# Emission Factor Documentation for AP-42
# Section 10.6.1

# Waferboard/Oriented Strandboard Manufacturing

## Final Report

**For U. S. Environmental Protection Agency**
**Office of Air Quality Planning and Standards**
**Emission Factor and Inventory Group**
**Research Triangle Park, NC 27711**

**Attn: Mr. Dallas Safriet (MD-14)**
**Emission Factor and Inventory Group**

**Purchase Order No. 8D-1933-NANX**

**MRI Project No. 4945**

**December 1998**

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NOTICE

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# PREFACE

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December 3, 1998

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# 1. INTRODUCTION

The document *Compilation of Air Pollutant Emission Factors* (AP-42) has been published by the U. S. Environmental Protection Agency (EPA) since 1972. Supplements to AP-42 have been routinely published to add new emission source categories and to update existing emission factors. AP-42 is routinely updated by EPA to respond to new emission factor needs of EPA, State and local air pollution control programs, and industry.

An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. Emission factors usually are expressed as the weight of pollutant divided by the unit weight, volume, distance, or duration of the activity that emits the pollutant. The emission factors presented in AP-42 may be appropriate to use in a number of situations, such as making source-specific emission estimates for areawide inventories for dispersion modeling, developing control strategies, screening sources for compliance purposes, establishing operating permit fees, and making permit applicability determinations. The purpose of this report is to provide background information from test reports and other information to support preparation of AP-42 Section 10.6.1, Waferboard/Oriented Strandboard Manufacturing.

This background report consists of five sections. Section 1 includes the introduction to the report. Section 2 gives a description of the waferboard/oriented strandboard (WB/OSB) manufacturing industry. It includes a characterization of the industry, a description of the different process operations, a characterization of emission sources and pollutants emitted, and a description of the technology used to control emissions resulting from these sources. Section 3 is a review of emission data collection (and emission measurement) procedures. It describes the literature search, the screening of emission data reports, and the quality rating system for both emission data and emission factors. Section 3 also discusses issues related to the testing and interpretation of emission data for wood products industry sources. Section 4 details how the new AP-42 section was developed. It includes the review of specific data sets and a description of how candidate emission factors were developed. Section 5 presents the AP-42 Section 10.6.1, Waferboard/Oriented Strandboard Manufacturing.

# 2. INDUSTRY DESCRIPTION

## 2.1 INDUSTRY CHARACTERIZATION[1-3]

Waferboard and OSB belong to the subset of reconstituted wood panel products called flakeboards. They are structural panels made from wood wafers specially produced from logs at the plant. When waferboard was developed in the 1950's, the wafers were not intentionally oriented. However, by 1989 most waferboard plants were producing oriented waferboard (OWB). Oriented strandboard originated in the early 1980's. The relatively long and narrow flakes (strands) are blended with resin and formed into a 3- or 5-layered mat. Aligning the strands in each layer perpendicular to adjacent layers gives OSB flexural properties superior to those of randomly oriented waferboard. Oriented waferboard and OSB are suitable for markets in which softwood plywood still dominates. They are chiefly used as sheathing, single-layer flooring, and underlayment in light-frame construction.

Waferboard and OSB fall under Standard Industrial Classification (SIC) Code 2493. They are further classified as 24932, waferboard and oriented strandboard. The six-digit Source Classification Code (SCC) grouping assigned to WB/OSB operations is 3-07-010, oriented strandboard.

There were 27 WB, OWB, and OSB plants operating in the United States in 1996, according to the *1997 Directory of the Wood Products Industry*. Table 2-1 presents the name, location, and annual production capacity for domestic WB, OWB, and OSB mills. Board densities reported ranged from 608 to 833 kilograms per cubic meter ($kg/m^3$) (38 to 52 pounds per cubic foot [$lb/ft^3$]). Annual domestic capacity for the 23 plants that reported their capacities ranged from $0.9 \times 10^6$ to $46.5 \times 10^6$ square meters ($m^2$) ($1 \times 10^7$ to $500 \times 10^6$ square feet [$ft^2$]) of board on a 0.95-cm (3/8-in.) basis. The principal production States in 1996 were Minnesota, Michigan, and Texas. Their combined production was about 50 percent of the U.S. total.

## 2.2 PROCESS DESCRIPTION[4-5]

Figure 2-1 presents a typical process flow diagram for a WB/OSB plant. Waferboard/OSB manufacturing begins with whole logs, which are cut to 254-cm (100-in.) lengths by a slasher saw. In northern plants, these logs are put in hot ponds maintained at a temperature between 18E and 43EC (80E and 120EF). This pretreatment prepares the logs for the waferizer by thawing them during winter operations. The logs then are debarked and carried to stationary slasher saws, where they are cut into 84-cm (33-in.) lengths, called bolts, in preparation for the waferizer. Some mills do not slash debarked logs into bolts, but instead feed whole debarked logs into the waferizer. The waferizer slices the logs into wafers approximately 3.8 cm (1.5 in.) wide by 7.6 cm (3 in.) long by 0.07 cm (0.028 in.) thick. The wafers may pass through green screens to remove fines and differentiate core and surface material, or they may be conveyed directly to wet wafer storage bins to await processing through the dryers.

Triple-pass rotary drum dryers are typical in WB/OSB plants. The dryers normally are fired with wood residue from the plant, but occasionally oil or natural gas also are used as fuels. The wafers are dried to a low moisture content (generally 4 to 10 percent, dry basis), to compensate for moisture gained by adding resins and other additives. Generally, dryers are dedicated to drying either core or surface material to allow independent adjustment of moisture content. This independent adjustment is particularly important where different resins are used in core and surface materials.

TABLE 2-1. DOMESTIC PRODUCTION OF WB, OWB, AND OSB IN 1996

| Mill name/location | Product | Annual capacity, millions of $ft^2$, 3/8-in. basis |
|---|---|---|
| Giles & Kendall, Inc., Huntsville, AL | WB | Not available |
| Lakeshore Pallet Manufacturing, Shegoysar Falls, WI | WB | Not available |
| Louisiana-Pacific Corp., Athens, GA | OWB | Not available |
| Louisiana-Pacific Corp., New Waverly, TX | OWB | 100 |
| Louisiana-Pacific Corp., Montrose, CO | OSB | 125 |
| Masonite Corp., Cordele, GA | OSB | Not available |
| Langboard, Inc., Quitman, GA | OSB | 240 |
| Louisiana-Pacific Corp., Urania, LA | OSB | 80 |
| J.M. Huber Corp., Easton, ME | OSB | 185 |
| Louisiana-Pacific Corp., Houlton, ME | OSB | 185 |
| Georgia-Pacific Corp., Woodland, ME | OSB | 210 |
| Weyerhaeuser Forest Products Co., Grayling, MI | OSB | 362 |
| Louisiana-Pacific Corp., Newberry, MI | OSB | 110 |
| Louisiana-Pacific Corp., Sagola, MI | OSB | 360 |
| Potlatch Corp., Bemidji, MN | OSB | 489 |
| Potlatch Corp., Cook, MN | OSB | 243 |
| Northwood Panelboard Co., Solway, MN | OSB | 330 |
| Louisiana-Pacific Corp., Two Harbors, MN | OSB | 130 |
| Georgia-Pacific Corp., Grenada, MS | OSB | 314 |
| Georgia-Pacific Corp., Dudley, NC | OSB | 161 |
| Louisiana-Pacific Corp., Corrigan, TX | OSB | 155 |
| International Paper Co., Nacogdoches, TX | OSB | 210 |
| Louisiana-Pacific Corp., Silsbee, TX | OSB | 350 |
| Louisiana-Pacific Corp., Dungannon, VA | OSB | 120 |
| Georgia-Pacific Corp., Skippers, VA | OSB | 350 |
| Louisiana-Pacific Corp., Hayward, WI | OSB | 500 |
| Wisconsin Laminates, Inc., Pewaukee, WI | OSB | 10 |
| Total plant capacity[a] | | 5,319 |

[a]Total plant capacity, less the four mills not reporting annual production capacity.

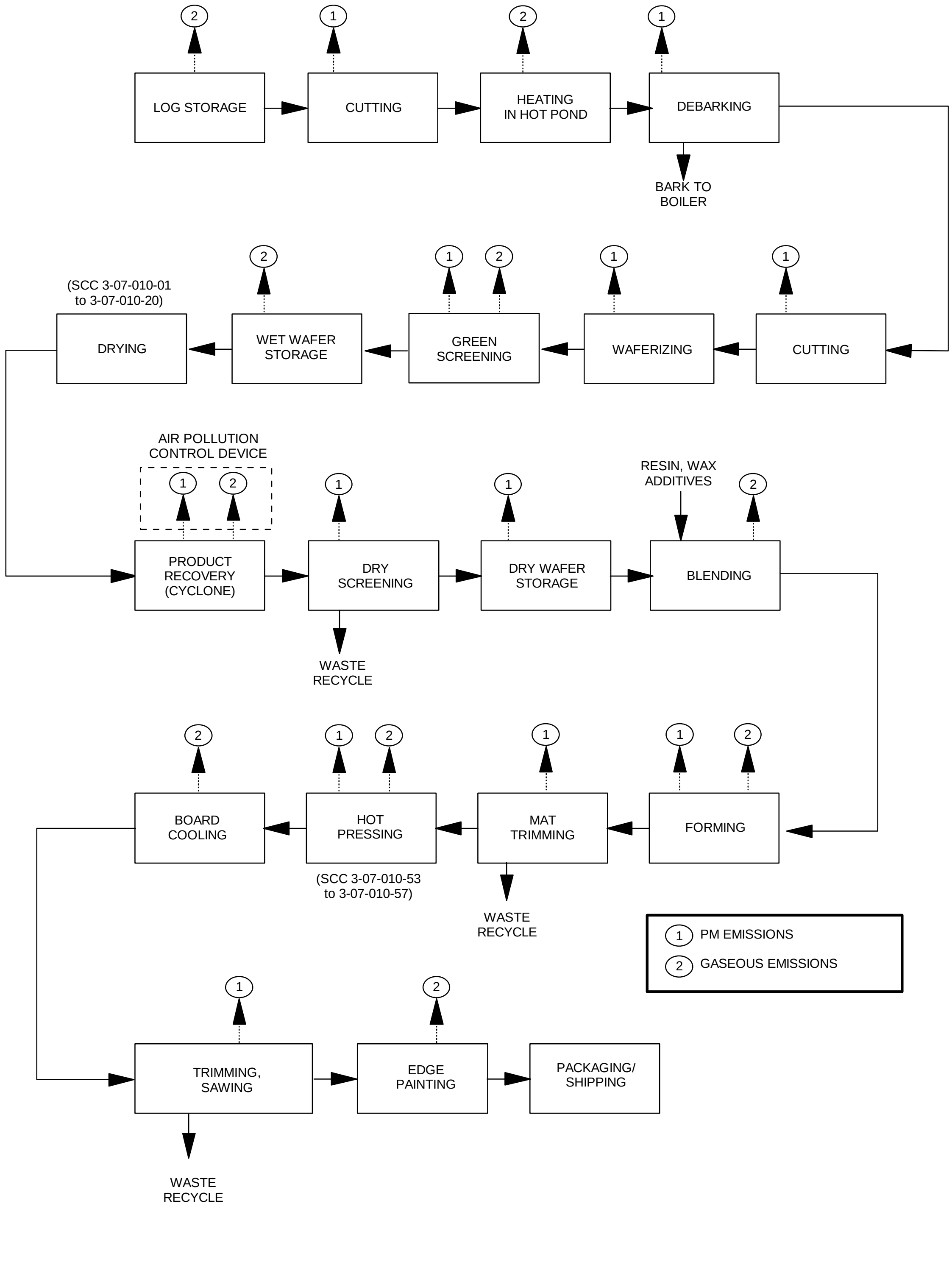


Figure 2-1. Typical process flow diagram for a waferboard/oriented strandboard plant.

After drying, the dried wafers are conveyed pneumatically from the dryer, separated from the gas stream at the primary cyclone, and screened to remove fines (which absorb too much resin) and to separate the wafers by surface area and weight. The gas stream continues through an air pollution control device and is emitted to the atmosphere. Undersized material is sent to a storage area for use as fuel for dryer burners or boilers. The screened wafers are stored in dry bins.

The dried wafers then are conveyed to the blender, where they are blended with resin, wax, and other additives. The most commonly used binders are thermosetting urea-formaldehyde, phenol-formaldehyde, and isocyanate resins, all of which require the application of heat for curing. From the blender, the resinated wafers are conveyed to the former, where they are metered out on a continuously moving screen system. The mat forming process is the only step in the manufacturing process in which there is any significant difference between WB and OSB production. In WB production, the wafers are allowed to fall randomly to the moving screen below to form a mat of the required thickness. In OSB production, the wafers are oriented electrostatically or mechanically in one direction as they fall to the screen below. Subsequent forming heads form distinct layers in which the wafers are oriented perpendicular to those in the previous layer. The alternating oriented layers result in a structurally superior panel.

In the mat trimming section, the continuous formed mat is cut into desired lengths by a traveling saw. The trimmed mat then is passed to the accumulating press loader and sent to the hot press. The press applies heat and pressure to activate the resin and bond the wafers into a solid reconstituted product. In most hot presses, heat is provided by steam generated by a boiler that burns plant residuals. Hot oil and hot water also can be used to heat the press. After cooling, the bonded panel is trimmed to final dimensions, finished (if necessary), and the product is packaged for shipment.

## 2.3 EMISSIONS[4,6-10]

The primary emission sources at WB/OSB mills are wafer dryers and hot press vents. Other emission sources may include boilers, log debarking, sawing, waferizing, blending, forming, board cooling, and finishing operations such as sanding, trimming, and edge painting. Other potential emissions sources ancillary to the manufacturing process may include wood chip storage piles and bins (including wood fuel), chip handling systems, and resin storage and handling systems.

Operations such as log debarking, sawing, and waferizing, in addition to chip piles and bins, and chip handling systems generate particulate matter (PM) and PM less than 10 micrometers in aerodynamic diameter (PM-10) emissions in the form of sawdust and wood particles.

Emissions from dryers that are exhausted from the primary recovery cyclone include wood dust and other solid PM, volatile organic compounds (VOC's), condensible PM, and products of combustion such as carbon monoxide (CO), carbon dioxide ($CO_2$), and nitrogen oxides ($NO_x$), if direct-fired units are used. The condensible PM and a portion of the VOC's leave the dryer stack as vapor but condense at normal atmospheric temperatures to form liquid particles or mist that creates a visible blue haze. Both the VOC's and condensible PM are primarily compounds evaporated from the wood, with a minor constituent being combustion products. Quantities emitted are dependent on wood species, dryer temperature, fuel used, and other factors including season of the year, time between logging and processing, and wafer storage time.

Emissions from board hot presses are dependent on the type and amount of resin used to bind the wood particles together, as well as wood species, wood moisture content, wax and catalyst application rates, and press conditions. When the press opens, vapors that may include resin ingredients such as formaldehyde, phenol, methylene diphenyl diisocyanate (MDI), and other VOC's are released. The rate at which formaldehyde is emitted during pressing and board cooling operations is a function of the amount of excess formaldehyde in the resin, board thickness, press temperature, press cycle time, and catalyst application rates.

Only limited data are available on emissions of the organic constituents included in the exhaust streams from WB/OSB dryers and presses. However, speciated organic emission data for particleboard (PB) and medium density fiberboard (MDF) may provide an indication of the types of organic compounds emitted from WB/OSB dryers and presses. Emission factors for speciated organic emissions from PB and MDF dryers and presses are included in AP-42 Sections 10.6.2 and 10.6.3, respectively.

Emissions from finishing operations for WB/OSB products are dependent on the type of products being finished. For most WB/OSB products, finishing involves trimming to size and possibly painting or coating the edges. Trimming and sawing operations are sources of PM and PM-10 emissions. No data specific to WB/OSB panel trimming or sawing are available. However, emission factors for general sawing operations may provide an order of magnitude estimate for similar WB/OSB sawing and trimming operations, bearing in mind that the sawing of dry OSB panels may result in greater PM and PM-10 emissions than the sawing of green lumber. It is expected that water-based coatings are used to paint OSB edges, and the resultant VOC emissions are relatively small.

## 2.4 EMISSION CONTROL TECHNOLOGY[4,6-14]

Particulate matter and PM-10 emissions from log debarking, sawing, and waferizing operations can be controlled through capture in an exhaust system connected to a sized cyclone and/or fabric filter collection system. Emissions of PM and PM-10 from final trimming operations can be controlled using similar methods. These wood dust capture and collection systems are used not only to control atmospheric emissions, but also to collect the dust as a by-product fuel for a boiler or dryer.

Electrostatic control devices provide highly efficient control of PM and PM-10, but lesser control of condensible organic pollutants in the exhaust streams from dryers. Two devices commonly used to control emissions from dryers are the electrified filter bed (EFB) and the wet electrostatic precipitator (WESP).

The EFB is a popular PM control device in the wood products industry for controlling dryer exhaust gases because it is a dry type of control that produces an effluent stream that requires no further treatment. These units also are relatively small and do not require a large amount of floor space. In a typical EFB system, fine particles in the exhaust gases are electrostatically charged in the corona formed by an ionizer and then are deposited on an electrically polarized filter bed of pea gravel. The pea gravel is removed from the filtration region and cleaned externally in a pneumatic conveyor. The dust removed from the gravel is conveyed to a small fabric filter and the cleaned gravel is returned to the filter. The EFB is effective at solid PM removal but not as efficient at removing condensible aerosols in that it cannot remove any material it cannot condense. Also, the sticky liquid particles generated by drying softwoods cause the EFB to require frequent maintenance.

An ESP is a PM control device that uses electrical forces to move entrained particles from the flowing gas stream and deposit them onto collector plates. Particle collection in an ESP involves three steps: the electrical charging of particles in the gas stream, the collection of the particles on the collection plates or electrodes, and the removal of the collected PM. Wet ESP's are used on effluent gas streams containing sticky, condensible hydrocarbon pollutants. Gases exiting the dryer enter a prequench to cool and to saturate the gases before they enter the WESP. The amount of cooling required depends on the characteristics of the exhaust air stream exiting the dryer. Therefore, the cooling requirement is determined on a system-specific basis. The prequench is essentially a low-energy scrubber that sprays water into the incoming gas stream.

Some fraction of the highly water soluble compounds, such as formaldehyde and methanol, may be scrubbed by the prequench and collected. The gas that exits the prequench is nearly saturated; therefore, further cooling in the precipitator will condense and capture more of the condensible hydrocarbons, mainly the sticky resins. The WESP collects only particles and droplets that can be electrostatically charged; vaporous components of the gas stream that do not condense are not collected by the device. One disadvantage of the WESP is that it generates a wastewater effluent. Because OSB mills generally are designated as zero discharge facilities, they must treat their own spray water and/or consume it internally. Mills that operate boilers or other wet cell burners can apply some of the spent spray water to the fuel. Some or all of the remaining spray water may be used as makeup water in hot ponds or in debarkers for dust control.

A VOC control technology gaining popularity in the wood products industry for controlling both dryer and press exhaust gases is regenerative thermal oxidation. Thermal oxidizers destroy VOC's, CO, and condensible organics by burning them at high temperatures. Regenerative thermal oxidizers (RTO's) are designed to preheat the inlet emission stream with heat recovered from the incineration exhaust gases. Up to 98 percent heat recovery is possible, although 95 percent is typically specified. Gases entering an RTO are heated by passing through pre-heated beds packed with a ceramic media. A gas burner brings the preheated emissions up to an incineration temperature between 788E and 871EC (1450E and 1600EF) in a combustion chamber with sufficient gas residence time to complete the combustion. Combustion gases then pass through a cooled ceramic bed where heat is extracted. By reversing the flow through the beds, the heat transferred from the combustion exhaust air preheats the gases to be treated, thereby reducing auxiliary fuel requirements.

One manufacturer has 16 commercial scale units installed at eight WB/OSB manufacturing facilities in the U.S. These units include 12 RTO's controlling emissions from 28 WB/OSB rotary dryers, 3 RTO's controlling emissions from 3 WB/OSB presses, and 1 RTO controlling emissions from both an OSB press and a dryer. Design airflows range from 68,000 to 135,000 standard cubic feet per minute (scfm) per RTO for dryer emission control, and average 120,000 scfm per RTO for press emission control.

Vendor literature indicates that an RTO can achieve a VOC destruction efficiency of 99 percent. The literature further indicates that with a particulate prefilter to remove inorganic PM, an RTO system can achieve a PM control efficiency of 95 percent. Of the 13 RTO's that control WB/OSB dryer exhaust, 3 have multiclones followed by a WESP as a particulate prefilter, 3 have only a WESP as a particulate prefilter, and the other 7 systems have only multiclones as a particulate prefilter. None of the three RTO's controlling only press vent emissions has a particulate prefilter.

Another control technology drawing the attention of the WB/OSB industry is biological air filtration, or biofiltration. In biofiltration, exhaust streams are vented through a moist bed of composted wood bark or other biologically active material. Pollutants are adsorbed from the exhaust stream onto the filter media and converted by microbiological degradation to $CO_2$, water, and inorganic salts. Typical biofilter design consists of a 3- to 6-foot deep bed of media suspended over an air distribution plenum. Exhaust gases entering the plenum are evenly distributed through the moist biofilter media.

Biofiltration systems can be used effectively for control of a variety of pollutants including organic compounds (including formaldehyde and benzene), $NO_x$, CO, and PM from both dryer and press exhaust streams. Data from pilot plant studies in U.S. OSB mills indicate that biofilters can achieve VOC control efficiencies of 70 to 90 percent, formaldehyde control efficiencies of 85 to 98 percent, CO control efficiencies of 30 to 50 percent, $NO_x$ control efficiencies of 80 to 95 percent, and resin/fatty acid control efficiencies of 83 to 99 percent.

Another promising technology for the control of WB/OSB dryer VOC and CO emissions is exhaust gas recycle. This technology uses an oversized combustion unit that can accommodate 100 percent recirculation of dryer exhaust gases. The recirculated dryer exhaust is mixed with combustion air and exposed directly to the burner flame. Volatile organic compound emissions from burner combustion are incinerated in the second stage of the unit. High temperature exhaust from the combustion unit passes through a heat exchanger, which provides heat for dryer inlet air, and then through an add-on device for PM emission control.

Other potential control technologies for WB/OSB dryers and presses include regenerative catalytic oxidation (RCO), and absorption systems (scrubbers).

Fugitive emissions from road dust and uncovered bark and dust storage piles may be controlled in a number of different ways. These methods include enclosure, wet suppression systems, and chemical stabilization. Control techniques for these sources are discussed more fully in AP-42 Chapter 13, Miscellaneous Sources.

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# 3. GENERAL DATA REVIEW AND ANALYSIS

## 3.1 LITERATURE SEARCH AND SCREENING

Data for this investigation were obtained from a number of sources within the Office of Air Quality Planning and Standards (OAQPS) and from outside organizations. The Factor Information and Retrieval (FIRE), Crosswalk/Air Toxic Emission Factor Data Base Management System (XATEF), and VOC/PM Speciation Data Base Management System (SPECIATE) data bases were searched by SCC code for identification of the potential pollutants emitted and emission factors for those pollutants. A general search of the Air CHIEF CD-ROM also was conducted to supplement the information from these data bases.

Information on the industry, including number of plants, plant location, and annual production capacities, was obtained from the *1997 Directory of the Wood Products Industry*. A number of sources of information were investigated specifically for emission test reports and data. Searches of the Source Test Information Retrieval System (STIRS) and the Test Method Storage and Retrieval (TSAR) data bases were conducted to identify test reports for sources within the waferboard/oriented strandboard industry. The EPA library was searched for additional test reports. Publications lists from the Office of Research and Development (ORD) and Control Technology Center (CTC) were also searched for reports on emissions from the WB/OSB manufacturing industry. In addition, NCASI and representative trade associations were contacted for assistance in obtaining information about the industry and emissions.

To screen out unusable test reports, documents, and information from which emission factors could not be developed, the following general criteria were used:

1. Emission data must be from a primary reference:

a. Source testing must be from a referenced study that does not reiterate information from previous studies.

b. The document must constitute the original source of test data. For example, a technical paper was not included if the original study was contained in the previous document. If the exact source of the data could not be determined, the document was eliminated.

2. The referenced study should contain test results based on more than one test run. If results from only one run are presented, the emission factors must be down rated.

3. The report must contain sufficient data to evaluate the testing procedures and source operating conditions (e.g., one-page reports were generally rejected).

A final set of reference materials was compiled after a thorough review of the pertinent reports, documents, and information according to these criteria.

## 3.2 DATA QUALITY RATING SYSTEM[1]

As part of the analysis of the emission data, the quantity and quality of the information contained in the final set of reference documents were evaluated. The following data were excluded from consideration:

1. Test series averages reported in units that cannot be converted to the selected reporting units;

2. Test series representing incompatible test methods (i.e., comparison of EPA Method 5 front half with EPA Method 5 front and back half);

3. Test series of controlled emissions for which the control device is not specified;

4. Test series in which the source process is not clearly identified and described; and

5. Test series in which it is not clear whether the emissions were measured before or after the control device.

Test data sets that were not excluded were assigned a quality rating. The rating system used was that specified by the Emission Factor and Inventory Group (EFIG) for preparing AP-42 sections. The data were rated as follows:

A—Multiple test runs that were performed using sound methodology and reported in enough detail for adequate validation. These tests do not necessarily conform to the methodology specified in EPA reference test methods, although these methods were used as a guide for the methodology actually used.

B—Tests that were performed by a generally sound methodology but lack enough detail for adequate validation.

C—Tests that were based on an unproven or new methodology or that lacked a significant amount of background information.

D—Tests that were based on a generally unacceptable method but may provide an order-of-magnitude value for the source.

The following criteria were used to evaluate source test reports for sound methodology and adequate detail:

1. Source operation. The manner in which the source was operated is well documented in the report. The source was operating within typical parameters during the test.

2. Sampling procedures. The sampling procedures conformed to a generally acceptable methodology. If actual procedures deviated from accepted methods, the deviations are well documented. When this occurred, an evaluation was made of the extent to which such alternative procedures could influence the test results.

3. Sampling and process data. Adequate sampling and process data are documented in the report, and any variations in the sampling and process operation are noted. If a large spread between test results cannot be explained by information contained in the test report, the data are suspect and are given a lower rating.

4. Analysis and calculations. The test reports contain original raw data sheets. The nomenclature and equations used were compared to those (if any) specified by EPA to establish equivalency. The depth of review of the calculations was dictated by the reviewer’s confidence in the ability and conscientiousness of the tester, which in turn was based on factors such as consistency of results and completeness of other areas of the test report.

## 3.3 EMISSION FACTOR QUALITY RATING SYSTEM[1]

The quality of the emission factors developed from analysis of the test data was rated using the following general criteria:

A—Excellent: Developed from A- and B-rated source test data taken from many randomly chosen facilities in the industry population. The source category is specific enough so that variability within the source category population may be minimized.

B—Above average: Developed only from A- or B-rated test data from a reasonable number of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industries. The source category is specific enough so that variability within the source category population may be minimized.

C—Average: Developed only from A-, B- and/or C-rated test data from a reasonable number of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industry. In addition, the source category is specific enough so that variability within the source category population may be minimized.

D—Below average: The emission factor was developed only from A-, B-, and/or C-rated test data from a small number of facilities, and there is reason to suspect that these facilities do not represent a random sample of the industry. There also may be evidence of variability within the source category population. Limitations on the use of the emission factor are noted in the emission factor table.

E—Poor: The emission factor was developed from C- and D-rated test data, and there is reason to suspect that the facilities tested do not represent a random sample of the industry. There also may be evidence of variability within the source category population. Limitations on the use of these factors are footnoted.

The use of these criteria is somewhat subjective and depends to an extent upon the individual reviewer. Details of the rating of each candidate emission factor are provided in Section 4.

## 3.4 EMISSION TEST METHODS[2-3]

The primary air pollutants of concern from the manufacture of WB/OSB, plywood and other reconstituted wood products are PM (or more specifically PM-10 and condensible PM) from drying operations, VOC from drying operations and hot presses, and formaldehyde from hot presses. Emission data for these pollutants have been obtained via a number of different methods, and these methods generate data that are not directly comparable. To facilitate interpretation of the data generated by different methods, the paragraphs below identify and briefly describe the procedures that have been used for measuring emissions of PM and related pollutants, VOC's, and formaldehyde from WB/OSB dryers and presses.

Test methods for PM (both filterable and condensible) include the standard reference method (EPA Methods 1 through 5 with Method 5 being the primary PM procedure) and derivatives of Method 5. Other methods that have been used in the wood products industry are EPA Method 17 for total PM, EPA Methods 201 and 201A for PM-10, EPA Method 202 for condensible PM, and the Oregon Department of Environmental Quality Method 7 (ODEQ-7) for both PM and condensible PM. However, ODEQ-7 was not used in any of the emission tests documented for this AP-42 section, and the method will not be discussed further in this report. The paragraphs below first describe the essential features of Method 5 and then describe how the other procedures differ from Method 5.

The primary components of the Method 5 train are the nozzle, the probe, a filter (which is maintained at 120 ± 14EC [250 ± 25EF] in a heated filter box), an impinger train that is kept in an ice bath to cool the gas stream to ambient temperature, a meter box, and a pump. The impinger train contains four impingers; the first two contain water, the third is dry, and the fourth contains silica gel to dry the gas stream before it enters the dry gas meter. The Method 5 train collects an integrated sample over one to several hours at sample points that span a cross-section of the exhaust duct or stack, typically on perpendicular traverses across the diameter of the stack. At each sampling point, a sample of the gas stream is collected isokinetically through the nozzle. The captured gas stream moves through the probe to the filter. Some particles are collected on the walls of the probe, and the remaining material that is in particle phase at 120EC (250EF) is collected on the filter. The gases that pass through the filter then go through the impinger train where any organic or inorganic materials that condense between 16E and 120EC (60E and 250EF) are collected. Typically, the material collected in the probe and filter (front half catch) is considered for regulatory purposes to be PM, and the material captured in the impingers (back half catch) is considered to be condensible PM. The procedures for Method 5 do not require the back half catch of the sampling train to be quantified. However, as explained below, the Method 5 train may be coupled with a Method 202 sampling train for measuring the condensible PM emission rate.

The other method that has been used to collect total PM emissions from WB/OSB operations, EPA Method 17, encompasses the same principles as EPA Method 5 but has specific modifications. The primary difference between EPA Methods 5 and 17 is in the collection temperature for the front half catch. In order to maintain a collection temperature of 120EC (250EF), the Method 5 train employs a heated probe and filter. In contrast, the Method 17 train employs an in-stack filter, so the collection temperature is equal to the actual temperature of the stack gas. If the stack gas temperature is less than 120EC (250EF), then any material that condenses at temperatures between the stack gas temperature and 120EC (250EF) will be measured as filterable PM with Method 17. However, in a Method 5 train, this material would pass through the front half of the train to the impingers and would not be quantified as filterable PM. The measures are reversed if the stack gas temperature is greater than 120EC (250EF).

In 40 CFR Part 51, EPA has published two procedures for determining PM-10 emission rates (EPA Methods 201 and 201A) and a method for measuring condensible PM emission rates (EPA Method 202). Methods 201 and 201A are derivatives of Method 5 both of which include an in-stack cyclone to remove particles with an aerodynamic diameter greater than 10 micrometers (µm) from the gas stream followed by an in-stack filter to collect the remaining particles. The back half of the train is identical to the back half of the Method 5 train. Both methods require a traverse of the stack, but Method 201 uses isokinetic sampling with a recirculating system to maintain constant flow through the cyclone, while Method 201A uses a constant sampling rate. The PM-10 is determined gravimetrically from the material captured in the sample line between the cyclone and filter and on the filter. Neither of the two methods specify procedures for determining condensible PM, but both methods indicate that for applications such as inventories of sources contributing to ambient PM-10 levels, PM-10 should be the sum of condensible PM emissions and PM-10 emissions measured by the Method 201 or 201A procedures.

Condensible PM emissions can be determined by EPA Method 202. Method 202, which applies to determination of condensible PM from stationary sources, measures condensible PM as material that passes through the filter and is collected in the impingers of a PM train. The primary method specifies that condensible PM be based on the back-half catch of a Method 17 train (which uses an in-stack filter), but Method 5, 201, or 201A procedures are also acceptable. The method specifies that the impinger solution be extracted with methylene chloride, the inorganic and organic fractions be dried separately, the residues weighed, and the condensible PM be determined from the combination of both residues. Note that because the method allows the use of either a heated filter system or an in-stack filter system, some ambiguity in results can occur from test to test.

Total hydrocarbon or VOC emission estimates from WB/OSB dryers and hot presses have been obtained primarily via one of two EPA methods--Method 25 and Method 25A. Method 25 measures VOC emissions as total gaseous nonmethane organics (TGNMO), and emission levels are typically reported as carbon concentrations or mass rates. Because organic PM interferes with the organic analysis, the sample is drawn through a heated filter for PM removal. The method currently requires that the filter be maintained at 121E ± 3EC (250E ± 5EF), but these filter requirements have evolved. Initially, the filter was optional, and temperature requirements have changed over the years. The sample is drawn from the filter through a condensate trap into an evacuated sample tank. The material in the trap and sample tank are recovered and analyzed separately, and the results are combined to determine total VOC. The organic material in the condensate trap is oxidized to $CO_2$ and collected in an evacuated vessel; then a portion of the $CO_2$ is reduced to methane ($CH_4$) and measured by flame ionization detector (FID). A portion of the gas collected in the sample tank is first passed through a gas chromatograph to separate CO, $CO_2$, and $CH_4$ from the remaining nonmethane organic material (NOM). The NOM is then oxidized to $CO_2$, reduced to $CH_4$, and measured by FID. This procedure essentially determines the number of carbon atoms present in the nonmethane volatile organic material and eliminates inconsistencies associated with the variable response of the FID to different organic compounds.

Method 25A is used to provide a continuous measure of the concentration of organic vapors consisting primarily of alkanes, alkenes, and aromatic hydrocarbons. The stack gas sample is collected through a heated sample line with either an in-stack or heated filter to remove PM. From the filter, the sample is directed to an FID, and the concentration of organic material in the gas stream is measured as calibration gas equivalents or as carbon equivalents. The results depend strongly on the particular constituents that make up the organic content of the gas stream because the FID has different response factors for different organic bond structures. In particular, the carbon/oxygen bond in formaldehyde provides a negative interference, so the response of the FID to formaldehyde is essentially zero, and responses for other aldehydes and ketones are diminished. Consequently, Method 25A does not include a measure of formaldehyde emissions and does not accurately quantify emissions of other aldehydes or ketones in the VOC estimate. Also Method 25A measures methane, which is not regulated as a VOC. This may result in the overestimation of VOC emissions from gas-fired dryers which can have significant methane emissions.

Because the resins often used to bond WB/OSB products are formaldehyde based, the exhaust gases from the presses and from drying operations are known to contain quantities of formaldehyde and may contain some amount of other aldehydes and ketones. The available data on aldehyde and ketone emissions from these operations have been obtained with EPA Method 0011. It is important to note that Method 0011 has not been validated for wood products industry emission sources. Method 0011 was developed specifically for formaldehyde emissions, but it has been applied to other aldehyde and ketone compounds. The procedure collects an integrated sample isokinetically at points along perpendicular traverses of the stack. The gaseous and particulate pollutants in the sample gas are collected in an impinger train that contains an aqueous acidic solution of dinitrophenyl-hydrazine. Formaldehyde reacts with the dinitrophenyl-hydrazine to form a formaldehyde dinitrophenylhydrazone derivative. This derivative is extracted, solvent exchanged, concentrated, and analyzed by high performance liquid chromatography.

## 3.5 EMISSION TESTING ISSUES

Many of the difficulties encountered in developing VOC and PM-10 emission factors for the WB/OSB industry dryers and hot presses arise because of the chemical composition of the organic materials found in the emission streams from these processes and the use of different test methods described above to collect and analyze these organic compounds for the historical data base. Also, the chemical and physical characteristics of these emission streams, particularly the moisture content and temperature variations, complicate sampling and analysis and data reduction. Particular issues of concern are complications associated with high moisture in exhaust streams, differing VOC and PM-10 results from different procedures and associated concerns with the condensible PM-10 as measured by Method 202, and the interrelationship between the estimates of VOC and PM-10 emissions. These issues are a general concern in the wood products industry and should be considered when interpreting test data and planning emission test programs for the industry. The paragraphs below first discuss the characteristics of the organic material in wood products exhaust streams and then address the general issues outlined above.

### 3.5.1 <u>Organic Emissions from Dryers and Presses</u>

As green wood is subjected to heat in wood products dryers, some of the organic material in the wood is volatilized and carried off with the exhaust stream. These organic materials that emanate from the wood are the primary VOC's and condensible organic PM in the dryer exhaust. Consequently, the organic compounds found in wood products dryer emissions typically include terpenes, terpene-like materials, resins, and fatty acids comparable to those found in wood. The boiling points of many of these materials are in the range of 155E to 370EC (310E to 700EF). These temperatures are greater than typical dryer temperatures, but the compounds exhibit significant vapor pressures at dryer temperatures. Consequently, some of these organic compounds are at saturation levels in the gas streams and will condense as the gas stream cools.

### 3.5.2 <u>Moisture Content of Dryer Exhaust</u>

The inherent moisture contents of wood products dryer exhaust streams complicate measurement of PM-10 emissions in these streams. This problem is most prevalent for facilities that have wet control devices such as WESP's or ionizing wet scrubbers. Because the exhaust from these systems is saturated, moisture condensation downstream from the control device is common. The PM-10 procedures described above prescribe an in-stack filter that operates at stack temperatures. If the gas stream does contain water droplets, sample train filter blinding (blockage of gas flow through filter) is likely to preclude PM-10 sampling. This problem has been encountered during EPA tests conducted on WESP-controlled dryers as a part of the program to develop emission factors for the wood products industry.

One solution to this problem is to use a heated filter rather than an in-stack filter in the Method 201 or 201A train. As a part of the testing, Method 202 could be used to determine condensible PM emissions from the back half of the Method 201 or 201A train. The total PM-10 emissions could be estimated as the sum of the PM-10 emissions obtained from Method 201 or 201A and the condensible PM emissions obtained from Method 202. This solution will eliminate the moisture problem, but it does have two drawbacks. First, since this procedure is different from the procedure used for dry control systems, the results will not be directly comparable. Second, this procedure exacerbates the problems related to the interrelationship of VOC and PM-10 emissions discussed below.

3.5.3 VOC and PM-10 Measurements

As suggested by the characteristics of the organic emissions from wood products dryers described above, the dryer exhaust gas contains a substantial amount of organic material that is condensible in the range of 50° to 120° C (120° to 250°F). Because all of the test methods described earlier contain a filter to collect PM, the amount of this material that remains on that filter and the amount that will be measured downstream from the filter depend on the operating temperature of the filter. Consequently, the material classified as PM-10, condensible PM, and VOC differs, depending on filter temperature. The situation related to VOC emissions is further complicated by the presence of aldehydes and ketones in the exhaust streams from dryers and presses. Because these compounds are treated differently by Methods 25 and 25A, results obtained by these two methods are not directly comparable. The paragraphs below first address the PM-10 issues and then the VOC issues.

The applicability sections for EPA Methods 201 and 201A indicate that if PM-10 results are to be used for purposes such as inventories, then the PM-10 results from those methods should be added to condensible PM results from Method 202 to obtain total PM-10 emissions. Because the primary purpose of AP-42 is to aid in preparing emission inventories, such a combination appears to be appropriate for developing AP-42 emission factors. However, condensible PM emissions can be determined via Method 202 in conjunction with a variety of trains. The available data base on condensible PM emissions from the wood products industry has been obtained using a Method 202 train following EPA Method 5 and Method 201A trains. Because these trains operate at different filter temperatures, they can generate different measures of condensible PM emissions for the same facility. Furthermore, because Method 201A operates with an in-stack filter, the distribution of filterable and condensible fractions will vary from site to site depending on stack gas temperatures. In addition, measurements of filterable PM by Method 5 and PM-10 by Methods 201 or 201A on the same stack gas can result in a PM-10 emission rate that is higher than the filterable PM emission rate because of the differences in sampling train filter temperatures. Such differences complicate averaging results across facilities to develop emission factors.

As noted in the discussion of Method 25 above, the protocol concerning the Method 25 particulate prefilter has changed over time. Data collected during the last several years are based on the organic material that passes through a 120°C (250°F) filter. However, some of the historical VOC data for the wood products industry were based on Method 25 trains with in-stack filters or with heated filters operating at 88°C (190°F). Because available data from NCASI testing indicate that substantial quantities of the organic material in wood products dryers may condense at temperatures between 77°C (170°F) and 120°C (250°F), the results from the historical tests with different filter temperatures cannot be combined consistently.

Development of VOC emission factors is further complicated by the differences between Method 25 and Method 25A results. First, Method 25A allows the use of an in-stack particulate filter in lieu of a heated filter, so the organic material that is subjected to analysis via the two methods is not equivalent. More importantly, the analytical methods are quite different. Method 25 collects an integrated sample over time and essentially counts the number of carbon atoms in the volatile fraction of the organic material collected. Consequently, irrespective of the structure of the organic compounds in the emission stream, the method measures the moles of carbon contained in those compounds. In contrast, Method 25A provides a continuous measure of the organic material present by measuring the response of an FID to that material relative to the response of the FID to a calibration gas. If the organic compounds in the exhaust gas are primarily aliphatic and aromatic hydrocarbons, the two methods provide reasonably comparable measures, but if the exhaust contains substantial quantities of oxygenated compounds such as aldehydes and ketones, the results will differ substantially. This difference is a consequence of the diminished response of the FID to aldehydes and ketones. Because the hot press exhaust and some dryer exhaust streams are known to contain quantities of aldehydes and ketones, the two methods are not expected to produce comparable results for those operations.

### 3.5.4 Interrelationship of PM/PM-10 and VOC Emissions

Due to source characteristics there is an interrelationship between PM/PM-10 and VOC emissions. Because of this interrelationship, the differences in the test methods described above can result in measuring some fraction of the organic constituents in the exhaust stream as both PM-10 and VOC emissions.

Available test data for wood products dryer emissions indicate that irrespective of filter temperature, essentially all of the condensible PM that passes through the filter and is collected in the back half of a PM or PM-10 train is organic material. Also, any organic material that passes through an in-stack filter used with Method 25A or that passes through a heated filter at 120EC (250EF) as used with Method 25 will be measured as VOC. At the same time, organic material that condenses between the stack temperature and 120EC (250EF) will be measured as PM-10 by Methods 201 and 201A. Furthermore, material that condenses in the back half of an EPA Method 5 train will be classified as condensible PM by EPA Method 202.

An overlap in the measured PM-10 and VOC emissions in the historical data base may have resulted in two instances. First, if the recommendations of Methods 201 and 201A related to including condensible PM in estimating total PM-10 emissions are followed, condensible PM will be measured as both VOC and PM-10. Second, some fraction of the organic material retained on the Method 201 or 201A filter and measured as PM-10 may also be counted as VOC via Method 25 because the filter temperatures in the Method 25 train can be higher than that of the PM-10 train for these emission sources.

### 3.5.5 Summary

Several general conclusions can be made regarding the measurement of PM-10 and VOC emissions for these sources. First, the source characteristics result in an interrelationship between PM/PM-10 and VOC. The constituent organic pollutants emitted act as both PM and VOC. When an in-stack filter is used during sampling the measured filterable PM, condensible PM, and VOC will be affected by the stack gas temperature. Consequently, these measurements should be made under normal operating conditions; ideally simultaneous measurements should be taken.

Second, the PM-10 and VOC test methods should be conducted to minimize the amount of overlap in their measurement. Use of Methods 201/201A for filterable PM-10 in conjunction with Method 202 for condensible PM-10 will provide total PM-10 results on the same basis (distribution of emissions between the filterable and condensible fraction will be dependent upon stack gas temperature because the 201/201A train uses an in-stack filter). Use of Method 25A with an in-stack filter will provide VOC data on the same basis as the PM-10 measurements. In this case, the condensible organic PM-10 fraction measured using Method 202 will also be measured as VOC by Method 25A. However, the amount of measurement overlap can be estimated.

Finally, Method 25A has a very low response to formaldehyde, and a reduced response to other aldehydes and ketones; consequently, the VOC emissions measured by Method 25A will be biased low in cases where these compounds are present. A separate measurement method (e.g., Method 0011) should be used to quantify these compounds when they are expected to be present in the emissions; for example, in the exhaust gases from the presses and from drying operations.

## REFERENCES FOR SECTION 3


1. *Procedures For Preparing Emission Factor Documents*, EPA-454/R-95-015, U. S. Environmental Protection Agency, Research Triangle Park, NC, May 1997.

2. Code Of Federal Regulations, Title 40, Part 60, Appendix A-Reference Methods.

3. Code Of Federal Regulations, Title 40, Part 51, Requirements for Preparation, Adoption, and Submittal of Implementation Plans.

# 4. REVIEW OF SPECIFIC DATA SETS

## 4.1 INTRODUCTION

This section describes how the AP-42 section was developed. First, descriptions of the data sets that were reviewed for this report are presented in Section 4.2. Section 4.3 explains how the candidate emission factors for WB/OSB manufacturing were developed.

## 4.2 REVIEW OF SPECIFIC DATA SETS

A total of 106 references were reviewed in the preparation of the AP-42 section on waferboard/oriented strandboard manufacturing. References 1 to 21 and 23 to 106 are emission test reports. Reference 22 is NCASI Technical Bulletin No. 694 and the associated data base (hereafter referred to as the NCASI data base). The following sections provide brief descriptions of these references.

### 4.2.1 References 1, 2, and 3

These reports present the results of the EPA-required air emission compliance tests performed February 24 through March 6, 1992 on the wafer dryers and the hot press at the Louisiana-Pacific Corporation, Kirby Forest Industries, OSB plant located in Silsbee, Texas. The PM-10 testing and formaldehyde testing were conducted by different testing contractors and are reported in individual reports, References 1 and 2, respectively. The results of the PM-10 and formaldehyde tests are also incorporated into the final emission report which also includes PM, total hydrocarbon (THC), CO, and $CO_2$ emission data for Kirby Forest Industries.

The Silsbee plant has five identical MEC wood-fired rotary wafer dryers. The wood species that was fired as dryer fuel during the tests is not indicated. However, the wood species dried is primarily southern yellow pine. Particulate matter emissions from each dryer are controlled by a primary cyclone (for product recovery) followed by a secondary multiclone. No other control devices are indicated. No data are available concerning the operating characteristics of the press. At the time of the test, the facility was using both phenol-formaldehyde and MDI resins. The report appears to indicate that a phenol-formaldehyde resin was used for the surface layers, and an MDI resin was used for the core layers.

Particulate matter and condensible PM emissions were tested in accordance with Methods 5 and 202, respectively. The back half of the PM sample was analyzed for condensible PM using a methylene chloride extraction, which recovers both inorganic and organic fractions. Recovered samples were extracted four times with 15 milliliter portions of methylene chloride. The aqueous fraction was evaporated over low heat and the residue weight determined gravimetrically. The organic fraction was evaporated at room temperature and the residue weight determined gravimetrically. The Method 5 and 202 results were reported as filterable PM, condensible inorganic PM, condensible organic PM, and total condensible PM. Emissions of PM-10 were measured in accordance with Method 201A. Average stack temperatures for the PM-10 runs for each dryer were as follows: Dryer No. 1: 83EC (182EF); Dryer No. 2: 80EC (176EF); Dryer No. 3: 78EC (173EF); Dryer No. 4: 76EC (169EF); Dryer No. 5: 73EC (163EF). However, the PM-10 train was modified from that required in Method 201A by eliminating the in-stack filter and using the heated filter from the Method 5 sampling train, i. e., the filter was heated to 121EC (250EF) rather than being held at stack temperature. Aqueous phase and solvent phase condensible data from the Method 202 run concurrent with the PM-10 run were not provided, therefore the organic and inorganic condensible fractions could not be discerned and only total condensible PM data were reported. Formaldehyde samples were collected in accordance with Method 0011. Total gaseous hydrocarbon concentrations were determined instrumentally using a Ratfisch flame ionization detector calibrated against propane in nitrogen standards in accordance with Method 25A. Results of THC monitoring were obtained on the basis of parts per million by volume (ppmv) as carbon and reported as pounds per hour (lb/hr) as carbon. Carbon monoxide determinations were made in accordance with Method 10, and concentrations were determined using a nondispersive infrared (NDIR) continuous emission monitor (CEM). Carbon dioxide determinations were made in accordance with Method 3.

Three PM, CO, formaldehyde, and THC runs were performed on each dryer and each press vent. Three PM-10 and $CO_2$ runs were performed on each dryer.

Process rates specific to each test run are not available; daily averages were used to calculate emission factors. Additionally, process data are not available for some of the test days. Tests for which daily averages are available for each test day were rated B. For each test day when no process data are available, the average of the process rates for the closest test days was used for calculating an emission factor. Tests where assumptions were made regarding process rates for one or more of the test days were rated C. Based on these criteria, all data were assigned ratings of B except for the following data sets, which were rated C: PM-10 for Dryer No. 1; PM-10 and formaldehyde for Dryer No. 2; PM, CO, $CO_2$, formaldehyde, and THC for Dryer No. 3; formaldehyde for Dryer No. 4; and formaldehyde for Dryer No. 5.

4.2.2 Reference 4

This report presents the results of the EPA-required air emission compliance tests performed March 24-28, 1992 on the wafer dryers and hot press at the Louisiana-Pacific Corporation OSB mill located in Corrigan, Texas.

The Corrigan plant has three wafer dryers. The dryer designs are not specified. However, all are wood-fired and dry primarily southern pine. Particulate matter emissions from all three dryers are controlled by a primary cyclone (for product recovery) followed by a secondary multicyclone.

The press at Corrigan has 14 openings, each producing a board that is approximately 1.32 meters (m) x 7.52 m (52 in. x 296 in.). Emissions from the press are vented by three press vents. Axial fans in the ducts above the roof provide the air movement. No control devices are indicated. The type of resin used at the time of the emission test is not specified in the test report.

Particulate matter and condensible PM emissions were tested in accordance with Methods 5 and 202, respectively. The data from Methods 5 and 202 are reported as filterable PM, condensible inorganic PM, condensible organic PM, and total condensible PM. Emissions of PM-10 were measured in accordance with Method 201A. Average stack temperatures for the dryers for the PM-10 runs were as follows: Dryer No. 1: 86EC (187EF); Dryer No. 2: 93EC (200EF); Dryer No. 3: 93EC (200EF). Aqueous phase and solvent phase data were provided for the Method 202 run concurrent with the PM-10 run; thus, an additional set of condensible organic PM, condensible inorganic PM, and total condensible PM data were reported. Formaldehyde samples were collected in accordance with Method 0011. Total gaseous hydrocarbon concentrations were determined instrumentally using a Ratfisch Model RS 55 heated flame ionization detector (HFID) calibrated against propane in air standards in accordance with Method 25A. The THC concentration was continuously monitored by extracting a slipstream of exhaust gas by means of a heated probe and filter holder. Results of THC monitoring were obtained on the basis of ppmv as carbon and reported as lb/hr as carbon. Carbon monoxide determinations were made in accordance with Method 10, and concentrations were determined using an NDIR CEM. Carbon dioxide determinations were made in accordance with Method 3.

Three PM, formaldehyde, and THC runs were performed on Dryers No. 1 and No. 3, and on each press vent. Three PM-10 runs were performed on Dryers No. 1 and No. 3. Nine CO and $CO_2$ runs were performed on Dryers No. 1 and No. 3. Exhaust from Dryer No. 2 was split and exhausted through two separate multicyclones, identified as stacks 2A and 2B. Five CO runs were performed on Dryer No. 2 stacks 2A and 2B. Volumetric flow rate determinations indicated that the flow rates through 2A and 2B were roughly equivalent. Two PM runs were performed on both 2A and 2B. Three PM-10 and THC runs were performed on 2A only. Three formaldehyde runs were performed on 2B only. Because the emission rates determined for PM-10, THC, and formaldehyde were determined for only one of the Dryer No. 2 stacks, these rates were doubled as warranted by the roughly equivalent flow rates and measured PM emissions from stacks 2A and 2B.

A rating of A was assigned to the Dryer No. 1 and Dryer No. 3 test data from this report, with the exception of the $CO_2$ data, which were rated B. A rating of B was assigned to the Dryer No. 2 test data from this report, with the exception of the $CO_2$ data, which were rated C. The Dryer No. 2 data were downrated because only one of the two stacks were tested. The $CO_2$ data for all three dryers were further downrated because these emission factors were calculated from an average process rate for the test day, as opposed to average process rates for the actual test run periods.

The press emission test data are assigned a rating of A. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.3 Reference 5

This report presents the results of the EPA-required air emission compliance tests performed March 30 to April 2, 1992 on the wafer dryers and hot press at the Louisiana-Pacific Corporation OSB mill located in New Waverly, Texas.

The New Waverly mill has two wood-fired wafer dryers that dry primarily southern pines. Particulate matter emissions from each dryer are controlled by a primary cyclone (for product recovery) followed by a secondary multicyclone. No data are available concerning emission control devices for the press. The type of resin used at the time of the emission test is not specified in the test report.

Particulate matter and condensible PM emissions were tested in accordance with EPA Methods 5 and 202, respectively. Method 5 and 202 results were reported as filterable PM, condensible inorganic PM, condensible organic PM, and total condensible PM. Emissions of PM-10 were measured in accordance with Method 201A. Average stack temperatures for the dryers for the PM-10 runs were as follows: Dryer No. 1: 82EC (179EF); Dryer No. 2: 62EC (143EF). Aqueous phase and solvent phase data were provided for the Method 202 run concurrent with the PM-10 run; thus, an additional set of condensible organic PM, condensible inorganic PM, and total condensible PM data were reported. Formaldehyde samples were collected in accordance with Method 0011. Total gaseous hydrocarbon concentrations were determined instrumentally using a Ratfisch Model RS 55 HFID calibrated against propane in air standards in accordance with Method 25A. The THC concentration was monitored continuously by extracting a slipstream of exhaust gas by means of a heated probe and filter holder. Results of THC monitoring were obtained as ppmv as carbon and reported as lb/hr as carbon. Carbon monoxide determinations were made in accordance with Method 10, and concentrations were determined using an NDIR CEM. Carbon dioxide determinations were made in accordance with Method 3.

Three PM and formaldehyde runs were performed on Dryers No. 1 and No. 2, and on each press vent. Three THC runs were performed on Dryers No. 1 and No. 2, and on each of the three press vents. Three PM-10 runs were performed on both dryers. Nine CO and $CO_2$ runs were performed on each dryer.

A rating of A was assigned to the test data from this report, with the exception of the $CO_2$ data, which were rated B. Tests were performed by sound methodologies and are reported in enough detail for adequate validation. The $CO_2$ data, however, are calculated from an average process rate for the test day, as opposed to average process rates for the actual test run periods.

4.2.4 Reference 6

This report presents the results of air emission compliance tests performed April 7, 1992 on the No. 1 and No. 3 boilers at the Louisiana-Pacific Corporation OSB mill located in Urania, Louisiana. Emission factors for boilers are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from this reference are not incorporated into AP-42 Section 10.6.1, and are not addressed further in this background report.

4.2.5 Reference 7

This report presents the results of the EPA-required air emission compliance tests performed April 4 to 9, 1992 on the wafer dryers and hot press at the Louisiana-Pacific Corporation OSB plant located in Urania, Louisiana.

The Urania plant has two wood-fired wafer dryers that dry primarily southern pine. Particulate matter emissions from each dryer are controlled by a primary cyclone (for product recovery) followed by a secondary multicyclone. No other control devices are indicated.

The press at Urania has 12 openings, each producing a board that is approximately 1.32 m x 7.49 m (52 in. x 295 in.). Emissions from the press are vented by four press vents. Axial fans in the ducts above the roof provide the air movement. No control devices are indicated. At the time of the test, the facility was using both phenol-formaldehyde and MDI resins. The report appears to indicate that a phenol-formaldehyde resin was used for the surface layers, and an MDI resin was used for the core layers.

Particulate matter and condensible PM emissions were tested in accordance with EPA Methods 5 and 202, respectively. Method 5 and 202 results were reported as filterable PM, condensible inorganic PM, condensible organic PM, and total condensible PM. Emissions of PM-10 were measured in accordance with Method 201A, thus the filters were held at stack temperature. Average stack temperatures for the dryers during the PM-10 runs were as follows: core dryer: 102EC (215EF); face dryer: 99EC (211EF). Aqueous phase and solvent phase data were provided for the Method 202 run concurrent with the PM-10 run; thus, an additional set of condensible organic PM, condensible inorganic PM, and total condensible PM data were reported. Formaldehyde samples were collected in accordance with Method 0011. Total gaseous hydrocarbon concentrations were determined instrumentally using a Ratfisch Model RS 55 HFID calibrated against propane in air standards in accordance with Method 25A. The THC concentration was monitored continuously by extracting a slipstream of exhaust gas by means of a heated probe and filter holder. Results of THC monitoring were obtained as ppmv as carbon and reported as lb/hr as carbon. Carbon monoxide determinations were made in accordance with Method 10, and concentrations were determined using an NDIR CEM. Carbon dioxide determinations were made in accordance with Method 3.

Three PM, formaldehyde, and THC runs were performed on each dryer and on each press vent. Three PM-10 runs were performed on each dryer. Nine $CO_2$ runs were performed on each dryer. Six CO runs were performed on the core dryer, and nine CO runs were performed on the face dryer.

The dryer test data for this mill were assigned ratings of B or C. Process rates specific to each test run are not available; daily averages were used to calculate emission factors. Additionally, process data are not available for some of the test days. Tests for which daily averages are available for each test day were rated B. For each test day for which no process data are available, the average of the process rates for the closest test days was used for calculating an emission factor. Tests where assumptions were made regarding process rates for one or more of the test days were rated C. Based on these criteria, all data were assigned ratings of B except PM, CO, $CO_2$, formaldehyde, and THC for the core dryer, and PM-10, CO, and $CO_2$ for the face dryer, which were assigned ratings of C.

The press emission test data are assigned a rating of A. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.6 Reference 8

This Source Test Report Review presents the results of air emission compliance tests performed August 19, 1988 on the surface dryer and core dryer at the Langboard Corporation OSB mill located in Quitman, Georgia. Because this memo is not the primary source of the emission data, and because the memo does not contain sufficient data to evaluate the testing procedures and source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1, and are not addressed further in this background report.

4.2.7 Reference 9

This Source Test Report Review presents the results of air emission compliance tests performed February 5-7, 1990 and May 15-16, 1990 on dryer No. 1, dryer No. 3, and on the press at the Louisiana-Pacific Corporation OSB mill located in Center, Georgia. Because this memo is not the primary source of the emission data, and because the memo does not contain sufficient data to evaluate the testing procedures and source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1, and are not addressed further in this background report.

4.2.8 Reference 10

The EPA and NCASI sponsored this test of the Weyerhaeuser OSB plant in Elkin, North Carolina. The purpose of this test was to develop emission factors for OSB production facilities. Simultaneous measurements were conducted at the inlet and outlet of the EFB for the No. 1 wood flake dryer exhaust and at the uncontrolled press vents. A multiclone precedes the dryer EFB, so EFB inlet data are multiclone controlled. The pollutants measured were PM, condensible PM, CO, $NO_x$, THC, formaldehyde, other aldehydes, ketones, semivolatile organic compounds, and volatile organic compounds. No PM-10 results are reported. The type of resin used at the time of the emission test is not specified in the test report.

Particulate matter and condensible PM emissions were tested using Methods 5 and 202. Method 5 and 202 results were reported as filterable PM, condensible inorganic PM, condensible organic PM, and total condensible PM. Formaldehyde and other aldehyde and ketone emissions were measured with Method 0011. However, the Method 0011 data were not used because the data are highly variable and considered invalid. Total gaseous nonmethane organic (TGNMO) emissions were tested using Method 25. Total hydrocarbon emissions were measured by Method 25A. Both TGNMO and THC results are reported as ppmv as carbon and lb/hr as carbon. Nitrogen oxides, CO, and $CO_2$ emissions were measured by Methods 7E, 10, and 3, respectively. The volatile organic sampling train (VOST) and semi-VOST tests were conducted for screening purposes and the resultant data are presented without discussion of the test methods or of the sample analysis procedures. In addition, the vast majority of the data were below detection limits, the detection limits of the methods for the various compounds were not provided in the report, and the method used to calculate the emission rates for these compounds is not explained. For these reasons, the VOST and semi-VOST data were not included in this report.

The wood mix for this mill was approximately 60 percent softwood, such as pine, 30 percent soft hardwood, such as sweet gum, and 10 percent hardwood. About 11.7 megagrams per hour (Mg/hr) (12.8 tons per hour [tons/hr]) of flakes were processed by two 3.66-meter (12-foot) diameter dryers with inlet temperatures of about 538EC (1000EF) and exit temperatures of about 113EC (236EF). The dryers were heated by a McConnell burner fired with recycled waste such as wood trim, fines, and resinated sander dust. The moisture content of the wood flakes exiting the dryer was about 2.7 percent.

A rating of A was assigned to the EFB inlet data. A rating of B was assigned to the EFB outlet data, as the discrepancies in the inlet versus outlet flow rates (a decrease of about 10 percent) and $O_2$ and $CO_2$ levels suggested leakage of exhaust gas to the atmosphere between the inlet and outlet.

4.2.9 Reference 11

Source sampling was performed at the Georgia-Pacific Corporation OSB plant in Dudley, North Carolina, in September 1983. The sampling had two purposes: (1) to determine PM emissions from three green chip dryers for compliance purposes, and (2) to determine the control efficiency of the dryer WESP.

Two simultaneous samples at the United-McGill WESP inlet and at the stack were made on September 20, 1983, and two simultaneous samples at the same locations were made on September 21, 1983. The first set of samples on September 21, 1983 was voided due to the failure of a posttest leak check. Particulate matter emissions were measured with Method 5. The type of resin used at the time of the emission test is not specified in the test report.

During the test, the dryers produced a total of approximately 17 Mg/hr (19 tons/hr) of dried flakes. Heat input to the dryer is provided by firing wood fines. The wood fines fired are a mixture of southern pine species and mixed soft hardwoods.

A rating of B was assigned to both the inlet and outlet data from this test report. There was only a limited process description.

4.2.10 Reference 12

This report presents the results of emission testing performed on the chip dryer inlet and outlet at Georgia-Pacific Corporation in Woodland, Maine, on October 25, 1988. The purpose of this test was to determine the efficiency of the United-McGill WESP in controlling emissions from the chip dryer. The data from this test are included in the NCASI data base.

The facility has two wood-fired dryers which are used to dry green wood flakes (50 percent moisture content, wet basis) for use in OSB production. The dryers are direct-fired, triple pass, rotary drum dryers, each is equipped with its own sanderdust suspension burner. The wood mix for this plant is spruce, fir, and poplar (evergreen pine types and soft hardwoods). Flue gases and dry wood flakes are pneumatically conveyed from each dryer to its own high efficiency cyclone and induced draft (ID) fan, and then to a common duct leading to a prequench chamber that removes large flakes and/or wood fibers and also saturates and cools the incoming gas stream in order to condense any organic compounds present. Inlet sampling was conducted prior to the prequench chamber. The saturated gas stream passes through a three-field WESP and stack to the atmosphere. During the test, the dryers operated at a combined rate of approximately 18 Mg/hr (20 tons/hr), which is capacity for the system. The type of resin used at the time of the emission test is not specified in the test report.

Particulate matter emission testing was performed using Method 5. The procedures used to analyze the back half of the Method 5 train were not described in the report. Method 5 and back half results were reported as filterable PM and total condensible PM only. Condensible organic and inorganic fractions were not reported separately. The TGNMO emission testing was done by using Method 25 and results were obtained as ppmv as carbon and reported as lb/hr as carbon. Formaldehyde emission testing was done using a method identified as "P&CAM 125." No description of this method was provided in the test report.

The quality ratings for these emission data are described in the discussion of Reference 22.

4.2.11 <u>Reference 13</u>

The EPA and NCASI sponsored this test of the Georgia-Pacific OSB plant in Skippers, Virginia. The purpose of the test was to develop emission factors for OSB production facilities. Simultaneous measurements were conducted at the inlet and outlet of the WESP for the wood flake dryer exhaust. Pollutants measured were PM, condensible PM, CO, $NO_x$, THC, formaldehyde, other aldehydes, ketones, and semivolatile organic compounds. The type of resin used at the time of the emission test is not specified in the test report. The data from this test are included in the NCASI data base.

Particulate matter and condensible PM emissions were tested using Methods 5 and 202. Method 5 and 202 results were reported as filterable PM, condensible inorganic PM, condensible organic PM, and total condensible PM. Formaldehyde and other aldehyde and ketone emissions were measured with Method 0011. However, the Method 0011 data were not used because the data are highly variable and considered invalid. Total gaseous nonmethane organic emissions were tested using Method 25. Total hydrocarbon emissions were measured by Method 25A. Both TGNMO and THC results were obtained as ppmv as carbon and reported as lb/hr as carbon. Nitrogen oxides, CO, and $CO_2$ concentrations were measured by Methods 7E, 10, and 3, respectively. Semivolatile organic compound emissions were measured with a Modified Method 5 (semi-VOST) sampling train. The semi-VOST tests were conducted for screening purposes and the resultant data are presented without discussion of the test method or of the sample analysis procedure. In addition, the vast majority of the data were below detection limits, the detection limits of the method for the various compounds were not provided in the report, and the method used to calculate the emission rates for these compounds is not explained. For these reasons, the semi-VOST data were not included in this report.

The wood mix for this plant is about 40 percent pine and 60 percent soft hardwoods. About 15 to 18 Mg/hr (17 to 20 tons/hr) of wet wood flakes are sent to each of four direct-heated wood-fired dryers with an inlet temperature of about 1000E to 1200EF (538E to 649EC) to maintain an exit temperature of about 250EF (121EC). At the dryer exit, the moisture content of the wood flakes ranges from 3 to 6 percent, wet basis.

The quality ratings for these emission data are described in the discussion of Reference 22.

4.2.12  <u>Reference 14</u>

This reference includes air emission and process data from compliance and engineering tests for dryer emissions from the J. M. Huber Corporation OSB plant in Commerce, Georgia.  Measurements were conducted at the inlet and outlet of three WESP's for the exhaust from three wood flake dryers.  Data are included for PM, condensible PM, TGNMO, THC, $NO_x$, CO, and formaldehyde.  The type of resin used at the time of the emission test is not specified in the test report.  The data from this test are included in the NCASI data base.

Particulate matter and condensible PM emissions were tested in accordance with Methods 5 and 202, respectively.  Method 5 and 202 results are reported as filterable PM and total condensible PM only. Condensible inorganic PM and condensible organic PM fractions were not reported separately.  Volatile organic compound emissions were tested in accordance with Method 25, and results were obtained as ppmv as carbon and reported as lb/hr as carbon.  Formaldehyde emissions were tested in accordance with Method 0011.  Nitrogen oxides emissions were measured by Method 7E.  Carbon monoxide emissions were tested with Method 10 for Dryers 1 and 3.  For Dryer 2, CO emissions were tested with Method 10B.

These tests were performed while operating the dryers at maximum throughput.  Each of the three wood-fired rotary dryers is controlled by a separate Geoenergy E-Tube WESP.  The wood used for OSB production comprised 90 percent Southern Yellow Pine and 10 percent soft hardwoods.

The quality ratings for these emission data are described in the discussion of Reference 22.

4.2.13  <u>Reference 15</u>

This report presents the results of the EPA-required air emission compliance tests performed on the wafer dryer and press vents at the Louisiana-Pacific Corporation waferboard plant located in Two Harbors, Minnesota.  The data from this test are included in the NCASI data base.

The wafer dryer tested is an MEC Model 1260 rotary drum dryer equipped with a pneumatic injection system for firing wood fines and a design heat input capacity of 42 x $10^6$ kilojoules per hour (kJ/hr) (40 x $10^6$ British thermal units per hour [Btu/hr]).  Particulate matter emissions from the wafer dryer are controlled by a primary cyclone followed by a secondary multicyclone, also manufactured by MEC Company, in series with an EFB manufactured by E.F.B., Inc.  Cleaned flue gas is emitted to the atmosphere through a 30-meter (100-foot) high, 1.2-meter (48-in.) diameter radial steel stack.

The press vents tested are the exhaust from general ventilators positioned over the board press and unloader.  Axial fans in the duct above the roof provide the air movement.  Emissions from the board presses are uncontrolled.  At the time of the test, the facility was using an MDI resin.

Particulate matter emissions evaluations were performed in accordance with EPA Method 5.  Wet catch samples were collected in the back half of the Method 5 sampling train to provide samples for methylene chloride extraction to determine total condensible organic compounds.  The PM-10 determinations were performed in accordance with Method 201A; thus, the filters were held at stack gas temperature. Average stack gas temperatures during the PM-10 runs were as follows:  dryer:  96EC (205EF); press:  24EC (75EF).  Aqueous phase and solvent phase data were not reported for the Method 202 run concurrent with the PM-10 run; thus, the condensible organic and condensible inorganic fractions could not be discerned and only total condensible PM data were reported for those runs.  The PM-10 determinations on the press vents at this facility were complicated by the fact that one nozzle was not adequate to perform an isokinetic traverse of the duct. Therefore, two nozzles were used, one to sample the low velocity pressure points and another to sample the high velocity pressure points. These two samplings were then combined to obtain the total PM-10 catch for each run. Formaldehyde samples were collected using Method 0011. Carbon monoxide determinations were performed in accordance with Method 10. Total hydrocarbon concentrations were determined instrumentally using a Ratfisch Model 55RS HFID calibrated against propane in air standards in accordance with Method 25A. The THC concentration was monitored continuously by extracting a slipstream of exhaust gas by means of a heated probe and filter holder. Results of THC monitoring were obtained as ppmv as carbon and reported as lb/hr as carbon.

The quality ratings for these emission data are described in the discussion of Reference 22.

4.2.14 Reference 16

This report presents the results of the EPA-required air emission compliance tests performed on the wafer dryer and press vents at the Louisiana-Pacific Corporation waferboard plant located in Newberry, Michigan. The data from this test are included in the NCASI data base.

The wafer dryer tested is an MEC Model 1360 rotary dryer equipped with a McConnell burner for firing wood fines with a design heat input capacity of 45 x $10^6$ kJ/hr (43 x $10^6$ Btu/hr). Particulate matter emissions from the wafer dryer are controlled by a multiclone in series with an EFB manufactured by E.F.B., Inc. All test results are reported for the outlet of the EFB. The dryer operating rate during the test was reported to be 9.6 Mg/hr (10.54 tons/hr).

The press vents tested are the exhaust from general ventilators positioned over the board press and unloader. Axial fans in the duct above the roof provide the air movement. At the time of the test, the facility was using both phenol-formaldehyde and MDI resins. The report appears to indicate that a phenol-formaldehyde resin was used for the surface layers and an MDI resin was used for the core layers.

Particulate matter emissions evaluations were performed in accordance with EPA Method 5. Wet catch samples were collected in the back half of the Method 5 sampling train to provide samples for methylene chloride extraction to determine total condensible organic compounds. The PM-10 determinations were performed in accordance with Method 201A; thus, the filters were held at stack gas temperature. Average stack gas temperatures during the PM-10 runs were as follows: dryer: 99EC (211EF); press: 26EC (78EF). Aqueous phase and solvent phase data were not reported for the Method 202 run concurrent with the PM-10 run; thus, the organic and inorganic fractions could not be discerned and only total condensible data were reported. The PM-10 determinations on the press vents at this facility were complicated by the fact that one nozzle was not adequate to perform an isokinetic traverse of the duct. Therefore, two nozzles were used, one to sample the low velocity pressure points and another to sample the high velocity pressure points. These two samplings were then combined to obtain the total PM-10 catch for each run. Formaldehyde samples were collected using Method 0011. Carbon monoxide determinations were performed in accordance with Method 10. Total hydrocarbon concentrations were determined instrumentally using a Ratfisch Model 55RS HFID calibrated against propane in air standards in accordance with Method 25A. The THC concentration was monitored continuously by extracting a slipstream of exhaust gas by means of a heated probe and filter holder. Results of THC monitoring were obtained as ppmv as carbon and reported as lb/hr as carbon.

The quality ratings for these emission data are described in the discussion of Reference 22.

4.2.15 Reference 17

This report includes data from source emission compliance testing conducted on three dryer stacks at the Louisiana-Pacific Corporation waferboard plant located in Sagola, Michigan. The objectives of this project were to quantify source emissions in response to a Clean Air Act Section 114 information request, and to compare emissions to applicable air emissions regulations stipulated by State and Federal regulations. Pollutants tested include PM, PM-10, CO, formaldehyde, and THC. The data from this test are included in the NCASI data base.

The dryers tested are rotary dryers 18 meters (60 feet) long with a diameter of 4 meters (13 feet). Each of the dryers is heated by firing wood fines. The wood species processed during the tests were 99 percent hardwood and 1 percent softwood. Particulate matter emissions from the dryers are controlled by twin cyclones followed by an EFB. At the time of the test, the facility was using both phenol-formaldehyde and MDI resins. The report appears to indicate that a phenol-formaldehyde resin was used for the surface layers, and an MDI resin was used for the core layers.

The testing for PM emissions was done according to Method 5. The testing for PM-10 emissions was conducted in accordance with Method 201A; thus, the filters were held at stack gas temperature. Average stack gas temperatures for the three dryers during the PM-10 runs were: 102EC (216EF), 121EC (250EF), and 118EC (244EF). Formaldehyde emissions were measured with Method 0011. Carbon monoxide emissions were determined with Method 10. Total hydrocarbon concentrations were determined instrumentally using a Ratfisch RS55 HFID calibrated against propane in air standards in accordance with Method 25A. Results of THC monitoring were obtained as ppmv as propane, multiplied by three to obtain ppmv as carbon, and reported as lb/hr as carbon.

The quality ratings for these emission data are described in the discussion of Reference 22.

4.2.16 Reference 18

This test report presents the results of air emission compliance tests conducted on the press and unloader vents at the Louisiana-Pacific Corporation waferboard plant located in Sagola, Michigan. Pollutants tested include PM, PM-10, CO, formaldehyde, and total hydrocarbon. The data from this test are included in the NCASI data base.

The press vents tested are the exhaust from general ventilators positioned over the board press and unloader. The press and unloader vent exhausts are emitted to the atmosphere via a common stack which extends 32 meters (105 feet) above grade and has a diameter of 1.8 meters (72 inches). At the time of the test, the facility was using both phenol-formaldehyde and MDI resins. The report appears to indicate that a phenol-formaldehyde resin was used for the surface layers, and an MDI resin was used for the core layers.

Particulate matter emissions evaluations were performed in accordance with EPA Method 5. Wet catch samples were collected in the back half of the Method 5 sampling train to provide samples for methylene chloride extraction to determine total condensible organic compounds. The PM-10 determinations were performed in accordance with Method 201A; thus, the filters were held at stack temperature. Average stack temperature during the PM-10 runs was 22EC (72EF). Aqueous phase and solvent phase data were not reported for the Method 202 run concurrent with the PM-10 run; thus, the organic and inorganic fractions could not be discerned and only total condensible data were reported for these runs. Formaldehyde samples were collected in accordance with Method 0011. Total gaseous hydrocarbon concentrations were determined instrumentally using a Ratfisch Model RS55 HFID calibrated against propane in air standards in accordance with Method 25A. The THC concentrations were continuously monitored by extracting a slipstream of exhaust gas by means of a heated probe and filter holder. Results of THC monitoring were obtained as ppmv as carbon and reported as lb/hr as carbon. Carbon monoxide determinations were performed in accordance with EPA Method 10.

The quality ratings for these emission data are described in the discussion of Reference 22.

4.2.17 Reference 19

This report presents the results of air emission tests performed September 24-26, 1991 on each of five OSB dryer stacks at the Kirby Forest Industries OSB mill located in Silsbee, Texas. The report contains no production data for any of the five dryers tested, therefore no emission factors could be developed from the emission rates reported. Because this report does not contain sufficient data to evaluate the source operating conditions during the test and no emission factors could be developed, these emission data are not incorporated into AP-42 Section 10.6.1, and are not addressed further in this background report.

4.2.18 Reference 20

This report presents the results of air emission compliance tests performed June 1, 1987 on the Unit 1 Wood Dryer/Ionizing Wet Scrubber (IWS) system at the Weyerhaeuser Company oriented strandboard manufacturing facility located in Elkin, North Carolina.

Heat input to the rotary dryer is provided by a combination of wet cell and suspension burner. The wood species dried and the dryer fuel type are not specified in this June 1987 report. However, subsequent test reports for this same dryer indicate that recycled wood waste is the fuel for the wet cell and the suspension burner, and that the wood mix for the mill is 60 percent softwood (pines), 30 percent soft hardwoods (sweet gum), and 10 percent hardwood. Particulate matter emissions from this dryer are controlled by a primary cyclone (for product recovery) followed by a Ceilcote ionizing wet scrubber. The process rate for the dryer was reported on the basis of oven dried wood product and was approximately 9 Mg/hr (9.9 tons/hr) during the test. Dryer inlet temperature averaged 584EC (1083EF) and dryer outlet temperature averaged 118EC (245EF). Data on wood furnish moisture content were not reported.

The dryer/IWS system had been off line for 8 hours prior to the test period due to a plugged cyclone. Due to the downward trend of the PM emission rate during the test period, it is probable that the dryer had not reached a stable operating condition prior to the start of the test period.

Filterable PM emissions were measured using Method 5. The procedures used to analyze the back half of the Method 5 train were not described in the report. The Method 5 and back half results were reported as front half particulate and total particulate. An emission factor was developed for filterable PM only. The back half results were not used to develop an emission factor for condensible PM due to the lack of sampling and analysis data.

A rating of D was assigned to the data, as the source may not have been operating within typical parameters during the test, and the sampling and analytical methods are not well documented.

4.2.19 Reference 21

This report presents the results of air emission compliance tests performed June 29, 1987 on the same OSB dryer that is the subject of Reference 20. Measured emissions included front half PM (filterable PM) and total PM.

The process rate for the dryer was reported on the basis of oven dried wood product. The belt speed used to determine dryer throughput was the same as for the previous test (Reference 20). However, this report gives the process rate as approximately 10 Mg/hr (11 tons/hr) of oven dried wood product, whereas the previous report indicated that the rate for the same belt speed was more specifically 9 Mg/hr (9.9 tons/hr). Given the lower PM emission rates and lower dryer inlet temperature of the June 29 test, the 9 Mg/hr (9.9 tons/hr) rate was used to calculate the emission factor. The dryer inlet temperature averaged 362EC (683EF) and dryer outlet temperature averaged 102EC (215EF) for this test. Data on wood furnish moisture content were not reported.

Filterable PM emissions were measured using Method 5. The procedures used to analyze the back half of the Method 5 train were not described in the report. The Method 5 and back half results were reported as front half particulate and total particulate. An emission factor was developed for filterable PM only. The back half results were not used to develop an emission factor for condensible PM due to the lack of sampling and analysis data.

A rating of B was assigned to the data, as the source operation and sampling and analytical methods are not well documented.

4.2.20 Reference 22

As indicated previously, this reference consists of a technical bulletin and the associated data base. The data base includes data on emission source design and operating parameters, emission test parameters, and emission measurements for a total of approximately 150 emission tests conducted at 16 oriented strandboard manufacturing facilities. Because of the extent of the data presented in the data base, a narrative description of the emission tests addressed is not practical for this report. Instead, the data are summarized in a series of tables. Table 4-1, Table 4-2, and Table 4-3 present data related to the sampling of criteria pollutants and related pollutants from OSB dryers. Table 4-1 presents data on dryer design and operating parameters, including dryer type, type of firing, dryer capacity, emission control device, form of wood materials dried, and the hot air source. Table 4-2 summarizes the emission data for OSB dryers. The table presents for each emission test, the test method, number of runs, volumetric flow rate, stack gas temperature and moisture, pollutant concentration, emission rate, process operating rate, and emission factor. Table 4-3 presents a summary of the other operating data that are likely to affect dryer emission levels. The table includes data on firing type, fuel type, wood species dried, inlet and outlet moisture contents of the wood furnish, dryer inlet and outlet temperatures, emission control device, number of test runs, emission factor, and data rating. The data in Table 4-1, Table 4-2, and Table 4-3 are ordered by pollutant and primary emission control device. The dryer test code and unit code for each test are provided in the first two columns of each of the tables. The dryer and parameter codes presented in these tables, as well as the other tables developed from the NCASI data base, are identical to the codes used in the NCASI data base. The footnotes at the end of each table define the relevant parameter codes that appear in the table.

Data on emissions of speciated organics from OSB dryers are presented in Table 4-4 and Table 4-5. The data in these tables correspond to the data presented in Table 4-2 and Table 4-3 on emission test parameters and other operating parameters that are likely to affect emissions. Table 4-6 defines the pollutant codes used in Table 4-4 and Table 4-5. These pollutant codes match those used in the NCASI data base and throughout this section.

Table 4-7 and Table 4-8 present a summary of the data on OSB presses. Table 4-7 includes press design and operating data and emission test parameters including press size, number of vents, test method, number of runs, stack parameters, pollutant concentration, emission rate, process rate, and emission factor. Table 4-8 presents other data that are likely to have a significant effect on emissions, including press temperature, cycle time, board thickness and density, moisture content, wood species, type of resin, resin application rate, the use of catalysts or scavengers, wax application rate, pollutant, and emission factor.

Table 4-9 summarizes the emission data for OSB press unloaders. The table presents for each emission test, the pollutant, number of runs, test method, wood species, resin type, emission rate, process operating rate, and emission factor.

The quality ratings for the emission data presented in Table 4-1, Table 4-2, Table 4-3, Table 4-4, Table 4-5, Table 4-7, Table 4-8, and Table 4-9 take into account the number of test runs, test method, and any other indication that the test results may be suspect. Generally, data based on three or more test runs were assigned a rating of A, 2-run data were assigned a rating of B, and single-run data were assigned a rating of D. If there were indications of other reasons for questioning the data, the rating was further lowered.

The quality ratings for the following emission data were lowered for the reasons indicated below:

1. 215-062591A. The cyclone-controlled PM emission factor for this test is reported as 0.094 lb/oven-dried ton (ODT). This factor is an order of magnitude below most WESP-controlled PM emission factors. The factor is therefore highly suspect and was downrated to D.

2. 052-011493B. The CO emission factor for this test is reported as 14.29 lb/ODT. This factor is an order of magnitude greater than all other CO data. In addition, the data for the three test runs are highly variable, ranging from 250 to 1,050 parts per million (ppm). The factor is therefore highly suspect and was downrated to D.

3. 070-031992B. The $NO_x$ emission factor for this test is reported as 0.16 lb/ODT. This factor is well below the range of $NO_x$ emission factors from other tests. In addition, the factor is based on only two test runs which vary by a factor of 7.5. The factor is therefore suspect and was downrated to D.

4. 070-101091B. The VOC emission factor for this test is reported as 11.02 lb/ODT. This factor is well above the range of VOC emission factors from other tests. In addition, the data for the three test runs vary by an order of magnitude. The factor is therefore suspect and was downrated to B.

5. 070-062891A. The VOC emission factor for this test was reported as 17.78 lb/ODT. This factor is well above the range of VOC emission factors from other tests. The data from the second of the three runs was over five times the average of the other two runs. The anomalous second run data were discarded and the average of the remaining two runs was taken to get an emission factor of 7.5 lb/ODT. Because the emission factor of 7.5 lb/ODT is based on only two test runs, the factor was downrated to B.

6. 070-062891A. The formaldehyde emission factor for this test was reported as 0.019 lb/ODT. The data from the second of the three runs was over 14 times the average of the other two runs. The anomalous second run data were discarded and the average of the remaining two runs was taken to get an

emission factor of 0.0035 lb/ODT. Because the emission factor of 0.0035 lb/ODT is based on only two test runs, the factor was downrated to B.

7. Data based on National Institute for Occupational Safety and Health (NIOSH) Method 3500 for sampling formaldehyde were rated no higher than D due to the error associated with that method, and were not used to develop emission factors.

4.2.21 References 23 and 24

This report and the supplemental letter present the results of air emission compliance tests performed July 23-25, 1996 on the wafer dryers and hot press at the Louisiana-Pacific Corporation, OSB plant located in Sagola, Michigan. Pollutants tested include PM, $NO_x$, CO, $CO_2$, VOC, formaldehyde, phenol, and MDI.

The Sagola plant has three Heil rotary wafer dryers 18 meters (60 feet) long with a diameter of 4 meters (12 feet). Each of the dryers is heated by firing wood fines in a Coen burner. The wood species processed during the tests was 100 percent pine (unspecified pines). Emissions from the dryers are controlled by primary cyclones followed by an E-Tube WESP and an RTO. Emissions from the press are controlled by a separate RTO. At the time of the test, the facility was using both phenol-formaldehyde and MDI resins.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as dry plus wet catch (total PM), and as dry catch (filterable PM) only. Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and pounds per hour as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were determined in accordance with Method 3A, using Orsat analyzers.

Phenol samples were collected using a Method 5 sampling train with neutral-buffered absorbing reagent. The first impinger in each sampling was spiked with isotopically-labeled phenol (phenol-d5) and 2-fluorophenol for sampling and recovery efficiency surrogates. The recovered samples were extracted and the extracts analyzed by gas chromatography/mass spectroscopy (GC/MS) for phenol, phenol-d5, and 2-fluorophenol as per EPA Method 8270. All three of the uncontrolled press phenol runs, and all three of the press RTO phenol runs were below detection limits. In accordance with EPA AP-42 procedures, because phenol has been measured in detectable quantities in similar sources, these emission data for phenol are included in this report based on half the method detection limit.

The MDI concentrations were determined in accordance with the 1-(2-pyridyl) piperazine method (1,2-PP) as developed by Radian Corporation under contract to EPA. This method employs collection of MDI with 1-(2-pyridyl) piperazine in toluene reagent, with analysis by high pressure liquid chromatography (HPLC). All three of the press RTO MDI runs were below detection limits. In accordance with EPA AP-42 procedures, because MDI has been measured in detectable quantities in similar sources, these emission data for MDI are included in this report based on half the method detection limit.

A rating of A, B, or C was assigned to the report data. The dryer and press RTO VOC data were assigned a rating of B because methane subtraction for TGNMO was done improperly for five out of six runs. The phenol and MDI data were assigned a rating of C because there were no volumetric flow and moisture measurements completed during the test period; an average from prior tests was used. The remainder of the data are assigned a rating of A. These tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.22 References 25 and 26

This report and the supplemental letter present the results of a performance specification test performed September 16, 1994 to verify acceptable performance of the carbon monoxide continuous emission monitoring system (CEMS) and continuous emission rate monitoring system (CERMS) installed at the RTO exhaust stack at Louisiana-Pacific Corporation's OSB manufacturing plant in Chilco, Idaho.

The Chilco, Idaho, plant is equipped with a natural gas-fired RTO to control emissions from both the press and the dryer. The production rate given in the report is approximately 11 tons per hour. It is not specified in the report if the production rate reported is finished product for the mill, dryer production, or press production. No other process data or description of plant equipment is provided. The results presented in this report represent combined press and dryer emissions from the RTO stack.

Because the emission data in this report cannot be attributed to a specific source or type of source, and because the report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.23 References 27 and 28

This report and the supplemental letter present the results of air emissions tests performed June 14-17, 1994 on the dryer RTO and press RTO at the Louisiana-Pacific Corporation OSB facility in Hanceville, Alabama. Pollutants tested include filterable PM, condensable PM, VOC, formaldehyde, $NO_x$, CO, and $CO_2$.

The Hanceville plant has five rotary dryers, each of which exhausts to a primary cyclone, then to a high efficiency multiclone. Exhausts from all five dryer multiclones are directed to a mixing chamber then to dual RTO's. Each RTO has its own stack. During this test program, the No. 3 Dryer was not operating. With all five dryers operating at capacity the dry bin was being overloaded, so four-dryer operation was maintained throughout the test program. No information was provided on the wood species being processed. No information on dryer design or firing characteristics was provided in the report. Emissions from the four press and unloader vents are collected and directed via two ducts to a mixing chamber, then to an RTO. Emissions from the press RTO exhaust to the atmosphere through a single stack. No information is provided in the test report regarding the type of resin used during the testing.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and lb/hr as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3, using Orsat analyzers.

Because the report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.24 Reference 29

This report presents the results of air emissions tests performed February 20-22, 1996 on the Line 1 dryer RTO, press RTO, and thermal oil heater at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Pollutants tested include filterable PM, condensable PM, $NO_x$, CO, $CO_2$, formaldehyde, benzene, VOC, MDI, phenol, and polyaromatic hydrocarbons (PAH).

Hayward Line 1 includes two direct wood-fired rotary dryers each of which exhausts to a primary cyclone, followed by a WESP. The exhausts from the two WESP's are combined and vented to a common RTO. No information on the wood species being processed was provided in the report. The Line 1 press exhausts through two press vents, then through a common duct to an RTO. Both MDI and phenol-formaldehyde resins were used throughout the test program. The Konus thermal oil heater emissions are controlled by an EFB.

Particulate matter and condensable PM emissions were tested in accordance with Method 5. The back half of the Method 5 sampling train was analyzed per Wisconsin Department of Natural Resources (DNR) protocol. Method 5 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and pounds per hour as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3A, using Orsat analyzers. Benzene samples were collected in accordance with Method 18 using 800/200 mg charcoal tubes. The samples were analyzed by Modified NIOSH 1501.

The MDI concentrations were determined in accordance with the 1,2-PP method. All three of the press RTO MDI runs were below the method detection limit. In accordance with EPA AP-42 procedures, because MDI has been measured in detectable quantities in similar sources, these emission data for MDI are included in this report based on half the method detection limit.

Phenol samples were collected using a Method 5 sampling train with neutral-buffered absorbing reagent followed by extraction with methylene chloride and direct analysis by GC/MS with no concentration as per EPA Method 8270. The samples were field spiked with phenol-d5 as a sampling and recovery efficiency surrogate. All three of the dryer RTO phenol runs were below detection limits. In accordance with EPA AP-42 procedures, because phenol has been measured in detectable quantities in similar sources, these emission data for phenol are included in this report based on half the method detection limit.

Polyaromatic hydrocarbons sampling was conducted using the EPA Modified Method 5 sampling procedure as per EPA Method 010 SW 846. The samples were extracted, concentrated, and analyzed in accordance with EPA Method 8270 by HRGC/LRMS. Each XAD-2 resin cartridge was field spiked with d10-fluoranthene in order to document overall collection and analytical efficiency and recovery. All of the PAH data for the dryer RTO stack were below detection limits. In accordance with EPA AP-42 procedures, PAH data were included for compounds which appear in quantities above the method detection limit in any other test.

A rating of A was assigned to the press emission data. These tests were performed by sound methodologies and are reported in enough detail for adequate validation. The dryer data were assigned a rating of B due to the lack of information on wood species processed.

4.2.25 Reference 30

This report presents the results of air emission compliance tests performed June 21-23, 1994 on the dryer, press, panel line paint drying oven, lap line paint drying oven, RTO, and thermal oil heater at the Louisiana-Pacific Corporation OSB facility in Chilco, Idaho. Pollutants tested include filterable PM, condensable PM, VOC, CO, $CO_2$, $NO_x$, formaldehyde, phenol, and MDI. Because the RTO handles the combined exhaust from the dryer, press, and the two paint drying ovens, the outlet data are not included in this background report. The uncontrolled inlet data are included in this report.

The wafer dryer tested is a direct wood-fired dryer with a design heat input capacity of 40 MMBtu/hr. Emissions from the dryer are controlled by an E-Tube WESP in series with an RTO. No information on the wood species being processed was provided in the report. Emissions from the press are controlled by the same RTO. Only MDI resin was used (core and surface) throughout the test program. The paint line drying systems tested include two lap line systems and one panel line system. The lap line paint drying system consists of two lines vented into a single duct and routed to the RTO. Painted lap siding is dried by a series of three gas burners rated at 1.2 MMBtu/hr on each line. The panel siding paint drying line uses one 1.6 MMBtu/hr burner. Exhaust is ducted to the RTO.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and lb/hr as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3, using Orsat analyzers. The MDI concentrations were determined in accordance with the 1,2-PP method.

Phenol samples were collected using a Method 5 sampling train with neutral-buffered absorbing reagent followed by extraction with methylene chloride and direct analysis by GC/MS with no concentration as per EPA Method 8270. The samples were field spiked with phenol-d6 and 2-fluorophenol as sampling and recovery efficiency surrogates.

All three VOC runs for the lap line RTO inlet were below the method detection limit of 1 ppm. In determining the emission rate and emission factor for this source, one-half of the detection limit was used. In addition, all three VOC runs for the press RTO outlet were below the method detection limit of 1 ppm. In determining the emission rate and emission factor for this source, one-half of the detection limit was used.

A rating of A was assigned to the press emission data. These tests were performed by sound methodologies and are reported in enough detail for adequate validation. The dryer data were assigned a rating of B due to the lack of information on wood species processed.

4.2.26 Reference 31

This report presents the results of relative accuracy certification tests performed November 8-9, 1994 to verify acceptable performance of the carbon monoxide CEMS installed on the Line 1 Dryer RTO stack, and the flow monitor installed on the Line 2 Press RTO stack at Louisiana-Pacific Corporation's OSB manufacturing plant in Hayward, Wisconsin.

The Hayward, Wisconsin, plant is equipped with an RTO to control emissions from the Line 1 dryers, and another RTO to control emissions from the Line 2 press. The production rates given in the report are 19.8 tons/hr and 18.6 tons/hr, for the November 8 and 9 emission tests, respectively. These rates are calculated from plant daily tonnage reports and appear to represent tons of finished product per hour. No other process data or description of plant equipment is provided.

Carbon monoxide emissions from the dryer RTO were measured concurrently with EPA Reference Method 10 and the CEMS. Carbon dioxide concentrations from the RTO stack were measured in accordance with EPA Method 3A. No emission data were measured from the press RTO stack.

Because the report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.27 Reference 32

This report presents the results of air emissions tests performed July 12-15, 1994 on the Line 1 dryers and RTO, and the Line 2 dryers and RTO at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Pollutants tested include filterable PM, condensable PM, $NO_x$, CO, $CO_2$, formaldehyde, benzene, VOC, phenol, and PAH.

Hayward Line 1 includes two direct wood-fired rotary dryers each of which exhausts to a primary cyclone, then to an EFB. Exhaust from the two EFB's are combined and ducted to a single RTO. Hayward Line 2 includes two direct wood-fired rotary dryers each of which exhausts to a primary cyclone, then to a secondary multiclone, followed by an EFB. Exhaust from the two EFB's are combined and ducted to a single RTO. Each of the four dryers is equipped with a wood-dust fired cyclonic suspension burner. No information on the wood species being processed was provided in the report.

Particulate matter and condensable PM emissions were tested in accordance with Method 5. The back half of the Method 5 sampling train was analyzed per Wisconsin DNR protocol. Method 5 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and pounds per hour as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3, using Orsat analyzers. Benzene samples were collected in accordance with Method 18 using charcoal tubes.

Phenol samples were collected using a Method 5 sampling train with neutral-buffered absorbing reagent followed by extraction with methylene chloride and direct analysis by GC/MS with no concentration as per EPA Method 8270. The samples were field spiked with phenol-d5 as a sampling and recovery efficiency surrogate. All of the phenol runs yielded results that were below the method detection limit. In accordance with EPA AP-42 procedures, because phenol has been measured in detectable quantities in similar sources, these emission data for phenol are included in this report based on half the method detection limit.

Polyaromatic hydrocarbons sampling was conducted using the EPA Modified Method 5 sampling procedure as per EPA Method 0010 SW 846. The samples were extracted, concentrated, and analyzed in accordance with EPA Method 8270 by HRGC/LRMS. Each XAD-2 resin cartridge was field spiked with d10-fluoranthene in order to document overall collection and analytical efficiency and recovery. Much of the PAH data for the dryer RTO stacks were below detection limits and are not presented in this report. Polyaromatic hydrocarbon data were included, however, for pollutants for which there were runs with results that were above the method detection limit. In addition, in accordance with EPA AP-42 procedures, PAH data were included for compounds which appear in quantities above the method detection limit in any other test.

A rating of B or C was assigned to the report data. The inlet VOC data for Line 2 were assigned a rating of C because there are no supporting raw data to show that testing was done for volumetric flow or moisture content. The remainder of the data are assigned a rating of B. These tests were performed by sound methodologies and are reported in enough detail for adequate validation, however, no information is provided on the wood species processed.

4.2.28 Reference 33

This report presents the results of relative accuracy certification tests performed August 23-26, 1994 to verify acceptable performance of four CO/flow CERMS installed on the Line 1 Dryer RTO stack, Line 2 Dryer RTO stack, Line 1 Press RTO stack, and Line 2 Press RTO stack at Louisiana-Pacific Corporation's OSB manufacturing plant in Hayward, Wisconsin.

The Hayward, Wisconsin, plant is equipped with two RTO's to control emissions from the Line 1 and Line 2 dryers, and another pair of RTOs to control emissions from the Line 1 and Line 2 presses. Plant production rates for August 23-26 are provided in the report. These rates are calculated from plant daily tonnage reports and daily production reports. Figures are available for tons of finished product per hour, and total square footage produced. No other process data or description of plant equipment is provided.

Carbon monoxide emissions from the dryer and press RTO's were measured concurrently with EPA Reference Method 10A and the CERMS. Carbon dioxide concentrations from the RTO stacks were measured in accordance with EPA Method 3, using Orsat analyzers.

Because the report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.29 Reference 34

This report presents the results of air emission compliance tests performed February 1, 1994 on the thermal oil heater at the Louisiana-Pacific Corporation waferboard plant located in Tomahawk, Wisconsin. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from this reference are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.30 Reference 35

This report presents the results of air emissions tests performed December 7, 1993 on the wafer dryers at the Louisiana-Pacific Corporation OSB plant in Tomahawk, Wisconsin. Pollutants tested include $NO_x$, CO, $CO_2$, and formaldehyde.

The Tomahawk plant includes two wood- and natural gas-fired rotary dryers 12 feet in diameter and 60 feet long. Emissions from each wafer dryer pass through a primary cyclone (for product recovery), then through a multiclone followed by a WESP. Exhaust from the two WESP's are then combined and vented to the atmosphere through a single stack. Dryer design capacity is 14.55 ODTH (each). During the test the dryers were fired with natural gas. During the test the plant processed approximately 90 percent hardwood and 10 percent softwood.

Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3, using Orsat analyzers.

A rating of A or D was assigned to the report data. The $CO_2$ data were assigned a rating of D because there was a 22-day hold time for the samples and Method 3 cites a maximum hold time of 8 hours. The remainder of the data are assigned a rating of A. These tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.31 Reference 36

This report presents the results of air emissions tests performed April 12-13, 1995 on the press RTO at the Louisiana-Pacific Corporation OSB plant in Sagola, Michigan. Pollutants tested include filterable PM, condensable PM, CO, $CO_2$, VOC, formaldehyde, phenol, and MDI.

The press at the Sagola plant has twelve 8-foot by 24-foot openings. At the time of the test, the facility was using both phenol-formaldehyde and MDI resins. Emissions from the press are controlled by a natural gas-fired RTO.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and lb/hr as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3A, using Orsat analyzers. The MDI concentrations were determined in accordance with the 1,2-PP method.

Phenol samples were collected using a Method 5 sampling train with neutral-buffered absorbing reagent followed by extraction and direct analysis by GC/MS for phenol, phenol-d5, and 2-fluorophenol. The first impinger in each sampling was spiked with isotopically-labeled phenol (phenol-d5) and 2-fluorophenol as sampling and recovery efficiency surrogates. All three of the uncontrolled press phenol runs, and all three of the press RTO phenol runs were below the method detection limit. In accordance with EPA AP-42 procedures, because phenol has been measured in detectable quantities in similar sources, these emission data for phenol are included in this report based on half the method detection limit.

A rating of A was assigned to the report data. These tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.32 Reference 37

This report presents the results of air emissions tests performed July 9, 1996 on the dryers and dryer RTO at the Louisiana-Pacific Corporation OSB plant in Houlton, Maine. Pollutants tested include filterable PM, condensable PM, $NO_x$, CO, $CO_2$, and VOC.

The Houlton plant includes two triple pass rotary drum wafer dryers with wood-fired cyclonic suspension burners. The exhaust from each dryer passes through a primary cyclone and a WESP. The exhausts from the two WESP's are combined and routed through a propane-fired RTO before being released to the atmosphere. No information on the wood species being processed was provided in the report.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as methane and reported in units of pounds per hour as methane. The VOC results were converted to a carbon basis for this report. Emissions of nitrogen oxides were measured in accordance with Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3A.

The report indicates that the Method 202 condensable PM samples taken at the RTO stack were contaminated with silicone grease. Because these samples were contaminated, the condensable PM data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

A rating of B or C was assigned to the report data. The PM and inlet $NO_x$, CO, $CO_2$, and VOC data were assigned a rating of C. The PM data were assigned a rating of C because all condensable organic fractions were contaminated with silicone grease and there is no lab report for the filterable PM. The inlet data were assigned a rating of C because the only flow data presented were from a preliminary test and the moisture content was estimated. The remainder of the data are assigned a rating of B. These tests were performed by sound methodologies and are reported in enough detail for adequate validation, however, no information is provided on the wood species processed.

4.2.33 Reference 38

This report presents the results of air emissions tests performed March 18-21, 1996 on the Line 2 dryers, press, and thermal oil heater at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Pollutants tested include filterable PM, condensable PM, $NO_x$, CO, $CO_2$, formaldehyde, benzene, VOC, phenol, and PAH.

Hayward Line 2 includes two direct wood-fired rotary dryers each of which exhausts to a primary cyclone followed by an E-Tube WESP, then to a common RTO. Each of the dryers is equipped with a wood-dust fired cyclonic suspension burner. No information on the wood species being processed was provided in the report.

The Line 2 press has twelve 8-foot by 16-foot openings. At the time of the test, the facility was using both phenol-formaldehyde and MDI resins. Emissions from the press are controlled by an RTO.

Particulate matter and condensable PM emissions were tested in accordance with Method 5. The back half of the Method 5 sampling train was analyzed per Wisconsin DNR protocol. Method 5 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and pounds per hour as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3A, using Orsat analyzers. Benzene samples were collected in accordance with Method 18 using charcoal tubes.

Phenol samples were collected using a Method 5 sampling train with neutral-buffered absorbing reagent followed by extraction with methylene chloride and direct analysis by GC/MS with no concentration as per EPA Method 8270. The samples were field spiked with phenol-d5 as a sampling and recovery efficiency surrogate. All of the phenol runs yielded results that were below the method detection limit. In accordance with EPA AP-42 procedures, because phenol has been measured in detectable quantities in similar sources, these emission data for phenol are included in this report based on half the method detection limit.

Polyaromatic hydrocarbons sampling was conducted using the EPA Modified Method 5 sampling procedure as per EPA Method 0010 SW 846. The samples were extracted, concentrated, and analyzed in accordance with EPA Method 8270 by HRGC/LRMS. Each XAD-2 resin cartridge was field spiked with d10-fluoranthene in order to document overall collection and analytical efficiency and recovery. All of the PAH data for the dryer RTO stack were below detection limits. In accordance with EPA AP-42 procedures, PAH data were included for compounds which appear in quantities above the method detection limit in any other test.

A rating of A or B was assigned to the report data. The press emission data are assigned a rating of A. These tests were performed by sound methodologies and are reported in enough detail for adequate validation. The dryer emission data are assigned a rating of B due to the lack of information on wood species processed. The benzene data were unrated and unused because there was no volumetric flow, gas composition, or moisture content testing conducted concurrently with which to calculate mass emission rates.

4.2.34 Reference 39

This report presents the results of air emissions tests performed March 21-22, 1996 on the dryer and press at the Louisiana-Pacific Corporation OSB plant in Two Harbors, Minnesota. Pollutants tested include filterable PM, condensable PM, PM-10, $NO_x$, CO, $CO_2$, formaldehyde, and VOC.

The Two Harbors plant includes a single MEC Model 1260 TNW/L triple pass rotary dryer with a McConnell wood-fired cyclonic suspension burner. Exhaust from the wafer dryer passes through a primary cyclone, and through a WESP, before being combined with exhaust from a number of paint drying ovens (panel dryers and lap dryers). The combined exhaust from the wafer dryer and paint drying ovens then passes through an RTO. During the test program, the plant was processing 100 percent hardwood species. The press at Two Harbors has eight 8-foot by 16-foot openings. At the time of the test, the facility was using only MDI resin. Emissions from the press pass uncontrolled through two roof vents to the atmosphere

Because the RTO handles the combined exhaust from the wafer dryer and the paint drying ovens, the RTO outlet data are not included in this background report. In addition, the RTO inlet data include emissions from both the wafer dryer and paint drying ovens, and are also not included in this background report. The wafer dryer primary cyclone outlet and the WESP outlet data include dryer emissions only, and are included in this report.

Particulate matter emissions were tested in accordance with Method 5. The back half of the Method 5 sampling train was analyzed in accordance with Method 202. Method 5 and Method 202 results are reported as front half (filterable PM) and back half (total condensable PM). PM-10 emissions sampling was conducted in accordance with Method 201A, using an Anderson PM-10 cyclone. Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and pounds per hour as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3A, using Orsat analyzers.

A rating of A was assigned to the report data. These tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.35 References 40 and 41

This report and the supplemental letter present the results of air emissions tests performed April 19, 1995 on the hot press at the Louisiana-Pacific Corporation OSB plant located in Houlton, Maine. Pollutants tested include filterable PM, condensable PM, $CO_2$, and VOC.

The hot press at the Houlton facility is an 8 x 16, 12-opening press. During the test program, the plant was pressing 7/16-inch board, and the press temperature averaged 210EC (410EF). Emissions from the hot press at the Houlton facility are collected and exhausted to a propane-fired RTO. Both MDI and phenol-formaldehyde resins were used during the test program.

Particulate matter emissions were tested in accordance with Method 5. The back half of the Method 5 sampling train was analyzed in accordance with Method 202. Method 5 and Method 202 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and pounds per hour as propane. The VOC results were converted to a carbon basis for consistency with other data in this report. Carbon dioxide concentrations were measured in accordance with Method 3, using Orsat analyzers.

A rating of A was assigned to the report data, with the exception of the RTO outlet $CO_2$ data. These tests were performed by sound methodologies and are reported in enough detail for adequate validation. Because only one $CO_2$ measurement was taken at the RTO outlet, these data were not rated and are not incorporated in AP-42 Section 10.6.1.

4.2.36 Reference 42

This report presents the results of air emissions tests performed May 11-12, 1995 on the dryers and dryer RTO at the Louisiana-Pacific Corporation OSB plant in Urania, Louisiana. Pollutants tested include filterable PM, condensable PM, $NO_x$, CO, $CO_2$, VOC, and formaldehyde.

The Urania plant includes two direct wood-fired rotary wafer dryers. Each dryer exhausts to a primary cyclone, then to a high efficiency multiclone. Exhausts from the multiclones are combined in a mixing chamber and then vented to an RTO. Inlet sampling was conducted prior to the dryer multiclones.

Only one of the inlets was sampled; velocity was measured from the other. Pollutant concentrations and other gas characteristics were assumed to be identical in both stacks for the calculation of total RTO inlet loading. No information on the wood species being processed was provided in the report.

Particulate matter and condensable PM emissions were tested in accordance with Method 5. Method 5 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and pounds per hour as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3, using Fyrite analyzers.

Because of the accuracy associated with the Fyrite analyzer, the $CO_2$ data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

A rating of B or C was assigned to the data in this report. The VOC and all No. 2 dryer RTO inlet data were assigned a rating of C. The VOC data were assigned a C because there are numerous instances where Method 25A procedures were not followed, thus compromising data quality. The inlet data were assigned a rating of C because it was assumed that pollutant concentrations were the same in both inlet ducts, so only volumetric flow testing was conducted on the second inlet duct. The remainder of the data are assigned a rating of B. These tests were performed by sound methodologies and are reported in enough detail for adequate validation, however, no information was provided on the wood species processed.

4.2.37 Reference 43

This report presents the results of air emissions tests performed May 31 and June 1, 1995 on the dryer and dryer RTO at the Louisiana-Pacific Corporation OSB plant in New Waverly, Texas. Pollutants tested include filterable PM, condensable PM, $NO_x$, CO, $CO_2$, VOC, and formaldehyde.

The New Waverly plant includes a direct wood-fired rotary wafer dryer which exhausts to a primary cyclone, then to a high efficiency multiclone followed by an RTO. Inlet sampling was conducted prior to the dryer multiclone. No information on the wood species being processed was provided in the report.

Particulate matter and condensable PM emissions were tested in accordance with Method 5. Method 5 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and pounds per hour as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3, using Fyrite analyzers.

Because of the accuracy associated with the Fyrite analyzer, the $CO_2$ data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

A rating of B or C was assigned to the data in this report. The $NO_x$, CO, and VOC data were assigned a rating of C because there are no supporting analyzer calibration data and there were deviations from test method procedures. The remainder of the data are assigned a rating of B. These tests were performed by sound methodologies and are reported in enough detail for adequate validation, however, no information is provided on the wood species processed.

4.2.38 Reference 44

This report presents the results of air emissions tests performed June 1-2, 1995 on the dryers and dryer RTO at the Louisiana-Pacific Corporation OSB plant in Corrigan, Texas. Pollutants tested include filterable PM, condensable PM, $NO_x$, CO, $CO_2$, VOC, and formaldehyde.

The Corrigan plant includes three direct wood-fired rotary wafer dryers, each of which exhausts to a primary cyclone, then to a high efficiency multiclone. Exhausts from the three multiclones are directed to a mixing chamber then to an RTO. Inlet sampling was conducted prior to the dryer multiclones. No information on the wood species being processed was provided in the report.

Particulate matter and condensable PM emissions were tested in accordance with Method 5. Method 5 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and pounds per hour as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3 using Fyrite analyzers.

Because of the accuracy associated with the Fyrite analyzer, the $CO_2$ data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

A rating of B was assigned to the report data. These tests were performed by sound methodologies and are reported in enough detail for adequate validation, however, no information was provided on wood species processed.

4.2.39 References 45 and 46

This report and the supplemental letter present the results of air emissions tests performed June 20-23, 1995 on the dryers and dryer RTO, and the press and press RTO at the Louisiana-Pacific Corporation OSB plant in Athens, Georgia. Pollutants tested include filterable PM, condensable PM, $NO_x$, CO, $CO_2$, VOC, and formaldehyde.

The Athens plant has five rotary dryers, each of which exhausts to a primary cyclone, then to a high efficiency multiclone. Exhausts from all five dryer multiclones are directed to a mixing chamber then to dual RTO's. Each RTO has its own stack. During this test program, the No. 1 Dryer was not operating. With all five dryers operating at capacity the dry bin was being overloaded, so four-dryer operation was maintained throughout the test program. No information was provided on the wood species being processed. No information on dryer design or firing characteristics was provided in the report. Dryer RTO inlet sampling was conducted after the multiclones, but prior to the mixing chamber.

Emissions from the four press vents are collected and directed via two ducts to a mixing chamber, then to an RTO. Emissions from the press RTO are released to the atmosphere through a single stack. Press RTO inlet sampling was conducted in the two inlet ducts prior to the mixing chamber. No information on resin types used during the test program was provided in the report.

Particulate matter and condensable PM emissions were tested in accordance with Method 5. Method 5 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and pounds per hour as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3 using Fyrite analyzers.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.40 Reference 47

This report presents the results of air emissions tests performed July 11-14, 1995 on the dryers, dryer RTO's, press, and press RTO at the Kirby Forest Products OSB plant in Silsbee, Texas. Pollutants tested include filterable PM, condensable PM, $NO_x$, CO, $CO_2$, VOC, formaldehyde, phenol, and MDI.

The Silsbee plant has five rotary wafer dryers with wood-fired suspension burners. Exhaust from each of the dryers passes through a primary cyclone followed by a multiclone. Exhaust streams from each of the five dryer multiclones pass through a bed protector into a manifold, and then to dual RTO's. Each RTO has a single stack. Southern pine species were processed during the test program.

Emissions from the wood-fired thermal oil heater are vented through the five dryers and associated RTO's. The thermal oil heater was not tested during this program, therefore the emission contribution from the thermal oil heater cannot be subtracted from the dryer emissions. Because the dryer exhaust streams include emissions from the thermal oil heater, it would be inappropriate to average these data with dryer-only data. Therefore, these data are not included in this report.

The hot press has four vents which are combined and routed via two ducts to a knockout box. One duct vents the combined exhaust from the knockout box to an RTO. Inlet sampling was conducted prior to the knockout box. Because the press RTO exhaust was sampled for both MDI and phenol, it is assumed that the plant was using both phenol-formaldehyde and MDI resins during the test program.

Particulate matter and condensable PM emissions were tested in accordance with Method 5. Method 5 results are reported as front half (filterable PM) and back half (total condensable PM). Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and pounds per hour as carbon. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured by Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3 using Fyrite analyzers.

Concentrations of MDI were determined using NIOSH Method P&CAM 142. The sampling train consists of a heated teflon-lined probe followed by two impingers each containing 200 milliliters of hydrochloric acid/acetic acid solution, an empty impinger, then 200 grams of silica gel. Analysis was by colorimetric method. The probe was washed with water and added to the impinger solutions. All three MDI runs yielded results below the method detection limit. In accordance with EPA AP-42 procedures, because MDI has been measured in detectable quantities in similar sources, these emission data for MDI are included in this report based on half the method detection limit.

Phenol was determined using NIOSH Method S330. The sampling train consists of a heated teflon-lined probe followed by two impingers each containing 200 milliliters of 0.1 normal sodium hydroxide (N

NaOH), followed by an empty impinger, then 200 grams of silica gel. Analysis was by HPLC. The probe was washed with water and added to the impinger solutions.

Because of the accuracy associated with the Fyrite analyzer, the $CO_2$ data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

A rating of B was assigned to the report data. These tests were performed by sound methodologies and are reported in enough detail for adequate validation, but there are no raw data to validate emissions data.

4.2.41 Reference 48

This report presents the results of air emissions tests performed May 27-29, 1992 on a pilot scrubber installed on the No. 1 dryer at the Louisiana-Pacific Corporation OSB plant in Corrigan, Texas. Pollutants tested include filterable PM, condensable PM, CO, $CO_2$, and VOC. Samples were also taken for organic constituents analysis.

The exhaust flow rate through the pilot scrubber system was less than 300 dscfm. No process parameters are included in the test report.

Because the emission data in this report are for a pilot system, and because the report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.42 References 49 and 50

This report and the supplemental letter present the results of air emissions tests performed August 30-31 and September 12-13, 1995 on a dryer, scrubber, RTO, thermal oil heater, and press at the Louisiana-Pacific Corporation OSB plant in Dungannon, Virginia. Pollutants tested include filterable PM, condensable PM, PM-10, CO, $CO_2$, $SO_2$, $NO_x$, VOC, formaldehyde, and MDI.

The wafer dryer at the Dungannon facility exhausts through the primary cyclone to a wet scrubber. Exhaust from the dryer scrubber is combined with the press exhaust and ducted to an RTO. The tests conducted on August 30 and 31, 1995 were conducted under normal operating conditions, processing yellow poplar (hardwood) and less than 10 percent pine. During the tests conducted on September 13, 1995 the plant was processing only pine (to evaluate a condition of the permit). Although much process data is presented in Appendix T of the report, dryer throughput cannot be accurately determined.

Limited process data are provided for the press. Because the press was sampled for MDI, it is assumed that the plant was using both MDI and phenol-formaldehyde resins during the testing.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Results are reported as front half (filterable PM) and back half (total condensable PM). PM-10 emissions were determined in accordance with Method 201A. Volatile organic compound emissions were tested in accordance with Method 25A, and results were obtained as ppmv as propane and reported in units of ppm and lb/hr as propane. The VOC results were converted to a carbon basis for consistency with other data in this report. Formaldehyde emissions were tested in accordance with Method 0011. Sulfur dioxide emissions were determined in accordance with Method 6C. Nitrogen oxides emissions were measured by Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3. The MDI concentrations were determined in accordance with the 1,2-PP method.

A rating of A was assigned to the press emissions data. These tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.43 Reference 51

This report presents the results of an air emissions test performed May 31, 1995 on the exhaust stack of a wet ESP installed on the wafer dryer at the Louisiana-Pacific Corporation OSB plant in Montrose, Colorado. Pollutants tested include filterable PM, inorganic condensable PM, and organic condensable PM. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.44 Reference 52

This report presents results of an air emissions test preformed December 14, 1995 on the press RTO at the Louisiana-Pacific Corporation OSB plant in Houlton, Maine. Pollutants tested include formaldehyde, $NO_x$, CO, and $CO_2$.

The Houlton facility operates one OSB line including two wafer dryers, a press, and two thermal oil heaters. The emissions from the press are collected and exhausted to a propane-fired RTO. The press at the Houlton facility, manufactured by Washington Iron Works, is an 8-foot by 16-foot 12-opening press. During the test program, the plant was pressing 7/16-inch board, and maintained an average press temperature of 215°C (149°F). The wood mix for the test program was 90 percent poplar and 10 percent unspecified hardwoods. Both phenol-formaldehyde and MDI resins were being used at the time of the test. Detailed plant production and process data are included in the report.

Formaldehyde samples were collected in accordance with the NCASI Acetylacetone Method (Determination of Formaldehyde in Water). The sample train was modified to utilize standard impingers instead of mini-impingers. Formaldehyde results are reported in units of ppm and pounds per hour. Nitrogen oxides emissions were measured in accordance with Method 7E. Carbon monoxide emissions were determined in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3A.

A rating of A was assigned to the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.45 Reference 53

This report presents the results of air emissions tests performed August 27 and 28, 1996 on the dryer primary cyclone exhaust, E-Tube outlet, dryer RTO outlet, and press vents at the Louisiana-Pacific Corporation OSB plant in Newberry, Michigan. The pollutant tested at each source is phenol. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.46 Reference 54

This report presents the results of air emissions tests performed December 6-8, 1994 on the dryer and press vent at the Louisiana-Pacific OSB plant in Montrose, Colorado. Pollutants tested include PM, VOC, formaldehyde, CO, and MDI.

The Montrose facility operates one direct wood-fired wafer dryer and one press. Emissions from the dryer are controlled by a multiclone and an E-Tube WESP. The dryer was processing 90 percent hardwood and 10 percent softwood during the testing. Emissions from the eight-opening 8-foot by 16-foot press are uncontrolled. Both phenol-formaldehyde and MDI resins were used in production on the test days.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202 (modified), respectively. The nitrogen purge for the impingers in Method 202 was omitted. Method 5 and 202 results are reported as front half (filterable PM) and back half organic and inorganic fractions (organic and inorganic condensable PM). Volatile organic compounds were tested in accordance with Method 25A and results are reported on an as carbon basis. Formaldehyde emissions were tested in accordance with Method 0011. Carbon monoxide emissions were tested in accordance with Method 10.

Concentrations of MDI were determined in accordance with the 1,2-PP method. All three of the test runs on the press were below method detection limits. In accordance with EPA AP-42 procedures, because MDI has been measured in detectable quantities in similar sources, these emission data for MDI are included in this report based on half the method detection limit.

A rating of A was assigned to the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.47 Reference 55

This report presents the results of air emissions tests performed June 16, 1994 on the Line 1 and Line 2 dryers and EFB outlets at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Pollutants tested include filterable PM, inorganic condensable PM, and organic condensable PM. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.48 Reference 56

This report presents the results of air emissions compliance testing performed June 7-10, 1994 on the Line 1 and Line 2 press RTO's and thermal oil heaters at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Pollutants tested include PM, $NO_x$, CO, formaldehyde, MDI, and VOC.

The emissions from the Hayward, Wisconsin, Line 1 and Line 2 presses and press unloaders are ducted to a pair of RTO's. Each press has twelve 8-foot by 16-foot openings. Plant production rates are provided for each set of tests. No data on wood species processed during the testing are presented in the report. Both phenol-formaldehyde and MDI resins were used during this test program.

Particulate matter and condensable PM emissions were tested in accordance with Method 5. The back half of the Method 5 train was analyzed per Wisconsin DNR protocol. Method 5 results are reported as front half (filterable PM) and back half (total condensable PM). Nitrogen oxides emissions were measured in accordance with Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Formaldehyde emissions were tested in accordance with Method 0011. Volatile organic compounds were tested in accordance with Method 25A and results are reported on an as carbon basis. Carbon dioxide concentrations were measured in accordance with Method 3, using Orsat analyzers.

The MDI concentrations were determined in accordance with the 1,2-PP method. In accordance with EPA AP-42 procedures, because MDI has been measured in detectable quantities in similar sources, these emission data for MDI are included in this report based on half the method detection limit.

A rating of A was assigned to the report data with the exception of the $NO_x$, CO, and $CO_2$ data which were rated B. The $NO_x$, CO, and $CO_2$ analyzer data are not well documented, calibrations are not logged, key information is missing from about 25 percent of the system bias check forms, calibration error and drift are not calculated, $NO_x$ data are not corrected for drift and bias as per Method 7E, and there are 7 days between sampling and analysis on some Orsat bags.

4.2.49 Reference 57

This report presents the results of air emissions compliance testing performed January 25-29, 1993 on the dryer, press, and unloader vents at the Louisiana-Pacific Corporation Waferboard plant in Montrose, Colorado. Pollutants tested include PM, formaldehyde, CO, MDI, and VOC.

The wafer dryer tested is a Model 1260 TNW/L dryer manufactured by MEC Company. It is equipped with a pneumatic injection system for firing wood fines and has a designed heat input capacity of 40 MMBtu/hr. Particulate matter emissions from the dryer are controlled by a primary cyclone followed by a multiclone, also manufactured by MEC, in series with an E-Tube WESP manufactured by Geoenergy, Inc. Cleaned flue gas is exhausted to the atmosphere by a 103-foot high, 48-inch diameter stack. The press has eight 8-foot by 16-foot openings. The press and unloader are vented together and are exhausted uncontrolled to the atmosphere via a single stack.

The production data for the test period are reported as an average over the test time period on each day. The plant produces a waferboard with a maximum of 20 percent softwood. Both phenol-formaldehyde and MDI resins were used during the test period with the phenol-formaldehyde resin used in the surface layers and the MDI used in the core. Detailed plant production and process data are included in the report.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202 (modified), respectively. Method 5 and 202 results are reported as front half (filterable PM) and front and back half (total PM). Method 5 results are reported as front and back half. Formaldehyde emissions were tested in accordance with Method 0011. Carbon monoxide emissions were tested in accordance with Method 10. Volatile organic compounds were tested in accordance with Method 25A and results are reported on an as carbon basis. Carbon dioxide concentrations were measured in accordance with Method 3, using Orsat analyzers.

The MDI concentrations were determined with Interpoll Laboratories Method II-8791 (ver 1.1), which is based on NIOSH Method P&CAM 347 (N-p-nitrobenzyl-N-propylamine impregnated filters with analysis of reaction product by HPLC). Exhaust gas samples were collected in such a manner as to collect both gaseous and aerosol phase MDI. An Interpoll Labs sampling train was used to extract MDI samples by means of a nonheated stainless steel probe and an out of stack filter assembly.

The dryer test data for this mill were assigned ratings of A or B. A rating of A was assigned to the formaldehyde and PM data. These tests were performed by sound methodologies and are reported in enough detail for adequate validation. A rating of B was assigned to the carbon monoxide data because the analysis was done 5 days after collection. Method 10 does not specify a hold time, but Method 3 specifies analysis within 8 hours. The VOC data are not reported because no volumetric flowrate data were collected for the time period during testing.

The press vent data are assigned ratings of A. These tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.50 Reference 58

This report presents the results of air emissions compliance testing performed July 19-20, 1994 on the dryer vent at the Louisiana-Pacific Corporation OSB plant in Montrose, Colorado. Pollutants tested include PM and CO.

The wafer dryer tested is a Model 1260 TNW/L dryer manufactured by MEC Company. It is equipped with a suspension burner with a pneumatic injection system for firing wood fines and has a design heat input capacity of 40 MMBtu/hr. Particulate emissions from the dryer are controlled by a primary cyclone followed by a multiclone, also manufactured by MEC, in series with an E-Tube WESP manufactured by Geoenergy, Inc. Cleaned flue gas is exhausted to the atmosphere by a 103-foot high, 48-inch diameter stack. No information on the wood species processed during the testing was provided in the report.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202 (modified), respectively. Method 5 and 202 results are reported as front half (filterable PM) and front and back half (total PM). Carbon monoxide emissions were tested in accordance with Method 10.

The dryer test data for this mill were assigned ratings of B or C. A rating of B was assigned to the PM data. These tests were performed by sound methodologies and are reported in enough detail for adequate validation, however, no information was provided on wood species processed. A rating of C was assigned to the carbon monoxide data because calibration procedures in the method were not followed and no volumetric flowrate testing was done in conjunction with these tests. The flow data from the last PM run were used in the emission calculation.

4.2.51 Reference 59

This report presents the results of air emissions compliance testing performed August 27-29, 1996 on the dryer and press vents at the Louisiana-Pacific Corporation OSB plant in Newberry, Michigan. Pollutants tested include PM, formaldehyde, $NO_x$, CO, $SO_2$, MDI, and VOC.

The Newberry facility operates one wafer dryer and one press. During the test program, the finished product was OSB siding sheets measuring 4-ft x 9-ft x 7/16-in. Emissions from the dryer pass through a primary cyclone, then through an E-Tube WESP, followed by an RTO. The plant was processing

100 percent unspecified hardwoods during testing. The press at Newberry is a 14-opening 4-ft x 18-ft press. The press and unloader emissions are exhausted through two roof vents and are uncontrolled. The MDI resin was used in both surface and core layers on the test days.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as front half (filterable PM) and back half organic and inorganic fractions (organic and inorganic condensable PM). Volatile organic compounds were tested in accordance with Method 25A with the subtraction of methane and results are reported on an as carbon basis. Formaldehyde emissions were tested in accordance with Method 0011. Sulfur dioxide emissions were measured in accordance with Method 6C. Nitrogen oxides emissions were measured in accordance with Method 7E. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3A, using Orsat analyzers. The MDI concentrations were determined in accordance with the 1,2-PP method.

A rating of A was assigned to the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.52 Reference 60

This report presents the results of air emission compliance tests performed July 11-13, 1995 on the wafer dryers and thermal oil heater at the Louisiana-Pacific Corporation OSB plant in Tomahawk, Wisconsin. Testing was also conducted on the press to gather data for permit revisions. Pollutants tested at the dryers include $NO_x$ and CO. Pollutants tested at the press include filterable PM, organic condensable PM, inorganic condensable PM, and CO.

The Tomahawk plant includes two MEC Model 1260 TNW/L wood- and natural gas-fired rotary dryers 12 feet in diameter and 60 feet long. Dryer design capacity is 14.55 ODTH (each). Emissions from each wafer dryer are controlled by a set of multiclones installed in series with an E-Tube WESP. Exhaust from the two WESP's are then combined and vented to the atmosphere through a single stack. During the July 11 test, the dryers were fired with natural gas. During the July 12 test, the dryers were fired with dry fines. During the tests, it was anticipated that the plant would process approximately 90 percent hardwood and 10 percent softwood as required by the air emission permit.

The press vents tested are the exhaust from general ventilators positioned over the board press and unloader. The press and unloader vents are exhausted to the atmosphere via a common stack. The press has eight openings. During the test, the facility was using MDI resin in the core and liquid phenol-formaldehyde resin in the surface.

Nitrogen oxides emissions were tested in accordance with Method 7E, while carbon monoxide emissions were tested in accordance with Method 10, and carbon dioxide emissions were tested in accordance with Method 3A. Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as dry catch (filterable PM) and as dry plus wet catch (total PM). The field data sheets present wet catch (condensable PM) separately from dry catch and also present the aqueous (inorganic) and solvent (organic) fractions of the wet catch.

Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from the thermal oil heaters are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report. A rating of A was assigned to the remainder of the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.53 Reference 61

This report presents the results of air emissions tests performed September 1 and 2, 1993 on the inlet and stack of a propane-fired RTO pilot unit installed on the Line 1 dryer at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Pollutants tested include filterable PM, total PM, CO, formaldehyde, VOC, and $NO_x$. The average exhaust gas flow rate through the pilot RTO system was less than 800 dscfm. No process parameters are included in the test report.

Because the emission data in this report are for a pilot system, and because the report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.54 Reference 62

This report presents the results of an air emissions test performed October 25, 1994 on the exhaust stack of a WESP installed on the wafer dryer at the Louisiana-Pacific Corporation OSB plant in Montrose, Colorado. The test was conducted to demonstrate compliance with the Colorado Department of Health permit requirements. Pollutants tested include $CO_2$, filterable PM, inorganic condensable PM, and organic condensable PM.

The Montrose plant includes a 60-foot triple pass rotary dryer rated at 40 x $10^6$ Btu/hr. Emissions from the wafer dryer are controlled by multiclones followed by an E-Tube WESP. The dryer is fired with dry wood fines and waferboard trimmings. During the test, the dryer was processing primarily aspen with 25 percent pine.

Carbon dioxide concentrations were measured in accordance with Method 3A. Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as front half (filterable PM) and back half (total condensable PM). Appendix A of the test report also presents the condensable particulate (inorganic) and hydrocarbon extraction (organic) fractions of the back half PM. Although Method 202 includes the option of a nitrogen purge to remove sulfates, this option was not performed since no sulfates are expected from this source; the pH of each back half sample was measured and confirmed to be greater than 4.5. Three runs were performed during the test. There was a power failure during run 1 which delayed the end of the test by 15 minutes.

A rating of A was assigned to the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.55 Reference 63

This report presents the results of air emissions tests performed April 4 and 5, 1995 on the inlet and outlet of a scrubber installed on the Line 1 surface dryer and on the outlet of a scrubber installed on the Line 1 core dryer at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Pollutants tested include filterable PM and total PM. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.56 Reference 64

This report presents the results of air emissions tests performed October 25 and 26, 1995 on the inlet and stack of an RTO installed on the Line 1 press and on the inlet and stack of an RTO installed on the Line 1 dryer at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Pollutants tested at the Line 1 press RTO include filterable PM, total PM, $NO_x$, and CO. Pollutants tested at the Line 1 dryer RTO include filterable PM, total PM, $NO_x$, CO, formaldehyde, and benzene. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.57 Reference 65

This report presents the results of air emissions tests performed May 14, 1996 on the Line 2 E-Tube WESP outlet, surface dryer E-Tube inlet, and core dryer E-Tube inlet at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. The exhaust from each dryer passes through a primary cyclone followed by a multiclone. The emission streams from the two multiclones are combined and routed through the WESP. Pollutants tested at each source include filterable PM, total PM, $NO_x$, and CO. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.58 Reference 66

This report presents the results of air emissions tests performed April 11, 1995 on the inlet and outlet of the Line 1 core dryer scrubber at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Pollutants tested include filterable PM and total PM. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.59 Reference 67

This report presents the results of air emissions tests performed February 16-18, 1994 on the inlet and outlet of an RTO installed on the Line 1 dryers, the inlet and outlet of an RTO installed on the Line 2 dryers, and the inlet and outlet of an RTO installed on the Line 2 press at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Pollutants tested at the Line 1 dryer RTO include filterable PM and total condensable PM. Solid PM collected at the inlet to the Line 1 dryer RTO was analyzed for sulfur and salt (calcium, magnesium, sodium, and potassium) content. Only volumetric flow rate tests were conducted on the Line 2 dryer and press. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.60 Reference 68

This report presents the results of air emissions tests performed June 2 and 3, 1994 on the Line 2 surface dryer cyclone exhaust, core dryer cyclone exhaust, dryer RTO inlet duct, and dryer RTO outlet at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Pollutants tested include filterable PM, total PM, and $CO_2$. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.61 Reference 69

This report presents the results of air emissions tests performed January 26 and 27, 1993 on the inlet and outlet of an E-Tube WESP installed on a wafer dryer at the Louisiana-Pacific Corporation OSB plant in Montrose, Colorado. Emissions from the dryer pass through a primary cyclone, followed by a multiclone, and then through an E-Tube WESP. Pollutants tested include filterable PM, total PM, formaldehyde, and VOC. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.62 Reference 70

This report presents the results of air emissions compliance testing performed March 29-31, 1994 on the dryer stack and the press and unloader vent at the Louisiana-Pacific Corporation OSB plant in Montrose, Colorado. Pollutants tested at the dryer stack include PM (filterable and condensable), CO, formaldehyde, and VOC. Carbon monoxide was also tested at the dryer inlet, but insufficient data were available to estimate a CO mass flux rate or emission factor. Pollutants tested at the press and unloader vent include PM (filterable and condensable), formaldehyde, VOC, and MDI. According to the report, during the test the plant produced a waferboard with 20 percent softwood (80 percent unspecified hardwoods).

The wafer dryer tested is a Model 1260 TNW/L dryer manufactured by MEC Company. It is equipped with a pneumatic injection system for firing wood fines and has a design heat input capacity of 40 MMBtu/hr. Particulate matter emissions from the dryer are controlled by a primary cyclone followed by a secondary multiclone, also manufactured by MEC, in series with an E-Tube WESP manufactured by Geoenergy, Inc. Cleaned flue gas is exhausted to the atmosphere by a 103-foot high, 48-inch diameter stack.

The press has eight 8-foot by 16-foot openings. The press and unloader are vented together and are exhausted uncontrolled to the atmosphere via a single stack which has an approximate 5-foot diameter. During the test, the facility was using both phenol-formaldehyde and MDI resins.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as dry catch (filterable PM) and dry catch plus

Method 202 condensable PM (total PM). Field data sheets also present the aqueous (inorganic) and solvent (organic) fractions of the condensable PM. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3A. Formaldehyde emissions were tested in accordance with Method 0011. Volatile organic compound emissions were tested in accordance with Method 25A using a Ratfisch Model RS55 heated flame ionization detector, and results are reported on a wet basis as carbon. MDI concentrations were determined in accordance with the 1,2-PP method.

Three test runs were performed during each emission test. Test conditions for the three VOC test runs for the wafer dryer were not provided in the test report. However, the time of the first VOC test run corresponds to the time of the third formaldehyde test run, while the times of the second and third VOC test runs correspond to the times of the first and second PM/CO test runs. Therefore, test conditions for those test runs were used for the VOC test runs. Detailed plant production and process data are included in the report.

A rating of A was assigned to the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.63 Reference 71

This report presents the results of air emission compliance tests performed August 23, 1995 on the press vent at the Louisiana-Pacific Corporation waferboard plant in Tomahawk, Wisconsin. Pollutants tested include filterable PM, organic condensable PM, inorganic condensable PM, CO, and $CO_2$. There are no data detailing the types of wood processed during testing.

The press vents tested are the exhaust from general ventilators positioned over the board press and unloader. The press and unloader vent emissions are exhausted to the atmosphere via a common stack. During the test, the facility was using both phenol-formaldehyde and MDI resins.

Carbon monoxide emissions were tested in accordance with Method 10, and $CO_2$ concentrations were measured in accordance with Method 3. Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as dry catch (filterable PM) and as dry catch plus organic/inorganic wet catch (total PM). The field data sheets present wet catch (condensable PM) separately from dry catch and also present the aqueous (inorganic) and solvent (organic) fractions of the wet catch. Three test runs were performed during each emission test.

A rating of A was assigned to the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.64 Reference 72

This report presents the results of air emission compliance tests performed March 21, 1996 on the Line 1 thermal oil heater at the Louisiana-Pacific Corporation OSB plant in Hayward, Wisconsin. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from this reference are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.65 Reference 73

This report presents the results of air emission compliance tests performed August 17-19, 1993 on the wafer dryers, press vent, and thermal oil heater at the Louisiana-Pacific Corporation OSB plant in Tomahawk, Wisconsin. Pollutants tested at the WESP inlet duct for each dryer include filterable PM, organic condensable PM, inorganic condensable PM, $CO_2$, formaldehyde, and VOC. Pollutants tested at the dryer WESP stack include the above pollutants, plus CO, benzene, $NO_x$, phenol, and benzo-a-pyrene. Pollutants tested at the press vent include filterable PM, organic condensable PM, inorganic condensable PM, $CO_2$, CO, formaldehyde, VOC, and phenol.

The Tomahawk plant includes two MEC Model 1260 TNW/L (core and face) dryers 12 feet (ft) in diameter and 60 ft long. Dryer design capacity is 14.55 ODTH (each). The fuels to be burned during the testing period are dry fines and natural gas. Emissions from each wafer dryer pass through a primary cyclone, followed by a set of multiclones installed in series with a WESP. Exhaust from the two WESP's are then combined and vented to the atmosphere through a single stack. During the tests, it was anticipated that the plant would process approximately 90 percent hardwood and 10 percent softwood as required by the air emission permit.

The press has eight openings 8-ft x 16-ft. The press vents tested are the exhaust from general ventilators positioned over the board press and unloader. The press and unloader are exhausted to the atmosphere via a common stack. During the test, the facility was using both phenol-formaldehyde and MDI resins.

Particulate matter emissions were tested in accordance with Method 5. The wet catch (condensable) PM emissions were collected in the back half of the Method 5 sampling train and analyzed in accordance with Wisconsin DNR protocol. Method 5 and Wisconsin DNR protocol results are reported as dry catch (filterable PM) and as dry plus organic/inorganic wet catch (total PM). The field data sheets present wet catch (condensable PM) separately from dry catch and also present the aqueous (inorganic) and solvent (organic) fractions of the wet catch. Emissions of $CO_2$, $NO_x$, CO, and formaldehyde were tested in accordance with Methods 3, 7, 10, and 0011, respectively. Benzene emissions were tested in accordance with Method 18 using charcoal tubes. Volatile organic compound emissions were tested in accordance with Method 25A using a Ratfisch Model RS55 heated flame ionization detector, and results are reported on a wet basis as carbon. Polyaromatic hydrocarbon emissions (including benzo-a-pyrene) were tested using the EPA Modified Method 5 sampling procedures, as per Method 010 SW 846. Phenol emissions were determined using a Method 5 sampling train with neutral buffered absorbing reagent, followed by extraction with methylene chloride and direct analysis by GC/MS. Three runs were performed during each test. Each $NO_x$ test run is an average of four samples taken during the run.

No data except emission data were available for any of the VOC tests. However, the VOC tests conducted on the dryers were conducted at approximately the same time as the formaldehyde tests (about 1 hour off for the first two runs, and roughly the same time for the third run). Therefore, test conditions for the formaldehyde test runs were used for the corresponding VOC test runs for all of the tests conducted at the dryer WESP inlet and stack.

Although no test conditions were available for the VOC test conducted on the press vent, the VOC test was conducted during the period from the second and third formaldehyde test runs to the first PM/CO test run. Therefore, test conditions for the second and third formaldehyde test runs were used for the first and second VOC test runs, and test conditions for the first PM/CO test run were used for the third VOC test run.

Data on stack temperature, actual flow rate, and isokinetic variation were unavailable for the phenol tests conducted on the dryer WESP stack and the press vent. However, preliminary temperature and flow rate data were available for the dryer WESP stack just prior to the phenol test and were used for each of the three phenol test runs for the dryer WESP stack. The phenol test was conducted on the press vent at approximately the same time as the formaldehyde test. Therefore, corresponding data on temperature and flow rate from the formaldehyde test runs were used for the phenol test runs.

Data on moisture and oxygen were unavailable for the PAH (i.e., benzo-a-pyrene) test conducted on the dryer WESP stack. However, the PAH test was conducted at roughly the same time as the formaldehyde test. Therefore, data on moisture and oxygen from the formaldehyde test runs were used for the PAH test runs.

All three test runs for phenol and the PAH compounds (including benzo-a-pyrene) conducted on the dryer WESP stack yielded results below the method detection limit. In accordance with EPA AP-42 procedures, because phenol and benzo-a-pyrene have been measured in detectable quantities in similar sources, these emission data for phenol and benzo-a-pyrene are included in this report based on half the method detection limit.

Free or condensed water was present in the gas stream during the Orsat and moisture analyses conducted during the formaldehyde and PM dryer stack tests. Therefore, the moisture values used for those test runs are saturated gas values.

For reasons discussed above, all of the reported phenol and VOC data are downrated to C. The benzo-a-pyrene data are also downrated to C. A rating of A was assigned to the remainder of the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from the thermal oil heater are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.66 Reference 74

This report presents the results of a source emissions survey performed January 16-18, 1996 on the RTO inlet and stack of the wafer dryers at the Louisiana-Pacific OSB plant in Silsbee, Texas. The purpose of the test was to demonstrate compliance with the special conditions of the plant's permit. Pollutants tested at each dryer exhaust include filterable PM, formaldehyde, $NO_x$, CO, VOC, and $CO_2$. Pollutants tested at each dryer RTO stack include those pollutants measured at each dryer, plus $SO_2$.

The Silsbee plant has five triple-pass rotary wafer dryers, with burners that use dry fines as fuel. Exhaust from each of the dryers passes through a primary cyclone followed by a multiclone. Each dryer's exhaust, after passing through the multiclone, is collected in a single manifold which discharges to both dryer RTO's. Each RTO has a single stack. Of the five dryers at the Silsbee plant, a maximum of four are in operation at any one time. Therefore, only four dryers (Nos. 2 through 5) were tested during the test program. Southern pine species were processed during the test program.

Emissions from the wood-fired thermal oil heater are routed to each of the five dryers and then to the associated dryer RTO's. The thermal oil heater was not tested during this program. Therefore, the emission contribution from the thermal oil heater cannot be subtracted from the dryer emissions. Because the dryer exhaust streams include emissions from the thermal oil heater, it would be inappropriate to average these data with dryer-only data. Therefore, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.67 Reference 75

This report presents the results of stationary source sampling performed August 6 and 9, 1996 on the RTO inlet and outlet of the wafer dryers and press at the Louisiana-Pacific OSB plant in Roxboro, North Carolina. The purpose of the testing was to determine the destruction removal efficiency of the RTO's controlling emissions from the dryers and press and to show that the RTO's are in compliance with specific conditions of the plant's air permit. Pollutants tested at the exhaust for each dryer include $CO_2$, $NO_x$, CO, and VOC. Pollutants tested at the stack of each RTO that serves the dryers include the above pollutants, plus filterable PM, organic condensable PM, inorganic condensable PM, and chromium. Pollutants tested at the inlet of the press RTO include VOC and $CO_2$. In addition to VOC and $CO_2$, pollutants tested at the press RTO stack include filterable PM, organic condensable PM, inorganic condensable PM, $NO_x$, and CO.

The Roxboro plant includes five triple-pass rotary dryers. Emissions from each wafer dryer are directed to a primary cyclone followed by a set of multiclones. Exhaust from the five sets of multiclones are then combined and directed to two RTO's (Nos. 1 and 2) before being vented to the atmosphere. Dry fines are used as fuel for the wafer dryer burners. The wood species processed during the test was pine (unspecified pines).

The press has 14 8-ft x 24-ft openings. Emissions from the enclosed press area are collected via exhaust fans and directed to the press RTO (No. 3) before being vented to the atmosphere. During the test, the Roxboro plant was using both liquid phenol-formaldehyde and MDI resins.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 results are reported as filterable PM, while Method 202 results are reported as organic condensable PM and inorganic condensable PM. Volatile organic compound emissions were tested in accordance with Method 25A, and results were reported as ppmvw, ppmvd, and lb/hr as carbon. Emissions of $CO_2$, $NO_x$, CO, and chromium were tested in accordance with Methods 3A, 7E, 10, and 29, respectively. Three runs were performed during each emission test.

Spot checks of the flue gas composition in the dryer exhausts showed that the $O_2$ and $CO_2$ values were approximately the same as at the RTO Nos. 1 and 2 stacks. Therefore, an average of the $O_2$ and $CO_2$ values determined at the RTO Nos. 1 and 2 stacks were used in the dryer exhaust volumetric flow rate calculations. Two Method 4 tests for the determination of moisture were conducted at the Dryer No. 2 exhaust. The percent moisture obtained from the two runs were averaged, and the average percent moisture was used in the volumetric air flow rate calculations for all of the dryer exhausts.

Due to process problems, the Run 1 results of Method 2 (flow rate determinations) for all dryer exhaust test locations were aborted. In the case of Dryer Nos. 1 and 2, replacement runs were performed, to give a total of three test runs for each dryer. For Dryer Nos. 3-5, no replacement runs were conducted. Instead, the results of Method 2 for one run were used in the emission rate calculations for two runs.

The report included sufficient process data to calculate emission factors for both the dryers and the press. Although the report included only the total dryer production rate for all five dryers, it was possible to determine the dryer production rate for each dryer by using the ratio of fuel burned by each dryer against the amount of fuel burned by all five dryers. This approach should provide a reasonable allocation of emissions per dryer.

The report does not indicate how the flow from the five dryers is divided between the two RTO's. Therefore, in order to determine the destruction removal efficiency of the RTO's, the emissions from the five dryer exhausts were totaled, and the emissions from the two dryer RTO's were totaled. Then, it was possible to compare the total emissions before and after the dryer RTO's.

All dryer outlet (RTO inlet) $CO_2$ data are assigned a rating of D due to reasons cited above. A rating of A was assigned to the remainder of the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.68 References 76 and 77

This report and the accompanying data package present the results of air emission measurements performed in June and July 1993 on the press and unloader vents at the Louisiana-Pacific Corporation waferboard plants in Sagola, Michigan (June 25) and Two Harbors, Minnesota (June 29 and July 1). Pollutants tested at the press and unloader vents at both plants include filterable PM, phenol, formaldehyde, VOC, and MDI.

The press vents tested at both facilities are the exhaust from general ventilators positioned over the board press and unloader areas. The press and unloader vents at Sagola are combined and exhaust through a common stack, which is 72 inches in diameter. The press and unloader vents at the Two Harbors facility each have their own 55-inch square stacks. During the tests, the Sagola plant was using both liquid phenol-formaldehyde and MDI resins. The Two Harbors plant was using only MDI resin.

The primary objective of the tests at these two facilities was to characterize MDI emissions from board press vents and to compare the efficiency of the four MDI methodologies under real world conditions. Four different sampling trains and/or analytical methods for MDI were used in this work: (1) N-p-nitrobenzyl-N-propylamine (nitro reagent) impregnated filters following a modification of NIOSH Method 347 (Interpoll Labs Method II-8791) with analysis by normal-phase HPLC; (2) nitro reagent-impregnated filters following a modification of NIOSH Method 347 after analysis with solvent exchange by reverse-phase HPLC; (3) N-1,2-methoxyphenyl piperazine (1,2-MP) impregnated filters followed by two impingers containing 1,2-MP in dry toluene with analysis after solvent exchange by reverse-phase HPLC; and (4) 1,2-MP in dry toluene in first two impingers followed by a 1,2-MP-impregnated filter with analysis after solvent exchange by reverse-phase HPLC. The trains were modified Method 5 sampling trains.

Particulate matter emissions were tested in accordance with Method 5. Method 5 results are reported as dry catch (filterable PM). Emissions of $CO_2$ and formaldehyde were tested in accordance with Methods 3 and 0011, respectively. Phenol emissions were determined using a Method 5 sampling train with a neutral-buffered absorbing reagent, followed by extraction with methylene chloride and direct analysis by GC/MS. Volatile organic compound emissions were tested in accordance with Method 25A using a Ratfisch Model RS55 heated flame ionization detector, and results are reported on a wet basis as carbon. Three runs were performed during each test.

The results of the reverse-phase HPLC are in good agreement with the results of the normal-phase determinations. On a theoretical basis, the reverse-phase analytical method should be the more definitive of the two separations and, therefore, capable of producing the most accurate and precise data. The results of the MDI samplings and analyses using 1,2-MP as a collecting and derivatizing agent are inconsistent. Recoveries of filter spikes and impinger spikes are similarly inconsistent, suggesting a recovery problem and/or an interference problem. Recovery from filters is poor. Recovery of impinger spikes is better but equally inconsistent. The nitro reagent based sampling and analytical methods outperformed the 1,2-MP based sampling and analytical methods. The results of the MDI determinations using Interpoll Labs Method II-8791 were viewed as the most accurate of the four sampling and analytical methods performed. Only these values have been converted and reported as exhaust gas concentrations in the report. Therefore, only these values have been used to calculate MDI emission factors.

Data on stack temperature, actual flow rate, and isokinetic variation were unavailable for the phenol and formaldehyde tests conducted at the Sagola plant. However, a full data set was available for the PM tests, which were conducted at the same time as the phenol and formaldehyde tests. Therefore, temperature and flow rate data for the PM test runs were used for the phenol and formaldehyde test runs.

No data except emission data were available for the VOC test, but the VOC test was conducted roughly during the period of the second and third MDI test runs. Therefore, test conditions for the second MDI test run were used for the first VOC test run. Test conditions for the third MDI test run were used for the second and third VOC test runs.

The VOC data for the press at Sagola were downrated to B for the reasons cited above. A rating of A was assigned to the remainder of the Sagola data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

Insufficient process data are available to estimate emission factors for the press at the Two Harbors plant. Because the Two Harbors emission test data do not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.69 Reference 78

This reference includes preliminary test results from (1) air emissions tests performed June 11, 1996 on the dryer RTO inlet (WESP outlet) and dryer RTO stack at the Louisiana-Pacific OSB plant in Sagola, Michigan and (2) air emissions tests performed June 20, 1996 on the dryer RTO inlet and RTO outlet at the Louisiana-Pacific OSB plant in Houlton, Maine. Pollutants tested at the Sagola and Houlton facilities include $NO_x$, CO, $CO_2$, and VOC.

No information is available from these preliminary test results on the dryers at the two facilities. However, information is available about the dryer at the Sagola facility from References 23 and 24, which include results of other dryer emission tests conducted at the Sagola facility in July 1996. According to these references, the Sagola facility has three rotary wafer dryers, each 60 ft long, with a diameter of 12 ft. Each of the dryers is heated by firing wood fines in a Coen burner. Emissions from the dryers are controlled by primary cyclones followed by an E-Tube WESP in series with an RTO. No information is available regarding the wood species being processed at the time of the June 1996 tests.

Information is available about the dryer at the Houlton facility from Reference 37, which includes results of another dryer emission test conducted at the Houlton facility in July 1996. According to this reference, the Houlton facility includes two triple-pass rotary wafer dryers with wood-fired cyclonic suspension burners. The exhaust from each dryer passes through a primary cyclone and a WESP. The exhausts from the two WESP's are combined and routed through a propane-fired RTO before being released to the atmosphere.

According to the preliminary test results for the Houlton facility, emissions of $CO_2$, $NO_x$, CO, and VOC at the Houlton facility were tested in accordance with Methods 3A, 7E, 10, and 25A, respectively.

However, no information on temperature, pressure, or production rate are included in the preliminary test results for the Houlton facility.  Because these preliminary results do not contain sufficient data to evaluate the source operating conditions during the test, the emission data for the Houlton dryer are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

Sufficient data are available from the Sagola preliminary test results to estimate emission factors, although no information is available on isokinetic variation or on the test methods used to obtain the Sagola emission data.  Because the Sagola data do not contain sufficient data to evaluate the testing procedures, they are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.70  Reference 79

This report presents the results of air emissions tests performed May 21 and 22, 1996 on the dryer primary cyclone outlet, E-Tube WESP outlet, and RTO inlet at the Louisiana-Pacific OSB plant in Two Harbors, Minnesota.  Pollutants tested at the primary cyclone outlet include filterable PM, total PM, CO, $NO_x$, and formaldehyde.  Pollutants tested at the E-Tube outlet include filterable PM, total PM, and formaldehyde.  Pollutants tested at the RTO inlet include filterable PM, total PM, $NO_x$, and CO.  No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, these emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.71  Reference 80

This report presents the results of a relative accuracy test audit performed August 1, 1995 to verify acceptable performance of a CO CEMS and a flow rate CERMS installed at the RTO exhaust stack at Louisiana-Pacific Corporation's OSB manufacturing plant in Chilco, Idaho.  The Chilco, Idaho plant is equipped with a natural gas-fired RTO to control emissions from the press and dryer.  No process data are provided.  Carbon monoxide emissions from the RTO were measured concurrently with EPA Reference Method 10 and the CO CEMS.

Because the report does not contain sufficient data to evaluate the source operating conditions during the test, the CO emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.72  Reference 81

This report presents the results of air emission tests conducted March 31, 1994 on the dryers at the Louisiana-Pacific Corporation OSB plant in Hanceville, Alabama.  Pollutants tested include PM, VOC, CO, $NO_x$, and $CO_2$.  No process data are included in the report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, the emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.73  Reference 82

This report presents the results of air emissions tests performed December 1 and 2, 1993 on the inlet and stack of an RTO controlling emissions from the dryer and press at the Louisiana-Pacific OSB plant in Chilco, Idaho. The VOC concentration at the RTO inlet and stack was determined instrumentally in accordance with EPA Method 25A using a Ratfisch Model RS55 HFID VOC analyzer. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, the VOC emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.74 Reference 83

This report presents the results of a source emissions survey performed January 18 and 19, 1996 on the press house RTO stack and the press house Nos. 1 and 2 vent ducts at the Louisiana-Pacific (Kirby Forest Industries) OSB plant in Silsbee, Texas. Pollutants tested include filterable PM, total PM, $NO_x$, CO, $CO_2$, VOC, $SO_2$, formaldehyde, phenol, and MDI.

Particulate matter emissions were tested in accordance with EPA Method 5. Method 5 results are reported as probe and filter catch (filterable PM) and total catch (total PM). Emissions of $NO_x$, CO, $CO_2$, $SO_2$, and formaldehyde were tested in accordance with EPA Methods 7E, 10, 3B, 6, and 0011, respectively. Emissions of VOC were tested in accordance with Method 25A, and results were reported in units of ppm as propane. Phenol was determined using Method TO-8 of the Texas Air Control Board. MDI was determined using NIOSH Method 5521. All three MDI runs yielded results below the method detection limit. Daily average production rates are provided for January 16, 17, and 18. The testing was conducted on January 18 and 19. Process parameters are not available for any of the formaldehyde test runs and are available for only one out of three test runs for the remaining pollutants.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, the emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.75 Reference 84

This report presents the results of air emissions tests performed April 27, 1995 on the inlet and stack of the press RTO at the Kirby Forest Industries' OSB facility in Silsbee, Texas. Pollutants tested include filterable PM, condensable organic PM, condensable inorganic PM, and VOC. The RTO inlet has two ducts from the press, which lead to a knockout chamber. Inlet sampling was conducted prior to the knockout chamber.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as front half (filterable PM), back half organic (condensable organic), and back half aqueous (condensable inorganic PM). Volatile organic compound emissions were tested in accordance with Method 25A using a TECO Model 51, and results were reported in units of ppm as propane. Although process parameters are provided for July 11-14, there are no process parameters provided for April 27, the day of the test.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, the PM and VOC emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.76 Reference 85

This report presents the results of a series of emission tests conducted from September 28, 1994 through October 1, 1994 on three dryers, a hot press, a blender area baghouse, and a thermal oil heater at the Louisiana-Pacific Corporation OSB mill in Dawson Creek, British Columbia.

No drawings or descriptions are provided in the report to determine whether the stacks tested are controlled or uncontrolled. No information is provided in the report regarding wood species processed in the dryers during testing. The plant was using both phenol-formaldehyde and MDI resins during the press emissions tests. Press process rates provided are daily averages.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Formaldehyde and phenol were tested in accordance with Methods 0011 and 10, respectively. Hydrogen cyanide emissions were tested in accordance with a modified Method 6. MDI concentrations were determined in accordance with the 1,2-PP method. Concentrations of $CO_2$ were measured using Fyrite analyzers. Two runs were conducted for each of the tests.

The Run 1 hydrogen cyanide sample from the surface/core dryer was lost in a laboratory accident. Therefore, the hydrogen cyanide (HCN) data for the surface/core dryer are based on only one test run.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, and it is not clear if emissions from the dryers and press are controlled or uncontrolled, the emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from the thermal oil heater are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.77 Reference 86

This report presents the results of a series of emission tests conducted April 3-6, 1995 on a dryer, hot press, blender area baghouse, and a thermal oil heater at the Louisiana-Pacific Corporation OSB mill in Dawson Creek, British Columbia.

No drawings or descriptions are provided in the report to determine whether the stacks tested are controlled or uncontrolled. No information is provided in the report regarding wood species processed in the dryer during testing. The plant was using both phenol-formaldehyde and MDI resins during the press emissions tests.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Formaldehyde and phenol were tested in accordance with Methods 0011 and 10, respectively. MDI concentrations were determined in accordance with the 1,2-PP method. Concentrations of $CO_2$ were measured using Fyrite analyzers. Two runs were conducted for each of the tests.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, and it is not clear if emissions from the dryer and press are controlled or uncontrolled, the emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from the thermal oil heater are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.78 Reference 87

This report presents the results of air emission compliance tests performed October 6, 1995 on the thermal oil heater at the Louisiana-Pacific Corporation OSB plant located in Dawson Creek, British Columbia. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from this reference are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.79 Reference 88

This report presents the results of a series of emission tests conducted June 20-22, 1994 on a dryer, hot press, blender area baghouse, and a thermal oil heater at the Louisiana-Pacific Corporation OSB mill in Dawson Creek, British Columbia.

Particulate matter and condensable PM emissions were measured with a Modified Method 5 train. Formaldehyde and phenol were tested in accordance with Methods 0011 and 10, respectively. The MDI concentrations were determined in accordance with the 1,2-PP method. The methods used for measuring hydrogen cyanide concentrations emissions from the dryer, and for measuring concentrations of $CO_2$ were not reported. Two runs were conducted for each of the tests. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, and it is not clear if emissions from the dryer and press are controlled or uncontrolled, the emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report. Emission factors for wood combustion are presented in AP-42 Chapter 1, External

Combustion Sources. Therefore, the data from the thermal oil heater are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.80 Reference 89

This report presents the results of a series of emission tests conducted on May 26, 1994 at the dryer E-Tube WESP outlet at the Louisiana-Pacific Corporation OSB mill in Chilco, Idaho. The sampling was conducted to determine inlet loading to the downstream RTO and to guarantee the E-Tube efficiency.

Particulate matter emissions were measured in accordance with Method 5. Condensible particulate matter was quantified by performing a methylene chloride extraction of the back-half portion of the Method 5 sample train. Three runs were conducted. The second run isokinetics were outside acceptable limits (88 percent). Attached to the back of the report are metals analyses of the front-half Method 5 catch for the Chilco plant, and for the Dawson Creek plant.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, the emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.81 Reference 90

This report presents the results of a series of emission tests conducted on June 7, 1994 at the core dryer E-Tube WESP inlet and outlet at the Louisiana-Pacific Corporation OSB mill in Dawson Creek, British Columbia.

Particulate matter emissions were measured in accordance with Method 5. Condensible particulate matter was quantified by performing a methylene chloride extraction of the back-half portion of the Method 5 sample train. One run was conducted at the E-Tube inlet; two runs were conducted at the E-Tube outlet. Attached to the back of the report is a copy of the same metals analyses described above in Reference 89.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, the emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.82 Reference 91

This report presents the results of a series of emission tests conducted on March 8-10, 1995 at the inlet and outlet of the wet scrubber at the Louisiana-Pacific Corporation OSB mill in Dungannon, Virginia.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. A BACHO Particle Classifier was used to perform particle size classification on the inlet sample. Due to limited sample collection, X-ray Sedigraphy was used to perform particle size classification on the outlet sample. Method 29 was used to determine metals emissions.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, the emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.83  Reference 92

This report presents the results of a series of emission tests conducted on July 27-28, 1995 at the outlet of the RTO at the Louisiana-Pacific Corporation OSB mill in Dungannon, Virginia.  The objective of the test program was to evaluate the performance of the RTO with respect to emissions limits contained in the Virginia permit.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively.  Emissions of $SO_2$ and $NO_x$ were tested in accordance with Methods 6C and 7E, respectively. Emissions of CO and formaldehyde were measured in accordance with Methods 10 and 0011, respectively. Volatile organic compound emissions were tested in accordance with Method 25A, and results were reported in units of ppm as propane.  The MDI concentrations were determined in accordance with the 1,2-PP method.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, the emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.84  Reference 93

This report presents the results of an emission engineering test performed March 28, 1994 on the dryer stack at the Louisiana-Pacific Corporation OSB plant in Dungannon, Virginia.  Pollutants tested include $NO_x$ and $CO_2$.  Emissions of $NO_x$ and $CO_2$ were tested in accordance with Methods 7E and 3A, respectively.  No information is available from this test report on the wafer dryer at the Dungannon facility. However, according to References 49 and 50, which include results of another emission test at the Dungannon facility, the wafer dryer at the Dungannon facility exhausts through the primary cyclone to a wet scrubber.  Exhaust from the dryer scrubber is combined with the press exhaust and ducted to an RTO.  No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, the $NO_x$ and $CO_2$ emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.85  Reference 94

This report presents the results of a series of emission tests conducted September 21-23, 1993 on the dryer, hot press, and thermal oil heater at the Louisiana-Pacific Corporation OSB mill in Dawson Creek, British Columbia.

The dryer tested is a 13-ft x 60-ft wood-fired dryer manufactured by Heil Company.  Exhaust from the dryer passes through primary cyclones followed by twin secondary cyclones.  No information is provided in the report regarding the wood species processed at the time of the testing.  The press has twelve 8-foot by 24-foot openings.  Emissions from the press and unloader are exhausted through two vents to the atmosphere. The plant was using both phenol-formaldehyde and MDI resins during the emissions testing.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively.  Formaldehyde emissions were tested in accordance with Method 0011.  Volatile organic compound emissions were tested in accordance with Method 25A.  Phenol emissions were measured using Method 8270.  An aliquot was taken from the phenol sample and analyzed for hydrogen cyanide in accordance with Method SW-846, 9010.  Emissions of MDI were determined using NIOSH

Method P&CAM 347. Carbon dioxide concentrations were measured in accordance with Method 3, using Orsat analyzers.

All three phenol measurements at the surface dryer stack were below the method detection limit. In accordance with EPA AP-42 procedures, because phenol has been measured in detectable quantities in similar sources, these emissions data for phenol are included in this report based on half the method detection limit.

A rating of A was assigned to the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from the thermal oil heater are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.86 Reference 95

This report presents the results of a series of emission compliance tests conducted June 8-10, 1993 on the dryer, hot press, and thermal oil heater at the Louisiana-Pacific Corporation waferboard plant in Dungannon, Virginia.

The dryer tested is a wood-fired, 12-ft x 60-ft MEC Model 1260 TNW/L. Exhaust from the dryer passes through a primary cyclone followed by a secondary multiclone in series with an EFB. The wood species processed during the test program were 99 percent (or greater) hardwood and 1 percent (or less) softwood. The hot press has eight 8-foot by 16-foot openings. Exhaust from the press and unloader vents are combined and exhausted to the atmosphere through a common stack. The plant was using both phenol-formaldehyde and MDI resins during testing.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Sampling for $NO_x$ was conducted using Method 7. Formaldehyde emissions were tested in accordance with Method 0011. Volatile organic compound emissions were tested in accordance with Method 25A. Phenol emissions were measured using Method 8270. Emissions of MDI were determined using NIOSH Method P&CAM 347. Carbon monoxide emissions were tested in accordance with Method 10. Carbon dioxide concentrations were measured in accordance with Method 3, using Orsat analyzers.

A rating of A was assigned to the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from the thermal oil heater are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.87 Reference 96

This report presents the results of an air emission compliance test program conducted September 10-11, 1996 on the dryer, hot press, and thermal oil heater at the Louisiana-Pacific Corporation waferboard plant in Dungannon, Virginia.

All testing was conducted while the plant was processing 95 percent hardwoods. The hot press has eight 8-foot by 16-foot openings. The plant was using both phenol-formaldehyde and MDI resins during the test program. Exhaust from the dryer passes through a primary cyclone followed by a wet scrubber. Emissions from the hot press are combined with the exhaust from the scrubber and vented to an RTO.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Sampling for $SO_2$ and $NO_x$ was conducted using Methods 6C and 7E, respectively. Emissions of CO were measured in accordance with Method 10. Formaldehyde emissions were tested in accordance with Method 0011. Volatile organic compound emissions were tested in accordance with Method 25A. Method 18 was used to measure emissions of methane. MDI concentrations were determined in accordance with the 1,2-PP method. Concentrations of $CO_2$ were measured in accordance with Method 3A.

A rating of A was assigned to the press exhaust data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation. Dryer exhaust data are not incorporated because it is unclear from the report if emissions were measured before or after the scrubber. The RTO outlet data are not incorporated because they include combined emissions from the press and dryer. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from the thermal oil heater are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.88 Reference 97

This report presents the results of State-required air emission compliance tests conducted December 14-17, 1993 on the dryer, hot press, and thermal oil heater at the Louisiana-Pacific Corporation waferboard plant in Dungannon, Virginia.

The dryer tested is a 12-ft x 60-ft MEC Model 1260 TNW/L. Exhaust from the dryer passes through a primary cyclone followed by a multiclone in series with an EFB. The dryers were processing 99 percent (or greater) hardwood and 1 percent (or less) softwood during the emission tests. The press has eight 8-foot by 16-foot openings. The press and unloader vents are combined and exhausted through a common stack. The plant was using both phenol-formaldehyde and MDI resins during the test program.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Emissions of CO were measured in accordance with Method 10. Sampling for $NO_x$ and formaldehyde was conducted using Methods 7 and 0011, respectively. Volatile organic compound emissions were tested in accordance with Method 25A. Phenol emissions were measured using Method 8270. Emissions of MDI were measured using two different methods simultaneously: NIOSH Method P&CAM 347, and the draft EPA Method using 1,2-PP. Concentrations of $CO_2$ were measured in accordance with Method 3.

All three phenol measurements at the press stack were below the method detection limit. In accordance with EPA AP-42 procedures, because phenol has been measured in detectable quantities in similar sources, these emission data for phenol are included in this report based on half the method detection limit.

A rating of A was assigned to the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from the thermal oil heater are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.89 References 98 and 99

This report and the associated data package present the results of air emission compliance tests conducted June 28-29, 1994 on the dryer, hot press, and thermal oil heater at the Louisiana-Pacific Corporation waferboard plant in Dungannon, Virginia.

The dryer tested is a 12-ft x 60-ft MEC Model 1260 TNW/L. Exhaust from the dryer passes through a primary cyclone followed by a multiclone in series with an EFB. No information is provided in the report regarding the wood species processed during the dryer emission tests. The press has eight 8-ft by 16-ft openings. The press and unloader vents are combined and exhausted through a common stack. The plant was using both phenol-formaldehyde and MDI resins during the test program.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Emissions of CO were measured in accordance with Method 10. Sampling for $NO_x$ was conducted using Method 7E for Run 1 and Method 7 for Runs 2 and 3. Formaldehyde concentrations were measured using Method 0011. Volatile organic compound emissions were tested in accordance with Method 25A. Phenol emissions were measured using Method 8270. Emissions of MDI were measured using two different methods simultaneously: NIOSH Method P&CAM 347, and the draft EPA Method using 1,2-PP. Concentrations of $CO_2$ were measured in accordance with Method 3.

All three phenol measurements at the press stack were below the method detection limit. In accordance with EPA AP-42 procedures, because phenol has been measured in detectable quantities in similar sources, these emission data for phenol are included in this report based on half the method detection limit.

A rating of A was assigned to the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from the thermal oil heater are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.90 Reference 100

This report presents the results of air emission compliance and engineering tests performed December 13, 1995 on the thermal oil heater stack at the Louisiana-Pacific Corporation waferboard plant located in Houlton, Maine. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from this reference are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.91 Reference 101

This report presents the results of air emission compliance tests performed March 4, 1993 on the thermal oil heater stack at the Louisiana-Pacific Corporation waferboard plant located in Houlton, Maine. Emission factors for wood combustion are presented in AP-42 Chapter 1, External Combustion Sources. Therefore, the data from this reference are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.92 Reference 102

This report presents the results of air emission compliance tests conducted June 15, 1995 on the dryer stack at the Louisiana-Pacific Corporation waferboard plant in Montrose, Colorado.

The dryer tested is a 60-ft MEC triple pass rotary dryer. Dry wood fines and waferboard trimmings are used to fire a McConnell burner rated at 40 MMBtu/hr. The dryer exhaust gases pass through a multiclone and then through an E-Tube WESP. No data are provided in the report regarding the wood species processed during the emission tests.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Carbon dioxide concentrations were measured in accordance with Method 3A, using Fyrite analyzers.

Because of the accuracy associated with the Fyrite analyzer, the $CO_2$ data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

A rating of A was assigned to the filterable and condensable PM data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.93 Reference 103

This report presents the results of air emission diagnostic tests conducted February 16, 1995 on the wet scrubber inlet and stack at the Louisiana-Pacific Corporation OSB plant in Dungannon, Virginia.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Metals were measured in accordance with Method 29. Only one test run was performed at the inlet and one test run at the outlet of the scrubber. No process parameters are included in the test report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, and because only one test run was conducted, the emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.94 Reference 104

This report presents the results of air emission diagnostic tests conducted March 9-10, 1995 on the RTO inlet and outlet at the Louisiana-Pacific Corporation OSB plant in Dungannon, Virginia.

Methods 4 and 202 were used for particle size determination. Emissions of $NO_x$ and CO were measured in accordance with Methods 7E and 10, respectively. Volatile organic compounds were measured in accordance with Method 25A. Carbon dioxide determinations were made using Method 3A. No process parameters are included in the report.

Because this report does not contain sufficient data to evaluate the source operating conditions during the test, the emission data are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.95 Reference 105

This report presents the results of air emission compliance tests conducted March 11, 1993 on the press stack at the Louisiana-Pacific Corporation OSB plant in Dungannon, Virginia.

The hot press has eight 8-ft x 16-ft openings. Emissions from the hot press and unloader vents are combined and exhausted to the atmosphere through a common stack. Emissions of MDI were sampled at two different MDI resin application rates. The first test condition was at a typical MDI application rate. The second test condition was at an elevated (approximately 50 percent higher) MDI application rate. Three test runs were conducted for each process condition. The plant was using both phenol-formaldehyde and MDI resins during the testing.

Concentrations of MDI were determined using NIOSH P&CAM 347. Concentrations of $CO_2$ were measured in accordance with Method 3A, using Orsat analyzers.

A rating of A was assigned to the report data measured during normal operation. Tests were performed by sound methodologies and are reported in enough detail for adequate validation. The data measured during the atypical process conditions are not incorporated into AP-42 Section 10.6.1 and are not addressed further in this background report.

4.2.96 Reference 106

This report presents the results of air emission compliance tests conducted March 29, 1994 on the dryer stack at the Louisiana-Pacific Corporation OSB plant in Dungannon, Virginia.

The dryer tested is a 12-foot by 60-foot MEC Model 1260 TNW/L. Exhaust from the dryer passes through a primary cyclone followed by a multiclone in series with an EFB. The wood species processed during the dryer emission tests were 99 percent (or greater) hardwoods and 1 percent (or less) softwoods.

Nitrogen oxide and $CO_2$ concentrations were measured in accordance with Methods 7E and 3A, respectively. Test run 1 was voided because the $NO_x$ analyzer did not meet the bias specifications outlined in the reference method. Test run 4 was aborted due to dryer fan shutdown. Test runs 2, 3, and 5 were used to calculate mass emission rates and emission factors.

A rating of A was assigned to the report data. Tests were performed by sound methodologies and are reported in enough detail for adequate validation.

4.2.97 Review of XATEF and SPECIATE Data Base Emission Factors

A search of the XATEF data base revealed 45 emission factors for SIC 2493. Six of the 45 emission factors were for waferboard operations. Two of these emission factors are based on a memorandum (Memorandum, from J. H. Stelling, and K. L. Wertz, Radian Corporation, Research Triangle Park, NC, to L. B. Evans, U. S. Environmental Protection Agency, Research Triangle Park, NC, July 1987). This memo discusses formaldehyde emissions from waferboard press operations. Emission rates from March 1986 and June 1986 test reports for a waferboard facility located in Olathe, Colorado are included, as well as formaldehyde emission factors from NCASI Technical Bulletin No. 503. The memo is brief and does not include enough background information for adequate validation. For that reason, these emission factors have not been incorporated into the draft of AP-42 Section 10.6.1.

One of the XATEF emission factors is based on another memorandum (Memorandum, from Dr. I. Gellman, National Council of the Paper Industry for Air and Stream Improvement, Inc., to Corporate Correspondents-CC88-24 SARA Section 313 Technical Session Attendees Regional Managers, EPA-SARA Title III - Revised Chemical Specific Information Sheets for Estimating Releases, New York, May 1988). The emission factors presented in this reference appear to be material balance data, as opposed to test data. For that reason, this emission factor has not been incorporated into the draft of AP-42 Section 10.6.1.

The three remaining waferboard emission factors from XATEF are based on an EPA report (Evaluation of Air Toxic Emissions at Minnesota's Reconstituted Panelboard Plants, EPA-450/3-91-009, U. S. Environmental Protection Agency, Research Triangle Park, NC, April 1991). This document presents an air toxics emissions evaluation of reconstituted panelboard plants in Minnesota conducted in order to develop an air toxics test strategy. The report includes a summary of available air toxics test data, primarily for formaldehyde and phenol emissions from dryers and formaldehyde emissions from press vents. Unfortunately, no information is provided regarding test methods. Because this report is not the original source of the test data, the test methods are not specified, and the control devices used (if any) are not specified, these emission factors have not been incorporated into the draft of AP-42 Section 10.6.1.

The SPECIATE data base includes emission factors for a number of speciated VOC's for SCC 3-07-007-04, waferboard dryers. However, the emission factors are all surrogates based on averages of plywood veneer dryer data. For that reason, these emission factors have not been incorporated into the draft of AP-42 Section 10.6.1.

The SPECIATE data base includes a speciated PM profile for SCC 3-07-007-04, waferboard dryers. However, the emission factors are all surrogates based on averages of plywood veneer dryer data. For that reason, these emission factors also have not been incorporated into the draft of AP-42 Section 10.6.1.

## 4.3 DEVELOPMENT OF CANDIDATE EMISSION FACTORS

As explained previously, Tables 4-1 to 4-9 summarize the data taken from the NCASI data base on emissions from WB/OSB manufacturing. Table 4-10 summarizes the WB/OSB dryer data from the other emission test reports (References 1 to 11) that also were reviewed in the preparation of this report. Table 4-11 presents a summary of WB/OSB press emission data from emission test reports that were not included in the NCASI data base.

The candidate emission factors for criteria pollutant and chromium emissions from WB/OSB manufacturing dryers are presented in Table 4-12. Table 4-13 includes the candidate emission factors for speciated organic pollutant emissions from WB/OSB dryers. Table 4-14 presents the candidate emission factors for WB/OSB presses. Tables 4-12 through 4-14 include the number of tests on which the factors are based, the range of the factors (minimum and maximum values), and the emission factor ratings. For those emission factors based on five or more emission tests, the factor standard deviations also are presented. Appendix A presents a series of tables that show which data sets were used to develop each of the factors presented in Tables 4-12 through 4-14. The following paragraphs describe the general approach used to develop the emission factors presented in those tables. After the discussion of the general approach, the factors for individual sources and pollutants are described.

### 4.3.1 General Approach to Developing Emission Factors

The emission factors were developed by grouping the data by pollutant, control device, and other parameters that could significantly impact emissions. The only parameters for which separate emission factors were developed for WB/OSB dryers are fuel type, control device, and wood species. Emission factors are not presented separately for other parameters because either only a single category was reported or the categories were not exclusive of one another. An example of a variable for which there was only a single category is dryer design; all dryers for which emission data were obtained were rotary triple pass dryers. An example of a variable for which the categories were not exclusive of one another is dryer fuel type. Most dryers were wood-fired. However, in some cases, dryer fuel was reported as wood refuse, and other dryers were fired with sanderdust or wood fines, both of which also could have been classified as wood refuse. For WB/OSB presses, emission factors were differentiated by resin type and emission control device only.

Emission data for mixed wood species were discarded. Emission factors for specific mixes of wood species may be calculated by combining emission factors for individual wood species as emission data for those species become available.

The data available for many of the specific emission factors developed included the results of multiple tests on the same emission source. In such cases, the test-specific emission factors for the same source were averaged first, and that average emission factor then was averaged with the factors for the other sources to yield the candidate emission factors for AP-42.

The NCASI data base included the results of several measurements of combined emissions of filterable PM and condensible PM and combined filterable PM-10 and condensible PM. These data were not used to develop separate factors for these combined emissions. However, the separate factors for filterable PM and condensible PM from the AP-42 section may be summed as appropriate to determine a factor for total PM. In addition, factors for VOC emissions are presented in the NCASI data base and in Tables 4-2, 4-3, 4-7, 4-8, and 4-9 on a carbon basis. However, for the purposes of AP-42, the VOC factors were converted to a propane basis.

The ratings assigned to the candidate emission factors are largely a function of the data ratings and the number of data sets upon which the specific factors are based. Generally, D-rated data were discarded and were not used in the determination of candidate emission factors. However, in cases where only D-rated data (or only C- and D-rated data) were available, the data were used and the candidate emission factor was assigned a rating of E. In addition, factors based on a single data set also were rated E. For factors based on multiple data sets, the ratings were based primarily on the number of data sets. In general, the candidate emission factors for criteria pollutants were rated D, if based on less than 10 data sets, factors based on 10 to 19 data sets were rated C, and factors based on 20 or more data sets were rated B. Factors for speciated organics were assigned lower ratings due to the inconsistency and sparsity of the data.

### 4.3.2 WB/OSB Dryers

The candidate emission factors for WB/OSB dryers are presented in Tables 4-12 and 4-13. Generally, dryer emission data were available for the criteria pollutants and several speciated organic pollutants. The control devices for which data were available included multiclones, EFB's, WESP's and RTO's. Two data sets were also available for filterable PM emissions controlled by an ionizing wet scrubber (IWS). Data were also available for uncontrolled emissions (emissions from the primary product recovery cyclone). Dryer emissions data were available for several wood species, including Southern yellow pine, and aspen. However, for much of the data the wood species is reported as unspecified southern pines, unspecified pines, or unspecified hardwoods. All of the dryer data pertain to direct-fired rotary dryers that use either wood material or natural gas for fuel.

4.3.2.1 Particulate Matter. For emissions of PM, the data from dryers were grouped first by emission control device, then by wood species. Emission factors were developed for emissions of filterable PM, filterable PM-10, and condensible PM. Although the organic and inorganic fractions of condensible PM were reported in some of the references, most of the condensible PM data are for total condensibles. Therefore, where applicable, the organic and inorganic fractions for individual data sets were combined and only the total condensible PM factors are presented. Appendix A, Table A-1 presents the emission factor calculations for filterable PM, filterable PM-10, and condensible PM emissions from WB/OSB dryers.

4.3.2.2 Volatile Organic Compounds. Data were available for VOC emission factors based on tests performed using Method 25 and Method 25A. In general, the VOC emission data were grouped by wood species, and by emission control device, where possible. The candidate emission factors developed from the data are presented in Table 4-12. These factors are presented on a propane basis. Because aldehydes and other oxygenated compounds respond poorly to the FID used in Method 25A sampling trains, the emission factors for formaldehyde were added to the corresponding VOC emission factors; the VOC factors in Table 4-12 are actually the sum of the Method 25A results and the corresponding factor for formaldehyde emissions. However, the formaldehyde factor was not added to the VOC factors developed from Method 25 emission test data. The emission factor calculations for dryer VOC emissions are summarized in Appendix A, Table A-2.

4.3.2.3 Other Pollutants. The data on emissions of CO, $CO_2$, and $NO_x$ were categorized by dryer fuel type (either wood or natural gas). The data taken from RTO outlets was also segregated and reported separately. Two CO data sets were based on measurements using Method 3. These data were rated C and were not included with the Method 10 data. One data set for CO did not specify a test method and was rated D. All C- and D-rated data for CO were discarded. The emission factor calculations for dryer CO emissions are summarized in Appendix A, Table A-3.

All $CO_2$ data sets were based on Method 3 or 3A data. All C- and D-rated $CO_2$ data were discarded. The emission factor calculations for dryer $CO_2$ emissions are summarized in Appendix A, Table A-3.

All $NO_x$ data sets were based on Method 7 or 7E measurements. The data for test 052-011493B indicated in one instance that dryer XD052 was indirect-heated and in another instance that the dryer was direct-fired. Because of uncertainty of the dryer firing type, this data set was discarded. All C- and D-rated data for $NO_x$ were discarded. The emission factor calculations for dryer $NO_x$ emissions are summarized in Appendix A, Table A-3.

Only one data set was available for emissions of $SO_2$ and chromium. These data are based on Methods 6C and 29, respectively. These emission factors are also presented in Appendix A, Table A-3.

4.3.2.4 Speciated Organic Compounds. The candidate emission factors for speciated organic compound emissions from WB/OSB dryers are presented in Table 4-13. The table includes factors for four different compounds. Data for three of the four compounds are limited to one data set from a single mill. The candidate emission factors for these three compounds were assigned a rating of E due to the scarcity of the data. Data for the remaining compound, formaldehyde, were available for a variety of wood species. Data were grouped by wood species and emission control device. Table A-4 of Appendix A summarizes the emission factor calculations for dryer emissions of speciated organics.

### 4.3.3 WB/OSB Presses

Table 4-14 summarizes the candidate emission factors for WB/OSB presses. Emission factors were developed for emissions of filterable PM, filterable PM-10, condensible PM, VOC, CO, $CO_2$, $SO_2$, $NO_x$, and four speciated organic compounds. The emission factors are presented in units of pounds of pollutant per thousand square feet of 3/8-inch thick panel (lb/MSF 3/8). The factors for WB/OSB presses were developed using the same general methodology as was described in Section 4.3.2 for WB/OSB dryers. The emission factor calculations for WB/OSB presses are summarized in Table A-5 of Appendix A.

### 4.3.4 Cross-Reference of Emission Data References

Table 4-15 presents a cross-referenced list giving reference numbers for sources reviewed in Chapter 4 of the Background Report, and the corresponding reference numbers for those references subsequently used in the AP-42 section.

TABLE 4-1. SUMMARY OF OSB DRYER DESIGN DATA FROM NCASI DATA BASE

| Test code | Unit code | Pollutant [b] | Dryer type [c] | Firing type [d] | Dryer capacity | Emission control device [e] Initial | Interm. | Final | Core/ surface/ both [f] | Primary |
|---|---|---|---|---|---|---|---|---|---|---|
| FILTERABLE PM | | | | | | | | | | |
| 041-052192A | XD041 | PM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-052192B | XD041 | PM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-063092A | XD041 | PM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-063092B | XD041 | PM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-121792A | XD041 | PM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-121792B | XD041 | PM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 044-102588A | XD044 | PM | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-102588B | XD044 | PM | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-102588C | XD044 | PM | RTP | DFIRE | NS | CYC | NA | WESP | B | POPLA |
| 044-102588C | XD044 | PM | RTP | DFIRE | NS | CYC | NA | WESP | B | POPLA |
| 044-102588D | XD044 | PM | RTP | DFIRE | NS | CYC | NA | WESP | B | POPLA |
| 052-011493A | XD052 | PM | RTP | IHEAT | 97 TPH (wet) | NS | NA | WESP | NS | HWOO |
| 052-011493B | XD052 | PM | RTP | IHEAT | 97 TPH (wet) | NS | NA | WESP | NS | HWOO |
| 069-081491A | 1D069 | PM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081491B | 1D069 | PM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081591A | 2D069 | PM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-081591B | 2D069 | PM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-081992A | 1D069 | PM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081992B | 1D069 | PM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-082092A | 2D069 | PM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-082092B | 2D069 | PM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-121390A | 2D069 | PM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-121390B | 1D069 | PM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-121390C | 2D069 | PM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 070-031992A | 2D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-031992B | 2D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042392B | 1D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042492B | 3D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891A | 1D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891B | 1D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] | | | Core/ surface/ both[f] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Initial | Interm. | Final | | Primary |
| 070-062891C | 3D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891D | 3D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091A | 2D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091B | 2D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091C | 3D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091D | 3D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091E | 2D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091F | 2D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091G | 3D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091H | 3D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102192A | 3D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102192B | 3D070 | PM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 083-060988A | YD083 | PM | RTP | DFIRE | 45,000 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 083-061088A | XD083 | PM | RTP | DFIRE | 45,000 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 088-120892A | 1D088 | PM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | PINE S |
| 088-121488A | 1D088 | PM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | HWOO |
| 096-012793A | 2D096 | PM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | WESP | B | ASPEN |
| 096-012793C | 2D096 | PM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | WESP | B | ASPEN |
| 096-060590A | 1D096 | PM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 096-060590C | 1D096 | PM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 096-060790C | 1D096 | PM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 096-060890C | 1D096 | PM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 097-061490A | XD097 | PM | RTP | DFIRE | 55,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 097-061588A | 2D097 | PM | RTP | DFIRE | 22,557 lb/hr | CYC | NA | MCLO | S | HWOO |
| 097-061688A | 1D097 | PM | RTP | DFIRE | 22,557 lb/hr | CYC | NA | MCLO | C | HWOO |
| 097-080290B | XD097 | PM | RTP | DFIRE | 55,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 097-091189A | 2D097 | PM | RTP | DFIRE | 22,557 lb/hr | CYC | NA | MCLO | S | HWOO |
| 097-091289A | 1D097 | PM | RTP | DFIRE | 22,557 lb/hr | CYC | NA | MCLO | C | HWOO |
| 097-100590A | XD097 | PM | RTP | DFIRE | 55,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 097-122089A | XD097 | PM | RTP | DFIRE | 55,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 210-021192A | 1D210 | PM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] | | | Core/ surface/ both[f] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Initial | Interm. | Final | | Primary |
| 210-042292A | 1D210 | PM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 211-041191A | 1D211 | PM | RTP | DFIRE | 19,927 lb/hr | MCLO | NA | EFB | C | HWOO |
| 212-101191A | 1D212 | PM | RTP | DFIRE | 31,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 215-042089A | XD215 | PM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | HWOO |
| 215-042089B | XD215 | PM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | HWOO |
| 215-062591A | XD215 | PM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591B | XD215 | PM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591C | YD215 | PM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591D | YD215 | PM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 225-020792A | 1D225 | PM | RTP | DFIRE | 20,890 lb/hr | MCLO | NA | EFB | B | HWOO |
| FILTERABLE PM-10 | | | | | | | | | | |
| 210-021192B | 1D210 | PM10 | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 210-042292B | 1D210 | PM10 | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 225-020792B | 1D225 | PM10 | RTP | DFIRE | 20,890 lb/hr | MCLO | NA | EFB | B | HWOO |
| CONDENSIBLE PM | | | | | | | | | | |
| 041-063092A | XD041 | CPM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-063092B | XD041 | CPM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-121792A | XD041 | CPM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-121792B | XD041 | CPM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 044-102588A | XD044 | CPM | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-102588B | XD044 | CPM | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-102588C | XD044 | CPM | RTP | DFIRE | NS | CYC | NA | WESP | B | POPLA |
| 044-102588D | XD044 | CPM | RTP | DFIRE | NS | CYC | NA | WESP | B | POPLA |
| 069-081491A | 1D069 | CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081491B | 1D069 | CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081591A | 2D069 | CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-081591B | 2D069 | CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-081992A | 1D069 | CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081992B | 1D069 | CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-082092A | 2D069 | CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-082092B | 2D069 | CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] Initial | Interm. | Final | Core/ surface/ both[f] | Primary |
|---|---|---|---|---|---|---|---|---|---|---|
| 069-121390A | 2D069 | CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-121390B | 1D069 | CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-121390C | 2D069 | CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 070-031992A | 2D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-031992B | 2D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042392B | 1D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042492B | 3D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891A | 1D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891B | 1D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891C | 3D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891D | 3D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091A | 2D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091B | 2D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091C | 3D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091D | 3D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091E | 2D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091F | 2D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091G | 3D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091H | 3D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102192A | 3D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102192B | 3D070 | CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 083-060988A | YD083 | CPM | RTP | DFIRE | 45,000 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 083-061088A | XD083 | CPM | RTP | DFIRE | 45,000 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 088-120892A | 1D088 | CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | PINE S |
| 096-012793A | 2D096 | CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | WESP | B | ASPEN |
| 096-012793C | 2D096 | CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | WESP | B | ASPEN |
| 096-060590A | 1D096 | CPM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 096-060590C | 1D096 | CPM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 096-060790C | 1D096 | CPM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 096-060890C | 1D096 | CPM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 210-021192A | 1D210 | CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] | | | Core/ surface/ both[f] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Initial | Interm. | Final | | Primary |
| 210-021192B | 1D210 | CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 210-042292A | 1D210 | CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 210-042292B | 1D210 | CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 212-101191A | 1D212 | CPM | RTP | DFIRE | 31,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 215-062591A | XD215 | CPM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591B | XD215 | CPM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591C | YD215 | CPM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591D | YD215 | CPM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 225-020792A | 1D225 | CPM | RTP | DFIRE | 20,890 lb/hr | MCLO | NA | EFB | B | HWOO |
| 225-020792B | 1D225 | CPM | RTP | DFIRE | 20,890 lb/hr | MCLO | NA | EFB | B | HWOO |
| TOTAL PM (FILTERABLE + CONDENSIBLE PM) | | | | | | | | | | |
| 041-063092A | XD041 | PM&CPM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-063092B | XD041 | PM&CPM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-121792A | XD041 | PM&CPM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-121792B | XD041 | PM&CPM | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 044-102588A | XD044 | PM&CPM | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-102588B | XD044 | PM&CPM | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-102588C | XD044 | PM&CPM | RTP | DFIRE | NS | CYC | NA | WESP | B | POPLA |
| 044-102588D | XD044 | PM&CPM | RTP | DFIRE | NS | CYC | NA | WESP | B | POPLA |
| 069-081491A | 1D069 | PM&CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081491B | 1D069 | PM&CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081591A | 2D069 | PM&CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-081591B | 2D069 | PM&CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-081992A | 1D069 | PM&CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081992B | 1D069 | PM&CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-082092A | 2D069 | PM&CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-082092B | 2D069 | PM&CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-121390A | 2D069 | PM&CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-121390B | 1D069 | PM&CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-121390C | 2D069 | PM&CPM | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 070-031992A | 2D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] Initial | Emission control device[e] Interm. | Emission control device[e] Final | Core/ surface/ both[f] | Primary |
|---|---|---|---|---|---|---|---|---|---|---|
| 070-031992B | 2D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042392B | 1D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042492B | 3D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891A | 1D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891B | 1D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891C | 3D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891D | 3D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091A | 2D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091B | 2D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091C | 3D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091D | 3D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091E | 2D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091F | 2D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091G | 3D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091H | 3D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102192A | 3D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102192B | 3D070 | PM&CPM | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 083-060988A | YD083 | PM&CPM | RTP | DFIRE | 45,000 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 083-061088A | XD083 | PM&CPM | RTP | DFIRE | 45,000 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 088-120892A | 1D088 | PM&CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | PINE S |
| 096-012793A | 2D096 | PM&CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | WESP | B | ASPEN |
| 096-012793C | 2D096 | PM&CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | WESP | B | ASPEN |
| 096-060590A | 1D096 | PM&CPM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 096-060590C | 1D096 | PM&CPM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 096-060790C | 1D096 | PM&CPM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 096-060890C | 1D096 | PM&CPM | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 127-062591A | 1D127 | PM&CPM | RTP | DFIRE | 5 ODTH | MCLO | NA | EFB | NS | ASPEN |
| 127-082190A | 1D127 | PM&CPM | RTP | DFIRE | 5 ODTH | MCLO | NA | EFB | NS | ASPEN |
| 210-021192A | 1D210 | PM&CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 210-042292A | 1D210 | PM&CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 211-012892A | 3D211 | PM&CPM | RTP | DFIRE | NS | MCLO | NA | EFB | B | HWOO |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] | | | Core/ surface/ both[f] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Initial | Interm. | Final | | Primary |
| 211-012992B | 1D211 | PM&CPM | RTP | DFIRE | 19,927 lb/hr | MCLO | NA | EFB | B | HWOO |
| 211-013092A | 2D211 | PM&CPM | RTP | DFIRE | NS | MCLO | NA | EFB | B | HWOO |
| 212-101191A | 1D212 | PM&CPM | RTP | DFIRE | 31,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 215-062591A | XD215 | PM&CPM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591B | XD215 | PM&CPM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591C | YD215 | PM&CPM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591D | YD215 | PM&CPM | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 225-020792A | 1D225 | PM&CPM | RTP | DFIRE | 20,890 lb/hr | MCLO | NA | EFB | B | HWOO |
| TOTAL PM-10 (FILTERABLE PM-10 + CONDENSIBLE PM) | | | | | | | | | | |
| 210-021192B | 1D210 | PM10&CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 210-042292B | 1D210 | PM10&CPM | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 211-012892B | 3D211 | PM10&CPM | RTP | DFIRE | NS | MCLO | NA | EFB | B | HWOO |
| 211-012992A | 1D211 | PM10&CPM | RTP | DFIRE | 19,927 lb/hr | MCLO | NA | EFB | B | HWOO |
| 211-013092B | 2D211 | PM10&CPM | RTP | DFIRE | NS | MCLO | NA | EFB | B | HWOO |
| 225-020792B | 1D225 | PM10&CPM | RTP | DFIRE | 20,890 lb/hr | MCLO | NA | EFB | B | HWOO |
| CARBON MONOXIDE | | | | | | | | | | |
| 041-052192B | XD041 | CO | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 044-092193A | XD044 | CO | RTP | DFIRE | NS | CYC | NA | WESP | NS | NS |
| 044-092193B | XD044 | CO | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 052-011493B | XD052 | CO | RTP | IHEAT | 97 TPH (wet) | NS | NA | WESP | NS | HWOO |
| 069-071592A | 1D069 | CO | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-071692A | 2D069 | CO | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-071692A | 2D069 | CO | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 070-031992B | 2D070 | CO | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042392B | 1D070 | CO | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042492B | 3D070 | CO | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891A | 1D070 | CO | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891B | 1D070 | CO | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102192B | 3D070 | CO | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 088-120892A | 1D088 | CO | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | PINE S |
| 096-012793A | 2D096 | CO | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | WESP | B | ASPEN |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] | | | Core/ surface/ both[f] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Initial | Interm. | Final | | Primary |
| 096-060590A | 1D096 | CO | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 096-060590C | 1D096 | CO | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 096-060790C | 1D096 | CO | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 096-060890C | 1D096 | CO | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 097-100590A | XD097 | CO | RTP | DFIRE | 55,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 097-122089A | XD097 | CO | RTP | DFIRE | 55,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 127-082190A | 1D127 | CO | RTP | DFIRE | 5 ODTH | MCLO | NA | EFB | NS | ASPEN |
| 127-091289A | 2D127 | CO | RTP | DFIRE | 5 ODTH | MCLO | NA | EFB | NS | ASPEN |
| 127-102290A | 1D127 | CO | RTP | DFIRE | 5 ODTH | MCLO | NA | EFB | NS | ASPEN |
| 210-013090A | 1D210 | CO | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 210-021192A | 1D210 | CO | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 210-022489A | 1D210 | CO | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | NS | ASPEN |
| 210-042292A | 1D210 | CO | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 210-042292E | 1D210 | CO | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 211-012892A | 3D211 | CO | RTP | DFIRE | NS | MCLO | NA | EFB | B | HWOO |
| 211-012992B | 1D211 | CO | RTP | DFIRE | 19,927 lb/hr | MCLO | NA | EFB | B | HWOO |
| 211-013092A | 2D211 | CO | RTP | DFIRE | NS | MCLO | NA | EFB | B | HWOO |
| 215-062591B | XD215 | CO | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 225-020792A | 1D225 | CO | RTP | DFIRE | 20,890 lb/hr | MCLO | NA | EFB | B | HWOO |
| 225-041990A | 1D225 | CO | RTP | DFIRE | 20,890 lb/hr | MCLO | NA | EFB | NS | HWOO |
| NITROGEN OXIDES | | | | | | | | | | |
| 044-092193A | XD044 | NOX | RTP | DFIRE | NS | CYC | NA | WESP | NS | NS |
| 044-092193B | XD044 | NOX | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 052-011493B | XD052 | NOX | RTP | IHEAT | 97 TPH (wet) | NS | NA | WESP | NS | HWOO |
| 069-071592A | 1D069 | NOX | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-071692A | 2D069 | NOX | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 070-031992B | 2D070 | NOX | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042492B | 3D070 | NOX | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 088-120892A | 1D088 | NOX | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | PINE S |
| 097-100590A | XD097 | NOX | RTP | DFIRE | 55,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 127-082190A | 1D127 | NOX | RTP | DFIRE | 5 ODTH | MCLO | NA | EFB | NS | ASPEN |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] Initial | Interm. | Final | Core/ surface/ both[f] | Primary |
|---|---|---|---|---|---|---|---|---|---|---|
| 127-091289A | 2D127 | NOX | RTP | DFIRE | 5 ODTH | MCLO | NA | EFB | NS | ASPEN |
| 210-022489A | 1D210 | NOX | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | NS | ASPEN |
| 215-062591B | XD215 | NOX | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| VOLATILE ORGANIC COMPOUNDS | | | | | | | | | | |
| 041-052192A | XD041 | VOC | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-052192B | XD041 | VOC | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 044-092193A | XD044 | VOC | RTP | DFIRE | NS | CYC | NA | WESP | NS | NS |
| 044-092193B | XD044 | VOC | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-102588A | XD044 | VOC | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-102588B | XD044 | VOC | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 052-011493A | XD052 | VOC | RTP | IHEAT | 97 TPH (wet) | NS | NA | WESP | NS | HWOO |
| 052-011493A | XD052 | VOC | RTP | IHEAT | 97 TPH (wet) | NS | NA | WESP | NS | HWOO |
| 052-011493B | XD052 | VOC | RTP | IHEAT | 97 TPH (wet) | NS | NA | WESP | NS | HWOO |
| 052-011493B | XD052 | VOC | RTP | IHEAT | 97 TPH (wet) | NS | NA | WESP | NS | HWOO |
| 069-071592B | 1D069 | VOC | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-071692B | 2D069 | VOC | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-081491A | 1D069 | VOC | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081491B | 1D069 | VOC | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081591A | 2D069 | VOC | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-081591B | 2D069 | VOC | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 070-031992A | 2D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-031992B | 2D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042392A | 1D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042392B | 1D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042492A | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042492B | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891A | 1D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891B | 1D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891C | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891D | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091A | 2D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] | | | Core/ surface/ both[f] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Initial | Interm. | Final | | Primary |
| 070-101091A | 2D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091B | 2D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091B | 2D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091C | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091C | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091D | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091D | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091E | 2D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091E | 2D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091F | 2D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091F | 2D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091G | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091G | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091H | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-101091H | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102192A | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102192B | 3D070 | VOC | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 083-082990A | XD083 | VOC | RTP | DFIRE | 45,000 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 088-030989A | 1D088 | VOC | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | HWOO |
| 088-120892A | 1D088 | VOC | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | PINE S |
| 088-120892B | 1D088 | VOC | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | HWOO |
| 088-121488A | 1D088 | VOC | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | HWOO |
| 096-012693A | 2D096 | VOC | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | WESP | B | ASPEN |
| 096-012693B | 2D096 | VOC | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | WESP | B | ASPEN |
| 096-060590B | 1D096 | VOC | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 096-060590D | 1D096 | VOC | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 096-060790C | 1D096 | VOC | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 096-060890C | 1D096 | VOC | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 097-061688B | 1D097 | VOC | RTP | DFIRE | 22,557 lb/hr | CYC | NA | MCLO | C | HWOO |
| 097-061688C | 2D097 | VOC | RTP | DFIRE | 22,557 lb/hr | CYC | NA | MCLO | S | HWOO |
| 097-100590B | XD097 | VOC | RTP | DFIRE | 55,000 lb/hr | MCLO | NA | EFB | B | HWOO |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] Initial | Interm. | Final | Core/ surface/ both[f] | Primary |
|---|---|---|---|---|---|---|---|---|---|---|
| 097-122189A | XD097 | VOC | RTP | DFIRE | 55,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 127-082190A | 1D127 | VOC | RTP | DFIRE | 5 ODTH | MCLO | NA | EFB | NS | ASPEN |
| 127-092289A | 2D127 | VOC | RTP | DFIRE | 5 ODTH | MCLO | NA | EFB | NS | ASPEN |
| 127-102290A | 1D127 | VOC | RTP | DFIRE | 5 ODTH | MCLO | NA | EFB | NS | ASPEN |
| 210-021192C | 1D210 | VOC | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 210-022489A | 1D210 | VOC | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | NS | ASPEN |
| 210-042292C | 1D210 | VOC | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 211-012892A | 3D211 | VOC | RTP | DFIRE | NS | MCLO | NA | EFB | B | HWOO |
| 211-012992B | 1D211 | VOC | RTP | DFIRE | 19,927 lb/hr | MCLO | NA | EFB | B | HWOO |
| 211-013092A | 2D211 | VOC | RTP | DFIRE | NS | MCLO | NA | EFB | B | HWOO |
| 211-041191A | 1D211 | VOC | RTP | DFIRE | 19,927 lb/hr | MCLO | NA | EFB | C | HWOO |
| 212-101191B | 1D212 | VOC | RTP | DFIRE | 31,000 lb/hr | MCLO | NA | EFB | B | HWOO |
| 215-042089A | XD215 | VOC | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | HWOO |
| 215-042089B | XD215 | VOC | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | HWOO |
| 215-062591A | XD215 | VOC | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591A | XD215 | VOC | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591B | XD215 | VOC | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591B | XD215 | VOC | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591C | YD215 | VOC | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591D | YD215 | VOC | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 225-020792D | 1D225 | VOC | RTP | DFIRE | 20,890 lb/hr | MCLO | NA | EFB | B | HWOO |
| SPECIATED ORGANIC COMPOUNDS | | | | | | | | | | |
| 215-062591A | XD215 | ACETALD | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591B | XD215 | ACETALD | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591A | XD215 | ACETONE | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591B | XD215 | ACETONE | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591A | XD215 | ACROLEIN | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591B | XD215 | ACROLEIN | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591A | XD215 | BUTYLALDEH | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591B | XD215 | BUTYLALDEH | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591A | XD215 | CROTONALDE | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] | | | Core/ surface/ both[f] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Initial | Interm. | Final | | Primary |
| 215-062591B | XD215 | CROTONALDE | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 041-052192A | XD041 | FOR | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 041-052192B | XD041 | FOR | RTP | DFIRE | 14 TPH (green) | NS | NA | WESP | NS | SY PIN |
| 044-092193A | XD044 | FOR | RTP | DFIRE | NS | CYC | NA | WESP | NS | NS |
| 044-092193A | XD044 | FOR | RTP | DFIRE | NS | CYC | NA | WESP | NS | NS |
| 044-092193B | XD044 | FOR | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-092193B | XD044 | FOR | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-102588A | XD044 | FOR | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-102588B | XD044 | FOR | RTP | DFIRE | NS | CYC | NA | WESP | B | SPRUC |
| 044-102588C | XD044 | FOR | RTP | DFIRE | NS | CYC | NA | WESP | B | POPLA |
| 044-102588D | XD044 | FOR | RTP | DFIRE | NS | CYC | NA | WESP | B | POPLA |
| 069-071692C | 2D069 | FOR | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-081491A | 1D069 | FOR | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081491B | 1D069 | FOR | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | C | POPLA |
| 069-081591A | 2D069 | FOR | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 069-081591B | 2D069 | FOR | RTP | DFIRE | 17 TFPH | CYC | CYC | WESP | S | POPLA |
| 070-031992B | 2D070 | FOR | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042392B | 1D070 | FOR | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-042492B | 3D070 | FOR | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891A | 1D070 | FOR | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891B | 1D070 | FOR | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891C | 3D070 | FOR | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-062891D | 3D070 | FOR | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102292A | 3D070 | FOR | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102292A | 3D070 | FOR | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102292B | 3D070 | FOR | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 070-102292B | 3D070 | FOR | RTP | DFIRE | 11 ODTH | CYC | MCLO | WESP | NS | PINE S |
| 088-120892B | 1D088 | FOR | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | HWOO |
| 096-012693A | 2D096 | FOR | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | WESP | B | ASPEN |
| 096-012693B | 2D096 | FOR | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | WESP | B | ASPEN |
| 096-060590A | 1D096 | FOR | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |

TABLE 4-1. (continued)

| Test code | Unit code | Pollutant[b] | Dryer type[c] | Firing type[d] | Dryer capacity | Emission control device[e] | | | Core/ surface/ both[f] | Primary |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Initial | Interm. | Final | | |
| 096-060590C | 1D096 | FOR | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | ASPEN |
| 096-060790C | 1D096 | FOR | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 096-060890C | 1D096 | FOR | RTP | DFIRE | 29,105 lb/hr | MCLO | NA | EFB | B | PINE S |
| 174-041191A | 1D174 | FOR | RTP | DFIRE | 40 MMBtu/hr | CYC | CYC | EFB | NS | HWOO |
| 174-041191B | 2D174 | FOR | RTP | DFIRE | 40 MMBtu/hr | CYC | CYC | EFB | NS | HWOO |
| 210-021192D | 1D210 | FOR | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 210-042292D | 1D210 | FOR | RTP | DFIRE | 29,105 lb/hr | CYC | MCLO | EFB | B | ASPEN |
| 211-012892C | 3D211 | FOR | RTP | DFIRE | NS | MCLO | NA | EFB | B | HWOO |
| 211-012992C | 1D211 | FOR | RTP | DFIRE | 19,927 lb/hr | MCLO | NA | EFB | B | HWOO |
| 211-013092C | 2D211 | FOR | RTP | DFIRE | NS | MCLO | NA | EFB | B | HWOO |
| 211-041191A | 1D211 | FOR | RTP | DFIRE | 19,927 lb/hr | MCLO | NA | EFB | C | HWOO |
| 215-042089A | XD215 | FOR | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | HWOO |
| 215-042089B | XD215 | FOR | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | HWOO |
| 215-062591A | XD215 | FOR | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591B | XD215 | FOR | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 225-020792C | 1D225 | FOR | RTP | DFIRE | 20,890 lb/hr | MCLO | NA | EFB | B | HWOO |
| 215-062591A | XD215 | PROPIONALD | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |
| 215-062591B | XD215 | PROPIONALD | RTP | DFIRE | 55 ODTH | CYC | NA | WESP | NS | SY PIN |

[a]NS = not specified. NA = not applicable.
[b]Pollutant codes are identified in Table 4-6.
[c]Dryer type: RTP = rotary triple pass
[d]Firing types: DFIRE = direct firing; IHEAT = indirect heating.
[e]Emission control devices: CYC = cyclone; MCLO = multiclone; EFB = electrified filter bed; WESP = wet electrostatic precipitator.
[f]Core/surface/both: C = core material dryer; S = surface material dryer; B = combination of core and surface material dryer.
[g]Wood species: SY PINE = Southern yellow pine; PINE SP = unknown pine species; UFIR = unspecified fir; SPRUCE = spruce; SWOOD = unspecified softwood; ASI
HWOOD = unspecified hardwood.
[h]Hot air sources: SUSP BU = suspension burner; FLUE GAS = combustion unit gases directly contact wood furnish; DFIRE = unspecified type of direct firing.

TABLE 4-2. SUMMARY OF EMISSION DATA FOR OSB DRYERS FROM NCASI DATA B

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Temp., EF | Moisture, % | Pollutant concentration: ppm | gr/dscf | Emission rate, lb/hr | Pr ra |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FILTERABLE PM | | | | | | | | | | | |
| 041-052192A | XD041 | PM | 3 | M5 | 128129 | 170 | 13.5 | | 0.0886 | 93.5 | 1 |
| 041-052192B | XD041 | PM | 3 | M5 | 106652 | 169 | 14.3 | | 0.0333 | 26.7 | 1 |
| 041-063092A | XD041 | PM | 3 | OD7 | 116999 | 194 | 9.5 | | 0.109 | 107.4 | 1( |
| 041-063092B | XD041 | PM | 3 | OD7 | 116337 | 158 | 9.3 | | 0.03 | 29.16 | 1( |
| 041-121792A | XD041 | PM | 3 | M5 | 89359 | 144 | 18 | | 0.0154 | 12.17 | 1( |
| 041-121792B | XD041 | PM | 3 | M5 | 101519 | 139 | 13.4 | | 893 | 77.01 | 1( |
| 044-102588A | XD044 | PM | 3 | M5 | 60986 | 196 | 10.1 | | 0.113 | 63.53 | 2( |
| 044-102588B | XD044 | PM | 3 | M5 | 54332 | 147 | 23.5 | | 0.008 | 3.89 | 2( |
| 044-102588C | XD044 | PM | 1 | M5 | 69788 | NS | NS | | 0.126 | 78.28 | N |
| 044-102588C | XD044 | PM | 1 | M5 | 69788 | NS | NS | | 0.095 | 39.42 | N |
| 044-102588D | XD044 | PM | 1 | M5 | 58344 | NS | NS | | 0.011 | 5.86 | N |
| 052-011493A | XD052 | PM | 3 | M5 | 141186 | 238 | 19.2 | | 0.135 | 164.23 | 3( |
| 052-011493B | XD052 | PM | 3 | M5 | 152862 | 142 | 21.1 | | 0.0173 | 22.63 | 3( |
| 069-081491A | 1D069 | PM | 3 | M5 | 28259 | 256 | 21.6 | | 0.118 | 28.45 | 1( |
| 069-081491B | 1D069 | PM | 3 | M5 | 27432 | 143 | 23.8 | | 0.0207 | 4.83 | 1( |
| 069-081591A | 2D069 | PM | 2 | M5 | 28380 | 244 | 21.4 | | 0.1435 | 34.65 | 1( |
| 069-081591B | 2D069 | PM | 3 | M5 | 29278 | 144 | 23.7 | | 0.021 | 5.23 | 1( |
| 069-081992A | 1D069 | PM | 3 | M5 | 34590 | 146 | 24.9 | | 0.156 | 38.14 | 1( |
| 069-081992B | 1D069 | PM | 3 | M5 | 34590 | 146 | 24.9 | | 0.0163 | 4.93 | 1( |
| 069-082092A | 2D069 | PM | 3 | M5 | 33690 | 142 | 22 | | 0.135 | 34.17 | 1( |
| 069-082092B | 2D069 | PM | 3 | M5 | 33690 | 142 | 22 | | 0.0094 | 2.72 | 1( |
| 069-121390A | 2D069 | PM | 3 | M5 | 31330 | 143 | 24.5 | | 0.019 | 5.14 | 1 |
| 069-121390B | 1D069 | PM | 3 | M5 | 28804 | 150 | 27.1 | | 0.0677 | 16.64 | 1 |
| 069-121390C | 2D069 | PM | 3 | M5 | 26441 | 216 | 24.5 | | 0.154 | 34.83 | 1 |
| 070-031992A | 2D070 | PM | 3 | G5T | 28934 | 197 | 25.4 | | 0.109 | 26.93 | 1( |
| 070-031992B | 2D070 | PM | 3 | G5T | 27003 | 149 | 25.4 | | 0.0215 | 4.96 | 1( |
| 070-042392B | 1D070 | PM | 4 | G5T | 32892 | 145 | 22.2 | | 0.0124 | 3.39 | 1( |
| 070-042492B | 3D070 | PM | 3 | G5T | 32780 | 150 | 23.4 | | 0.0227 | 6.37 | 1 |
| 070-062891A | 1D070 | PM | 3 | G5T | 26757 | 203 | 29.5 | | 0.111 | 25.5 | 1( |
| 070-062891B | 1D070 | PM | 3 | G5T | 28653 | 151 | 27.8 | | 0.0117 | 2.89 | 1( |

TABLE 4-2. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Temp., EF | Moisture, % | Pollutant concentration: ppm | gr/dscf | Emission rate, lb/hr | Pr ra |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 070-062891C | 3D070 | PM | 3 | G5T | 25074 | 194 | 25 | | 0.128 | 27.4 | 8. |
| 070-062891D | 3D070 | PM | 3 | G5T | 25614 | 148 | 23.9 | | 0.01 | 2.23 | 8. |
| 070-101091A | 2D070 | PM | 3 | G5T | 24858 | 179 | 27.4 | | 0.204 | NS | 1 |
| 070-101091B | 2D070 | PM | 3 | G5T | 24735 | 150 | 28.1 | | 0.039 | NS | 1 |
| 070-101091C | 3D070 | PM | 3 | G5T | 25133 | 191 | 24.3 | | 0.076 | NS | 1 |
| 070-101091D | 3D070 | PM | 3 | G5T | 24721 | 150 | 24.9 | | 0.0177 | NS | 1 |
| 070-101091E | 2D070 | PM | 1 | G5T | 26052 | NS | NS | | NS | NS | 5. |
| 070-101091F | 2D070 | PM | 1 | G5T | 29590 | 143 | 26.7 | | 0.018 | NS | 5. |
| 070-101091G | 3D070 | PM | 1 | G5T | 24357 | 193 | 24.9 | | 0.036 | NS | 5. |
| 070-101091H | 3D070 | PM | 1 | G5T | 26607 | 142 | 18.6 | | 0.009 | NS | 5. |
| 070-102192A | 3D070 | PM | 3 | M5 | 31141 | 197 | 22.3 | | 0.131 | 34.87 | 9. |
| 070-102192B | 3D070 | PM | 3 | M5 | 37453 | 143 | 19.3 | | 0.0167 | 5.36 | 9. |
| 083-060988A | YD083 | PM | 3 | M5 | 60906 | 248 | 16.9 | | 0.0191 | 9.96 | 1 |
| 083-061088A | XD083 | PM | 3 | M5 | 59869 | 205 | 17.2 | | 0.0215 | 11 | 1 |
| 088-120892A | 1D088 | PM | 3 | M5 | 35171 | 182 | 19.2 | | 0.0288 | 8.68 | 1 |
| 088-121488A | 1D088 | PM | 3 | M5 | 34881 | 204 | 10.9 | | 0.0241 | 7.21 | 9. |
| 096-012793A | 2D096 | PM | 3 | M5 | 32020 | 136 | 21 | | 0.0098 | 2.69 | 1 |
| 096-012793C | 2D096 | PM | 3 | M5 | 27026 | 198 | 23.4 | | 0.137 | 31.69 | 1 |
| 096-060590A | 1D096 | PM | 3 | M5 | 32885 | 246 | 12.7 | | 0.0253 | 6.93 | 7. |
| 096-060590C | 1D096 | PM | 3 | M5 | 31064 | 241 | 19.1 | | 0.0248 | 8.72 | 1 |
| 096-060790C | 1D096 | PM | 3 | M5 | 37974 | 189 | 9.3 | | 0.0165 | 5.36 | 1 |
| 096-060890C | 1D096 | PM | 3 | M5 | 35975 | 226 | 9.9 | | 0.0131 | 4.03 | 8. |
| 097-061490A | XD097 | PM | 3 | M5 | 51174 | 225 | 20.9 | | 0.0261 | 11.44 | 1 |
| 097-061588A | 2D097 | PM | 3 | M5 | 25908 | 198 | 17.5 | | 0.309 | 68.63 | 8. |
| 097-061688A | 1D097 | PM | 3 | M5 | 25352 | 213 | 20.9 | | 0.119 | 25.87 | 8. |
| 097-080290B | XD097 | PM | 3 | M5 | 54599 | 226 | 21.1 | | 0.0351 | 16.41 | 1 |
| 097-091189A | 2D097 | PM | 3 | M5 | 28839 | 212 | 18.7 | | 0.338 | 83.29 | 9. |
| 097-091289A | 1D097 | PM | 3 | M5 | 24456 | 217 | 24.7 | | 0.117 | 24.53 | 8. |
| 097-100590A | XD097 | PM | 3 | M5 | 48343 | 230 | 24.5 | | 0.0635 | 12.52 | 1 |
| 097-122089A | XD097 | PM | 3 | M5 | 56074 | 206 | 25.5 | | 0.0502 | 24.28 | 2 |
| 210-021192A | 1D210 | PM | 3 | M5 | 31527 | 207 | 25.9 | | 0.152 | 40.91 | 1 |

TABLE 4-2. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Temp., EF | Moisture, % | Pollutant concentration: ppm | gr/dscf | Emission rate, lb/hr | Pr ra |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 210-042292A | 1D210 | PM | 3 | M5 | 28988 | 231 | 27.1 | | 0.0719 | 17.84 | 1 |
| 211-041191A | 1D211 | PM | 3 | M5 | 32400 | 243 | 21.1 | | 0.0213 | 5.8 | 9. |
| 212-101191A | 1D212 | PM | 3 | M5 | 28751 | 205 | 20.1 | | 0.0232 | 5.66 | 1 |
| 215-042089A | XD215 | PM | 3 | M5 | 118589 | NS | NS | | 0.163 | 160.5 | 3 |
| 215-042089B | XD215 | PM | 3 | M5 | 116530 | NS | NS | | 0.0121 | 12.37 | 3 |
| 215-062591A | XD215 | PM | 3 | M5 | 115057 | 195 | 22.2 | | 0.138 | 3.54 | 3 |
| 215-062591B | XD215 | PM | 3 | M5 | 115330 | 144 | 22.1 | | 0.0127 | 0.32 | 3 |
| 215-062591C | YD215 | PM | 1 | OD7 | 26999 | 196 | NS | | 0.097 | 2.22 | 1 |
| 215-062591D | YD215 | PM | 1 | OD7 | 27000 | 183 | NS | | 0.063 | 2.51 | 4. |
| 225-020792A | 1D225 | PM | 3 | M5 | 36527 | 211 | 21.8 | | 0.0346 | 10.83 | 1 |
| FILTERABLE PM-10 | | | | | | | | | | | |
| 210-021192B | 1D210 | PM10 | 3 | M201A | 32935 | 205 | 24.8 | | 0.0957 | 25.12 | 1 |
| 210-042292B | 1D210 | PM10 | 3 | M201A | 30794 | 231 | 25.6 | | 0.0289 | 7.64 | 1 |
| 225-020792B | 1D225 | PM10 | 3 | M201A | 36511 | 211 | 23.4 | | 0.0277 | 8.66 | 1 |
| CONDENSIBLE PM | | | | | | | | | | | |
| 041-063092A | XD041 | CPM | 3 | OD7 | 116999 | 194 | 9.5 | | 0.0148 | 15.05 | 1 |
| 041-063092B | XD041 | CPM | 3 | OD7 | 116337 | 158 | 9.3 | | 0.007 | 6.85 | 1 |
| 041-121792A | XD041 | CPM | 3 | M5A | 89359 | 144 | 18 | | 0.0073 | 5.82 | 1 |
| 041-121792B | XD041 | CPM | 3 | M5A | 101519 | 139 | 13.4 | | 0.008 | 6.85 | 1 |
| 044-102588A | XD044 | CPM | 3 | M5 | 60986 | 196 | 10.1 | | 0.159 | 89.44 | 2 |
| 044-102588B | XD044 | CPM | 3 | M5 | 54332 | 147 | 23.5 | | 0.0063 | 2.37 | 2 |
| 044-102588C | XD044 | CPM | 1 | M5 | 69788 | NS | NS | | 0.064 | 39.89 | N |
| 044-102588D | XD044 | CPM | 1 | M5 | 58344 | NS | NS | | 0.004 | 2.11 | N |
| 069-081491A | 1D069 | CPM | 3 | M202 | 28259 | 256 | 21.6 | | 0.1 | 24.1 | 1 |
| 069-081491B | 1D069 | CPM | 3 | M202 | 27432 | 143 | 23.8 | | 0.0197 | 4.63 | 1 |
| 069-081591A | 2D069 | CPM | 3 | M202 | 28380 | 244 | 21.4 | | 0.0455 | 11.05 | 1 |
| 069-081591B | 2D069 | CPM | 3 | M202 | 29278 | 144 | 23.7 | | 0.025 | 6.3 | 1 |
| 069-081992A | 1D069 | CPM | 3 | M202 | 34590 | 146 | 24.9 | | 0.0723 | 17.79 | 1 |
| 069-081992B | 1D069 | CPM | 3 | M202 | 34590 | 146 | 24.9 | | 0.0174 | 5.14 | 1 |
| 069-082092A | 2D069 | CPM | 3 | M202 | 33690 | 142 | 22 | | 0.052 | 13.3 | 1 |
| 069-082092B | 2D069 | CPM | 3 | M202 | 33690 | 142 | 22 | | 0.0232 | 6.72 | 1 |

## TABLE 4-2. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Stack gas parameters: Temp., EF | Stack gas parameters: Moisture, % | Pollutant concentration: ppm | Pollutant concentration: gr/dscf | Emission rate, lb/hr | Pr ra |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 069-121390A | 2D069 | CPM | 3 | M202 | 31330 | 143 | 24.5 | | 0.009 | 2.47 | 1 |
| 069-121390B | 1D069 | CPM | 3 | M202 | 28804 | 150 | 27.1 | | 0.02 | 4.84 | 1 |
| 069-121390C | 2D069 | CPM | 3 | M202 | 26441 | 216 | 24.5 | | 0.0287 | 6.54 | 1 |
| 070-031992A | 2D070 | CPM | 3 | G5T | 28934 | 197 | 25.4 | | 0.118 | 29.23 | 1 |
| 070-031992B | 2D070 | CPM | 3 | G5T | 27003 | 149 | 25.4 | | 0.0341 | 7.9 | 1 |
| 070-042392B | 1D070 | CPM | 3 | G5T | 32892 | 145 | 22.2 | | 0.0112 | 3.06 | 1 |
| 070-042492B | 3D070 | CPM | 3 | G5T | 32780 | 150 | 23.4 | | 0.0263 | 7.36 | 1 |
| 070-062891A | 1D070 | CPM | 2 | G5T | 26757 | 203 | 29.5 | | 0.1436 | 32.96 | 1 |
| 070-062891B | 1D070 | CPM | 3 | G5T | 28653 | 151 | 27.8 | | 0.0318 | 7.74 | 1 |
| 070-062891C | 3D070 | CPM | 3 | G5T | 25074 | 194 | 25 | | 0.0603 | 12.86 | 8. |
| 070-062891D | 3D070 | CPM | 3 | G5T | 25614 | 148 | 23.9 | | 0.0286 | 6.34 | 8. |
| 070-101091A | 2D070 | CPM | 3 | G5T | 24858 | 179 | 27.4 | | 0.106 | NS | 1 |
| 070-101091B | 2D070 | CPM | 3 | G5T | 24735 | 150 | 28.1 | | 0.044 | NS | 1 |
| 070-101091C | 3D070 | CPM | 3 | G5T | 25133 | 191 | 24.3 | | 0.143 | NS | 1 |
| 070-101091D | 3D070 | CPM | 3 | G5T | 24721 | 150 | 24.9 | | 0.04 | NS | 1 |
| 070-101091E | 2D070 | CPM | 1 | G5T | 26052 | NS | NS | | NS | NS | 5. |
| 070-101091F | 2D070 | CPM | 1 | G5T | 29590 | 143 | 26.7 | | 0.036 | NS | 5. |
| 070-101091G | 3D070 | CPM | 1 | G5T | 24357 | 193 | 24.9 | | 0.046 | NS | 5. |
| 070-101091H | 3D070 | CPM | 1 | G5T | 26607 | 142 | 18.6 | | 0.034 | NS | 5. |
| 070-102192A | 3D070 | CPM | 3 | M5/202 | 31141 | 197 | 22.3 | | 0.0534 | 14.25 | 9. |
| 070-102192B | 3D070 | CPM | 3 | M5/202 | 37453 | 143 | 19.3 | | 0.0155 | 4.96 | 9. |
| 083-060988A | YD083 | CPM | 3 | M5 | 60906 | 248 | 16.9 | | 0.0139 | 7.29 | 1 |
| 083-061088A | XD083 | CPM | 3 | M5 | 59869 | 205 | 17.2 | | 0.0093 | 4.79 | 1 |
| 088-120892A | 1D088 | CPM | 3 | M202 | 35171 | 182 | 19.2 | | 0.0183 | 5.52 | 1 |
| 096-012793A | 2D096 | CPM | 3 | M202 | 32020 | 136 | 21 | | NS | 3.61 | 1 |
| 096-012793C | 2D096 | CPM | 3 | M202 | 27026 | 198 | 23.4 | | NS | 4.83 | 1 |
| 096-060590A | 1D096 | CPM | 3 | M202 | 32885 | 246 | 12.7 | | 0.0081 | 2.29 | 7. |
| 096-060590C | 1D096 | CPM | 3 | M202 | 31064 | 241 | 19.1 | | 0.0054 | 1.43 | 1 |
| 096-060790C | 1D096 | CPM | 3 | M202 | 37974 | 189 | 9.3 | | 0.0141 | 4.61 | 1 |
| 096-060890C | 1D096 | CPM | 3 | M202 | 35975 | 226 | 9.9 | | 0.016 | 4.95 | 8. |
| 210-021192A | 1D210 | CPM | 3 | M202 | 31527 | 207 | 25.9 | | NS | 4.86 | 1 |

TABLE 4-2. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Temp., EF | Moisture, % | Pollutant concentration: ppm | gr/dscf | Emission rate, lb/hr | Pr ra |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 210-021192B | 1D210 | CPM | 3 | M202 | 32935 | 205 | 24.8 | | NS | 6.2 | 13 |
| 210-042292A | 1D210 | CPM | 3 | M202 | 28988 | 231 | 27.1 | | NS | 6.96 | 13 |
| 210-042292B | 1D210 | CPM | 3 | M202 | 30794 | 231 | 25.6 | | NS | 3.99 | 13 |
| 212-101191A | 1D212 | CPM | 3 | M5 | 28751 | 205 | 20.1 | | NS | 5.65 | 12 |
| 215-062591A | XD215 | CPM | 3 | M202 | 115057 | 195 | 22.2 | | 0.0417 | NS | 38 |
| 215-062591B | XD215 | CPM | 3 | M202 | 115330 | 144 | 22.1 | | 0.0137 | NS | 38 |
| 215-062591C | YD215 | CPM | 1 | OD7 | 26999 | 196 | NS | | 0.066 | NS | 10 |
| 215-062591D | YD215 | CPM | 1 | OD7 | 27000 | 183 | NS | | 0.018 | NS | 4. |
| 225-020792A | 1D225 | CPM | 3 | M5 | 36527 | 211 | 21.8 | | 0.0108 | 3.37 | 10 |
| 225-020792B | 1D225 | CPM | 3 | M5 | 36511 | 211 | 23.4 | | 0.0119 | 3.74 | 10 |
| TOTAL PM (FILTERABLE + CONDENSIBLE PM) | | | | | | | | | | | |
| 041-063092A | XD041 | PM&CPM | 3 | OD7 | 116999 | 194 | 9.5 | | 0.125 | 125.5 | 16 |
| 041-063092B | XD041 | PM&CPM | 3 | OD7 | 116337 | 158 | 9.3 | | 0.0385 | 38.45 | 16 |
| 041-121792A | XD041 | PM&CPM | 3 | M5 | 89359 | 144 | 18 | | 0.0222 | 17.65 | 16 |
| 041-121792B | XD041 | PM&CPM | 3 | M5 | 101519 | 139 | 13.4 | | 0.0972 | 83.86 | 16 |
| 044-102588A | XD044 | PM&CPM | 3 | M5 | 60986 | 196 | 10.1 | | 0.271 | 152.98 | 20 |
| 044-102588B | XD044 | PM&CPM | 3 | M5 | 54332 | 147 | 23.5 | | 0.0143 | 6.93 | 20 |
| 044-102588C | XD044 | PM&CPM | 1 | M5 | 69788 | NS | NS | | 0.19 | 118.17 | N |
| 044-102588D | XD044 | PM&CPM | 1 | M5 | 58344 | NS | NS | | 0.015 | 7.97 | N |
| 069-081491A | 1D069 | PM&CPM | 3 | M5/202 | 28259 | 256 | 21.6 | | 0.2175 | 52.62 | 16 |
| 069-081491B | 1D069 | PM&CPM | 3 | M5/202 | 27432 | 143 | 23.8 | | 0.0403 | 9.44 | 16 |
| 069-081591A | 2D069 | PM&CPM | 3 | M5/202 | 28380 | 244 | 21.4 | | 0.188 | 45.7 | 16 |
| 069-081591B | 2D069 | PM&CPM | 3 | M5/202 | 29278 | 144 | 23.7 | | 0.0453 | 11.51 | 16 |
| 069-081992A | 1D069 | PM&CPM | 3 | M5/202 | 34590 | 146 | 24.9 | | 0.228 | 55.93 | 16 |
| 069-081992B | 1D069 | PM&CPM | 3 | M5/202 | 34590 | 146 | 24.9 | | 0.0337 | 10.07 | 16 |
| 069-082092A | 2D069 | PM&CPM | 3 | M5/202 | 33690 | 142 | 22 | | 0.187 | 47.47 | 16 |
| 069-082092B | 2D069 | PM&CPM | 3 | M5/202 | 33690 | 142 | 22 | | 0.0326 | 9.44 | 16 |
| 069-121390A | 2D069 | PM&CPM | 3 | M5/202 | 31330 | 143 | 24.5 | | 0.028 | 7.6 | 17 |
| 069-121390B | 1D069 | PM&CPM | 3 | M5/202 | 28804 | 150 | 27.1 | | 0.0877 | 21.48 | 17 |
| 069-121390C | 2D069 | PM&CPM | 3 | M5/202 | 26441 | 216 | 24.5 | | 0.182 | 41.37 | 17 |
| 070-031992A | 2D070 | PM&CPM | 3 | G5T | 28934 | 197 | 25.4 | | NS | 56.15 | 10 |

TABLE 4-2. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Temp., EF | Moisture, % | Pollutant concentration: ppm | gr/dscf | Emission rate, lb/hr | Pr ra |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 070-031992B | 2D070 | PM&CPM | 3 | G5T | 27003 | 149 | 25.4 | | 0.0556 | 12.86 | 1( |
| 070-042392B | 1D070 | PM&CPM | 4 | G5T | 32892 | 145 | 22.2 | | 0.0236 | 6.45 | 1( |
| 070-042492B | 3D070 | PM&CPM | 3 | G5T | 32780 | 150 | 23.4 | | 0.049 | 13.73 | 1: |
| 070-062891A | 1D070 | PM&CPM | 3 | G5T | 26757 | 203 | 29.5 | | NS | 58.46 | 1( |
| 070-062891B | 1D070 | PM&CPM | 3 | G5T | 28653 | 151 | 27.8 | | NS | 10.64 | 1( |
| 070-062891C | 3D070 | PM&CPM | 3 | G5T | 25074 | 194 | 25 | | 0.189 | 40.29 | 8. |
| 070-062891D | 3D070 | PM&CPM | 3 | G5T | 25614 | 148 | 23.9 | | 0.0386 | 8.55 | 8. |
| 070-101091A | 2D070 | PM&CPM | 3 | G5T | 24858 | 179 | 27.4 | | 0.309 | NS | 1( |
| 070-101091B | 2D070 | PM&CPM | 3 | G5T | 24735 | 150 | 28.1 | | 0.0833 | NS | 1( |
| 070-101091C | 3D070 | PM&CPM | 3 | G5T | 25133 | 191 | 24.3 | | 0.219 | NS | 1( |
| 070-101091D | 3D070 | PM&CPM | 3 | G5T | 24721 | 150 | 24.9 | | 0.0583 | NS | 1( |
| 070-101091E | 2D070 | PM&CPM | 1 | G5T | 26052 | NS | NS | | NS | NS | 5. |
| 070-101091F | 2D070 | PM&CPM | 1 | G5T | 29590 | 143 | 26.7 | | 0.054 | NS | 5. |
| 070-101091G | 3D070 | PM&CPM | 1 | G5T | 24357 | 193 | 24.9 | | 0.081 | NS | 5. |
| 070-101091H | 3D070 | PM&CPM | 1 | G5T | 26607 | 142 | 18.6 | | 0.043 | NS | 5. |
| 070-102192A | 3D070 | PM&CPM | 3 | M5/202 | 31141 | 197 | 22.3 | | 0.184 | 49.12 | 9. |
| 070-102192B | 3D070 | PM&CPM | 3 | M5/202 | 37453 | 143 | 19.3 | | 0.0322 | 10.32 | 9. |
| 083-060988A | YD083 | PM&CPM | 3 | M5 | 60906 | 248 | 16.9 | | 0.033 | 17.25 | 1! |
| 083-061088A | XD083 | PM&CPM | 3 | M5 | 59869 | 205 | 17.2 | | 0.0308 | 15.82 | 1! |
| 088-120892A | 1D088 | PM&CPM | 3 | M5/202 | 35171 | 182 | 19.2 | | 0.047 | 14.2 | 1: |
| 096-012793A | 2D096 | PM&CPM | 3 | M5/202 | 32020 | 136 | 21 | | 0.023 | 6.3 | 1: |
| 096-012793C | 2D096 | PM&CPM | 3 | M5/202 | 27026 | 198 | 23.4 | | 0.158 | 36.52 | 1: |
| 096-060590A | 1D096 | PM&CPM | 3 | M5/202 | 32885 | 246 | 12.7 | | NS | 9.23 | 7. |
| 096-060590C | 1D096 | PM&CPM | 3 | M5/202 | 31064 | 241 | 19.1 | | NS | 10.15 | 1: |
| 096-060790C | 1D096 | PM&CPM | 3 | M5/202 | 37974 | 189 | 9.3 | | NS | 9.98 | 1: |
| 096-060890C | 1D096 | PM&CPM | 3 | M5/202 | 35975 | 226 | 9.9 | | NS | 8.98 | 8. |
| 127-062591A | 1D127 | PM&CPM | 3 | M5 | NS | NS | NS | | 0.0697 | 9.69 | N |
| 127-082190A | 1D127 | PM&CPM | 3 | M5 | 18602 | 199 | 19.9 | | 0.0847 | 13.27 | 6. |
| 210-021192A | 1D210 | PM&CPM | 3 | M5/202 | 31527 | 207 | 25.9 | | 0.17 | 45.77 | 1: |
| 210-042292A | 1D210 | PM&CPM | 3 | M5/202 | 28988 | 231 | 27.1 | | 0.0996 | 24.8 | 1: |
| 211-012892A | 3D211 | PM&CPM | 3 | M5 | 33233 | 209 | 20.4 | | 0.037 | 10.63 | 1: |

TABLE 4-2. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Temp., EF | Moisture, % | Pollutant concentration: ppm | gr/dscf | Emission rate, lb/hr | Pr ra |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 211-012992B | 1D211 | PM&CPM | 3 | M5 | 33400 | 249 | 18.8 | | 0.0237 | 6.8 | 11 |
| 211-013092A | 2D211 | PM&CPM | 3 | M5 | 35100 | 239 | 20.1 | | 0.0273 | 8.33 | 11 |
| 212-101191A | 1D212 | PM&CPM | 3 | M5 | 28751 | 205 | 20.1 | | 0.0463 | 11.31 | 12 |
| 215-062591A | XD215 | PM&CPM | 3 | M5/202 | 115057 | 195 | 22.2 | | 0.18 | NS | 38 |
| 215-062591B | XD215 | PM&CPM | 3 | M5/202 | 115330 | 144 | 22.1 | | 0.0263 | NS | 38 |
| 215-062591C | YD215 | PM&CPM | 2 | OD7 | 26999 | 196 | NS | | 0.163 | NS | 10 |
| 215-062591D | YD215 | PM&CPM | 2 | OD7 | 27000 | 183 | NS | | 0.08 | NS | 4. |
| 225-020792A | 1D225 | PM&CPM | 3 | M5 | 36527 | 211 | 21.8 | | 0.0454 | 14.2 | 10 |
| TOTAL PM-10 (FILTERABLE + CONDENSIBLE PM) | | | | | | | | | | | |
| 210-021192B | 1D210 | PM10&CPM | 3 | M201A/202 | 32935 | 205 | 24.8 | | 0.111 | 31.32 | 13 |
| 210-042292B | 1D210 | PM10&CPM | 3 | M201A/202 | 30794 | 231 | 25.6 | | 0.044 | 11.63 | 13 |
| 211-012892B | 3D211 | PM10&CPM | 3 | M201A | 34733 | 216 | 20.4 | | 0.0537 | 16.14 | 11 |
| 211-012992A | 1D211 | PM10&CPM | 3 | M201A | 34567 | 244 | 20 | | 0.0383 | 11.37 | 11 |
| 211-013092B | 2D211 | PM10&CPM | 3 | M201A | 34667 | 250 | 21.4 | | 0.0273 | 8.33 | 11 |
| 225-020792B | 1D225 | PM10&CPM | 3 | M201A | 36511 | 211 | 23.4 | | 0.0397 | 12.39 | 10 |
| CARBON MONOXIDE | | | | | | | | | | | |
| 041-052192B | XD041 | CO | 3 | M10 | 106652 | 169 | 14.3 | 206 | NA | 86.44 | 17 |
| 044-092193A | XD044 | CO | 3 | M10 | 57182 | 213 | 23.7 | NS | NA | 245.47 | 44 |
| 044-092193B | XD044 | CO | 3 | M10 | 65504 | 150 | 22 | NS | NA | 66.76 | 44 |
| 052-011493B | XD052 | CO | 3 | M10 | 152862 | 142 | 21.1 | 766.7 | NA | 514.53 | 38 |
| 069-071592A | 1D069 | CO | 3 | M10 | 33680 | 145 | 22.5 | 396.7 | NA | 58.3 | 16 |
| 069-071692A | 2D069 | CO | 1 | M10 | 34830 | 146 | 20.1 | 118.8 | NA | 18.26 | 16 |
| 069-071692A | 2D069 | CO | 2 | M10 | 34830 | 146 | 20.1 | 158.9 | NA | 24.33 | 16 |
| 070-031992B | 2D070 | CO | 3 | M10B | 27003 | 149 | 25.4 | 429.7 | NA | 50.56 | 10 |
| 070-042392B | 1D070 | CO | 3 | M10B | 32892 | 145 | 22.2 | 137 | NA | 18.83 | 10 |
| 070-042492B | 3D070 | CO | 3 | M10B | 32780 | 150 | 23.4 | 275.7 | NA | 39.43 | 11 |
| 070-062891A | 1D070 | CO | 3 | M3 | 26757 | 203 | 29.5 | 388 | NA | 45.2 | 10 |
| 070-062891B | 1D070 | CO | 3 | M3 | 28653 | 151 | 27.8 | 341.7 | NA | 42.43 | 10 |
| 070-102192B | 3D070 | CO | 3 | NS | 37453 | 143 | 19.3 | 154.7 | NA | 25.28 | 9. |
| 088-120892A | 1D088 | CO | 3 | M10 | 35171 | 182 | 19.2 | 225.3 | NA | 31 | 11 |
| 096-012793A | 2D096 | CO | 3 | M10 | 32020 | 136 | 21 | 673.3 | NA | 93.97 | 12 |

TABLE 4-2. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Temp., EF | Moisture, % | Pollutant concentration: ppm | gr/dscf | Emission rate, lb/hr | Pr ra |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 096-060590A | 1D096 | CO | 3 | M10 | 32885 | 246 | 12.7 | 32.3 | NA | 4.64 | 7. |
| 096-060590C | 1D096 | CO | 3 | M10 | 31064 | 241 | 19.1 | 140.3 | NA | 18.97 | 1 |
| 096-060790C | 1D096 | CO | 3 | M10 | 37974 | 189 | 9.3 | 32.9 | NA | 5.44 | 1 |
| 096-060890C | 1D096 | CO | 3 | M10 | 35975 | 226 | 9.9 | 32.7 | NA | 5.11 | 8. |
| 097-100590A | XD097 | CO | 3 | M10 | 48343 | 230 | 24.5 | 320 | NA | 66.07 | 1 |
| 097-122089A | XD097 | CO | 3 | M10 | 56074 | 206 | 25.5 | 596 | NA | 146 | 2 |
| 127-082190A | 1D127 | CO | 3 | M10 | 18602 | 199 | 19.9 | 104.5 | NA | 8.33 | 6. |
| 127-091289A | 2D127 | CO | 3 | M10 | 18723 | 198 | 18.9 | 560.7 | NA | 45.67 | 5. |
| 127-102290A | 1D127 | CO | 3 | M10 | 17733 | 192 | 18.9 | 169.3 | NA | 13.23 | 4. |
| 210-013090A | 1D210 | CO | 3 | M10 | 29900 | 212 | 27.8 | 175.7 | NA | 22.9 | 1 |
| 210-021192A | 1D210 | CO | 3 | M10 | 31527 | 207 | 25.9 | 905 | NA | 123.97 | 1 |
| 210-022489A | 1D210 | CO | 3 | M10 | NS | NS | NS | NS | NA | 80.33 | N |
| 210-042292A | 1D210 | CO | 3 | M10 | 28988 | 231 | 27.1 | 621 | NA | 78.4 | 1 |
| 210-042292E | 1D210 | CO | 3 | M10 | 28988 | NS | 27.1 | NS | NA | 25.33 | 1 |
| 211-012892A | 3D211 | CO | 3 | M10 | 33233 | 209 | 20.4 | NS | NA | 44.13 | 1 |
| 211-012992B | 1D211 | CO | 3 | M10 | 33400 | 249 | 18.8 | NS | NA | 59.2 | 1 |
| 211-013092A | 2D211 | CO | 3 | M10 | 35100 | 239 | 20.1 | NS | NA | 101.73 | 1 |
| 215-062591B | XD215 | CO | 3 | M10 | 115330 | 144 | 22.1 | 144.9 | NA | 70.97 | 3 |
| 225-020792A | 1D225 | CO | 3 | M10 | 36527 | 211 | 21.8 | 256.7 | NA | 40.8 | 1 |
| 225-041990A | 1D225 | CO | 3 | M10 | 34688 | 185 | 24.7 | 170.1 | NA | 25.7 | 1 |
| NITROGEN OXIDES | | | | | | | | | | | |
| 044-092193A | XD044 | NOX | 3 | M7E | 57182 | 213 | 23.7 | NS | NA | 5.29 | 4 |
| 044-092193B | XD044 | NOX | 3 | M7E | 65504 | 150 | 22 | NS | NA | 0.6 | 4 |
| 052-011493B | XD052 | NOX | 3 | M7 | 152862 | 142 | 21.1 | 19.7 | NA | 21.57 | 3 |
| 069-071592A | 1D069 | NOX | 3 | M7 | 33680 | 145 | 22.5 | 10.4 | NA | 2.5 | 1 |
| 069-071692A | 2D069 | NOX | 2 | M7 | 34830 | 146 | 20.1 | 10.5 | NA | 2.64 | 1 |
| 070-031992B | 2D070 | NOX | 2 | M7E | 27003 | 149 | 25.4 | 8.5 | NA | 1.68 | 1 |
| 070-042492B | 3D070 | NOX | 3 | M7E | 32780 | 150 | 23.4 | 16.8 | NA | 4.27 | 1 |
| 088-120892A | 1D088 | NOX | 3 | M7 | 35171 | 182 | 19.2 | 24.3 | NA | 6.07 | 1 |
| 097-100590A | XD097 | NOX | 3 | M7 | 48343 | 230 | 24.5 | 22.3 | NA | 7.37 | 1 |
| 127-082190A | 1D127 | NOX | 3 | M7 | 18602 | 199 | 19.9 | 74.1 | NA | 7.7 | 6. |

# TABLE 4-2. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Temp., EF | Moisture, % | Pollutant concentration: ppm | gr/dscf | Emission rate, lb/hr | Pr ra |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 127-091289A | 2D127 | NOX | 3 | M7 | 18723 | 198 | 18.9 | 57.6 | NA | 7.73 | 5. |
| 210-022489A | 1D210 | NOX | 3 | M7 | NS | NS | NS | 38.6 | NA | 8.83 | N |
| 215-062591B | XD215 | NOX | 3 | M7E | 115330 | 144 | 22.1 | 24.3 | NA | 19.47 | 3 |
| VOLATILE ORGANIC COMPOUNDS | | | | | | | | | | | |
| 041-052192A | XD041 | VOC | 3 | M25A | 128129 | 170 | 13.5 | 161.7 | NA | 53.21 | 1 |
| 041-052192B | XD041 | VOC | 3 | M25A | 106652 | 169 | 14.3 | 190.5 | NA | 53.88 | 1 |
| 044-092193A | XD044 | VOC | 3 | M25A | 57182 | 213 | 23.7 | NS | NA | 21.04 | 4 |
| 044-092193B | XD044 | VOC | 3 | M25A | 65504 | 150 | 22 | NS | NA | 8.54 | 4 |
| 044-102588A | XD044 | VOC | 3 | M25 | 60986 | 196 | 10.1 | NS | NA | 95.91 | 2 |
| 044-102588B | XD044 | VOC | 3 | M25 | 54332 | 147 | 23.5 | NS | NA | 25.34 | 2 |
| 052-011493A | XD052 | VOC | 3 | M25 | 141186 | 238 | 19.2 | 792 | NA | 209.27 | 3 |
| 052-011493A | XD052 | VOC | 3 | M25A | 141186 | 238 | 19.2 | 537.7 | NA | 141.9 | 3 |
| 052-011493B | XD052 | VOC | 3 | M25A | 152862 | 142 | 21.1 | 480.7 | NA | 137.43 | 3 |
| 052-011493B | XD052 | VOC | 3 | M25 | 152862 | 142 | 21.1 | 427.3 | NA | 121.87 | 3 |
| 069-071592B | 1D069 | VOC | 3 | M25A | 43400 | NS | NS | 169 | NA | 13.73 | 1 |
| 069-071692B | 2D069 | VOC | 2 | M25A | 44055 | NS | NS | 94.3 | NA | 7.77 | 1 |
| 069-081491A | 1D069 | VOC | 2 | M25A | 28259 | 256 | 21.6 | 192.2 | NA | 10.15 | 1 |
| 069-081491B | 1D069 | VOC | 3 | M25A | 27432 | 143 | 23.8 | 201.2 | NA | 10.31 | 1 |
| 069-081591A | 2D069 | VOC | 3 | M25A | 28380 | 244 | 21.4 | 121.3 | NA | 6.44 | 1 |
| 069-081591B | 2D069 | VOC | 3 | M25A | 29278 | 144 | 23.7 | 122.4 | NA | 6.71 | 1 |
| 070-031992A | 2D070 | VOC | 3 | M25 | 28934 | 197 | 25.4 | 1769.7 | NA | 95.67 | 1 |
| 070-031992B | 2D070 | VOC | 3 | M25 | 27003 | 149 | 25.4 | 1143.7 | NA | 58.04 | 1 |
| 070-042392A | 1D070 | VOC | 3 | M25 | NS | NS | NS | 807.3 | NA | 48.6 | 1 |
| 070-042392B | 1D070 | VOC | 3 | M25 | 32892 | 145 | 22.2 | 874.3 | NA | 52.6 | 1 |
| 070-042492A | 3D070 | VOC | 3 | M25 | NS | NS | NS | 1597.7 | NA | 94.17 | 1 |
| 070-042492B | 3D070 | VOC | 3 | M25 | 32780 | 150 | 23.4 | 847.7 | NA | 52.43 | 1 |
| 070-062891A | 1D070 | VOC | 2 | M25 | 26757 | 203 | 29.5 | 3811.7 | NA | 191.93 | 1 |
| 070-062891B | 1D070 | VOC | 3 | M25 | 28653 | 151 | 27.8 | 1985.7 | NA | 107.1 | 1 |
| 070-062891C | 3D070 | VOC | 3 | M25 | 25074 | 194 | 25 | 1312 | NA | 61.1 | 8. |
| 070-062891D | 3D070 | VOC | 3 | M25 | 25614 | 148 | 23.9 | 1235.3 | NA | 59.4 | 8. |
| 070-101091A | 2D070 | VOC | 3 | M25A | 24858 | 179 | 27.4 | 1571 | NA | NS | 1 |

TABLE 4-2. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Temp., EF | Moisture, % | Pollutant concentration: ppm | gr/dscf | Emission rate, lb/hr | Pr ra |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 070-101091A | 2D070 | VOC | 3 | M25 | 24858 | 179 | 27.4 | 1939.7 | NA | NS | 1( |
| 070-101091B | 2D070 | VOC | 2 | M25A | 24735 | 150 | 28.1 | 1655.5 | NA | NS | 1( |
| 070-101091B | 2D070 | VOC | 3 | M25 | 24735 | 150 | 28.1 | 2244.3 | NA | NS | 1( |
| 070-101091C | 3D070 | VOC | 3 | M25 | 25133 | 191 | 24.3 | 1824.7 | NA | NS | 1( |
| 070-101091C | 3D070 | VOC | 3 | M25A | 25133 | 191 | 24.3 | 1368.3 | NA | NS | 1( |
| 070-101091D | 3D070 | VOC | 3 | M25A | 24721 | 150 | 24.9 | 1488.7 | NA | NS | 1( |
| 070-101091D | 3D070 | VOC | 3 | M25 | 24721 | 150 | 24.9 | 1695.7 | NA | NS | 1( |
| 070-101091E | 2D070 | VOC | 1 | M25A | 26052 | NS | NS | 704 | NA | NS | 5. |
| 070-101091E | 2D070 | VOC | 1 | M25 | 26052 | NS | NS | 846 | NA | NS | 5. |
| 070-101091F | 2D070 | VOC | 1 | M25 | 29590 | 143 | 26.7 | 553 | NA | NS | 5. |
| 070-101091F | 2D070 | VOC | 1 | M25A | 29590 | 143 | 26.7 | 723 | NA | NS | 5. |
| 070-101091G | 3D070 | VOC | 1 | M25A | 24357 | 193 | 24.9 | 905 | NA | NS | 5. |
| 070-101091G | 3D070 | VOC | 1 | M25 | 24357 | 193 | 24.9 | 734 | NA | NS | 5. |
| 070-101091H | 3D070 | VOC | 1 | M25 | 26607 | 142 | 18.6 | 676 | NA | NS | 5. |
| 070-101091H | 3D070 | VOC | 1 | M25A | 26607 | 142 | 18.6 | 807 | NA | NS | 5. |
| 070-102192A | 3D070 | VOC | 3 | M25A | 31141 | 197 | 22.3 | 779 | NA | 58.2 | 9. |
| 070-102192B | 3D070 | VOC | 3 | M25A | 37453 | 143 | 19.3 | 679.7 | NA | 59.16 | 9. |
| 083-082990A | XD083 | VOC | 3 | M25A | 60143 | 198 | 12.5 | 213.3 | NA | 24.43 | 1: |
| 088-030989A | 1D088 | VOC | 3 | M25A | 35202 | 181 | 10.8 | 79 | NA | 5.17 | 9. |
| 088-120892A | 1D088 | VOC | 3 | M25A | 35171 | 182 | 19.2 | NS | NA | 38.89 | 1: |
| 088-120892B | 1D088 | VOC | 3 | M25A | 35867 | 179 | 19.4 | NS | NA | 13.3 | 1: |
| 088-121488A | 1D088 | VOC | 3 | M25A | 34881 | 204 | 10.9 | 278 | NA | 18 | 9. |
| 096-012693A | 2D096 | VOC | 3 | M25 | NS | NS | NS | NS | NA | 34.67 | N |
| 096-012693B | 2D096 | VOC | 3 | M25 | 26950 | 198 | 23.3 | NS | NA | 39.33 | 1: |
| 096-060590B | 1D096 | VOC | 1 | M25A | NS | NS | NS | NS | NA | 4.6 | 7. |
| 096-060590D | 1D096 | VOC | 1 | M25A | NS | NS | NS | NS | NA | 11.9 | 1: |
| 096-060790C | 1D096 | VOC | 1 | M25A | 37974 | 189 | 9.3 | NS | NA | 42 | 1: |
| 096-060890C | 1D096 | VOC | 1 | M25A | 35975 | 226 | 9.9 | NS | NA | 44 | 8. |
| 097-061688B | 1D097 | VOC | 3 | M25 | NS | NS | NS | 203.7 | NA | 9.54 | 8. |
| 097-061688C | 2D097 | VOC | 3 | M25 | NS | NS | NS | 150.3 | NA | 7.25 | 8. |
| 097-100590B | XD097 | VOC | 3 | M25 | NS | NS | NS | 211 | NA | 25.2 | 1! |

# TABLE 4-2. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Stack gas parameters: Temp., EF | Stack gas parameters: Moisture, % | Pollutant concentration: ppm | Pollutant concentration: gr/dscf | Emission rate, lb/hr | Pr ra |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 097-122189A | XD097 | VOC | 3 | M25 | 56680 | NS | 25 | 274.7 | NA | 29.1 | 1 |
| 127-082190A | 1D127 | VOC | 3 | M25 | 18602 | 199 | 19.9 | 186.7 | NA | 5.87 | 6. |
| 127-092289A | 2D127 | VOC | 3 | M25 | 18625 | 186 | 17.8 | 264 | NA | 9.07 | 5. |
| 127-102290A | 1D127 | VOC | 3 | M25A | 17733 | 192 | 18.9 | 109.3 | NA | 4.5 | 4. |
| 210-021192C | 1D210 | VOC | 3 | M25 | NS | NS | 25.2 | NS | NA | 49.2 | 1 |
| 210-022489A | 1D210 | VOC | 3 | M25 | NS | NS | NS | 475.3 | NA | 28.67 | N |
| 210-042292C | 1D210 | VOC | 3 | M25 | NS | NS | 23.6 | NS | NA | 17.63 | 1 |
| 211-012892A | 3D211 | VOC | 3 | M25A | 33233 | 209 | 20.4 | NS | NA | 11.33 | 1 |
| 211-012992B | 1D211 | VOC | 3 | M25A | 33400 | 249 | 18.8 | NS | NA | 14.47 | 1 |
| 211-013092A | 2D211 | VOC | 3 | M25A | 35100 | 239 | 20.1 | NS | NA | 15.2 | 1 |
| 211-041191A | 1D211 | VOC | 3 | M25A | 32400 | 243 | 21.1 | NS | NA | 10.3 | 9. |
| 212-101191B | 1D212 | VOC | 3 | M25 | 28751 | 205 | 20.1 | 727.7 | NA | 48.8 | 1 |
| 215-042089A | XD215 | VOC | 3 | M25 | 118589 | NS | NS | NS | NA | 187.23 | 3 |
| 215-042089B | XD215 | VOC | 3 | M25 | 116530 | NS | NS | NS | NA | 91.8 | 3 |
| 215-062591A | XD215 | VOC | 3 | M25A | 115057 | 195 | 22.2 | 618 | NA | 132.37 | 3 |
| 215-062591A | XD215 | VOC | 3 | M25 | 115057 | 195 | 22.2 | 727 | NA | 156.23 | 3 |
| 215-062591B | XD215 | VOC | 3 | M25 | 115330 | 144 | 22.1 | 154.4 | NA | 140.97 | 3 |
| 215-062591B | XD215 | VOC | 3 | M25A | 115330 | 144 | 22.1 | 528.3 | NA | 113.03 | 3 |
| 215-062591C | YD215 | VOC | 2 | M25 | 26999 | 196 | NS | 355 | NA | 17.95 | 1 |
| 215-062591D | YD215 | VOC | 2 | M25 | 27000 | 183 | NS | 166.5 | NA | 8.4 | 4. |
| 225-020792D | 1D225 | VOC | 3 | M25 | NS | NS | NS | NS | NA | 8.35 | 1 |

[a]NS = not specified. NA = not applicable.
[b]Pollutant codes are identified in Table 4-6. Factors for VOC on an as carbon basis.
[c]Test methods: M5 = EPA Method 5; M5A = EPA Method 5A, back half; M5/202 = EPA Methods 5 and 202, front and back half; M3 = EPA Method 3; M7 = EPA M
M10 = EPA Method 10; M10B = EPA Method 10B; M0011 = BIF Method 0011; MM0011 = Modified BIF Method 0011; G5T = Georgia 5T; M25 = EPA Method
OD7 = Oregon Department of Environmental Quality (ODEQ) Method 7; M201A = EPA Method 201A; M202 = EPA Method 202; M201A/202 = EPA Methods 20
[d]Production rate: ODTH = oven dried tons of wood flakes per hour; TFPH = tons of finished product (board) per hour.

TABLE 4-3. SUMMARY OF EMISSION FACTORS FOR OSB DRYERS FROM NCASI DATA

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Emis contr devic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| FILTERABLE PM | | | | | | | | | | | | | |
| 041-052192A | XD041 | PM | DFIRE | WREF | SY PINE | 60 | HWOOD | 40 | 94.5 | 8.4 | 853 | 276 | CYC |
| 041-052192B | XD041 | PM | DFIRE | WREF | SY PINE | 60 | HWOOD | 40 | 94.5 | 8.4 | 853 | 276 | WES |
| 041-063092A | XD041 | PM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 91 | 8.1 | 836 | 266 | CYC |
| 041-063092B | XD041 | PM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 91 | 8.1 | 836 | 266 | WES |
| 041-121792A | XD041 | PM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 102 | 10.7 | 908 | 229 | WES |
| 041-121792B | XD041 | PM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 102 | 10.7 | 908 | 229 | CYC |
| 044-102588A | XD044 | PM | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | 99 | 6.4 | 1184 | 227 | CYC |
| 044-102588B | XD044 | PM | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | 99 | 6.4 | 1184 | 227 | WES |
| 044-102588C | XD044 | PM | DFIRE | SDUST | POPLAR | 39 | SWOOD | 61 | NS | NS | NS | NS | WES |
| 044-102588C | XD044 | PM | DFIRE | SDUST | POPLAR | 39 | SWOOD | 61 | NS | NS | NS | NS | WES |
| 044-102588D | XD044 | PM | DFIRE | SDUST | POPLAR | 39 | SWOOD | 61 | NS | NS | NS | NS | WES |
| 052-011493A | XD052 | PM | IHEAT | WREF | HWOOD | 50 | SY PINE | 50 | 100 | 3.5 | 912 | 287 | CYC |
| 052-011493B | XD052 | PM | IHEAT | WREF | HWOOD | 50 | SY PINE | 50 | 100 | NS | 912 | 287 | WES |
| 069-081491A | 1D069 | PM | DFIRE | FINES | POPLAR | 100 | NA | NA | 80.2 | 4 | 1107 | 319 | WES |
| 069-081491B | 1D069 | PM | DFIRE | FINES | POPLAR | 100 | NA | NA | 80.2 | 4 | 1107 | 319 | WES |
| 069-081591A | 2D069 | PM | DFIRE | FINES | POPLAR | 100 | NA | NA | 87.9 | 5.1 | 1192 | 312 | WES |
| 069-081591B | 2D069 | PM | DFIRE | FINES | POPLAR | 100 | NA | NA | 87.9 | 5.1 | 1192 | 312 | WES |
| 069-081992A | 1D069 | PM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1240 | 326 | WES |
| 069-081992B | 1D069 | PM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1240 | 326 | WES |
| 069-082092A | 2D069 | PM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 4.2 | 1259 | 295 | WES |
| 069-082092B | 2D069 | PM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 4.2 | 1259 | 295 | WES |
| 069-121390A | 2D069 | PM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 5.1 | 1305 | 330 | WES |
| 069-121390B | 1D069 | PM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 4.2 | 1343 | 311 | WES |
| 069-121390C | 2D069 | PM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 5.1 | 1305 | 330 | WES |
| 070-031992A | 2D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 93 | 5.2 | 952 | 224 | MCI |
| 070-031992B | 2D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 93 | 5.2 | 952 | 224 | WES |
| 070-042392B | 1D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 91 | 8.6 | 985 | 196 | WES |
| 070-042492B | 3D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 82.3 | 6.4 | 994 | 221 | WES |
| 070-062891A | 1D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | MCI |

TABLE 4-3. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Emis cont devi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| 070-062891B | 1D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | WES |
| 070-062891C | 3D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5.5 | 1073 | 202 | MCI |
| 070-062891D | 3D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5.5 | 1073 | 202 | WES |
| 070-101091A | 2D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1158 | 196 | MCI |
| 070-101091B | 2D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1158 | 196 | WES |
| 070-101091C | 3D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1135 | 197 | MCI |
| 070-101091D | 3D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1135 | 197 | WES |
| 070-101091E | 2D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 842 | NS | WES |
| 070-101091F | 2D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 842 | NS | WES |
| 070-101091G | 3D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 843 | NS | MCI |
| 070-101091H | 3D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 843 | NS | WES |
| 070-102192A | 3D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 88.4 | 6.4 | 999 | 206 | MCI |
| 070-102192B | 3D070 | PM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 88.4 | 6.4 | 999 | 206 | WES |
| 083-060988A | YD083 | PM | DFIRE | DFINE | ASPEN | 95 | PINE SP | 5 | NS | NS | 976 | 239 | EFB |
| 083-061088A | XD083 | PM | DFIRE | DFINE | ASPEN | 95 | PINE SP | 5 | NS | NS | 1036 | 247 | EFB |
| 088-120892A | 1D088 | PM | DFIRE | WREF | PINE SP | 100 | NA | NA | 89 | 9.3 | 1041 | 196 | EFB |
| 088-121488A | 1D088 | PM | DFIRE | WREF | HWOOD | 95 | SWOOD | 5 | 51 | 8.3 | 650 | 191 | EFB |
| 096-012793A | 2D096 | PM | DFIRE | DFINE | ASPEN | 80 | PINE SP | 20 | 79.5 | 4.5 | 1388 | 197 | WES |
| 096-012793C | 2D096 | PM | DFIRE | DFINE | ASPEN | 80 | PINE SP | 20 | 79.5 | 4.5 | 1388 | 197 | MCI |
| 096-060590A | 1D096 | PM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 80.8 | 8 | 993 | 240 | EFB |
| 096-060590C | 1D096 | PM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 64.7 | 6.4 | 1194 | 217 | EFB |
| 096-060790C | 1D096 | PM | DFIRE | DFINE | PINE SP | 100 | NA | NA | 33.2 | 4.6 | 759 | 166 | EFB |
| 096-060890C | 1D096 | PM | DFIRE | DFINE | PINE SP | 100 | NA | NA | 50.4 | 4.3 | 848 | 190 | EFB |
| 097-061490A | XD097 | PM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 90.9 | 5.6 | 1142 | 230 | EFB |
| 097-061588A | 2D097 | PM | DFIRE | DFINE | HWOOD | 100 | NA | NA | NS | 7.2 | 1103 | 203 | MCI |
| 097-061688A | 1D097 | PM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 74.5 | 4.5 | 1145 | 228 | MCI |
| 097-080290B | XD097 | PM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 87.2 | 5.1 | 1173 | 231 | EFB |
| 097-091189A | 2D097 | PM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 78.8 | 8.2 | 1108 | 217 | MCI |
| 097-091289A | 1D097 | PM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 96.2 | 4.5 | 1222 | 219 | MCI |

## TABLE 4-3. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Emis cont devi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| 097-100590A | XD097 | PM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 90.9 | 5.7 | 1203 | 234 | EFB |
| 097-122089A | XD097 | PM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 95.3 | 6 | 1398 | 229 | EFB |
| 210-021192A | 1D210 | PM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 98 | 5.4 | 1470 | 240 | EFB |
| 210-042292A | 1D210 | PM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 93.8 | 6 | 1273 | 274 | EFB |
| 211-041191A | 1D211 | PM | DFIRE | WREF | HWOOD | 100 | NA | NA | 95 | 6.3 | 1080 | 249 | EFB |
| 212-101191A | 1D212 | PM | DFIRE | DFINE | HWOOD | 10 | SWOOD | 90 | 57.4 | 7 | 953 | 192 | EFB |
| 215-042089A | XD215 | PM | DFIRE | WREF | HWOOD | 45 | PINE SP | 55 | 100.3 | 3.3 | 1126 | 250 | CYC |
| 215-042089B | XD215 | PM | DFIRE | WREF | HWOOD | 45 | PINE SP | 55 | 100.3 | 3 | 1126 | 250 | WES |
| 215-062591A | XD215 | PM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | CYC |
| 215-062591B | XD215 | PM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WES |
| 215-062591C | YD215 | PM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 88.7 | 3.1 | 1074 | NS | CYC |
| 215-062591D | YD215 | PM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 88.7 | 3.1 | 843 | NS | CYC |
| 225-020792A | 1D225 | PM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 127.7 | 5.8 | 1340 | 260 | EFB |
| FILTERABLE PM-10 | | | | | | | | | | | | | |
| 210-021192B | 1D210 | PM10 | DFIRE | DFINE | ASPEN | 100 | NA | NA | 113.7 | 6 | 1449 | 257 | EFB |
| 210-042292B | 1D210 | PM10 | DFIRE | DFINE | ASPEN | 100 | NA | NA | 90.2 | 5.9 | 1325 | 274 | EFB |
| 225-020792B | 1D225 | PM10 | DFIRE | DFINE | HWOOD | 100 | NA | NA | 122.7 | 6.1 | 1292 | 278 | EFB |
| CONDENSIBLE PM | | | | | | | | | | | | | |
| 041-063092A | XD041 | CPM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 91 | 8.1 | 836 | 266 | CYC |
| 041-063092B | XD041 | CPM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 91 | 8.1 | 836 | 266 | WES |
| 041-121792A | XD041 | CPM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 102 | 10.7 | 908 | 229 | WES |
| 041-121792B | XD041 | CPM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 102 | 10.7 | 908 | 229 | CYC |
| 044-102588A | XD044 | CPM | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | 99 | 6.4 | 1184 | 227 | CYC |
| 044-102588B | XD044 | CPM | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | 99 | 6.4 | 1184 | 227 | WES |
| 044-102588C | XD044 | CPM | DFIRE | SDUST | POPLAR | 39 | SWOOD | 61 | NS | NS | NS | NS | WES |
| 044-102588D | XD044 | CPM | DFIRE | SDUST | POPLAR | 39 | SWOOD | 61 | NS | NS | NS | NS | WES |
| 069-081491A | 1D069 | CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 80.2 | 4 | 1107 | 319 | WES |
| 069-081491B | 1D069 | CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 80.2 | 4 | 1107 | 319 | WES |
| 069-081591A | 2D069 | CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 87.9 | 5.1 | 1192 | 312 | WES |

TABLE 4-3. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Moisture content, % Inlet | Outlet | Temp., EF Inlet | Outlet | Emis contr devi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 069-081591B | 2D069 | CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 87.9 | 5.1 | 1192 | 312 | WES |
| 069-081992A | 1D069 | CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1240 | 326 | WES |
| 069-081992B | 1D069 | CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1240 | 326 | WES |
| 069-082092A | 2D069 | CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 4.2 | 1259 | 295 | WES |
| 069-082092B | 2D069 | CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 4.2 | 1259 | 295 | WES |
| 069-121390A | 2D069 | CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 5.1 | 1305 | 330 | WES |
| 069-121390B | 1D069 | CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 4.2 | 1343 | 311 | WES |
| 069-121390C | 2D069 | CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 5.1 | 1305 | 330 | WES |
| 070-031992A | 2D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 93 | 5.2 | 952 | 224 | MCI |
| 070-031992B | 2D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 93 | 5.2 | 952 | 224 | WES |
| 070-042392B | 1D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 91 | 8.6 | 985 | 196 | WES |
| 070-042492B | 3D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 82.3 | 6.4 | 994 | 221 | WES |
| 070-062891A | 1D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | MCI |
| 070-062891B | 1D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | WES |
| 070-062891C | 3D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5.5 | 1073 | 202 | MCI |
| 070-062891D | 3D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5.5 | 1073 | 202 | WES |
| 070-101091A | 2D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1158 | 196 | MCI |
| 070-101091B | 2D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1158 | 196 | WES |
| 070-101091C | 3D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1135 | 197 | MCI |
| 070-101091D | 3D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1135 | 197 | WES |
| 070-101091E | 2D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 842 | NS | WES |
| 070-101091F | 2D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 842 | NS | WES |
| 070-101091G | 3D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 843 | NS | MCI |
| 070-101091H | 3D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 843 | NS | WES |
| 070-102192A | 3D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 88.4 | 6.4 | 999 | 206 | MCI |
| 070-102192B | 3D070 | CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 88.4 | 6.4 | 999 | 206 | WES |
| 083-060988A | YD083 | CPM | DFIRE | DFINE | ASPEN | 95 | PINE SP | 5 | NS | NS | 976 | 239 | EFB |
| 083-061088A | XD083 | CPM | DFIRE | DFINE | ASPEN | 95 | PINE SP | 5 | NS | NS | 1036 | 247 | EFB |
| 088-120892A | 1D088 | CPM | DFIRE | WREF | PINE SP | 100 | NA | NA | 89 | 9.3 | 1041 | 196 | EFB |

TABLE 4-3. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Moisture content, % Inlet | Outlet | Temp., EF Inlet | Outlet | Emis contr devi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 096-012793A | 2D096 | CPM | DFIRE | DFINE | ASPEN | 80 | PINE SP | 20 | 79.5 | 4.5 | 1388 | 197 | WES |
| 096-012793C | 2D096 | CPM | DFIRE | DFINE | ASPEN | 80 | PINE SP | 20 | 79.5 | 4.5 | 1388 | 197 | MCI |
| 096-060590A | 1D096 | CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 80.8 | 8 | 993 | 240 | EFB |
| 096-060590C | 1D096 | CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 64.7 | 6.4 | 1194 | 217 | EFB |
| 096-060790C | 1D096 | CPM | DFIRE | DFINE | PINE SP | 100 | NA | NA | 33.2 | 4.6 | 759 | 166 | EFB |
| 096-060890C | 1D096 | CPM | DFIRE | DFINE | PINE SP | 100 | NA | NA | 50.4 | 4.3 | 848 | 190 | EFB |
| 210-021192A | 1D210 | CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 98 | 5.4 | 1470 | 240 | EFB |
| 210-021192B | 1D210 | CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 113.7 | 6 | 1449 | 257 | EFB |
| 210-042292A | 1D210 | CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 93.8 | 6 | 1273 | 274 | EFB |
| 210-042292B | 1D210 | CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 90.2 | 5.9 | 1325 | 274 | EFB |
| 212-101191A | 1D212 | CPM | DFIRE | DFINE | HWOOD | 10 | SWOOD | 90 | 57.4 | 7 | 953 | 192 | EFB |
| 215-062591A | XD215 | CPM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | CYC |
| 215-062591B | XD215 | CPM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WES |
| 215-062591C | YD215 | CPM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 88.7 | 3.1 | 1074 | NS | CYC |
| 215-062591D | YD215 | CPM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 88.7 | 3.1 | 843 | NS | CYC |
| 225-020792A | 1D225 | CPM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 127.7 | 5.8 | 1340 | 260 | EFB |
| 225-020792B | 1D225 | CPM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 122.7 | 6.1 | 1292 | 278 | EFB |
| TOTAL PM (FILTERABLE PM + CONDENSIBLE PM) | | | | | | | | | | | | | |
| 041-063092A | XD041 | PM&CPM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 91 | 8.1 | 836 | 266 | CYC |
| 041-063092B | XD041 | PM&CPM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 91 | 8.1 | 836 | 266 | WES |
| 041-121792A | XD041 | PM&CPM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 102 | 10.7 | 908 | 229 | WES |
| 041-121792B | XD041 | PM&CPM | DFIRE | WREF | SY PINE | 70 | HWOOD | 30 | 102 | 10.7 | 908 | 229 | CYC |
| 044-102588A | XD044 | PM&CPM | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | 99 | 6.4 | 1184 | 227 | CYC |
| 044-102588B | XD044 | PM&CPM | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | 99 | 6.4 | 1184 | 227 | WES |
| 044-102588C | XD044 | PM&CPM | DFIRE | SDUST | POPLAR | 39 | SWOOD | 61 | NS | NS | NS | NS | WES |
| 044-102588D | XD044 | PM&CPM | DFIRE | SDUST | POPLAR | 39 | SWOOD | 61 | NS | NS | NS | NS | WES |
| 069-081491A | 1D069 | PM&CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 80.2 | 4 | 1107 | 319 | WES |
| 069-081491B | 1D069 | PM&CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 80.2 | 4 | 1107 | 319 | WES |
| 069-081591A | 2D069 | PM&CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 87.9 | 5.1 | 1192 | 312 | WES |

TABLE 4-3. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Emis cont devi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| 069-081591B | 2D069 | PM&CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 87.9 | 5.1 | 1192 | 312 | WES |
| 069-081992A | 1D069 | PM&CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1240 | 326 | WES |
| 069-081992B | 1D069 | PM&CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1240 | 326 | WES |
| 069-082092A | 2D069 | PM&CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 4.2 | 1259 | 295 | WES |
| 069-082092B | 2D069 | PM&CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 4.2 | 1259 | 295 | WES |
| 069-121390A | 2D069 | PM&CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 5.1 | 1305 | 330 | WES |
| 069-121390B | 1D069 | PM&CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 4.2 | 1343 | 311 | WES |
| 069-121390C | 2D069 | PM&CPM | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 5.1 | 1305 | 330 | WES |
| 070-031992A | 2D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 93 | 5.2 | 952 | 224 | MCI |
| 070-031992B | 2D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 93 | 5.2 | 952 | 224 | WES |
| 070-042392B | 1D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 91 | 8.6 | 985 | 196 | WES |
| 070-042492B | 3D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 82.3 | 6.4 | 994 | 221 | WES |
| 070-062891A | 1D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | MCI |
| 070-062891B | 1D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | WES |
| 070-062891C | 3D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5.5 | 1073 | 202 | MCI |
| 070-062891D | 3D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5.5 | 1073 | 202 | WES |
| 070-101091A | 2D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1158 | 196 | MCI |
| 070-101091B | 2D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1158 | 196 | WES |
| 070-101091C | 3D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1135 | 197 | MCI |
| 070-101091D | 3D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1135 | 197 | WES |
| 070-101091E | 2D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 842 | NS | WES |
| 070-101091F | 2D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 842 | NS | WES |
| 070-101091G | 3D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 843 | NS | MCI |
| 070-101091H | 3D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 843 | NS | WES |
| 070-102192A | 3D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 88.4 | 6.4 | 999 | 206 | MCI |
| 070-102192B | 3D070 | PM&CPM | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 88.4 | 6.4 | 999 | 206 | WES |
| 083-060988A | YD083 | PM&CPM | DFIRE | DFINE | ASPEN | 95 | PINE SP | 5 | NS | NS | 976 | 239 | EFB |
| 083-061088A | XD083 | PM&CPM | DFIRE | DFINE | ASPEN | 95 | PINE SP | 5 | NS | NS | 1036 | 247 | EFB |
| 088-120892A | 1D088 | PM&CPM | DFIRE | WREF | PINE SP | 100 | NA | NA | 89 | 9.3 | 1041 | 196 | EFB |

TABLE 4-3. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Emis cont devi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| 096-012793A | 2D096 | PM&CPM | DFIRE | DFINE | ASPEN | 80 | PINE SP | 20 | 79.5 | 4.5 | 1388 | 197 | WES |
| 096-012793C | 2D096 | PM&CPM | DFIRE | DFINE | ASPEN | 80 | PINE SP | 20 | 79.5 | 4.5 | 1388 | 197 | MCI |
| 096-060590A | 1D096 | PM&CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 80.8 | 8 | 993 | 240 | EFB |
| 096-060590C | 1D096 | PM&CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 64.7 | 6.4 | 1194 | 217 | EFB |
| 096-060790C | 1D096 | PM&CPM | DFIRE | DFINE | PINE SP | 100 | NA | NA | 33.2 | 4.6 | 759 | 166 | EFB |
| 096-060890C | 1D096 | PM&CPM | DFIRE | DFINE | PINE SP | 100 | NA | NA | 50.4 | 4.3 | 848 | 190 | EFB |
| 127-062591A | 1D127 | PM&CPM | DFIRE | WDUST | ASPEN | 95 | PINE SP | 5 | 82 | 2 | 1205 | 205 | EFB |
| 127-082190A | 1D127 | PM&CPM | DFIRE | WDUST | ASPEN | 95 | PINE SP | 5 | 82 | 3 | 847 | 200 | EFB |
| 210-021192A | 1D210 | PM&CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 98 | 5.4 | 1470 | 240 | EFB |
| 210-042292A | 1D210 | PM&CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 93.8 | 6 | 1273 | 274 | EFB |
| 211-012892A | 3D211 | PM&CPM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 96.3 | 7.8 | 814 | 189 | EFB |
| 211-012992B | 1D211 | PM&CPM | DFIRE | WREF | HWOOD | 100 | NA | NA | 99.7 | 8.8 | 935 | 241 | EFB |
| 211-013092A | 2D211 | PM&CPM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 93 | 8.7 | 868 | 210 | EFB |
| 212-101191A | 1D212 | PM&CPM | DFIRE | DFINE | HWOOD | 10 | SWOOD | 90 | 57.4 | 7 | 953 | 192 | EFB |
| 215-062591A | XD215 | PM&CPM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | CYC |
| 215-062591B | XD215 | PM&CPM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WES |
| 215-062591C | YD215 | PM&CPM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 88.7 | 3.1 | 1074 | NS | CYC |
| 215-062591D | YD215 | PM&CPM | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 88.7 | 3.1 | 843 | NS | CYC |
| 225-020792A | 1D225 | PM&CPM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 127.7 | 5.8 | 1340 | 260 | EFB |
| TOTAL PM-10 (FILTERABLE PM-10 + CONDENSIBLE PM) | | | | | | | | | | | | | |
| 210-021192B | 1D210 | PM10&CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 113.7 | 6 | 1449 | 257 | EFB |
| 210-042292B | 1D210 | PM10&CPM | DFIRE | DFINE | ASPEN | 100 | NA | NA | 90.2 | 5.9 | 1325 | 274 | EFB |
| 211-012892B | 3D211 | PM10&CPM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 95.3 | 9.4 | 839 | 240 | EFB |
| 211-012992A | 1D211 | PM10&CPM | DFIRE | WREF | HWOOD | 100 | NA | NA | 95 | 7.7 | 908 | 221 | EFB |
| 211-013092B | 2D211 | PM10&CPM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 91 | 7.9 | 909 | 198 | EFB |
| 225-020792B | 1D225 | PM10&CPM | DFIRE | DFINE | HWOOD | 100 | NA | NA | 122.7 | 6.1 | 1292 | 278 | EFB |

TABLE 4-3. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Emis contr devic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| CARBON MONOXIDE | | | | | | | | | | | | | |
| 041-052192B | XD041 | CO | DFIRE | WREF | SY PINE | 60 | HWOOD | 40 | 94.5 | 8.4 | 853 | 276 | WES |
| 044-092193A | XD044 | CO | DFIRE | SDUST | NS | NS | NA | NA | NS | NS | NS | NS | WES |
| 044-092193B | XD044 | CO | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | NS | NS | 1569 | 236 | WES |
| 052-011493B | XD052 | CO | IHEAT | WREF | HWOOD | 50 | SY PINE | 50 | 100 | NS | 912 | 287 | WES |
| 069-071592A | 1D069 | CO | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1240 | 326 | WES |
| 069-071692A | 2D069 | CO | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1239 | 295 | WES |
| 069-071692A | 2D069 | CO | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1239 | 295 | WES |
| 070-031992B | 2D070 | CO | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 93 | 5.2 | 952 | 224 | WES |
| 070-042392B | 1D070 | CO | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 91 | 8.6 | 985 | 196 | WES |
| 070-042492B | 3D070 | CO | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 82.3 | 6.4 | 994 | 221 | WES |
| 070-062891A | 1D070 | CO | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | MCI |
| 070-062891B | 1D070 | CO | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | WES |
| 070-102192B | 3D070 | CO | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 88.4 | 6.4 | 999 | 206 | WES |
| 088-120892A | 1D088 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | 89 | 9.3 | 1041 | 196 | EFB |
| 096-012793A | 2D096 | CO | DFIRE | DFINE | ASPEN | 80 | PINE SP | 20 | 79.5 | 4.5 | 1388 | 197 | WES |
| 096-060590A | 1D096 | CO | DFIRE | DFINE | ASPEN | 100 | NA | NA | 80.8 | 8 | 993 | 240 | EFB |
| 096-060590C | 1D096 | CO | DFIRE | DFINE | ASPEN | 100 | NA | NA | 64.7 | 6.4 | 1194 | 217 | EFB |
| 096-060790C | 1D096 | CO | DFIRE | DFINE | PINE SP | 100 | NA | NA | 33.2 | 4.6 | 759 | 166 | EFB |
| 096-060890C | 1D096 | CO | DFIRE | DFINE | PINE SP | 100 | NA | NA | 50.4 | 4.3 | 848 | 190 | EFB |
| 097-100590A | XD097 | CO | DFIRE | DFINE | HWOOD | 100 | NA | NA | 90.9 | 5.7 | 1203 | 234 | EFB |
| 097-122089A | XD097 | CO | DFIRE | DFINE | HWOOD | 100 | NA | NA | 95.3 | 6 | 1398 | 229 | EFB |
| 127-082190A | 1D127 | CO | DFIRE | WDUST | ASPEN | 95 | PINE SP | 5 | 82 | 3 | 847 | 200 | EFB |
| 127-091289A | 2D127 | CO | DFIRE | WDUST | ASPEN | 100 | NA | NA | 82 | 3 | 1700 | 220 | EFB |
| 127-102290A | 1D127 | CO | DFIRE | WDUST | ASPEN | 96 | PINE SP | 4 | 82 | 2.8 | 1200 | 204 | EFB |
| 210-013090A | 1D210 | CO | DFIRE | DFINE | ASPEN | 100 | NA | NA | NS | 6.3 | 1160 | 240 | EFB |
| 210-021192A | 1D210 | CO | DFIRE | DFINE | ASPEN | 100 | NA | NA | 98 | 5.4 | 1470 | 240 | EFB |
| 210-022489A | 1D210 | CO | DFIRE | DFINE | ASPEN | 100 | NA | NA | NS | 4.7 | 1236 | 244 | EFB |
| 210-042292A | 1D210 | CO | DFIRE | DFINE | ASPEN | 100 | NA | NA | 93.8 | 6 | 1273 | 274 | EFB |

TABLE 4-3. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Emis cont devi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| 210-042292E | 1D210 | CO | DFIRE | DFINE | ASPEN | 100 | NA | NA | 81.7 | 6.2 | 1113 | 272 | EFB |
| 211-012892A | 3D211 | CO | DFIRE | DFINE | HWOOD | 100 | NA | NA | 96.3 | 7.8 | 814 | 189 | EFB |
| 211-012992B | 1D211 | CO | DFIRE | WREF | HWOOD | 100 | NA | NA | 99.7 | 8.8 | 935 | 241 | EFB |
| 211-013092A | 2D211 | CO | DFIRE | DFINE | HWOOD | 100 | NA | NA | 93 | 8.7 | 868 | 210 | EFB |
| 215-062591B | XD215 | CO | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WES |
| 225-020792A | 1D225 | CO | DFIRE | DFINE | HWOOD | 100 | NA | NA | 127.7 | 5.8 | 1340 | 260 | EFB |
| 225-041990A | 1D225 | CO | DFIRE | DFINE | HWOOD | 100 | NA | NA | 99.9 | 5.9 | 1116 | 257 | EFB |
| NITROGEN OXIDES | | | | | | | | | | | | | |
| 044-092193A | XD044 | NOX | DFIRE | SDUST | NS | NS | NA | NA | NS | NS | NS | NS | WES |
| 044-092193B | XD044 | NOX | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | NS | NS | 1569 | 236 | WES |
| 052-011493B | XD052 | NOX | IHEAT | WREF | HWOOD | 50 | SY PINE | 50 | 100 | NS | 912 | 287 | WES |
| 069-071592A | 1D069 | NOX | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1240 | 326 | WES |
| 069-071692A | 2D069 | NOX | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1239 | 295 | WES |
| 070-031992B | 2D070 | NOX | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 93 | 5.2 | 952 | 224 | WES |
| 070-042492B | 3D070 | NOX | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 82.3 | 6.4 | 994 | 221 | WES |
| 088-120892A | 1D088 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | 89 | 9.3 | 1041 | 196 | EFB |
| 097-100590A | XD097 | NOX | DFIRE | DFINE | HWOOD | 100 | NA | NA | 90.9 | 5.7 | 1203 | 234 | EFB |
| 127-082190A | 1D127 | NOX | DFIRE | WDUST | ASPEN | 95 | PINE SP | 5 | 82 | 3 | 847 | 200 | EFB |
| 127-091289A | 2D127 | NOX | DFIRE | WDUST | ASPEN | 100 | NA | NA | 82 | 3 | 1700 | 220 | EFB |
| 210-022489A | 1D210 | NOX | DFIRE | DFINE | ASPEN | 100 | NA | NA | NS | 4.7 | 1236 | 244 | EFB |
| 215-062591B | XD215 | NOX | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WES |
| VOLATILE ORGANIC COMPOUNDS | | | | | | | | | | | | | |
| 041-052192A | XD041 | VOC | DFIRE | WREF | SY PINE | 60 | HWOOD | 40 | 94.5 | 8.4 | 853 | 276 | CYC |
| 041-052192B | XD041 | VOC | DFIRE | WREF | SY PINE | 60 | HWOOD | 40 | 94.5 | 8.4 | 853 | 276 | WES |
| 044-092193A | XD044 | VOC | DFIRE | SDUST | NS | NS | NA | NA | NS | NS | NS | NS | WES |
| 044-092193B | XD044 | VOC | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | NS | NS | 1569 | 236 | WES |
| 044-102588A | XD044 | VOC | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | 99 | 6.4 | 1184 | 227 | CYC |
| 044-102588B | XD044 | VOC | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | 99 | 6.4 | 1184 | 227 | WES |
| 052-011493A | XD052 | VOC | IHEAT | WREF | HWOOD | 50 | SY PINE | 50 | 100 | 3.5 | 912 | 287 | CYC |

TABLE 4-3. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Emis contr devi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| 052-011493A | XD052 | VOC | IHEAT | WREF | HWOOD | 50 | SY PINE | 50 | 100 | 3.5 | 912 | 287 | CYC |
| 052-011493B | XD052 | VOC | IHEAT | WREF | HWOOD | 50 | SY PINE | 50 | 100 | NS | 912 | 287 | WES |
| 052-011493B | XD052 | VOC | IHEAT | WREF | HWOOD | 50 | SY PINE | 50 | 100 | NS | 912 | 287 | WES |
| 069-071592B | 1D069 | VOC | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1240 | 326 | WES |
| 069-071692B | 2D069 | VOC | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 3.9 | 1239 | 295 | WES |
| 069-081491A | 1D069 | VOC | DFIRE | FINES | POPLAR | 100 | NA | NA | 80.2 | 4 | 1107 | 319 | WES |
| 069-081491B | 1D069 | VOC | DFIRE | FINES | POPLAR | 100 | NA | NA | 80.2 | 4 | 1107 | 319 | WES |
| 069-081591A | 2D069 | VOC | DFIRE | FINES | POPLAR | 100 | NA | NA | 87.9 | 5.1 | 1192 | 312 | WES |
| 069-081591B | 2D069 | VOC | DFIRE | FINES | POPLAR | 100 | NA | NA | 87.9 | 5.1 | 1192 | 312 | WES |
| 070-031992A | 2D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 93 | 5.2 | 952 | 224 | MCI |
| 070-031992B | 2D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 93 | 5.2 | 952 | 224 | WES |
| 070-042392A | 1D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 91 | 8.6 | 985 | 196 | MCI |
| 070-042392B | 1D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 91 | 8.6 | 985 | 196 | WES |
| 070-042492A | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 82.3 | 6.4 | 994 | 221 | MCI |
| 070-042492B | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 82.3 | 6.4 | 994 | 221 | WES |
| 070-062891A | 1D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | MCI |
| 070-062891B | 1D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | WES |
| 070-062891C | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5.5 | 1073 | 202 | MCI |
| 070-062891D | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5.5 | 1073 | 202 | WES |
| 070-101091A | 2D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1158 | 196 | MCI |
| 070-101091A | 2D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1158 | 196 | MCI |
| 070-101091B | 2D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1158 | 196 | WES |
| 070-101091B | 2D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1158 | 196 | WES |
| 070-101091C | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1135 | 197 | MCI |
| 070-101091C | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1135 | 197 | MCI |
| 070-101091D | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1135 | 197 | WES |
| 070-101091D | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 1135 | 197 | WES |
| 070-101091E | 2D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 842 | NS | MCI |
| 070-101091E | 2D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 842 | NS | MCI |

TABLE 4-3. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Emis contr devic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| 070-101091F | 2D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 842 | NS | WES |
| 070-101091F | 2D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 842 | NS | WES |
| 070-101091G | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 843 | NS | MCI |
| 070-101091G | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 843 | NS | MCI |
| 070-101091H | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 843 | NS | WES |
| 070-101091H | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5 | 843 | NS | WES |
| 070-102192A | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 88.4 | 6.4 | 999 | 206 | MCI |
| 070-102192B | 3D070 | VOC | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 88.4 | 6.4 | 999 | 206 | WES |
| 083-082990A | XD083 | VOC | DFIRE | DFINE | ASPEN | 95 | PINE SP | 5 | 80.9 | 11.8 | 1021 | 218 | EFB |
| 088-030989A | 1D088 | VOC | DFIRE | WREF | HWOOD | 95 | SWOOD | 5 | 58.5 | 9.6 | 781 | 182 | EFB |
| 088-120892A | 1D088 | VOC | DFIRE | WREF | PINE SP | 100 | NA | NA | 89 | 9.3 | 1041 | 196 | EFB |
| 088-120892B | 1D088 | VOC | DFIRE | WREF | HWOOD | 95 | PINE SP | 5 | 83.1 | 7.9 | 1096 | 198 | EFB |
| 088-121488A | 1D088 | VOC | DFIRE | WREF | HWOOD | 95 | SWOOD | 5 | 51 | 8.3 | 650 | 191 | EFB |
| 096-012693A | 2D096 | VOC | DFIRE | DFINE | ASPEN | 80 | PINE SP | 20 | 68.4 | 4.8 | 1379 | 195 | WES |
| 096-012693B | 2D096 | VOC | DFIRE | DFINE | ASPEN | 80 | PINE SP | 20 | 68.4 | 4.8 | 1379 | 195 | MCI |
| 096-060590B | 1D096 | VOC | DFIRE | DFINE | ASPEN | 100 | NA | NA | 80.8 | 8 | 993 | 240 | EFB |
| 096-060590D | 1D096 | VOC | DFIRE | DFINE | ASPEN | 100 | NA | NA | NS | NS | NS | NS | EFB |
| 096-060790C | 1D096 | VOC | DFIRE | DFINE | PINE SP | 100 | NA | NA | 33.2 | 4.6 | 759 | 166 | EFB |
| 096-060890C | 1D096 | VOC | DFIRE | DFINE | PINE SP | 100 | NA | NA | 50.4 | 4.3 | 848 | 190 | EFB |
| 097-061688B | 1D097 | VOC | DFIRE | DFINE | HWOOD | 100 | NA | NA | 84.6 | 3.8 | 1181 | 225 | MCI |
| 097-061688C | 2D097 | VOC | DFIRE | DFINE | HWOOD | 100 | NA | NA | 77 | 6.8 | 1166 | 205 | MCI |
| 097-100590B | XD097 | VOC | DFIRE | DFINE | HWOOD | 100 | NA | NA | 94.7 | 5.7 | 1144 | 248 | EFB |
| 097-122189A | XD097 | VOC | DFIRE | DFINE | HWOOD | 100 | NA | NA | 91.6 | 6.2 | 1257 | 245 | EFB |
| 127-082190A | 1D127 | VOC | DFIRE | WDUST | ASPEN | 95 | PINE SP | 5 | 82 | 3 | 847 | 200 | EFB |
| 127-092289A | 2D127 | VOC | DFIRE | WDUST | ASPEN | 100 | NA | NA | NS | NS | NS | NS | EFB |
| 127-102290A | 1D127 | VOC | DFIRE | WDUST | ASPEN | 96 | PINE SP | 4 | 82 | 2.8 | 1200 | 204 | EFB |
| 210-021192C | 1D210 | VOC | DFIRE | DFINE | ASPEN | 100 | NA | NA | 101.2 | 5.5 | 1459 | 258 | EFB |
| 210-022489A | 1D210 | VOC | DFIRE | DFINE | ASPEN | 100 | NA | NA | NS | 4.7 | 1236 | 244 | EFB |
| 210-042292C | 1D210 | VOC | DFIRE | DFINE | ASPEN | 100 | NA | NA | 98.3 | 6.2 | 1326 | 274 | EFB |

TABLE 4-3. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Emis contr devic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| 211-012892A | 3D211 | VOC | DFIRE | DFINE | HWOOD | 100 | NA | NA | 96.3 | 7.8 | 814 | 189 | EFB |
| 211-012992B | 1D211 | VOC | DFIRE | WREF | HWOOD | 100 | NA | NA | 99.7 | 8.8 | 935 | 241 | EFB |
| 211-013092A | 2D211 | VOC | DFIRE | DFINE | HWOOD | 100 | NA | NA | 93 | 8.7 | 868 | 210 | EFB |
| 211-041191A | 1D211 | VOC | DFIRE | WREF | HWOOD | 100 | NA | NA | 95 | 6.3 | 1080 | 249 | EFB |
| 212-101191B | 1D212 | VOC | DFIRE | DFINE | HWOOD | 10 | SWOOD | 90 | 57.7 | 6.6 | 1029 | 195 | EFB |
| 215-042089A | XD215 | VOC | DFIRE | WREF | HWOOD | 45 | PINE SP | 55 | 100.3 | 3.3 | 1126 | 250 | CYC |
| 215-042089B | XD215 | VOC | DFIRE | WREF | HWOOD | 45 | PINE SP | 55 | 100.3 | 3 | 1126 | 250 | WES |
| 215-062591A | XD215 | VOC | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | CYC |
| 215-062591A | XD215 | VOC | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | CYC |
| 215-062591B | XD215 | VOC | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WES |
| 215-062591B | XD215 | VOC | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WES |
| 215-062591C | YD215 | VOC | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 88.7 | 3.1 | 1074 | NS | CYC |
| 215-062591D | YD215 | VOC | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 88.7 | 3.1 | 843 | NS | CYC |
| 225-020792D | 1D225 | VOC | DFIRE | DFINE | HWOOD | 100 | NA | NA | NS | NS | NS | NS | EFB |

[a]NS = not specified. NA = not applicable.
[b]Pollutant codes are identified in Table 4-6. Factors for VOC on an as carbon basis.
[c]Firing types: DFIRE = direct firing; IHEAT = indirect firing.
[d]Fuel types: WREF = wood residue; SDUST = sanderdust; FINES = unspecified fines; DFINE = unspecified dry fines; WDUST = unspecified wood dust.
[e]Wood species: SY PINE = Southern yellow pine; HWOOD = unspecified hardwood; SPRUCE = spruce; UFIR = unspecified fir; POPLAR = poplar; SWOOD = unspe
PINE SP = unknown pine species; ASPEN = aspen.
[f]Emission control devices: CYC = cyclone; MCLO = multiclone; EFB = electrified filter bed; WESP = wet electrostatic precipitator.

TABLE 4-4. SUMMARY OF EMISSION DATA FOR OSB DRYERS FROM NCASI DATA BASE -- SPECI

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters | | | Pollutant concentration | | Emissi rate, lb/ |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Flow, dscfm | Temp. EF | Moisture, % | ppm | gr/dscf | |
| 215-062591A | XD215 | ACETALD | 3 | M0011 | 115057 | 195 | 22.2 | 8.14 | NS | 6.32 |
| 215-062591B | XD215 | ACETALD | 3 | M0011 | 115330 | 144 | 22.1 | 4.3 | NS | 10.2 |
| 215-062591A | XD215 | ACETONE | 3 | M0011 | 115057 | 195 | 22.2 | 1.7 | NS | 5.32 |
| 215-062591B | XD215 | ACETONE | 3 | M0011 | 115330 | 144 | 22.1 | 1.2 | NS | 3.59 |
| 215-062591A | XD215 | ACROLEIN | 3 | M0011 | 115057 | 195 | 22.2 | 1.3 | NS | 3.97 |
| 215-062591B | XD215 | ACROLEIN | 3 | M0011 | 115330 | 144 | 22.1 | 1.19 | NS | 3.6 |
| 215-062591A | XD215 | BUTALDEH | 3 | M0011 | 115057 | 195 | 22.2 | 0.07 | NS | 0.7 |
| 215-062591B | XD215 | BUTALDEH | 3 | M0011 | 115330 | 144 | 22.1 | 0.23 | NS | 0.88 |
| 215-062591A | XD215 | CROTONALDE | 3 | M0011 | 115057 | 195 | 22.2 | 0.31 | NS | 0.39 |
| 215-062591B | XD215 | CROTONALDE | 3 | M0011 | 115330 | 144 | 22.1 | 0.34 | NS | 0.43 |
| 041-052192A | XD041 | FOR | 2 | P&CAM125 | 128129 | 170 | 13.5 | NS | NS | 0.74 |
| 041-052192B | XD041 | FOR | 2 | P&CAM125 | 106652 | 169 | 14.3 | NS | NS | 1.4 |
| 044-092193A | XD044 | FOR | 3 | M0011 | 57182 | 213 | 23.7 | NS | NS | 1.19 |
| 044-092193A | XD044 | FOR | 3 | TO-5 | 57182 | 213 | 23.7 | NS | NS | 26.01 |
| 044-092193B | XD044 | FOR | 3 | M0011 | 65504 | 150 | 22 | NS | NS | 2.41 |
| 044-092193B | XD044 | FOR | 3 | TO-5 | 65504 | 150 | 22 | NS | NS | 18.67 |
| 044-102588A | XD044 | FOR | 3 | P&CAM125 | 60986 | 196 | 10.1 | NS | NS | 0.12 |
| 044-102588B | XD044 | FOR | 3 | P&CAM125 | 54332 | 147 | 23.5 | NS | NS | 0.05 |
| 044-102588C | XD044 | FOR | 1 | P&CAM125 | 69788 | NS | NS | NS | NS | 0.08 |
| 044-102588D | XD044 | FOR | 1 | P&CAM125 | 58344 | NS | NS | NS | NS | 0.09 |
| 069-071692C | 2D069 | FOR | 1 | M0011 | 34635 | 146 | 20.6 | 25 | NS | 4.02 |
| 069-081491A | 1D069 | FOR | 3 | M0011 | 28259 | 256 | 21.6 | 6.6 | 0.12433 | 0.86 |
| 069-081491B | 1D069 | FOR | 3 | M0011 | 27432 | 143 | 23.8 | 0.1 | 0.0013 | 0.01 |
| 069-081591A | 2D069 | FOR | 2 | M0011 | 28380 | 244 | 21.4 | 6.7 | 0.127 | 0.88 |
| 069-081591B | 2D069 | FOR | 2 | M0011 | 29278 | 144 | 23.7 | 1.2 | 0.0217 | 0.15 |
| 070-031992B | 2D070 | FOR | 3 | M0011 | 27003 | 149 | 25.4 | 4.2 | NS | 0.52 |
| 070-042392B | 1D070 | FOR | 3 | M0011 | 32892 | 145 | 22.2 | 15.2 | NS | 2.39 |
| 070-042492B | 3D070 | FOR | 3 | M0011 | 32780 | 150 | 23.4 | 29 | NS | 4.6 |

TABLE 4-4. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters: Flow, dscfm | Stack gas parameters: Temp. EF | Stack gas parameters: Moisture, % | Pollutant concentration: ppm | Pollutant concentration: gr/dscf | Emissi rate, lb/ |
|---|---|---|---|---|---|---|---|---|---|---|
| 070-062891A | 1D070 | FOR | 2 | M0011 | 26757 | 203 | 29.5 | 1.7 | NS | 0.21 |
| 070-062891B | 1D070 | FOR | 3 | M0011 | 28653 | 151 | 27.8 | 0.4 | NS | 0.05 |
| 070-062891C | 3D070 | FOR | 3 | MM0011 | 25074 | 194 | 25 | 1.6 | NS | 0.19 |
| 070-062891D | 3D070 | FOR | 3 | MM0011 | 25614 | 148 | 23.9 | 0.6 | NS | 0.07 |
| 070-102292A | 3D070 | FOR | 3 | TO-11 | 31460 | 196 | 23.5 | 33.5 | NS | 4.92 |
| 070-102292A | 3D070 | FOR | 3 | M0011 | 31460 | 196 | 23.5 | 16.9 | NS | 2.47 |
| 070-102292B | 3D070 | FOR | 3 | TO-11 | 35886 | 143 | 19.2 | 23.1 | NS | 3.85 |
| 070-102292B | 3D070 | FOR | 3 | M0011 | 35886 | 143 | 19.2 | 18.8 | NS | 3.13 |
| 088-120892B | 1D088 | FOR | 3 | M0011 | 35867 | 179 | 19.4 | 6.9 | NS | 1.16 |
| 096-012693A | 2D096 | FOR | 3 | M0011 | NS | NS | NS | 5.1 | NS | 0.76 |
| 096-012693B | 2D096 | FOR | 3 | M0011 | 26950 | 198 | 23.3 | 9.4 | NS | 1.17 |
| 096-060590A | 1D096 | FOR | 3 | MN3500 | 32885 | 246 | 12.7 | 1.7 | NS | 0.26 |
| 096-060590C | 1D096 | FOR | 3 | MN3500 | 31064 | 241 | 19.1 | 6 | NS | 0.89 |
| 096-060790C | 1D096 | FOR | 3 | MN3500 | 37974 | 189 | 9.3 | 0.1 | NS | 0.02 |
| 096-060890C | 1D096 | FOR | 3 | MN3500 | 35975 | 226 | 9.9 | 0.4 | NS | 0.07 |
| 174-041191A | 1D174 | FOR | 3 | N3500 | 35119 | 211 | NS | 78.3 | NS | 12.87 |
| 174-041191B | 2D174 | FOR | 3 | N3500 | 35472 | 211 | NS | 19 | NS | 3.17 |
| 210-021192D | 1D210 | FOR | 3 | M0011 | 31661 | 207 | 25.3 | 11.7 | NS | 1.74 |
| 210-042292D | 1D210 | FOR | 3 | M0011 | 29666 | 232 | 23.6 | 8.9 | NS | 1.23 |
| 211-012892C | 3D211 | FOR | 3 | M0011 | 32667 | 212 | 22.4 | NS | NS | 0 |
| 211-012992C | 1D211 | FOR | 3 | M0011 | 33567 | 248 | 20.5 | NS | NS | 0 |
| 211-013092C | 2D211 | FOR | 3 | M0011 | 34067 | 248 | 21.6 | NS | NS | 0 |
| 211-041191A | 1D211 | FOR | 3 | MN3500 | 32400 | 243 | 21.1 | 47.7 | NS | 7.2 |
| 215-042089A | XD215 | FOR | 3 | NM1501 | 118589 | NS | NS | NS | NS | 10.33 |
| 215-042089B | XD215 | FOR | 3 | NM1501 | 116530 | NS | NS | NS | NS | 10.23 |
| 215-062591A | XD215 | FOR | 3 | M0011 | 115057 | 195 | 22.2 | 29.1 | NS | 15.47 |
| 215-062591B | XD215 | FOR | 3 | M0011 | 115330 | 144 | 22.1 | 19.1 | NS | 10.25 |

TABLE 4-4. (continued)

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Stack gas parameters | | | Pollutant concentration | | Emissi |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Flow, dscfm | Temp. EF | Moisture, % | ppm | gr/dscf | rate, lb/ |
| 225-020792C | 1D225 | FOR | 3 | M0011 | 36888 | 203 | 22.4 | 9.4 | NS | 1.63 |
| 215-062591A | XD215 | PROPIONALD | 3 | M0011 | 115057 | 195 | 22.2 | 0.4 | NS | 0.40 |
| 215-062591B | XD215 | PROPIONALD | 3 | M0011 | 115330 | 144 | 22.1 | 0.3 | NS | 0.35 |

[a] NS = not specified.

[b] Pollutant codes are identified in Table 4-6.

[c] Test methods: M0011 = BIF Method 0011, P&CAM125 = P&CAM125; TO-5 = TO-5 (from Compendium of Methods for the Determination of Toxic Organic Comp
MM0011 = Modified BIF Method 0011; TO-11 = TO-11 (from Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air); MN3
N3500 = NIOSH Method 3500; NM1501 = NIOSH Method 1501.

[d] Production rate: ODTH = oven dried tons of flakes per hour; TPH (wet) = tons per hour of wet flakes into dryer; TFPH = tons of finished product (board) per hour.

TABLE 4-5. SUMMARY OF EMISSION FACTORS FOR OSB DRYERS FROM NCASI DATA BASE -- SPE(

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Em con dev |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| 215-062591A | XD215 | ACETALD | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 215-062591B | XD215 | ACETALD | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 215-062591A | XD215 | ACETONE | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 215-062591B | XD215 | ACETONE | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 215-062591A | XD215 | ACROLEIN | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 215-062591B | XD215 | ACROLEIN | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 215-062591A | XD215 | BUTYLALDEH | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 215-062591B | XD215 | BUTYLALDEH | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 215-062591A | XD215 | CROTONALDE | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 215-062591B | XD215 | CROTONALDE | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 041-052192A | XD041 | FOR | DFIRE | WREF | SY PINE | 60 | HWOOD | 40 | 94.5 | 8.4 | 853 | 276 | CY |
| 041-052192B | XD041 | FOR | DFIRE | WREF | SY PINE | 60 | HWOOD | 40 | 94.5 | 8.4 | 853 | 276 | WE |
| 044-092193A | XD044 | FOR | DFIRE | SDUST | NS | NS | NA | NA | NS | NS | NS | NS | WE |
| 044-092193A | XD044 | FOR | DFIRE | SDUST | NS | NS | NA | NA | NS | NS | NS | NS | WE |
| 044-092193B | XD044 | FOR | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | NS | NS | 1569 | 236 | WE |
| 044-092193B | XD044 | FOR | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | NS | NS | 1569 | 236 | WE |
| 044-102588A | XD044 | FOR | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | 99 | 6.4 | 1184 | 227 | CY |
| 044-102588B | XD044 | FOR | DFIRE | SDUST | SPRUCE | 50 | UFIR | 50 | 99 | 6.4 | 1184 | 227 | WE |
| 044-102588C | XD044 | FOR | DFIRE | SDUST | POPLAR | 39 | SWOOD | 61 | NS | NS | NS | NS | WE |
| 044-102588D | XD044 | FOR | DFIRE | SDUST | POPLAR | 39 | SWOOD | 61 | NS | NS | NS | NS | WE |
| 069-071692C | 2D069 | FOR | DFIRE | FINES | POPLAR | 100 | NA | NA | 100 | 4.1 | 1242 | 297 | WE |
| 069-081491A | 1D069 | FOR | DFIRE | FINES | POPLAR | 100 | NA | NA | 80.2 | 4 | 1107 | 319 | WE |
| 069-081491B | 1D069 | FOR | DFIRE | FINES | POPLAR | 100 | NA | NA | 80.2 | 4 | 1107 | 319 | WE |
| 069-081591A | 2D069 | FOR | DFIRE | FINES | POPLAR | 100 | NA | NA | 87.9 | 5.1 | 1192 | 312 | WE |
| 069-081591B | 2D069 | FOR | DFIRE | FINES | POPLAR | 100 | NA | NA | 87.9 | 5.1 | 1192 | 312 | WE |
| 070-031992B | 2D070 | FOR | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 93 | 5.2 | 952 | 224 | WE |
| 070-042392B | 1D070 | FOR | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 91 | 8.6 | 985 | 196 | WE |
| 070-042492B | 3D070 | FOR | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 82.3 | 6.4 | 994 | 221 | WE |
| 070-062891A | 1D070 | FOR | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | MC |

TABLE 4-5. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Em con dev |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| 070-062891B | 1D070 | FOR | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 92.3 | 5.9 | 1163 | 202 | WE |
| 070-062891C | 3D070 | FOR | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5.5 | 1073 | 202 | MC |
| 070-062891D | 3D070 | FOR | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 90 | 5.5 | 1073 | 202 | WE |
| 070-102292A | 3D070 | FOR | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 79.9 | 5.9 | 995 | 211 | MC |
| 070-102292A | 3D070 | FOR | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 79.9 | 5.9 | 995 | 211 | MC |
| 070-102292B | 3D070 | FOR | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 79.9 | 5.9 | 995 | 211 | WE |
| 070-102292B | 3D070 | FOR | DFIRE | NS | PINE SP | 85 | HWOOD | 15 | 79.9 | 5.9 | 995 | 211 | WE |
| 088-120892B | 1D088 | FOR | DFIRE | WREF | HWOOD | 95 | PINE SP | 5 | 83.1 | 7.9 | 1096 | 198 | EFI |
| 096-012693A | 2D096 | FOR | DFIRE | DFINE | ASPEN | 80 | PINE SP | 20 | 68.4 | 4.8 | 1379 | 195 | WE |
| 096-012693B | 2D096 | FOR | DFIRE | DFINE | ASPEN | 80 | PINE SP | 20 | 68.4 | 4.8 | 1379 | 195 | MC |
| 096-060590A | 1D096 | FOR | DFIRE | DFINE | ASPEN | 100 | NA | NA | 80.8 | 8 | 993 | 240 | EFI |
| 096-060590C | 1D096 | FOR | DFIRE | DFINE | ASPEN | 100 | NA | NA | 64.7 | 6.4 | 1194 | 217 | EFI |
| 096-060790C | 1D096 | FOR | DFIRE | DFINE | PINE SP | 100 | NA | NA | 33.2 | 4.6 | 759 | 166 | EFI |
| 096-060890C | 1D096 | FOR | DFIRE | DFINE | PINE SP | 100 | NA | NA | 50.4 | 4.3 | 848 | 190 | EFI |
| 174-041191A | 1D174 | FOR | DFIRE | SDUST | HWOOD | 40 | SWOOD | 60 | 88.7 | 7.5 | 1125 | 235 | EFI |
| 174-041191B | 2D174 | FOR | DFIRE | FINES | HWOOD | 40 | SWOOD | 60 | 88.7 | 5.2 | 925 | 230 | EFI |
| 210-021192D | 1D210 | FOR | DFIRE | DFINE | ASPEN | 100 | NA | NA | 98 | 5.4 | 1467 | 255 | EFI |
| 210-042292D | 1D210 | FOR | DFIRE | DFINE | ASPEN | 100 | NA | NA | 89.9 | 6.3 | 1318 | 273 | EFI |
| 211-012892C | 3D211 | FOR | DFIRE | DFINE | HWOOD | 100 | NA | NA | 106.1 | 8.3 | 933 | 197 | EFI |
| 211-012992C | 1D211 | FOR | DFIRE | WREF | HWOOD | 100 | NA | NA | 96.3 | 8.3 | 919 | 250 | EFI |
| 211-013092C | 2D211 | FOR | DFIRE | DFINE | HWOOD | 100 | NA | NA | 93.7 | 8.9 | 907 | 222 | EFI |
| 211-041191A | 1D211 | FOR | DFIRE | WREF | HWOOD | 100 | NA | NA | 95 | 6.3 | 1080 | 249 | EFI |
| 215-042089A | XD215 | FOR | DFIRE | WREF | HWOOD | 45 | PINE SP | 55 | 100.3 | 3.3 | 1126 | 250 | CY |
| 215-042089B | XD215 | FOR | DFIRE | WREF | HWOOD | 45 | PINE SP | 55 | 100.3 | 3 | 1126 | 250 | WE |
| 215-062591A | XD215 | FOR | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | CY |
| 215-062591B | XD215 | FOR | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 225-020792C | 1D225 | FOR | DFIRE | DFINE | HWOOD | 100 | NA | NA | 112.5 | 5.8 | 1309 | 254 | EFI |

TABLE 4-5. (continued)

| Test code | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Moisture content, % | | Temp., EF | | Em con dev |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | Inlet | Outlet | Inlet | Outlet | |
| 215-062591A | XD215 | PROPIONALD | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |
| 215-062591B | XD215 | PROPIONALD | DFIRE | WREF | SY PINE | 40 | HWOOD | 60 | 89.4 | 3.1 | 1118 | 243 | WE |

[a] NS = not specified. NA = not applicable.
[b] Pollutant codes are identified in Table 4-6.
[c] Firing type: DFIRE = direct firing.
[d] Fuel types: WREF = wood residue; SDUST = sanderdust; FINES = unspecified fines; DFINE = unspecified dry fines.
[e] Wood species: SY PINE = Southern yellow pine; HWOOD = unspecified hardwood; SPRUCE = spruce; UFIR = unspecified fir; POPLAR = poplar; SWOOD = unsp pine species; ASPEN = aspen.
[f] Emission control devices: CYC = cyclone; MCLO = multiclone; EFB = electrified filter bed; WESP = wet electrostatic precipitator.

TABLE 4-6. POLLUTANT CODES

| Code | Pollutant |
|---|---|
| 1METHNAPTH | 1-Methyl naphthalene |
| ACENAPTH | Acenaphthalene |
| ACETALD | Acetaldehyde |
| ACETONE | Acetone |
| ACROLEIN | Acrolein |
| BENZENE | Benzene |
| BENZOAP | Benzo-a-pyrene |
| BUTYLALDEH | Butylaldehyde |
| CHROMIUM | Chromium |
| CO | Carbon monoxide |
| $CO_2$ | Carbon dioxide |
| CPM | Condensible PM |
| CPM-I | Inorganic fraction of condensible PM |
| CPM-O | Organic fraction of condensible PM |
| CROTONALDE | Crotonaldehyde |
| FOR | Formaldehyde |
| HCYANIDE | Hydrogen cyanide |
| MDI | Methylene diphenyl diisocyanate |
| NAPHTHALENE | Naphthalene |
| NOX | Nitrogen oxides |
| PHENANTH | Phenanthrene |
| PHENOL | Phenol |
| PM | Filterable particulate matter |
| PM10 | PM-10, PM less than 10 micrometers |
| PM10&CPM | PM-10 and condensible PM |
| PROPIONALD | Propionaldehyde |
| VOC | Volatile organic compounds |

TABLE 4-7. SUMMARY OF OSB PRESS DESIGN AND EMISSION DATA FROM NCASI DATA

| EPATest code | Unit code | Press size, ft | No. of openings | No. of vents | Pollutant [b] | Test method [c] | No. of runs | Stack parameters: Flow, dscfm | Stack parameters: Temp, EF | Stack parameters: Moist., % | Pollutant concentration: ppm | Pollutant concentration: gr/dscf | E ra |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 044-062392A | 1P044 | 8x16 | NS | 3 | PM | M5 | 2 | 104,421 | NS | NS | | NS | |
| 044-062392B | 1P044 | 8x16 | NS | 3 | PM | M5 | 2 | 104,168 | NS | NS | | NS | |
| 044-092393A | 1P044 | 8x16 | NS | 3 | PM | M5 | 3 | 109,994 | NS | NS | | NS | |
| 069-062492A | 1P069 | 8x16 | 12 | 1 | PM | M5 | 3 | NS | NS | NS | | 0.0019 | |
| 088-121092A | 1P088 | 8x16 | 8 | 1 | PM | M5 | 3 | 80,856 | 73 | 1.2 | | 0.0031 | |
| 096-012893A | 2P096 | 8x16 | 8 | 2 | PM | M5 | 3 | 80,705 | 77 | 1.1 | | 0.0028 | |
| 096-060490A | 1P096 | 8x16 | 8 | 2 | PM | M5 | 3 | 27,961 | 108 | 0.8 | | 0.0061 | |
| 096-060490C | 1P096 | 8x16 | 8 | 2 | PM | M5 | 3 | 28,049 | 105 | 1.0 | | 0.0030 | |
| 096-060590E | 1P096 | 8x16 | 8 | 2 | PM | M5 | 3 | 28,438 | 100 | 0.9 | | 0.0022 | |
| 096-060590F | 1P096 | 8x16 | 8 | 2 | PM | M5 | 3 | 27,369 | 113 | 1.1 | | 0.0040 | |
| 096-060690B | 1P096 | 8x16 | 8 | 2 | PM | M5 | 3 | 27,232 | 108 | 0.8 | | 0.0034 | |
| 096-060690C | 1P096 | 8x16 | 8 | 2 | PM | M5 | 3 | 28,026 | 105 | 0.8 | | 0.0026 | |
| 096-060790A | 1P096 | 8x16 | 8 | 2 | PM | M5 | 3 | 27,822 | 103 | 1.0 | | 0.0025 | |
| 096-060790B | 1P096 | 8x16 | 8 | 2 | PM | M5 | 3 | 27,018 | 110 | 1.1 | | 0.0046 | |
| 096-060890A | 1P096 | 8x16 | 8 | 2 | PM | M5 | 3 | 28,069 | 95 | 1.2 | | 0.0043 | |
| 096-060890B | 1P096 | 8x16 | 8 | 2 | PM | M5 | 3 | 27,963 | 111 | 1.2 | | 0.0052 | |
| 210-021292C | 1P210 | 8x16 | 8 | 2 | PM | M5 | 3 | 66,561 | 88 | 1.4 | | 0.0053 | |
| 211-022592A | 1P211 | 8x24 | 12 | 2 | PM | M5 | 3 | NS | NS | NS | | 0.0025 | |
| 225-020692A | 2P225 | 5x18 | 14 | 1 | PM | M5 | 3 | 120,601 | 77 | 1.0 | | 0.0032 | |
| 044-092393A | 1P044 | 8x16 | NS | 3 | PM10 | M201A | 3 | 109,994 | NS | NS | | NS | |
| 210-021292A | 1P210 | 8x16 | 8 | 2 | PM10 | M201A | 3 | 80,467 | 75 | 1.2 | | 0.0045 | |
| 211-022692A | 1P211 | 8x24 | 12 | 2 | PM10 | M201A | 3 | 128,108 | 72 | 1.3 | | 0.0045 | |
| 044-062392A | 1P044 | 8x16 | NS | 3 | CPM | OD7 | 2 | 104,421 | NS | NS | | NS | [illegible] |
| 044-062392B | 1P044 | 8x16 | NS | 3 | CPM | OD7 | 2 | 104,168 | NS | NS | | NS | |
| 044-092393A | 1P044 | 8x16 | NS | 3 | CPM | OD7 | 3 | 109,994 | NS | NS | | NS | |
| 088-121092A | 1P088 | 8x16 | 8 | 1 | CPM | M202 | 3 | 80,856 | 73 | 1.2 | | 0.0056 | |
| 096-012893A | 2P096 | 8x16 | 8 | 2 | CPM | M202 | 3 | 80,705 | 77 | 1.1 | | NS | |
| 096-060490A | 1P096 | 8x16 | 8 | 2 | CPM | M202 | 3 | 27,961 | 108 | 0.8 | | 0.0052 | |

TABLE 4-7. (continued)

| EPATest code | Unit code | Press size, ft | No. of openings | No. of vents | Pollutant [b] | Test method [c] | No. of runs | Stack parameters: Flow, dscfm | Stack parameters: Temp, EF | Stack parameters: Moist., % | Pollutant concentration: ppm | Pollutant concentration: gr/dscf | E[illegible] ra[illegible] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 096-060490C | 1P096 | 8x16 | 8 | 2 | CPM | M202 | 3 | 28,049 | 105 | 1.0 | | 0.0065 | |
| 096-060590E | 1P096 | 8x16 | 8 | 2 | CPM | M202 | 3 | 28,438 | 100 | 0.9 | | 0.0064 | |
| 096-060590F | 1P096 | 8x16 | 8 | 2 | CPM | M202 | 3 | 27,369 | 113 | 1.1 | | 0.0040 | |
| 096-060690B | 1P096 | 8x16 | 8 | 2 | CPM | M202 | 3 | 27,232 | 108 | 0.8 | | 0.0075 | |
| 096-060690C | 1P096 | 8x16 | 8 | 2 | CPM | M202 | 3 | 28,026 | 105 | 0.8 | | 0.0054 | |
| 096-060790A | 1P096 | 8x16 | 8 | 2 | CPM | M202 | 3 | 27,822 | 103 | 1.0 | | 0.0024 | |
| 096-060790B | 1P096 | 8x16 | 8 | 2 | CPM | M202 | 3 | 27,018 | 110 | 1.1 | | 0.0033 | |
| 096-060890A | 1P096 | 8x16 | 8 | 2 | CPM | M202 | 3 | 28,069 | 95 | 1.2 | | 0.0029 | |
| 096-060890B | 1P096 | 8x16 | 8 | 2 | CPM | M202 | 3 | 27,963 | 111 | 1.2 | | 0.0189 | |
| 210-021292A | 1P210 | 8x16 | 8 | 2 | CPM | M202 | 3 | 80,467 | 75 | 1.2 | | NS | |
| 210-021292C | 1P210 | 8x16 | 8 | 2 | CPM | M202 | 3 | 66,561 | 88 | 1.4 | | NS | |
| 211-022592A | 1P211 | 8x24 | 12 | 2 | CPM | M5 | 3 | NS | NS | NS | | 0.0001 | |
| 211-022692A | 1P211 | 8x24 | 12 | 2 | CPM | M5 | 3 | 128,108 | 72 | 1.3 | | 0.0006 | |
| 225-020692A | 2P225 | 5x18 | 14 | 1 | CPM | M5 | 3 | 120,601 | 77 | 1.0 | | 0.0010 | |
| 044-062392A | 1P044 | 8x16 | NS | 3 | PM&CPM | M5/OD7 | 2 | 104,421 | NS | NS | | NS | [illegible] |
| 044-062392B | 1P044 | 8x16 | NS | 3 | PM&CPM | M5/OD7 | 2 | 104,168 | NS | 23.7 | | NS | [illegible] |
| 044-092393A | 1P044 | 8x16 | NS | 3 | PM&CPM | M5 | 3 | 109,994 | NS | NS | | NS | |
| 088-121092A | 1P088 | 8x16 | 8 | 1 | PM&CPM | M5/202 | 3 | 80,856 | 73 | 1.2 | | 0.0086 | |
| 096-012893A | 2P096 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 80,705 | 77 | 0.6 | | 0.0043 | |
| 096-060490A | 1P096 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 27,961 | 108 | 0.8 | | NS | |
| 096-060490C | 1P096 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 28,049 | 105 | 1.0 | | NS | |
| 096-060590E | 1P096 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 28,438 | 100 | 0.9 | | NS | |
| 096-060590F | 1P096 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 27,369 | 113 | 1.1 | | NS | |
| 096-060690B | 1P096 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 27,232 | 108 | 0.8 | | NS | |
| 096-060690C | 1P096 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 28,026 | 105 | 0.8 | | NS | |
| 096-060790A | 1P096 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 27,822 | 103 | 1.0 | | NS | |
| 096-060790B | 1P096 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 27,018 | 110 | 1.1 | | NS | |

TABLE 4-7. (continued)

| EPATest code | Unit code | Press size, ft | No. of openings | No. of vents | Pollutant [b] | Test method [c] | No. of runs | Stack parameters: Flow, dscfm | Temp, EF | Moist., % | Pollutant concentration: ppm | gr/dscf | E ra |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 096-060890A | 1P096 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 28,069 | 95 | 1.2 | | NS | |
| 096-060890B | 1P096 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 27,963 | 111 | 1.2 | | NS | |
| 210-021292C | 1P210 | 8x16 | 8 | 2 | PM&CPM | M5/202 | 3 | 66,561 | 88 | 1.3 | | 0.0061 | |
| 211-022592A | 1P211 | 8x24 | 12 | 2 | PM&CPM | M5 | 3 | NS | NS | 1.6 | | 0.0026 | |
| 225-020692A | 2P225 | 5x18 | 14 | 1 | PM&CPM | M5 | 3 | 120,601 | 77 | 0.9 | | 0.0042 | |
| 044-092393A | 1P044 | 8x16 | NS | 3 | PM10&CPM | M201A/OD7 | 3 | 109,994 | NS | NS | | NS | |
| 210-021292A | 1P210 | 8x16 | 8 | 2 | PM10&CPM | M201A/202 | 3 | 80,467 | 75 | 1.2 | | 0.0060 | |
| 211-022692A | 1P211 | 8x24 | 12 | 2 | PM10&CPM | M5/202 | 3 | 128,108 | 72 | 1.2 | | 0.0051 | |
| 225-020692B | 2P225 | 5x18 | 14 | 1 | PM10&CPM | M201A | 3 | 114,865 | 78 | NS | | NS | |
| 044-062392A | 1P044 | 8x16 | NS | 3 | CO | M10 | 2 | 104,421 | NS | NS | NS | | |
| 088-121092A | 1P088 | 8x16 | 8 | 1 | CO | M10 | 3 | 80,856 | 73 | 1.2 | 4.0 | | |
| 096-060490A | 1P096 | 8x16 | 8 | 2 | CO | M10 | 3 | 27,961 | 108 | 0.8 | 11.3 | | |
| 096-060490C | 1P096 | 8x16 | 8 | 2 | CO | M10 | 3 | 28,049 | 105 | 1.0 | 12.3 | | |
| 096-060590E | 1P096 | 8x16 | 8 | 2 | CO | M10 | 3 | 28,438 | 100 | 0.9 | 7.3 | | |
| 096-060590F | 1P096 | 8x16 | 8 | 2 | CO | M10 | 3 | 27,369 | 113 | 1.1 | 7.3 | | |
| 096-060690B | 1P096 | 8x16 | 8 | 2 | CO | M10 | 3 | 27,232 | 108 | 0.8 | 6.0 | | |
| 096-060690C | 1P096 | 8x16 | 8 | 2 | CO | M10 | 3 | 28,026 | 105 | 0.8 | 6.6 | | |
| 096-060790A | 1P096 | 8x16 | 8 | 2 | CO | M10 | 3 | 27,822 | 103 | 1.0 | 6.8 | | |
| 096-060790B | 1P096 | 8x16 | 8 | 2 | CO | M10 | 3 | 27,018 | 110 | 1.1 | 8.5 | | |
| 096-060890A | 1P096 | 8x16 | 8 | 2 | CO | M10 | 3 | 28,069 | 95 | 1.2 | 6.0 | | |
| 096-060890B | 1P096 | 8x16 | 8 | 2 | CO | M10 | 3 | 27,963 | 111 | 1.2 | 6.4 | | |
| 210-021292D | 1P210 | 8x16 | 8 | 2 | CO | M10 | 3 | 68,297 | 88 | 1.3 | 11.3 | | |
| 211-022592A | 1P211 | 8x24 | 12 | 2 | CO | M10 | 3 | NS | NS | NS | 6.9 | | |
| 225-020692A | 2P225 | 5x18 | 14 | 1 | CO | M10 | 3 | 120,601 | 77 | 1.0 | NS | | |
| 044-062392A | 1P044 | 8x16 | NS | 3 | NOX | M7E | 2 | 104,421 | NS | NS | NS | | |
| 044-062392A | 1P044 | 8x16 | NS | 3 | VOC | M25A | 2 | 104,421 | NS | NS | NS | | |
| 044-092393A | 1P044 | 8x16 | NS | 3 | VOC | M25A | 3 | 109,994 | NS | 10.1 | NS | | |

TABLE 4-7. (continued)

| EPATest code | Unit code | Press size, ft | No. of openings | No. of vents | Pollutant[b] | Test method[c] | No. of runs | Stack parameters Flow, dscfm | Temp, EF | Moist., % | Pollutant concentration ppm | gr/dscf | Ei ra |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 069-062492A | 1P069 | 8x16 | 12 | 1 | VOC | M25A | 3 | NS | NS | 22.5 | 10.0 | | |
| 083-011990A | 1P083 | 8x16 | 12 | 0 | VOC | M25A | 3 | 34,257 | 117 | 1.5 | 173.7 | | |
| 083-012090A | 1P083 | 8x16 | 12 | 0 | VOC | M25A | 3 | 31,983 | 115 | 2.6 | 43.7 | | |
| 088-121092A | 1P088 | 8x16 | 8 | 1 | VOC | M25A | 3 | 80,856 | 73 | 1.2 | NS | | |
| 088-121588C | 2P088 | 8x16 | 8 | 1 | VOC | M25A | 3 | 29,373 | 80 | 1.8 | 13.3 | | |
| 096-012893C | 2P096 | 8x16 | 8 | 2 | VOC | M25 | 3 | NS | NS | 0.9 | NS | | |
| 096-060490A | 1P096 | 8x16 | 8 | 2 | VOC | M25A | 1 | 27,961 | 108 | 1.0 | NS | | |
| 096-060490C | 1P096 | 8x16 | 8 | 2 | VOC | M25A | 1 | 28,049 | 105 | 12.7 | NS | | |
| 096-060590E | 1P096 | 8x16 | 8 | 2 | VOC | M25A | 1 | 28,438 | 100 | 1.1 | NS | | |
| 096-060590F | 1P096 | 8x16 | 8 | 2 | VOC | M25A | 1 | 27,369 | 113 | 0.8 | NS | | |
| 096-060690B | 1P096 | 8x16 | 8 | 2 | VOC | M25A | 1 | 27,232 | 108 | 0.8 | NS | | |
| 096-060690C | 1P096 | 8x16 | 8 | 2 | VOC | M25A | 1 | 28,026 | 105 | 1.0 | NS | | |
| 096-060790A | 1P096 | 8x16 | 8 | 2 | VOC | M25A | 1 | 27,822 | 103 | 1.1 | NS | | |
| 096-060790B | 1P096 | 8x16 | 8 | 2 | VOC | M25A | 1 | 27,018 | 110 | 9.3 | NS | | |
| 096-060890A | 1P096 | 8x16 | 8 | 2 | VOC | M25A | 1 | 28,069 | 95 | 1.2 | NS | | |
| 096-060890B | 1P096 | 8x16 | 8 | 2 | VOC | M25A | 1 | 27,963 | 111 | 9.9 | NS | | |
| 127-082090A | 1P127 | 4x24 | NS | 3 | VOC | M25 | 3 | NS | NS | 19.9 | 81.3 | | |
| 127-092289C | 1P127 | 4x24 | NS | 3 | VOC | M25 | 3 | 113,526 | 95 | 18.9 | 185.0 | | |
| 210-021292B | 1P210 | 8x16 | 8 | 2 | VOC | M25 | 3 | NS | NS | 1.4 | NS | | |
| 210-022389A | 1P210 | 8x16 | 8 | 2 | VOC | M25 | 3 | NS | NS | NS | 70.3 | | |
| 211-022692B | 1P211 | 8x24 | 12 | 2 | VOC | M25A | 3 | 123,883 | 83 | 21.1 | 29.8 | | |
| 212-100991A | 1P212 | 8x16 | 8 | 3 | VOC | M25 | 3 | 30,393 | 74 | 1.7 | 102.3 | | |
| 225-020692C | 2P225 | 5x18 | 14 | 1 | VOC | M25 | 3 | NS | NS | 0.91 | NS | | |
| 044-062392A | 1P044 | 8x16 | NS | 3 | FOR | TO-5 | 2 | 104,421 | NS | NS | NS | | |
| 044-062392A | 1P044 | 8x16 | NS | 3 | FOR | P&CAM125 | 2 | 104,421 | NS | NS | NS | | |
| 044-062392B | 1P044 | 8x16 | NS | 3 | FOR | TO-5 | 2 | 104,168 | NS | NS | NS | | |
| 044-062392B | 1P044 | 8x16 | NS | 3 | FOR | P&CAM125 | 2 | 104,168 | NS | NS | NS | | |

TABLE 4-7. (continued)

| EPATest code | Unit code | Press size, ft | No. of openings | No. of vents | Pollutant [b] | Test method [c] | No. of runs | Stack parameters: Flow, dscfm | Stack parameters: Temp, EF | Stack parameters: Moist., % | Pollutant concentration: ppm | Pollutant concentration: gr/dscf | E ra |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 069-062492A | 1P069 | 8x16 | 12 | 1 | FOR | M0011 | 3 | NS | NS | NS | 6.7 | | |
| 070-012793A | 1P070 | 12x8 | 24 | 3 | FOR | M0011 | 3 | 107,344 | 100 | 1.5 | 4.7 | | |
| 088-121092C | 1P088 | 8x16 | 8 | 1 | FOR | M0011 | 3 | 78,584 | 77 | 10.9 | 1.8 | | |
| 088-121588C | 2P088 | 8x16 | 8 | 1 | FOR | MN3500 | 3 | 29,373 | 80 | 2.0 | 12.6 | | |
| 096-012993A | 2P096 | 8x16 | 8 | 2 | FOR | M0011 | 3 | 80,799 | 75 | 0.8 | 2.5 | | |
| 096-060490A | 1P096 | 8x16 | 8 | 2 | FOR | MN3500 | 3 | 27,961 | 108 | 0.8 | 1.7 | | |
| 096-060490C | 1P096 | 8x16 | 8 | 2 | FOR | MN3500 | 3 | 28,049 | 105 | 1.0 | 1.7 | | |
| 096-060590E | 1P096 | 8x16 | 8 | 2 | FOR | MN3500 | 3 | 28,438 | 100 | 0.9 | 2.1 | | |
| 096-060590F | 1P096 | 8x16 | 8 | 2 | FOR | MN3500 | 3 | 27,369 | 113 | 1.1 | 2.2 | | |
| 096-060690B | 1P096 | 8x16 | 8 | 2 | FOR | MN3500 | 3 | 27,232 | 108 | 0.8 | 1.2 | | |
| 096-060690C | 1P096 | 8x16 | 8 | 2 | FOR | MN3500 | 3 | 28,026 | 105 | 0.8 | 0.7 | | |
| 096-060790A | 1P096 | 8x16 | 8 | 2 | FOR | MN3500 | 3 | 27,822 | 103 | 1.0 | 0.8 | | |
| 096-060790B | 1P096 | 8x16 | 8 | 2 | FOR | MN3500 | 3 | 27,018 | 110 | 1.1 | 1.3 | | |
| 096-060890A | 1P096 | 8x16 | 8 | 2 | FOR | MN3500 | 3 | 28,069 | 95 | 1.2 | 0.6 | | |
| 096-060890B | 1P096 | 8x16 | 8 | 2 | FOR | MN3500 | 3 | 27,963 | 111 | 1.2 | 0.7 | | |
| 174-041191C | 1P174 | 8x16 | 16 | 7 | FOR | N3500 | 3 | 154,403 | 122 | 27.8 | 5.1 | | I |
| 210-021292D | 1P210 | 8x16 | 8 | 2 | FOR | M0011 | 3 | 68,297 | 88 | NS | 5.3 | | |
| 211-022592B | 1P211 | 8x24 | 12 | 2 | FOR | M0011 | 3 | 125,706 | 82 | 1.3 | 4.9 | | |
| 225-020692D | 2P225 | 5x18 | 14 | 1 | FOR | M0011 | 3 | 131,803 | 76 | 21.8 | 3.6 | | |
| 225-041990B | 1P225 | 5x18 | 14 | 1 | FOR | MN3500 | 3 | 70,932 | 84 | 0.5 | 4.8 | | |
| 088-031193A | 1P088 | 8x16 | 8 | 1 | MDI | N347 | 3 | 81,042 | 77 | 1.1 | 0.02 | | |
| 088-031193B | 1P088 | 8x16 | 8 | 1 | MDI | N347 | 3 | 80,972 | 78 | 19.2 | 0.03 | | |
| 096-012893B | 2P096 | 8x16 | 8 | 2 | MDI | N347 | 3 | 82,541 | 78 | NS | 0.01 | | |
| 096-092790A | 1P096 | 8x16 | 8 | 2 | MDI | N347 | 3 | 28,425 | 95 | 1.6 | NS | | |
| 096-092790B | 1P096 | 8x16 | 8 | 2 | MDI | N347 | 3 | 28,880 | 92 | 20.9 | NS | | |
| 069-062492A | 1P069 | 8x16 | 12 | 1 | NAPHALENE | NM1501 | 3 | NS | NS | NS | 0.2 | | |
| 070-012893A | 1P070 | 12x8 | 24 | 3 | NAPHALENE | NM1501 | 3 | 107,306 | 102 | 1.5 | 0.01 | | |

TABLE 4-7. (continued)

| EPATest code | Unit code | Press size, ft | No. of openings | No. of vents | Pollutant[b] | Test method[c] | No. of runs | Stack parameters | | | Pollutant concentration | | E ra |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Flow, dscfm | Temp, EF | Moist., % | ppm | gr/dscf | |
| 044-062392A | 1P044 | 8x16 | NS | 3 | PHENOL | TO-8 | 2 | 104,421 | NS | NS | NS | | |
| 044-062392B | 1P044 | 8x16 | NS | 3 | PHENOL | TO-8 | 2 | 104,168 | NS | NS | NS | | |
| 069-062492A | 1P069 | 8x16 | 12 | 1 | PHENOL | N3500 | 3 | NS | NS | NS | 1.9 | | |
| 070-012893A | 1P070 | 12x8 | 24 | 3 | PHENOL | MM5 | 3 | 107,306 | 102 | 25.4 | 1.6 | | |
| 088-120992D | 1P088 | 8x16 | 8 | 1 | PHENOL | M5X | 3 | 81,000 | NS | NS | 0.1 | | |
| 088-120992E | 1P088 | 8x16 | 8 | 1 | PHENOL | N347 | 3 | 82,784 | 75 | 1.2 | 0.1 | | |
| 088-121588C | 2P088 | 8x16 | 8 | 1 | PHENOL | M604 | 3 | 29,373 | 80 | 2.0 | 0.1 | | |

[a] NS = not specified. Lb/MSF 3/8 = pounds of pollutant per thousand square feet of 3/8-inch thick panel.
[b] Pollutant codes are identified in Table 4-6. Factors for VOC on an as carbon basis.
[c] Test methods: M5 = EPA Method 5; M201A = EPA Method 201A; OD7 = Oregon Department of Environmental Quality (ODEQ) Method 7; M202 = EPA Method 202 ODEQ Method 7 back half; M5/202 = EPA Methods 5 and 202, front and back half; M201A/OD7 = EPA Method 201A with ODEQ Method 7 back half; M201A/202 = 10 front and back half; M10 = EPA Method 10; M7E = EPA Method 7E; TO-5 = TO-5 (from Compendium of Methods for the Determination of Toxic Organic Compou P&CAM125; M0011 = BIF Method 0011; MN3500 = Modified NIOSH Method 3500; N3500 = NIOSH Method 3500; N347 = NIOSH P&CAM 347; NM1501 = NI (from Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air); MM5 = modified EPA Method 5; M5X = EPA Method 5 train with Method 604 (phenol).

TABLE 4-8. SUMMARY OF EMISSION FACTORS FOR OSB PRESSES FROM NCASI DATA I

| Test code | Unit code | Board thick., in. | Board density, lb/ft3 | Wood species [b] Primary | % | Second. | % | Adhesive/ resin applic. rate, lb/hr MDI | PF | Pollutant [c] | Emission rate, lb/hr | Producti rate, MSF 3/8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 044-062392A | 1P044 | 0.75 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 772 | PM | 7.40 | 31.08 |
| 044-062392B | 1P044 | 0.38 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 579 | PM | 7.04 | 27.71 |
| 044-092393A | 1P044 | 0.75 | 38.0 | SPRUCE | 50 | UFIR | 50 | | 668 | PM | 4.39 | 28.11 |
| 069-062492A | 1P069 | 0.38 | 37.0 | POPLAR | 100 | NA | NA | | | PM | 0.677 | 25.6 |
| 088-121092A | 1P088 | 0.44 | 37.7 | HWOOD | 95 | PINE SP | 5 | 700 | 429 | PM | 2.13 | 16.66 |
| 096-012893A | 2P096 | 0.44 | 37.0 | NS | NS | NS | NS | 279 | 466 | PM | 1.95 | 20.15 |
| 096-060490A | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 237 | 334 | PM | 1.46 | 12.25 |
| 096-060490C | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 223 | 311 | PM | 0.725 | 11.15 |
| 096-060590E | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 354 | 444 | PM | 0.550 | 17.28 |
| 096-060590F | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 375 | 474 | PM | 0.948 | 18.84 |
| 096-060690B | 1P096 | 1.13 | 33.7 | ASPEN | 60 | PINE SP | 40 | 364 | 457 | PM | 0.795 | 19.74 |
| 096-060690C | 1P096 | 1.13 | 34.2 | ASPEN | 60 | PINE SP | 40 | 230 | 289 | PM | 0.630 | 12.29 |
| 096-060790A | 1P096 | 0.44 | 38.0 | PINE SP | 100 | NA | NA | 232 | 323 | PM | 0.585 | 12.53 |
| 096-060790B | 1P096 | 0.44 | 36.1 | PINE SP | 100 | NA | NA | 364 | 459 | PM | 1.06 | 17.45 |
| 096-060890A | 1P096 | 0.72 | 36.8 | PINE SP | 100 | NA | NA | 233 | 325 | PM | 1.04 | 11.99 |
| 096-060890B | 1P096 | 0.72 | 34.7 | PINE SP | 100 | NA | NA | 365 | 458 | PM | 1.26 | 19.47 |
| 210-021292C | 1P210 | 0.44 | 40.4 | ASPEN | 100 | NA | NA | 749 | | PM | 3.02 | 16.8 |
| 211-022592A | 1P211 | 0.44 | 43.3 | HWOOD | 100 | NA | NA | 547 | 863 | PM | 2.62 | 45.43 |
| 044-092393A | 1P044 | 0.75 | 38.0 | SPRUCE | 50 | UFIR | 50 | | 668 | PM10 | 3.07 | 28.11 |
| 211-022692A | 1P211 | 0.44 | 43.3 | HWOOD | 100 | NA | NA | 537 | 870 | PM10 | 4.90 | 45.43 |
| 044-062392A | 1P044 | 0.75 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 772 | CPM | 9.98 | 31.08 |
| 044-062392B | 1P044 | 0.38 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 579 | CPM | 6.62 | 27.71 |
| 044-092393A | 1P044 | 0.75 | 38.0 | SPRUCE | 50 | UFIR | 50 | | 668 | CPM | 5.47 | 28.11 |
| 088-121092A | 1P088 | 0.44 | 37.7 | HWOOD | 95 | PINE SP | 5 | 700 | 429 | CPM | 3.86 | 16.66 |
| 096-012893A | 2P096 | 0.44 | 37.0 | NS | NS | NS | NS | 279 | 466 | CPM | 1.04 | 20.15 |
| 096-060490A | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 237 | 334 | CPM | 1.26 | 12.25 |
| 096-060490C | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 223 | 311 | CPM | 1.56 | 11.15 |

TABLE 4-8. (continued)

| Test code | Unit code | Board thick., in. | Board density, lb/ft3 | Wood species [b] Primary | % | Second. | % | Adhesive/ resin applic. rate, lb/hr MDI | PF | Pollutant [c] | Emission rate, lb/hr | Producti rate, MSF 3/8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 096-060590E | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 354 | 444 | CPM | 1.55 | 17.28 |
| 096-060590F | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 375 | 474 | CPM | 0.947 | 18.84 |
| 096-060690B | 1P096 | 1.13 | 33.7 | ASPEN | 60 | PINE SP | 40 | 364 | 457 | CPM | 1.73 | 19.74 |
| 096-060690C | 1P096 | 1.13 | 34.2 | ASPEN | 60 | PINE SP | 40 | 230 | 289 | CPM | 1.30 | 12.29 |
| 096-060790A | 1P096 | 0.44 | 38.0 | PINE SP | 100 | NA | NA | 232 | 323 | CPM | 0.577 | 12.53 |
| 096-060790B | 1P096 | 0.44 | 36.1 | PINE SP | 100 | NA | NA | 364 | 459 | CPM | 0.760 | 17.45 |
| 096-060890A | 1P096 | 0.72 | 36.8 | PINE SP | 100 | NA | NA | 233 | 325 | CPM | 0.692 | 11.99 |
| 096-060890B | 1P096 | 0.72 | 34.7 | PINE SP | 100 | NA | NA | 365 | 458 | CPM | 4.54 | 19.47 |
| 210-021292C | 1P210 | 0.44 | 40.4 | ASPEN | 100 | NA | NA | 749 |  | CPM | 0.407 | 16.8 |
| 211-022592A | 1P211 | 0.44 | 43.3 | HWOOD | 100 | NA | NA | 547 | 863 | CPM | 0.133 | 45.43 |
| 211-022692A | 1P211 | 0.44 | 43.3 | HWOOD | 100 | NA | NA | 537 | 870 | CPM | 0.667 | 45.43 |
| 044-062392A | 1P044 | 0.75 | 36.1 | SPRUCE | 50 | UFIR | 50 |  | 772 | PM&CPM | 17.4 | 31.08 |
| 044-062392B | 1P044 | 0.38 | 36.1 | SPRUCE | 50 | UFIR | 50 |  | 579 | PM&CPM | 12.9 | 27.71 |
| 044-092393A | 1P044 | 0.75 | 38.0 | SPRUCE | 50 | UFIR | 50 |  | 668 | PM&CPM | 9.86 | 28.11 |
| 088-121092A | 1P088 | 0.44 | 37.7 | HWOOD | 95 | PINE SP | 5 | 700 | 429 | PM&CPM | 5.99 | 16.66 |
| 096-012893A | 2P096 | 0.44 | 37.0 | NS | NS | NS | NS | 279 | 466 | PM&CPM | 3.00 | 20.15 |
| 096-060490A | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 237 | 334 | PM&CPM | 3.02 | 12.25 |
| 096-060490C | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 223 | 311 | PM&CPM | 1.98 | 11.15 |
| 096-060590E | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 354 | 444 | PM&CPM | 2.10 | 17.28 |
| 096-060590F | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 375 | 474 | PM&CPM | 1.89 | 18.84 |
| 096-060690B | 1P096 | 1.13 | 33.7 | ASPEN | 60 | PINE SP | 40 | 364 | 457 | PM&CPM | 2.53 | 19.74 |
| 096-060690C | 1P096 | 1.13 | 34.2 | ASPEN | 60 | PINE SP | 40 | 230 | 289 | PM&CPM | 1.93 | 12.29 |
| 096-060790A | 1P096 | 0.44 | 38.0 | PINE SP | 100 | NA | NA | 232 | 323 | PM&CPM | 1.16 | 12.53 |
| 096-060790B | 1P096 | 0.44 | 36.1 | PINE SP | 100 | NA | NA | 364 | 459 | PM&CPM | 1.82 | 17.45 |
| 096-060890A | 1P096 | 0.72 | 36.8 | PINE SP | 100 | NA | NA | 233 | 325 | PM&CPM | 1.73 | 11.99 |

TABLE 4-8. (continued)

| Test code | Unit code | Board thick., in. | Board density, lb/ft3 | Wood species [b] Primary | % | Second. | % | Adhesive/ resin applic. rate, lb/hr MDI | PF | Pollutant [c] | Emission rate, lb/hr | Producti[illegible] rate, MSF 3/8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 096-060890B | 1P096 | 0.72 | 34.7 | PINE SP | 100 | NA | NA | 365 | 458 | PM&CPM | 5.33 | 19.47 |
| 210-021292C | 1P210 | 0.44 | 40.4 | ASPEN | 100 | NA | NA | 749 | | PM&CPM | 3.43 | 16.8 |
| 211-022592A | 1P211 | 0.44 | 43.3 | HWOOD | 100 | NA | NA | 547 | 863 | PM&CPM | 2.75 | 45.43 |
| 044-092393A | 1P044 | 0.75 | 38.0 | SPRUCE | 50 | UFIR | 50 | | 668 | PM10&CPM | 8.54 | 28.11 |
| 211-022692A | 1P211 | 0.44 | 43.3 | HWOOD | 100 | NA | NA | 537 | 870 | PM10&CPM | 5.56 | 45.43 |
| 225-020692B | 2P225 | 0.47 | 35.9 | HWOOD | 100 | NA | NA | 162 | 354 | PM10&CPM | 4.86 | 14.4 |
| 044-062392A | 1P044 | 0.75 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 772 | CO | 3.99 | 31.08 |
| 088-121092A | 1P088 | 0.44 | 37.7 | HWOOD | 95 | PINE SP | 5 | 700 | 429 | CO | 1.43 | 16.66 |
| 096-060490A | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 237 | 334 | CO | 1.38 | 12.25 |
| 096-060490C | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 223 | 311 | CO | 1.51 | 11.15 |
| 096-060590E | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 354 | 444 | CO | 0.906 | 17.28 |
| 096-060590F | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 375 | 474 | CO | 0.877 | 18.84 |
| 096-060690B | 1P096 | 1.13 | 33.7 | ASPEN | 60 | PINE SP | 40 | 364 | 457 | CO | 0.707 | 19.74 |
| 096-060690C | 1P096 | 1.13 | 34.2 | ASPEN | 60 | PINE SP | 40 | 230 | 289 | CO | 0.812 | 12.29 |
| 096-060790A | 1P096 | 0.44 | 38.0 | PINE SP | 100 | NA | NA | 232 | 323 | CO | 0.823 | 12.53 |
| 096-060790B | 1P096 | 0.44 | 36.1 | PINE SP | 100 | NA | NA | 364 | 459 | CO | 1.00 | 17.45 |
| 096-060890A | 1P096 | 0.72 | 36.8 | PINE SP | 100 | NA | NA | 233 | 325 | CO | 0.732 | 11.99 |
| 096-060890B | 1P096 | 0.72 | 4.7 | PINE SP | 100 | NA | NA | 49 | 62 | CO | 0.777 | 19.47 |
| 210-021292D | 1P210 | 0.44 | 40.4 | ASPEN | 100 | NA | NA | 749 | | CO | 3.40 | 16.8 |
| 211-022592A | 1P211 | 0.44 | 43.3 | HWOOD | 100 | NA | NA | 547 | 863 | CO | 3.80 | 45.43 |
| 044-062392A | 1P044 | 0.75 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 772 | NOX | 0.170 | 31.08 |
| 044-062392A | 1P044 | 0.75 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 772 | VOC | 2.77 | 31.08 |
| 044-092393A | 1P044 | 0.75 | 38.0 | SPRUCE | 50 | UFIR | 50 | | 668 | VOC | 5.44 | 28.11 |
| 069-062492A | 1P069 | 0.38 | 37.0 | POPLAR | 100 | NA | NA | | | VOC | 0.793 | 25.6 |
| 083-011990A | 1P083 | 0.44 | 40.5 | ASPEN | 95 | PINE SP | 5 | 292 | 491 | VOC | 11.1 | 28.2 |
| 083-012090A | 1P083 | 0.44 | 40.5 | ASPEN | 95 | PINE SP | 5 | 285 | 503 | VOC | 2.61 | 28.2 |

TABLE 4-8. (continued)

| Test code | Unit code | Board thick., in. | Board density, lb/ft3 | Wood species [b] | | | | Adhesive/ resin applic. rate, lb/hr | | Pollutant [c] | Emission rate, lb/hr | Producti rate, MSF 3/8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Primary | % | Second. | % | MDI | PF | | | |
| 088-121092A | 1P088 | 0.44 | 37.7 | HWOOD | 95 | PINE SP | 5 | 700 | 429 | VOC | 2.10 | 16.66 |
| 088-121588C | 2P088 | 0.44 | 37.0 | HWOOD | 95 | SWOOD | 5 | 287 | 287 | VOC | 0.727 | 13.16 |
| 096-012893C | 2P096 | 0.44 | 37.0 | NS | NS | NS | NS | 279 | 466 | VOC | 4.28 | 20.15 |
| 096-060490A | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 237 | 334 | VOC | 0.580 | 12.25 |
| 096-060490C | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 223 | 311 | VOC | 0.750 | 11.15 |
| 096-060590E | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 354 | 444 | VOC | 0.130 | 17.28 |
| 096-060590F | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 375 | 474 | VOC | 0.470 | 18.84 |
| 096-060690B | 1P096 | 1.13 | 33.7 | ASPEN | 60 | PINE SP | 40 | 364 | 457 | VOC | 2.50 | 19.74 |
| 096-060690C | 1P096 | 1.13 | 34.2 | ASPEN | 60 | PINE SP | 40 | 230 | 289 | VOC | 2.70 | 12.29 |
| 096-060790A | 1P096 | 0.44 | 38.0 | PINE SP | 100 | NA | NA | 232 | 323 | VOC | 8.90 | 12.53 |
| 096-060790B | 1P096 | 0.44 | 36.1 | PINE SP | 100 | NA | NA | 364 | 459 | VOC | 13.0 | 17.45 |
| 096-060890A | 1P096 | 0.72 | 36.8 | PINE SP | 100 | NA | NA | 233 | 325 | VOC | 11.0 | 11.99 |
| 096-060890B | 1P096 | 0.72 | 34.7 | PINE SP | 100 | NA | NA | 365 | 458 | VOC | 11.0 | 19.47 |
| 127-082090A | 1P127 | 0.75 | 39.0 | ASPEN | 100 | NA | NA | | 1274 | VOC | 11.4 | 31.68 |
| 127-092289C | 1P127 | 0.75 | 39.0 | ASPEN | 100 | NA | NA | | 1255 | VOC | 39.0 | 31.2 |
| 210-021292B | 1P210 | 0.44 | 40.3 | ASPEN | 100 | NA | NA | 745 | | VOC | 7.73 | 17.5 |
| 210-022389A | 1P210 | 0.44 | 39.7 | ASPEN | 100 | NA | NA | 588 | | VOC | 3.92 | 15.8 |
| 211-022692B | 1P211 | 0.44 | 43.3 | HWOOD | 100 | NA | NA | 537 | 870 | VOC | 7.24 | 45.43 |
| 212-100991A | 1P212 | 0.44 | 43.7 | HWOOD | 10 | SWOOD | 90 | | | VOC | 5.91 | 17.69 |
| 225-020692C | 2P225 | 0.47 | 35.9 | HWOOD | 100 | NA | NA | 162 | 354 | VOC | 3.94 | 14.4 |
| 044-062392A | 1P044 | 0.75 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 772 | FOR | 0.0572 | 31.08 |
| 044-062392A | 1P044 | 0.75 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 772 | FOR | 0.231 | 31.08 |
| 044-062392B | 1P044 | 0.38 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 579 | FOR | 0.0846 | 27.71 |
| 044-062392B | 1P044 | 0.38 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 579 | FOR | 0.283 | 27.71 |
| 069-062492A | 1P069 | 0.38 | 37.0 | POPLAR | 100 | NA | NA | | | FOR | 1.30 | 25.6 |
| 070-012793A | 1P070 | 0.44 | 37.0 | PINE SP | 85 | HWOOD | 15 | | | FOR | 2.38 | 32.48 |

TABLE 4-8. (continued)

| Test code | Unit code | Board thick., in. | Board density, lb/ft3 | Wood species [b] | | | | Adhesive/ resin applic. rate, lb/hr | | Pollutant [c] | Emission rate, lb/hr | Producti rate, MSF 3/8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Primary | % | Second. | % | MDI | PF | | | |
| 088-121092C | 1P088 | 0.44 | 40.2 | HWOOD | 95 | PINE SP | 5 | 700 | 429 | FOR | 0.680 | 16.66 |
| 088-121588C | 2P088 | 0.44 | 37.0 | HWOOD | 95 | SWOOD | 5 | 287 | 287 | FOR | 1.73 | 13.16 |
| 096-012993A | 2P096 | 0.44 | 36.2 | NS | NS | NS | NS | 286 | 443 | FOR | 0.940 | 19.59 |
| 096-060490A | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 237 | 334 | FOR | 0.213 | 12.25 |
| 096-060490C | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 223 | 311 | FOR | 0.227 | 11.15 |
| 096-060590E | 1P096 | 0.44 | 35.6 | ASPEN | 100 | NA | NA | 354 | 444 | FOR | 0.277 | 17.28 |
| 096-060590F | 1P096 | 0.72 | 35.6 | ASPEN | 100 | NA | NA | 375 | 474 | FOR | 0.277 | 18.84 |
| 096-060690B | 1P096 | 1.13 | 33.7 | ASPEN | 60 | PINE SP | 40 | 364 | 457 | FOR | 0.157 | 19.74 |
| 096-060690C | 1P096 | 1.13 | 34.2 | ASPEN | 60 | PINE SP | 40 | 230 | 289 | FOR | 0.0933 | 12.29 |
| 096-060790A | 1P096 | 0.44 | 38.0 | PINE SP | 100 | NA | NA | 232 | 323 | FOR | 0.100 | 12.53 |
| 096-060790B | 1P096 | 0.44 | 36.1 | PINE SP | 100 | NA | NA | 364 | 459 | FOR | 0.167 | 17.45 |
| 096-060890A | 1P096 | 0.72 | 36.8 | PINE SP | 100 | NA | NA | 233 | 325 | FOR | 0.0733 | 11.99 |
| 096-060890B | 1P096 | 0.72 | 34.7 | PINE SP | 100 | NA | NA | 365 | 458 | FOR | 0.100 | 19.47 |
| 174-041191C | 1P174 | 0.44 | 37.0 | PINE SP | 60 | HWOOD | 40 | | | FOR | | 36.3 |
| 210-021292D | 1P210 | 0.44 | 40.4 | ASPEN | 100 | NA | NA | 749 | | FOR | 1.68 | 16.8 |
| 211-022592B | 1P211 | 0.44 | 43.3 | HWOOD | 100 | NA | NA | 547 | 863 | FOR | 2.97 | 45.43 |
| 225-020692D | 2P225 | 0.47 | 35.9 | HWOOD | 100 | NA | NA | 162 | 354 | FOR | 2.22 | 14.4 |
| 225-041990B | 1P225 | 0.44 | 39.0 | HWOOD | 100 | NA | NA | 605 | | FOR | 1.60 | 15.3 |
| 088-031193A | 1P088 | 0.44 | 49.7 | HWOOD | 95 | SWOOD | 5 | 220 | 435 | MDI | 0.0640 | 16.16 |
| 088-031193B | 1P088 | 0.44 | 49.7 | HWOOD | 95 | SWOOD | 5 | 350 | 435 | MDI | 0.096 | 16.16 |
| 096-012893B | 2P096 | 0.44 | 37.0 | NS | NS | NS | NS | 279 | 466 | MDI | 0.0277 | 20.15 |
| 096-092790A | 1P096 | 0.44 | 37.9 | ASPEN | 100 | NA | NA | 366 | | MDI | 0.0273 | 14.7 |
| 096-092790B | 1P096 | 1.13 | 34.0 | ASPEN | 80 | PINE SP | 20 | 361 | | MDI | 0.0130 | 16.2 |
| 069-062492A | 1P069 | 0.38 | 37.0 | POPLAR | 100 | NA | NA | | | NAPHALENE | 0.143 | 25.6 |
| 070-012893A | 1P070 | 0.44 | 37.0 | PINE SP | 85 | HWOOD | 15 | | | NAPHALENE | 0.0143 | 34.56 |
| 044-062392A | 1P044 | 0.75 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 772 | PHENOL | 0.463 | 31.08 |

TABLE 4-8. (continued)

| Test code | Unit code | Board thick., in. | Board density, lb/ft3 | Wood species [b] Primary | % | Second. | % | Adhesive/ resin applic. rate, lb/hr MDI | PF | Pollutant [c] | Emission rate, lb/hr | Producti rate, MSF 3/8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 044-062392B | 1P044 | 0.38 | 36.1 | SPRUCE | 50 | UFIR | 50 | | 579 | PHENOL | 1.79 | 27.71 |
| 069-062492A | 1P069 | 0.38 | 37.0 | POPLAR | 100 | NA | NA | | | PHENOL | 1.16 | 25.6 |
| 070-012893A | 1P070 | 0.44 | 37.0 | PINE SP | 85 | HWOOD | 15 | | | PHENOL | 2.53 | 34.56 |
| 088-120992D | 1P088 | 0.44 | 33.8 | HWOOD | 95 | PINE SP | 5 | 700 | 429 | PHENOL | 0.160 | 16.3 |
| 088-120992E | 1P088 | 0.44 | 33.8 | HWOOD | 95 | PINE SP | 5 | 700 | 429 | PHENOL | 0.182 | 16.3 |
| 088-121588C | 2P088 | 0.44 | 37.0 | HWOOD | 95 | SWOOD | 5 | 287 | 287 | PHENOL | 0.0320 | 13.16 |

[a] NS = not specified. NA = not applicable. PF = phenol formaldehyde. MSF 3/8/hr = thousand square feet of 3/8-inch thick panel per hour. MSF 3/8 = thousand square fe

[b] Wood species: SPRUCE = spruce; UFIR = unspecified fir; POPLAR = poplar; HWOOD = unspecified hardwood; PINE SP = unknown pine species; ASPEN = aspen; SV

[c] Pollutant codes are identified in Table 4-6. Factors for VOC on an as carbon basis.

[d] Emission factors for formaldehyde and phenol in units of lb of pollutant emitted per ton of phenol-formaldehyde resin applied. Emission factors for MDI in units of lb of M applied.

TABLE 4-9. SUMMARY OF EMISSION FACTORS FOR OSB PRESS UNLOADERS FROM NCASI D

| Test code | Unit code | Pollutant[b] | No. of runs | Test method[c] | Wood species[d] Primary | % | Second. | % | Adhesive/ resin type | Emission rate, lb/hr | Pro MS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 083-011990A | 1U083 | VOC | 3 | M25A | ASPEN | 95 | PINE SP | 5 | MDI/PF | 10.32 | |
| 083-012090A | 1U083 | VOC | 3 | M25A | ASPEN | 95 | PINE SP | 5 | MDI/PF | 7.56 | |
| 088-121588B | 1U088 | VOC | 3 | M25A | HWOOD | 95 | PINE SP | 5 | MDI/PF | 0.62 | |
| 210-022389B | 1U210 | VOC | 3 | M25 | ASPEN | 100 | NA | NA | MDI | 1.13 | |
| 212-100991B | 1U212 | VOC | 3 | M25 | SWOOD | 90 | HWOOD | 10 | PF | 5.91 | |
| 088-121588B | 1U088 | FOR | 3 | MN3500 | HWOOD | 95 | PINE SP | 5 | MDI/PF | 0.79 | |
| 225-041990C | 1U225 | FOR | 3 | MN3500 | HWOOD | 100 | NA | NA | MDI | 0.68 | |
| 088-121588D | 1U088 | PHENOL | 2 | M604 | HWOOD | 95 | PINE SP | 5 | MDI/PF | 0.02 | |

[a]NA = not applicable. MSF 3/8/hr = thousand square feet of 3/8-inch thick panel per hour. Lb/MSF 3/8 = pounds of pollutant per thousand square feet of 3/8-inch thick

[b]Pollutant codes are identified in Table 4-6. Factors for VOC on an as carbon basis.

[c]Test methods: M25A = EPA Method 25A; M25 = EPA Method 25; MN3500 = Modified NIOSH Method 3500; M604 = Method 604 (phenol).

[d]Wood species: ASPEN = aspen; PINE SP = unknown pine species; HWOOD = unspecified hardwood; SWOOD = unspecified softwood.

TABLE 4-10. SUMMARY OF EMISSION FACTORS FOR OSB DRYERS FROM EMISSION TEST I

| Ref. Nos. | Unit code | Pollutant [b] | Firing type [c] | Fuel type [d] | Wood species [e] Primary | % | Second. | % | Emission control device [f] | Test method [g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DSL-1 | PM10 | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M201A |
| 1 | DSL-1 | CPM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 1 | DSL-2 | PM10 | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M201A |
| 1 | DSL-2 | CPM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 1 | DSL-3 | PM10 | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M201A |
| 1 | DSL-3 | CPM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 1 | DSL-4 | PM10 | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M201A |
| 1 | DSL-4 | CPM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 1 | DSL-5 | PM10 | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M201A |
| 1 | DSL-5 | CPM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 2 | DSL-1 | FOR | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M0011 |
| 2 | DSL-2 | FOR | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M0011 |
| 2 | DSL-3 | FOR | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M0011 |
| 2 | DSL-4 | FOR | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M0011 |
| 2 | DSL-5 | FOR | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M0011 |
| 3 | DSL-1 | PM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M5 |
| 3 | DSL-1 | CPM-I | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-1 | CPM-O | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-1 | CPM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-1 | CO | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M10 |
| 3 | DSL-1 | CO2 | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M3 |
| 3 | DSL-1 | VOC | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M25A |
| 3 | DSL-2 | PM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M5 |
| 3 | DSL-2 | CPM-I | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-2 | CPM-O | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-2 | CPM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-2 | CO | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M10 |
| 3 | DSL-2 | CO2 | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M3 |
| 3 | DSL-2 | VOC | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M25A |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | DSL-3 | PM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M5 |
| 3 | DSL-3 | CPM-I | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-3 | CPM-O | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-3 | CPM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-3 | CO | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M10 |
| 3 | DSL-3 | CO2 | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M3 |
| 3 | DSL-3 | VOC | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M25A |
| 3 | DSL-4 | PM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M5 |
| 3 | DSL-4 | CPM-I | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-4 | CPM-O | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-4 | CPM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-4 | CO | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M10 |
| 3 | DSL-4 | CO2 | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M3 |
| 3 | DSL-4 | VOC | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M25A |
| 3 | DSL-5 | PM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M5 |
| 3 | DSL-5 | CPM-I | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-5 | CPM-O | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-5 | CPM | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M202 |
| 3 | DSL-5 | CO | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M10 |
| 3 | DSL-5 | CO2 | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M3 |
| 3 | DSL-5 | VOC | DFIRE | WREF | SY PINE | 100 | NA | NA | MCLO | M25A |
| 4 | DCO-1 | PM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M5 |
| 4 | DCO-1 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-1 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-1 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-1 | PM10 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M201A |
| 4 | DCO-1 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-1 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | DCO-1 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-1 | CO | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M10 |
| 4 | DCO-1 | CO2 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M3 |
| 4 | DCO-1 | FOR | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M0011 |
| 4 | DCO-1 | VOC | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M25A |
| 4 | DCO-2 | PM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M5 |
| 4 | DCO-2 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-2 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-2 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-2 | PM10 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M201A |
| 4 | DCO-2 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-2 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-2 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-2 | CO | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M10 |
| 4 | DCO-2 | CO2 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M3 |
| 4 | DCO-2 | FOR | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M0011 |
| 4 | DCO-2 | VOC | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M25A |
| 4 | DCO-3 | PM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M5 |
| 4 | DCO-3 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-3 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-3 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-3 | PM10 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M201A |
| 4 | DCO-3 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-3 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-3 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 4 | DCO-3 | CO | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M10 |
| 4 | DCO-3 | CO2 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M3 |
| 4 | DCO-3 | FOR | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M0011 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant [b] | Firing type [c] | Fuel type [d] | Wood species [e] Primary | % | Second. | % | Emission control device [f] | Test method [g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | DCO-3 | VOC | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M25A |
| 5 | DNW-1 | PM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M5 |
| 5 | DNW-1 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-1 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-1 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-1 | PM10 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M201A |
| 5 | DNW-1 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-1 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-1 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-1 | CO | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M10 |
| 5 | DNW-1 | CO2 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M3 |
| 5 | DNW-1 | FOR | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M0011 |
| 5 | DNW-1 | VOC | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M25A |
| 5 | DNW-2 | PM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M5 |
| 5 | DNW-2 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-2 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-2 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-2 | PM10 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M201A |
| 5 | DNW-2 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-2 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-2 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 5 | DNW-2 | CO | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M10 |
| 5 | DNW-2 | CO2 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M3 |
| 5 | DNW-2 | FOR | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M0011 |
| 5 | DNW-2 | VOC | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M25A |
| 7 | DUR-1 | PM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M5 |
| 7 | DUR-1 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 7 | DUR-1 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 | DUR-1 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 7 | DUR-1 | PM10 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M201A |
| 7 | DUR-1 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 7 | DUR-1 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 7 | DUR-1 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 7 | DUR-1 | CO | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M10 |
| 7 | DUR-1 | CO2 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M3 |
| 7 | DUR-1 | FOR | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M0011 |
| 7 | DUR-1 | VOC | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M25A |
| 7 | DUR-2 | PM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M5 |
| 7 | DUR-2 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 7 | DUR-2 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 7 | DUR-2 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 7 | DUR-2 | PM10 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M201A |
| 7 | DUR-2 | CPM-I | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 7 | DUR-2 | CPM-O | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 7 | DUR-2 | CPM | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M202 |
| 7 | DUR-2 | CO | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M10 |
| 7 | DUR-2 | CO2 | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M3 |
| 7 | DUR-2 | FOR | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M0011 |
| 7 | DUR-2 | VOC | DFIRE | WREF | US PINE | 100 | NA | NA | MCLO | M25A |
| 10 | DEL-1 | PM | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO/EFB | M5 |
| 10 | DEL-1 | PM | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO | M5 |
| 10 | DEL-1 | CPM-I | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO/EFB | M202 |
| 10 | DEL-1 | CPM-I | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO | M202 |
| 10 | DEL-1 | CPM-O | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO/EFB | M202 |
| 10 | DEL-1 | CPM-O | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO | M202 |
| 10 | DEL-1 | CPM | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO/EFB | M202 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | DEL-1 | CPM | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO | M202 |
| 10 | DEL-1 | VOC | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO/EFB | M25A |
| 10 | DEL-1 | VOC | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO | M25A |
| 10 | DEL-1 | VOC | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO/EFB | M25 |
| 10 | DEL-1 | VOC | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO | M25 |
| 10 | DEL-1 | CO | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO/EFB | M10 |
| 10 | DEL-1 | NOX | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO/EFB | M7E |
| 10 | DEL-1 | CO2 | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | MCLO | M3 |
| 11 | DDD-1 | PM | DFIRE | SDUST | US PINE | NS | HWOOD | NS | WESP | M5 |
| 11 | DDD-1 | PM | DFIRE | SDUST | US PINE | NS | HWOOD | NS | CYC | M5 |
| 11 | DDD-1 | CPM-O | DFIRE | SDUST | US PINE | NS | HWOOD | NS | WESP | M5 |
| 11 | DDD-1 | CPM-O | DFIRE | SDUST | US PINE | NS | HWOOD | NS | CYC | M5 |
| 11 | DDD-1 | CO2 | DFIRE | SDUST | US PINE | NS | HWOOD | NS | CYC | M3 |
| 20 | DEL-1 | PM | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | IWS | M5 |
| 21 | DEL-1 | PM | DFIRE | WREF | US PINE | 60 | HWOOD | 40 | IWS | M5 |
| 23,24 | DSA-1 | PM | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M5 |
| 23,24 | DSA-1 | CPM | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M202 |
| 23,24 | DSA-1 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M3A |
| 23,24 | DSA-1 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M7E |
| 23,24 | DSA-1 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M10 |
| 23,24 | DSA-1 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M3A |
| 23,24 | DSA-1 | FOR | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M0011 |
| 23,24 | DSA-1 | VOC | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M25A |
| 23,24 | DSA-2 | PM | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M5 |
| 23,24 | DSA-2 | CPM | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M202 |
| 23,24 | DSA-2 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M3A |
| 23,24 | DSA-2 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M7E |
| 23,24 | DSA-2 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M10 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 23,24 | DSA-2 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M3A |
| 23,24 | DSA-2 | FOR | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M0011 |
| 23,24 | DSA-2 | VOC | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M25A |
| 23,24 | DSA-3 | PM | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M5 |
| 23,24 | DSA-3 | CPM | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M202 |
| 23,24 | DSA-3 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M3A |
| 23,24 | DSA-3 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M7E |
| 23,24 | DSA-3 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M10 |
| 23,24 | DSA-3 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M3A |
| 23,24 | DSA-3 | FOR | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M0011 |
| 23,24 | DSA-3 | VOC | DFIRE | WREF | PINE SP | 100 | NA | NA | CYC | M25A |
| 23,24 | DSA-123 | PM | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP | M5 |
| 23,24 | DSA-123 | CPM | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP | M202 |
| 23,24 | DSA-123 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP | M3A |
| 23,24 | DSA-123 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP | M7E |
| 23,24 | DSA-123 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP | M10 |
| 23,24 | DSA-123 | PM | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP/RTO | M5 |
| 23,24 | DSA-123 | CPM | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP/RTO | M202 |
| 23,24 | DSA-123 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP/RTO | M3A |
| 23,24 | DSA-123 | VOC | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP/RTO | M25A |
| 23,24 | DSA-123 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP/RTO | M7E |
| 23,24 | DSA-123 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP/RTO | M10 |
| 23,24 | DSA-123 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP/RTO | M3A |
| 23,24 | DSA-123 | FOR | DFIRE | WREF | PINE SP | 100 | NA | NA | WESP/RTO | M0011 |
| 29 | DH1-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 29 | DH1-1 | CO2 | DFIRE | WREF | NS | NS | NS | NS | CYC | M3A |
| 29 | DH1-1 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 29 | DH1-1 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 | DH1-2 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 29 | DH1-2 | CO2 | DFIRE | WREF | NS | NS | NS | NS | CYC | M3A |
| 29 | DH1-2 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 29 | DH1-2 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |
| 29 | DH1-12 | PM | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M5 |
| 29 | DH1-12 | CPM | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | WDNR |
| 29 | DH1-12 | VOC | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M25A |
| 29 | DH1-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M3A |
| 29 | DH1-12 | NOX | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M7E |
| 29 | DH1-12 | CO | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M10 |
| 29 | DH1-12 | BENZENE | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M18 |
| 29 | DH1-12 | PHENOL | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | MM5 |
| 29 | DH1-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M3A |
| 29 | DH1-12 | FOR | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M0011 |
| 29 | DH1-12 | BENZOAP | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | MM5 |
| 29 | DH1-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M3A |
| 30 | DCH-1 | PM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 30 | DCH-1 | CPM | DFIRE | WREF | NS | NS | NS | NS | CYC | M202 |
| 30 | DCH-1 | CO2 | DFIRE | WREF | NS | NS | NS | NS | CYC | M3 |
| 30 | DCH-1 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7 |
| 30 | DCH-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 32 | DH1-1 | PM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 32 | DH1-1 | CPM | DFIRE | WREF | NS | NS | NS | NS | CYC | WDNR |
| 32 | DH1-1 | CO2 | DFIRE | WREF | NS | NS | NS | NS | CYC | M3 |
| 32 | DH1-1 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7 |
| 32 | DH1-1 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |
| 32 | DH1-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 32 | DH1-2 | PM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Emission control device[f] | Test method[g] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | DH1-2 | CPM | DFIRE | WREF | NS | NS | NS | NS | CYC | WDNR | |
| 32 | DH1-2 | CO2 | DFIRE | WREF | NS | NS | NS | NS | CYC | M3 | |
| 32 | DH1-2 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7 | |
| 32 | DH1-2 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 | |
| 32 | DH1-2 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A | |
| 32 | DH1-12 | PM | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | M5 | |
| 32 | DH1-12 | CPM | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | WDNR | |
| 32 | DH1-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | M3 | |
| 32 | DH1-12 | NOX | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | M7 | |
| 32 | DH1-12 | CO | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | M10 | |
| 32 | DH1-12 | VOC | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | M25A | |
| 32 | DH1-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | M3 | |
| 32 | DH1-12 | BENZENE | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | M18 | |
| 32 | DH1-12 | PHENOL | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | MM5 | |
| 32 | DH1-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | M3 | |
| 32 | DH1-12 | FOR | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | M0011 | |
| 32 | DH1-12 | NAPHTHALENE | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | MM5 | |
| 32 | DH1-12 | 1METHNAPTH | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | MM5 | |
| 32 | DH1-12 | ACENAPTH | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | MM5 | |
| 32 | DH1-12 | PHENANTH | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | MM5 | |
| 32 | DH1-12 | BENZOAP | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | MM5 | |
| 32 | DH1-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | EFB/RTO | M3 | |
| 32 | DH2-1 | PM | DFIRE | WREF | NS | NS | NS | NS | MCLO | M5 | |
| 32 | DH2-1 | CPM | DFIRE | WREF | NS | NS | NS | NS | MCLO | WDNR | |
| 32 | DH2-1 | CO2 | DFIRE | WREF | NS | NS | NS | NS | MCLO | M3 | |
| 32 | DH2-1 | NOX | DFIRE | WREF | NS | NS | NS | NS | MCLO | M7 | |
| 32 | DH2-1 | CO | DFIRE | WREF | NS | NS | NS | NS | MCLO | M10 | |
| 32 | DH2-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | MCLO | M25A | |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | | |
| 32 | DH2-2 | PM | DFIRE | WREF | NS | NS | NS | NS | MCLO | M5 |
| 32 | DH2-2 | CPM | DFIRE | WREF | NS | NS | NS | NS | MCLO | WDNR |
| 32 | DH2-2 | CO2 | DFIRE | WREF | NS | NS | NS | NS | MCLO | M3 |
| 32 | DH2-2 | NOX | DFIRE | WREF | NS | NS | NS | NS | MCLO | M7 |
| 32 | DH2-2 | CO | DFIRE | WREF | NS | NS | NS | NS | MCLO | M10 |
| 32 | DH2-2 | VOC | DFIRE | WREF | NS | NS | NS | NS | MCLO | M25A |
| 32 | DH2-12 | PM | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | M5 |
| 32 | DH2-12 | CPM | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | WDNR |
| 32 | DH2-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | M3 |
| 32 | DH2-12 | NOX | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | M7 |
| 32 | DH2-12 | CO | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | M10 |
| 32 | DH2-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | M3 |
| 32 | DH2-12 | BENZENE | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | M18 |
| 32 | DH2-12 | PHENOL | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | MM5 |
| 32 | DH2-12 | VOC | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | M25A |
| 32 | DH2-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | M3 |
| 32 | DH2-12 | FOR | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | M0011 |
| 32 | DH2-12 | NAPHTHALENE | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | MM5 |
| 32 | DH2-12 | 1METHNAPTH | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | MM5 |
| 32 | DH2-12 | ACENAPTH | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | MM5 |
| 32 | DH2-12 | PHENANTH | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | MM5 |
| 32 | DH2-12 | BENZOAP | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | MM5 |
| 32 | DH2-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB/RTO | M3 |
| 35 | DTO-12 | CO2 | DFIRE | NGAS | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M3 |
| 35 | DTO-12 | NOX | DFIRE | NGAS | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M7 |
| 35 | DTO-12 | CO | DFIRE | NGAS | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M10 |
| 35 | DTO-12 | FOR | DFIRE | NGAS | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M0011 |
| 37 | DHO-12 | PM | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M5 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant [b] | Firing type [c] | Fuel type [d] | Wood species [e] Primary | % | Second. | % | Emission control device [f] | Test method [g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | DHO-12 | VOC | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M25A |
| 37 | DHO-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M3A |
| 37 | DHO-12 | NOX | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M7E |
| 37 | DHO-12 | CO | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M10 |
| 37 | DHO-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 37 | DHO-1 | CO2 | DFIRE | WREF | NS | NS | NS | NS | CYC | M3A |
| 37 | DHO-1 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 37 | DHO-1 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |
| 37 | DHO-2 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 37 | DHO-2 | CO2 | DFIRE | WREF | NS | NS | NS | NS | CYC | M3A |
| 37 | DHO-2 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 37 | DHO-2 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |
| 38 | DH2-12 | PM | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M5 |
| 38 | DH2-12 | CPM | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | WDNR |
| 38 | DH2-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M3A |
| 38 | DH2-12 | CO | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M10 |
| 38 | DH2-12 | PHENOL | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | MM5 |
| 38 | DH2-12 | VOC | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M25A |
| 38 | DH2-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M3A |
| 38 | DH2-12 | NOX | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M7E |
| 38 | DH2-12 | CO | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M10 |
| 38 | DH2-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M3A |
| 38 | DH2-12 | FOR | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M0011 |
| 38 | DH2-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | M3A |
| 38 | DH2-12 | BENZOAP | DFIRE | WREF | NS | NS | NS | NS | WESP/RTO | MM5 |
| 38 | DH2-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 38 | DH2-1 | CO2 | DFIRE | WREF | NS | NS | NS | NS | CYC | M3A |
| 38 | DH2-1 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 38 | DH2-1 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |
| 38 | DH2-2 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 38 | DH2-2 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 38 | DH2-2 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |
| 38 | DH2-12 | PM | DFIRE | WREF | NS | NS | NS | NS | WESP | M5 |
| 38 | DH2-12 | CPM | DFIRE | WREF | NS | NS | NS | NS | WESP | WDNR |
| 38 | DH2-12 | CO2 | DFIRE | WREF | NS | NS | NS | NS | WESP | M3A |
| 38 | DH2-12 | NOX | DFIRE | WREF | NS | NS | NS | NS | WESP | M7E |
| 39 | DTH-1 | VOC | DFIRE | WREF | HWOOD | 100 | NA | NA | CYC | M25A |
| 39 | DTH-1 | VOC | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP | M25A |
| 42 | DUR-12 | PM | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M5 |
| 42 | DUR-12 | CPM | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M5 |
| 42 | DUR-12 | NOX | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M7E |
| 42 | DUR-12 | CO | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M10 |
| 42 | DUR-12 | VOC | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M25A |
| 42 | DUR-12 | FOR | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M0011 |
| 42 | DUR-1 | PM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 42 | DUR-1 | CPM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 42 | DUR-1 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 42 | DUR-1 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |
| 42 | DUR-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 42 | DUR-1 | FOR | DFIRE | WREF | NS | NS | NS | NS | CYC | M0011 |
| 42 | DUR-2 | PM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 42 | DUR-2 | CPM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 42 | DUR-2 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 42 | DUR-2 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |
| 42 | DUR-2 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 42 | DUR-2 | FOR | DFIRE | WREF | NS | NS | NS | NS | CYC | M0011 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 43 | DNW-1 | PM | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M5 |
| 43 | DNW-1 | CPM | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M5 |
| 43 | DNW-1 | NOX | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M7E |
| 43 | DNW-1 | CO | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M10 |
| 43 | DNW-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M25A |
| 43 | DNW-1 | FOR | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M0011 |
| 43 | DNW-1 | PM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 43 | DNW-1 | CPM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 43 | DNW-1 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 43 | DNW-1 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |
| 43 | DNW-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 43 | DNW-1 | FOR | DFIRE | WREF | NS | NS | NS | NS | CYC | M0011 |
| 44 | DCO-123 | PM | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M5 |
| 44 | DCO-123 | CPM | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M5 |
| 44 | DCO-123 | NOX | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M7E |
| 44 | DCO-123 | CO | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M10 |
| 44 | DCO-123 | VOC | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M25A |
| 44 | DCO-123 | FOR | DFIRE | WREF | NS | NS | NS | NS | MCLO/RTO | M0011 |
| 44 | DCO-1 | PM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 44 | DCO-1 | CPM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 44 | DCO-1 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 44 | DCO-1 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |
| 44 | DCO-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 44 | DCO-1 | FOR | DFIRE | WREF | NS | NS | NS | NS | CYC | M0011 |
| 44 | DCO-2 | PM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 44 | DCO-2 | CPM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 44 | DCO-2 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 44 | DCO-2 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant [b] | Firing type [c] | Fuel type [d] | Wood species [e] Primary | % | Second. | % | Emission control device [f] | Test method [g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 44 | DCO-2 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 44 | DCO-2 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 44 | DCO-2 | FOR | DFIRE | WREF | NS | NS | NS | NS | CYC | M0011 |
| 44 | DCO-3 | PM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 44 | DCO-3 | CPM | DFIRE | WREF | NS | NS | NS | NS | CYC | M5 |
| 44 | DCO-3 | NOX | DFIRE | WREF | NS | NS | NS | NS | CYC | M7E |
| 44 | DCO-3 | CO | DFIRE | WREF | NS | NS | NS | NS | CYC | M10 |
| 44 | DCO-3 | VOC | DFIRE | WREF | NS | NS | NS | NS | CYC | M25A |
| 44 | DCO-3 | FOR | DFIRE | WREF | NS | NS | NS | NS | CYC | M0011 |
| 54 | DMO-1 | PM | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M5 |
| 54 | DMO-1 | CPM | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M202 |
| 54 | DMO-1 | CO | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M10 |
| 54 | DMO-1 | VOC | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M25A |
| 54 | DMO-1 | FOR | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M0011 |
| 57 | DMO-1 | CO2 | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M3 |
| 57 | DMO-1 | FOR | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M0011 |
| 57 | DMO-1 | PM | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M5 |
| 57 | DMO-1 | CPM | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M202 |
| 57 | DMO-1 | CO2 | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M3 |
| 57 | DMO-1 | CO | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M10 |
| 58 | DMO-1 | PM | DFIRE | WREF | NS | NS | NS | NS | MCLO/WESP | M5 |
| 58 | DMO-1 | CPM | DFIRE | WREF | NS | NS | NS | NS | MCLO/WESP | M202 |
| 58 | DMO-1 | CO | DFIRE | WREF | NS | NS | NS | NS | MCLO/WESP | M10 |
| 59 | DNB-1 | PM | DFIRE | WREF | HWOOD | 100 | NA | NA | CYC | M5 |
| 59 | DNB-1 | CPM | DFIRE | WREF | HWOOD | 100 | NA | NA | CYC | M202 |
| 59 | DNB-1 | VOC | DFIRE | WREF | HWOOD | 100 | NA | NA | CYC | M25A |
| 59 | DNB-1 | CO2 | DFIRE | WREF | HWOOD | 100 | NA | NA | CYC | M3A |
| 59 | DNB-1 | NOX | DFIRE | WREF | HWOOD | 100 | NA | NA | CYC | M7E |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | | |
| 59 | DNB-1 | CO | DFIRE | WREF | HWOOD | 100 | NA | NA | CYC | M10 |
| 59 | DNB-1 | CO2 | DFIRE | WREF | HWOOD | 100 | NA | NA | CYC | M3A |
| 59 | DNB-1 | FOR | DFIRE | WREF | HWOOD | 100 | NA | NA | CYC | M0011 |
| 59 | DNB-1 | PM | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP | M5 |
| 59 | DNB-1 | CPM | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP | M202 |
| 59 | DNB-1 | VOC | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP | M25A |
| 59 | DNB-1 | CO2 | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP | M3A |
| 59 | DNB-1 | NOX | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP | M7E |
| 59 | DNB-1 | CO | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP | M10 |
| 59 | DNB-1 | CO2 | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP | M3A |
| 59 | DNB-1 | FOR | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP | M0011 |
| 59 | DNB-1 | PM | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP/RTO | M5 |
| 59 | DNB-1 | CPM | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP/RTO | M202 |
| 59 | DNB-1 | VOC | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP/RTO | M25A |
| 59 | DNB-1 | SO2 | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP/RTO | M6C |
| 59 | DNB-1 | CO2 | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP/RTO | M3A |
| 59 | DNB-1 | NOX | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP/RTO | M7E |
| 59 | DNB-1 | CO | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP/RTO | M10 |
| 59 | DNB-1 | CO2 | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP/RTO | M3A |
| 59 | DNB-1 | FOR | DFIRE | WREF | HWOOD | 100 | NA | NA | WESP/RTO | M0011 |
| 60 | DTO-12 | NOX | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M7E |
| 60 | DTO-12 | CO | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M10 |
| 60 | DTO-12 | CO2 | DFIRE | NGAS | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M3A |
| 60 | DTO-12 | CO | DFIRE | NGAS | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M10 |
| 62 | DMO-1 | PM | DFIRE | WREF | ASPEN | 75 | PINE SP | 25 | MCLO/WESP | M5 |
| 62 | DMO-1 | CPM | DFIRE | WREF | ASPEN | 75 | PINE SP | 25 | MCLO/WESP | M202 |
| 62 | DMO-1 | CO2 | DFIRE | WREF | ASPEN | 75 | PINE SP | 25 | MCLO/WESP | M3A |
| 70 | DMO-1 | PM | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M5 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | | |
| 70 | DMO-1 | CPM | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M202 |
| 70 | DMO-1 | CO2 | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M3A |
| 70 | DMO-1 | CO | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M10 |
| 70 | DMO-1 | VOC | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M25A |
| 70 | DMO-1 | CO2 | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M3A |
| 70 | DMO-1 | FOR | DFIRE | WREF | HWOOD | 80 | SWOOD | 20 | MCLO/WESP | M0011 |
| 73 | DTO-1 | PM | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | M5 |
| 73 | DTO-1 | CPM | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | WDNR |
| 73 | DTO-1 | CO2 | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | M3 |
| 73 | DTO-1 | CO2 | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | M3 |
| 73 | DTO-1 | FOR | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | M0011 |
| 73 | DTO-1 | VOC | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | M25A |
| 73 | DTO-2 | PM | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | M5 |
| 73 | DTO-2 | CPM | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | WDNR |
| 73 | DTO-2 | CO2 | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | M3 |
| 73 | DTO-2 | CO2 | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | M3 |
| 73 | DTO-2 | FOR | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | M0011 |
| 73 | DTO-2 | VOC | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO | M25A |
| 73 | DTO-12 | PM | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M5 |
| 73 | DTO-12 | CPM | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | WDNR |
| 73 | DTO-12 | CO2 | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M3 |
| 73 | DTO-12 | CO | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M10 |
| 73 | DTO-12 | BENZENE | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M18 |
| 73 | DTO-12 | CO2 | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M3 |
| 73 | DTO-12 | NOX | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M7 |
| 73 | DTO-12 | FOR | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M0011 |
| 73 | DTO-12 | VOC | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M25A |
| 73 | DTO-12 | CO2 | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | M3 |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] Primary | % | Second. | % | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 73 | DTO-12 | PHENOL | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | MM5 |
| 73 | DTO-12 | BENZOAP | DFIRE | WREF | HWOOD | 90 | SWOOD | 10 | MCLO/WESP | MM5 |
| 75 | DRX-1 | VOC | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M25A |
| 75 | DRX-1 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M3A |
| 75 | DRX-1 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M7E |
| 75 | DRX-1 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M10 |
| 75 | DRX-2 | VOC | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M25A |
| 75 | DRX-2 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M3A |
| 75 | DRX-2 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M7E |
| 75 | DRX-2 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M10 |
| 75 | DRX-3 | VOC | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M25A |
| 75 | DRX-3 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M3A |
| 75 | DRX-3 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M7E |
| 75 | DRX-3 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M10 |
| 75 | DRX-4 | VOC | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M25A |
| 75 | DRX-4 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M3A |
| 75 | DRX-4 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M7E |
| 75 | DRX-4 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M10 |
| 75 | DRX-5 | VOC | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M25A |
| 75 | DRX-5 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M3A |
| 75 | DRX-5 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M7E |
| 75 | DRX-5 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO | M10 |
| 75 | DRX-12345 | CHROMIUM | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO/RTO | M29 |
| 75 | DRX-12345 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO/RTO | M3A |
| 75 | DRX-12345 | PM | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO/RTO | M5 |
| 75 | DRX-12345 | CPM | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO/RTO | M202 |
| 75 | DRX-12345 | VOC | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO/RTO | M25A |
| 75 | DRX-12345 | CO2 | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO/RTO | M3A |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant [b] | Firing type [c] | Fuel type [d] | Wood species [e] Primary | % | Second. | % | Emission control device [f] | Test method [g] |
|---|---|---|---|---|---|---|---|---|---|---|
| 75 | DRX-12345 | NOX | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO/RTO | M7E |
| 75 | DRX-12345 | CO | DFIRE | WREF | PINE SP | 100 | NA | NA | MCLO/RTO | M10 |
| 94 | DDC-1 | FOR | DFIRE | WREF | NS | NS | NS | NS | MCLO | M0011 |
| 94 | DDC-1 | PHENOL | DFIRE | WREF | NS | NS | NS | NS | MCLO | MM5 |
| 94 | DDC-1 | HCYANIDE | DFIRE | WREF | NS | NS | NS | NS | MCLO | MM5 |
| 94 | DDC-1 | PM | DFIRE | WREF | NS | NS | NS | NS | MCLO | M5 |
| 94 | DDC-1 | CPM | DFIRE | WREF | NS | NS | NS | NS | MCLO | M202 |
| 94 | DDC-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | MCLO | M25A |
| 94 | DDC-1 | CO2 | DFIRE | WREF | NS | NS | NS | NS | MCLO | M3 |
| 95 | DDG-1 | PM | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M5 |
| 95 | DDG-1 | CPM | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M202 |
| 95 | DDG-1 | VOC | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M25A |
| 95 | DDG-1 | CO2 | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M3 |
| 95 | DDG-1 | CO | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M10 |
| 95 | DDG-1 | NOX | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M7 |
| 95 | DDG-1 | FOR | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M0011 |
| 97 | DDG-1 | PM | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M5 |
| 97 | DDG-1 | CPM | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M202 |
| 97 | DDG-1 | NOX | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M7 |
| 97 | DDG-1 | CO2 | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M3 |
| 97 | DDG-1 | CO | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M10 |
| 97 | DDG-1 | VOC | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M25A |
| 97 | DDG-1 | FOR | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M0011 |
| 98,99 | DDG-1 | PM | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB | M5 |
| 98,99 | DDG-1 | CPM | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB | M202 |
| 98,99 | DDG-1 | CO2 | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB | M3 |
| 98,99 | DDG-1 | CO | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB | M10 |
| 98,99 | DDG-1 | VOC | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB | M25A |

TABLE 4-10. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Firing type[c] | Fuel type[d] | Wood species[e] | | | | Emission control device[f] | Test method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Primary | % | Second. | % | | |
| 98,99 | DDG-1 | CO2 | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB | M3 |
| 98,99 | DDG-1 | FOR | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB | M0011 |
| 98,99 | DDG-1 | NOX | DFIRE | WREF | NS | NS | NS | NS | MCLO/EFB | M7 |
| 102 | DMO-1 | PM | DFIRE | WREF | NS | NS | NS | NS | MCLO/WESP | M5 |
| 102 | DMO-1 | CPM | DFIRE | WREF | NS | NS | NS | NS | MCLO/WESP | M202 |
| 106 | DDG-1 | CO2 | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M3A |
| 106 | DDG-1 | NOX | DFIRE | WREF | HWOOD | 99 | SWOOD | 1 | MCLO/EFB | M7E |

[a] NS = not specified. NA = not applicable. Lb/ODT = pounds of pollutant per oven-dried ton of wood material out of dryer.

[b] Pollutant codes are identified in Table 4-6. Factors for VOC on an as carbon basis.

[c] Firing type: DFIRE = direct firing.

[d] Fuel types: WREF = wood residue; SDUST = sanderdust; NGAS = natural gas.

[e] Wood species: SY PINE = Southern yellow pine; US PINE = unspecified southern pines; HWOOD = unspecified hardwood; PINE SP = unspecified pin softwood; ASPEN = aspen.

[f] Emission control devices: CYC = cyclone; MCLO = multiclone; EFB = electrified filter bed; WESP = wet electrostatic precipitator; IWS = ionizing wet s thermal oxidizer.

[g] Test methods: M201A = EPA Method 201A; M202 = EPA Method 202; M0011 = BIF Method 0011; M5 = EPA Method 5; M10 = EPA M M3A = EPA Method 3A; M25 = EPA Method 25; M25A = EPA Method 25A; M7 = EPA Method 7; M7E = EPA Method 7E; M18 = EPA modification of EPA Method 5; M6C = EPA Method 6C; M29 = EPA Method 29; WDNR = Wisconsin Department of Natural Resources me

TABLE 4-11. SUMMARY OF EMISSION FACTORS FOR OSB PRESSES FROM EMISSION TEST I

| Ref. Nos. | Unit code | Pollutant[b] | Wood species[c] | | | | Resin type[d] | Control device[e] | Test method[f] | ( |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Primary | % | Secondary | % | | | | |
| 4 | PCO-1 | PM | US PINE | 100 | NA | NA | NS | NONE | M5 | |
| 4 | PCO-1 | CPM-I | US PINE | 100 | NA | NA | NS | NONE | M202 | |
| 4 | PCO-1 | CPM-O | US PINE | 100 | NA | NA | NS | NONE | M202 | |
| 4 | PCO-1 | CPM | US PINE | 100 | NA | NA | NS | NONE | M202 | |
| 4 | PCO-1 | FOR | US PINE | 100 | NA | NA | NS | NONE | M0011 | |
| 4 | PCO-1 | VOC | US PINE | 100 | NA | NA | NS | NONE | M25A | |
| 7 | PUR-1 | PM | US PINE | 100 | NA | NA | PF/MDI | NONE | M5 | |
| 7 | PUR-1 | CPM-I | US PINE | 100 | NA | NA | PF/MDI | NONE | M202 | |
| 7 | PUR-1 | CPM-O | US PINE | 100 | NA | NA | PF/MDI | NONE | M202 | |
| 7 | PUR-1 | CPM | US PINE | 100 | NA | NA | PF/MDI | NONE | M202 | |
| 7 | PUR-1 | FOR | US PINE | 100 | NA | NA | PF/MDI | NONE | M0011 | |
| 7 | PUR-1 | VOC | US PINE | 100 | NA | NA | PF/MDI | NONE | M25A | |
| 23,24 | PSA-1 | PM | PINE SP | 100 | NA | NA | PF/MDI | RTO | M5 | |
| 23,24 | PSA-1 | CPM | PINE SP | 100 | NA | NA | PF/MDI | RTO | M202 | |
| 23,24 | PSA-1 | CO2 | PINE SP | 100 | NA | NA | PF/MDI | RTO | M3A | |
| 23,24 | PSA-1 | VOC | PINE SP | 100 | NA | NA | PF/MDI | NONE | M25A | |
| 23,24 | PSA-1 | NOX | PINE SP | 100 | NA | NA | PF/MDI | NONE | M7E | |
| 23,24 | PSA-1 | CO | PINE SP | 100 | NA | NA | PF/MDI | NONE | M10 | |
| 23,24 | PSA-1 | PHENOL | PINE SP | 100 | NA | NA | PF/MDI | NONE | MM5 | |
| 23,24 | PSA-1 | VOC | PINE SP | 100 | NA | NA | PF/MDI | RTO | M25A | |
| 23,24 | PSA-1 | NOX | PINE SP | 100 | NA | NA | PF/MDI | RTO | M7E | |
| 23,24 | PSA-1 | CO | PINE SP | 100 | NA | NA | PF/MDI | RTO | M10 | |
| 23,24 | PSA-1 | PHENOL | PINE SP | 100 | NA | NA | PF/MDI | RTO | MM5 | |
| 23,24 | PSA-1 | MDI | PINE SP | 100 | NA | NA | PF/MDI | RTO | 1,2-PP | |
| 23,24 | PSA-1 | CO2 | PINE SP | 100 | NA | NA | PF/MDI | NONE | M3A | |
| 23,24 | PSA-1 | FOR | PINE SP | 100 | NA | NA | PF/MDI | NONE | M0011 | |
| 23,24 | PSA-1 | CO2 | PINE SP | 100 | NA | NA | PF/MDI | RTO | M3A | |
| 23,24 | PSA-1 | FOR | PINE SP | 100 | NA | NA | PF/MDI | RTO | M0011 | |
| 29 | PH1-1 | PM | NS | NS | NS | NS | PF/MDI | RTO | M5 | |
| 29 | PH1-1 | CPM | NS | NS | NS | NS | PF/MDI | RTO | WDNR | |
| 29 | PH1-1 | VOC | NS | NS | NS | NS | PF/MDI | RTO | M25A | |

TABLE 4-11. (continued)

| Ref. Nos. | Unit code | Pollutant[b] | Wood species[c] | | | | Resin type[d] | Control device[e] | Test method[f] | ( |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Primary | % | Secondary | % | | | | |
| 29 | PH1-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3A | |
| 29 | PH1-1 | NOX | NS | NS | NS | NS | PF/MDI | RTO | M7E | |
| 29 | PH1-1 | CO | NS | NS | NS | NS | PF/MDI | RTO | M10 | |
| 29 | PH1-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3A | |
| 29 | PH1-1 | MDI | NS | NS | NS | NS | PF/MDI | RTO | 1,2-PP | |
| 29 | PH1-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3A | |
| 29 | PH1-1 | FOR | NS | NS | NS | NS | PF/MDI | RTO | M0011 | |
| 29 | PH1-1 | VOC | NS | NS | NS | NS | PF/MDI | NONE | M25A | |
| 29 | PH1-1 | NOX | NS | NS | NS | NS | PF/MDI | NONE | M7E | |
| 29 | PH1-1 | CO | NS | NS | NS | NS | PF/MDI | NONE | M10 | |
| 30 | PCH-1 | PM | NS | NS | NS | NS | MDI | NONE | M5 | |
| 30 | PCH-1 | CPM | NS | NS | NS | NS | MDI | NONE | M202 | |
| 30 | PCH-1 | CO2 | NS | NS | NS | NS | MDI | NONE | M3 | |
| 30 | PCH-1 | VOC | NS | NS | NS | NS | MDI | NONE | M25A | |
| 36 | PSA-1 | PM | NS | NS | NS | NS | PF/MDI | NONE | M5 | |
| 36 | PSA-1 | CPM | NS | NS | NS | NS | PF/MDI | NONE | M202 | |
| 36 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3A | |
| 36 | PSA-1 | CO | NS | NS | NS | NS | PF/MDI | NONE | M10 | |
| 36 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3A | |
| 36 | PSA-1 | FOR | NS | NS | NS | NS | PF/MDI | NONE | M0011 | |
| 36 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3A | |
| 36 | PSA-1 | PHENOL | NS | NS | NS | NS | PF/MDI | NONE | MM5 | |
| 36 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3A | |
| 36 | PSA-1 | MDI | NS | NS | NS | NS | PF/MDI | NONE | 1,2-PP | |
| 36 | PSA-1 | VOC | NS | NS | NS | NS | PF/MDI | NONE | M25A | |
| 36 | PSA-1 | PM | NS | NS | NS | NS | PF/MDI | RTO | M5 | |
| 36 | PSA-1 | CPM | NS | NS | NS | NS | PF/MDI | RTO | M202 | |
| 36 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3A | |
| 36 | PSA-1 | CO | NS | NS | NS | NS | PF/MDI | RTO | M10 | |
| 36 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3A | |

TABLE 4-11. (continued)

| Ref. Nos. | Unit code | Pollutant [b] | Wood species [c] | | | | Resin type [d] | Control device [e] | Test method [f] | ( |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Primary | % | Secondary | % | | | | |
| 36 | PSA-1 | FOR | NS | NS | NS | NS | PF/MDI | RTO | M0011 | |
| 36 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3A | |
| 36 | PSA-1 | PHENOL | NS | NS | NS | NS | PF/MDI | RTO | MM5 | |
| 36 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3A | |
| 36 | PSA-1 | MDI | NS | NS | NS | NS | PF/MDI | RTO | 1,2-PP | |
| 36 | PSA-1 | VOC | NS | NS | NS | NS | PF/MDI | RTO | M25A | |
| 38 | PH2-1 | PM | NS | NS | NS | NS | PF/MDI | RTO | M5 | |
| 38 | PH2-1 | CPM | NS | NS | NS | NS | PF/MDI | RTO | WDNR | |
| 38 | PH2-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3A | |
| 38 | PH2-1 | VOC | NS | NS | NS | NS | PF/MDI | RTO | M25A | |
| 38 | PH2-1 | NOX | NS | NS | NS | NS | PF/MDI | RTO | M7E | |
| 38 | PH2-1 | CO | NS | NS | NS | NS | PF/MDI | RTO | M10 | |
| 38 | PH2-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3A | |
| 38 | PH2-1 | FOR | NS | NS | NS | NS | PF/MDI | RTO | M0011 | |
| 38 | PH2-1 | VOC | NS | NS | NS | NS | PF/MDI | NONE | M25A | |
| 38 | PH2-1 | NOX | NS | NS | NS | NS | PF/MDI | NONE | M7E | |
| 38 | PH2-1 | CO | NS | NS | NS | NS | PF/MDI | NONE | M10 | |
| 39 | PTH-1 | PM | HWOOD | 100 | NA | NA | MDI | NONE | M5 | |
| 39 | PTH-1 | CPM | HWOOD | 100 | NA | NA | MDI | NONE | M202 | |
| 39 | PTH-1 | VOC | HWOOD | 100 | NA | NA | MDI | NONE | M25A | |
| 39 | PTH-1 | CO2 | HWOOD | 100 | NA | NA | MDI | NONE | M3A | |
| 39 | PTH-1 | NOX | HWOOD | 100 | NA | NA | MDI | NONE | M7E | |
| 39 | PTH-1 | CO | HWOOD | 100 | NA | NA | MDI | NONE | M10 | |
| 40,41 | PHO-1 | PM | NS | NS | NS | NS | PF/MDI | NONE | M5 | |
| 40,41 | PHO-1 | CPM | NS | NS | NS | NS | PF/MDI | NONE | M202 | |
| 40,41 | PHO-1 | VOC | NS | NS | NS | NS | PF/MDI | NONE | M25A | |
| 40,41 | PHO-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3 | |
| 40,41 | PHO-1 | PM | NS | NS | NS | NS | PF/MDI | RTO | M5 | |
| 40,41 | PHO-1 | CPM | NS | NS | NS | NS | PF/MDI | RTO | M202 | |
| 40,41 | PHO-1 | VOC | NS | NS | NS | NS | PF/MDI | RTO | M25A | |

TABLE 4-11. (continued)

| Ref. Nos. | Unit code | Pollutant [b] | Wood species [c] | | | | Resin type [d] | Control device [e] | Test method [f] | ( |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Primary | % | Secondary | % | | | | |
| 40,41 | PHO-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3 | |
| 47 | PSL-1 | PM | SY PINE | 100 | NA | NA | PF/MDI | RTO | M5 | |
| 47 | PSL-1 | CPM | SY PINE | 100 | NA | NA | PF/MDI | RTO | M5 | |
| 47 | PSL-1 | NOX | SY PINE | 100 | NA | NA | PF/MDI | RTO | M7E | |
| 47 | PSL-1 | CO | SY PINE | 100 | NA | NA | PF/MDI | RTO | M10 | |
| 47 | PSL-1 | MDI | SY PINE | 100 | NA | NA | PF/MDI | RTO | NM142 | |
| 47 | PSL-1 | VOC | SY PINE | 100 | NA | NA | PF/MDI | RTO | M25A | |
| 47 | PSL-1 | FOR | SY PINE | 100 | NA | NA | PF/MDI | RTO | M0011 | |
| 47 | PSL-1 | PHENOL | SY PINE | 100 | NA | NA | PF/MDI | RTO | NMS330 | |
| 47 | PSL-1 | PM | SY PINE | 100 | NA | NA | PF/MDI | NONE | M5 | |
| 47 | PSL-1 | CPM | SY PINE | 100 | NA | NA | PF/MDI | NONE | M5 | |
| 47 | PSL-1 | NOX | SY PINE | 100 | NA | NA | PF/MDI | NONE | M7E | |
| 47 | PSL-1 | CO | SY PINE | 100 | NA | NA | PF/MDI | NONE | M10 | |
| 47 | PSL-1 | VOC | SY PINE | 100 | NA | NA | PF/MDI | NONE | M25A | |
| 49,50 | PDG-1 | VOC | POPLAR | 90 | PINE SP | 10 | PF/MDI | NONE | M25A | |
| 49,50 | PDG-1 | SO2 | POPLAR | 90 | PINE SP | 10 | PF/MDI | NONE | M6C | |
| 49,50 | PDG-1 | CO2 | POPLAR | 90 | PINE SP | 10 | PF/MDI | NONE | M3 | |
| 49,50 | PDG-1 | NOX | POPLAR | 90 | PINE SP | 10 | PF/MDI | NONE | M7E | |
| 49,50 | PDG-1 | CO | POPLAR | 90 | PINE SP | 10 | PF/MDI | NONE | M10 | |
| 49,50 | PDG-1 | FOR | POPLAR | 90 | PINE SP | 10 | PF/MDI | NONE | M0011 | |
| 49,50 | PDG-1 | CO2 | POPLAR | 90 | PINE SP | 10 | PF/MDI | NONE | M3 | |
| 49,50 | PDG-1 | MDI | POPLAR | 90 | PINE SP | 10 | PF/MDI | NONE | 1,2-PP | |
| 52 | PHO-1 | NOX | POPLAR | 90 | HWOOD | 10 | PF/MDI | NONE | M7E | |
| 52 | PHO-1 | CO | POPLAR | 90 | HWOOD | 10 | PF/MDI | NONE | M10 | |
| 52 | PHO-1 | FOR | POPLAR | 90 | HWOOD | 10 | PF/MDI | NONE | ACET | |
| 52 | PHO-1 | NOX | POPLAR | 90 | HWOOD | 10 | PF/MDI | RTO | M7E | |
| 52 | PHO-1 | CO | POPLAR | 90 | HWOOD | 10 | PF/MDI | RTO | M10 | |
| 52 | PHO-1 | FOR | POPLAR | 90 | HWOOD | 10 | PF/MDI | RTO | ACET | |
| 54 | PMO-1 | PM | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M5 | |
| 54 | PMO-1 | CPM | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M202 | |

TABLE 4-11. (continued)

| Ref. Nos. | Unit code | Pollutant [b] | Wood species [c] | | | | Resin type [d] | Control device [e] | Test method [f] |
|---|---|---|---|---|---|---|---|---|---|
| | | | Primary | % | Secondary | % | | | |
| 54 | PMO-1 | FOR | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M0011 |
| 54 | PMO-1 | VOC | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M25A |
| 54 | PMO-1 | MDI | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | 1,2-PP |
| 56 | PH1-1 | PM | NS | NS | NS | NS | PF/MDI | NONE | M5 |
| 56 | PH1-1 | CPM | NS | NS | NS | NS | PF/MDI | NONE | WDNR |
| 56 | PH1-1 | VOC | NS | NS | NS | NS | PF/MDI | NONE | M25A |
| 56 | PH1-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3 |
| 56 | PH1-1 | FOR | NS | NS | NS | NS | PF/MDI | RTO | M0011 |
| 56 | PH1-1 | PM | NS | NS | NS | NS | PF/MDI | RTO | M5 |
| 56 | PH1-1 | CPM | NS | NS | NS | NS | PF/MDI | RTO | WDNR |
| 56 | PH1-1 | VOC | NS | NS | NS | NS | PF/MDI | RTO | M25A |
| 56 | PH1-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3 |
| 56 | PH1-1 | NOX | NS | NS | NS | NS | PF/MDI | RTO | M7E |
| 56 | PH1-1 | CO | NS | NS | NS | NS | PF/MDI | RTO | M10 |
| 56 | PH1-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3 |
| 56 | PH1-1 | MDI | NS | NS | NS | NS | PF/MDI | RTO | 1,2-PP |
| 56 | PH2-1 | PM | NS | NS | NS | NS | PF/MDI | NONE | M5 |
| 56 | PH2-1 | CPM | NS | NS | NS | NS | PF/MDI | NONE | WDNR |
| 56 | PH2-1 | VOC | NS | NS | NS | NS | PF/MDI | NONE | M25A |
| 56 | PH2-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3 |
| 56 | PH2-1 | PM | NS | NS | NS | NS | PF/MDI | RTO | M5 |
| 56 | PH2-1 | CPM | NS | NS | NS | NS | PF/MDI | RTO | WDNR |
| 56 | PH2-1 | VOC | NS | NS | NS | NS | PF/MDI | RTO | M25A |
| 56 | PH2-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3 |
| 56 | PH2-1 | NOX | NS | NS | NS | NS | PF/MDI | RTO | M7E |
| 56 | PH2-1 | CO | NS | NS | NS | NS | PF/MDI | RTO | M10 |
| 56 | PH2-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3 |
| 56 | PH2-1 | FOR | NS | NS | NS | NS | PF/MDI | RTO | M0011 |
| 56 | PH2-1 | CO2 | NS | NS | NS | NS | PF/MDI | RTO | M3 |
| 56 | PH2-1 | MDI | NS | NS | NS | NS | PF/MDI | RTO | 1,2-PP |

TABLE 4-11. (continued)

| Ref. Nos. | Unit code | Pollutant [b] | Wood species [c] Primary | % | Secondary | % | Resin type [d] | Control device [e] | Test method [f] | ( |
|---|---|---|---|---|---|---|---|---|---|---|
| 57 | PMO-1 | CO2 | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M3 | |
| 57 | PMO-1 | FOR | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M0011 | |
| 57 | PMO-1 | PM | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M5 | |
| 57 | PMO-1 | CPM | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M202 | |
| 57 | PMO-1 | CO2 | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M3 | |
| 57 | PMO-1 | VOC | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M25A | |
| 57 | PMO-1 | CO2 | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M3 | |
| 57 | PMO-1 | MDI | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | N347 | |
| 59 | PNB-1 | CO2 | HWOOD | 100 | NA | NA | MDI | NONE | M3A | |
| 59 | PNB-1 | MDI | HWOOD | 100 | NA | NA | MDI | NONE | 1,2-PP | |
| 59 | PNB-1 | CO2 | HWOOD | 100 | NA | NA | MDI | NONE | M3A | |
| 59 | PNB-1 | FOR | HWOOD | 100 | NA | NA | MDI | NONE | M0011 | |
| 59 | PNB-1 | PM | HWOOD | 100 | NA | NA | MDI | NONE | M5 | |
| 59 | PNB-1 | CPM | HWOOD | 100 | NA | NA | MDI | NONE | M202 | |
| 59 | PNB-1 | VOC | HWOOD | 100 | NA | NA | MDI | NONE | M25A | |
| 59 | PNB-1 | CO2 | HWOOD | 100 | NA | NA | MDI | NONE | M3A | |
| 59 | PNB-1 | NOX | HWOOD | 100 | NA | NA | MDI | NONE | M7E | |
| 59 | PNB-1 | CO | HWOOD | 100 | NA | NA | MDI | NONE | M10 | |
| 60 | PTO-1 | PM | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M5 | |
| 60 | PTO-1 | CPM | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M202 | |
| 60 | PTO-1 | CO2 | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M3A | |
| 60 | PTO-1 | CO | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M10 | |
| 70 | PMO-1 | PM | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M5 | |
| 70 | PMO-1 | CPM | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M202 | |
| 70 | PMO-1 | CO2 | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M3A | |
| 70 | PMO-1 | VOC | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M25A | |
| 70 | PMO-1 | CO2 | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M3A | |
| 70 | PMO-1 | FOR | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M0011 | |
| 70 | PMO-1 | CO2 | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | M3A | |
| 70 | PMO-1 | MDI | HWOOD | 80 | SWOOD | 20 | PF/MDI | NONE | 1,2-PP | |

TABLE 4-11. (continued)

| Ref. Nos. | Unit code | Pollutant [b] | Wood species [c] Primary | % | Secondary | % | Resin type [d] | Control device [e] | Test method [f] | ( |
|---|---|---|---|---|---|---|---|---|---|---|
| 71 | PTO-1 | PM | NS | NS | NS | NS | PF/MDI | NONE | M5 | |
| 71 | PTO-1 | CPM | NS | NS | NS | NS | PF/MDI | NONE | M202 | |
| 71 | PTO-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3 | |
| 71 | PTO-1 | CO | NS | NS | NS | NS | PF/MDI | NONE | M10 | |
| 73 | PTO-1 | PM | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M5 | |
| 73 | PTO-1 | CPM | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | WDNR | |
| 73 | PTO-1 | CO2 | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M3 | |
| 73 | PTO-1 | CO | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M10 | |
| 73 | PTO-1 | CO2 | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M3 | |
| 73 | PTO-1 | FOR | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M0011 | |
| 73 | PTO-1 | VOC | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M25A | |
| 73 | PTO-1 | CO2 | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | M3 | |
| 73 | PTO-1 | PHENOL | HWOOD | 90 | SWOOD | 10 | PF/MDI | NONE | MM5 | |
| 75 | PRX-1 | VOC | PINE SP | 100 | NA | NA | PF/MDI | NONE | M25A | |
| 75 | PRX-1 | PM | PINE SP | 100 | NA | NA | PF/MDI | RTO | M5 | |
| 75 | PRX-1 | CPM | PINE SP | 100 | NA | NA | PF/MDI | RTO | M202 | |
| 75 | PRX-1 | VOC | PINE SP | 100 | NA | NA | PF/MDI | RTO | M25A | |
| 75 | PRX-1 | CO2 | PINE SP | 100 | NA | NA | PF/MDI | RTO | M3A | |
| 75 | PRX-1 | NOX | PINE SP | 100 | NA | NA | PF/MDI | RTO | M7E | |
| 75 | PRX-1 | CO | PINE SP | 100 | NA | NA | PF/MDI | RTO | M10 | |
| 76,77 | PSA-1 | PM | NS | NS | NS | NS | PF/MDI | NONE | M5 | |
| 76,77 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3 | |
| 76,77 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3 | |
| 76,77 | PSA-1 | PHENOL | NS | NS | NS | NS | PF/MDI | NONE | MM5 | |
| 76,77 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3 | |
| 76,77 | PSA-1 | FOR | NS | NS | NS | NS | PF/MDI | NONE | M0011 | |
| 76,77 | PSA-1 | VOC | NS | NS | NS | NS | PF/MDI | NONE | M25A | |
| 76,77 | PSA-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3 | |
| 76,77 | PSA-1 | MDI | NS | NS | NS | NS | PF/MDI | NONE | N347 | |
| 94 | PDC-1 | FOR | NS | NS | NS | NS | PF/MDI | NONE | M0011 | |

TABLE 4-11. (continued)

| Ref. Nos. | Unit code | Pollutant [b] | Wood species [c] | | | | Resin type [d] | Control device [e] | Test method [f] | ( |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Primary | % | Secondary | % | | | | |
| 94 | PDC-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3 | |
| 94 | PDC-1 | PHENOL | NS | NS | NS | NS | PF/MDI | NONE | MM5 | |
| 94 | PDC-1 | VOC | NS | NS | NS | NS | PF/MDI | NONE | M25A | |
| 94 | PDC-1 | VOC | NS | NS | NS | NS | PF/MDI | NONE | M25A | |
| 94 | PDC-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3 | |
| 94 | PDC-1 | MDI | NS | NS | NS | NS | PF/MDI | NONE | N347 | |
| 95 | PDG-1 | CO2 | HWOOD | 99 | SWOOD | 1 | PF/MDI | NONE | M3 | |
| 95 | PDG-1 | FOR | HWOOD | 99 | SWOOD | 1 | PF/MDI | NONE | M0011 | |
| 95 | PDG-1 | PHENOL | HWOOD | 99 | SWOOD | 1 | PF/MDI | NONE | MM5 | |
| 95 | PDG-1 | MDI | HWOOD | 99 | SWOOD | 1 | PF/MDI | NONE | N347 | |
| 95 | PDG-1 | VOC | HWOOD | 99 | SWOOD | 1 | PF/MDI | NONE | M25A | |
| 96 | PDG-1 | VOC | HWOOD | 95 | SWOOD | 5 | PF/MDI | NONE | M25A | |
| 96 | PDG-1 | CO2 | HWOOD | 95 | SWOOD | 5 | PF/MDI | NONE | M3A | |
| 97 | PDG-1 | CO2 | HWOOD | 99 | SWOOD | 1 | PF/MDI | NONE | M3 | |
| 97 | PDG-1 | FOR | HWOOD | 99 | SWOOD | 1 | PF/MDI | NONE | M0011 | |
| 97 | PDG-1 | VOC | HWOOD | 99 | SWOOD | 1 | PF/MDI | NONE | M25A | |
| 97 | PDG-1 | PHENOL | HWOOD | 99 | SWOOD | 1 | PF/MDI | NONE | MM5 | |
| 97 | PDG-1 | MDI | HWOOD | 99 | SWOOD | 1 | PF/MDI | NONE | N347 | |
| 97 | PDG-1 | MDI | HWOOD | 99 | SWOOD | 1 | PF/MDI | NONE | 1,2-PP | |
| 98,99 | PDG-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3 | |
| 98,99 | PDG-1 | FOR | NS | NS | NS | NS | PF/MDI | NONE | M0011 | |
| 98,99 | PDG-1 | PHENOL | NS | NS | NS | NS | PF/MDI | NONE | MM5 | |
| 98,99 | PDG-1 | MDI | NS | NS | NS | NS | PF/MDI | NONE | N347 | |
| 98,99 | PDG-1 | MDI | NS | NS | NS | NS | PF/MDI | NONE | 1,2-PP | |
| 98,99 | PDG-1 | VOC | NS | NS | NS | NS | PF/MDI | NONE | M25A | |

TABLE 4-11. (continued)

| Ref. Nos. | Unit code | Pollutant [b] | Wood species [c] | | | | Resin type [d] | Control device [e] | Test method [f] | ( |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Primary | % | Secondary | % | | | | |
| 105 | PDG-1 | MDI | NS | NS | NS | NS | PF/MDI | NONE | N347 | |
| 105 | PDG-1 | CO2 | NS | NS | NS | NS | PF/MDI | NONE | M3A | |

[a]NS = not specified. NA = not applicable. Lb/MSF 3/8 = pounds of pollutant per thousand square feet of 3/8-in. thick panel.
[b]Pollutant codes are identified in Table 4-6. Factors for VOC on an as carbon basis.
[c]Wood species: US PINE = unspecified southern pines; PINE SP = unspecified pines; HWOOD = unspecified hardwood;
[d]Resin type: PF = phenol-formaldehyde; MDI = methylene bisphenyl isocyanate.
[e]Control device: RTO = regenerative thermal oxidizer.
[f]Test method: M5 = EPA Method 5; M202 = EPA Method 202; M0011 = BIF Method 0011; M25A = EPA Method 25A; M3 = EPA Method 3; M3A M7E = EPA Method 7E; M10 = EPA Method 10; MM5 = a modification of EPA Method 5; 1,2-PP = draft 1-(2-pyridyl) piperazine method for MDI; W Department of Natural Resources method; NM142 = NIOSH Method 142; NMS330 = NIOSH Method S330; M6C = EPA Method 6C; ACET = NCA N347 = NIOSH Method 347.

TABLE 4-12. SUMMARY OF CANDIDATE EMISSION FACTORS FOR WB/OSB DRYERS
CRITERIA POLLUTANTS AND CHROMIUM [a]

| Pollutant | No. of tests | No. of dryers | Wood species | Emission control device[b] | Emission factor, lb/ODT | | | Stan. dev.[c] | Rating | R |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Average | | | |
| Direct wood-fired rotary dryer | | | | | | | | | | |
| Condensible PM | 3 | 3 | Unspecified pines | None[d] | 1.3 | 2.2 | 1.9 | NA | D | 23 |
| Condensible PM | 1 | 1 | Hardwood | None[d] | NA | NA | 1.9 | NA | E | 59 |
| Condensible PM | 24 | 12 | Unspecified pines | MCLO | 0.052 | 1.4 | 0.41 | 0.37 | B | 1, |
| Condensible PM | 2 | 2 | Hardwood | MCLO | 0.23 | 0.76 | 0.50 | NA | D | 73 |
| Condensible PM | 3 | 2 | Unspecified pines | EFB | 0.38 | 0.60 | 0.49 | NA | D | 22 |
| Condensible PM | 8 | 4 | Aspen | EFB | 0.12 | 0.50 | 0.35 | 0.13 | D | 22 |
| Condensible PM | 11 | 6 | Hardwood | EFB | 0.12 | 0.66 | 0.40 | 0.14 | C | 22 |
| Condensible PM | 1 | 1 | Unspecified pines | WESP | NA | NA | 0.83 | NA | E | 23 |
| Condensible PM | 3 | 3 | Hardwood | WESP | 0.087 | 0.55 | 0.30 | NA | D | 54 |
| Condensible PM | 2 | 2 | Unspecified pines | RTO | 0.098 | 0.14 | 0.12 | NA | D | 23 |
| Condensible PM | 1 | 1 | Hardwood | RTO | NA | NA | 0.12 | NA | E | 59 |
| Filterable PM | 3 | 3 | Unspecified pines | None[d] | 3.8 | 4.2 | 3.9 | NA | D | 23 |
| Filterable PM | 12 | 12 | Unspecified pines | MCLO | 1.3 | 3.0 | 2.1 | 0.48 | C | 3, |
| Filterable PM | 6 | 4 | Hardwood | MCLO | 2.8 | 11 | 6.9 | 3.2 | D | 22 |
| Filterable PM | 3 | 2 | Unspecified pines | EFB | 0.44 | 0.76 | 0.61 | NA | D | 22 |
| Filterable PM | 6 | 4 | Aspen | EFB | 0.66 | 3.0 | 1.1 | 0.89 | D | 22 |
| Filterable PM | 15 | 9 | Hardwood | EFB | 0.61 | 3.0 | 0.92 | 0.59 | C | 22 |
| Filterable PM | 1 | 1 | Unspecified pines | WESP | NA | NA | 0.20 | NA | E | 23 |
| Filterable PM | 3 | 3 | Hardwood | WESP | 0.10 | 0.26 | 0.20 | NA | D | 54 |
| Filterable PM | 2 | 2 | Unspecified pines | RTO | 0.051 | 0.28 | 0.17 | NA | D | 23 |
| Filterable PM | 1 | 1 | Hardwood | RTO | NA | NA | 0.036 | NA | E | 59 |
| Filterable PM-10 | 12 | 12 | Unspecified pines | MCLO[e] | 1.9 | 3.0 | 2.5 | 0.33 | C | 1, |
| Filterable PM-10 | 2 | 1 | Aspen | EFB | 0.55 | 1.8 | 1.2 | NA | D | 22 |
| Filterable PM-10 | 3 | 2 | Hardwood | EFB | 0.55 | 1.8 | 1.0 | NA | D | 22 |
| VOC[f] | 19 | 19 | Unspecified pines | None[g] | 4.2 | 19 | 8.6 | 3.4 | C | 3, |
| VOC[f] | 7 | 4 | Aspen | None[g] | 1.2 | 4.4 | 2.2 | 1.1 | D | 22 |

TABLE 4-12. (continued)

| Pollutant | No. of tests | No. of dryers | Wood species | Emission control device[b] | Emission factor, lb/ODT Minimum | Maximum | Average | Stan. dev.[c] | Rating | R |
|---|---|---|---|---|---|---|---|---|---|---|
| VOC[f] | 26 | 16 | Hardwood | None[g] | 0.73 | 4.4 | 1.6 | 0.77 | B | 2 |
| VOC[f] | 2 | 2 | Unspecified pines | RTO | 0.17 | 0.49 | 0.33 | NA | D | 2 |
| VOC[f] | 1 | 1 | Hardwood | RTO | NA | NA | 0.036 | NA | E | 5 |
| Carbon monoxide | 64 | 41 | All species[h] | None[g] | 0.35 | 23 | 5.8 | 5.0 | B | 3, 4 9 |
| Carbon monoxide | 11 | 8 | All species[h] | RTO | 0.65 | 5.6 | 2.1 | 1.5 | C | 2 |
| Carbon dioxide | 48 | 26 | All species[h] | None[g] | 220 | 1760 | 604 | 260 | B | 3, 5 1 |
| Carbon dioxide | 22 | 6 | All species[h] | RTO | 577 | 974 | 756 | 101 | B | 2 |
| Nitrogen oxides | 39 | 29 | All species[h] | None[g] | 0.051 | 1.5 | 0.65 | 0.31 | B | 1 5 |
| Nitrogen oxides | 10 | 8 | All species[h] | RTO | 0.057 | 1.1 | 0.60 | 0.34 | C | 2 |
| Sulfur dioxide | 1 | 1 | All species[h] | RTO | NA | NA | 0.014 | NA | E | 5 |
| Chromium | 1 | 1 | Unspecified pines | RTO | NA | NA | 0.000063 | NA | E | 7 |
| Direct natural gas-fired rotary dryer | | | | | | | | | | |
| Carbon monoxide | 2 | 1 | All species[h] | None[g] | 0.24 | 1.2 | 0.72 | NA | D | 3 |
| Carbon dioxide | 1 | 1 | All species[h] | None[g] | NA | NA | 327 | NA | E | 6 |
| Nitrogen oxides | 1 | 1 | All species[h] | None[g] | NA | NA | 0.68 | NA | E | 3 |

[a]Emission factors in units of pounds of pollutant per oven-dried ton of wood material out of dryer. NA = not applicable.
[b]Emission control device: EFB = electrified filter bed; WESP = wet electrostatic precipitator; IWS = ionizing wet scrubber.
[c]Standard deviation calculated only if the number of tests was at least 5.
[d]Cyclones are used as product recovery devices and are not considered to be emission control equipment.
[e]Multiclones are used for PM; effects on PM-10 are considered negligible.
[f]Factors for VOC on an as propane basis. Formaldehyde has been added.
[g]Emission controls used are for PM; effects on gaseous emissions are considered negligible.
[h]All species = average of all available data.

TABLE 4-13. SUMMARY OF CANDIDATE EMISSION FACTORS FOR WB/OSB DRYERS--SPECIATE

| Pollutant | No. of tests | No. of dryers | Wood species | Control device[b] | Emission factor, lb/ODT | | | Stan. dev.[c] |
|---|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Average | |
| Direct wood-fired | | | | | | | | |
| Benzene | 1 | 1 | Hardwood | None[d] | NA | NA | 0.0016 | NA |
| Benzo-a-pyrene | 1 | 1 | Hardwood | None[d] | NA | NA | 0.0000030 | NA |
| Formaldehyde | 15 | 15 | Unspecified pines | None[d] | 0.017 | 0.15 | 0.067 | 0.045 |
| Formaldehyde | 2 | 1 | Aspen | None[d] | 0.089 | 0.13 | 0.11 | NA |
| Formaldehyde | 15 | 12 | Hardwood | None[d] | 0.00013 | 0.27 | 0.084 | 0.078 |
| Formaldehyde | 1 | 1 | Unspecified pines | RTO | NA | NA | 0.034 | NA |
| Formaldehyde | 1 | 1 | Hardwood | RTO | NA | NA | 0.017 | NA |
| Phenol | 1 | 1 | Hardwood | None[d] | NA | NA | 0.0050 | NA |
| Direct natural gas-fired | | | | | | | | |
| Formaldehyde | 1 | 1 | Hardwood | None[d] | NA | NA | 0.036 | NA |

[a]Emission factors in units of pounds of pollutant per oven-dried ton of wood material out of dryer. NA = not applicable.
[b]Emission control device: RTO = regenerative thermal oxidizer.
[c]Standard deviation calculated only if the number of tests was at least 5.
[d]Uncontrolled. Emission controls used are for PM; effects on gaseous emissions are considered negligible.

TABLE 4-14. SUMMARY OF CANDIDATE EMISSION FACTORS FOR WB/OSB PRESSE

| Pollutant | No. of tests | No. of presses | Control device[b] | Resin type[c] | Emission factor, lb/MSF 3/8 | | | Standard dev.[d] | Rating |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Minimum | Maximum | Average | | |
| Carbon monoxide | 26 | 14 | None | All | 0.031 | 0.27 | 0.10 | 0.059 | B |
| Carbon monoxide | 9 | 6 | RTO | All | 0.051 | 0.84 | 0.26 | 0.24 | D |
| Carbon dioxide | 36 | 10 | None | All | 2.3 | 148 | 12 | 32 | B |
| Carbon dioxide | 18 | 4 | RTO | All | 3.1 | 69 | 42 | 26 | C |
| Condensible PM | 4 | 4 | None | MDI | 0.010 | 0.12 | 0.046 | NA | D |
| Condensible PM | 3 | 1 | None | PF | 0.18 | 0.32 | 0.25 | NA | D |
| Condensible PM | 26 | 12 | None | PF/MDI | 0.0030 | 0.87 | 0.14 | 0.16 | B |
| Condensible PM | 9 | 6 | RTO | PF/MDI | 0.015 | 0.38 | 0.082 | 0.11 | D |
| Formaldehyde | 2 | 2 | None | MDI | 0.028 | 0.10 | 0.064 | NA | E |
| Formaldehyde | 6 | 3 | None | PF | 0.0018 | 0.073 | 0.043 | 0.030 | E |
| Formaldehyde | 18 | 11 | None | PF/MDI | 0.0057 | 0.15 | 0.063 | 0.036 | D |
| Formaldehyde | 8 | 5 | RTO | PF/MDI | 0.0013 | 0.0097 | 0.0043 | 0.0027 | E |
| MDI | 3 | 2 | None | MDI | 0.00080 | 0.0021 | 0.0017 | NA | E |
| MDI | 16 | 6 | None | PF/MDI | 0.000018 | 0.0069 | 0.0021 | 0.0022 | D |
| MDI | 6 | 4 | RTO | PF/MDI | 0.0000097 | 0.00022 | 0.000078 | 0.000078 | E |
| Naphthalene | 2 | 2 | None | PF | 0.00042 | 0.0056 | 0.0030 | NA | E |
| Nitrogen oxides | 9 | 9 | None | All | 0.0055 | 0.093 | 0.038 | 0.030 | D |
| Nitrogen oxides | 8 | 6 | RTO | All | 0.064 | 0.43 | 0.28 | 0.11 | D |
| Phenol | 4 | 3 | None | PF | 0.015 | 0.073 | 0.053 | NA | E |
| Phenol | 11 | 6 | None | PF/MDI | 0.000021 | 0.068 | 0.019 | 0.019 | D |
| Phenol | 3 | 2 | RTO | PF/MDI | 0.0018 | 0.0032 | 0.0026 | NA | E |
| Filterable PM | 4 | 4 | None | MDI | 0.080 | 0.26 | 0.16 | NA | D |
| Filterable PM | 4 | 2 | None | PF | 0.027 | 0.25 | 0.12 | NA | D |
| Filterable PM | 26 | 12 | None | PF/MDI | 0.017 | 2.9 | 0.37 | 0.56 | B |

TABLE 4-14. (continued)

| Pollutant | No. of tests | No. of presses | Control device[b] | Resin type[c] | Emission factor, lb/MSF 3/8 Minimum | Emission factor, lb/MSF 3/8 Maximum | Emission factor, lb/MSF 3/8 Average | Standard dev.[d] | Rating |
|---|---|---|---|---|---|---|---|---|---|
| Filterable PM | 9 | 6 | RTO | PF/MDI | 0.0098 | 0.19 | 0.049 | 0.057 | D |
| Filterable PM-10 | 1 | 1 | None | PF | NA | NA | 0.10 | NA | E |
| Filterable PM-10 | 1 | 1 | None | PF/MDI | NA | NA | 0.11 | NA | E |
| Sulfur dioxide | 1 | 1 | None | All | NA | NA | 0.037 | NA | E |
| VOC[e] | 5 | 4 | None | MDI | 0.11 | 0.93 | 0.45 | 0.31 | D |
| VOC[e] | 6 | 4 | None | PF | 0.081 | 1.5 | 0.52 | 0.55 | D |
| VOC[e] | 28 | 16 | None | PF/MDI | 0.15 | 2.6 | 0.56 | 0.57 | B |
| VOC[e] | 9 | 6 | RTO | PF/MDI | 0.010 | 0.10 | 0.040 | 0.030 | D |

[a]Emission factors in units of pounds of pollutant per thousand square feet of 3/8-inch thick panel. NA = not applicable.
[b]Control device: RTO = regenerative thermal oxidizer.
[c]Resin type: MDI = 4,4-methylene bis(phenylisocyanate); PF = phenol formaldehyde; All = average of all available data.
[d]Standard deviation calculated only if the number of tests was at least 5.
[e]Factors for VOC on an as propane basis. Formaldehyde has been added.

TABLE 4-15. CROSS-REFERENCED LIST OF EMISSION DATA REFERENCES

| Ref. No. | |
|---|---|
| Background Report, Chapter 4 | AP-42, Section 10.6.1 |
| 1 | 4 |
| 2 | 5 |
| 3 | 6 |
| 4 | 7 |
| 5 | 8 |
| 6 | Not used |
| 7 | 9 |
| 8 | Not used |
| 9 | Not used |
| 10 | 10 |
| 11 | 11 |
| 12[a] | Not used[a] |
| 13[a] | Not used[a] |
| 14[a] | Not used[a] |
| 15[a] | Not used[a] |
| 16[a] | Not used[a] |
| 17[a] | Not used[a] |
| 18[a] | Not used[a] |
| 19 | Not used |
| 20 | Not used |
| 21 | Not used |
| 22 | 12 |
| 23 | 15 |
| 24 | 16 |
| 25 | Not used |
| 26 | Not used |
| 27 | Not used |
| 28 | Not used |
| 29 | 17 |
| 30 | 18 |
| 31 | Not used |
| 32 | 19 |
| 33 | Not used |
| 34 | Not used |
| 35 | 20 |
| 36 | 21 |
| 37 | 22 |
| 38 | 23 |
| 39 | 24 |
| 40 | 25 |
| 41 | 26 |
| 42 | 27 |
| 43 | 28 |
| 44 | 29 |
| 45 | Not used |
| 46 | Not used |
| 47 | 30 |
| 48 | Not used |
| 49 | 31 |
| 50 | 32 |
| 51 | Not used |
| 52 | 33 |
| 53 | Not used |
| 54 | 34 |
| 55 | Not used |
| 56 | 35 |
| 57 | 36 |
| 58 | 37 |
| 59 | 38 |
| 60 | 39 |
| 61 | Not used |
| 62 | 40 |
| 63 | Not used |
| 64 | Not used |
| 65 | Not used |
| 66 | Not used |
| 67 | Not used |
| 68 | Not used |
| 69 | Not used |
| 70 | 41 |
| 71 | 42 |
| 72 | Not used |
| 73 | 43 |
| 74 | Not used |
| 75 | 44 |
| 76 | 45 |
| 77 | 46 |
| 78 | Not used |
| 79 | Not used |
| 80 | Not used |
| 81 | Not used |
| 82 | Not used |
| 83 | Not used |
| 84 | Not used |
| 85 | Not used |
| 86 | Not used |
| 87 | Not used |
| 88 | Not used |
| 89 | Not used |
| 90 | Not used |
| 91 | Not used |
| 92 | Not used |
| 93 | Not used |
| 94 | 47 |
| 95 | 48 |
| 96 | 49 |
| 97 | 50 |
| 98 | 51 |
| 99 | 52 |
| 100 | Not used |
| 101 | Not used |
| 102 | 53 |
| 103 | Not used |
| 104 | Not used |
| 105 | 54 |
| 106 | 55 |

[a]Included in Background Report Reference 22 (AP-42 Reference 12).

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106. *Results of the March 29, 1994 Oxides of Nitrogen Emission Compliance Test on the Dryer Stack at the Louisiana-Pacific Plant in Dungannon, Virginia*, prepared for Louisiana-Pacific Corporation, by Interpoll Laboratories, Inc., Report No. 4-2557, April 1994.

# 5. PROPOSED AP-42 SECTION

The final AP-42 Section 10.6.1, Waferboard/Oriented Strandboard Manufacturing, is presented on the following pages as it would appear in the document.