controls to reduce emissions. However, EPA does not have sufficient information on the number and effectiveness of these controls, so no reductions were estimated. Also, mills may use fuels that emit lower amounts of criteria pollutants when combusted, or may use other control options, such as the clean condensate alternative or lower emitting equipment, that may not increase secondary emissions.

Comment: Two commenters (20,025, 20,114) stated that EPA used incorrect assumptions about ozone formation contending that the relationship between VOC reductions and ozone reductions is not linear. One commenter (20,025) continues by stating that given the relationship between VOCs and ozone in rural areas, and other uncertainties [relating to background ozone concentrations] there is no basis for monetizing the agricultural benefits relative to VOC reduction.

Response: The photochemical production of ozone is the result of atmospheric physical processes and complex chemical processes involving two classes of precursor pollutants: VOCs and NO_x. The analysis for the proposal of the pulp and paper rule used the most readily available data at the time to quantify and monetize VOC emission reductions. Since that time, a more recent analysis (the Regulatory Impact Analyses for the Particulate Matter and Ozone National Ambient Air Quality Standards [NAAQS] and Proposed Regional Haze Rule) provides data that can be used to monetize VOC emission reductions. The ozone NAAQS analysis acknowledges the complex relationship between emission reductions and ambient ozone concentrations by using a variety of prognostic and empirical models to examine this issue. The complex relationship is also incorporated into the benefits analysis for this pulp and paper rule since the VOC benefit value is derived from the ozone NAAQS data.

One of the methods used to value VOC emission reductions estimated for the pulp and paper rule limits the valuation (both health and welfare categories) of the emission reductions only to areas with ambient ozone concentrations high enough to potentially violate either the current ozone standard or the revised ozone standard. These areas (rural or urban) are not only above the background concentration level, but also above the current ozone standard or the newly promulgated ozone NAAQS. The Ozone Staff Paper estimates the national average background ozone concentration to be approximately 0.04 parts per million, which is incorporated into the benefit analysis of reduced ozone concentrations. Given this estimated background ozone concentration, the method of valuing VOC emission reductions as described above addresses the background ozone concern in both urban and rural areas.

Comment: Several commenters (20,025, 20,027, 20,101, 20,114, 20,116) stated that the benefits assessment of the proposed rules contains calculation errors. Two commenters (20,025, 20,027) stated that their review of the Regulatory Impact Assessment (RIA) indicates that EPA's analysis does not employ sound science, is skewed by a large arithmetic error, uses unrepresentative data, and is based on unwarranted assumptions. One commenter (20,025) stated that incorrect assumptions about ozone formation led to unjustified agricultural benefits. Three commenters (20,025, 20,101, 20,114) stated that EPA made a mathematical error in the use of the Office of Technology Assessment's economic benefits analysis which resulted in a per-metric ton benefit for VOC control that is $468 million too high.

Response: The benefits assessment in the RIA at proposal contained a printing error. In addition, the benefits assessment has been updated to reflect more recent valuation estimates for VOC, PM, and SO_2 emission reductions. Revisions to the analysis also include an added explanation of the underlying assumptions and a revision of the benefit calculations due to a reevaluation of the emission reductions and the related monetized health and welfare benefits valuation.

Comment: One commenter (20,083) argued that EPA should not refer to methylene chloride as a VOC in the final rule and preamble since methylene chloride is specifically excluded from EPA's definition of VOC. Therefore, the commenter (20,083) stated that corrections should be made to the benefits or tropospheric ozone reductions calculations due to the control of methylene chloride. One commenter (20,083) argued that it is inappropriate for EPA to use VOC reductions as a "benefit" for supporting the stringent HAP emission standards.

Response: Methylene chloride is not referred to as a VOC in the final rule and is not included as a VOC in the benefits analysis. However, methylene chloride is classified as a HAP and benefits were attributed to reductions in human health effects from reductions in emissions.

Comment: Two commenters (20,025, 20,116) stated that EPA used an obsolete potency factor for the inhalation route of exposure in the chloroform risk assessment. One commenter (20,025) stated that EPA should update the potency factor. Two commenters (20,025, 20,114) stated that the cancer risk reductions for formaldehyde and chloroform were overstated due to the use of incorrect potency and scaling factors.

Response: The Agency is aware that several organizations have reassessed the carcinogenic potency of formaldehyde and chloroform. The reassessments have incorporated more biologically based dose-response information. The cancer potency factors used in the risk assessment at proposal were taken from the Integrated Risk Information System (IRIS). A recent search of IRIS shows the same cancer potencies as were used in this risk assessment. This program office has tended to base risk assessments on the values contained in IRIS. The Agency did not reassess the risk from the pollutants for the final rule, did not place a monetary value on them, and did not base the decisions in the final regulatory alternative on this information.

Comment: Several commenters (20,016, 20,005, 20,027, 20,101, 20,117) said the costs outweigh the economic benefits. One commenter (20,117) suggested that EPA seriously consider the economic impacts of the proposal and compare those impacts to the environmental benefits. The commenter (20,117) contended that the environmental benefits achieved by the regulation will be small while the economic impact will be severe. Two commenters (20,011, 20,088) stated that the costs are likely understated while the benefits are probably overstated due to the improper characterization of secondary pollutant impacts. One commenter (20,016) stated that the pulp and paper industry does not oppose environmental capital investments but asks that any environmental requirements be based on demonstrated benefits commensurate with the costs of the requirements.

One commenter (20,101) contended that EPA should reconsider whether the benefits resulting from reduced air emissions outweigh the costs of achieving those benefits. One commenter (20,027) submitted that the realistic costs of the proposed "cluster" standards exceed the realistic benefits by a factor of thirty. (Case law cited: Portland Cement Assoc., National Lime Assoc., Sierra Club.) The commenter (20,027) indicated that the enormous costs are unwarranted considering the minimal benefits achieved with the standard. The commenter (20,027) warned that EPA grossly overestimated the environmental benefits of the proposed MACT standards. One commenter (20,025) added that EPA had not cited any reliable studies to support health benefits of reducing TRS emissions. Another commenter (20,066A4) argued that the proposed rules were only marginally cost-effective as underscored by EPA's benefit-cost comparison. The commenter (20,066A4) added that in every case of these studies, the annualized compliance cost for the mills exceeds the annualized benefit of the rule by many millions of dollars.

Response: The EPA is limited in its ability to place a monetary value on all of the benefit categories. Because several health and welfare endpoints, as well as entire pollutant categories are not monetized, the estimate of benefits is underestimated. For instance, one category that achieves significant reductions is TRS, which is responsible for the malodorous smell associated with pulp and paper mills and can result in toxic effects, as well, irrespective of odor. The value of these reductions could be significant given the odor's negative affect on individuals comfort and well-being, and the toxic effects that adversely impact human health (e.g., headaches, nasal irritation, and respiratory and cardiovascular impacts). Overall, all of the information outside of the monetized costs and benefits presentation must be considered before a determination that costs outweigh benefits can be made. Given the uncertainties described in the analyses, EPA cannot make a statement in either direction. The analysis of the final rule presents a range of benefits. The lower bound estimate results in a net cost (i.e., costs exceed benefits) while the upper bound estimate produces net benefits (i.e., benefits exceed costs).

Comment: One commenter (20,114) contended that EPA should perform a cost-to-benefit evaluation to justify the RIA. One commenter (20,129) indicated that EPA should perform risk assessments when developing control applicability cut-off values.

Response: The EPA did present a cost-to-benefit comparison and presented the results in a RIA for the proposed rule. For the final rule, the EPA presented results in the EA report (A-92-40, V-A-2). The analysis of HAP benefits relies on risk assessments, however, this is completed independent of the development of cut-off values.

Comment: One commenter (20,011) indicated that EPA did not provide sufficient information to allow the industry to check the accuracy of the cost-benefit analysis calculations.

Response: The benefits analysis, in the proposed rules RIA and in the promulgated rules EA report (A-92-40, V-A-2), outlines the assumptions that were used. All sources of information used are available in the public docket.

Comment: Two commenters (20,005, 20,059) contended that EPA will have to establish a second round of standards in 8 years to address the residual cancer risk associated with the pulp and paper industry because the current proposed MACT standards were not sufficiently aggressive. One commenter (20,059) stated that EPA should establish final MACT standards that would reduce emissions of carcinogenic and acutely toxic compounds to levels that will protect public health with an adequate margin of safety. One commenter (20,005) stated that EPA should establish air toxic regulations based on risk so that emissions are reduced by the most cost-effective methods available.

Response: The Act requires that MACT standards require ". . . the maximum degree of reduction in emissions of the hazardous air pollutants that the Administrator . . . determines is achievable . . . through application of measures, processes, methods, systems, or techniques . . . ." In other words, the MACT standards are technology-based standards, rather than risk- or health-based standards; MACT standards control total HAP emissions, rather than each individual HAP. Therefore, EPA cannot consider the toxicity of different compounds when developing the standards. The EPA maintains that the final rule requires stringent control of all HAP's. Additional control of a few HAP's through other technologies is not warranted considering the cost and other impacts of those technologies.

As the commenter noted, the residual cancer risk after the standard has been promulgated will be analyzed 8 years after promulgation. At such time, EPA will review the toxicity of specific compounds.

Comment: One commenter (20,072A8) stressed that requiring the soda mills to collect, transport, and incinerate vent gases that are not an odor problem discourages the use of the soda process without consideration of the welfare benefits (odor reduction) associated with soda mill operation.

Response: The EPA agrees with the commenter that soda mills do not have TRS emissions or the odor problems associated with TRS. However, test information and information submitted by the industry indicates that soda mills have HAP emissions comparable to kraft mills. The EPA has determined that significant HAP reductions can be achieved for minimal cost of controlling selected equipment at soda mills. Therefore, EPA maintains that substantial benefit is obtained from controlling emission vents at soda mills.

Comment: One commenter (20,059) argued that EPA did not provide sufficient information to indicate the extent of emissions that will go uncontrolled as a result of the exemptions.

Response: The EPA disagrees with the commenter. In memoranda placed in the docket at proposal and promulgation, in the background information document (volume 1), and in chapter 20 of this document, EPA has provided the baseline emissions and emissions reductions for each control option. The emissions that will go uncontrolled can be calculated from this information.

Comment: Commenter (IV-D2-15) opposed language in the March 8, 1996, Federal Register notice that stated that all the HAP's to be regulated at pulp and paper mills "can cause toxic health effects following exposure, including nausea, headaches, respiratory distress, and possible reproductive problems" because it does not reference amount of dosage or exposure levels. The commenter contended that EPA had not shown that the effects described are associated with exposure levels resulting from pulp and paper HAP emissions.

Response: The Federal Register statement was a qualitative description of possible effects of the HAP's emitted by pulp and paper mills. The EPA did not state that these effects were quantified. The benefit analysis contained in the RIA at proposal evaluates and quantifies changes in cancer incidences resulting from the proposed rule, but qualitatively discusses all other health effect end-points.

Commenter: One commenter (20,025) contended that the EPA had no basis for assigning benefits to acrolein emission reductions because there are no emissions at baseline. The commenter (20,025) also stated that the TRS emissions calculated by EPA were erroneously high, which led to a gross exaggeration of potential human benefits.

Response: The EPA disagrees with the commenter. Based on information contained in emission test reports for pulp and paper mills, emission factors were developed for acrolein. The commenter is referred to the chemical pulping emission factor document (A-92-40, IV-A-81 for emissions information on acrolein obtained by the EPA. Baseline emissions of acrolein were calculated to be 257 mg/yr. Regarding TRS emissions, the EPA revised its estimates of emissions based on additional information and test reports obtained since proposal. See chapter 20 for TRS emission estimates and the chemical pulping emission factor document (A-92-40, IV-A-8) for development of TRS emission factors.

13.0 EMISSIONS AVERAGING

Comment: The December 17, 1993 proposal requested comment on whether to include emissions averaging in the final rule. Three commenters (20,011, 20,027, 20,056) supported including emissions averaging to provide flexibility to the industry. Other commenters (20,059, 20,102, 20,103, 20,129) opposed averaging because they asserted that averaging would increase emissions and not be enforceable.

One commenter (20,027) noted that in keeping with EPA's approach of not distinguishing among the regulated pollutants (HAP's) from this source category, EPA should establish an emissions trading system. The commenter (20,027) also favored EPA making a generic finding that emissions averaging in the pulp and paper industry does not increase hazards. Other commenters (20,011, 20,146) supported an emissions trading system and claimed that an emissions trading policy is consistent with the Act, EPA policy, the current administration's views, and general congressional intent.

Several commenters (20,059, 20,102, 20,103, 20,129) strongly objected to emissions averaging and supported point-by-point compliance requirements. Two commenters (20,102, 20,103) expressed concern that averaging between types of emissions could minimize the public health benefits of the regulation, particularly substitution of ultra-hazardous pollutants for less toxic ones. One commenter (20,059) indicated that the omission of detailed discussion of interpollutant trading in section 112(g) of the Act reflects an intention of Congress not to authorize this practice for MACT standards. One commenter (20,103) contended that emissions averaging would be too difficult to enforce. One commenter (20,129) considered HAP emissions to be highly variable and a function of chemical pulping process conditions and air pollution control technology. The commenter (20,129) warned that averaging HAP emissions that are highly variable and not well known is problematic.

One commenter (IV-D2-4), while maintaining opposition to the use of emissions averaging, conceded that in this instance, limited emissions averaging may be useful to minimize the overall cost of compliance while still achieving the desired emissions reduction. The commenter (IV-D2-4) supported requiring a "static" vs. a "dynamic" emissions averaging scheme, restricting emissions averaging to streams of similar pollutants, and allowing permitting agencies to restrict the use of emissions averaging.

Response: Based on comments received following proposal, EPA concluded that incorporating emissions averaging in the rule would add flexibility and could reduce the costs of compliance. However, EPA has decided that a traditional emissions averaging approach (as taken in the HON) is not appropriate for this industry. The EPA and industry held several meetings after proposal to discuss mill-wide emissions limits and emissions averaging concepts, based on the use of emission factors (A-92-40, IV-Dl-49, 51, and 61). The EPA concluded that currently available emission factors were sufficient for estimating national emissions reductions and impacts; however, they were inadequate for demonstrating compliance in a traditional emissions averaging program. The variability between mill operations would require a case-by-case evaluation of the feasibility of emissions averaging. Since a significant amount of emissions source testing would be necessary to support a viable emissions averaging program, demonstrating compliance would be too burdensome on industry and very difficult to enforce.

Some commenters suggested an alternative to traditional emissions averaging that would be more appropriate for the pulp and paper industry. This condensate pretreatment alternative is currently referred to in the final rule as the CCA. A brief discussion of this alternative was presented in the March 8, 1996 Federal Register supplemental notice. A description of the industry's assumptions used to assess the condensate pretreatment alternative was also submitted to the Agency (A-92-40, IV-Dl-59).

The CCA is based on information provided by the industry after the December 17, 1993 proposal (A-92-40, IV-Dl-29, 29a, 33, and 38). The CCA focuses on reducing the HAP concentration in process water (such as from the digestion and liquor evaporation areas) that is introduced into process equipment throughout the mill. By reducing the amount of HAP in the process water, reductions in HAP emissions will also be achieved since less HAP will be available to volatilize off the process to the atmosphere. To demonstrate compliance, the mass emission reduction of HAP's achieved by the alternative technology must equal or exceed that which would have been achieved by implementing the kraft pulping vent controls. Eligibility for this compliance alternative is determined on a case-by-case basis during the permitting process.

For purposes of developing a compliance strategy, sources may use either emission test data or engineering assessment to determine the baseline HAP emission reductions that would be achieved by complying with the kraft pulping vent standard. To demonstrate that the alternative technology complies with the emission reduction requirements of the standards, emission test data must be used. Two conditions must be met for a CCA compliance demonstration: (1) owners and operators that choose this alternative must first comply with pulping process condensate standards before implementing the alternative technology, and (2) the HAP emission reductions cannot include reductions associated with any control equipment required by local, State, or Federal agencies or statutes or with emission reductions attributed to equipment installed prior to December 17, 1993 (i.e., the date of publication of the proposed rule).

For purposes of the CCA, the rule provides an alternative definition of the affected source. The alternative definition allows for CCA to apply to process systems outside of the kraft pulping system. The expanded source includes the causticizing system and the paper making system. The mill must specify the process equipment within the expanded source with which to generate the required HAP emissions reductions using the CCA. The mass emission reduction of HAP's must equal or exceed the reduction that would have been achieved through application of the kraft pulping vent standards. The final determination of equivalency shall be made by the permitting authority based on an evaluation of the HAP emission reductions.

Comment: Several commenters (IV-D2-2, IV-D2-7, IV-D2-15, IV-D2-19) to the March 8, 1996 Federal Register supplemental notice supported the concept of the CCA compliance approach as outlined by the industry. The commenters also suggested that the final MACT rule allow individual mills to make a case-by-case demonstration that installing and operating a condensate treatment system and reusing the cleaned condensates in various process areas will achieve equivalent or greater mill-wide total HAP emissions reductions as compared to the MACT requirements.

One commenter (IV-D2-15) recommended that in order to make a case-by-case determination of equivalent emissions reduction, a mill would: (1) determine total HAP emissions reductions for any pulping component systems that would be subject to a 98 percent total HAP reduction requirement under the final rule; (2) determine the emissions reductions from implementing the CCA for all process units where the recycled cleaned condensates would be used (or would affect the emissions of total HAP), by using estimates of relevant process liquid concentrations; (3) verify the step 2 reductions are equal to or exceed those from step 1; and (4) periodically monitor the methanol concentration or other appropriate parameters on a case-by-case basis to ensure reductions continue.

One commenter (IV-D2-15) stated that NCASI documented the relationship between process stream methanol concentration and air emissions for vacuum drum brownstock washer systems, oxygen systems, smelt dissolving tanks, and paper making systems. The commenter (IV-D2-15) also contended that a relationship has been developed for estimating total bleaching system methanol emissions based on the amount of methanol entering the bleaching system and the total vent gas flow rate. These relationships could be used by mills to demonstrate the emissions reductions achieved by the reduction of HAP concentration in reused condensate streams, in lieu of testing.

Response: The EPA included provisions for the CCA in the final rule. To be considered equivalent to point-by-point control, the CCA must achieve at least the same total HAP reductions as would be achieved if the MACT controls were implemented on a point-by-point basis. The responsible permitting authority will determine the adequacy of the plan.

The EPA rejected the use of the HAP emissions/process water concentration relationship data developed by NCASI (A-92-40, IV-Dl-29, 33, and 38) as a means of demonstrating compliance with the CCA. While a relationship may exist between the HAP emissions from a piece of process equipment and the HAP concentration in the process water reused or recycled to the equipment, the information compiled thus far by NCASI is insufficient for demonstrating compliance due to inherent process variability between mills. These emission factors may be helpful for screening or preliminary evaluations of the viability of the CCA. To demonstrate compliance with the CCA, however, the rule requires that a mill (1) perform emissions testing to establish the baseline, uncontrolled emissions level for the pulping system after the pulping process condensate requirements of § 63.446 are met; (2) apply the 98 percent HAP emissions reduction required by § 63.443(c) to obtain a compliance HAP emissions level; and (3) after the alternative technology has been implemented, retest the pulping system to determine the HAP emissions level. To demonstrate compliance with the Act, the HAP emissions levels measured after the CCA technologies have been implemented must be equal to, or lower than, the compliance level of HAP emissions calculated from the baseline testing.

14.0 DEFINITIONS

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Acid plant	None	The process equipment used at sulfite mills to produce cooking acid from sulfurous acid, sulfur dioxide, bisulfite salts, and acids and various base cations. (A-92-40, IV-Dl-104)	Definition not needed.	No definition for acid plant was incorporated into the proposal. While the industry's definition appears to be technically correct, the term acid plant is not used in the rule. Therefore, this definition was not needed.
Affected source	None	For the purpose of this subpart, a facility which is a major source that produces pulp from wood or other fiber sources, a facility which is a major source that manufactures paper and paperboard, or a facility which is a major source that has integrated production of pulp and manufacture of paper and paperboard. (A-92-40, IV-Dl-104)	Definition not needed.	The affected source is presented in the applicability section of the rule.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Air-dried pulp	A pulp sample with a moisture content of less than or equal to 10 percent by weight. Pulp samples for the pulping component shall be unbleached pulp and for the bleached component shall be bleached pulp. [from December 17, 1993 proposal]	A pulp sample at 10 percent by weight moisture content. Pulp samples for applicability or compliance determinations for both the pulping and bleaching component shall be unbleached pulp. (A-92-40, IV-Dl-104)	Definition not needed.	The units used in the rule are based on oven-dried pulp.
Black liquor	Pulping liquor from the digester to the point of its incineration in the recovery furnace of a sulfate (kraft) recovery process. It contains dissolved organic wood substances and residual active alkali compounds from pulping process. [from December 17, 1993 proposal, preamble]	Pulping liquor from the pulping process to the point of its incineration in the recovery furnace of a sulfate (kraft) recovery process. It contains dissolved organic wood substances and residual active alkali compounds from pulping process. [commenter 20,056]	Spent cooking liquor that has been separated form the pulp produced by the kraft, soda, or semi-chemical pulping process.	The commenter's definition changes the word "digester" to "pulping process". However, the rule definition has been simplified to improve clarity.
Bleaching	Brightening and delignification of pulp by the addition of oxidizing chemicals. [from December 17, 1993 proposal1	Brightening of pulp by the addition of oxidizing chemicals or reducing chemicals. (A-92-40, IV-Dl-104)	The industry definition was used in the rule.	Industry definition addresses the use of reducing chemicals. Therefore, the industry's definition was used in the rule.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Bleaching component	All process equipment beginning with the first application of chlorine or chlorine-containing compound up to and including the final bleaching stage. Treatment with ozone, oxygen, peroxide may occur before or after the addition of chlorine. If treatment occurs before this chlorine addition, then these stages are included in the pulping component; if treatment occurs after the addition of chlorine, then these bleaching stages are included in the bleaching component. [from December 17, 1993 proposal)	All process equipment after high density pulp storage prior to the first application of oxidizing, purification, or reducing chemicals following the pulping component up to and including the final bleaching stage. (A-92-40, IV-Dl-104)	Definition not needed; included in the definition of "bleaching system."	Industry definition addresses the use of oxidizing or reducing chemicals and provides an equipment reference for the start of the bleaching component. This is necessary to accommodate the TCF process. The rule definition is a combination of the proposal and industry definitions.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Bleaching stage	None	All process equipment associated with a discrete step in the bleaching process, including chemical and steam mixers, bleaching towers, washers, and seal (filtrate) tanks. (A-92-40, IV-Dl-104)	All process equipment associated with a discrete step of chemical application and removal in the bleaching process including chemical and steam mixers, bleaching towers, washers, seal (filtrate) tanks, and vacuum pumps, and any other equipment serving the same functions as those previously listed.	The proposal did not contain a definition of a bleaching stage. The industry definition appears to be accurate and the EPA agrees with the commenter. For the rule, the industry definition was slightly modified to address "chemical application and removal" and to include "but not limited to" language.
Bleaching system	None	None	All process equipment after high-density pulp storage prior to the first application of oxidizing chemicals or reducing chemicals following the pulping system, up to and including the final bleaching stage.	"Bleaching system" better describes the definition than "bleaching component."
Boiler	Any enclosed combustion device that extracts useful energy in the form of steam. Boilers are not considered incinerators. [from December 17, 1993 proposal1	Any enclosed combustion device whose primary purpose is the extraction of useful energy in the form of steam. Boilers are not considered incinerators. (A-92-40, IV-Dl-104)	Any enclosed combustion device that extracts useful energy in the form of steam. A boiler is not considered a thermal oxidizer.	The EPA does not believe that the industry's definition adds any clarity to the rule. Therefore, the proposal definition was used in the rule. However, the term "incinerator" was replaced by "thermal oxidizer" to add clarity.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Brownstock washer system	Includes rotary vacuum drum washers, pressure washers, diffusion washers, horizontal belt washers, all filtrate tanks, and intermediate stock chests. The washing system does not include deckers, screens, stock chests or pulp storage tanks following the last stage of brownstock washing. [from March 8, 1996 Federal Register supplemental notice1	The equipment used to wash pulp and separate spent cooking chemicals following the digester system and prior to the bleaching component, oxygen delignification system or paper machine system (at unbleached mills), such as vacuum drum washers, diffusion washers, rotary pressure washers, horizontal belt filters, intermediate stock chests, and their associated vacuum pumps, filtrate tanks and foam breakers or tanks. The washing system does not include deckers, screens, stock chests, or pulp storage tanks, following the last stage of brownstock washing. (A-92-40, IV-Dl-104)	All equipment used to wash pulp and separate spent cooking chemicals following the digester system and prior to the bleaching system, oxygen delignification system, or paper machine system (at unbleached mills). The pulp washing system equipment includes vacuum drum washers, diffusion washers, rotary pressure washers, horizontal belt filters, intermediate stock chests, and their associated vacuum pumps, filtrate tanks and foam breakers or tanks, and any other equipment serving the same function as those previously listed. The pulp washing system does not include deckers, screens, knotters, stock chests, or pulp storage tanks, following the last stage of pulp washing.	The industry definition appears to be technically correct. The definition (pulp washing system) used in the rule was modified to address all pulp washing systems (i.e., separate definitions for brown and red stock would not be needed) by removing the term l'brownlt and replacing with word "stock" with the word "pulp"

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Causticizing system	None	All lime mud washers and storage tanks, white and mud liquor clarifiers and storage tanks, slakers, slaker grit washers, lime kilns, green liquor clarifiers and storage tanks, and dreg washers ending with the white liquor storage tanks prior to the digester system. (A-92-40, IV-Dl-104)	All equipment associated with converting sodium carbonate into active sodium hydroxide. The equipment includes smelt dissolving tanks, lime mud washers and storage tanks, white and mud liquor clarifiers and storage tanks, slakers, slaker grit washers, kilns, green liquor clarifiers and storage tanks, and dreg washers ending with the white liquor storage tanks prior to the digester system, and any other equipment serving the same function as those previously listed.	No definition was included at proposal. The industry definition appears to be technically correct. For the rule, the industry definition was slightly modified to present function first, followed by typical lime equipment.
Chemical recovery	The process by which pulping chemicals in the spent cooking liquor are extracted or recovered after the multiple effect evaporator system. [from December 17, 1993 proposal]	The process by which pulping chemicals in the spent cooking liquor are extracted or recovered after the multiple effect evaporator system, consisting of a recovery furnace, black liquor oxidation (if any), black liquor storage tanks, and ending with the smelt dissolving tank, and associated equipment. (A-92-40, IV-Dl-104)	Definition not needed.	The term "chemical recovery" is not used in the rule.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Chip steamer	None	A separate vessel for the purpose of preheating wood chips prior to the digester, using flash steam from the digester or live steam. (A-92-40, IV-Dl-104)	A vessel used for the purpose of preheating or pretreating wood chips prior to the digester, using flash steam from the digester or live steam.	No definition was included at proposal. The industry definition appears to be technically correct, however the rule definition was slightly modified to remove the term "separate" to acknowledge that chip steamer vessels may be integrated into the digester system.
Closed-vent system	A system that is not open to the atmosphere and is composed of piping, ductwork, connections, and, if necessary, flow-inducing devices that transport gas or vapor from an emission point to a control device. [from December 17, 1993 proposal]	A system that does not discharge to the atmosphere during normal operation and is composed of piping, ductwork, connections, and if necessary, flow inducing devices that transport gas or vapor from an emission point to a control device. (A-92-40, IV-Dl-104)	The proposal definition was used in the rule.	The industry definition includes language referring to normal operation to address concerns regarding malfunctions and safety-related venting. This language does not add any clarity to the definition and is unnecessary. Also, EPA does not intend for the definition to depend on operating mode. Therefore, the proposal definition was used in the rule.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Combustion device	An individual unit of equipment, including but not limited to, an incinerator, lime kiln, recovery furnace, process heater, or boiler, used for the thermal oxidation of organic hazardous air pollutant vapors. [from December 17, 1993 proposal]	An individual unit of equipment, including but not limited to, a thermal oxidizer, lime kiln, recovery furnace, process heater, or boiler, used for the thermal oxidation of organic hazardous air pollutant vapors. (A-92-40, IV-Dl-104)	An individual unit of equipment, including but not limited to, a thermal oxidizer, lime kiln, recovery furnace, process heater, or boiler, used for the thermal oxidation of organic hazardous air pollutant vapors.	The industry definition includes the terms "incinerator" and "thermal oxidizer." The EPA believes that an incinerator is addressed by the "term" thermal oxidizer. Therefore, only the term "thermal oxidizer" was included in the definition for the rule.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Condensate Segregation	The practice of generating, producing, or isolating a high-HAP concentration/low flow rate condensate stream Erom process vent vapors or gases in order to maximize the HAP mass and minimize the condensate volume sent to subsequent treatment [from March 8, 1996 Federal Register supplemental notice]	The practice of generating, producing, or isolating a high-HAP concentration/low flow rate condensate stream from process vent vapors or gases in order to maximize the HAP mass and minimize the condensate volume sent to subsequent treatment. For the cases where condensate segregation is practiced, the segregation process must be operated such that either: (a) The combined high methanol fraction streams from one or more sources contain 50 percent of the total methanol in the foul condensate streams from the same sources; or (b) All foul condensate streams when combined contain a minimum of 10 lb methanol/ADTP for bleached mills or 6.4 lb nethanol/ADTP for unbleached mills. (A-92-40, IV-Dl-107)	Definition not needed.	The concept of condensate segregation is incorporated into the language of the rule.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Container	Container means any portable unit in which wastewater or HAP removed from wastewater is stored, transported, treated, or otherwise handled. Examples of containers are drums, barrels, tank trucks, barges, dumpsters, tank cars, dump trucks, and ships. [from December 17, 1993 proposal]	Delete entire definition. (A-92-40, IV-Dl-104)	Definition not needed.	Based on industry comments, containers are not used in the pulp and paper industry. Therefore, the rule does not have container requirements.
Decker system	A piece of equipment used to thicken or reduce the water content of the pulp slurry after the pulp washing system. [from December 17, 1993 proposal]	The equipment, including filtrate tanks, primarily used to thicken the pulp slurry or reduce its liquid content after the brownstock washer system and prior to high density storage. (A-92-40, IV-Dl-104)	Equipment used to thicken the pulp slurry or reduce its liquid content after the pulp washing system and prior to high-density pulp storage. The decker system includes decker vents, filtrate tanks, and associated vacuum pumps, and any other equipment serving the same function as those previously listed.	The industry definition includes references to process equipment location and appears to be technically correct. However, the terms "primarily" and "brown" were deleted and a list of typical equipment was were added to the rule definition to broaden the definition. The wording was modified to present function first, followed by typical equipment.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Digester system	Each continuous digester or each set of batch digesters used for the chemical treatment of wood, including associated flash tank(s), blow tank(s), chip steamer(s), condenser(s), and pre-hydrolysis unit(s). [from December 17, 1993 proposal]	Each continuous digester or each batch digester used for the chemical treatment of wood or non-wood fibers, including associated flash tank(s), blow tank(s), chip steamer(s), blow heat accumulator(s), condenser(s), and pre-hydrolysis unit(s) preceding brownstock washers. (A-92-40, IV-Dl-104)	Each continuous digester or each batch digester used for the chemical treatment of wood or non-wood fibers. The digester system equipment includes associated flash tank(s), blow tank(s), chip steamer(s) not using fresh steam, blow heat accumulator(s), relief gas condenser(s), pre-hydrolysis unit(s) preceding the pulp washing system, and any other equipment serving the same function as those previously listed. The digester system includes any of the liquid streams or condensates associated with batch or continuous digester relief, blow, or flash steam processes.	The industry's recommended definition includes pulping of non-wood fibers and includes specific equipment. The EPA agrees with the commenter's revisions. However, the words "brownstock washer" were replaced with "pulp washing system" and "but is not limited to" was included. Additionally, the language was modified to present function first, followed by typical equipment.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Emission point	Any location within a source from which air pollutants are emitted, including an individual process vent, wastewater collection and treatment system, or an open piece of process equipment. [from December 17, 1993 proposal]	Any location within a source from which air pollutants are emitted to the atmosphere, including an individual process vent, an open wastewater collection and treatment system unit, or an open piece of process equipment. (A-92-40, IV-D1-104)	Any part of a stationary source that emits hazardous air pollutants regulated under this subpart, including emissions from individual process vents, stacks, open pieces of process equipment, equipment leaks, wastewater and condensate collection and treatment system units, and those emissions that could reasonably be conveyed through a stack, chimney, or duct where such emissions first reach the environment.	The proposed definition was expanded to add clarity.
Evaporator system	Any and all equipment associated with increasing the solids content of spent cooking liquor including, but not limited to, pre-evaporators, evaporators (direct and indirect contact), and concentrators. [from 1996 notice]	Any and all equipment designed to increase the solids content of spent cooking liquor including, but not limited to, pre-evaporators, multi-effect evaporators, and concentrators.	All equipment associated with increasing the solids content and/or concentrating spent cooking liquor from the pulp washing system including pre-evaporators, multi-effect evaporators concentrators and vacuum systems, as well as, associated condensers, hotwells, and condensate streams, and any other equipment serving the same function as those previously listed.	The industry definition includes some minor changes that seem appropriate and add clarity to the definition. The EPA agrees with the commenters' revisions. The rule definition also has minor language changes in order to remain consistent with other definitions (e.g., brownstock to pulp).

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Existing source	None	For the purposes of this subpart, a source covered by this subpart that is not a new source. (A-92-40, IV-Dl-104)	The most current general provisions definition was used in the rule.	The industry definition is slightly different from that in the general provisions, however, the rule is not the appropriate mechanism for changing the general provisions definitions. Any revisions to the general provisions should be accomplished in the ongoing litigation. The most current general provisions definition is used.
Flow indicator	A device which indicates whether gas flow is present in a closed vent system. [from December 17, 1993 proposal]	Any device that indicates gas or liquid flow in an enclosed system. [Commenter 20,027]	The industry definition was used in the rule.	The industry definition includes liquid flow. The EPA agrees with the commenter's revision.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Foul condensates	Any liquid streams originating from the following process areas or equipment: batch digester relief and blow gas system condensates; batch digester blow heat recovery system condensates; continuous digester system flash steam condensates; continuous digester chip steaming vessel condensates; turpentine decanter underflow; NCG system condensates; NCG system low point drains; and condensates from weak liquor feed stage(s) in the evaporator system. Where vapors or gases from the digester, turpentine recovery, NCG, and/or evaporator systems are segregated into low-HAP and high-HAP concentration fractions though multistage, differential, or selective condensation, only the high-HAP fraction stream is considered foul condensate. If condensate segregation is not performed on the	The following liquid streams are considered foul condensates: turpentine decanter underflow, noncondensible gas handling system condensates, continuous digester flash steam condensates, batch digester blow steam condensates, batch digester relief steam condensates, evaporator vacuum system condensates, and condensed vapors from evaporator weak black liquor feed stage(s) (first liquor evaporation step). Where condensate segregation is practiced and vapors from digesters (flash, blow, and relief steam), and/or black liquor evaporators are condensed through multistage, differential or selective condensation, to produce low methanol and high methanol fractions, only the concentrated stream (high methanol fraction) is considered foul condensate.	Definition not needed.	The definition for foul condensates was removed from the rule since the rule format was revised to name streams to be controlled. Additionally, the term "foul" pertains to the presence of TRS compounds, which may or may not be indicative of the presence of HAP compounds.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Green liquor	Liquor made by dissolving the sodium containing smelt from the kraft recovery process in water, prior to causticizing. [from December 17, 1993 proposal, preamble]	The solution made by dissolving smelt (primarily sodium sulfide and sodium carbonate) from the kraft recovery process in water, prior to causticizing. [Commenter 20,027]	Definition not needed in the rule.	The industry definition is more technically correct (i.e., solution versus liquor). However, the definition was not needed in rule.
Hardwood	Pulpwood from broad-leaved dicotyledonous deciduous trees. [from December 17, 1993 proposal, preamble]	Any species of broad-leaved angiosperms possessing true vessels. (A-92-40, IV-Dl-104)	Definition not needed.	The term "hardwood" is not used in the rule.
High volume, low concentration or HVLC collection system	None	None	The gas collection and transport system used to convey gases from the HVLC system to a control device.	This term was included in the rule to distinguish between the HVLC collection system and the HVLC system vents.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Incinerator	An enclosed combustion device that is used for destroying organic compounds. Auxiliary fuel may be used to heat waste gas to combustion temperatures. Any energy recovery section present is not physically formed into one manufactured or assembled unit with the combustion section; rather, the energy recovery section is a separate section following the combustion section and the two are joined by ducts or connections carrying flue gas. [from December 17, 1993 proposal]	Industry recommended replacing this definition with the definition for thermal oxidizer. (A-92-40, IV-Dl-104)	The definition for thermal oxidizer was used in the rule.	The definition for thermal oxidizer replaces the incinerator definition because it was a broader definition.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Individual drain system	The system used to convey process wastewater streams from pulping or bleaching process equipment or tanks or process wastewater collection and treatment system unit to a receiving process wastewater collection and treatment system unit. The term includes all process drains and junction boxes, together with their associated sewer lines and other junction boxes, manholes, sumps, and lift stations, down to the receiving process wastewater treatment system. The individual drain system shall be designed to segregate the vapors within the system from the other drain systems. A segregated storm water sewer system, which is a drain and collection system designed and operated for the sole purpose of collecting rainfall-runoff at a facility, and which is segregated from all other individual drain	The system used to convey process wastewater streams from the pulping component to a receiving process wastewater collection and treatment system unit. The term includes all process drains and junction boxes, together with their associated sewer lines and other junction boxes, manholes, sumps, and lift stations, to the receiving process wastewater treatment system. (A-92-40, IV-Dl-104)	Definition not needed.	This definition was not included in the final rule because the original definition was too burdensome and did not adequately reflect the streams included in this rule. Systems used to convey wastewater streams from pulping and bleaching systems are referred to as hardpiping.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Junction box	A manhole access point to a wastewater sewer system line or a lift station. [from December 17, 1993 proposal]	Any structure designed for the conjunction of two or more sewer lines. A junction box may allow access to the sewer lines. [Commenter 20,027]	Definition not needed in rule.	Although EPA agrees that the industry revision addresses the fact that not all junction boxes will have manholes or allow access, this definition was deleted from the rule since the control options for wastewater have been simplified.
Knotter system	A piece of equipment where knots or pieces of uncooked wood are removed from the pulp slurry after the digester system and prior to the pulp washing system. Equipment used to remove oversized particles from pulp following the pulp washer are considered screens. [from December 17, 1993 proposal]	All equipment where knots, oversized material, or pieces of uncooked wood are removed from the pulp slurry after the digester system and prior to the brownstock washer system. Pieces of equipment used to remove oversized particles from pulp following the brownstock washer are considered screens. (A-92-40, IV-Dl-104)	Equipment where knots, oversized material, or pieces of uncooked wood are removed from the pulp slurry after the digester system and prior to the pulp washing system. The knotter system equipment includes the knotter, knot drainer tanks and ancillary tanks, and any other equipment serving the same function as those previously listed.	The industry definition adds the term "oversized material". The EPA agrees with the commenter's revision. For the rule, the proposal definition has added more specific equipment associated with knotter systems to provide greater clarity and brownstock has been replaced with pulp to broaden the definition. Additionally, the language was modified to present function first, followed by typical equipment.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Kraft recovery furnace	An enclosed combustion device where concentrated spent liquor is burned to recover sodium and sulfur, produce steam, and dispose of unwanted dissolved wood components in the liquor. [from December 17, 1993 proposal]	Delete entire definition. (A-92-40, IV-D1-104)	The term "recovery furnace" replaced "kraft recovery furnace."	Industry recommended deleting this definition; however, "recovery furnace" replaces "kraft recovery furnace" to broaden the definition. The EPA maintains that the definition for "recovery furnace" is needed because it is specifically mentioned in the rule.
Lime kiln	An enclosed combustion device used to calcine lime mud, which consists primarily of calcium carbonate, into calcium oxide. [from December 17, 1993 proposal]	None	The proposal definition was used in the rule.	The proposal definition appropriately defines the lime kiln.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Low volume, high concentration or LVHC collection system	Includes batch digester blow vents; batch digester relief steam condenser vents; continuous digester relief steam vents; turpentine condenser(s) vents; continuous digester blow tank vent; evaporator vacuum system vents; liquor concentrator vacuum system vents; pre-evaporator vacuum system vents; steam stripper feed tank vents; and steam stripper off gas vents. [from March 8, 1996 Federal Register supplemental notice]	Includes batch digester blow tank and/or blow heat recovery vents; batch digester relief condenser vents; continuous digester blow tank and/or blow heat recovery vents; continuous digester relief condenser vents; black liquor pre-evaporator; evaporator; and concentrator vacuum systems vents; foul condensate off gas vents; and foul condensate storage tank vents. (A-92-40, IV-Dl-104)	The gas collection and transport system used to convey gases from the LVHC to a control device.	The proposal definition was modified to distinguish between the LVHC collection system and the LVHC system vents.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Malfunction	None	Any sudden and not reasonably preventable failure of air pollution control equipment, a process, or process equipment to operate in a normal or usual manner, or the venting of equipment for safety reasons. Failures that are caused by poor maintenance or careless operation and not malfunctions. (A-92-40, IV-Dl-104)	The most current general provisions definition was used.	The industry definition adds language for safety venting to the general provisions definition. However, the rule is not the appropriate mechanism for changing the general provisions definitions. Any revisions to the general provisions should be accomplished in the ongoing litigation. The most current general provisions definition was used.
Mechanical pulping	None	None	A pulping process that only uses mechanical and thermo-mechanical processes to reduce wood to a fibrous mass. The mechanical pulping processes include, but are not limited to, stone groundwood, pressurized groundwood, refiner mechanical, thermal refiner mechanical, thermo-mechanical, and tandem thermo-mechanical.	Definition needed for final rule. This process was not addressed in the proposed rule.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Multiple-effect evaporator system	A series of evaporators operated at different pressures such that the vapor from one evaporator body becomes the steam supply for the next evaporator, and associated condenser(s) and hotwell(s) used to concentrate the spent cooking liquid that is separated from the pulp. [from December 17, 1993 proposal]	Delete definition. (A-92-40, IV-Dl-104)	This definition was replaced with the evaporator system definition.	The industry recommends deleting this definition from the rule since evaporator system will be defined. The EPA agrees with the commenter.
New kraft recovery furnace	None	A kraft recovery furnace located at an existing source covered by this subpart, on which construction or reconstruction is commenced after (proposal date for MACT II) or a kraft recovery furnace located at a new source. (A-92-40, IV-Dl-104)	Definition not needed.	The rule does not define new or existing equipment but references the results from the general provisions litigation.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
New source	None	For purposes of this subpart, an affected source on which construction or reconstruction is commenced after December 17, 1993. A unit process or component added to or modified at an existing facility is not a new source, unless such addition or reconstruction is so large as to make the entire facility a new source by virtue of the definition of "reconstruction" in this subpart. (A-92-40, IV-Dl-104)	The most current general provisions definition was used in the rule.	The industry definition is different from that in the general provisions. However, the rule is not the appropriate mechanism for changing the General Provision definition. Any revisions to the general provisions should be accomplished in the ongoing litigation. The most current general provisions definition was used.
Non-condensible gas system	None	None	Definition not needed.	This definition was replaced with definitions for LVHC and HVLC collection systems.
Non-wood pulping	None	Includes pulping of flax straw, cereal straw, bagasse, hemp, cotton, jute, kenaf, grasses, leaf fibers, or secondary fiber repulping. [Commenter IV-D2-141	The production of pulp from fiber sources other than trees. The non-wood sources include, but are not limited to, bagasse, cereal straw, cotton, flax straw, hemp, jute, kenaf, and leaf fibers.	The industry definition appears to be technically correct. The EPA agrees with the commenter. Language was added to the beginning of the definition for clarity.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Nuisance scrubber	None	A device which circulates a liquid solution to remove pollutants from a gaseous vent stream. The effluent from a nuisance scrubber is sewered and not recovered for cooking acid production. (A-92-40, IV-Dl-104)	Definition not needed.	The industry definition appears to be technically correct. However, this definition was not needed since the rule does not specify or identify control technologies for sulfite mills.
Operating parameter value	A minimum or maximum value established for a control device or process parameter if achieved by itself, or in combination with one or more other operating parameter values; determines that an owner or operator has complied with an applicable emission limitation or standard. [from December 17, 1993 proposal]	A minimum or maximum value established for a control device or process parameter which, if achieved by itself, or in combination with one or more other operating parameter values; is an indication that an owner or operator has complied with an applicable emission limitation or standard. (A-92-40, IV-Dl-104)	Definition not needed.	"Operating parameter value" was incorporated into the rule; therefore, the definition was not needed.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Oven-dried pulp	None	None	A pulp sample at zero percent moisture content by weight. Pulp samples for applicability or compliance determinations for both the pulping and bleaching systems shall be unbleached pulp. For purposes of complying with mass emission limits in this subpart, megagram of ODP shall be measured to represent the amount of pulp entering and processed by the equipment system under the specified emission limit. For equipment that does not process pulp, megagram of ODP shall be measured to represent the amount of pulp that was processed to produce the gas and liquid streams that the subject equipment is processing.	This term was needed to define the units in the rule.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Oxygen deligni-fication	Includes the blow tank, the post oxygen washers, filtrate tanks, and any interstage pulp storage tanks. [from March 8, 1996 <u>Federal Register</u> supplemental notice]	The equipment that uses oxygen to remove lignin from pulp after brownstock high density storage and prior to the bleaching component. The oxygen delignification system includes the blow tank, the post oxygen washers, filtrate tanks, and any interstage pulp storage tanks. (A-92-40, IV-D1-104)	The equipment that uses oxygen to remove lignin from pulp after high-density stock storage and prior to the bleaching system. The oxygen delignification system equipment includes the blow tank, washers, filtrate tanks, and any interstage pulp storage tanks, and any other equipment serving the same function as those previously listed.	The industry definition appears technically correct and adds specific equipment for reference. The EPA agrees with the commenter. The industry definition was slightly modified to remove "brownstock" and add "but is not limited to" to broaden the definition in the final rule.
Papermaking component	None	All of the equipment used to convert pulp into paper, paperboard, or market pulp, including the stock storage and preparation systems (such as pulp mixing and dispersion, beating and refining, and addition of additives), the paper or paperboard machine "wet end" systems (including sheet formation, pressing and vacuum systems), paper machine white water systems, broke recovery systems, and "dry end" systems (including drying, calendering, on-machine coating, winding, slitting, and cutting). (A-92-40, IV-D1-104)	Definition not needed; it was included in the definition of "papermaking system."	This definition was included in the "papermaking system" definition. "Papermaking system" better describes the definition than "papermaking component."

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Papermaking system	None	None	All equipment used to convert pulp into paper, paperboard, or market pulp, including the stock storage and preparation systems, the paper or paperboard machines, the paper machine white water system, broke recovery systems, and the systems involved in calendering, drying, on-machine coating, slitting, winding, and cutting.	"Papermaking component" was replaced by "papermaking system" because "papermaking system" better describes the definition. The EPA maintains that industry's proposed definition of "papermaking component" was too specific and was modified to be more broad and also renamed "papermaking system."
Part 70 permit	None	A permit issued by a state permitting authority pursuant to a program approved by EPA under part 70 of this chapter. (A-92-40, IV-Dl-104)	The most current general provisions definition was used.	The industry definition is different from that in the general provisions. However, the rule is not the appropriate mechanism for changing the general provisions definition. Any revisions to the general provisions should be accomplished in the ongoing litigation. The most current general provisions definition was used.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Point of generation	The location where the process wastewater stream exits the pulping or bleaching process equipment or tank prior to mixing with other process wastewater streams or prior to handling or treatment in a piece of equipment that is not an integral part of the pulping or bleaching process equipment. A piece of equipment is an integral part of the process if it is essential to the operation of the process (i.e., removal of the equipment would result in the process being shut down). [from December 17, 1993 proposal]	Delete definition entirely. (A-92-40, IV-D1-104)	Definition not needed.	The EPA agrees with the commenter that this definition is not needed since the format of the rule has been revised to naming specific streams to be controlled.
Pre-washing screening system	Includes knotters, knotter drain tanks, screens, and reject tanks prior to brownstock washing. [from March 8, 1996 <u>Federal Register</u> supplemental notice]	None	Definition not needed.	This term is not used in the rule.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Primary fuel	The fuel that provides the principal heat input to the combustion device. To be considered primary, the fuel must be able to sustain operation of the combustion device without the addition of other fuels. [from December 17, 1993 proposal]	The combination of fuels that provides the principal heat input to the combustion device. To be considered primary, the fuel must be able to sustain operation of the combustion device without the addition of other fuels. (A-92-40, IV-D-97)	The proposal definition was used in the rule.	The EPA disagrees with the industry revision because primary fuel is meant to imply a single fuel, and not a combination of fuels. The proposal definition was used in the rule.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Process emission point	A gas stream that contains hazardous air pollutants discharged during operation of process equipment including, but not limited to digesters, evaporators, pulp washing systems, bleaching towers, bleaching stage washers, and associated filtrate tanks. [from December 17, 1993 proposal]	The location where a gas stream that contains hazardous air pollutants is discharged from the process equipment in the pulping component, bleaching component, process wastewater component, chemical recovery component/system, papermaking component, or causticizing system as defined in this section. Process emission points include gas streams that are discharged directly to the atmosphere, discharge to the atmosphere via vents or open process equipment, or after diversion through a product recovery device. (A-92-40. IV-Dl-104)	Definition not needed.	The EPA agrees with the industry revisions, however, this definition was not needed since the format of the rule has been revised to name specific vents to be controlled.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Process wastewater collection system	A piece of equipment, structure, or transport mechanism used in conveying or storing a process wastewater stream. Examples of a process wastewater collection system equipment include individual drain systems, wastewater tanks, surface impoundments, or containers. [from December 17, 1993 proposal]	A grouping of equipment, structures, or transport mechanisms used in conveying or storing a process wastewater stream. Examples of process wastewater collection system equipment include foul condensate drain systems, wastewater tanks, or surface impoundments. (A-92-40, IV-Dl-104)	Definition not needed.	This definition was not needed since the pulping wastewater control options have been simplified.
Process wastewater component	Air emissions from all process wastewater streams produced from the pulping and bleaching processes. [from December 17, 1993 proposal]	Delete definition. (A-92-40, IV-Dl-104)	Definition not needed.	This definition was not needed since the format of the rule has been revised to name specific vents to be controlled.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Process wastewater stream	Any HAP-containing liquid that results from either direct or indirect contact of water with organic compounds. Examples of a process wastewater stream include, but are not limited to, digester condensates, evaporator condensates, and NCG system condensates. [from December 17, 1993 proposal 1	Any HAP-containing liquid that results from contact of water with organic compounds. (A-92-40, IV-Dl-104)	Definition not needed.	This definition was not needed since the format of the rule has been revised to name specific vents to be controlled.
Process wastewater treatment component	None	A collection of equipment or structures, a process, or specific technique that conveys or removes or destroys any HAP in a process wastewater stream. Examples include, but are not limited to, a steam stripping unit, or a biological treatment unit. (A-92-40, IV-Dl-104)	Definition not needed; replaced by "process wastewater treatment system."	The definition for process wastewater treatment system replaces "process wastewater treatment component."

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Process oastewater treatment system	A process or specific technique that removes or destroys the organics or any HAP in a process wastewater stream. Examples include, but are not limited to, a steam stripping unit, wastewater incinerator, or biological treatment unit. [from December 17, 1993 proposal]	None	A collection of equipment, a process, or specific technique that removes or destroys the HAP's in a process wastewater stream. Examples include, but are not limited to, a steam stripping unit, wastewater thermal oxidizer, or biological treatment unit.	"Process wastewater treatment component" was changed to "process wastewater treatment system" because "process wastewater treatment system" better describes the definition.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Pulp washing system	Pulp or brownstock washers and associated vacuum pumps, filtrate tanks, and foam breakers or tanks used to wash the pulp to separate spent cooking chemicals following the digestion system and prior to the bleaching component. [from December 17, 1993 proposal)	None	All equipment used to wash pulp and separate spent cooking chemicals following the digester system and prior to the bleaching system, oxygen delignification system, or paper machine system (at unbleached mills). The pulp washing system equipment includes vacuum drum washers, diffusion washers, rotary pressure washers, horizontal belt filters, intermediate stock chests, and their associated vacuum pumps, filtrate tanks, and foam breakers or tanks, and any other equipment serving the same function as those previously listed. The pulp washing system does not include deckers, screens, knotters, stock chests, or pulp storage tanks, following the last stage of pulp washing.	The definition used in the rule was modified to address all pulp washing systems (i.e., separate definitions for brown and redstock would not be needed) by removing the term "brown" and replacing with word "stock" with the word "pulp".

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Pulping component	All process equipment, beginning with the digester system, and up to and including the last piece of pulp conditioning equipment prior to the bleaching component, including treatment with ozone, oxygen, or peroxide before the first application of chlorine or chlorine-containing compounds. [from December 17, 1993 proposal]	The wood storage and preparation area (including debarking and chipping), the digester system, knotter systems, brownstock washer system, pulp storage, turpentine recovery system, multiple effect evaporator system, causticizing systems, weak and strong black liquor storage tanks, tall oil recovery system, oxygen delignification system, deckers and screens. The pulping component ends with the last stage of brownstock washing, deckers and/or screens, or the last stage of post-oxygen washing. (A-92-40, IV-Dl-104)	Definition not needed; included in definition of "pulping system."	Industry indicated that they want to include wood storage and preparation. The EPA disagrees because the rule does not address emissions from wood storage and preparation areas. This definition was incorporated into the "pulping system" definition.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Pulping process condensates	None	None	Any HAP-containing liquid that results from contact of water with organic compounds in the pulping process. Examples of a process condensates stream include digester system condensates, evaporator system condensates, LVHC, and HVLC system condensates, and any other condensates from equipment serving the same function as those previously listed. Liquid streams that are intended for by-product recovery are not considered process condensate streams.	"Process wastewater stream" was replaced by "pulping process condensates" because "pulping process condensates" better describes the definition.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Pulping system	None	None	All process equipment, beginning with the digester system, and up to and including the last piece of pulp conditioning equipment prior to the bleaching system, including treatment with ozone, oxygen, or peroxide before the first application of a chemical bleaching agent intended to brighten pulp. The pulping system includes pulping process condensates and can include multiple pulping lines.	"Pulping component" was changed to "pulping" system" because "pulping system" better describes the definition.
Purchased pulp	Virgin pulp purchased from an off-site facility or obtained from an inter-company transfer from another site. [from December 17, 1993 proposal, preamble]	Pulp purchased from an off-site facility or obtained from an inter-company transfer from another site. [Commenter 20,027]	Definition not needed.	The term is not used in the rule.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Reconstruction	None	The replacement of components at a source subject to this subpart to such an extent that: (1) The fixed capital cost of the new components exceeds 50% of the fixed capital cost that would be required to construct a comparable new source; and (2) It is technologically and economically feasible for the reconstructed source to meet the relevant standard(s) established in this subpart. Any reconstructed source is subject to relevant standards for new sources, including compliance dates, irrespective of any change in emissions or hazardous air pollutant from that source. (A-92-40, IV-Dl-104)	The most current general provisions definition was used in the rule.	The industry definition adds language for safety venting. However, the rule is not the appropriate mechanism for revising the general provisions definitions. Any revisions to the general provisions should be accomplished in the ongoing litigation. The most current general provisions definition was used.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Recovery device	An individual unit of equipment, such as an absorber or a condenser, capable of and used for the purpose of recovering chemicals for use, reuse, or sale. [from December 17, 1993 proposal]	Delete definition entirely. (A-92-40, IV-Dl-104)	Definition not needed.	This term is not used in the rule.
Recovery furnace	An enclosed combustion device where concentrated spent liquor is burned to recover sodium and sulfur, produce steam, and dispose of unwanted dissolved wood components in the liquor. [from December 17, 1993 proposal]	Delete definition. (A-92-40, IV-Dl-104)	The proposal definition was used in the rule.	The EPA believes this definition was necessary since recovery furnaces are referenced in the pulping control options. "Recovery furnace" replaces "kraft recovery furnace" because "recovery furnace" is a broader definition.
Redstock washer system	None	The equipment used to wash sulfite pulp and to separate spent sulfite liquor (which is returned for recovery) following the digester system. (A-92-40, IV-Dl-104)	Definition not needed. "Red stock washer system" was included in the "pulp washing system" definition.	The brownstock and redstock washer system definitions have been incorporated into the "pulp washing system" definition.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Relief valve	A valve used only to release an unplanned, nonroutine discharge. A relief valve discharge can result from an operator error, a malfunction such as a power failure or equipment failure, or other unexpected cause that requires immediate venting of gas from process equipment to avoid safety hazards or equipment damage. [from December 17, 1993 proposal]	None	Delete the definition.	This term is not used in the rule.
Screen system	A piece of process equipment where pieces of oversized particles are removed from the pulp slurry after the pulp washing system and prior to the papermaking equipment. Equipment used to remove uncooked wood prior to the pulp washing system are considered knotters. [from December 17, 1993 proposal]	A piece of process equipment in which oversized particles are removed from the pulp slurry after the brownstock washer system and decker system and prior to the bleaching or paper machine component washed stock storage. Pieces of equipment used to remove knots, oversized materials, or pieces of uncooked wood prior to the brownstock washer system are considered knotters. (A-92-40, IV-Dl-104)	All equipment in which oversized particles are removed from the pulp slurry prior to the bleaching or papermaking system washed stock storage.	The EPA agrees that the industry definition adds clarity to the rule. The proposal definition was slightly modified (e.g., "brownstock" to "pulp") to broaden the definition.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Secondary Fiber pulping	None	None	A pulping process that converts a fibrous material, that has previously undergone a manufacturing process, into pulp stock through the addition of water and mechanical energy. The mill then uses that pulp as the raw material in another manufactured product. These mills may also utilize chemical, heat, and mechanical processes to remove ink particles from the fiber stock.	Definition needed for final rule. This source was not in the proposed rule.
Segregated condensate stream (high-HAP fraction)	Any condensate stream that contains at least 65 percent by weight of the total HAP mass (measured as methanol) that is present in the vapor stream prior to condensation or isolation. [from March 8, 1996 Federal Register supplemental notice]	No definition was provided by industry. However, they indicated in the July 9, 1996 letter that the percent split between high and low fractions should be 50/50 (not 65/35).	Definition not needed.	This term is incorporated into the rule language.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Semi-chemical pulping	A pulping process that combines both chemical and mechanical pulping processes. [from December 17, 1993 proposal]	A pulping process that combines both chemical and mechanical pulping processes with typical pulping yields of 65 percent or greater based on the dry weight of pulpwood. (A-92-40, IV-D1-104)	A pulping process that combines both chemical and mechanical pulping processes. The semi-chemical pulping process produces intermediate yields ranging from 55 to 90 percent.	The EPA agrees with the commenter that the definition needs to be clarified to distinguish semi-chemical pulping from mechanical pulping where small amounts of chemicals are used. For the rule, the proposal definition was revised to reflect this difference.
Sewer line	A lateral, trunk line, branch line, or other conduit including, but not limited to, grates, and trenches used to convey process wastewater streams or any HAP removed from process wastewater streams to a downstream unit in the process wastewater collection and treatment system. [from December 17, 1993 proposal]	A lateral line, trunk line, branch line, or other conduit including, but not limited to, grates, and trenches used to convey process wastewater streams to a downstream unit in the process wastewater collection and treatment system. (A-92-40, IV-D1-104)	Definition not needed.	This definition was not included in the final rule because it is too burdensome and did not adequately reflect the streams included in the rule. Systems used to convey wastewater streams from pulping and bleaching systems will be referred to as hardpiping.
Soda pulping	A chemical pulping process that uses sodium hydroxide as the active chemical in the cooking liquor. [from December 17, 1993 proposal]	None	The proposal definition was used in the rule.	The proposal term appropriately defines the soda pulping process.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Spent liquor	Cooking liquor from a digestion or pulp-washer process, containing dissolved organic wood materials and residual cooking compounds. [from December 17, 1993 proposal]	Process liquid generated from the separation of black liquor from pulp by the pulp washing process, containing dissolved organic wood materials and residual cooking compounds. (A-92-40, IV-Dl-104)	Process liquid generated from the separation of cooking liquor from pulp by the pulp washing system containing dissolved organic wood materials and residual cooking compounds.	The industry definition appears technically correct. The final definition was a modified version of industry's definition with "pulp washing system" replacing "pulp washing process."
Steam stripper system	A column, and associated condensers or heat exchangers, used to strip compounds from wastewater, using air or steam. [from December 17, 1993 proposal]	A column, and associated stripper feed tank, condensers or heat exchangers, used to remove compounds from foul condensate, using air or steam. (A-92-40, IV-Dl-104)	A column (including associated stripper feed tank, condensers, or heat exchangers), used to remove compounds from wastewater or condensates using steam. The steam stripper system also contains all equipment associated with a methanol rectification process including rectifiers, condensers, decanters, and storage tanks, and any other equipment serving the same function as those previously listed.	The EPA believes that industry comments improve the definition and have been incorporated into the definition. Additionally, the definition was revised to address methanol rectification.
Sulfite pulping	A chemical pulping process that uses a mixture of sulfurous acid and bisulfite ion as the cooking liquor. [from December 17, 1993 proposal]	None	The proposal definition was used in the rule.	The proposed term appropriately defines the sulfite pulping process.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Surface impoundment	A unit which is a natural topographic depression, manmade excavation, or diked area formed primarily of earthen materials (although it may be lined with manmade materials), which is used for the purpose of treating, storing, or disposing of wastewater and is not an injection well. Examples of surface impoundments are equalization, settling, and aeration pits, ponds, and lagoons. [from December 17, 1993 proposal]	Delete the definition. (A-92-40, IV-Dl-104)	Definition not needed.	This term is not used in the rule.
Temperature monitoring device	A piece of equipment used to monitor temperature and having an accuracy of +1 percent of the temperature being monitored expressed in degrees Celsius or +0.5 degrees Celsius (°C), whichever is greater. [from December 17, 1993 proposal]	A piece of equipment used to monitor temperature and having an accuracy of +1.0 percent of the temperature being monitored expressed in degrees Celsius or +0.5 degrees Celsius (°C), whichever is greater. (A-92-40, IV-Dl-104)	A piece of equipment used to monitor temperature and having an accuracy of +1.0 percent of the temperature being monitored expressed in degrees Celsius or +0.5 degrees Celsius (°C), whichever is greater. (A-92-40, IV-Dl-104)	The EPA agrees with the industry definition.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Thermal oxidizer	None	Thermal oxidizer means an enclosed combustion device that is designed for thermally oxidizing gaseous organic compounds. (A-92-40, IV-Dl-104)	Thermal oxidizer means an enclosed combustion device that destroys organic compounds by thermal oxidation.	Industry indicated that the term thermal oxidizer includes incinerators. The EPA agrees with the commenter. Therefore the rule definition for "thermal oxidizer" includes incinerators. Also, the auxiliary fuel and energy recovery language in the incinerator definition was removed since it is not needed.
Turpentine recovery system	None	The decanters and storage tanks used for recovering turpentine from the digester system. (A-92-40, IV-Dl-104)	All equipment associated with recovering turpentine from digester system gases including condensers, decanters, and storage tanks, and any other equipment serving the same function as those previously listed. The turpentine recovery system includes any liquid streams associated with the turpentine recovery process such as turpentine decanter underflow. Liquid streams that are intended for byproduct recovery are not considered turpentine recovery system condensate streams.	The industry definition is specific to decanters and storage tanks. The EPA modified the definition to add more clarity, specifically including equipment used in turpentine recovery systems.

Term	Proposal/ supplemental notice definition	Industry recommendation	Final definition	Rationale for final definition
Weak black Liquor storage tanks	None	All storage tanks containing black liquor recovered from the brownstock washer system and prior to the multiple effect evaporator system. (Brownstock or decker filtrate tanks are not weak black liquor storage tanks.) (A-92-40, IV-Dl-104)	Definition not needed.	The EPA agrees with the industry definition. For the rule, the definition was slightly modified so that it is not specific to kraft mills only. Furthermore, weak black liquor storage tanks were included in the definition for weak liquor storage tanks.
Weak liquor storage tanks	None	None	Any storage tanks except washer filtrate tanks containing spent recovered from the pulping process and prior to the evaporator system.	This definition replaces weak black liquor storage tanks. The definition was expanded such that it was not specific to kraft mills.
Working day	None	Any day on which the federal government offices are open for normal business. Saturdays, Sundays, and official federal holidays are not working days. (A-92-40, IV-Dl-104)	Definition not needed.	Industry indicated that this definition was left out of the general provisions, however, the rule is not the mechanism for changing general provisions definitions. Any revisions to the general provisions should be accomplished in the ongoing litigation. This definition is not needed in the rule.

15.0 INTEGRATED RULE INTERACTION

15.1 GENERAL

<u>Comment</u>: Several commenters (20,019, 20,027, 20,039, 20,051, 20,057A2, 20,088, 20,089, 20,091, 20,115, 20,153) supported the concept of an integrated rule. However, several commenters (20,027, 20,039, 20,057A2, 20,059, 20,088, 20,115) criticized combining air and water regulations into one rule because they believed it failed to fully consider the cross-media impacts of each of the regulations.

One commenter (20,091) stated that they were impressed with the coordinated effort by EPA to develop air and effluent guidelines but thought that pollution prevention should be carried further. One commenter (20,088) supported EPA's effort to combine air and water regulations, but stated that EPA should use a life cycle analysis, or holistic approach to evaluate the effectiveness of the combined rule. Several commenters (20,049A3, 20,059, 20,082, 20,129, 20,132, 20,133) indicated that EPA has authority under the Act to establish emission limits for non-HAP's. One commenter (20,049A3) contended that EPA has the authority to set limits for other pollutants under the Act and should propose enforceable emissions limits for all air pollutants of concern including criteria and non-conventional pollutants. One commenter (20,059) cited section 111(d)(l) of the Act as authorization for EPA to establish "existing source" performance standards to control non-criteria pollutants, such as TRS, and to require State Implementation Plans (SIP) to incorporate these standards.

One commenter (20,122) argued that a truly cross-media rulemaking would consider the impacts on workers, products, chemical accident potential, and hazardous waste generation.

Response: The EPA disagrees with the commenters' suggestion that the cross-media impacts associated with the combined rule have not been addressed. All of the information submitted to the Agency following the December 17, 1993 proposed rule and the March 8, 1996 supplemental notice has been considered in developing the final rule. For example, the effluent limitation guidelines and standards, established by EPA's Office of Water, have the potential to increase the solids loading sent to the recovery process. This scenario was considered by OW in developing their cost and benefit analysis.

In another case, the MACT standards and the effluent limitation guidelines and standards require 100 percent ClO_2 substitution. This process modification would reduce the chlorine and chlorinated HAP's being sent to the bleach plant scrubber. Comments received following proposal indicated that the percent removal requirements for bleach plant scrubbers would be difficult to achieve if the mass of chlorine and chlorinated HAP's sent to the scrubber were reduced. In response to these comments, EPA included chlorine outlet concentration and outlet mass emission limit compliance options.

Regarding pollution prevention efforts, the final rule will contain provisions for complying with the kraft pulping standards using a strategy that focuses on removing HAP's from in-process recycled or reused condensate streams before they are allowed to be volatilized into the atmosphere. Since the final rule does not identify the specific control technology to be used, this compliance alternative (the CCA), provides industry with the opportunity to implement pollution prevention projects that can achieve the HAP reductions equivalent to the MACT standards. Additionally, the effluent guidelines contain voluntary performance-based incentive programs designed to compliment the baseline BAT to encourage individual mills to evaluate and install technologies that could achieve further pollutant reductions.

Regarding the comprehensiveness of the regulations, NESHAP standards are limited to addressing the compounds contained in the HAP list in section 112(b) of the Act and emitted from the all significant sources at pulp and paper mills. Although there are some areas of the mill that are not specifically covered by the pulp and paper rule, EPA maintains that the rule addresses the pollutants, and pollutant sources deemed most critical at pulp and paper mills. The effects on workers and product markets caused by the MACT standards are evaluated in the EA (A-92-40, V-A-2). Chemical accident potentials are addressed under section 112(r) of the Act for applicable facilities. Residual risks of this rule will be addressed under section 112(f) of the Act. Hazardous waste generation is addressed and regulated under RCRA. The EPA maintains that all cross-media impacts will be considered, if not specifically under this rule, under other rules that are already in effect.

<u>Comment:</u> One commenter (20,122) indicated that TCF and secondarily chlorine free (SCF recycled paper products that have not been secondarily bleached with chlorine and chlorine compounds) technologies should be evaluated from both air and

water perspectives. The commenter (20,122) stated that it was inappropriate for EPA not to consider the applicability of TCF/SCF technologies under the Act simply because they were eliminated from consideration under the CWA. The commenter (20,122) further asserted that EPA must develop a way to phase in TCF/SCF technologies within the rule and other authorities. Another commenter (20,102) encouraged incentives for producing paper using TCF and other environmentally friendly technologies.

Response: The EPA has included incentives for facilities to use TCF processes in the final rule. For this NESHAP, all kraft mills have been given a total of 8 years to comply with the standard. This additional 5 years was given to allow facilities to install process equipment, such as oxygen delignification and TCF bleaching. The OW has also included several incentive packages in the effluent guidelines. These incentives would provide mills with additional compliance time, up to 16 years beyond the date of promulgation, to meet limitations more stringent than BAT. Qualifying technologies more stringent than BAT include oxygen delignification and TCF bleaching. Additionally, EPA considers that the TCF technologies would constitute compliance with the bleaching component of the MACT requirements. Therefore, in the air portion of the combined rule, EPA has indicated that application of TCF technologies for bleaching would comply with the bleaching standards.

Comment: One commenter (20,145) opposed the expansion of the combined rule to a multimedia permit concept. The commenter (20,145) indicated that a single multimedia permit at a facility would prevent new projects and delay major expansions. The commenter (20,145) opposed multimedia permits because they would limit the flexibility of industry to choose options for reducing pollutants and because changes that affect one permitted media would open the permit for review on all permitted media.

Response: Compliance with the combined rule will not require a multimedia permit. The air and water regulations were developed jointly because of the multimedia nature of pollution control in this industry. The air and water regulations are being promulgated simultaneously to facilitate coordinated compliance planning. However, the regulations are being promulgated individually under the respective authorities of the Act and the CWA. Accordingly, each regulation will be implemented under the authority of its respective Act. Permitting requirements, therefore, will be unchanged. This NESHAP will be implemented according the requirements of the part 63 general provisions and each mill's title V operating permit. New source review permits will be required for any new or modified sources. Water regulations will not be addressed in air permits, nor will air regulations be addressed in the permits required under the CWA.

15.2 EFFLUENT GUIDELINES

Comment: Two commenters (20,018, 20,027) questioned whether EPA had effectively evaluated the integration of air and water standards for the bleaching component. One commenter (20,057A2) stated that EPA has not evaluated the impact of the proposed air standards on the effluent guidelines.

One commenter (20,018) indicated that there appeared to be inconsistencies between the proposed MACT standards for the bleaching component and the technology requirements applied to pulp bleaching in the effluent guidelines due to lack of coordination between air and wastewater groups. The commenter (20,018) stated that the proposed effluent guidelines require complete substitution of chlorine with ClO_2 for kraft bleaching. The commenter (20,018) contended that MACT for the bleaching component should be complete ClO_2 substitution since emissions of chlorine and chloroform from a ClO_2 bleaching stage are significantly lower than a chlorine bleaching stage.

One commenter (20,027) stressed that the impact of the effluent guidelines proposed process changes on elemental chlorine emissions should have been considered when determining the air control options for the bleach plant. The commenter (20,027) stated that substitution of ClO_2 for elemental chlorine plus oxygen delignification would greatly reduce the concentration of elemental chlorine at the inlet to bleach plant scrubbers. The commenter (20,027) pointed out that this would make it difficult to demonstrate the high removal efficiency required by MACT and significantly increase the probability of a calculated exceedance when, in reality, the actual emissions of chlorine were very small.

Response: The EPA has conducted several impact analyses on the integration of the air and water standards and maintains that a sufficient evaluation of the integration of these two standards has been completed. The EPA has analyzed air emissions after implementation of the effluent limitation guidelines and standards options (referred to as OW Options A and B), and TCF. Results of these analyses are presented in chapter 20 of this document.

The December 17, 1993 proposed rule specified that HAP emissions from chlorine or chlorinated compound application stages must be reduced by 99 percent. The EPA agrees with the commenters that ClO_2 substitution, required by OW and the MACT floor, will decrease the amount of chlorine in bleach plant scrubber inlets and that a 99 percent reduction of chlorinated HAP's from a ClO_2 application stage may not be feasible. As discussed in the March 8, 1996 supplemental notice, EPA incorporated a scrubber outlet chlorine concentration and considered a mass emission limit as options for the bleaching system requirement. The outlet concentration, mass emission limit, and the percent mass reduction options are considered by EPA to be equivalent (A-92-40, II-I-24, IV-B-29).

Comment: One commenter (20,027) stated that the waste heat that will accompany steam stripping will have adverse water pollution consequences. The commenter (20,027) noted that many mills (particularly in southern States) have heat-limited effluent treatment systems. The commenter (20,027) declared that requiring increased steam stripping at such mills would probably lead either to noncompliance with NPDES limits or to the need to construct cooling towers.

Response: The EPA reviewed the data submitted by industry (A-92-40, IV-Dl-46) detailing the number of cooling towers existing in the pulp and paper industry. (The data indicated that I3 cooling towers were being used.) No additional data were submitted to EPA regarding potential conflicts with steam stripping and the NPDES permit program or the prevalence of cooling towers used in conjunction with steam stripping systems. While some mills may need cooling towers to handle the waste heat load from the pulping and bleaching processes, EPA's judgment is that it is not appropriate to assign the costs for installing and operating cooling towers to all mills for estimating national impacts.

15.3 COMBUSTION MACT

Comment: Several commenters (20,027, 20,018, 20,043, 20,054A2, 20,056, 20,057A2, 20,146) argued that all processes in the mill are interrelated and that EPA failed to consider this when it failed to propose combustion MACT standards with the MACT standards for other sources. Two commenters (20,027, 20,057A2) claimed that EPA proposed an integrated rule that requires changes in the technology and engineering of process-source emissions without considering the impact of those changes on the design, capacity, and engineering of the liquor recovery process. Several commenters (20,011, 20,014, 20,027, 20,043, 20,046) stated that the lack of integration between the process sources and combustion source rulemakings has several technical, engineering, emissions, and economic implications that were not considered by EPA. One commenter (20,014) stated that it is difficult to evaluate the combined regulations because the air emission regulations for other sources at the mill (i.e., recovery furnaces, lime kilns, smelt dissolving tank vents, oxidizers, and power boilers) are not known. Another commenter (20,046, 20,046A2) contended that the costs associated with the combustion sources must be considered as part of the ultimate cost/benefit analysis of the combined rule.

Several commenters (20,027, 20,043, 20,056, 20,114) urged EPA to integrate the combustion and process MACT standards and re-propose the NESHAP. One commenter (20,059) indicated that the deferral of proposals for combustion and certain non-combustion sources frustrates the objective of a coordinated pollution prevention approach. Several commenters (20,011, 20,027, 20,043, 20,059, 20,066A3) indicated that EPA must consider the impacts the proposed non-combustion standards and combustion standards would have on each other because the two types of sources are so interrelated. Three commenters (20,027, 20,043, 20,066A3) cited examples of pulping emission units at sulfite mills that are currently controlled by combustion source control equipment and combustion emission sources (white liquor production) that are affected by water reuse patterns. One commenter (20,057) indicated that the combustion and non-combustion standards must be consistent with each other.

Three commenters (20,046A2, 20,056, 20,074) indicated that the costs of the pending combustion source MACT regulations are likely to be very high, and in order to assess the total costs of the regulations on mills, EPA should wait until the combustion source requirements are clearly understood and then integrate them into the cost-effectiveness assessments.

Response: In the preamble to the December 17, 1993 proposal, EPA indicated that the combustion source MACT standards were expected to be proposed in 1994 and be promulgated together with the standards for the non-combustion source emission points and effluent guidelines. After further evaluation and analyses, EPA proposed the combustion source standards as the non-combustion MACT standards and the effluent guidelines were promulgated.

The EPA contends that the Agency has considered the interrelated nature of pulp and paper mills and impacts of the combined rule (i.e., combustion sources, non-combustion sources, and effluent guidelines). The non-combustion source standards address HAP emissions associated with pulping and bleaching processes. The only potential conflict between the combustion and non-combustion source standards is the use of recovery furnaces as emissions control devices. While combustion sources (e.g., chemical recovery operations) are not covered in the scope of the non-combustion source standards, the recovery furnace has been identified as a control device for pulping emissions used at a limited number of existing facilities. Comments received following proposal have stressed that industry groups strongly recommend that recovery furnaces not be used for controlling pulping emissions due to serious explosion risks. Although EPA agrees with the industry's concerns regarding explosion hazards, the final rule contains a control option for routing pulping emissions to a recovery furnace, power boiler, or lime kiln to provide individual mills flexibility in complying with the non-combustion source standards.

The effluent limitation guidelines and standards contain requirements that have the potential to affect combustion sources. Most notably, the effluent limitation guidelines and standards for handling black liquor spills which will likely result in increased solids loading to chemical recovery processes. The EPA's OW has taken these interactions into account in their costs and impacts analyses.

With regard to sulfite mills, EPA has established a separate subcategory for these pulping processes and re-evaluated the floor level of control. This analysis was discussed in the March 8, 1996 supplemental notice. Consequently, EPA determined that sulfite pulping emissions are typically controlled using the acid making/chemical recovery systems at these mills. The acid making/chemical recovery systems at sulfite mills should not be affected by the combustion source standards.

<u>Comment</u>: One commenter (20,053Al) suggested that emission standards for black liquor oxidation (BLO_x) systems should be included in the proposed pulping emission standards. The

commenter (20,053Al) asserted that control of HAP emissions from BLO_x systems would be substantially more cost effective, and would result in significantly greater environmental benefits than treatment of insignificant HAP sources such as brownstock washer vents and oxygen delignification vents.

Response: The EPA disagrees with the commenter regarding the insignificance of brownstock washer vents and oxygen delignification vents. As presented in the revised emission factor document (A-92-40, IV-A-8), HAP emissions from these sources are not insignificant. With regard to the appropriate placement in the rule for BLO_x systems, EPA contends that these systems should be considered part of the chemical recovery process (i.e., combustion sources). The purpose of BLO_x systems is to convert sodium sulfide into thiosulfate. This conversion is done to prevent the stripping of hydrogen sulfide gas in the chemical recovery process and is therefore best considered under the combustion source MACT standards.

16.0 INTERACTION WITH OTHER RULES

16.1 NEW SOURCE REVIEW/PREVENTION OF SIGNIFICANT DETERIORATION

Comment: Industry and some States have commented extensively on the potential problems that could result from the interaction between the December 17, 1993 proposed rule and the NSR program. The NSR program includes the PSD and nonattainment NSR preconstruction permit programs.

Regarding the December 17, 1993 proposed rule, many commenters (20,027, 20,057, 20,057A2, 20,071, 20,103, 20,111, 20,118) stated that: (1) the control equipment and process changes required to comply with the rule will increase emissions of SO_2 and NO_x; (2) these compounds are generated from the combustion of vent gases required by the rule; and (3) the increases in SO2 emissions could be of such magnitude to trigger the need for preconstruction permits under the PSD/NSR program.

Several commenters (20,027, 20,043, 20,053A1, 20,054A2, 20,057, 20,057A2, 20,146) maintained that there are issues and impacts of PSD/NSR review that were overlooked by EPA. Commenters indicated that NSR review would: (1) cost the pulp and paper industry significantly more for permitting and implementation of NSR and PSD requirements 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.

One commenter (20,071) indicated that, for some sources, it would be difficult or impossible to obtain permits due to emission caps and difficulties obtaining offsets. The commenter (20,071) indicated that sources would be required by one set of regulations to install emission controls and constrained from beginning construction on them by another set of regulations. One commenter (20,027) noted that the PSD/NSR review could preclude existing combustion devices from controlling vent gases (i.e., stand-alone thermal oxidizers would have to be used). One commenter (20,043) also noted that a steam-limited facility near a Federal Class I PSD area (61 FR 38250, July 23, 1996) area may not be able to perform the required steam stripping because an increase in criteria air pollutant emissions, resulting from increased steam production, may be prohibited, or limited, by the PSD air quality restraints.

Many commenters (20,010, 20,011, 20,027, 20,011, 20,057A2, 20,010, 20,111, 20,118) made recommendations on how EPA should handle the issue of PSD/NSR in the final rule. Several commenters (20,010, 20,011, 20,057A2, 20,111, 20,118) stated their views on whether or not the pollution controls required by MACT should be excluded from PSD/NSR review. Three commenters (20,027, 20,011, 20,057A2) proposed that controls installed to comply with MACT standards be granted an explicit "pollution control" exclusion from PSD review and NSR. One commenter (20,057A2) recommended that EPA include language in the PSD and NSPS regulations to exempt sources that install controls as a result of MACT standards, rather than in each MACT standard.

One commenter (20,010) indicated that the PSD regulations should not be bypassed for situations where the installation of new incineration equipment results in increases in criteria pollutants. One commenter (20,111) indicated that the installation of MACT controls should trigger PSD or NSR requirements if there is an associated increase in pulp production or in the permitted emission levels of the existing boiler.

Response: An industry-wide NSR exemption for pulp and paper mills is not necessary because EPA already has an existing policy for excluding from NSR pollution control projects (PCP) at existing sources (July 1, 1994 memorandum from John Seitz, "Pollution Control Projects and NSR" and proposed revisions to 40 CFR parts 51 and 52 at 61 FR 38250). The PCP exclusion is granted on a case-by-case basis by the permitting authority. Under this policy, projects that are eligible include physical or operational changes whose primary function is the reduction of air pollutants subject to regulation under the Act (e.g., MACT standards). To obtain the exclusion, a mill must submit a request for exclusion to the permitting authority through either a minor NSR permitting process, a State non-applicability process, or other similar process. Modifications to existing combustion devices (e.g., boilers) or the addition of a stand-alone thermal oxidizer to comply with a MACT standard are the types of technologies that would qualify for a PCP exclusion.

To grant a PCP exclusion, the permitting authority must determine that the project is "environmentally beneficial" and would cause no adverse air quality impacts. An adverse air quality impact is defined as causing or contributing to the violation of a national ambient air quality standard (NAAQS), a

PSD increment, or an air quality related value (AQRV) in a Federal Class I PSD area (e.g., national parks). The AQRV's are specified by the responsible Federal Land Manager (FLM).

In the March 8, 1996 supplemental notice, EPA presented a strategy for streamlining the process of granting a PCP exemption. Based on an evaluation of pollutant reductions and environmental and energy impacts, the notice proposed a policy statement that projects implemented to comply with the MACT portion of the December 17, 1993 proposed rule were to be considered "environmentally beneficial" under the Agency's PCP policy. This determination would mitigate one of the two case-by-case determinations required by the permitting authorities. A case-by-case determination that PCP would pose no adverse air quality impacts would still be required in order for the exemption to be granted.

The March 8, 1996 supplemental notice requested comment on the determination that these MACT control projects are environmentally beneficial and eligible for the PCP exemption. The EPA also solicited comments on providing a specific exclusion in the NSR rule for these types of controls installed to comply with MACT.

Issues related to the time required to obtain a PSD/NSR review and the impact on the compliance schedule are addressed in the response to the following comment summary.

<u>Comment:</u> With regard to the March 8, 1996 supplemental notice, several commenters (IV-D2-2, IV-D2-3, IV-D2-7, IV-D2-10, IV-D2-11) stated that the guidance by EPA regarding the existing PCP exclusion was inadequate, and recommended including specific language in the pulp and paper MACT rule exempting MACT compliance projects from PSD/NSR review. One commenter

(IV-D2-15) supported EPA's determination that MACT compliance projects will be environmentally beneficial and should qualify for exemption under EPA's PCP exclusion guidance. However, the commenter (IV-D2-15) contended that EPA should recognize that when mills install the controls required for MACT, they will likely upgrade other parts of the operation at the same time, including increases in capacity. The commenter (IV-D2-15) requested that the exclusion be broad enough to include all the actions taken concurrently with the MACT installation. The commenter (IV-D2-15) requested a firm commitment from EPA that MACT compliance projects will be expressly excluded from coverage in the new NSR reform regulations. Two commenters (IV-D2-11, IV-D2-15) urged that EPA include language in the pulp and paper MACT rule that will expressly exclude any project installed for the purpose of complying with MACT from NSR or PSD review without any need for a site-by-site air quality benefit analysis.

Another commenter (25,538) objected that both the PCP exemption and proposed NSR reform rule provide inadequate relief. Both policies still give the FLM an opportunity to conduct an AQRV review. The commenter (25,538) also objected that these policies apply only to "modified" sources and not to new emission units (e.g., new boilers) that may be constructed to comply with the rule. The commenter (25,538) indicated that, because the granting of NSR relief is voluntary by the State, it is doubtful that the States will confer the NSR relief that EPA has proposed. As a result, the commenter (25,538) asserts that additional controls on these collateral emissions will be required, and EPA has not taken into account the cost of these additional controls. Two commenters (20,057A2, 20,118) on the December 17, 1993 proposed rule had noted that EPA failed to consider the additional burden that PSD/NSR review would have on State permitting agencies.

One commenter (IV-D2-4) strongly opposed the specific exclusion of these types of projects in the NSR rules. The commenter (IV-D2-4) noted that these projects are not necessarily environmentally beneficial and should not be eligible for automatic exemption from major source NSR. The commenter (IV-D2-4) also expressed concern that EPA's statement that MACT compliance projects are "environmentally beneficial" and would limit the States' authority to apply the environmental safeguards available in the July 1, 1994 policy. These safeguards are required to ensure that progress made by permitting authorities to reduce air pollution is not compromised. One commenter (20,103) questioned what the appropriate response would be where an increase in SO_2 results in potential violation of SO_2 NAAQS.

Response: The PCP exemption offered by the current policy (July 1, 1994 memorandum from John Seitz, "Pollution Control Projects and NSR" and proposed revisions to 40 CFR parts 51 and 52 at 61 FR 38250) and in the proposed NSR reform (61 FR 38250) provides adequate relief from any cost or schedule impacts of NSR that are unreasonable. In the December 17, 1993 proposed rule, EPA has concluded that projects implemented to comply with the rule are "environmentally beneficial," under the context of the NSR program, based on the overall environmental impacts associated with this rule. This conclusion, along with the proposed NSR reform rule, should reduce some of the uncertainty with the policy and help provide uniformity in its application. The Agency does not believe, however, that an automatic exemption from NSR is appropriate or necessary. Case-by-case review and approval by the permitting authority is a necessary and appropriate step to ensure that the environmental safeguards are met and that the approval is subject to public notice. The environmental safeguards are protection of the NAAQS, PSD increments, and AQRV's in Federal Class I areas; and the securing of offsetting emission reductions if the project results in a significant increase of a nonattainment pollutant. Designation of MACT projects as "environmentally beneficial" does not limit the States' authority to apply these environmental safeguards, as provided in the July 1994 policy.

The case-by-case nature of the PCP exemption should not impede the granting of exemptions. The objections to the proposed exclusion that were raised by the State and local air pollution control agencies pertained primarily to EPA's request for comment on the proposed option of granting in the rule an automatic exemption from major NSR. An exemption in the rule could allow significant emission increases even in cases with local air quality problems. Their position was that the environmental safeguards in the current policy should be retained. The EPA agrees that an automatic exemption from major NSR is not appropriate. In addition, the procedure of a PCP application and review by the permitting authority is necessary to ensure that the PCP exemption is not applied to projects performed concurrently with NESHAP compliance that would result in an increase in process utilization or emissions. The types of projects suggested by one commenter as being candidates for PCP exemption include such activities as concurrent process upgrades to increase production capacity. The EPA believes that these are the types of projects that the Act presumes should be subject to NSR preconstruction review. Review by the permitting authority through the minor NSR process, therefore, is a necessary safeguard to monitor appropriate application of the policy.

Obtaining a minor NSR permit should not impose any significant delays that would adversely affect the ability of pulp and paper mills to comply with the NESHAP on time. Possible triggers for NSR/PSD review would be SO_2 and NO_X emission increases associated with the control of pulping systems. First, most of the mills that will experience significant SO_2 and NO_X emission increases will be kraft mills, and the final rule allows 8 years for compliance with the kraft pulping HVLC system requirements. In addition, a mill can request a compliance date extension of up to 1 year if needed for the installation of controls. Delays in the ability to install controls that are caused by the permitting process could qualify for this additional extension.

In addition, the proposed NSR reforms contain measures to reduce the delays that sometimes are associated with permitting near Federal Class I PSD areas. The proposed NSR reforms better define the role of the FLM and the procedures to follow for an AQRV analysis. The proposed NSR reforms require that the FLM provide to the applicant, in advance, a current list of relevant AQRV, sensitive receptors, critical pollutant loadings for each AQRV, and the methods available to analyze potential impacts. The rule also will define the role of the FLM and set a timetable for FLM involvement in the permitting process. These reforms should streamline the process by reducing much of the uncertainty inherent in the current process.

The claim that the PCP exemption is a "voluntary" action by the permitting authority is somewhat misleading. The current policy and the proposed NSR rules contain specific criteria for issuing an exemption. Emissions cannot cause or contribute to a violation of a NAAQS, and PSD increment, or an AQRV. These criteria involve local air quality impacts that must be considered on a case-by-case basis. Also, review by the local authority is needed to ensure that the proposed project is a MACT compliance activity. Projects that meet these criteria qualify for an exemption from major NSR, and there is no reason to believe that the permitting authority will not issue the exemption if all the legal criteria are met.

In conclusion, EPA maintains that for the majority of pulp and paper mills, compliance with the NESHAP will not trigger major NSR because most mills will qualify for, and obtain, a PCP exemption from NSR. Since NSR is not expected to occur in a widespread or frequent manner, it is not appropriate to account for additional costs of NSR in the national impacts of the rule. Likewise, a significant burden increase on State permitting agencies is not expected. The 8-year compliance period for designated HVLC system operations at kraft mills with potential NSR problems allows the time to explore alternative pollution prevention programs that have less secondary impacts, like those anticipated with the clean condensate alternative.

Comment: One commenter (20,057A2) suggested that EPA evaluate the impact of the proposed rule on the northeast Transport Region ozone non-attainment areas (NAA). The commenter (20,057A2) requested that EPA provide guidance on meeting the NO_X reasonably achievable control technology (RACT) standards and for new source compliance with LAER.

Response: The EPA has concluded that this rule should not have an adverse impact on ozone attainment in the northeast Ozone Transport Region (OTR) because the decreases in VOC emissions are very large compared to the potential increases in NO_X emissions (about 75 to 1). The rule will decrease VOC emissions by 409,000 Mg/yr and may increase NO_X emissions by 5,230 Mg/yr, nationally. The EPA recognizes that some of those increases will occur in the northeast OTR. These increases in NO_X are very small in comparison with current national and regional NO_X emissions and with current NO_X emissions from pulp and paper plants subject to the final rule. Increases in NO_X emissions from compliance with the MACT standard are estimated at about 5,230 Mg/yr (5,753 tons/yr). National NO_X emissions in 1994 were approximately 21.4 million Mg/yr (23.6 million tons/yr).

Increases in NO_X emissions resulting from compliance with the NESHAP are primarily due to increased steam demand for steam stripping the pulping process condensate streams. Combustion of pulping vent streams accounts for a minority of the estimated increases in NO_X emissions.

Facilities installing boilers or increasing boiler capacity to meet the increased steam demand may have to meet NO_X, RACT standards or LAER. For these facilities, EPA has provided guidance on meeting NO_X standards in a documented entitled *Alternative Control Techniques Document -- NO_X Emissions from Industrial/Commercial/Institutional (ICI) Boilers, EPA-453/R-94-022, published in March 1994.* This document outlines several options for reducing NO_X from industrial boilers.

For combustion devices used to combust pulping vent streams, EPA does not believe that guidance on NO_X RACT and LAER is necessary. The EPA has concluded that approximately 70 percent of all facilities will comply with the pulping standard by routing vents to existing combustion devices and 30 percent will construct incinerators to control the vents (A-92-40, IV-E-93). Analysis of existing combustion sources shows that a 5 percent increase in fuel use is required to incorporate the vent streams and keep the combustion device at a consistent level of operation (A-92-40, II-B-31). Such a small increase in fuel requirements should result in minimal NO_x increases at these mills. The facilities using existing combustion devices should not trigger any additional NO_x RACT requirements beyond those already in place for these devices.

For the 30 percent of facilities EPA estimates will install new incinerators, NO_x increases are not expected to trigger LAER, because the anticipated emissions increases are below the emission thresholds for nonattainment NSR. For incinerators, the rule requires 98 percent HAP reduction. The rule requires 98 percent reduction of HAP's or an operating temperature of 1600 ^oF at a residence time of 0.75 seconds. Sources are not expected to operate incinerators at temperatures significantly higher than 1600 ^oF due to added fuel costs. Analysis of NO_x formation mechanisms show that below 1800 ^oF, negligible levels of NO_x are generated. Therefore, the standard tends to minimize the additional formation of NO_x. In the event that a facility that does become subject to NO_x RACT, available technologies include low-NO_x burners, selective catalytic reduction (SCR), or selective non-catalytic reduction (SNCR) technologies.

<u>Comment:</u> One commenter (20,027) maintained that the exclusion from NSR and PSD review for the installation of pollution control projects (including process modifications such as ClO_2 substitution) is legally required based on the definition of "modification" in NSPS regulations.

Response: The comment is incorrect. A pollution control project modification is not legally required to be exempted from NSR and PSD review based on the NSPS definition of "modification" in 40 CFR part 60. For purposes of NSPS, the addition or use of any system or device whose primary function is the reduction of air pollutants is not considered to be a "modification." This definition, however, has no application to the NSR/PSD rules. A separate and distinct definition of "modification" is specified for NSR/PSD implementation in 40 CFR parts 51 and 52.

16.2 RESOURCE CONSERVATION AND RECOVERY ACT/BOILERS AND INDUSTRIAL FURNACES

Comment: Regarding the December 17, 1993 proposal, two commenters (20,011, 20,027) agreed with the proposed requirement of combusting steam stripper overheads in the process wastewater area. According to three commenters (20,027, 20,057, 20,057A2) the overhead stream should be condensed to enhance the fuel value by concentrating the methanol. Three commenters (20,027, 20,057, 20,146) pointed out that increasing the concentration of methanol would increase the cost-effectiveness of this control option; however, burning a waste-derived fuel would likely trigger the Resource Conservation and Recovery Act/Boilers and Industrial Furnaces (RCRA/BIF) rules. Several commenters (20,011, 20,027, 20,054A2, 20,057, 20,057A2, 20,071) indicated that EPA failed to address the potential RCRA/BIF implications of the combined rule. Three of these commenters (20,027, 20,057A2, 20,071) urged EPA to exempt the burning of methanol condensates (from steam-stripping devices installed to meet the HAP reduction requirements) from the RCRA/BIF rules under a "clean fuels exemption," as long as they are combusted on site and only exhibit the characteristic of ignitability.

One commenter (20,078) indicated that the need for both a title V air permit and a RCRA permit (when methanol is concentrated and burned) was redundant and suggested issuing only air permits. The commenter (20,078) stated that a similar process is currently in place for water quality/RCRA issues using a NPDES permit.

In the March 8, 1996 supplemental notice, EPA proposed to exclude from RCRA/BIF requirements the combustion of steam stripper system condensates. Three commenters (IV-D2-7, IV-D2-15, IV-D2-19) supported EPA's decision that stripper vent gases that were condensed and combusted on site to meet MACT requirements should not be subject to the RCRA/BIF requirements. One commenter (IV-D2-15) expressed concern that EPA limited the scope of its decision to only those stripper overheads that have been concentrated before being combusted. The commenter (IV-D2-15) stated that some mills may be able to meet the MACT requirements without rectifying their vent gases, but because those gas streams may condense naturally, they would fall under RCRA/BIF. The commenter (IV-D2-15) stated that although these mills may not be utilizing their methanol streams to their greatest energy potential, the environmental risk posed by burning the unconcentrated materials would be no greater than that for the rectified materials. The commenter (IV-D2-15) recommended that EPA modify its proposal in the final rule to allow mills that simply condense stripper vent gases and burn these condensates to be excluded from regulations under RCRA/BIF.

One commenter (IV-D2-3) recommended that the methanol rectification system (steam stripper, rectifier, separate tanks, and delivery system) be exempted as a whole from RCRA/BIF. Such an explicit exclusion will ensure that a facility may efficiently re-use methanol fuel without component pieces of the handling system being re-regulated by BIF.

One commenter (IV-D2-14) noted that the proposed standards for pulp mills may trigger RCRA/BIF regulations, and specifically stressed concern over RCRA/BIF applicability at the point of generation of the pulping process condensate waste stream. To resolve the conflict, the commenter (IV-D2-14) suggested that the collection and subsequent stripping or alternative treatment of pulping process condensate should be exempt from RCRA/BIF and should only be regulated by MACT standards. The commenter (IV-D2-14) also requested that EPA include red and foul oil in the MACT exemption from RCRA/BIF for stripper overhead products. The commenter (IV-D2-14) also requested that EPA explicitly define turpentine, red oil, or foul oil burning at kraft mills as activities currently regulated by the Act and exempted from RCRA.

Response: As explained in the March 8, 1996 supplemental notice, EPA has concluded that regulation of the combustion of condensates, whether rectified or dilute, is not needed under RCRA/BIF because the MACT controls will be adequately protective (and certainly sufficiently protective to eliminate the need for RCRA controls until the residual risk determination under section 112(f) of the Act is conducted). The condensate does not contain chlorinated HAP's, and any organic HAP's in the condensate would be controlled to the level specified by the MACT standards. In addition, EPA maintains that the burning of this condensate does not produce any additional HAP's due to the high temperature and residence times found in the combustion devices that would be used to comply with the kraft pulping standards. Therefore, burning condensate will not increase the potential environmental risk over the burning of the steam stripper vent gases prior to condensation. Additionally, the use of the condensate as a fuel could reduce or eliminate the need for supplemental firing of fossil fuels in such combustion devices. The potential cost savings produced by allowing the burning of condensed steam stripper vent gases would be significant. Industry estimates that annual cost savings would be approximately $850,000 per mill, or $100 million for the entire kraft industry. Cost savings would come primarily through the reduction in fossil fuel purchases.

In summary, regulation under RCRA is not necessary since the practice in question would not increase environmental risk, reduces secondary impacts, and provides a cost savings. Further considerations of risk should appropriately be handled as part of the section 112(f) residual risk determination required for all sources after implementation of MACT standards. For these reasons, EPA will exclude from the BIF requirements of RCRA combustion sources that burn condensates derived from steam stripper overheads.

This decision is consistent with RCRA section 1006, which requires EPA to "integrate all provisions of [RCRA] for purposes of administration and enforcement and . . . avoid duplication, to the extent practicable, with the appropriate provisions of the Clean Air Act . . .". The EPA acknowledges that the imposition of RCRA regulations in this instance would result in the types of unnecessary duplication that section 1006 is intended to prevent. The EPA maintains that steam stripping with rectification followed by combustion of the concentrated condensates is MACT, given the energy, economic, and environmental impacts. See generally 60 FR 32587, 32593 (June 23, 1995), and 59 FR 29570, 29776 (June 9, 1994) where EPA similarly found that RCRA regulation of secondary lead smelter emissions was unnecessary, at least until completion of the residual risk process.

Some mills further process the condensate to extract turpentine and red and foul oils. The EPA notes that it considers the residues that are generated as part of this processing of the condensates to be within the scope of the exclusion when such residues are burned as fuels for the same reasons given above. (These residues also may not exhibit the ignitability characteristic, and so would not be hazardous in any case.) Also, the Agency notes that the turpentine and red and foul oils, which can be put to use as raw materials or non-fuel products, are not subject to RCRA under the existing regulations either because they are co-products and not secondary materials (see 40 CFR 261, l(b) (3) and 261, 2(c)), or because they are used as ingredients or as substitutes for commercial chemical products (40 CFR 261, 2(e) (1) (i) and (ii)).

16.3 SECTION 112 RULES (112(g), 112(j), 112(r))

<u>Comment</u>: Section X.L. of the preamble to the proposed regulation discussed regulations under development that could affect new, modified, or reconstructed sources at pulp and paper mills. The preamble encouraged commenters concerned with the interaction between the proposed 112(d) NESHAP, section 112(g), and 112(j) rules to submit those concerns as comments to the proposed 112(g) rule.

One commenter (20,054A2) indicated that they did not have time to fully evaluate the impact or interaction of the 112(g) rule because it was proposed during the MACT comment period. The commenter (20,054A2) requested that EPA provide an additional comment period for further comments on the relationship between the broad definition of source proposed in the MACT standards and 112(g).

Another commenter (20,027) asserted that pulp and paper sources should be exempt from 112(g) review. The commenter (20,027) also asserted that EPA's proposed MACT standards should not be used as the starting point for 112(g) determinations in view of the flaws contained in the proposal. The commenter (20,027) advised that EPA should issue a public statement to that effect.

Response: These comments address issues that are no longer relevant to the pulp and paper industry because section 112(g) will not apply to sources covered by this NESHAP. At the time that the pulp and paper standards were proposed (December 1993), the section 112(g) rules had not been proposed. Since then, the 112(g) rules have been proposed (63 FR 15504, April 1, 1994) and the public comment period was reopened (61 FR 13125, March 26, 1996) in a draft final rule. These actions have addressed issues associated with the relationship between section 112(g) and the MACT standards. Moreover, on February 14, 1996, the Agency published an interpretive notice (60 FR 8333) that deferred the applicability of section 112(g) until after the final section 112(g) regulations are promulgated. The section 112(g) rule was promulgated on December 27, 1996 (61 FR 68384).

The final 112(g) rule should have no effect on the pulp and paper processes covered by the section 112(d) MACT standards. The section 112(g) program is a transitional measure to protect the public from HAP's until EPA issues the MACT standards for a listed source category. As stated in the final 112(g) rule, only sources that commence construction or reconstruction after

June 29, 1998, will be effected, unless a State program to implement the 112(g) provisions is adopted sooner. Since the 112(d) MACT standard for pulp and paper mills will be promulgated in 1997, the sources addressed in this rule will be exempted from 112(g) review.

Comment: Two commenters (20,102, 20,103) suggested that EPA use its 45-day review period on all part 70 (title V) permits to evaluate case-by-case MACT determinations for consistency with any proposed but not yet promulgated MACT standards to provide consistency between 112(g) and MACT standards.

Response: The 45-day review period for title V permits is in place to determine the adequacy and completeness of the permit application, and is not the place for reviewing consistency between rules. However, a case-by-case MACT determination under section 112(g) is not required for emission sources that are regulated by or specifically exempted by a relevant MACT standard. Modifications at the affected sources outlined in this rule are not subject to 112(g) review.

Comment: One commenter (IV-D2-15) stated that 112(g) should have no applicability to any units that are either covered by standards promulgated in this rule, or that are the subject of a "no regulation" decision. The commenter (IV-D2-15) asserted that MACT III sources would fall in the second category. The commenter (IV-D2-15) believes a broader definition of source than that proposed would allow the flexibility to implement equipment retrofits and rebuilds, restructure production processes and install new technology to comply with the MACT standard without triggering section 112(g) review. The commenter (IV-D2-15) contended that a plant-wide definition of source for implementing 112(g) is both legally required and represents sound policy.

Response: For the final regulation, EPA is defining the affected source to which existing MACT requirements apply to include the total of all HAP emission points in the pulping and bleaching system (including pulping condensates). The EPA agrees with the commenters that certain emission points that are excluded from the definition of affected source in the rule, or are subject to a determination that MACT for these operations is no control, should not be required to undergo Act section 112(g) review. The sources that have been so identified in are wood yard operations (including wood piles), tall oil recovery systems, pulping systems at mechanical, secondary fiber, and non-wood fiber pulping mills, and paper making systems. With regard to wood yard operations, tall oil recovery systems, and pulping systems at mechanical, secondary fiber, and non-wood fiber pulping mills, EPA has determined that these sources do not generally emit large quantities of HAP's and is not aware of any reasonable technologies for controlling HAP's from these sources. For paper making systems, EPA has not identified any reasonable control technology, other than the clean condensate alternative, that can reduce HAP emissions attributable to HAP's present in the pulp arriving from the pulping and bleaching systems. Additionally, EPA has determined that the use of paper making system additives and solvents result in negligible emissions of HAP's. Therefore, based on the applicability requirements of section 112(g) (40 CFR 63 part B, 63.40(b)), wood yard operations; pulping systems at mechanical, secondary fiber, and non-wood fiber mills; and paper making systems would not be required to undergo section 112(g) review.

Comment: One commenter (20,027) requested that, because the provisions of 112(j) may be misconstrued to apply to sulfite recovery furnaces independent of the December 17, 1993 proposed rule, EPA should make a definite statement as to the status of sulfite recovery furnaces. The commenter (20,027) expressed concern that recovery furnaces will not be covered by the proposed non-combustion or combustion MACT standards and therefore will be subject to 112(j).

Response: The EPA intends to cover sulfite recovery furnaces under a separate NESHAP for combustion sources at pulp and paper mills. The NESHAP covering combustion sources at pulp and paper mills will be proposed concurrently with the promulgation of this rule. Since the pulp and paper source category has been listed for promulgation by November 15, 1997, the section 112(j) provisions will not apply unless the combustion NESHAP is not promulgated by May 15, 1999.

Comment: One commenter (20,059) indicated that because the proposed rule would increase the reliance on the substitution of chlorine by ClO_2, EPA should use its section 112(r) authority to establish accident prevention standards or monitoring requirements to minimize the risks of accidental release. The commenter (20,059) stated that such standards could ensure that is manufactured on site in small quantities for use in closed-loop systems.

Response: Accident prevention regulations under 112(r) were promulgated in the Federal Register (61 FR 31668) on June 20, 1996. These regulations included a list of 77 compounds for which accident prevention and response programs are required. Facilities storing over 1,000 pounds of ClO_2 are subject to the 112(r) requirement of an approved accident prevention and response plan. Section 112(r) does not give EPA authority to require facilities to generate ClO_2 on site. However, EPA has concluded that facilities using ClO_2 will install on site, ClO_2 generators since on-site generation has proven to be the most cost-effective method of providing chlorine dioxide.

16.4 NEW SOURCE PERFORMANCE STANDARDS AND CONTROL TECHNOLOGY GUIDELINES

Comment: One commenter (20,059) recommended that EPA update the NSPS to include tighter emission limits for all criteria pollutants and establish numeric, enforceable emission limits for existing sources of TRS under section 111(d)(1). The commenter (20,059) also requested that EPA develop a Control Technology Guideline (CTG) for the pulp and paper industry to establish more stringent presumptive norms for VOC RACT, as well as requiring States with nonattainment areas to incorporate these new requirements into their SIP.

One commenter (20,133) contended that EPA failed to update the 1978 sulfur dioxide emission standards and TRS compound standards. Three commenters (20,049A3, 20,082, 20,132) stated that EPA should retain in the final rule the proposed regulations to control the amount of TRS air emissions.

Response: The pulp and paper NESHAP were developed under the section 112 of the Act. NESHAP are only applicable to the compounds contained in the HAP list in section 112(b). The EPA did not promulgate any sulfur dioxide emission standards for pulp and paper mills. The EPA is not, at this time, revising the TRS rules previously developed under section 111. However, the pulping streams controlled under this NESHAP contain most of the TRS compounds emitted from pulping system, and the HAP control required by this rule will also significantly reduce TRS emissions. The EPA estimates a reduction in TRS of 78,500 Mg/yr as a result of this rule.

The promulgated rule will achieve significant VOC emission reductions since the technologies used to control organic HAP's that are subject to this rule also control VOC. The EPA estimates a reduction in VOC emissions of 409,000 Mg/yr as a result of this rule. All significant sources of VOC and TRS from the pulping and bleaching systems have been captured by this rule.

The MACT standard is a uniform, national requirement that applies to all new and existing pulp mills. The EPA sees no need for additional regulatory measures for TRS or VOC control for pulp mills because any additional emission reductions would not be significant given the reductions obtained under this rule.

Comment: One commenter (20,011) requested that process wastewaters subject to emission control in the proposed rule should not be additionally subject to RACT.

Response: The EPA's analysis indicates that all significant VOC-laden pulping process condensates at pulp and paper mills will be subject to the MACT standards. The technology used for meeting MACT is also the best technology for VOC control. Since all new and existing mills are subject to the rule, no additional VOC reductions would be achieved by RACT. However, the level of control for bleaching wastewater streams was no control and some bleaching wastewater streams may contain significant levels of VOC. Therefore, consideration of RACT may be appropriate for these streams.

Comment: With regard to EPA's solicitation for comments on the potential overlap of the kraft NSPS and the proposed NESHAP standards in the March 8, 1996 supplemental notice, two commenters (IV-D2-7, IV-D2-15) contended that compliance with MACT should be considered compliance with the NSPS for those sources subject to both rules and any source covered by both rules should not have any further monitoring, recordkeeping, or reporting obligations under the NSPS. Another commenter (IV-D2-10) supported the concept of consolidating the NSPS and MACT programs, noting that it should not be necessary to report things twice and that redundant or overburdensome monitoring or recordkeeping should be eliminated in a "common sense" rule that would combine these requirements.

One commenter (IV-D2-4) disagreed, noting that allowing a facility to choose compliance with the NESHAP in lieu of the NSPS for certain process equipment is inappropriate. The commenter (IV-D2-4) asserted that the emission units that require TRS monitors under the NSPS (recovery furnaces, lime kilns, and brownstock washer, evaporator, and condensate stripper systems that are not incinerated) are not the same as those regulated under this NESHAP. The commenter also urged caution as the NSPS and the NESHAP standards were written to regulate different types of pollutants.

<u>Response</u>: Sources that are affected by this NESHAP and the kraft mill NSPS are the pulping system, brownstock washer, and the steam stripper treatment system. The EPA agrees that duplication between this NESHAP and the kraft mill NSPS should be minimized. If an owner or operator complies with the NESHAP requirements for these sources with one of the combustion control options, the requirements of the NSPS would also be met. For the reporting requirements of this NESHAP, documentation of compliance with the combustion control option used for control of vents from the pulping system, brownstock washer, and the steam stripper would also satisfy the NSPS. In this case, only one set of monitoring, recordkeeping, and reporting requirements would be

required in the facility's title V permit to satisfy both the NESHAP and NSPS requirements. However, if emissions from these sources are controlled by a means other than combustion, such as the clean condensate alternative, a mill will have to prove compliance with both the NESHAP and the NSPS. In this case, a mill would have to report HAP reductions obtained by the non-combustion control option (to satisfy the NESHAP) and TRS concentrations at any affected source vent (to satisfy the NSPS).

Comment: One commenter (IV-D2-15) contended that because so many facilities have installed thermal oxidizers to meet the standards in the NSPS, and because these controls were considered in the MACT floor level of control, the MACT rule should include all the operating parameters associated with NSPS controls, not just the equipment itself.

Response: The MACT floor level of control is based on the average of best 12 percent of the population, with respect to HAP reduction. In the case of this NESHAP, the best-performing mills controlled pulping system vents by combustion in power boilers, lime kilns, and recovery furnaces, all of which achieve 98 percent HAP reduction. Therefore, the MACT floor level of control was 98 percent control of HAP's from pulping system vents. The operational parameters for thermal oxidizers defined in the NSPS for control of TRS emissions may not produce the 98-percent HAP emission reduction required by this rule. For example, the thermal oxidizer operating conditions specified in the NSPS (1200 °F, 0.5 seconds residence time) are not sufficient to provide the 98 percent HAP reduction that is achievable in a boiler, lime kiln, or recovery furnace (A-92-40, IV-B-18). Analysis of HAP destruction in thermal oxidizers show that an operation level of 1600 °F and 0.75 seconds residence time is required to meet the 98 percent HAP reduction requirement. However, this rule allows three options for a facility to show compliance when a thermal oxidizer is used to control HAP's in pulping vent streams. To meet the thermal oxidizer requirements of this rule, a facility must show that the thermal oxidizer is operating at 1600 $^{\circ}F$ and 0.75 seconds residence time, achieving 98 percent HAP reduction, or has an outlet HAP concentration no greater than 20 ppmv at 10 percent oxygen. Any existing thermal oxidizer designed to comply with the minimum NSPS requirements may have to upgrade to meet the requirements of this rule.

16.5 GENERAL PROVISIONS

<u>Comment:</u> One commenter (IV-D2-15) asserted that EPA should incorporate corrections to the general provisions definitions in the final rule. The commenter stated that these changes include changes to definitions of affected source, malfunction, new source, and reconstruction. The commenter (IV-D2-15) also recommended eliminating a drafting error in the general provisions for "part 70 permit" by defining part 70 permit to mean "a permit issued by a State permitting authority pursuant to a program approved by EPA under part 70 of this chapter." This definition would recognize that permits are not issued pursuant to part 70, but are issued by States that have permit programs approved pursuant to part 70. The commenter (IV-D2-15) recommended including a definition of working day in this rule since the definition was unintentionally left out of the general provisions to part 63. The commenter (IV-D2-15) recommended that working day mean "any day on which the Federal government offices are open for normal business. Saturdays, Sundays, and official federal holidays are not working days."

Response: Concurrently with this rulemaking the Agency conducted a separate rulemaking effort to revise the general provisions to part 63. The definitions mentioned by the commenter relate to broad policy issues that affect all sources subject to NESHAP. There is no basis for revising these definitions as part of the pulp and paper NESHAP because an individual NESHAP is not the proper mechanism for changing the definitions in the general provisions. Any revisions to the general provisions should be accomplished in the ongoing litigation. When the revised general provisions are completed, any changes will be applied to all sources subject to section 112 provisions, including pulp and paper mills.

16.6 PROJECT XL

Comment: The proposed rule did not address Project XL. One commenter (IV-D2-14) suggested that EPA use the promulgation process for the rule as an opportunity to build a foundation for the implementation of a portion of Project XL. The commenter (IV-D2-14) recommended changes to the proposed rule that would provide the foundation for the implementation of Project XL for affected facilities. The revised language would allow mills, with approved Project XL Final Project Agreements (FPA), flexibility in meeting the NESHAP. The commenter (IV-D2-14) reasoned that the additional language would allow for the implementation of Project XL at affected sources but does not require EPA to agree to a Final Project Agreement in lieu of MACT.

Response: The EPA interprets the commenter's concern to be that the draft FPA for Project XL was just a non-binding, non-regulatory agreement that provided the XL participant no protection from being subject to the applicable rules. The EPA has reached agreement with the XL participant and reflected this agreement in the draft FPA issued for public comments on October 9, 1996. The draft FPA stated that EPA intends to implement the agreement through a site-specific rulemaking, permit revisions, or other appropriate legal mechanisms.

17.0 SCHEDULE ISSUES

17.1 RULEMAKING SCHEDULE

Comment: One commenter (20,071) indicated that EPA should delay the final MACT standards until all data are submitted and the impacts for RCRA and PSD/NSR are clarified. One commenter (20,027) reasoned that EPA should have waited to receive the industry test data before proposing the MACT standards. The commenter (20,027) challenged that EPA is legally bound to issue a responsible notice of proposed rulemaking and cannot plead time pressures as a reason for issuing an irresponsible rule. [Case law cited: NRDC v. Thomas, 805 F.2d 410, 433-437 (D.C. Cir. 1986); State of New Jersey v. Costle, 26, F.2d 1038,1042 (D.C. Cir. 1980).] However, one commenter (20,102) cautioned that promulgation of the rule should not be delayed for additional testing and data gathering because it would result in a delay in reaching the proposed limitations and additional exposure of the public and the environment to toxic emissions.

Two commenters (20,027, 20,056) stated that EPA should extend the rulemaking time line so that the costs and impacts of the combustion MACT standards are considered with the impacts from the MACT standards for non-combustion sources. One commenter (20,018) stated that the accelerated rulemaking schedule did not allow for development and proper analysis of data to determine MACT regulations.

Response: The December 17, 1993 proposed rule acknowledged that more data would be collected for use in revising the proposed rule. Additional data were collected and announcements of data availability were published in the February 22, 1995 and March 8, 1996 Federal Register supplemental notices. The March 8, 1996 Federal Register supplemental notice also presented EPA'S analysis of new data, proposed rule changes, and a solicitation for responses on the revisions to the December 17, 1993 proposed rule. The Agency believes this consideration of comments and new data is sufficient. There is no need to delay the rulemaking process for further consideration of data.

In the March 8, 1996 Federal Register supplemental notice, EPA included proposed responses to concerns raised about the potential impacts of RCRA and PSD/NSR on compliance with the December 17, 1993 proposed rule. The supplemental notice also presented a strategy for streamlining the process of granting a PCP exemption from PSD/NSR.

17.2 COMPLIANCE SCHEDULE

Comment: In the December 17, 1993 proposed rule, existing MACT sources were given 3 years from the date of promulgation to reach compliance. New sources (those constructing after December 17, 1993) were required to be in compliance at the time of startup, or upon promulgation of the final pulp and paper rule, whichever is later.

Numerous commenters (20,001, 20,015, 20,018, 20,054A2, 20,057, 20,057A2, 20,070Al, 20,071, 20,074) on the proposed rule expressed concern that kraft pulping mills could not meet the 3-year compliance schedule. The commenters (20,001, 20,015, 20,018, 20,054A2, 20,057, 20,057A2, 20,070Al, 20,071, 20,074) submitted data supporting their position.

Response: Based on the data received regarding the December 17, 1993 proposal, EPA proposed (in the March 8, 1996 Federal Register supplemental notice) to extend the MACT compliance schedule for kraft brownstock washers and oxygen delignification units by an additional 5 years. As outlined in the March 8, 1996 Federal Register supplemental notice, many kraft mills are currently considering the addition of oxygen delignification to their pulping lines by the year 2000. The addition of oxygen delignification has been shown to have significant environmental benefit, reducing the need for chlorinated chemical application in the bleaching process. A reduction in chlorinated compound use in the bleaching processes results in reduced loadings of chlorinated pollutants to the air and into the bleach plant effluent.

The EPA considers that the addition of oxygen delignification would likely require redesigned brownstock washers to improve washing efficiency before the pulp is sent to the oxygen delignification system. The new brownstock washer designs are more efficient, less polluting, and easier to control. However, implementation of the new brownstock washers and oxygen delignification systems would probably not occur within a 3-year compliance schedule due to the cost and the need to design and construct these systems. Given a 3-year compliance schedule, time constraints would dictate that mills retrofit their current washers with a vent gas collection system to achieve compliance. Once such a collection system is installed, mills would likely postpone or cancel installation of oxygen delignification systems. The EPA concluded that allowing an additional 5 years to the 3-year compliance schedule for kraft mills would allow sufficient time for a complete evaluation of all pollution control options and provide an overall greater benefit in terms of both air and water pollution control.

Comment: With regard to the proposed extension presented in the March 8, 1996 supplemental notice, several commenters (IV-D2-11, IV-D2-5, IV-D2-19, IV-D2-10, IV-D2-3, IV-D2-4, IV-D2-2, IV-D2-15) supported the EPA's decision and rationale for extending the compliance period for brownstock washing and oxygen delignification vents for 5 years.

One commenter (IV-D2-8) argued that the 5-year extension for control of brownstock washer and oxygen delignification vents should be applied to all kraft mills instead of only those mills that are installing oxygen delignification systems. The commenter (IV-D2-8) noted that the decision to install an oxygen delignification system is very difficult and mill-specific, and that the goal of improving emissions reduction through improved brownstock washing systems is equally applicable to mills that determine that oxygen delignification is not an appropriate option.

One commenter (IV-D2-8) noted that for mills where condensates are recycled back to brownstock washers or oxygen delignification systems, a potential compliance issue exists because, while the vents have been given a 5-year extension, these mills will be meeting the wastewater standards for which compliance is required 3 years after final promulgation. This conflict will have several negative impacts: all mills would not be treated equally; inaction would deny relief that EPA clearly intended to give to the regulated community; and inaction would arbitrarily penalize many companies who already have adopted a sound environmental approach to control of polluted streams (recycle and reuse) in advance of Federal regulations. The commenter (IV-D2-8) suggested extending the compliance time for wastewater streams recycled to brownstock washing and oxygen delignification systems to coincide with the compliance time for vents from those units.

Several commenters (IV-D2-11, IV-D2-3, IV-D2-7, IV-D2-15) requested that the 5-year extension also be applied to weak black liquor tanks, pre-washer knotter and screening systems, and other HVLC vent streams because emissions from these sources will be transported and controlled by the same HVLC collection and incineration system as the brownstock washers. These commenters (IV-D2-11, IV-D2-3, IV-D2-7, IV-D2-15) noted that extension of the compliance period for all HVLC sources also allows for proper consideration of the full range of emerging innovative control options.

Response: The Agency reviewed the commenters' concerns and agreed that vents included in the HVLC system should be allowed a similar compliance time as the brownstock washing and oxygen delignification systems. The majority of emissions and vent gas flow from equipment associated with the HVLC vent streams occur from the washing system and the oxygen delignification system. Therefore, the design of the HVLC collection and transport system would be significantly influenced by these two systems. If different compliance times were provided for the components of the HVLC system, an affected source would expend significant amounts of capital to control systems required to comply in the 3-year time frame. The source would have to redesign the gas transport and control devices 5 years later to accommodate controlling the washing system and oxygen delignification system. This cost could discourage the implementation of low flow washing and oxygen delignification systems. This would serve as an obvious disincentive to installation of advanced wastewater treatment technology since mills would be understandably reluctant to replace a newly installed air pollution control system. Therefore, EPA concluded that additional compliance time is appropriate and necessary for the remaining equipment controlled by the HVLC collection and transport system as well as the brownstock washing system and the oxygen delignification system (see 61 FR 9394-95, March 8, 1996). The final rule allows affected sources to control all the equipment in the HVLC system at the same time, 8 years after publication of the pulp and paper rule.

The compliance extension applies to HVLC systems at all kraft mills. The additional design and mill modification to meet the standards is a lengthy process. The Agency wanted to allow sufficient time for each kraft mill to fully consider all pollution control options. The Agency also recognized that the pulp and paper industry will be implementing both water and air rules essentially at the same time. Given the engineering requirements, capital expenditures, permitting requirements, and the resources necessary to implement both the water and air standards, the Agency decided that all kraft mills would be given a 5-year compliance extension for HVLC systems.

The final rule includes requirements for kraft mills to submit a non-binding control strategy report along with the initial notification. The purpose of the control strategy report is to provide the Agency and the permitting authority with a means for measuring a mill's progress towards compliance. The control strategy report contains information such as a description of the emission controls or process modifications selected for compliance with the control requirements and compliance schedule. The information in the control strategy report must be revised or updated every 2 years until the mill is in compliance with the standards of § 63.443.

Compliance with the pulping process condensate standards in the 3-year time frame should not pose a conflict with the extended compliance schedule allowed for HVLC systems at kraft mills. Many of the changes a mill will need to implement to comply with the pulping process condensate requirements can be considered before air pollution control systems are implemented, since the standards do not address recycling patterns, only the HAP content of the recycled condensates. Additionally, standards for pollution control from pulping process condensates apply to streams that are typically not recycled or reused in the pulping process (namely the HVLC streams from the digester, evaporator, and turpentine recovery systems) without prior treatment. The control strategy of recycling uncontrolled process condensates to controlled equipment is also an option. If a mill cannot meet the pulping process condensates requirements using this option, it can choose to treat condensate streams in a stream stripper or convey condensate to a biological treatment unit.

Comment: One commenter (20,057) stated that EPA has no basis for concluding that compliance with the December 17, 1993 proposed rule can be achieved within 3 years by all mills. However, another commenter (20,059) argued that compliance deadlines should be set as expeditiously as possible and that EPA should not authorize any categorical l-year extensions.

Several commenters (20,015, 20,018, 20,057A2, 20,054A2, 20,070Al, 20,071, 20,142, 20,146) indicated that due to the extensive amount of changes needed and the shortage of available engineering firms, the time period of 3 years was not sufficient for mills to perform the engineering analyses, modifications, and permitting efforts needed to comply with the proposed rule. One commenter (20,146) stated that the proposed wastewater requirements would trigger PSD/NSR permitting requirements that would make the compliance schedule unrealistic. One commenter (20,015) suggested an extension of compliance dates along with a phased compliance schedule allowing the air and water components compliance dates to be staggered. One commenter (20,001) suggested EPA extend the compliance deadlines for all existing sources by 2 to 5 years, along with proposing interim targets for partial compliance. Another commenter (20,074) strongly recommended that EPA extend the compliance deadline by 2 years. One commenter (20,027) recommended that EPA should allow more time for compliance, particularly in view of the accelerated schedule for promulgation of MACT for this industry. The commenter (20,027) declared that EPA could issue a rule that allowed more than 3 years for compliance and still require MACT compliance within the original time frame envisioned by the Agency (November 15, 1997). One commenter (20,071) stated that it would realistically take up to 6 years for all facilities to be in compliance. Two commenters (20,027, IV-D2-15) claimed that because of the far-reaching scope of the proposed rule; its integration with the future combustion rule; potential PSD/NSR delays; and limits on available capital, equipment, and expertise, EPA should grant a l-year industry-wide compliance extension to provide a more reasonable time frame in which mills will be able to achieve compliance with the proposed rule.

One commenter (20,061) suggested a compliance extension of 5 years for mills making an enforceable commitment to TCF technology. Two commenters (20,102, 20,103) suggested that EPA offer a l-year compliance extension as an incentive to mills that voluntarily switch to TCF processes. Two commenters (20,102, 20,103) recommended that the extension not be granted to mills that are required by the effluent guidelines to use TCF processes (paper-grade sulfite mills). One commenter (20,094) recommended adjusting the compliance schedule for bleach plant chlorine compound emission control to be in accordance with any modified compliance schedules for TCF mills required by the effluent guidelines.

Response: The EPA considers the 3-year compliance period ample time for most mills to achieve compliance. For HVLC systems at kraft mills, EPA has provided an additional 5 years beyond the 3-year compliance time for a total of 8 years from the date of promulgation. The EPA believes that this additional time will be sufficient for kraft mills to completely evaluate all pollution control options for HVLC systems and to install pollution controls and pollution prevention processes.

With regard to the combustion MACT for pulp and paper mills, compliance will be staggered approximately 2 years following this rule.

If a facility realizes that it may not achieve compliance by the specified date due to shortages of materials or services needed to install pollution controls, it may apply for a l-year compliance extension. The process for receiving a compliance extension is outlined in § 63.6(i) of the general provisions. The Agency reviews requests for compliance extensions on a case-by-case basis and an extension may be granted if the Agency deems the request acceptable.

Regarding the additional compliance period for meeting the effluent limitation guidelines and standards, EPA's OW has included several incentive packages in the final rule for bleaching systems at paper-grade mills which have elected to treat wastewater to levels surpassing BAT requirements. Incentive packages include adding oxygen delignification prior to bleaching, implementing technologies that result in additional reduction of process wastewater use, reducing chlorinated bleaching chemicals use, and various bleaching system modifications. As an incentive to make this election, EPA is not requiring participating mills to achieve compliance with the more stringent portions of the "Advanced Technology" BAT limitations for 6, 11, and 16 years (for Tiers I, II, and III, respectively) in order to afford these mills sufficient time to develop, finance, and install the Advanced Technologies. In light of this, the Agency is concerned that requiring bleached paper-grade kraft and soda mills to comply in 3 years with MACT standards based on process substitution of chlorine dioxide for elemental chlorine would discourage these mills from electing to participate in the Advanced Technology program. This is largely because a mill that implements process substitution before it installs oxygen or other extended delignification systems is likely to construct more chlorine dioxide generating capacity than it ultimately will need. A mill thus compelled to invest first in process substitution may be very reluctant to abandon a portion of that investment soon afterwards in order to participate in the voluntary incentives program.

The EPA also believes that requiring compliance in 3 years with a chloroform MACT standard based on baseline BAT for bleached paper-grade kraft and soda mills would present similar disincentives to achieving greater effluent reductions. A mill in those circumstances will have made a substantially larger capital investment than it will need to control chloroform once its array of advanced water technologies is installed. Also, depending on the degree of process modifications the mill makes, the mill may need a much smaller scrubber for the non-chloroform chlorinated HAP's and, in some cases, a scrubber may not be needed at all to meet the MACT standards for chlorinated HAP concentration limit. Thus, a mill otherwise interested in participating in the Voluntary Advanced Technology Incentives Program will find itself diverting capital to environmental controls that it ultimately will not need, instead of employing that capital to make more advanced process modifications that will benefit both the water and the air.

Under these unusual circumstances where imposition of MACT requirements could likely result in foregoing substantial cross-media environmental benefits, EPA believes that a two-stage MACT compliance scheme is justified for existing sources at bleached paper-grade kraft and soda mills that enroll in the water Voluntary Advanced Technology Incentives Program (see 61 FR 9394 for a similar argument relating to compliance with MACT for washers and oxygen delignification systems). The first stage is an interim MACT of no backsliding--which reflects the current level of air emissions control. The second stage requires compliance with revised MACT based on baseline BAT requirements for all parameters for bleached paper-grade kraft and soda mills. (The second stage in effect revises MACT to reflect the control technologies which will be available at this later date. See Act section 112(d)(6).) The no-backsliding provisions apply to the period from 60 days from publication in the Federal Register until compliance with the second-stage MACT standards is required 6 years from publication in the Federal Register. This two-step alternative is available only to bleached paper-grade kraft and soda mills actually making the binding decision to comply with Tier I, II, or III water limitations.

The EPA believes that providing these mills an additional 3 years to comply with MACT (i.e., baseline BAT requirements for all parameters) is an appropriate and logical outgrowth of the discussions set forth in the March 8, 1996 Federal Register supplemental notice (61 FR 9393) and the July 15, 1996 Federal Register supplemental effluent guidelines notice (61 FR 36835-58). In the March 8, 1996 Federal Register supplemental notice, EPA solicited comments on its preliminary findings that MACT for chloroform air emissions should be compliance with baseline BAT. Commenters agreed with this preliminary determination. In the July 15, 1996 Federal Register notice, EPA set forth its vision of more stringent BAT for mills that voluntarily enter the Advanced Technologies Incentives program. As part of that voluntary program under the water standards, EPA is promulgating a requirement that mills in Tiers II and III, at a minimum, meet all the limitations promulgated as baseline BAT no later than 6 years after publication in the Federal Register. Thus, more stringent air emission controls than stage one MACT will likewise be available at this time since compliance with these interim BAT limitations will result in compliance with MACT. For Tier II and Tier III mills, this means that the second stage MACT requirement is compliance with the baseline BAT limitations by 6 years from date of publication in the Federal Register. The same is the case for Tier I mills, even though under the water regulation Tier I mills will be required to achieve more stringent limitations at that time. The EPA is defining MACT to be the baseline BAT limitations even in this situation because compliance with the more stringent absorbable organic halides limitations and other requirements unique to Tier I are unnecessary to control chloroform emissions at these mills.

The EPA further believes that most plants likely to elect to comply with a tier option already control air emissions of chlorinated HAP's (both chloroform and other chlorinated HAP's) through application of the MACT technologies (process substitution for chloroform and caustic scrubbing for the remaining chlorinated HAP's). Thus, there will be some control of the emissions from these bleaching operations during the time preceding compliance with the second stage of MACT. To ensure that there is no lessening of existing controls, EPA also is promulgating a no backsliding requirement as an interim MACT -- reflecting current control levels. During the extended compliance period, mills may not increase their application rates of chlorine or hypochlorite above the average rates determined for the 3-month period prior to 60 days after promulgation in the Federal Register.

The EPA notes that an affected bleached paper-grade mill must comply with the MACT requirements no later than 3 years from publication in the Federal Register, even if the mill's existing CWA NPDES permit does not yet reflect the corresponding effluent limitation guidelines and standards because its existing terms have not expired or it has been administratively extended. Put another way, even if a mill's existing NPDES permit serves as a shield (until reissuance) against imposition of new limits based on new effluent limitations guidelines (see CWA section 402(k)), the MACT requirement for bleached paper-grade mills to control chloroform emissions through compliance with all parameter requirements in the effluent limitation guidelines and standards take effect to satisfy the requirements of the Act. Similarly, if a bleached paper-grade mill's NPDES permit is reissued sooner than the expiration of the 3-year compliance schedule authorized for the chloroform MACT requirements and calls for immediate compliance with the BAT limitations, that deadline would prevail. The same principles will apply when effluent limitations guidelines and MACT standards are promulgated for dissolving-grade mills.

Comment: One commenter (20,027) stated that the benefits of the December 17, 1993 proposed rule (i.e., orderly, coordinated approach to air and water pollution control) will not be realized unless the compliance schedules established in the December 17, 1993 proposed rule apply uniformly to all pulp and paper sources.

Response: The benefit of the December 17, 1993 proposed rule is that regulatory requirements and compliance dates would be known in advance. This advance knowledge provides a mill with the opportunity to plan and choose the appropriate method of compliance that satisfies all rules and at the lowest cost for each mill. Additionally, the proposed rule contains extended compliance schedules for specified pulping area systems and incentive programs for bleaching systems to provide increased flexibility for mills to develop and implement compliance strategies.

Comment: One commenter (20,083) recommended extending the compliance deadline by 3 years for sources subject to different definitions of "new source" under the Act and CWA. The result is that, if a source begins construction after the December 17, 1993 proposed rule but before promulgation, the source is "new" under Act but not under CWA. Consequently, the source would have to begin planning for compliance with the air requirements before promulgation, yet the final rule might impose water requirements that would make those plans and expenditures worthless. One commenter (20,057A2) expressed that the proposed rule should not be applicable to construction or reconstruction during the period prior to the final promulgation.

Response: The EPA proposed a broad definition of "source" for the proposed rule in order to reduce or eliminate the number of sources which would be defined differently by the Act and CWA. If "source" is defined to include all pulping processes, all bleaching processes, and all associated wastewater streams at mills, there will be far fewer instances in which a source will be constructed or reconstructed between proposal and promulgation than if a "source" is defined to be an individual piece of process equipment. If source is defined broadly, a piece of equipment that is added will not constitute a "new source" in most situations, but instead will be considered a change to an existing source. Such changes would be required to comply with the existing source standards at some period of time after promulgation of the standards, when all requirements of the guidelines are known.

Comment: With regard to the March 8, 1996 Federal Register supplemental notice, two commenters (IV-D2-18, IV-D2-17) supported EPA's OW suggestion to specify the application of BAT as the compliance mechanism for bleaching wastewater in place of numerical emission limits. The commenters suggested, however, that under such an approach the compliance date for dissolving mills would need to be deferred, because the BAT for these mills will not be established by the time the December 17, 1993 proposed rule is promulgated. One commenter (IV-D2-17) noted that there is significant environmental benefit for withdrawing and reserving dissolving-grade MACT until the ongoing technology development for BAT is completed. Namely, if EPA were to set MACT for chloroform now, based on current process technology, the MACT floor level of control would be no control with no reasonable add-on control technology.

Response: The MACT floor level of control for all bleaching systems is 99 percent reduction of chlorinated HAP's using caustic scrubbing and process modifications (100 percent chlorine dioxide substitution and elimination of hypochlorite as a bleaching agent). The technology basis for BAT under the CWA are at least equivalent to the MACT requirements. Since BAT and MACT are essentially the same, EPA therefore proposed in the March 8, 1996 supplemental notice that chloroform emissions be controlled by complying with the BAT requirements. No adverse comments were received to this proposal.

As stated in the July 15, 1996 Federal Register notice (61 FR 36835), EPA is evaluating new data on the technical feasibility of reducing hypochlorite usage and implementing high levels of chlorine dioxide substitution on a range of dissolving-grade pulp products. Therefore, EPA is deferring issuing effluent limitation guidelines and standards for dissolving-grade mills until the comments and data can be fully evaluated. The EPA expects to promulgate final effluent limitation guidelines and standards for dissolving-grade subcategories at a later date.

The EPA has decided to delay establishing these MACT standards for chloroform and for other chlorinated HAP's for dissolving-grade bleaching operations until promulgation of effluent limitation guidelines and standards for those operations, for the following reasons. With respect to the MACT standard for chloroform, first, as explained above and in the

March 8, 1996 Federal Register notice, the control technology basis for the effluent limitation guidelines and standards and the MACT requirements will be the same. Second, at present, the Agency is unsure what level of chlorine substitution and hypochlorite use is achievable for dissolving-grade mills. Thus, although EPA has a reasonably good idea what the technology basis of MACT and effluent limitation guidelines and standards is likely to be for dissolving-grade mills, the precise level of the standards remains to be determined. Consequently, at present, EPA is unable to establish what the MACT floor would be for chloroform emissions from bleaching systems at these mills, and there is no conceivable beyond-the-floor technology to consider. The EPA will make these determinations based on data being developed, and then promulgate for these mills effluent limitation guidelines and standards and, concurrently, MACT standards based on those effluent limitation guidelines and standards. Covered mills would therefore be required to comply with the MACT standards reflecting performance of the effluent limitation guidelines and standards no later than 3 years after the effective date of those standards, pursuant to section 112(i)(3)(A) of the Act.

The basis for delaying MACT requirements for chlorinated HAP's other than chloroform (again, from dissolving-grade bleach operations only) differs somewhat. As noted above, the technology basis for control of these HAP's is use of a caustic scrubber. However, when plants substitute chlorine dioxide for chlorine and eliminate hypochlorite (in order to control chloroform emissions and discharges to water, as explained above), a different scrubber will be needed that can adequately control both the chlorine dioxide emissions for worker safety reasons and the emissions of chlorinated, non-chloroform HAP's. The Agency's concern (shared by the commenters who addressed this question) is that immediate control of the non-chloroform chlorinated HAP's could easily result in plants having to install and then replace a caustic scrubber system in a few years due to promulgation of effluent limitation guidelines and standards and MACT requirements for chloroform. This result is an inappropriate utilization of scarce pollution control resources.

Comment: One commenter (IV-D2-15) contended that if an alternative technology will produce the same or greater emission reductions than specified in the rule, EPA should work with the source to develop a reasonable compliance timetable. If after the technology is installed and operating normally, it does not achieve the reductions that were predicted, or if operation of the technology does not turn out to be practicable, the source should be required to revert back to the original control requirements. In that event, the source should negotiate a new compliance date with the Administrator. The source should be required to comply with the original requirements as soon as practicable under the circumstances, but in no event later than 8 years after the technology has been found to be inadequate or impracticable.

Response: If an affected source wishes to establish an alternative means of emission reduction, the affected source can apply for and obtain approval for this alternate compliance method through the procedures outlined in § 63.6(g) of the general provisions. The EPA maintains that the 3-year compliance schedule outlined in the rule is reasonable and further adds that all kraft mills have a 5-year extension for compliance on HVLC systems. If an alternate compliance method does not reach the standards set in the rule, and if the affected source cannot reach compliance by the target date, the affected source may apply for a l-year extension of the compliance date under the procedures outlined in section 112(i) (3) of the Act.

18.0 MECHANICAL PULPING MILL, SECONDARY FIBER PULPING MILL, NON-WOOD FIBER PULPING MILL, AND PAPERMAKING SYSTEM (MACT III) COMMENTS

Comment: Several commenters (IV-D2-1, IV-D2-4, IV-D2-5, IV-D2-7, IV-D2-8, IV-D2-9, IV-D2-10, IV-D2-12) stated that they supported the March 8, 1996 standards proposed by EPA for MACT III sources (i.e., floor for pulping systems at these mills and papermaking systems at all mills is no control and for bleaching systems at these mills that use chlorine or chlorine dioxide, control is caustic scrubbing).

Three commenters (IV-D2-1, IV-D2-5, IV-D2-8) agree with EPA's findings that the floor level of control for papermaking systems is no control. The same commenters (IV-D2-1, IV-D2-5, IV-D2-8) also supported further examination of HAP emissions attributable to the use of papermaking system additives in order to determine if these emissions are a major source of HAP.

Three commenters (IV-D2-2, IV-D2-3, IV-D2-6) disagreed with EPA's findings that the floor level of control for MACT III sources (mechanical mills, secondary fiber mills, non-wood fiber mills, and papermaking systems) was no control. Due to the lack of available data, the commenters (IV-D2-2, IV-D2-3, IV-D2-6) stated that EPA should wait for the conclusion of the MACT III testing program sponsored by industry before promulgating a final rule. The commenters (IV-D2-2, IV-D2-3, IV-D2-6) stated that they believed there were not enough data to substantiate a finding of no control for MACT III sources.

Response: The information gathered during the MACT development process indicates that there are no air pollution control devices in place at mechanical mills, secondary fiber mills, and non-wood fiber mills except at elemental chlorine and chlorine dioxide bleaching stages. This information also indicated that no air pollution control devices are currently in place on papermaking systems at any mill (A-95-31, II-B-l). Through site visits, working with stakeholders, and reviewing the results of the industry-sponsored MACT III testing program, EPA maintains that the floor level of control for these sources is no control except for elemental chlorine and chlorine dioxide bleaching stages. The EPA has also concluded that going beyond the floor level of control requiring controls for MACT III sources would be cost-prohibitive given the estimated reduction in HAP's (A-95-31, IV-B-5, IV-B-6, IV-B-7, IV-B-8). Therefore, EPA decided to move forward with the MACT standard for the MACT III sources and promulgate in conjunction with standards for MACT I sources. The EPA believes this is a sound decision that will result in time and money savings for the Agency and stakeholders, and that no environmental benefit would be gained by delaying promulgation of the standards for MACT III sources.

Comment: One commenter (IV-D2-10) requested that EPA give MACT III sources additional time in which to comply if the promulgated rule is more stringent than the proposed rule.

Response: The proposed standard for MACT III mills was no control except for chlorine bleaching stages. For chlorine bleaching stages, EPA concluded that scrubbers were already used to control chlorine and HCl for process and worker safety reasons. The final standard does not contain any additional control requirements for MACT III mills than stated at proposal. Therefore, EPA maintains that the promulgated standard is no more stringent than the proposed standard and additional compliance time is not necessary.

<u>Comment:</u> Several commenters (IV-D2-2, IV-D2-3, IV-D2-6) requested that EPA provide information on the industry sampling and testing protocol and any data collected through the industry test program.

<u>Response</u>: The information provided on the industry test program is available in the Pulp and Paper MACT III docket (A-95-31, IV-J-3 through IV-J-13). The sampling and testing protocol provided by the industry are entries II-D-5 and II-D-11.

<u>Comment:</u> Two commenters (IV-D2-2, IV-D2-3) requested that EPA publish the final MACT III rule in a separate <u>Federal Register</u> notice. The commenters (IV-D2-2, IV-D2-3) stated that the inclusion of MACT III sources at the end of the MACT I sources has inadvertently limited public comment on the proposed rule because State and local organizations without MACT I sources would not look for a MACT III rule in the document in which the rule was proposed.

<u>Response</u>: The EPA concluded that the most efficient way to address MACT III sources was to propose standards for this source group in combination with the announcement in the March 8, 1996 <u>Federal Register</u> supplemental notice. Both actions were stated at the beginning of the notice after the title "National Emission Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production," followed by a summary of the action describing what was addressed in the notice. A separate section for the MACT III mills, section X, "Standards for Mechanical

Mills, Secondary Fiber Mills, Nonwood Fiber Mills, and Paper Machines," was provided. Consequently, EPA maintains that adequate notice was given for comment response on the proposed MACT III rule. During subsequent work group meetings which included State and local representatives, notification was given that EPA intends to combine the MACT III promulgation with the final pulp and paper rule.

Comment: One commenter (IV-D2-9) questioned whether or not the MACT standards for these sources were warranted. The commenter (IV-D2-9) further stated that due to the low emissions from their mill they believed that no MACT standards were necessary.

Response: All categories and subcategories of major sources that are listed pursuant to section 112(c) of the Act must be evaluated for possible NESHAP. Since MACT III sources are major sources of a listed source category, EPA is legally bound to determine MACT standards pursuant to section 112(d) of the Act.

Comment: Two commenters (IV-D2-8, IV-D2-10) confirmed that MACT III sources that bleach with elemental chlorine are already using scrubbers for chlorine emission control. Both commenters (IV-~2-8, IV-D2-10) indicated that regulatory controls for elemental chlorine bleaching systems in addition to scrubbers such as incineration, would not be appropriate. One commenter (IV-D2-10) interpreted the term "chlorine bleaching" to exclusively represent the use of elemental chlorine as a bleaching agent, and "non-chlorine bleaching" to represent any bleaching agent other than elemental chlorine. One commenter (IV-D2-8) agreed that bleach plants at MACT III sources that are collocated with MACT I sources will be subject to the MACT I controls if any equipment is common to both process lines.

Response: For collocated and stand-alone MACT III mills that have elemental chlorine or chlorine dioxide bleaching stages, these stages shall reduce the total chlorinated HAP mass in the vent stream entering the control device (scrubber) by 99 percent or more by weight, achieve a treatment device (scrubber) outlet concentration of 10 ppmv or less of total chlorinated HAP (other than chloroform), achieve an outlet mass emissions limit of 0.001 kg of total chlorinated HAP (other than chloroform) per Mg ODP. Information available to EPA (A-95-31, IV-B-5) indicated that MACT III mills bleaching with elemental chlorine or chlorine dioxide already employ scrubbers. Information from industry (A-95-31, IV-B-5) also indicated that the majority of MACT III mills that have bleaching systems use hypochlorite and are not controlled. Furthermore, available test data show that HAP emissions from hypochlorite bleaching stages are not large. Therefore, EPA has concluded that control requirements for hypochlorite bleaching stages at MACT III mills are not warranted. MACT III mills with hypochlorite bleaching stages are exempt from any bleaching control requirements. In addition, MACT III mills that use TCF bleaching are also exempt from any bleaching control requirements.

Comment: One commenter (IV-D2-3) stated that they supported capture and combustion of LVHC gas streams and requested that EPA investigate the feasibility of controlling these streams.

Response: Based on available information, EPA believes that LVHC streams do not exist at MACT III mills. Information available to EPA (A-95-31, IV-B-7) indicate the HVLC streams at MACT III mills are not controlled and that HAP emissions from these sources are low. Therefore, EPA concluded that little environmental benefit would be gained by controlling the HVLC streams at MACT III mills.

Comment: One commenter (IV-D2-14) stated that the definition for non-wood pulping should include other sources of non-wood fiber and not just flax. The commenter (IV-D2-14) also recommended a detailed process description for non-wood pulping.

Response: The EPA agrees with the recommendation to adjust the definition for non-wood pulping. The EPA has defined non-wood pulping as the production of pulp from fiber sources other than trees. The non-wood fiber sources include, but are not limited to, bagasse, cereal straw, cotton, flax straw, hemp, jute, kenaf, and leaf fibers. Since the promulgated standard for non-wood pulping is no control, EPA determined that a detailed process description was not needed.

19.0 MISCELLANEOUS COMMENTS

19.1 INFORMATION OMITTED FROM THE DOCKET

Comment: One commenter (20,027) indicated that information submitted to EPA by Mead regarding process equipment, economic impacts, and non-water quality environmental impacts associated with soda pulping was not included in the docket at the time of proposal. The commenter (20,072Al) included the Mead Corporation information in their comments on the proposed rule. In addition, information submitted by Weyerhauser Corporation and NCASI was omitted from the docket at the time of proposal. The American Forest Products Association (AF&PA) has resubmitted this information as appendices MACT 7, 8, and 9 (20,027A7, 20,027A8, 20,027A9).

Response: All of the data and public comments regarding the proposed MACT standards and the final MACT standards that were not claimed confidential were submitted to the public docket maintained by EPA's OW.

19.2 ADDITIONS OR CORRECTIONS TO THE PROPOSED RULE

Comment: One commenter (20,056) indicated the following corrections to the December 17, 1993 proposed rule: (1) the units of the de minimis level for the bleaching system should be standard cubic meters per minute (not standard cubic feet); (2) § 63.444(a) (5) referred to item (1) (iii) which does not exist; (3) in § 63.444(f) (1), the "or" should be substituted for "and" in the following excerpt: "... knowledge of the process, and mass balance information..." so that process and mass balance information may be used.

Response: Valid editorial mistakes identified by commenters have been corrected.

Comment: One commenter (20,102) stated that procurement guidelines should be established to encourage the reduction of both HAP generation at the production facility and the quantity of solid waste produced after use of the paper product.

Response: The EPA does not have the authority under the Act to establish procurement guidelines.

19.3 OTHER COMMENTS

Comment: One commenter (20,091) stated that verification of compliance by the regulatory agencies responsible for pollution control is essential for public confidence and environmental protection. The commenter (20,091) argued that this area of the system needed improvement and suggested more frequent unannounced inspections (with sampling and testing) should be conducted by State and Federal agencies.

Response: All facilities will have to perform tests for compliance or acceptably document emission control. Notification is required prior to performance tests so that the tests can be attended by a State or Federal representative. Test results must be submitted to the regulatory agency to demonstrate compliance. Facilities will have to monitor operational parameters, established through performance testing, on an ongoing basis to prove compliance. Facilities must submit semi-annual reports of compliance status, and report any infractions. The EPA believes that the monitoring, recordkeeping, and reporting requirements of this rule provide acceptable assurance of compliance.

Comment: One commenter (20,089) stressed that EPA failed to provide adequate public notice and opportunity for public comment on its general MACT determination for most segments of the regulated community. The commenter (20,089) stated that most of EPA requests for general comments on the MACT floor have been contained in industry-specific rulemakings which do not affect large portions of the regulated community. The commenter (20,089) indicated that the notice of the rulemaking will likely reach only limited industry segments since EPA addresses general comments on the MACT floor determination within rulemakings for specific MACT categories.

Response: The EPA requested comments on a discussion of the statutory interpretation and determination of the MACT floor for HON and other sources on March 9, 1994 (59 FR 11018). Comments were received from industries, trade associations, environmental groups, State and local agencies, and labor unions. On June 6, 1994 (59 FR 29196), EPA published a discussion of the statutory interpretation and determination of the MACT floor. While this notice established general interpretation, it also stressed that EPA has certain areas of discretion within the statutory framework to determine how best to set the MACT floor for each source category considering the data available for each category. The notice also envisioned that as additional MACT standards are developed, they may raise new issues pertaining to the MACT floor (although no such issues are present in this rule, and the Agency accordingly applied the interpretation out in the June 6 notice). As stated in the June 6, 1994 notice, to properly consider the specifics of each source category, EPA will solicit and fully consider comments on individual MACT standards, including comments on interpretation of section 112 regarding MACT floor determination. All section 112 standards are proposed in the Federal Register and anyone is free to submit comments on any proposed rule. A revision of EPA procedures for requesting public comment on MACT floor determinations is not planned.

Comment: One commenter (20,085) expressed an interest in establishing health monitoring or health surveillance programs to determine the effectiveness of pollution control programs.

Response: This activity is not covered under the scope of this NESHAP. The purpose of the testing and monitoring requirements of the NESHAP must be to ensure compliance with the emission limits in the rule. The EPA has no authorization under section 112 to monitor public health because health data are not needed to determine compliance with the MACT standards.

Comment: One commenter (20,078) suggested that EPA conduct a pilot level regulatory/permitting process using the proposed rule to identify whether or not the chosen limits can be implemented.

Response: The limits specified in this rule have been set from actual emission levels obtained at the best performing (12 percent) mills in the nation. MACT standards are set in this manner to insure that the specified limits can be actually met in practice.

20.0 ENVIRONMENTAL AND COST IMPACTS

20.1 INTRODUCTION

This section summarizes the environmental and cost impacts of the final rule. This section also discusses the major revisions to the environmental impacts and associated analyses at proposal. A complete description of the methodology for estimating impacts was presented in the 1993 BID (A-92-40, II-A-35). The 1993 BID, along with this section, documents EPA's conclusions concerning demonstrated control technologies, HAP emissions, control costs, and other impacts upon which the final rule is based.

The final rule covers chemical and semi-chemical wood pulping and bleaching processes and papermaking systems at the following types of mills:

- chemical and semi-chemical wood pulp mills;
- integrated mills (mills that combine on-site production of both pulp and paper);
- mechanical wood pulping mills;
- secondary fiber deinking and non-deinking mills; and
- non-wood pulping mills.

Such mills typically fall under standard industrial classification (SIC) codes 2611 and 2621 for pulp and integrated mills, respectively.

The only processes regulated at non-chemical mills (mechanical wood pulping mills, secondary fiber deinking and non-deinking mills, and non-wood mills) are chlorine and chlorine dioxide stages in bleaching operations (see section 16.0). As a result, most of the analyses in this chapter center on chemical and semi-chemical pulping and bleaching processes because these are the processes that are most affected by the final rule and because the pulping and bleaching processes occur at the same mill. Unless otherwise specified, references to pulp mills or pulping or bleaching processes should be interpreted to mean only wood pulping and bleaching processes at chemical and semi-chemical pulp mills and integrated mills. The only regulated process condensates are from the kraft pulping process.

This section presents an overview of the revisions made to the impacts analyses performed at proposal. Where the full rationale for specific revisions can be briefly presented, this chapter presents the relevant information. For some of the more complex technical issues, this section summarizes the technical approach, explains the assumptions, presents the results, and refers the reader to the documents contained in the public docket for the detailed technical analyses.

20.1.1 Section Organization

Section 20.2 characterizes the pulp and paper industry and includes process descriptions, the emissions estimation approach and estimated baseline emissions. Section 20.3 discusses applicable control technologies. Section 20.4 presents the technical approach for estimating the impacts of the final rule. Section 20.5 relates the approach taken to estimate control costs and section 20.6 documents the development of the data base used to estimate national environmental and cost impacts for the pulp and paper industry. Section 20.7 summarizes the cost and environmental impacts of all MACT standards on the pulp and paper industry, before and after the effluent guidelines limitations have been implemented.

20.2 PROCESS DESCRIPTIONS AND EMISSIONS ESTIMATES

This section characterizes mill processes and baseline emissions. Section 20.2.1 describes the nationwide distribution of pulp and paper mills in the U.S, section 20.2.2 describes changes to the emissions estimation approach used since proposal, and section 20.2.3 presents the baseline emissions estimates and control technology assumptions.

20.2.1 Industry Characterization

The pulp and paper industry includes facilities that manufacture pulp, paper, or other products from pulp. Converting operations, such as the production of paperboard products (e.g., containers and boxes) and coating or laminating, are not included in this assessment.

There are approximately 566 operating pulp and paper mills in the United States. This estimate was determined from responses to a 1990 EPA OW survey. (The responses to the survey are considered Confidential Business Information.) This number reflects both chemical and non-chemical mills. Many of these pulp and paper mills operate more than one type of pulping process; for example, a mill may produce pulp using a chemical process (e.g., kraft or sulfite) and a mechanical or semi-chemical process. Industry correspondence and literature sources, reflecting closures and changes that have occurred since the initial survey, were used to adjust the total number of chemical and semi-chemical mills. As of fall 1996, there were 156 total mills operating some combination of kraft, semi-chemical, sulfite, or soda pulping processes. Table 20-l shows the distribution of the 156 mills in each State by type of chemical or semi-chemical pulping process used. The States with the highest concentration of chemical pulp mills are Washington, Alabama and Georgia. Of the 156 mills, 112 are kraft mills, 16 are semi-chemical mills, 2 are soda mills, 15 are sulfite mills, 10 are co-located kraft and semi-chemical mills, and 1 is a co-located kraft and sulfite mill.

Other sources of information used to characterize mills at proposal included the 1992 voluntary NCASI survey, site visits, and literature sources (such as the Lockwood Post's Directory). After proposal, EPA received comments and new information from the industry (the March 8, 1996 Federal Register notice presents a listing of the new data). As stated above, the OW survey has been continuously updated (with information on mill names, closures, production capacities, bleaching sequences, and number of process systems) as has the Lockwood Post's Directory (with information on mill names, pulping processes, and production capacities). The latest updates for the OW survey and Lockwood Post Directory (A-92-40, IV-J-87) occurred in 1996.

20.2.2 System Approach to Emissions Estimation

20.2.2.1 System Approach Issues. At proposal, EPA developed emission factors for each type of individual emission point typically found at pulp and paper mills. To estimate

TABLE 20-l. DISTRIBUTION OF CHEMICAL AND SEMI-CHEMICAL PULP PROCESSES IN THE UNITED STATES[a]

State	Kraft	Semi-chemical	Soda	Sulfite
Alabama	14	2		
Alaska				1
Arizona	1			
Arkansas	7			
California	2			
Florida	7			1
Georgia	12	2		
Idaho	1			
Indiana		1		
Iowa		1		
Kentucky	2	1		
Louisiana	10	3		
Maine	7			1
Maryland	1			
Michigan	3	3		
Minnesota	2			
Mississippi	6			
Montana	1			
New Hampshire	1	1		
New York	1			2
North Carolina	5			
Ohio	1	2		
Oklahoma	1			
Oregon	7	2		
Pennsylvania	3			
South Carolina	6	1		
Tennessee	2	1		
Texas	6			
Virginia	4	2		
Washington	6	3		4
Wisconsin	4	1		5
Total	123	26	2	15

[a]In this table, mills with more than one pulp process are counted once for each pulp process (e.g., a mill with kraft and semi-chemical processes is listed in both kraft and semi-chemical columns). Of the 156 total mills, 112 are kraft mills, 16 are semi-chemical mills, 2 are soda mills, 15 are sulfite mills, 10 are co-located kraft and semi-chemical mills, and 1 is a co-located kraft and sulfite mill. Note that the sulfite mill in Alaska is closing.

Source: 1990 EPA OW Survey, adjusted as of Fall 1996 emissions, emission points (e.g., the digester, knotter, and washer) were grouped based on operating parameters believed to affect emissions. Their emission factors were averaged, and then assigned to a pulping line model process unit. After receiving additional test data following proposal, EPA adopted an emissions estimation approach based on mill systems. A mill system is a collection of equipment and ancillary tanks and piping that performs a discrete operation (e.g. the pulp washing system consists of pulp washer, filtrate tank, and foam tank). Test data from systems where the complete system was evaluated (i.e., all the emission points in the system were tested) were analyzed on a system basis rather than on an emission point basis, and emission factors for each system were developed. Emissions were then estimated for each mill based on which systems were present, according to survey results.

The EPA has concluded, after assessing the additional test data and industry concerns regarding the emission point approach, that the mill system approach is a better tool for analyzing the data and yields results that more accurately reflect the actual emissions from the industry. Details of industry comment and EPA response on this issue are contained in chapter 2.0, Industry Characterization. Details of the system approach to estimating mill emissions, including estimated emission factors for each mill system, are contained in the revised Chemical Pulping Emission Factor Development Document (A-92-40, IV-A-8). A summary of the rationale for using the mill system approach is contained in the March 8, 1996 Federal Register supplemental notice.

20.2.2.2 Pulping Processes. The proposal BID describes the pulping process and provides a general overview of pulping technologies and the types of equipment common to the industry. As a basis for the creation and selection of model process units, the document also notes which operating parameters influenced air emissions. Several assumptions and conclusions have been revised based on public comment and data submitted since proposal. Specifically, EPA has modified the following assumptions and conclusions since the proposal BID:

- At proposal, two model emission points had been assigned to digester blow gases on the assumption that digester blow gas emissions differ between batch and continuous digesters. (Specifically, batch digesters release gases in surges when the digester blows its entire load into a blow tank; continuous digester emissions are released at a constant rate.) Digester blow gases are now included in the "digester system and evaporators" mill system for both types of digestion because EPA's analysis of the data did not show a significant difference in the quantity of emissions as a function of digester type.

- The proposal BID suggested that brownstock washer emissions are a function of pulp production, type of digestion (batch or continuous), type of wood pulp (softwood or hardwood), and point of shower water application. New data, however, do not support establishing different emission factors for washer emissions on any basis other than washer type and HAP concentration in the shower water. The EPA's final analysis includes emission factors for low-flow washer systems (e.g., belt presses and diffusion washers) and high-flow washer systems (i.e., rotary vacuum drum washers). Based on the data, rotary vacuum drum washer systems are differentiated by the HAP concentration in the shower water.

- The proposal BID noted a relationship between wood type and emission rates for semi-chemical pulping processes.

The final analysis does not differentiate mill systems by wood type as the data do not support a significant difference in emission rates based on wood type for semi-chemical pulping processes.

20.2.2.3 Bleaching Processes. At proposal, EPA developed emission factors for each bleaching stage in the bleaching process. Each bleaching sequence (i.e., series of bleaching stages) was assigned emission factors based on the type of stages present.

Since proposal, EPA concluded that emissions from bleaching processes are more a function of mill operating parameters and equipment rather than bleaching sequence. The EPA statistically analyzed all the emission data from bleaching processes and the associated mill parameters (presence of oxygen delignification, bleaching sequence, degree of chlorine dioxide substitution, use of hypochlorite, wood type, inlet methanol concentration in the bleaching process shower water, and air flow rate of bleach plant vents). The results of the statistical analyses indicated that only the presence of a hypochlorite stage in the bleaching sequence and the degree of chlorine dioxide substitution significantly affect the level of chlorinated HAP emissions. The EPA was unable to detect a significant difference in emissions as a result of bleach sequence (apart from the presence of a hypochlorite stage or any of the other parameters). The EPA developed three emission factors to represent total bleach plant air emissions: one for bleach plants with a hypochlorite stage, one for bleach plants without a hypochlorite stage and with a low degree of chlorine dioxide substitution (60 percent or less), and one for bleach plants without a hypochlorite stage and with a high degree of chlorine dioxide substitution (greater than

60 percent). Details of the analysis of bleach plant air emissions are contained in the revised Chemical Pulping Emission Factor Development Document (A-92-40, IV-A-8). The emission factors were assigned to each bleaching process based on which case fit each bleach sequence at a mill.

20.2.3 Baseline Emissions

Baseline emissions are the uncontrolled emission estimates adjusted for the effects of current State and Federal regulations, as well as additional controls known to be currently in place based on the MACT survey. The revised estimation of the baseline level of control for kraft, semi-chemical, soda and sulfite pulping processes and for bleaching processes is documented in detail in a memorandum contained in the public docket (A-92-40, IV-B-16). The memorandum also presents the percent of systems that are controlled at each type of mill.

Two of the most significant revisions to the baseline level of control since proposal that affect the baseline emissions are the following:

- Control of all kraft LVHC vents (digester, evaporator and turpentine recovery system vents and steam stripper overheads) is now considered to be included in the baseline level of control.

- Control of only chlorinated HAP through caustic scrubbers at all bleach plants (and no control of non-chlorinated HAP) is now considered to be included in the baseline level of control.

Additionally, OW is promulgating BAT controls that would affect pulping and bleaching processes. Under one OW control option (Option A), the BAT controls would require 100 percent substitution of chlorine with chlorine dioxide and elimination of hypochlorite as a bleaching agent at all paper-grade bleaching processes. Option A would also require mills to replace vibratory screens with lower-emitting pressure screens and add a low- air flow washing stage to the washing system. These changes decrease the emissions from the pulping area. A second OW option (Option B) would require bleached paper-grade kraft mills to apply oxygen delignification in addition to the requirements of Option A. The addition of an oxygen delignification system will increase the concentration of methanol in process water recycled to the decker system. Baseline emissions are increased because of additional oxygen delignification units and higher emissions from the decker system using dirtier (i.e., higher HAP concentration) process water from oxygen delignification filtrates. The BAT requirements have not yet been established for dissolving-grade bleaching processes.

At proposal, data available to estimate HAP emissions from pulping and bleaching processes were limited. These data included a field test program of air and liquid samples from four kraft and one sulfite mills (referred to as EPA 5-mill study) (A-92-40, II-A-17 a through d) and some limited industry data (see the proposal BID). In their comments to the proposed rule, industry representatives maintained that these data were insufficient to accurately characterize emissions. Following proposal, industry commenters supplied EPA with additional test data from kraft, sulfite, semi-chemical, and soda mills. The EPA evaluated and incorporated the data into its analyses. The revised emission factors for mill systems are contained in the revised Chemical Pulping Emission Factor Development Document (A-92-40, IV-A-8).

Uncontrolled emissions from pulping vent streams are calculated by multiplying the lb/ODTP for each pollutant in each equipment system (e.g., pulp washing system), the pulp capacity (ODTP/day) for each equipment system at each mill, and the hours of operation per year. Baseline emissions from pulping vent streams are calculated by applying the emission reduction efficiency of existing control devices (e.g., 98 percent reduction for combustion devices) associated with each equipment system to the uncontrolled emissions from each system. Baseline emissions of chlorinated HAP from bleaching vent streams are calculated by applying the emission factors specific to the process conditions at each bleaching process (i.e., ClO_2 substitution level and hypochlorite use). Baseline emissions of non-chlorinated HAP do not change because of process conditions. Emissions are calculated by multiplying the non-chlorinated HAP emission factors, the pulping capacity of the mill, and the operating hours.

Uncontrolled emissions from pulping process condensates are calculated by multiplying the mass of each pollutant in the condensate by the fraction emitted (Fe) values developed from wastewater treatment models. The models are discussed in the revised Chemical Pulping Emission Factor Development Document (A-92-40, IV-A-8). Baseline emissions from pulping process condensates are calculated by applying the reduction efficiency of existing control devices (e.g., steam stripping combined with overhead vent combustion) associated with the condensate streams.

Table 20-2 presents uncontrolled and baseline emissions for an example mill. Table 20-3 summarizes estimated national baseline emissions from the pulp and paper industry (before and after OW's BAT options are applied), and includes estimates for total HAP, total VOC, TRS, and the 25 highest emitted compounds. As shown in the table, methanol is the largest constituent contributing to total HAP emissions.

The analysis does not include air emissions from mechanical wood pulping mills, secondary fiber deinking and non-deinking mills, non-wood pulping mills, paper machines, or chemical recovery at chemical and semi-chemical mills. Air emissions of HAP's from mechanical wood pulping mills, secondary fiber deinking and non-deinking mills, non-wood pulping mills and paper machines are discussed in the September 29, 1995 presumptive MACT report for non-chemical and other pulp and paper (MACT III) mills (A-95-31, II-B-l).

20.3 EMISSION CONTROL TECHNIQUES

This section discusses the assumptions made regarding control techniques applied to reduce HAP emissions from pulping, bleaching, and pulping process condensates. The MACT emission control technologies have design criteria and operating parameters (e.g., combustion control device temperature and residence time) that were determined for proposal. Based on comments and subsequent evaluation, the Agency revised some of the assumptions previously presented. Section 20.3.1 discusses vent controls and section 20.3.2 discusses pulping process condensate controls. Section 20.3.1 also presents the theory and assumptions behind the clean condensate alternative, an alternative emission control strategy that was not described in the proposal BID.

TABLE 20-2. EMISSIONS FROM AFFECTED SOURCES FOR AN EXAMPLE MILL
(1,000 tons of oven-dried pulp per day kraft mill)

Affected Sources[a]	Existing controls	Low Recycle "Open" Mill (Mg/yr)[b] HAP[c]	High Recycle "Closed" Mill (Mg/yr)[b] HAP[c]
Digester and evaporator[d]	99.9% (combustion)	2.2	2.2
Knotters	None	2.6	0.48
Screens	None	73	1.3
Pulp washing			
Rotary vacuum drum washers	None	81	280
Low air flow washers	None	20	20
Deckers	None	20	31
Oxygen delignification	None	66	225
Weak black liquor storage	None	12	12
Pulping wastewater	Biotreatment	115	115
Total - pulping area		390	690
Bleaching system[e,f]	Scrubber	65	46
Bleaching wastewater	None	64	24
Total - bleaching area		130	70
Mill total		520	760

[a]Systems listed are assumed to exist at the example mill.
[b]Emission factors taken from Chemical Pulping Emission Factor Development Document (A-92-40, IV-A-E). Emissions (Mg/yr) = emission factor (lb/ODTP) * capacity (1000 ton/day) * (350 day/yr) * (1 Mg/l.l ton) * (1 ton/2000 lb).
[c]Total HAP is calculated by summing emissions from all HAP species.
[d]Combustion control efficiency of 99.9 percent assumed in the emissions presented.
[e]No uncontrolled emission factor available. All data is post scrubber. Emissions reflect the presence of a scrubber.
[f]Assumed no hypochlorite stage and no chlorine dioxide substitution for the open mill. Assumed 100 percent substitution for the closed mill.

TABLE 20-3. SUMMARY OF ESTIMATED NATIONAL BASELINE EMISSIONS[a]

Major Pollutants	Baseline Emissions (Mg/yr)					
	HAP	VOC	TRS	Current	After OW Option A	After OW Option B
Total HAP				209,000	198,000	232,000
Total VOC				826,000	814,000	872,000
TRS				145,000	142,000	144,000
Selected Compounds						
a-pinene		√		267,000	253,000	257,000
methanol	√	√		139,000	135,000	159,000
terpenes		√		134,000	134,000	142,000
b-pinene		√		84,500	78,600	85,600
dimethyl sulfide		√	√	64,100	75,300	72,800
p-cymene		√		31,800	31,800	31,800
dimethyl disulfide		√	√	20,600	24,300	28,300
hydrogen sulfide			√	43,900	23,500	21,100
methyl mercaptan	√	√	√	16,300	19,400	22,200
o-cresol	√	√		9,800	10,600	14,600
acetaldehyde	√	√		8,140	8,940	11,100
cumene	√	√		7,520	8,030	7,980
chloroform	√	√		10,800	4,020	4,020
methyl ethyl ketone	√	√		4,230	4,700	5,640
1,2,4-trichlorobenzene	√	√		3,340	3,750	4,940
ethyl benzene	√	√		4,590	2,930	2,860
formaldehyde	√	√		2,800	3,160	3,890
phenol	√	√		2,790	2,720	3,340
carbon tetrachloride	√	√		2,500	2,740	3,040
o-xylene	√	√		2,200	1,430	1,430
1,1,1-trichloroethane	√	√		350	1,350	1,390
methylene chloride	√	√		1,020	1,200	1,220
propionaldehyde	√	√		1,850	1,170	1,390
chlorine	√			120	25	24

[a]Summary of emissions from chemical and semi-chemical pulping, bleaching, and condensate operations. Selected compounds are the 23 largest constituents of the total emissions (plus chlorine), sorted by descending baseline emissions after OW Option B.
Source: Pulp and Paper NESHAP Database Outputs. (A-92-40, IV-B-26)

20.3.1 Applicable Control Techniques for Vents

This section discusses the applicable control technologies for pulping and bleaching process vents. The control technologies can be categorized into two types of control, add-on control devices applied to an emission point or condensate stream to reduce HAP, and process modifications or substitutions that affect the formation or generation of HAP compounds. Vent control devices typically found in the industry include combustion control devices (i.e., lime kilns, power boilers, recovery furnaces, thermal oxidizers, and flares), scrubbers, and condensers. Pulping process modifications include extended cooking, oxygen delignification, use of pressure screens, and improved pulp washing. Bleaching process modifications include chlorine dioxide substitution, elimination of hypochlorite, using oxygen or peroxide in extraction stages, split chlorine addition and ozonation.

All of these technologies are described in the proposal BID (and are not discussed in this document), but the approach for estimating the effect of process modifications and the removal efficiencies of scrubbing have been updated based on the Agency's evaluation of public comments and additional data. These changes are discussed below.

20.3.1.1 Process Modifications. Process modifications affect the generation of HAP compounds, and therefore, the amount of HAP's that can be emitted. Process modifications are accounted for through assigning different emission factors to a facility; one emission factor represents conditions before the process modification and another emission factor represents conditions following the modification (i.e., before and after using pressure screens, improved washers, 100 percent ClO_2 substitution, elimination of hypochlorite). The environmental impact of the process modifications is estimated as the difference in emissions obtained from applying the two emission factors.

The emission factors used at proposal were based on a collection of emission points for individual pieces of equipment. In the mill system analysis for the final rule, process modifications are still taken into account through separate emission factors, but the impact of process modifications is estimated on a mill system basis rather than on an equipment-specific basis. The development of mill system emission factors that vary based on process modifications is detailed in the revised Chemical Pulping Emission Factor Development Document (A-92-40, IV-A-8).

20.3.1.2 Removal Efficiencies for Gas Scrubber. Commenters stated that the non-chlorinated HAP removal efficiency for bleach plant vent scrubbers was overstated, especially for methanol. The commenters stated that the scrubbers in the bleach plant were designed and operated only for removal of chlorinated compounds, primarily chlorine and chlorine dioxide. Industry testing of air vent scrubbers at bleach plants (A-92-40, II-I-24), supported 99 percent removal of chlorinated HAP (measured as chlorine) and no reduction of non-chlorinated compounds. The EPA agreed with the commenters that bleaching systems achieve at least 99 percent control of chlorinated HAP's, but do not reduce non-chlorinated HAP's. Detailed responses to comments on this topic are presented in chapters 4.0 and 6.0 of this document. The final impacts analysis reflects this updated information.

20.3.1.3 Clean Condensate Alternative. This section briefly describes the conceptual basis for the CCA, a pollution prevention option allowed in the final rule for compliance with the kraft mill air standards for HVLC system vents specified in 63.443. The CCA compliance option was not included in the proposal.

The concept behind the CCA is that a portion of the HAP emissions from a process unit that receives recycled or reused process water is attributable to the HAP concentration in that water. By reducing the HAP concentration in water that is used in open or vented process equipment, less HAP will be available to be volatilized to the atmosphere.

The EPA's evaluation of emissions from pulp washing systems supports this concept since the emission factor for pulp washing systems that received process water with a relatively high HAP concentration was greater than the emission factor developed for pulp washing systems that used low HAP concentration process water (A-92-40, item IV-A-8).

The industry submitted a CCA preliminary engineering study to EPA (A-92-40, items IV-Dl-59 and 92). The control technique presented in the study is based on biological treatment. Although no mills currently have this technology in place, the industry speculates that the CCA is capable of reducing the HAP concentration in process waters down to the 100 ppmw range. Industry asserts that the CCA can achieve HAP reductions equal to or greater than would have been achieved by implementing the MACT add-on controls on the HVLC system vents. The emission reductions would come from process equipment in the HVLC system (e.g., pulp washing system) as well as other process areas that are not addressed by the MACT standard (e.g., causticizing system).

20.3.2 Applicable Control Technologies for Pulping Process Condensates

This section addresses the technical changes to the applicable control technologies for pulping process condensate emission points. The use of steam stripping systems and biological treatment systems (combined with hard-piping) are the two pulping process condensate control technologies used by the pulp and paper industry. In addition, volume reduction options for condensate streams to be controlled have been added to the analysis since proposal.

20.3.2.1 Steam Stripping Systems. The HAP removal efficiency has been revised to reflect the comments and operating data received following proposal (A-92-40, IV-B-l0). Based on analyses of the comments and performance data, the removal efficiency for total HAP and methanol has been increased from 90 to 92 percent. The EPA has also determined that the hydrophilic properties of methanol relative to the other HAP compounds indicate that a 92 percent removal of methanol constitutes at least 92 percent removal of total HAP.

Mass removal and steam stripper system outlet concentration options were determined based on the same set of performance data used to develop the 92 percent removal of total HAP (methanol). Therefore, the following control options are found to be equivalent to the 92 percent removal achieved by steam stripping: for bleached pulp mills, pulping process condensates treated to remove 4.6 kilograms or more of total HAP per megagram of ODP or achieving a total HAP outlet concentration of 330 ppmw from the steam stripper system; and for unbleached pulp mills, pulping process condensates treated to remove 2.9 kg/Mg ODP or more or achieving a total HAP outlet concentration of 210 ppmw from the steam stripper system.

20.3.2.2 Biological Treatment Systems. In the proposed rule, a biological treatment system that achieved 90 percent reduction in total HAP was specified as one of the control options for pulping process condensates. A closed-collection system had to be used to convey the pulping process condensates to the biological treatment system (i.e., hard-piping).

In the final rule, biological treatment systems are retained as a compliance option. However, the total HAP destruction efficiency has been increased from 90 percent to 92 percent to reflect the revisions made to the steam stripper system performance requirements. Additionally, the closed-collection system requirements for tanks, containers, surface impoundments, and drain system in the proposed rule were revised. In the final rule, the individual drain systems must meet the requirements specified in referenced §§ 63.960, 63.961, 63.962, and 63.964 of subpart RR of part 63.

20.3.2.3 Condensate Segregation. The final rule contains provisions for allowing mills the option of minimizing the volume of digester, turpentine recovery, and evaporator system condensates sent to treatment in the steam stripping or biological treatment systems. Condensate segregation is typically achieved using multistage condensation techniques on the vent stream gases or vapors. Industry commented that mills would perform condensate segregation in order to generate a low volume, high HAP concentration stream that would be sent to treatment and a high volume, low HAP concentration stream that could be sent to the mill's hot water tank for distribution to other process areas (e.g., pulp washing system). This practice will reduce the energy cost associated with steam stripping (more concentrated, lower volume stream sent to treatment) and reduce the demand for fresh water in the mill process.

Based on industry data received since proposal, the mills that use this practice can achieve a 65/35 percent mass split (A-92-40, item IV-B-24). This means that 65 percent of the total HAP mass is contained in the LVHC stream. In addition to achieving the percent mass split, the final rule contains an option for achieving the segregation option requirements based on sending a minimum HAP mass to treatment from the segregated digester, turpentine recovery, and evaporator system condensates and the LVHC and HVLC collection system condensates.

20.4 CONTROL OPTIONS AND ENVIRONMENTAL IMPACTS

Section 20.4.1 presents the control options that were analyzed to estimate national impacts of the final rule.

Section 20.4.2 discusses emissions reductions and secondary environmental impacts.

20.4.1 Control Options

This section presents the options analyzed to estimate the national impacts of the final rule. The rationale for choosing the MACT floor or going beyond the floor is discussed in the preambles to the proposed and final rules, and in chapter 4.0 of this document. The final rule specifies a MACT technology to be used to control emissions. The final rule also allows mills to use other control technologies, including control devices and process modifications or chemical substitutions, if they achieve equivalent control to the MACT technology. For purposes of estimating costs and environmental impacts, the Agency selected control technologies that would represent how mills could comply with the final rule. Table 20-4 presents the options considered for existing pulping sources in the national impacts analysis. Table 20-5 presents the options considered for new pulping sources. The first option shows the option selected for the final rule. Additional options above the sources covered by the final rule, in order of cost-effectiveness, are also presented. Subsequent tables only present costs and impacts for the selected option.

For bleaching systems, the MACT floor is control of chlorinated HAP's (by 99 percent) using a caustic scrubber. Information supplied by commenters to the proposed rule and industry survey responses indicate that all bleach plants use scrubbing technologies to reduce chlorinated HAP emissions. As stated in the proposal preamble, EPA analyzed more stringent controls, such as combustion of scrubber vent gases or combustion of bleaching vent gases followed by a scrubber. These more stringent options were determined to be unreasonable considering

TABLE 20-4. CONTROL OPTIONS FOR EXISTING PULPING SOURCES

Subcategory	Option	Equipment System
Kraft	1	Pulp washing, oxygen delignification, high emitting deckers, high emitting knotters and screens, and steam stripping condensates
	2	Option 1 systems, and weak liquor storage tanks
	3	Option 2 systems, and low emitting deckers
	4	Option 3 systems, and low emitting knotters and screens
Sulfite	1	Digester, evaporator, end stock washer
	2	Option 1 systems, and weak liquor tanks and strong liquor tanks
Semi-chemical	1	Digesters and evaporators
	2	Option 1 systems, and pulp washing
Soda	1	Digesters and evaporators
	2	Option 1 systems, and pulp washing

TABLE 20-5. CONTROL OPTIONS FOR NEW PULPING SOURCES

Subcategory	Option	Equipment System
Kraft	1	Pulp washing, oxygen delignification, all deckers, all knotter and screens, weak liquor storage tanks, and steam stripping condensates
	2	Option 1 systems, and pulp storage tanks
Sulfite	1	Digester, evaporator, red stock washer
	2	Option 1 systems, and weak liquor tanks and strong liquor tanks
Semi-chemical	1	Digesters and evaporators, pulp washing system
	2	Option 1 systems, and pulp storage tanks
Soda	1	Digesters and Evaporators, pulp washing systems
	2	Option 1 systems, and pulp storage tanks

the cost and environmental impacts. The EPA's baseline analysis of air impacts on the bleaching system are after OW's BAT options are implemented (see section 20.2.2). No additional control technologies or options in the bleaching systems were identified.

20.4.2 Environmental Impacts

This section discusses the methodology used to estimate national air, water, energy, and other environmental impacts of the final rule. For the final rule, impacts were estimated for each individual mill and summed to provide the national estimate. Mill-by-mill variations in costs and impacts are a function of mill-specific design, equipment, and operating parameters, which are based on the site specific mill data obtained from the 1992 voluntary MACT survey and the OW survey, and updated from comments and information provided in response to the proposed rule. Section 20.6 (Data Base System for Estimating National Impacts) presents the procedure for assigning default process operations and equipment to mills where site specific information was unavailable.

20.4.2.1 Primary Air Impacts The primary air impacts include the reduction of HAP, VOC, and TRS emissions directly attributed to applying the control options. Emission reductions for kraft, soda, and semi-chemical pulping vents are calculated by applying the reduction efficiency of combustion devices (98 percent) to the baseline emissions for systems not already controlling emissions using a combustion device. Emission reductions for sulfite mills are estimated based on the the reduction from baseline necessary to meet the sulfite pulping emission limits.

Table 20-6 presents primary air impacts for an example mill. Table 20-7 presents the national primary air impacts (baseline and emission reductions) of MACT controls, by mill type and mill area (pulping vents, pulping wastewater, bleaching vents, and bleaching wastewater) for methanol, total HAP, total VOC, and TRS after OW's BAT Option A has been applied. Table 20-8 presents similar information after OW's BAT Option B has been applied.

20.4.2.2 Energy Impacts. Additional energy is required for the control of vent streams and condensate streams. This energy may take the form of electricity, steam, or fuel. Table 20-9 lists the areas of the mills where energy is consumed to meet the MACT standard.

For pulping vent streams, the amount of electricity required to operate equipment (e.g., fans, pumps) and auxiliary fuel needed to combust vent streams were determined from algorithms contained in the OCCM (A-92-40, II-A-4), in the proposal BID (A-92-40, II-A-35), and in supporting memoranda (A-92-40, IV-B-13, IV-B-28). The amount of electricity required to operate fans or pumps is estimated from the horsepower required to provide motive force to transport vent and condensate streams to control devices. Electricity demand was assumed to be met using off-site power generation facilities. Electricity demand was converted to equivalent fuel requirements assuming off-site power

When a combustion device is used to control HAP emissions, auxiliary fuel may be required to sustain combustion. At proposal, vent streams were assumed to be combusted in existing combustion devices to estimate the effect on fuel usage requirements. Following proposal, EPA determined that some mills could use existing devices for combusting vent streams, while

TABLE 20-6. PRIMARY AIR IMPACTS FOR AN EXAMPLE MILL
(1,000 tons of oven-dried pulp per day kraft mill)

Affected sources	Baseline HAP emissions after OW Option A (Mg/yr) [a]	Control Option	Emission reduction (percent)			Emission reduction (Mg/yr)		
			HAP	VOC	TRS	HAP	VOC	TRS
Digester and evaporator	2.2	None	None	None	None	None	None	None
Knotters	0.48	Combustion	98	98	98	0.47	0.60	0.11
Screens	1.3	Combustion	98	98	98	1.3	1.6	0.31
Pulp washing								
Rotary vacuum drum washers	280	Combustion	98	98	98	274	810	190
Low air flow washers	20	Combustion	98	98	98	20	62	14
Deckers	31	Combustion	98	98	98	31	300	35
Oxygen delignification	225	Combustion	98	98	98	220	63	20
Weak black liquor storage	12	None	None	None	None	None	None	None
Pulping wastewater	115[b]	None	None	None	None	None	None	None
Total - pulping area	687					550	1200	260
Bleaching system	46	None	None	None	None	None	None	None
Bleaching wastewater	24	None	None	None	None	None	None	None
Total - bleaching area	70							
Mill total	757					550	1200	260

[a]Baseline HAP emissions assumes control of digester and evaporator vents and OW Option A process changes (including no hypochlorite state and 100 percent ClO_2 substitution in the bleaching system).
[b]The baseline HAP emissions of 115 Mg/yr corresponds to a mill using biological treatment with a HAP FE equal to 6.3 percent.

TABLE 20-7. NATIONAL EMISSIONS AND REDUCTIONS FROM THE MACT, AFTER APPLYING OW OPTION A (Mg/yr)[a]

Pollutant	Pulping Vents		Pulping Condensates		Bleaching Vents		Bleaching Condensates		Industry Total	
	Baseline after OW Option A	Reductions from the MACT	Baseline after OW Option A	Reductions from the MACT	Baseline after OW Option A	Reductions from the MACT	Baseline after OW Option A	Reductions from the MACT	Baseline after OW Option A	Reductions from the MACT
INDUSTRY TOTAL										
Total HAP	165,537	124,382	12,178	3,880	6,689	-	13,554	-	197,958	128,262
Total VOC	778,444	392,901	11,841	3,880	10,699	-	13,335	-	814,319	396,782
TRS	140,807	75,493	-	-	1,647	-	-	-	142,454	75,493
Methanol	110,036	88,600	11,262	3,861	5,016	-	8,585	-	135,005	92,461
Chloroform	420	267	-	-	500	-	3,104	-	4,024	267
Total Chlorinated HAP	6,926	5,193	-	-	580	-	3,601	-	11,224	5,193
KRAFT										
Total HAP	157,235	118,524	10,116	3,880	5,824	-	12,976	-	186,151	122,404
Total VOC	765,226	386,176	10,092	3,880	9,688	-	12,735	-	797,741	390,056
TRS	139,969	75,493	-	-	1,647	-	-	-	141,616	75,947
Methanol	103,631	83,590	10,022	3,861	4,643	-	8,074	-	126,370	87,451
Chloroform	399	250	-	-	404	-	3,090	-	3,893	250
Total Chlorinated HAP	6,802	5,168	-	-	469	-	3,584	-	10,855	5,168
SEMICHEM										
Total HAP	2,197	864	550	-	-	-	-	-	2,747	864
Total VOC	4,942	909	550	-	-	-	-	-	5,492	909
TRS	838	0	-	-	-	-	-	-	838	0
Methanol	1,564	607	550	-	-	-	-	-	2,220	607
Chloroform	3	0	-	-	-	-	-	-	3	0
Total Chlorinated HAP	29	0	-	-	-	-	-	-	29	0
SODA										
Total HAP	678	596	103	-	57	-	97	-	935	596
Total VOC	1,903	1,402	103	-	72	-	97	-	2,176	1,402
TRS	-	-	-	-	-	-	-	-	-	-
Methanol	597	541	103	-	49	-	86	-	835	541
Chloroform	1	1	-	-	2	-	8	-	11	1
Total Chlorinated HAP	1	1	-	-	2	-	9	-	12	1

TABLE 20-7. NATIONAL EMISSIONS AND REDUCTIONS FROM THE MACT, AFTER APPLYING OW OPTION A (Mg/yr)[a] (Continued)

Pollutant	Pulping Vents		Pulping Condensates		Bleaching Vents		Bleaching Condensates		Industry Total	
	Baseline after OW Option A	Reductions from the MACT	Baseline after OW Option A	Reductions from the MACT	Baseline after OW Option A	Reductions from the MACT	Baseline after OW Option A	Reductions from the MACT	Baseline after OW Option A	Reductions from the MACT
SULFITE										
Total HAP	5,428	4,398	1,409	-	808	-	481	-	8,126	4,398
Total VOC	6,373	4,414	1,096	-	939	-	502	-	8,910	4,414
TRS	-	-	-	-	-	-	-	-	-	-
Methanol	4,245	3,862	587	-	324	-	424	-	5,580	3,862
Chloroform	17	17	-	-	93	-	6	-	116	17
Total Chlorinated HAP	94	24	-	-	108	-	7	-	208	24

[a] A "-" in the column represents zero emissions, while a zero in the column represents a result less than 0.5 Mg/yr. Baseline emissions represent the baseline emissions after implementing the OW Option A. Reductions represents the amount of emissions reduction from applying the MACT requirements.

TABLE 20-8. NATIONAL EMISSIONS AND REDUCTIONS FROM THE MACT, AFTER APPLYING OW OPTION B (Mg/yr)[a]

Pollutant	Pulping Vents		Pulping Condensates		Bleaching Vents		Bleaching Condensates		Industry Total	
	Baseline after OW Option B	Reductions from the MACT	Baseline after OW Option B	Reductions from the MACT	Baseline after OW Option B	Reductions from the MACT	Baseline after OW Option B	Reductions from the MACT	Baseline after OW Option B	Reductions from the MACT
INDUSTRY TOTAL										
Total HAP	199,866	157,576	12,179	4,081	6,689	-	13,554	-	232,287	161,657
Total VOC	836,521	449,050	11,842	4,081	10,699	-	13,335	-	872,398	453,117
TRS	142,822	77,468	-	-	1,647	-	-	-	144,469	77,468
Methanol	133,665	114,790	11,263	4,062	5,016	-	8,585	-	158,634	116,120
Chloroform	420	267	-	-	500	-	3,104	-	4,024	267
Total Chlorinated HAP	9,274	7,379	-	-	580	-	3,601	-	13,454	7,379
KRAFT										
Total HAP	191,312	151,718	10,117	4,081	5,824	-	12,976	-	220,228	155,799
Total VOC	822,712	442,325	10,093	4,081	9,688	-	12,735	-	855,228	446,406
TRS	141,984	77,468	-	-	1,647	-	-	-	143,631	77,922
Methanol	127,031	107,047	10,023	4,062	4,643	-	8,074	-	149,772	110,381
Chloroform	398	248	-	-	404	-	3,090	-	3,893	248
Total Chlorinated HAP	9,100	7,304	-	-	469	-	3,584	-	13,153	7,304
SEMICHEMICAL										
Total HAP	2,197	864	550	-	-	-	-	-	2,747	864
Total VOC	4,942	909	550	-	-	-	-	-	5,492	909
TRS	838	-	-	-	-	-	-	-	838	0
Methanol	1,564	607	550	-	-	-	-	-	2,220	607
Chloroform	3	0	-	-	-	-	-	-	3	0
Total Chlorinated HAP	29	0	-	-	-	-	-	-	29	0
SODA										
Total HAP	929	596	103	-	57	-	97	-	1,186	596
Total VOC	2,495	1,402	103	-	72	-	97	-	2,767	1,402
TRS	-	-	-	-	-	-	-	-	-	-
Methanol	825	541	103	-	49	-	86	-	1,063	541
Chloroform	2	2	-	-	2	-	8	-	12	2
Total Chlorinated HAP	51	51	-	-	2	-	9	-	63	51

TABLE 20-8. NATIONAL EMISSIONS AND REDUCTIONS FROM THE MACT, AFTER APPLYING OW OPTION B (Mg/yr)[a] (Continued)

Pollutant	Pulping Vents		Pulping Condensates		Bleaching Vents		Bleaching Condensates		Industry Total	
	Baseline after OW Option B	Reductions from the MACT	Baseline after OW Option B	Reductions from the MACT	Baseline after OW Option B	Reductions from the MACT	Baseline after OW Option B	Reductions from the MACT	Baseline after OW Option B	Reductions from the MACT
SULFITE										
Total HAP	5,428	4,398	1,409	-	808	-	481	-	8,126	4,398
Total VOC	6,373	4,414	1,096	-	939	-	502	-	8,910	4,414
TRS	-	-	-	-	-	-	-	-	-	-
Methanol	4,245	3,862	587	-	324	-	424	-	5,580	3,862
Chloroform	17	17	-	-	93	-	6	-	116	17
Total Chlorinated HAP	94	24	-	-	108	-	7	-	209	24

[a] A "-" in the column represents zero emissions, while a zero in the column represents a result less than 0.5 Mg/yr. Baseline emissions represent the baseline emissions after implementing the OW Option B. Reductions represents the amount of emissions reduction from applying the MACT requirements.

TABLE 20-9. SUMMARY OF TYPES OF ENERGY REQUIREMENTS OF MACT AND OW STANDARDS (by process area)

Area	Energy	Location of Energy Provider	Source Requiring Energy	Description of Source	Fuel
Pulping vents	Auxiliary fuel	On-site	Combustion device	Incinerator	Methane
				Existing boiler	Mixture of fuels
	Electricity	Off-site from power grid	Fans	Motive force for vents from emission point to control device	Residual oil
			Pumps	Motive force for condensate stream from condenser to tanks	Residual oil
Pulping condensates	Steam	On-site from boilers	Steam stripper	Used to remove pollutants from pulping process condensates stream	Mixture of fuels
Bleaching System	Electricity	Off-site from power grid	Fans	Motive force for vents from emission point to control device	Residual oil
			Pumps	Motive force for condensate stream from condenser to tanks	Mixture of fuels
			Chlorate production	Chemical manufacturing, energy supplied to the chemical manufacturer by off-site electrical producer	Residual oil

others would need to construct a stand-alone incinerator (A-92-40, IV-E-93).

For stand-alone incinerators, EPA assumed that natural gas would be used as the auxiliary fuel. For existing boilers, a mixture of hog fuel (i.e., wood waste) (60 percent), oil (10 percent), natural gas (10 percent), and coal (20 percent) was assumed based on fuel usage information supplied by the pulp and paper industry in responses to the OW survey (A-92-40, IV-B-28). The fuel energy required to combust vent streams was calculated in the incinerator and boiler design algorithms from the OCCM. For boilers, the fuel energy was converted to the mass of hog fuel, oil, natural gas, and coal needed using the fuel splits presented above and the heating value of each fuel (4,500 Btu per lb of coal; 18,000 Btu per lb of oil; 1,000 Btu per standard cubic foot of natural gas; and 13,000 Btu per lb of hog fuel). (A-92-40, IV-J-78)

For kraft pulping condensates, increased steam is required for stripping HAP-laden condensate streams. Steam demand was converted to equivalent fuel requirements based on the same composite of fuels used in the existing boiler assumption. Table 20-10 presents energy impacts for an example mill. Table 20-11 presents national energy requirements.

20.4.2.3 Secondary Air Impacts. The secondary air impacts evaluated are the increases in criteria pollutant emissions (SO_2, CO, NO_x, PM, and VOC) resulting from: (1) combustion of compounds in vent streams and (2) increased burning of fuel used as auxiliary fuel or for steam or electricity generation used for powering equipment.

TABLE 20-10. ENERGY IMPACTS FOR AN EXAMPLE MILL[a]
(1,000 tons of oven-dried pulp per day kraft mill)

Area	Energy requirements (Million Btu/yr)			
	Pulping vents	Pulping condensates	Bleaching vents	Total
After OW Option A				
MACT I electricity	57,745	--	--	57,745
MACT I auxiliary fuel	20,319	--	--	20,319
MACT I steam	--	135,977	--	135,977
MACT II electricity	2,610	--	--	2,610
OW on-site electricity	10,941	--	--	10,941
OW off-site electricity	--	--	51,945	51,945
OW steam	(15,221)	--	--	(15,221)
OW wastewater	--	(28,584)	--	(28,584)
TOTAL	76,394	107,393	51,945	235,732
After OW Option B				
MACT I electricity	66,582	--	--	66,582
MACT I auxiliary fuel	23,577	--	--	23,577
MACT I steam	--	135,977	--	135,977
MACT II electricity	2,610	--	--	2,610
OW on-site electricity	60,487	--	--	60,487
OW off-site electricity	--	--	(95,622)	(95,622)
OW steam	(16,052)	--	--	(16,052)
OW wastewater	--	(26,614)	--	(26,614)
TOTAL	137,204	109,363	(95,622)	150,945

[a]Sources being controlled are defined in Table 20-2. Table shows requirements, so negative values (in parenthesis) are net energy credits. A "--" in the table indicates no energy impacts for the given area.

TABLE 20-11. NATIONAL ENERGY IMPACTS AFTER MACT AND OW OPTIONS (Million Btu/yr)[a]

Energy demand description	Pulping vents	Pulping condensates	Bleaching vents	Total
After MACT and OW Option A				
Electricity	9,830,643	(4,058,136)	7,374,715	13,147,222
Auxiliary fuel	2,989,103	--	--	2,989,123
Steam	(2,161,000)	19,112,019	--	16,957,193
Total	10,658,746	15,053,883	7,374,715	33,087,344
After MACT and OW Option B				
Electricity	18,162,959	(3,788,493)	(13,575,681)	808,785
Auxiliary fuel	3,466,194	--	--	3,466,214
Steam	(2,279,000)	19,112,019	--	16,833,019
Total	19,350,153	15,333,526	(13,575,681)	21,107,998

[a]Energy impacts include those associated with applying the MACT (I, II, and III) and with applying the OW options. The table reports impacts. Negative results, shown in parenthesis, are therefore net energy credits. A "--" in the table indicates no energy impacts for the given area.

The combustion of vent gases results in secondary emissions of sulfur dioxide. The proposal BID presented secondary emissions of sulfur dioxide based on combustion of TRS compounds only (i.e., hydrogen sulfide, dimethyl disulfide, dimethyl sulfide, and methyl mercaptan). For the final rule, secondary emissions of sulfur dioxide were estimated by assuming complete stoichiometric combustion of all sulfur containing compounds (i.e., the TRS compounds, and carbon disulfide and carbonyl sulfide) to the combustion end products of water, ClO_2, and sulfur dioxide. For example, 1 kilogram of hydrogen sulfide oxidizes to form 1.88 kilograms of sulfur dioxide. The new methodology increases the sulfur dioxide emissions calculated for the final rule.

The impacts calculated for the final rule may over-estimate sulfur dioxide emissions because mills may be able to use existing sulfur dioxide controls to reduce sulfur dioxide emissions. However, EPA does not have sufficient information on the number and effectiveness of these controls, so no reductions were taken. Also, mills may use other control options that may not increase sulfur dioxide emissions, such as the clean condensate alternative or low-emitting equipment.

Criteria pollutants are also emitted from fuel used to generate electricity and steam, and from the burning of auxiliary fuel to combust vent streams. Areas where energy is consumed are presented in table 20-9. Criteria pollutant emissions were calculated from the amount of fuel required (as discussed in section 20.4.2.2) and criteria pollutant emission factors (usually in pound of pollutant per ton or gallon of fuel) presented in previous EPA studies for combustion of each fuel. (A-92-40, IV-J-77)

Scrubbing of bleaching system vent streams was assumed to generate no secondary air emissions because all bleached mills are assumed to be already operating a scrubber, and no additional control techniques were applied to the bleaching system.

Table 20-12 presents secondary air impacts for an example mill. Tables 20-13 and 20-14 present national secondary air emissions from applying the MACT requirements and OW Option A and Option B, respectively, to the current baseline.

20.4.2.4 Water and Other Impacts. No significant revisions were made to the assumptions or conclusions regarding water impacts and other impacts (i.e., noise, visual, odor, and solid waste).

20.5 ESTIMATED CONTROL COSTS

This section presents the national cost of the final rule and the changes made to the costing methodology. Section 20.5.1 discusses the assumptions used for sizing and estimating the costs of control technologies; section 20.5.2 presents estimated national costs.

20.5.1 Control Cost Methodology.

The national costs are estimated by calculating the cost of each control option applicable to each mill and summing the mill-specific results to obtain a national total.

The OCCM was used to size and cost equipment in the proposed and final rules. In general, most of the inputs to the OCCM design and cost algorithms did not change from proposal. Some of the global changes were to the interest rate used to estimate capital recovery (7 percent was used in the final rule instead of 10 percent) and labor and utility rates were updated.

The EPA has assumed some different control technologies and equipment for the final rule, which required a revision of the costs. These changes are discussed below.

TABLE 20-12. SECONDARY AIR IMPACTS FOR AN EXAMPLE MILL (Mg/yr)[a]
(1,000 tons of oven-dried pulp per day kraft mill)

		CO	NO_x	PM[b]	SO_2	VOC[c]
Area; After OW Option A						
Pulping vents	MACT I electric	0.90	9.78	0.01	19.54	0.05
	MACT I fuel[d]	8.62	3.03	0.08	7.39	0.08
	MACT II electric	0.04	0.44	0.00	0.88	0.00
	OW electric on-site	0.17	1.85	0.00	3.71	0.01
	OW steam	(6.46)	(2.27)	(0.06)	(5.53)	(0.06)
	Vent combustion[e]	--	--	--	588.77	20.77
Pulping condensates	MACT I steam	57.69	20.28	0.56	49.43	0.54
	OW wastewater	(0.44)	(4.84)	(0.00)	(9.68)	(0.03)
Bleaching	OW electric off-site	0.80	8.80	0.00	17.57	0.05
Total		61	37	0.59	672	21
Area; After OW Option B						
Pulping vents	MACT I electric	57.69	20.28	0.56	49.43	0.54
	MACT I fuel[d]	10.00	3.51	0.09	8.57	0.09
	MACT II electric	0.04	0.44	0.00	0.88	0.00
	OW electric on-site	0.94	10.24	0.00	20.46	0.06
	OW steam	(6.81)	(2.40)	(0.06)	(5.83)	(0.06)
	Vent combustion[e]	--	--	--	604.16	23.76
Pulping condensates	MACT I steam	1.02	11.28	0.01	22.52	0.06
	OW wastewater	(0.41)	(4.51)	(0.00)	(9.00)	(0.02)
Bleaching	OW electric off-site	(1.48)	(16.19)	(0.01)	(32.34)	(0.08)
Total		61	23	0.59	659	24

[a]Sources being controlled are defined in Table 20-2. Table shows emissions, so negative values, (in parenthesis) indicate reductions. A "--" in the table represents no secondary air impacts, while a "0.00" in the table indicates less than 0.005 Mg/yr.
[b]PM emissions are assumed to be reduced by 90 percent using existing electrostatic precipitators on existing combustion devices.
[c]VOC generated from incomplete combustion.
[d]Calculated using EPA derived emission factors for fuel types (A-92-40, IV-J-77), fuel splits from the OW industry survey, and energy in table 20-10.
[e]Calculated assuming stoichiometric conversion of all sulfur containing compounds to SO_2, water, and CO_2.

TABLE 20-13. SECONDARY AIR EMISSIONS AND ENERGY IMPACTS FROM APPLYING THE MACT AND OW OPTION A TO THE CURRENT BASELINE[a]

Secondary Pollution Impacts	Pulping Vents	Pulping Condensates	Bleaching Vents	Bleaching Condensates	Kraft Total
KRAFT					
Energy (10^6 Btu/yr)	10,731,190	15,094,464	7,300,968	-	33,126,622
SO2 (Mg/yr)	86,397	5,593	2,469	-	94,459
NOx (Mg/yr)	1,803	2,170	1,237	-	5,210
CO (Mg/yr)	458	8,047	113	-	8,607
VOC (Mg/yr)	2,775	228	7	-	3,010
PM (Mg/yr)	4	79	0	-	83
SEMICHEM					
Energy (10^6 Btu/yr)	(296,658)	-	-	-	(296,658)
SO2 (Mg/yr)	(103)	-	-	-	(103)
NOx (Mg/yr)	(50)	-	-	-	(50)
CO (Mg/yr)	20	-	-	-	20
VOC (Mg/yr)	18	-	-	-	18
PM (Mg/yr)	0	-	-	-	0
SODA					
Energy (10^6 Btu/yr)	55,124	(40,581)	73,747	-	88,290
SO2 (Mg/yr)	20	(14)	25	-	31
NOx (Mg/yr)	8	(7)	12	-	14
CO (Mg/yr)	19	(1)	11	-	29
VOC (Mg/yr)	25	(0)	0	-	25
PM (Mg/yr)	0	(0)	0	-	0
SULFITE					
Energy (10^6 Btu/yr)	169,090	-	-	-	169,090
SO2 (Mg/yr)	57	-	-	-	57
NOx (Mg/yr)	29	-	-	-	29
CO (Mg/yr)	3	-	-	-	3
VOC (Mg/yr)	0	-	-	-	0
PM (Mg/yr)	0	-	-	-	0

TABLE 20-13. SECONDARY AIR EMISSIONS AND ENERGY IMPACTS FROM APPLYING THE MACT AND OW OPTION A TO THE CURRENT BASELINE (Mg/yr)[a] (Continued)

Secondary Pollution Impacts	Pulping Vents	Pulping Condensates	Bleaching Vents	Bleaching Condensates	Kraft Total
INDUSTRY TOTAL					
Energy (10^6 Btu/yr)	10,658,746	15,053,883	7,374,715	-	33,087,343
SO2 (Mg/yr)	86,371	5,579	2,494	-	94,444
NOx (Mg/yr)	1,791	2,163	1,249	-	5,203
CO (Mg/yr)	499	8,046	124	-	8,659
VOC (Mg/yr)	2,818	228	7	-	3,053
PM (Mg/yr)	4	79	0	-	83

[a] Results shown are emissions and impacts resulting from applying OW Option A and the MACT requirements to the current baseline. Results are emissions or impacts, therefore negative values indicate a reduction of emission or a net energy credit. A "-" in the table represents a value of zero, while a zero in the table represents a result less than 0.5 Mg/yr (or 0.5 MMBtu/yr).

TABLE 20-14. SECONDARY AIR EMISSIONS AND ENERGY IMPACTS FROM APPLYING THE MACT AND OW OPTION B TO THE CURRENT BASELINE[a]

Secondary Pollution Impacts	Pulping Vents	Pulping Condensates	Bleaching Vents	Bleaching Condensates	Kraft Total
KRAFT					
Energy (10^6 Btu/yr)	19,284,308	15,371,311	(13,439,924)	-	21,215,695
SO2 (Mg/yr)	91,460	5,688	(4,546)	-	92,602
NOx (Mg/yr)	3,243	2,216	(2,276)	-	3,183
CO (Mg/yr)	731	8,041	(208)	-	8,564
VOC (Mg/yr)	3,204	229	(12)	-	3,421
PM (Mg/yr)	6	79	(1)	-	84
SEMICHEM					
Energy (10^6 Btu/yr)	(261,242)	-	-	-	(261,242)
SO2 (Mg/yr)	(90)	-	-	-	(90)
NOx (Mg/yr)	(44)	-	-	-	(44)
CO (Mg/yr)	24	-	-	-	24
VOC (Mg/yr)	18	-	-	-	18
PM (Mg/yr)	0	-	-	-	0
SODA					
Energy (10^6 Btu/yr)	132,123	(37,785)	(135,757)	-	(41,419)
SO2 (Mg/yr)	46	(13)	(46)	-	(13)
NOx (Mg/yr)	21	(6)	(23)	-	(9)
CO (Mg/yr)	21	(1)	(2)	-	18
VOC (Mg/yr)	25	(0)	(1)	-	24
PM (Mg/yr)	0	(0)	(0)	-	0
SULFITE					
Energy (10^6 Btu/yr)	194,964	-	-	-	194,964
SO2 (Mg/yr)	66	-	-	-	66
NOx (Mg/yr)	33	-	-	-	33
CO (Mg/yr)	3	-	-	-	3
VOC (Mg/yr)	0	-	-	-	0
PM (Mg/yr)	0	-	-	-	0

TABLE 20-14. SECONDARY AIR EMISSIONS AND ENERGY IMPACTS FROM APPLYING THE MACT AND OW OPTION B TO THE CURRENT BASELINE (Mg/yr)[a] (Continued)

Secondary Pollution Impacts	Pulping Vents	Pulping Condensates	Bleaching Vents	Bleaching Condensates	Kraft Total
INDUSTRY TOTAL					
Energy (10^6 Btu/yr)	19,350,153	15,333,526	(13,575,681)	-	21,107,998
SO2 (Mg/yr)	91,481	5,675	(4,592)	-	92,564
NOx (Mg/yr)	3,253	2,210	(2,299)	-	3,164
CO (Mg/yr)	779	8,040	(210)	-	8,610
VOC (Mg/yr)	3,247	229	(13)	-	3,463
PM (Mg/yr)	6	79	(1)	-	84

[a] Results shown are emissions and impacts resulting from applying OW Option B and the MACT requirements to the current baseline. Results are emissions or impacts, therefore negative values indicate a reduction of emission or a net energy credit. A "-" in the table represents a value of zero, while a zero in the table represents a result less than 0.5 Mg/yr (or 0.5 million Btu/yr).

20.5.1.1 Enclosures and Vent Gas Conveyance Svstems. The algorithms and assumptions used for estimating the cost of equipment enclosures, as presented in the proposal BID, have not been revised. However, assumptions regarding ductwork used for the conveyance of vent streams from either discrete emission points or from enclosures to the control devices have been revised (A-92-40, IV-B-13). Specifically, the following design assumptions affecting cost have been revised since proposal:

- Based on comments received following proposal, the duct length from the emission points and enclosures to existing combustion devices has been increased from 1,000 feet to 1,500 feet.

- At proposal, the equipment comprising the ductwork system was assumed to include ductwork and elbows, fan, knock-out drum(s), flame arrestor(s), rupture discs, supports, and insulation. Based on comments to the proposed rule, EPA also included the following additional equipment: condenser, condensate storage tank(s), and sampling port(s).

- Costs for ductwork at bleach plants were not evaluated because mills are already controlling the chlorinated vents. Analysis of non-chlorinated vents were dropped as an option as discussed earlier.

20.5.1.2 Control Technology Costs for Vents. For the thermal oxidizer system, heat recovery is a key variable affecting capital costs. At proposal, the model mill that was used to calculate costs was assumed to combust pulping vents in an existing combustion device (e.g., lime kiln or power boiler). Therefore, no heat recovery for a thermal oxidizer was assumed. After proposal, EPA surveyed several mills on the capacity of existing combustion devices to combust additional vent streams (A-92-40, IV-E-85). The results of the survey indicated that two-thirds may have the capacity in their existing combustion devices, while one-third would construct a stand-alone incinerator. This ratio was used to estimate national impacts. Because EPA did not have sufficient information to assign the control scenarios to each mill, costs were calculated assuming one-third of the costs for controlling pulping systems were from a stand-alone incinerator and two-thirds of the cost was from routing vent streams to an existing boiler. A 95 percent heat recovery was assumed in developing the final thermal oxidizer system costs. Costs associated with a thermal oxidizer were calculated using algorithms on the OCCM. These algorithms were previously used to cost thermal oxidizers to control bleaching system vents in the proposal BID.

20.5.1.3 Control Technology Costs for Pulping Process Condensates. This section describes the steam stripper design considerations. It also provides the design parameters affecting cost and the general methodology used to develop capital and annual costs for steam-stripping and for hard-piping condensate streams to wastewater treatment systems.

Steam stripping costs. No revisions were made since proposal to the general methodology used to develop capital and annual costs for steam stripper systems, but some specific revisions were made to the steam stripper design assumptions used in the costing methodology. As discussed in section 20.3.2.1, the removal efficiency of methanol was increased from 90 to 92 percent.

The volumetric flow rate of condensate sent to the stripper system was also revised. Based on industry data submitted following proposal (A-92-40, item IV-B-g), the flow rate was decreased from approximately 1 GPM per ADTP to 0.20 GPM per ADTP. The revised value is more accurately reflects the volumes of condensate treated in the existing steam stripper systems.

The steam stripper column tray efficiency was reduced from 67 percent to 50 percent. This revision was made based on industry comments indicating that a 50 percent efficiency more accurately reflects the operation of steam strippers in the pulp industry due to plugging of tray openings associated with the fiber content of pulping process condensates.

Steam stripper cost credits were developed for the methanol rectification process and the reduced amount of BOD sent to biological treatment system because of the operation of the steam stripper. The methanol rectification credit is based on costs savings associated with replacing fossil fuels used for power generation with the concentrated methanol condensates derived from the steam stripper vent gases (A-92-40, IV-B-17). The biological treatment system cost credit was developed based on information submitted by industry following proposal (A-92-40, IV-B-25).

Hard-piping to biological treatment system costs. The cost of biological treatment was not estimated at proposal. Following proposal, several companies submitted estimates for the costs associated with hard-piping pulping process condensates to a biological treatment system. These costs were normalized to a dollar per ton of pulp produced basis ($1,230 per PDTP total capital investment, $197 per ODTP total annual cost). The normalized cost factor was then used to estimate the cost of hard-piping for other mills. (A-92-40, IV-B-25)

20.5.2 National Costs for the Control Options

Tables 20-15 and 20-16 present summaries of total capital investment and total annual cost by mill type for the control options chosen in the final rule (and options beyond the chosen option) after OW Option A and B have been implemented. Tables 20-15 and 20-16 present costs for controlling existing sources only. A summary and discussion of total capital investment and total annual costs for controlling new sources is contained in the new source costing memorandum (A-92-40, IV-B-l00).

20.6 DATA BASE SYSTEM FOR ESTIMATING NATIONAL IMPACTS

This section summarizes the changes to the pulp and paper NESHAP data base that is used to estimate national impacts of the final rule. This section only presents changes to the original data base discussed in chapter 6 of the proposal BID. Section 20.6.1 discusses revisions to the data base. Section 20.6.2 presents the calculation of impacts and section 20.6.3 discusses revisions to the national impacts estimation methodology and analyses performed to incorporate effluent guidelines regulations, which are being promulgated simultaneously with the NESHAP.

20.6.1 Data Base Revisions

20.6.1-l Data Base Structure. At proposal, EPA developed model pulping and bleaching process units to represent the variety of emission points in a pulp mill. To estimate national impacts, the models were assigned to each mill based on As discussed in section 20.2.1, EPA used a number of sources to develop a data base characterizing pulp and paper mills. When information from the various sources conflicted, the following

TABLE 20-15. SUMMARY OF NATIONAL COST AND COST-EFFECTIVENESS OF MACT CONTROL OPTIONS AFTER OW OPTION A (selected option is underlined)

Existing Source Control Option	Capital Investment (10^6 $)	Annual Cost (10^6 $/yr)	Baseline Emissions[a] (10^3 Mg/yr)	Emission Reduction[b] (10^3 Mg/yr)	Emission Reduction (percent)	Average Cost Effectiveness ($/Mg)	Incremental Cost Effectiveness ($/Mg)
KRAFT							
(1) Washing system, OD, deckers[c], knotters and screens[d], steam stripping combined with hardpiping	452	118	186	123	66%	959	--
(2) Option (1) equipment, plus WBLST	473	125	186	125	67%	1,000	3,500
(3) Option (2) equipment, plus low emitting deckers	488	130	186	125	67%	1,038	10,833
(4) Option (3) equipment, plus low emitting knotters and screens	508	138	186	126	68%	1,099	22,438
SEMI-CHEMICAL							
(1) Digesters and evaporators	11	1.0	2.9	0.86	30%	1,215	--
(2) Digesters and evaporators, washing system	25	4.8	2.9	1.6	55%	3,000	5,075
SODA							
(1) Digesters and evaporators	2.4	0.2	1.1	0.6	55%	333	--
(2) Digesters and evaporators, washing system	5.0	1.3	1.1	0.8	73%	1,625	5,500
SULFITE							
(1) Digester, evaporator, red stock washer	23	4.8	7.7	4.4	57%	1,095	--
(2) Digester, evaporator, red stock washer, weak liquor, strong liquor	32	6.4	7.7	4.6	60%	1,396	8,000
Total (for selected options)	488	124	198	128	65%	963	--
Total (for recordkeeping and reporting)	8.3	6.9	--	--	--	--	--
Grand Total	496	130	198	128	65%	1,016	--

[a]Industry total baseline emissions from affected sources, assuming OW Option A has been implemented.
[b]Emission reductions reflects the change from the post-OW Option A baseline to the post-MACT residual emissions.
[c]High-emitting deckers are controlled.
[d]High-emitting knotters and screens are controlled.

TABLE 20-16. SUMMARY OF NATIONAL COST AND COST-EFFECTIVENESS OF MACT CONTROL OPTIONS AFTER OW OPTION B (selected option is underlined)

Existing Source Control Option	Capital Investment (10^6 $)	Annual Cost (10^6 $/yr)	Baseline Emissions[a] (10^3 Mg/yr)	Emission Reduction[b] (10^3 Mg/yr)	Emission Reduction (percent)	Average Cost Effectiveness ($/Mg)	Incremental Cost Effectiveness ($/Mg)
KRAFT							
(1) Washing system, OD, deckers[c], knotters and screens[d], steam stripping combined with hardpiping	588	149	220	156	71%	955	--
(2) Option (1) equipment, plus WBLST	609	156	220	158	72%	987	3,500
(3) Option (2) equipment, plus low emitting knotters and screens	629	164	220	158	72%	1,036	22,438
SEMICHEMICAL							
(1) Digesters and evaporators	11	1.0	2.9	0.86	30%	1,215	--
(2) Digesters and evaporators, washing system	25	4.8	2.9	1.6	55%	3,000	5,075
SODA							
(1) Digesters and evaporators	2.4	0.2	1.4	0.6	43%	333	--
(2) Digesters and evaporators, washing system	5.0	1.3	1.4	0.8	57%	1,625	5,500
SULFITE							
(1) Digester, evaporator, red stock washer	23	4.8	7.7	4.4	57%	1,095	--
(2) Digester, evaporator, red stock washer, weak liquor, strong liquor	32	6.4	7.7	4.6	60%	1,396	8,000
Total (for selected options)	624	155	232	162	70%	958	--
Total (for recordkeeping and reporting)	8.3	6.9	--	--	--	--	--
Grand Total	632	162	232	162	70%	1,001	--

[a]Industry total baseline emissions from affected sources, assuming OW Option B has been implemented.

[b]Emission reductions reflects the change from the post-OW Option B baseline to the post-MACT residual emissions.

[c]High-emitting deckers are controlled. After OW Option B, all deckers are assumed to be high-emitting deckers because of condensate recirculation associated with adding an oxygen delignification unit.

[d]High-emitting knotters and screens are controlled.

hierarchy was used. The OW survey was determined to be the most current source of information, followed by the comments and industry information supplied after proposal, the latest edition of the Lockwood Post Directory, site visits, and the 1992 NCASI survey.

Secondary emissions from control devices were also re-evaluated as discussed in section 20.4. The major changes include assuming all sulfur containing compounds were combusted; and emissions would be controlled using an existing boiler or incinerator, so secondary impacts were calculated from the fuel burned.

20.6.1.2 <u>Default Values</u>. At proposal, the data base structure was based on model process units. Since each mill was assigned a specific pulping and bleaching model, default values were not necessary to fill in data gaps for each facility.

Following proposal, the data base was revised to estimate national impacts based on the actual equipment systems at each facility. The data base contains complete information on mill production capacity, bleaching sequences, the number of oxygen delignification systems, etc.; however, complete pulping system equipment and control information was not available for every mill. In the absence of mill-specific data, default information was used. A detailed discussion of the defaults is presented in a supporting memorandum (A-92-40, IV-B-28).

In general, information on the vent stream characteristics (e.g., emissions, vent gas flow rate, temperature, and moisture content) for each mill was not available. Therefore, average characteristics were developed from test data. The average emission factors are documented in the revised Chemical Pulping

Emission Factor Development Document (A-92-40, IV-A-8), and the average vent stream characteristics are detailed in a separate memorandum (A-92-40, IV-B-28).

If no emission controls were reported in the surveys or in other data then generally none were assigned. The exceptions were the control status of the LVHC system and assignment of enclosures to pulp washers. Since a NSPS exists requiring LVHC vent streams at kraft mills to be controlled, the assumption was made that all LVHC systems at kraft mills were already controlled. As documented in the proposal BID, pulp washers constructed after 1978 were assumed to be enclosed.

Information was not available to describe the pulping condensate characteristics (e.g., flow rate, HAP concentration, recycle/reuse patterns, etc.) at each mill. Condensate characteristics, per unit capacity, were developed based on the information contained in the NCASI condensate study (A-92-40, IV-A-8). These characteristics were used for all pulping types.

20.6.2 Calculation of Impacts

For the final rule, national impacts were calculated using methodologies discussed earlier in this subsection and in sections 20.1 through 20.5. The structure of the data base remained relatively unchanged since proposal (see figure 6-l in the proposal BID). The only major changes are that actual system data was used rather than using model units, and default values were used to fill in data gaps. Therefore, the industry characterization did not include model mills.

Baseline emissions and emission reductions resulting from control options were calculated for each equipment system and were summed for each system, each mill, and for all mills combined. Control costs were calculated by mill area (pulping vents, pulping wastewater, bleaching vents) and summed for the total mill, instead of by equipment system since add-on controls may be applied to multiple systems (i.e., multiple vents were assumed to be routed to control devices through a common header).

As discussed in section 20.5, after proposal EPA determined that for kraft, soda, and semi-chemical mills, some could use existing combustion devices while others would need to construct stand-alone incinerators to control vent streams. Because EPA did not have sufficient information to assign the control scenario to each mill, total costs were calculated by adding two-thirds of the costs for routing to an existing device and one-third of the cost for constructing a dedicated incinerator. The control costs for sulfite mills were based on reducing the temperature of the vent gas streams before they are routed to the acid plant scrubber or nuisance scrubber to increase the removal efficiency.

For kraft pulping condensates, baseline emissions were estimated based on the type of treatment process (i.e., biological treatment system or steam stripping) in place at existing mills. For mills where the configuration of the existing biological treatment systems were available, emissions were based on the configuration of the equipment and the model that calculates air emissions from wastewater systems. Emission reductions were estimated based on hard-piping pulping process condensates to well-operated biological treatment systems. Steam stripping emission reductions were applied to mills with existing biological treatment systems not arranged to meet the final rule without major reconstruction. For control purposes a new steam stripper was costed.

For mills where no information was available regarding the configuration of the existing biological treatment systems and there was not existing steam stripper, the impacts were estimated by applying average factors, on a ton of pulp production basis. The average factors were calculated by dividing the total impacts, estimated for the mills with sufficient configuration data, by the total production for those mills.

20.6.3 Effects of OW Changes on Impacts

As discussed in section 20.2.3, OW is promulgating effluent guidelines that change pulping and bleaching processes. The baseline equipment configurations and assumptions were adjusted to represent the mill after the two OW options where enacted. The major adjustments that affect emissions and costing are:

- Use of low water flow washers (emitting less air emissions) at specific mills,

- More recycling condensates of in the pulping mill which increases air emissions for affected equipment,

- Use of oxygen delignification (which increases the number of emission sources to be controlled, and increases the HAP concentration in process water recycled into other systems), and

- Changes in the use of chlorinated compounds in bleach areas (which reduces chlorinated air emissions).

The effect the changes have on emissions and costs is presented in supporting memoranda (A-92-40, IV-B-28). Impacts presented in this section are after OW Options A and B have been implemented, and differences in environmental and energy impacts is shown on table 20-17.

20.7 SUMMARY OF ENVIRONMENTAL AND COST IMPACTS OF THE MACT STANDARDS

Table 20-17 also summarizes the total impacts of the MACT standards after OW's effluent guidelines (Options A and B) have been implemented. The table presents the current baseline emissions, baseline emissions after OW Options A and B are implemented, and the MACT II baseline emissions (see MACT II BID for details on the MACT II estimates). The table also summarizes emission reductions, energy consumption, secondary impact generation, and costs resulting from applying MACT controls to the MACT I and MACT II sources.

TABLE 20-17. TOTAL MILLS AND EMISSIONS; PULP AND PAPER NATIONWIDE ENVIRONMENTAL AND COST IMPACTS

IMPACTS	MACT I & III Baseline Emissions (Before MACT Is Applied)[a,c]			MACT II Baseline Emissions (before MACT is applied)[c]	MACT I & III Emissions (After MACT is applied)[b,c]		MACT II Emissions (After MACT is applied)[c]	Emissions After MACT I, II, & III[c]	
	Current (for affected sources)	After OW Opt. A	After OW Opt. B		With OW Opt. A	With OW Opt. B		With OW Opt. A	With OW Opt. B
Environmental (Megagrams per Year):									
HAP:									
- Gaseous HAP	209,000	198,000	232,000	32,200	69,700	70,600	29,700	99,400	100,300
- Particulate HAP	-	-	-	220	-	-	147	147	147
- Total HAP	209,000	198,000	232,000	32,400	69,700	70,600	29,850	99,600	100,500
- Selected HAP:									
- Acetaldehyde	8,140	8,940	11,100	1,790	3,630	3,710	1,720	5,350	5,430
- Acrolein	257	284	355	-	111	114	-	111	114
- Benzene	56	62	64	1,430	54	53	917	971	970
- Carbon tetrachloride	2,500	2,740	3,040	-	816	820	-	816	820
- o-Cresol	9,800	10,600	14,600	-	2,610	2,800	-	2,610	2,800
- Chloroform	10,800	4,020	4,020	-	3,750	3,750	-	3,750	3,750
- Cumene	7,520	8,030	7,980	-	6,470	6,320	-	6,470	6,320
- Formaldehyde	2,800	3,160	3,890	946	1,160	1,190	637	1,800	1,830
- Methanol	139,000	135,000	159,000	11,300	42,500	43,000	10,400	52,900	53,400
- Methyl ethyl ketone	4,230	4,700	5,640	1,040	2,360	2,380	720	3,080	3,100
- Phenol	2,790	2,720	3,340	1,970	680	700	1,970	2,650	2,670
- 1,2,4-Trichlorobenzene	3,340	3,750	4,940	-	1,130	1,190	-	1,130	1,190
VOC	826,000	814,000	872,000	71,200	417,000	419,000	38,600	456,000	458,000
Particulate	-	(9)	(10)	64,400	83	84	40,600	40,700	40,700
TRS	145,000	142,000	144,000	4,040	66,500	66,500	4,040	70,540	70,540

TABLE 20-17. TOTAL MILLS AND EMISSIONS; PULP AND PAPER NATIONWIDE ENVIRONMENTAL AND COST IMPACTS (Continued)

IMPACTS	MACT I & III Baseline Emissions (Before MACT Is Applied)[a,c]			MACT II Baseline Emissions (before MACT is applied)[c]	MACT I & III Emissions (After MACT is applied)[b,c]		MACT II Emissions (After MACT is applied)[c]	Emissions After MACT I, II, & III[c]	
	Current (for affected sources)	After OW Opt. A	After OW Opt. B		With OW Opt. A	With OW Opt. B		With OW Opt. A	With OW Opt. B
CO	-	(840)	(1,100)	248,400	8,660	8,610	190,700	199,400	199,300
NO_x	-	500	(1,820)	120,100	5,230	3,200	120,600	126,000	124,000
SO_2	-	860	(3,800)	102,600	94,500	92,600	102,500	197,000	195,000
Energy (million Btu/Yr):									
- Electric	-	4,870,000	(8,770,000)	-	13,320,000	982,000	(173,000)	13,150,000	809,000
- Steam	-	(2,161,000)	(2,279,000)	-	16,950,000	16,833,000	-	16,950,000	16,833,000
- Fuel	-	-	-	-	2,975,000	3,452,000	14,300	2,989,300	3,466,300
- Total	-	2,710,000	(11,050,000)	-	33,250,000	21,300,000	(158,000)	33,100,000	21,100,000
MACT Control, Reporting, and Recordkeeping Costs:									
Capital (Million $)	-	-	-		496	633	258	756	893
Annual (Million $/Yr.)	-	-	-		130	162	42	172	207
Cost-effectiveness:									
$ / Mg of HAP	-	-	-		1,020	1,000	16,400	1,300	1,200
$ / Mg of VOC	-	-	-		327	358	1,290	400	420

[a]Particulate, CO, nitrogen oxide, and sulfur dioxide emissions are from secondary impacts of OW options.

[b] Particulate, CO, nitrogen oxide, and sulfur dioxide emissions are increases from baseline due to OW options and after MACT is applied.

[c]Number in parenthesis indicates a decrease in pollutant or energy use.

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16. ABSTRACT

National emission standards for hazardous air pollutants (NESHAP) are being promulgated for the pulp and paper industry under authority of Section 112(d) of the Clean Air Act as amended in 1990. This background information document provides technical information and analyses used in the development of the promulgated pulp and paper NESHAP, and contains responses to comments from the proposed rule. This document covers air emission controls for wood pulping and bleaching processes at pulp mills and integrated mills (i.e., mills that combine on-site production of both pulp and paper). Effluent guideline limitations for pulp and paper mills are being developed concurrently under the Clean Water Act. Technical information used for the development of effluent guideline limitations is in separate documents.

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