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1-02

#40

SOURCE
EMISSION
EVALUATION

November 15, 1994

Prepared For:

LOUISIANA-PACIFIC CORPORATION
ORIENTED STRANDBOARD FACILITY
FUEL DRYER E-TUBE STACK
MONTROSE, COLORADO
OCTOBER 25, 1994

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We certify that the information contained herein is accurate and complete to the best of our knowledge.

[cbh\c:\w\r\lpmonco: job #94-178]

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1.0

INTRODUCTION

The purpose of this source emission evaluation was to quantify emissions of particulate and condensible matter at the fuel dryer E-tube exhaust stack at Louisiana-Pacific Corporation's oriented strandboard (OSB) facility located in Montrose, Colorado. This testing was conducted to demonstrate compliance with the Colorado Department of Health permit requirements. Louisiana-Pacific Corporation contracted Am Test-Air Quality, Inc. based in Preston, Washington to conduct these source tests.

Testing and analysis procedures used for this project are presented in the July 1, 1993 edition of the Environmental Protection Agency (EPA) document Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, Methods 1, 2, 3A, 4 and 5 and in 40 CFR 51, Appendix M, Method 202. Methods 1 and 2 were performed to measure the stack gas temperature and velocity for calculating volumetric flow rate. Method 3A was performed to determine the molecular weight of the stack gas based on measurements of the oxygen (O_2) and carbon dioxide (CO_2) concentration in the stack gas. Method 4 was performed to measure the moisture content of the stack gas. Method 5 and Method 202 were performed to quantify particulate and condensible matter emissions. The Colorado Department of Health requires that the condensible particulate matter present in the gas stream be quantified by performing an extraction of the back-half portion of the Method 5 sample train. Three (3) Method 1, 2, 3A, 4 and 5/202 samples were collected at the dryer E-tube stack on October 25, 1994.

Mr. K. Steven Mackey of Am Test-Air Quality, Inc. performed the field sampling. Sample recovery and gravimetric laboratory analysis of the Method 5 samples were performed by Ms. Stacy Akin and Ms. Annika M. Woehr of Am Test. Data reduction, quality assurance review and final report preparation were performed by Mr. Kris A. Hansen, Ms. Angela F. Blaisdell, Ms. Cassie B. Heaton and Ms. Annika M. Woehr of Am Test. This testing program was coordinated by Ms. Susan Somers and Mr. Dick Klopschinski of Louisiana-Pacific Corporation who also provided process data. Mr. Charlie Cox of the Colorado Department of Health observed the testing.

2.0

SUMMARY OF RESULTS

The following section of this report presents results from the particulate matter testing performed at the dryer E-tube stack. Refer to the Table of Contents to locate specific information for each test. The summary tables in this section contain information obtained from computer printouts for each individual run which are included in Appendix A of this report. Appendix B of this report contains example calculations of results and copies of the original field data sheets. Appendix C of this report contains process data. Appendix D of this report contains miscellaneous supporting information.

The results of the three (3) 60-minute Method 5/202 tests for quantifying particulate and condensible matter emissions at the dryer E-tube stack are summarized in Table 2.0 below, and on the following computer printout titled "Summary of Results - Methods 1, 2, 3A, 4 and 5".

Table 2.0. Summary of particulate matter emission test results from samples collected on October 25, 1994 at the dryer E-tube stack at Louisiana-Pacific Corporation's facility in Montrose, Colorado.

Sample Run #	Front-half P.M. Emission Conc. (gr/dscf)	Back-half P.M. Emission Conc. (gr/dscf)	Total P.M. Emission Conc. (gr/dscf)	Total P.M. Emission Rate (lb/hr)
1	0.007	0.021	0.028	8.20
2	0.002	0.021	0.022	6.65
3	0.007	0.023	0.030	8.66
Average	0.005	0.022	0.027	7.84

The front-half, back-half and total particulate matter emission concentrations were calculated in units of grains per dry standard cubic foot (gr/dscf) and milligrams per dry standard cubic meter (mg/dscm). The total particulate matter emission rates were calculated in units of pounds per hour (lb/hr). The particulate matter emission standard for this source is 7.44 lb/hr.

AMTEST
AIR QUALITY, INC.

SUMMARY OF RESULTS - METHODS 1, 2, 3A, 4, 5 AND 202
AM TEST - AIR QUALITY, INC.

FILE NAME: S721\LPSUM
CLIENT: Louisiana-Pacific Corporation
LOCATION: Montrose, Colorado

	DRYER E-TUBE STACK			
	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	6787	6788	6789	
DATE:	10/25/94	10/25/94	10/25/94	
START TIME:	08:16	10:18	12:13	
STOP TIME:	09:34	11:22	13:15	
SAMPLE LENGTH (minutes):	60.0	60.0	60.0	
VOLUME SAMPLED (cubic feet):	50.236	54.836	55.564	53.545
VOLUME SAMPLED (dry std. cubic feet):	43.329	45.176	44.799	44.435
VOLUME SAMPLED (dry std. cubic meters):	1.227	1.279	1.269	1.258
STACK GAS MOISTURE (percent):	22.01	20.99	23.03	22.01
BAROMETRIC PRESSURE (inches of Hg):	25.22	25.22	25.19	25.21
STATIC PRESSURE (inches of H2O):	0.15	0.15	0.12	0.14
STACK PRESSURE (inches of Hg):	25.23	25.23	25.20	25.22
STACK TEMPERATURE (degrees F.):	150.5	149.8	151.8	150.7
STACK TEMPERATURE (degrees R.):	610.5	609.8	611.8	610.7
CARBON DIOXIDE (percent):	2.2	2.2	2.2	2.2
OXYGEN (percent):	17.3	17.3	17.1	17.2
MOLECULAR WEIGHT (dry, g/g-mole):	29.04	29.04	29.04	29.04
MOLECULAR WEIGHT (wet, g/g-mole):	26.61	26.73	26.49	26.61
AVERAGE VELOCITY HEAD (inches of H2O):	1.348	1.368	1.343	1.353
PITOT TUBE Cp:	0.84	0.84	0.84	
STACK GAS VELOCITY (feet per second):	79.5	79.9	79.7	79.7
STACK DIAMETER (inches):	48.0	48.0	48.0	
STACK AREA (square feet):	12.6	12.6	12.6	
STACK GAS AIRFLOW (dry std. cubic feet per min.):	34099.7	34744.1	33606.0	34149.9
STACK GAS AIRFLOW (actual cubic feet per min.):	59952.1	60222.6	60064.8	60079.8
NOZZLE DIAMETER (inches):	0.230	0.230	0.230	
ISOKINETICS (percent):	92	94	97	
FRONT-HALF PARTICULATE EMISSION CONC. (gr/dscf):	0.007	0.002	0.007	0.005
BACK-HALF PARTICULATE EMISSION CONC. (gr/dscf):	0.021	0.021	0.023	0.022
TOTAL PARTICULATE EMISSION CONC. (gr/dscf):	0.028	0.022	0.030	0.027
TOTAL PARTICULATE EMISSION CONC. (mg/dscm):	64.2	51.1	68.8	61.4
TOTAL PARTICULATE MATTER EMISSION RATE (lb/hr):	8.20	6.65	8.66	7.84

3.0

PROJECT OVERVIEW/EXCEPTIONS

An acceptable leak check of less than 0.02 cfm at the highest vacuum rate (or greater) used during the test preceded and followed each run. The average percentage isokinetics for each run were within the acceptable limits of 100 ± 10%.

During run 1 there was a power failure which delayed the end of the test by 15 minutes.

A nitrogen purge to remove sulfates from the sample is an option of Method 202. It was not performed since no sulfates were expected from this source. The pH of each back-half sample was measured and confirmed to be greater than 4.5 so the Method 202 analysis for sulfates was not performed.

4.0

SOURCE OPERATION

Louisiana-Pacific Corporation's Montrose, Colorado facility is an oriented strand board (OSB) manufacturing plant with a rotary dryer. The MEC 60-foot triple pass rotary dryer is equipped with multiclones and a Geoenergy E-tube wet electrostatic precipitator (ESP) to control emissions. Dry wood fines and waferboard trimmings are used to fire a McConnell burner rated at 40 million British thermal units per hour (MMBtu/hr). The burner heats the triple pass rotary dryer which is used to dry wood chips for OSB production. The process was operated on primarily aspen with 25% pine. Dryer exhaust gases are controlled by multiclones, followed by an ID fan, a quench duct and a Geoenergy E-tube wet ESP. The scrubber water had a 25-28% solids content. A process information sheet, completed in the field, is included in the appendices of this report.

5.0

SAMPLING AND ANALYSIS PROCEDURES

5.1 EPA Methods 1 and 2 - Velocity, Temperature and Airflow

EPA Method 1 procedures were used to assure that representative measurements of volumetric flow rate were obtained by dividing the cross-section of the stack or duct into a number of equal areas, and then locating a traverse point within each of the equal areas. Refer to the "Stack Schematic and Location of Sample Points" data sheet and/or the figure titled, "Location of Sampling Ports and Traverse Points", located in the appendices of this report for a schematic of the stack and the point locations selected for testing. Method 2 was performed to measure the stack gas velocity using a type S or a standard pitot tube, and the gas temperature using a calibrated thermocouple probe connected to a digital thermocouple indicator. The type S pitot tubes were connected with tubing to an oil-filled inclined manometer, a hook gauge manometer or magnehelic gauges to obtain velocity measurements. The pitot tube lines were leak-checked and the pressure measurement device was leveled and zeroed prior to use. Calibration information for each pressure and temperature measurement device used are included in the appendices of this report.

5.2 EPA Method 3A - Molecular Weight

The stack gas composition was evaluated during each test by collecting integrated samples of the stack gas in multilayer bags. The integrated bag samples were analyzed both on-site and in Am Test's laboratory using a paramagnetic analyzer to measure the percent (%) O_2. The samples were analyzed in the laboratory using a non-dispersive infrared (NDIR) analyzer to measure the % carbon dioxide (CO_2) in the gas stream. The gas composition data were used to calculate the molecular weight of the stack gas.

5.3 EPA Method 4 - Moisture

The percent moisture in the gas stream was quantified by weighing the impingers to 0.1 grams before and after each Method 5 run on a digital top-loading balance. The net weight (final minus initial) was used to calculate the amount of moisture condensed from the known volume of stack gas collected.

5.4 EPA Method 5/202 - Particulate and Condensible Matter

The sample train used for collecting particulate matter samples was an EPA Method 202 design as illustrated in the figure titled "Method 202 Sample Train" in the appendices of this report. The "Sample Train Information Sheet" (also in the appendices) details the type of nozzle, probe, probe liner and filter used along with the contents of the sample train impingers. The gas is drawn from the stack through a quartz nozzle and heated quartz probe liner, through a pre-tared front-half quartz filter, and into a Method 202 impinger train for collecting condensible particulate matter. A stainless steel probe sheath with a heated quartz probe liner was used to draw gas from the filter to the impinger train. The probe was equipped with type S pitot tubes for measuring gas velocity and a thermocouple sensor for measuring stack gas temperature. The thermocouple sensor was connected to a digital thermocouple indicator which was used to measure the stack gas temperature at each sample point. The temperature of the probe liner was monitored to assure that condensation did not occur within the probe liner. The nozzle, probe liner and filter are often referred to as the "front-half" of the sample train. Following the filter was a probe and condenser (impinger) section which, by convention, is referred to as the "back-half". The impinger section was maintained at a temperature below 68° F by keeping ice on the impingers. The temperature at the outlet of the silica gel bubbler was monitored to verify that it did not exceed 68° F during a test. Note: Some subparts or methods specify alternate temperatures for the probe liner, filter holder box and impinger ice bath. The "Sample Train Information Sheet" details any exceptions.

The sample train was connected to a control box by means of an umbilical cord which contained a vacuum hose, pitot lines, thermocouple wires and a 4-wire electrical cord. The control box (meter box) was used to monitor stack conditions and to facilitate isokinetic sampling. The control box consists of a leak-free pump used to pull the stack gas through the sample train, fine and coarse metering valves to control the sampling rate, a vacuum gauge which measures the pressure drop from the sampling nozzle to the metering valves, and a calibrated dry gas meter readable to 0.001 cubic feet. The dry gas meter inlet and outlet temperatures were monitored by thermocouples which were connected to a multichannel thermocouple indicator. The dry gas meter calibration factor, Y, was determined by calibrating the meter against a wet test meter or calibrated dry gas meter. At the outlet of the dry gas meter was a calibrated orifice which was used to monitor the flow of gas through the metering system to assure that samples were collected isokinetically. The pressure drop across the orifice was monitored at each sample point. The pitot tubes utilized to measure stack gas velocity were connected to the control box via the umbilical cord. The control box contained either low and high range magnehelic gauges or an incline manometer, which were used for the velocity measurement.

Stack condition measurements were made prior to collecting a sample, including measurements of velocity, temperature and a check for cyclonic flow in the stack. A sample nozzle was selected and isokinetic operating parameters were established utilizing a Hewlett-Packard programmable calculator. The sampling nozzle, probe and prefilter connective glassware were cleaned and rinsed with dichloromethane prior to use. The sample train was assembled and determined to be leak free following the procedures outlined in Method 5. The sample nozzle was positioned in the stack at the first sample point. The sample pump was turned on, and the gas sampling rate was adjusted for isokinetic sampling. At the conclusion of the test, the pump was turned off, the probe was removed from the stack, and a post-test leak check was performed according to Method 5 procedures. Following the leak check, the impingers were removed from the sample train. A nitrogen purge to remove sulfates from the sample is an option of Method 202. It was not performed since no sulfates were expected from this source. The front-half of the sample train was recovered with acetone per EPA Method 5 procedures and the particulate matter was quantified gravimetrically after evaporation of the acetone. The back-half of the sample train was recovered per EPA Method 202.

Following sample collection, the Method 5 sample trains were transferred to an area free from air disturbances and airborne particulate matter. The filters were transferred to petri dishes labeled with the sample date, client name and run number. Am Test refers to the front-half filter portion of the particulate catch as the "A" section. Care was taken to assure that any loose particulate matter and filter mat were quantitatively transferred to the petri dish. In the laboratory, the filters were placed in an oven and baked at 105° C for two (2) hours, then transferred to a constant humidity desiccator containing silicon dioxide (SiO_2) for at least 24 hours of desiccation prior to obtaining weights. The same weighing procedures were followed to obtain the tare weights for the filters. The tare and final weights were made using an electronic balance set to a time integrating mode with a readability of 0.1 milligrams. The filters were weighed to a constant weight of ±0.5 milligrams. The interval between weighings was at least 6 hours. These weights were recorded in a bound laboratory notebook.

Following each run, the contents of the nozzle, probe liner and prefilter connective glassware were quantitatively transferred to the "B" section storage container labeled with sample date, client name and run number. Several rinses of acetone, with simultaneous loosening of particulate matter using a clean nylon brush, were used for the front-half clean-up. An iodine flask with a female ball joint end was attached to the male ball joint end of the probe to assure that no particulate matter was lost during the rinsing and brushing of the probe. The contents of the iodine flask were quantitatively transferred to the "B" section storage container. In the laboratory, the "B" section acetone rinse was transferred to a tared, graduated 150 milliliter (mL) beaker. The volume of acetone was recorded and the beakers were placed in an evaporation chamber at a temperature of approximately 75-80° F until dry. Note: Some subparts or methods specify alternate "B" section cleanup solvents. The "Sample Train Information Sheet" details any exceptions.

The bubblers and impingers utilized for the condenser section, or "back-half" of the sample train were weighed with a readability of 0.1 grams before and after sampling using an electronic top loading balance. The difference between the initial and final weights of the condenser section constitute the amount of moisture gain during the run. To perform the Method 202 back-half analysis, the impinger solutions were recovered into a graduated cylinder. The impingers were rinsed with deionized water and the rinses were combined with the contents of the graduated cylinder and the final volume was recorded. The pH of each sample was measured and confirmed to be greater than 4.5 so the Method 202 analysis for sulfates was not performed. An aliquot of the impinger water was taken for potential future analysis. The condensible matter was quantified in the Am Test laboratory by performing a solvent extraction using a separatory funnel on the remaining impinger solution. The impingers were given a final rinse with 75 mL of CH_2Cl_2, which was collected in a glass sample container for later use in the first extraction. Two (2) additional 75 mL portions of CH_2Cl_2 were used for a total of three (3) 75 mL extractions. The organic layer was transferred to tared 150 mL beakers labeled as the "Cx" section and these beaker's contents were allowed to evaporate in an evaporation chamber at ambient temperature to dryness, the beakers were desiccated, then weighed to a constant weight. The water layer was transferred to a tared 150 mL beaker with glass boiling beads labeled the "C" section and this beaker's contents were heated on a hot plate to boiling until approximately 50 milliliters remained in the beaker. The remaining 50 milliliters in the beaker were evaporated to dryness in an oven at 105° C. Since no sulfates were present, the ammonium hydroxide titration to remove sulfuric acid interference was not necessary and was omitted. Sample blanks containing acetone, DI water and CH_2Cl_2 were analyzed in an identical fashion as the representative "section". All beakers were desiccated for at least 24 hours and weighed to constant weights of ± 0.5 milligrams after their contents had evaporated. The total particulate matter weight is the sum of the net weights of the particulate matter found on the filter plus the net weights found in the beakers containing sample, minus the acetone, water and methylene chloride blank contributions.

6.0

QUALITY ASSURANCE PLAN

The purpose of the quality assurance plan is to provide guidelines for achieving quality control in air pollution measurements. The detailed procedures which are utilized are included in the Environmental Protection Agency's (EPA's) reference manual titled Quality Assurance Handbook for Air Pollution Measurement Systems, Volume 3, EPA-600/4-77-027b. These procedures are followed throughout equipment preparation, field sampling, sample recovery, analysis and data reduction. Am Test-Air Quality, Inc.'s quality assurance procedures are discussed below.

6.1 Calibration Procedures and Frequency

Field equipment utilized for on-site measurements is calibrated at a frequency recommended by the equipment manufacturer or industry practice. Prior to field use, each instrument is calibrated and the calibration value is recorded. If any measuring or test device requiring calibration cannot immediately be removed from service, the Project Manager may extend the calibration cycle providing a review of the equipment's history warrants the issuance of an extension. No equipment will be extended more than twice a calibration cycle, nor will the extension exceed one-half the prescribed calibration cycle. Test equipment consistently found to be out of calibration will be repaired or replaced.

The sample nozzles used to collect isokinetic samples are calibrated on-site before sampling using digital inside calipers readable to 0.001 inch. Three (3) measurements were taken at varying points around the inside of the nozzle tip and averaged. The dry gas meters used to accurately measure sample volumes are calibrated using a standard laboratory dry gas meter. The type S pitot tubes utilized for velocity determination are calibrated using Method 2, Section 4.1, and are inspected regularly for wear. The magnehelic gauges used for pressure measurements are checked against an oil-filled manometer. The digital thermocouple indicator used for temperature measurement has a readability of 1 degree Fahrenheit and is periodically re-certified by the manufacturer. Each thermocouple probe used to monitor temperature is checked periodically at three (3) temperature settings. Copies of calibration information for each measurement device used are included in the appendices of this report. A barometer readable to 0.01 inches of mercury is used in the field to obtain barometric pressure readings.

In the laboratory reagent blanks are carried throughout the gravimetric analysis procedures. The samples were weighed to constant weights of ±0.5 milligrams following desiccation in a cabinet desiccator. This desiccator is an electronic dehumidifier which automatically maintains the humidity inside the desiccator. The dehumidifier automatically recharges the internal desiccant every 5.5 hours. An Airguide humidity indicator accurate to ±1% is used to check the humidity inside the desiccator when obtaining tare and final weights. A small container of indicating silica gel is placed in the desiccators to maintain the desired humidity. The Mettler AE163 electronic balance used to obtain weights is set to a time integrating mode (100,000 readings per minute) with a readability of 0.01 milligrams. The balance is calibrated prior to every weighing session and an audit is performed with class S weights once a week. The calibration of Am Test's Mettler balances is checked by the manufacturer on a yearly basis.

Support equipment is defined as all equipment, not previously discussed, that is required for completing an environmental monitoring or measurement task. This equipment may include storage and transportation containers, sample recovery glassware, and communications gear. Support equipment is periodically inspected to maintain the performance standards necessary for proper and efficient execution of all tasks and responsibilities.

During a project, a systems audit is performed, consisting of an on-site qualitative inspection and review of the total measurement system. This inspection is conducted on a daily basis by the Project Leader. During the systems audit, the auditor observes the procedures and techniques of the field team in the following general areas:

- Setting up and leak testing the sample train
- Isokinetic sampling check
- Final leak check of the sample train
- Sample recovery

Visual inspections of pitot tubes, glassware, and other equipment are also made. The main purpose of a systems audit is to ensure that the measurement system will generate valid data, if operated properly.

6.2 Sample Recovery and Field Documentation

Data collected during each test, are immediately inspected for completeness and placed under the custody of the Project Leader until custody is transferred when the samples were returned to the Air Quality laboratory. Sample recovery is carried out in a suitable area free from particulate matter contamination. Each sample is assigned an identifying lab number to assist the chemists in tracking the sample.

6.3 Data Reduction, Validation and Reporting

Raw data are handled according to strict guidelines when being transposed into computer files or to other logs. The guidelines include document receipt control procedures, file review, and sign-off by a project assistant. Raw data are entered into the appropriate computer spreadsheet by a "processor", then the entered figures are checked for accuracy by a "checker", different from the "processor". Any mistakes are corrected, and figures are rechecked and signed off by the "checker". In addition, a by-hand calculation check of each spreadsheet is made using a hand-held calculator to validate the computer output. All data generated by each phase of a laboratory or field sampling program are reviewed by the senior reviewer. The data package is signed off by the senior reviewer prior to releasing the data for report preparation.

The test results are calculated in accordance with current EPA 40 CFR 60 criteria. Copies of the pertinent equations used to derive the results for this test are included in the appendices of this report. Standard conditions are 29.92 inches of mercury and 68° F.

7.0

METHODOLOGY REFERENCES

EPA. Title 40 Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, Reference Methods 1, 2, 3A, 4 and 5. July 1, 1993.

EPA. Title 40 Code of Federal Regulations, Part 51 (40 CFR 51), Appendix M, Reference Method 202. July 1, 1993.

EPA. EPA 450/2-79-006, APTI Course, "Course 450 - Source Sampling For Particulate Pollutants", December 1979.

EPA. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume 3, EPA-60/4-77-027b.

APPENDIX A

Computer Printouts of Results

```
                              METHODS 1, 2, 3A, 4, AND 5
                              AM TEST-AIR QUALITY, INC.

FILE NAME:   S721\LPCOR1                    LAB #:                  6787
CLIENT:      Louisiana Pacific              START TIME:             08:16 o'clock
LOCATION:    Montrose, Colorado             STOP TIME:              09:34 o'clock
SAMPLE SITE: Dryer E-Tube Stack             SAMPLE LENGTH:          60.0 minutes
SAMPLE DATE: October 25, 1994
RUN #:       1 - Method 5
OPERATORS:   Mackey

           IMPINGER WEIGHTS
      FINAL    INITIAL    NET               PITOT TUBE Cp:          0.84
      grams    grams      grams             NOZZLE DIAMETER:        0.230 inches
      -----    -----      -----             NOZZLE AREA:            0.0003 sq. feet
      809.9    643.3      166.6             STACK DIAMETER:         48.0 inches
      700.5    633.3       67.2             STACK AREA:             12.6 sq. feet
      665.4    654.2       11.2             METER TEMPERATURE:      57.2 degrees F
      829.8    815.5       14.3             BAROMETRIC PRES.:       25.22 inches Hg
TOTAL H2O GAIN:           259.3             STATIC PRESSURE:         0.15 inches H2O
TOTAL VOLUME (scf):        12.23            STACK PRESSURE:         25.23 inches Hg
PERCENT MOISTURE:          22.01            ORIFICE PRESSURE:        2.173 inches H2O
Bws:                        0.2201          METER PRESSURE:         25.38 inches Hg

INIT. METER VOLUME:       923.899
FINAL METER VOLUME:       974.135           AVERAGE CONC. CO2:       2.2 percent
VOLUME SAMPLED:            50.236           AVERAGE CONC. O2:       17.3 percent
STD VOLUME (dscf):         43.329           AVERAGE CONC. CO:        NA ppm
STD VOLUME (dscm):          1.227           MOLECULAR WEIGHT:       29.04 g/g-mole-dry
Y FACTOR:                   0.996           MOLECULAR WEIGHT:       26.61 g/g-mole-wet

-------------------------------------------------------------------------------------
  SAMPLE     VELOCITY    TEMPERATURE         SAMPLE    VELOCITY    TEMPERATURE
  POINT      " OF H2O        °F              POINT     " OF H2O        °F

  N  1          1.23        149              W  1          1.33        149
     2          1.26        150                 2          1.33        150
     3          1.26        150                 3          1.38        151
     4          1.21        150                 4          1.36        152
     5          1.30        149                 5          1.28        154
     6          1.23        148                 6          1.10        150
     7          1.22        148                 7          1.38        153
     8          1.32        149                 8          1.48        153
     9          1.39        149                 9          1.51        152
    10          1.42        149                10          1.54        152
    11          1.41        151                11          1.52        153
    12          1.42        149                12          1.54        153
-------------------------------------------------------------------------------------

PERCENT ISOKINETICS:                      92 %
STACK GAS TEMPERATURE:                 150.5 degrees F          610.5 degrees R
AVERAGE VELOCITY HEAD:                 1.348 " of H2O
STACK GAS VELOCITY:                                              79.5 ft/second
STACK GAS AIR FLOW:                  59952.1 acf/min          34099.7 dscf/min
PARTICULATE EMISSION CONCENTRATION (FRONT-HALF):                0.007 gr/dscf
PARTICULATE EMISSION CONCENTRATION (BACK-HALF):                 0.021 gr/dscf
TOTAL PARTICULATE EMISSION CONC. (FRONT & BACK-HALF):           0.028 gr/dscf
TOTAL PARTICULATE EMISSION CONCENTRATION:                        64.2 mg/dscm
TOTAL PARTICULATE MATTER EMISSION RATE:                          8.20 lb/hr
```

```
FRONT-HALF PARTICULATE MATTER MASS LOADING
-------------------------------------------------------------------
FILTER NUMBER:                                              #110-377
TARE WEIGHT OF FILTER (grams):                                0.5905
FINAL WEIGHT OF FILTER (grams):                               0.5998
NET WEIGHT OF PARTICULATE MATTER (grams):                     0.0093

PROBE RINSE BEAKER NUMBER:                                 #150-1978
TARE WEIGHT OF BEAKER (grams):                               70.2140
FINAL WEIGHT OF BEAKER (grams):                              70.2241
NET WEIGHT OF PARTICULATE MATTER (grams):                     0.0101
VOLUME OF ACETONE (milliliters):                               160.0
WT./VOL. OF ACETONE BLANK (milligrams/mL):                    0.0000
NET WEIGHT OF PARTIC. DUE TO ACETONE (grams):                 0.0000

TOTAL FRONT-HALF PARTICULATE MATTER (grams):                  0.0194

BACK-HALF PARTICULATE MATTER MASS LOADING
-------------------------------------------------------------------
"C" SECTION - CONDENSER PARTICULATE                        #150-2011
TARE WEIGHT OF BEAKER (grams):                               66.0861
FINAL WEIGHT OF BEAKER (grams):                              66.0964
NET WEIGHT OF PARTIC. MATTER (grams):                         0.0107
TOTAL VOLUME OF WATER (milliliters):                           590.0
VOLUME OF ALIQUOT (milliliters):                                20.0
VOLUME OF WATER CONDENSED (milliliters):                       245.0
NET VOLUME OF WATER FOR BLANK (milliliters):                   345.0
WT./VOL. OF WATER BLANK (milligrams/mL):                      0.0000
NET WEIGHT OF PARTIC. DUE TO WATER (grams):                   0.0000

"Cx" SECTION - HYDROCARBON EXTRACTION           #150-1979 & 1980
TARE WEIGHT OF BEAKER (grams):                              140.7433
FINAL WEIGHT OF BEAKER (grams):                             140.7905
NET WEIGHT OF PARTIC. MATTER (grams):                         0.0489
TOTAL VOLUME OF CH2Cl2 (milliliters):                          220.0
WT./VOL. OF CH2Cl2 BLANK (milligrams/mL):                     0.0007
NET WEIGHT OF PARTIC. DUE TO CH2Cl2 (grams):                  0.0002

TOTAL BACK-HALF PARTICULATE MATTER (grams):                   0.0594
TOTAL WEIGHT OF PARTICULATE MATTER (grams):                   0.0788
```

```
                                              METHODS 1, 2, 3A, 4, AND 5
                                              AM TEST-AIR QUALITY, INC.

FILE NAME:   S721\LPCOR2                      LAB #:                  6788
CLIENT:      Louisiana Pacific                START TIME:            10:18 o'clock
LOCATION:    Montrose, Colorado               STOP TIME:             11:22 o'clock
SAMPLE SITE: Dryer E-Tube Stack               SAMPLE LENGTH:          60.0 minutes
SAMPLE DATE: October 25, 1994
RUN #:       2 - Method 5
OPERATORS:   Mackey

          IMPINGER WEIGHTS
      FINAL     INITIAL    NET                PITOT TUBE Cp:          0.84
      grams      grams    grams               NOZZLE DIAMETER:       0.230 inches
      -----      -----    -----               NOZZLE AREA:          0.0003 sq. feet
      900.2      699.2    201.0               STACK DIAMETER:         48.0 inches
      676.2      640.0     36.2               STACK AREA:             12.6 sq. feet
      669.9      666.0      3.9               METER TEMPERATURE:      81.9 degrees F
      838.1      824.7     13.4               BAROMETRIC PRES.:      25.22 inches Hg
TOTAL H2O GAIN:           254.5               STATIC PRESSURE:        0.15 inches H2O
TOTAL VOLUME (scf):       12.00               STACK PRESSURE:        25.23 inches Hg
PERCENT MOISTURE:         20.99               ORIFICE PRESSURE:      2.444 inches H2O
Bws:                     0.2099               METER PRESSURE:        25.40 inches Hg

INIT. METER VOLUME:     974.940
FINAL METER VOLUME:    1029.776               AVERAGE CONC. CO2:       2.2 percent
VOLUME SAMPLED:          54.836               AVERAGE CONC. O2:       17.3 percent
STD VOLUME (dscf):       45.176               AVERAGE CONC. CO:         NA ppm
STD VOLUME (dscm):        1.279               MOLECULAR WEIGHT:      29.04 g/g-mole-dry
Y FACTOR:                 0.996               MOLECULAR WEIGHT:      26.73 g/g-mole-wet

------------------------------------------------------------------------------------
  SAMPLE     VELOCITY   TEMPERATURE           SAMPLE   VELOCITY   TEMPERATURE
  POINT      " OF H20       °F                POINT    " OF H20       °F

  S  1         1.22        150                W  1       1.38        149
     2         1.23        150                   2       1.39        148
     3         1.24        150                   3       1.38        149
     4         1.23        149                   4       1.42        149
     5         1.23        150                   5       1.26        153
     6         1.22        149                   6       1.12        153
     7         1.29        150                   7       1.41        153
     8         1.40        149                   8       1.51        148
     9         1.39        148                   9       1.53        150
    10         1.39        149                  10       1.60        153
    11         1.42        149                  11       1.61        149
    12         1.44        149                  12       1.60        149
------------------------------------------------------------------------------------

PERCENT ISOKINETICS:                    94 %
STACK GAS TEMPERATURE:               149.8 degrees F           609.8 degrees R
AVERAGE VELOCITY HEAD:               1.368 " of H20
STACK GAS VELOCITY:                                             79.9 ft/second
STACK GAS AIR FLOW:                60222.6 acf/min           34744.1 dscf/min
PARTICULATE EMISSION CONCENTRATION (FRONT-HALF):               0.002 gr/dscf
PARTICULATE EMISSION CONCENTRATION (BACK-HALF):                0.021 gr/dscf
TOTAL PARTICULATE EMISSION CONC. (FRONT & BACK-HALF):          0.022 gr/dscf
TOTAL PARTICULATE EMISSION CONCENTRATION:                       51.1 mg/dscm
TOTAL PARTICULATE MATTER EMISSION RATE:                         6.65 lb/hr
```

```
FRONT-HALF PARTICULATE MATTER MASS LOADING
----------------------------------------------------------
FILTER NUMBER:                                    #110-703
TARE WEIGHT OF FILTER (grams):                      0.5935
FINAL WEIGHT OF FILTER (grams):                     0.5935
NET WEIGHT OF PARTICULATE MATTER (grams):           0.0000

PROBE RINSE BEAKER NUMBER:                       #150-1981
TARE WEIGHT OF BEAKER (grams):                     78.3910
FINAL WEIGHT OF BEAKER (grams):                    78.3962
NET WEIGHT OF PARTICULATE MATTER (grams):           0.0052
VOLUME OF ACETONE (milliliters):                     160.0
WT./VOL. OF ACETONE BLANK (milligrams/mL):          0.0000
NET WEIGHT OF PARTIC. DUE TO ACETONE (grams):       0.0000

TOTAL FRONT-HALF PARTICULATE MATTER (grams):        0.0052

BACK-HALF PARTICULATE MATTER MASS LOADING
----------------------------------------------------------
"C" SECTION - CONDENSER PARTICULATE              #150-2012
TARE WEIGHT OF BEAKER (grams):                     67.2101
FINAL WEIGHT OF BEAKER (grams):                    67.2238
NET WEIGHT OF PARTIC. MATTER (grams):               0.0141
TOTAL VOLUME OF WATER (milliliters):                 650.0
VOLUME OF ALIQUOT (milliliters):                      20.0
VOLUME OF WATER CONDENSED (milliliters):             241.1
NET VOLUME OF WATER FOR BLANK (milliliters):         408.9
WT./VOL. OF WATER BLANK (milligrams/mL):            0.0000
NET WEIGHT OF PARTIC. DUE TO WATER (grams):         0.0000

"Cx" SECTION - HYDROCARBON EXTRACTION     #150-1982 & 1983
TARE WEIGHT OF BEAKER (grams):                    144.9391
FINAL WEIGHT OF BEAKER (grams):                   144.9839
NET WEIGHT OF PARTIC. MATTER (grams):               0.0462
TOTAL VOLUME OF CH2Cl2 (milliliters):                218.0
WT./VOL. OF CH2Cl2 BLANK (milligrams/mL):           0.0007
NET WEIGHT OF PARTIC. DUE TO CH2Cl2 (grams):        0.0002

TOTAL BACK-HALF PARTICULATE MATTER (grams):         0.0602
TOTAL WEIGHT OF PARTICULATE MATTER (grams):         0.0654
```

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                                         METHODS 1, 2, 3A, 4, AND 5
                                          AM TEST-AIR QUALITY, INC.

FILE NAME:   S721\LPCOR3                  LAB #:                 6789               FRONT-HALF PARTICULATE MATTER MASS LOADING
CLIENT:      Louisiana Pacific            START TIME:            12:13 o'clock      --------------------------------------------------------
LOCATION:    Montrose, Colorado           STOP TIME:             13:15 o'clock      FILTER NUMBER:                                  #110-379
SAMPLE SITE: Dryer E-Tube Stack           SAMPLE LENGTH:          60.0 minutes      TARE WEIGHT OF FILTER (grams):                    0.5956
SAMPLE DATE: October 25, 1994                                                       FINAL WEIGHT OF FILTER (grams):                   0.6033
RUN #:       3 - Method 5                                                           NET WEIGHT OF PARTICULATE MATTER (grams):         0.0077
OPERATORS:   Mackey
                                                                                    PROBE RINSE BEAKER NUMBER:                     #150-1984
         IMPINGER WEIGHTS                                                           TARE WEIGHT OF BEAKER (grams):                   77.9157
      FINAL      INITIAL    NET           PITOT TUBE Cp:          0.84              FINAL WEIGHT OF BEAKER (grams):                  77.9271
      grams      grams      grams         NOZZLE DIAMETER:        0.230 inches      NET WEIGHT OF PARTICULATE MATTER (grams):         0.0114
      -----      -----      -----         NOZZLE AREA:           0.0003 sq. feet    VOLUME OF ACETONE (milliliters):                  110.0
      846.0      642.5      203.5         STACK DIAMETER:         48.0 inches       WT./VOL. OF ACETONE BLANK (milligrams/mL):        0.0000
      693.7      633.7       60.0         STACK AREA:             12.6 sq. feet     NET WEIGHT OF PARTIC. DUE TO ACETONE (grams):     0.0000
      601.9      596.7        5.2         METER TEMPERATURE:      93.1 degrees F
      826.3      810.7       15.6         BAROMETRIC PRES.:      25.19 inches Hg    TOTAL FRONT-HALF PARTICULATE MATTER (grams):      0.0191
TOTAL H2O GAIN:             284.3         STATIC PRESSURE:        0.12 inches H2O
TOTAL VOLUME (scf):          13.40        STACK PRESSURE:        25.20 inches Hg    BACK-HALF PARTICULATE MATTER MASS LOADING
PERCENT MOISTURE:            23.03        ORIFICE PRESSURE:      2.471 inches H2O   --------------------------------------------------------
Bws:                         0.2303       METER PRESSURE:        25.37 inches Hg    "C" SECTION - CONDENSER PARTICULATE             #150-2013
                                                                                    TARE WEIGHT OF BEAKER (grams):                   66.0167
INIT. METER VOLUME:         30.250                                                  FINAL WEIGHT OF BEAKER (grams):                  66.0303
FINAL METER VOLUME:         85.814        AVERAGE CONC. CO2:       2.2 percent      NET WEIGHT OF PARTIC. MATTER (grams):             0.0140
VOLUME SAMPLED:             55.564        AVERAGE CONC. O2:       17.1 percent      TOTAL VOLUME OF WATER (milliliters):              720.0
STD VOLUME (dscf):          44.799        AVERAGE CONC. CO:         NA ppm          VOLUME OF ALIQUOT (milliliters):                   20.0
STD VOLUME (dscm):           1.269        MOLECULAR WEIGHT:      29.04 g/g-mole-dry VOLUME OF WATER CONDENSED (milliliters):          268.7
Y FACTOR:                    0.996        MOLECULAR WEIGHT:      26.49 g/g-mole-wet NET VOLUME OF WATER FOR BLANK (milliliters):      451.3
                                                                                    WT./VOL. OF WATER BLANK (milligrams/mL):          0.0000
--------------------------------------------------------------------------------    NET WEIGHT OF PARTIC. DUE TO WATER (grams):       0.0000
  SAMPLE      VELOCITY   TEMPERATURE          SAMPLE     VELOCITY   TEMPERATURE
  POINT       " OF H2O       °F               POINT      " OF H2O       °F          "Cx" SECTION - HYDROCARBON EXTRACTION    #150-1985 & 1986
                                                                                    TARE WEIGHT OF BEAKER (grams):                  129.8080
  S  1          1.28        150               W  1          1.33        151         FINAL WEIGHT OF BEAKER (grams):                 129.8608
     2          1.23        151                  2          1.39        153         NET WEIGHT OF PARTIC. MATTER (grams):             0.0543
     3          1.31        151                  3          1.41        153         TOTAL VOLUME OF CH2Cl2 (milliliters):             208.0
     4          1.23        150                  4          1.38        151         WT./VOL. OF CH2Cl2 BLANK (milligrams/mL):         0.0007
     5          1.32        150                  5          1.28        151         NET WEIGHT OF PARTIC. DUE TO CH2Cl2 (grams):      0.0001
     6          1.29        153                  6          1.22        149
     7          1.25        155                  7          1.28        149         TOTAL BACK-HALF PARTICULATE MATTER (grams):       0.0682
     8          1.22        156                  8          1.43        150         TOTAL WEIGHT OF PARTICULATE MATTER (grams):       0.0873
     9          1.32        155                  9          1.39        150
    10          1.43        156                 10          1.39        149
    11          1.43        154                 11          1.39        150
    12          1.46        155                 12          1.61        150
--------------------------------------------------------------------------------

PERCENT ISOKINETICS:                          97 %
STACK GAS TEMPERATURE:                     151.8 degrees F         611.8 degrees R
AVERAGE VELOCITY HEAD:                     1.343 " of H2O
STACK GAS VELOCITY:                                                 79.7 ft/second
STACK GAS AIR FLOW:                      60064.8 acf/min         33606.0 dscf/min
PARTICULATE EMISSION CONCENTRATION (FRONT-HALF):                   0.007 gr/dscf
PARTICULATE EMISSION CONCENTRATION (BACK-HALF):                    0.023 gr/dscf
TOTAL PARTICULATE EMISSION CONC. (FRONT & BACK-HALF):              0.030 gr/dscf
TOTAL PARTICULATE EMISSION CONCENTRATION:                           68.8 mg/dscm
TOTAL PARTICULATE MATTER EMISSION RATE:                             8.66 lb/hr
```

APPENDIX B
Example Calculations and Field Data Sheets

EXAMPLE CALCULATION SHEET
EPA METHODS 1, 2, 3A, 4 AND 5

CLIENT: Louisiana Pacific LOCATION: Montrose CO DATE: 10-25-94

RUN #: 2 LAB #: 6788 SITE LOCATION: Dryer E-tube Stack

Particulate Matter Emission Concentration - Equation 5-1

Vm_{std} = 17.647°R/"$Hg_{(constant)}$*volume sampled*Y_{factor}*(P_B + ΔH/13.6)/(460 + T_m)

= 17.647°R/"Hg* 54.836 ft^3* 0.996 *(25.22 "Hg + (2.444 "H_2O/13.6))/(460 + 81.9° F)

= 45.176 dscf

dscm = 45.176 dscf/35.31 ft^3/m^3

= 1.279 dscm

Substitution of Equation 5-4 into 5-5

W_a = mg/ml blank * ml sample = mg sample due to acetone blank

= 0.0 mg = 0.0 mg/ml * 160 ml

M_n = (net weight filter catch) + (net weight "B" section) - Wa + Back-half

= 65.4 mg = 0.0 mg + 5.2 mg - 0.0 mg + 60.2 mg

C_s = (0.001 g/mg) * (15.43 grains/gram) * M_n / Vm_{std}

Front-half

C_s = (0.001 g/mg) * (15.43 grains/gram) * 5.2 mg / 45.176 dscf

= 0.002 gr/dscf (Equation 5-6)

gr/dscf @ ____ % O_2 = ______ gr/dscf * (20.9% - ______ %O_2)/(20.9% - ______ %O_2)

% correction % measured

= NA gr/dscf @ ____ % O_2

gr/dscf @ ___ %CO_2 = ______ gr/dscf * ______ % / ______ %CO_2

% correction % measured

= NA gr/dscf @ ____ % CO_2

Back-half

C_s = (0.001 g/mg) * (15.43 grains/gram) * 60.2 mg / 45.176 dscf

= 0.021 gr/dscf (Equation 5-6)

gr/dscf @ ____ % O_2 = ______ gr/dscf * (20.9% - ______ %O_2)/(20.9% - ______ %O_2)

% correction % measured

= NA gr/dscf @ ____ % O_2

gr/dscf @ ___ %CO_2 = ______ gr/dscf * ______ % / ______ %CO_2

% correction % measured

= NA gr/dscf @ ____ % CO_2

EXAMPLE CALCULATION SHEET (continued)
EPA METHODS 1, 2, 3A, 4 and 5

Total

C_s = (0.001 g/mg) * (15.43 grains/gram) * 65.4 mg / 45.176 dscf

= 0.022 gr/dscf (Equation 5-6)

gr/dscf @ ____ % O_2 = ______ gr/dscf * (20.9% - ______ $\%O_2$)/(20.9% - ______ $\%O_2$)

% correction % measured

= NA gr/dscf @ ____ % O_2

gr/dscf @ ____ $\%CO_2$ = ______ gr/dscf * ______ % / ______ $\%CO_2$

% correction % measured

= NA gr/dscf @ ____ % CO_2

mg/dscm = 65.4 mg/ 1.279 dscm

= 51.1 mg/dscm

Particulate Matter Emission Rate

pounds/hour = C_S * dscf/min * 60 min/hr * 1 lb/7000 grains

= 0.022 gr/dscf * 34744.1 dscf/min * 60 min/hr * 1 lb/7000 grains

= 6.65 lb/hr

tons/year = ______ lb/hr * 24 hr/day * 365 days/yr * 1 ton/2000 lb

= NA tons/yr

Moisture - Equation 5-2 and 5-3

Vw_{std} = 0.04715 ft^3/g * 254.5 grams of H_2O collected in impingers

= 12.00 scf

B_{ws} = (12.00 scf)/(12.00 scf + 45.176 dscf)

= 0.2099

% Moisture = 20.99 % = B_{ws} * 100

Molecular weight - Equation 3-2

M_d = 0.440*(2.2 $\%CO_2$)+0.320*(17.3 $\%O_2$)+0.280*(100%- 2.2 $\%CO_2$- 17.3 $\%O_2$(%CO+$\%N_2$))

= 29.04 g/g-mole (dry)

M_s = M_d * (1-B_{ws}) + 18.0 * B_{ws} = 29.04 g/g-mole * (1 - 0.2099) + 18.0 g/g-mole * 0.2099

= 26.73 g/g-mole (wet)

F_o = (20.9 - ______)$\%O_2$/______ $\%CO_2$ = NA

√

EXAMPLE CALCULATION SHEET (continued)
EPA METHODS 1, 2, 3A, 4 and 5

Stack gas velocity and volumetric flow rate - Equation 2-9 and 2-10

V_s = 85.49 * C_p* $\sqrt{\Delta P * T_s{}^\circ R / (M_s\ g/g\text{-mole} * P_s\text{"Hg})}$

= 85.49 * 0.84 * $\sqrt{1.368 * 609.8\ {}^\circ R / (28.73\ g/g\text{-mole} * 25.23\ \text{"Hg})}$

(149.8° F + 460)° R (23.22 P_B + 2.15 P_s/13.6)

= 79.9 ft/sec (std)

Q_{sd} = 3600 * (1 - B_{ws}) * V_s ft/sec * A_s ft^2 * (T_{std}° R/T_s° R) * (P_s"Hg / P_{std}"Hg) / 60 min/hr

= 3600 * (1 - 0.2099) * 79.9 ft/sec * 12.6 ft^2 * (528° R/609.8 ° R) * (25.23 "Hg / 29.92"Hg) / 60

= 34744.1 dscf/min (dry standard cubic feet per minute)

acfm = 79.9 ft/sec * 12.6 ft^2* 60 sec/min

= 60388.6 acfm (actual cubic feet per minute)

Isokinetic variation - Equation 5-8

I = 0.09450 * Vm_{std} dscf * T_s° R / [P_s"Hg * $V_s$ft/sec * minutes * A_n ft^2 *(1 -B_{ws})]

= 0.09450 * 45.176 dscf * 609.8 ° R/[25.23 "Hg * 79.9 ft/sec * 60 min * 0.0003 ft^2 *(1 - 0.2099)]

(.230 N_{dia}/12/2)^2*Pi

= 94 %

All of the above numbered equations are from the 40 CFR 60 and assume English units.

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EXAMPLE CALCULATION SHEET (continued)
EPA METHODS 1, 2, 3A, 4 and 5
BACK-HALF PARTICULATE

"C" Section

(write in final and intial wts for all appropriate impingers for c below)

1000.2 619.2
576.2 540.0
669.9 666.0
2246.3 - 2005.2 = 241.1

a 13.7 mg particulate in "C" Section Beaker
b 650 ml of water in condensers, including rinses
c 241.1 ml condensation in 1st, 2nd and 3rd bubblers (final wt - initial wt, assumes 1g/1ml water density)
d 408.9 ml DI water used in bubblers including rinses = *b* - *c*
e 0.0 mg/ml blank particulate = 0.0 mg blank / 500 ml blank
f 0.0 mg blank particulate = *e* * *d*
g 20 ml aliquot
h 1.032 correction factor = *b*/(*b*-*g*)
14.1 **mg of "C" particulate** = *a***h* - *f* = (13.7 mg * 1.032) - 0.0 mg

"Cx" Section

a 46.2 mg particulate in "Cx" Section Beaker = 44.8 mg * 1.032 correction factor (*h*)
b 218 ml CH_2Cl_2 used for sample
c 0.0007 mg/ml blank particulate = 0.1 mg blank / 150 ml blank
d 0.2 mg blank particulate = *b* * *c*
46.1 **mg of "Cx" particulate** = *a* - *d* = 46.2 mg - 0.2 mg

"D" Section

a ______ mg particulate in "D" Section Beaker
b ______ ml Acetone used for sample
c ______ mg/ml blank particulate (Same as "B" Section)
d ______ mg blank particulate = *b* * *c*
N/A **mg of "D" particulate** = *a* - *d* = ______ mg - ______ mg

TOTAL BACK-HALF PARTICULATE

\+ 14.1 mg "C" Section Particulate
\+ 46.1 mg "Cx" Section Particulate
\+ — mg "D" Section Particulate
\+ — mg Back-half Filter Particulate (If applicable)

= 60.2 **mg Back-half Particulate**

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STACK SCHEMATIC AND LOCATION OF SAMPLE POINTS

Client L.P. Montrose

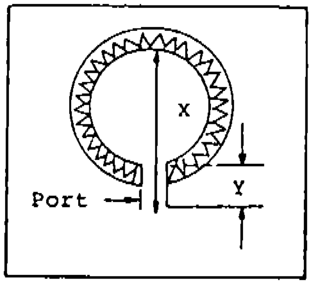
Location Montrose, CO

Sampling Location Dryer E-tube stack

Inside of far wall to outside of port (distance, X) 54"

Inside of near wall to outside of port (distance, Y) 6"

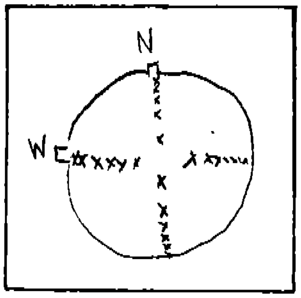
Stack I.D. (distance X - distance Y) 48" ϕ

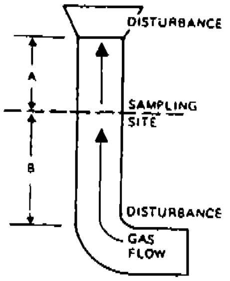


Schematic of Sampling Location

1 Traverse Point #	2 Fractional Percent of Stack I.D.	3 Stack I.D. inches	4 Column 2 x 3	5 Distance Y	6 Traverse Point Location from Outside of Port columns 4 + 5
1	.021	48.0"	1.0"	6.0"	7.0"
2	.067		3.2		9.2
3	.118		5.7		11.7
4	.177		8.5		14.5
5	.250		12.0		18.0
6	.356		17.1		23.1
7	.644		30.9		36.9
8	.750		36.0		42.0
9	.823		39.5		45.5
10	.882		42.3		48.3
11	.933		44.8		50.8
12	.979		47.0		53.0

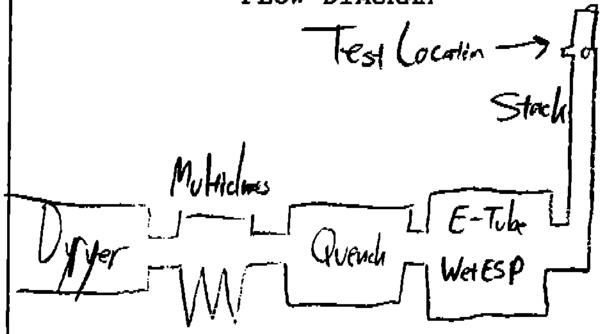
CROSS SECTION





Distance A = ~40 ft *downstream*
Distance B = 14 ft *upstream*

STACK, CONTROL DEVICE AND PROCESS FLOW DIAGRAM



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TRAVERSE SAMPLING DATA SHEET

Page 1 of 1 29

Client Louisiana Pacific - Montrose
Location Montrose, CO
Sample Site Dryer E-Tube Stack
Stack Diameter 48"
Date 10/25/94
Operators MSM
Run I.D. 1 - Meth 5/202

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ✓
Magnehelic Cal. ✓
Temp. Probe Cal. ✓
Gas Meter Calib. ✓

Start Time 8:16
Stop Time 9:34
Barometric Pressure "Hg 25.27
Static Pres "H_2O +0.15
Production Rate

Filter # 10 Box # 12-1

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.009 / .004
Leak Test Vacuum	15" / 15"

✓ Pitots, Pre Leak Ck
✓ Pitots, Post Leak Ck
✓ Gas Sampling System
✓ Integrated Bag
M5 Rinse Acetone/H_2O/Other

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	809.9	643.3	166.6
#2 Imp.	700.5	633.3	67.2
#3 Imp.	665.4	654.2	11.2
#4 Imp.	~~[illegible]~~		
#5 Imp.			
#6 S.G.	829.8	815.5	14.3

Total H_2O Volume 259.3 g

SAMPLING PARAMETERS

% Moisture 22/27/24.5/27.1
Meter Temp. 45/55
Stack Temp. 139/151/148/153
Δ H@ 1.868 Y 0.996
Pitot # 54 (54?) Side # A (Buell A?)
Cp .84
Nozzle Diameter .230 inch
D_1 .230 D_2 .230 D_3 .231
K Factor 1.52/1.05/1.55

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Orifice Setting (Δ H) " H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
N 1	0	923.899	1.23	2.14	2.14	48	48	1	263	50	149		
2	2.5	926.510	1.26	2.19	2.19	49	48	1	263	50	150		
3	5	928.710	1.26	1.91	1.92	50	49	1	264	52	150		
4	7.5	930.819	1.21	1.84	1.84	50	49	1	264	54	150		
5	10	932.741	1.30	1.97	1.97	52	50	1	262	55	149		
6	12.5	934.820	1.23	1.87	1.87	53	51	1	265	58	148		
7	15	936.800	1.22	1.85	1.85	55	52	1	265	59	148		
8	17.5	938.755	1.32	2.00	2.00	56	52	1	262	60	149		
9	20	940.805	1.39	2.29	2.29	57	53	1	265	61	149		
[illegible]	22.5	942.869	1.42	2.34	2.34	58	54	1	265	61	149		
[illegible]	25	944.889	1.41	2.33	2.33	59	55	1	264	62	151		
[illegible]	27.5	946.978	1.42	2.34	2.34	59	55	1	263	62	149		
W [illegible]	30	949.147	1.33	2.20	2.20	60	57	1	265	59	149		
2	32.5	951.102	1.33	2.20	2.20	60	57	1	265	60	150		
3	35	953.209	1.38	2.29	2.28	62	58	1	266	59	151		
4	37.5	955.320	1.36	2.25	2.25	62	58	1	265	58	152		
5	40	957.314	1.28	2.11	2.11	63	60	1	266	59	154		
6	42.5	959.310	1.10	1.81	1.81	64	60	1	269	59	150		
7	45	961.350	1.38	2.28	2.28	65	61	1	265	60	153		
8	47.5	963.505	1.48	2.44	2.44	65	62	1	264	60	153		
9	50	965.525	1.51	2.35	2.35	65	62	1	264	59	152		
10	52.5	967.620	1.54	2.39	2.39	66	62	1	265	60	152		
11	55	969.825	1.52	2.36	2.36	66	62	1	265	60	153		
12	57.5	972.080	1.54	2.39	2.39	66	62	1	264	59	153	←	Power failure (15 minute delay)
	60	974.135											
		[illegible]			2.173	57.3					150		

METHOD 5
LABORATORY ANALYSIS

Client Louisiana Pacific Run Number 1

Sample Location Dryer E-Tube Stack

Date 10/25/94

"A" Section (Filter)

Filter # 110-377	Tare Weight 0.5905 grams
	Final Weight 0.5998 grams F
	Net Weight 0.0093 grams

"B" Section (Probe Wash)

Beaker # 150-1978	Tare Weight 70.2140 grams
Volume Acetone 160 mls	Final Weight 70.2241 grams F
	Net Weight 0.0101 grams

"C" Section (Condenser Particulate - Inorganic Catch)

Beaker # 150-2011	Tare Weight 66.0861 grams
Volume Water 570/590 mls	Final Weight 66.0964 grams
	Net Weight 0.0103 grams

"Cx" Section (Condenser Particulate - Organic Catch)

	[illegible] + 71.1958
Beaker # 150-1979/150-1980	Tare Weight 140.7433 grams
	69.3162 + 71.4743 F
Volume CH_2Cl_2 145/75 mls	Final Weight 140.7905 grams
	Net Weight grams

"D" Section (Final Acetone Rinse of Impingers)

Beaker #	Tare Weight grams
Volume Acetone mls	Final Weight grams
	Net Weight grams

73

16/W Perm Cool

165-1648

~22% H2O

~27.85 F/sm

~93% ISO-K

Charlie Cox

Stuart Co.

6287

Run 1 Gas Bag (In Field Analysis) = 17.3% O2

6788

TRAVERSE SAMPLING DATA SHEET

Page 1 of 1 31

Client C P Montrose
Location Montrose, CO
Sample Site Dryer E-tube stack

Stack Diameter 48.0"φ
Date 10/25/04
Operators KSH
Run I.D. 2-[illegible] 5/202

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.006 / .007
Leak Test Vacuum	15" / 15"

✓ Pitots, Pre Leak Ck
✓ Pitots, Post Leak Ck
✓ Gas Sampling System
✓ Integrated Bag
M5 Rinse Acetone/H_2O/Other

QA FORMS COMPLETED
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ✓
Magnehelic Cal.. ✓
Temp. Probe Cal. ✓
Gas Meter Calib. ✓

Filter # 10- Box # B2

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	900.2	699.2	201.0 ✓
#2 Imp.	676.2	640.0	36.2 ✓
#3 Imp.	669.9	666.0	3.9 ✓
#4 Imp.	[illegible]		
#5 Imp.			
#6 S.G.	838.1	824.7	13.4 ✓

Total H_2O Volume 254.5 ✓ g

Start Time 10:18
Stop Time 11:22
Barometric Pressure "Hg 25.27
Static Pres "H_2O +0.15
Production Rate

SAMPLING PARAMETERS

% Moisture 23%
Meter Temp. 76
Stack Temp. 150
✓ ΔH@ 1.868 Y 0.996 (8[illegible])
✓ Pitot # 54 (5H?) Side # 1
✓ Cp .84
Nozzle Diameter .230 inch
D_1 .230 D_2 .230 D_3 .231
K Factor 1.79

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Orifice Setting (Δ H) " H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
South 1	0	974.940	1.22	2.18	2.18	75	75	1	268	59	150		
2	2.5	977.101	1.23	2.20	2.20	76	76	1	265	59	150		
3	5	979.290	1.24	2.21	2.21	76	77	1	263	59	150		
4	7.5	981.281	1.23	2.20	2.20	76	77	1	263	57	149		
5	10	983.484	1.23	2.20	2.20	78	79	1	[illegible]	56	150		
6	12.5	985.616	1.22	2.18	2.18	78	79	1	269	57	149		
7	15	987.801	1.29	2.30	2.30	79	80	1	270	56	150		
8	17.5	989.848	1.40	2.50	2.50	80	81	1	270	57	149		
9	20	992.150	1.39	2.43	2.43	80	81	1	263	57	148		
10	22.5	994.499	1.39	2.43	2.43	81	82	1	272	58	149		
11	25	996.683	1.42	2.53	2.53	82	82	1.5	270	58	149		
12	27.5	999.015	1.44	2.57	2.57	82	82	1.5	269	58	149		
West 1	30	1001.495	1.38	2.46	2.46	83	83	1.5	261	59	149		
2	32.5	1003.651	1.39	2.48	2.48	83	84	1.5	262	58	149		
3	35	1005.859	1.38	2.46	2.46	83	84	1.5	261	58	149		
4	37.5	1008.290	1.42	2.53	2.53	83	85	1.5	259	58	149		
5	40	1010.500	1.26	2.25	2.25	84	85	1.0	264	59	153		
6	42.5	1012.688	1.12	2.00	2.00	84	86	1	263	59	153		
7	45	1014.743	1.41	2.52	2.52	84	86	1.5	261	60	153		
8	47.5	1017.061	1.51	2.70	2.70	85	86	2	261	60	148		
9	50	1019.453	1.53	2.73	2.73	85	87	2	261	60	150		
10	52.5	1021.733	1.60	2.86	2.86	85	87	2	261	61	153		
11	55	1024.314	1.61	2.87	2.87	85	87	2	257	62	149		
12	57.5	1026.977	1.60	2.86	2.86	85	87	2	258	63	149		
	60	1029.776											
		54.23		2.444 /		81.9 /					149.8 /		

METHOD 5
LABORATORY ANALYSIS

Client LOUISIANA PACIFIC Run Number 2

Sample Location DRYER E-TUBE STACK

Date 10/25/94

"A" Section (Filter)

Filter # 110-703	Tare Weight 0.5935 grams F
	Final Weight 0.5875 grams
	Net Weight -0.0060 grams

"B" Section (Probe Wash)

Beaker # 150-1981	Tare Weight 78.3910 grams
Volume Acetone 160 mls	Final Weight 78.3962 grams F
	Net Weight 0.0052 grams

"C" Section (Condenser Particulate - Inorganic Catch)

Beaker # 150-2012	Tare Weight 67.2101 grams
Volume Water 630/650 mls	Final Weight 67.2238 grams F
	Net Weight 0.0137 grams

"Cx" Section (Condenser Particulate - Organic Catch)

	65.[illegible] + 79.[illegible]
Beaker # 150-1982/150-1983	Tare Weight 144.9291 grams
	65.4134 + 79.5[illegible]
Volume CH_2Cl_2 ~~143~~/~~75~~ mls	Final Weight 144.9839 grams
63 150	Net Weight 0.0448 grams

"D" Section (Final Acetone Rinse of Impingers)

Beaker #	Tare Weight grams
Volume Acetone mls	Final Weight grams
	Net Weight grams

$(\sqrt{\Delta P})_{avg} = 1.170$

Avg $\Delta P = 1.368$

$V_s = 80.2$ ft/sec

6288 9459 ISO-K

Run 2 Gas Bag (Infield Analysis): 17.3% O_2

6789

TRAVERSE SAMPLING DATA SHEET

Page 1 of 1 33

Client LP Montrose
Location Montrose CO
Sample Site Dryer E-Tube Stack
Stack Diameter 48" ⌀
Date 10/25/94
Operators KSM
Run I.D. 3- Method 5

QA FORMS COMPLETED ✓
Stack Schematic ✓
Sample Train ✓
Pitot Tube Insp. ✓
Magnehelic Cal. ✓
Temp. Probe Cal. ✓
Gas Meter Calib. ✓

Start Time 12:13
Stop Time 13:15
Barometric Pressure "Hg 25.19
Static Pres "H_2O +.12
Production Rate

Filter # 110- Box # R-3

EQUIPMENT CHECKS

	Initial/Final
Leak Rate cfm	.009 / .008
Leak Test Vacuum	15" / 15"

✓ Pitots, Pre Leak Ck
✓ Pitots, Post Leak Ck
✓ Gas Sampling System
✓ Integrated Bag
M5 Rinse Acetone/H_2O/Other

	Final Wt. gram	Initial Wt. gram	Net Wt. gram
#1 Imp.	846.0	642.5	
#2 Imp.	693.7	633.7	
#3 Imp.	601.9	596.7	
#4 Imp	~~836.3~~		
#5 Imp.			
#6 S.G.	826.3	810.7	

Total H_2O Volume 234.3 ✓ g

SAMPLING PARAMETERS

% Moisture 23%
Meter Temp. 95
Stack Temp. 150
Δ H@ 1.868 Y 0.996
Pitot # 5H (5H?) Side # A
Cp .84
Nozzle Diameter .230 inch
D_1 .230 D_2 .230 D_3 .231
K Factor 1.84

Sample Point	Elap Time Min.	Dry Gas Meter Reading Cu.Ft.	Pitot Reading Δ P " H_2O	Orifice Setting (Δ H) " H_2O Ideal	Orifice Setting (Δ H) " H_2O Actual	Gas Meter Temp °F In	Gas Meter Temp °F Out	Pump Vac. Gauge " Hg	Filter Box Temp °F	Imp. Exit Temp °F	Stack Temp °F	O_2 %	
South 1	0	30.250	1.28	2.35	2.35	91	94	2	256	62	150		
2	2.5	32.585	1.23	2.26	2.26	91	94	2	251	59	151		
3	5.0	34.700	1.31	2.41	2.41	90	95	2	252	58	151		
4	7.5	36.895	1.23	2.26	2.26	90	95	2	252	56	150		
5	10	39.118	1.32	2.43	2.43	90	95	2	259	57	150		
6	12.5	41.440	1.29	2.37	2.37	90	95	2	259	58	153		
7	15	43.888	1.25	2.30	2.30	90	94	2	259	58	155		
8	17.5	45.964	1.22	2.24	2.24	90	94	2	259	56	156		
9	20	48.221	1.32	2.43	2.43	90	95	2	259	59	155		
10	22.5	50.480	1.43	2.63	2.63	91	95	2½	259	64	156		
11	25	52.811	1.43	2.63	2.63	91	91	2½	259	62	154		
12	27.5	55.071	1.46	2.68	2.68	91	95	2½	259	61	155		
West 1	30	57.529	1.33	2.44	2.44	91	95	2	258	66	151		
2	32.5	59.769	1.39	2.55	2.55	91	95	2	258	63	153		
3	35	62.071	1.41	2.59	2.59	92	95	2	258	62	153		
4	37.5	64.400	1.38	2.54	2.54	92	95	2	255	62	151		
5	40	67.081	1.28	2.35	2.35	92	95	2	258	62	151		
6	42.5	69.202	1.22	2.24	2.24	92	96	2	258	60	149		
7	45	71.504	1.28	2.36	2.36	92	96	2	261	60	149		
8	47.5	73.770	1.43	2.63	2.63	92	96	2½	261	61	150		
9	50	76.122	1.39	2.55	2.55	93	96	2½	262	61	150		
10	52.5	78.600	1.39	2.55	2.55	93	96	2½	262	62	149		
11	55	81.005	1.39	2.55	2.55	93	96	2½	262	64	150		
12	57.5	83.406	1.61	2.96	2.96	93	96	2½	262	65	150		
	(60)	85.814											
		55.564 ✓			2.471	93.1 ✓					151.3 ✓		

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METHOD 5
LABORATORY ANALYSIS

Client LOUISIANA PACIFIC Run Number 3

Sample Location DRYER E-TUBE STACK

Date 10/25/94

"A" Section (Filter)

Filter # 110-379

Tare Weight 0.5956 grams

Final Weight 0.6033 grams F

Net Weight 0.0077 grams

"B" Section (Probe Wash)

Beaker # 150-1984

Volume Acetone 110 mls

Tare Weight 77.9157 grams

Final Weight 77.9271 grams

Net Weight 0.0114 grams F

"C" Section (Condenser Particulate - Inorganic Catch)

Beaker # 150-2013

Volume Water 700/720 mls

Tare Weight 66.0167 grams

Final Weight 66.0303 grams F

Net Weight 0.0136 grams

"Cx" Section (Condenser Particulate - Organic Catch)

Beaker # 150-1985/150-1986

Volume CH_2Cl_2 133/75 mls

[illegible]

Tare Weight 129.8080 grams

Final Weight 129.8608 grams

[illegible]

Net Weight 0.0528 grams

"D" Section (Final Acetone Rinse of Impingers)

Beaker #________

Volume Acetone ________ mls

Tare Weight________ grams

Final Weight________ grams

Net Weight________ grams

Gas Bag Analysis InFrip 17.1% O_2

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LOUISIANA PACIFIC

METHOD 5
LABORATORY ANALYSIS

Acetone Blank

Beaker # 150-1987
Volume Acetone 140 mls

Tare Weight 64.9525 grams
Final Weight 64.9523 grams
Net Weight — grams
$0.0 \frac{mg}{ml}$

Distilled, Deionized Water Blank

Beaker # 150-2014
Volume Water 300 mls

Tare Weight 68.3090 grams
Final Weight 68.3082 grams
Net Weight — grams
$0.0 \frac{mg}{ml}$

Methylene Chloride (CH2Cl2) Blank

Beaker # 150-1988
Volume CH_2Cl_2 150 mls

Tare Weight 65.0619 grams
Final Weight 65.0620 grams
Net Weight 0.0001 grams
$\frac{0.1 mg}{150 ml} = 0.0007 \frac{mg}{ml}$

AMTEST
AIR QUALITY, INC.

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SAMPLE TRAIN INFORMATION

Fill out one sheet per site and per test type.

CLIENT: L.P. Montrose.
LOCATION: Montrose CO
SITE: Dryer E-Tube Stack
TEST TEAM: KSM DATE(S): 10/25/94
RUN #'S: 1-3 TYPE: Method 5/202

Probe/Filter Temperature: __X__ 248+25 F ______320 F ______Other
Impinger Temperature: __X__ <68 F ______Other

THIMBLE: ______ yes __X__ no NOZZLE TYPE: __X__quartz ______steel ______none

PROBE LINER: __X__quartz ______glass ______steel ______teflon

PROBE TYPE: __X__regular ______water-cooled

FRONT-HALF FILTER: __X__yes ____no SIZE (mm): ____90 __X__110 ____125 ____other____
FRONT-HALF FILTER MEDIA: __X__quartz fiber ______glass fiber ______teflon

SUPPORT: ______steel __X__glass frit ______teflon GASKET: __✓__silicon ______teflon

BACK-HALF FILTER: ____yes __X__no
BACK-HALF FILTER MEDIA: ____quartz fiber ____glass fiber ____telfon ____tared ____untared
NOTE: Show the back-half filter location with an arrow on the table below.

CONTENTS	Initial Volume (mL)	Clean-up Solution Used	Bottle Type	Comments
Nozzle/Probe Rinse		Acetone	500 ml	
Filter		—	Petri Dish	
#1 100 mls DI H_2O	100	DCM	1000 ml	
#2 100 mls DI H_2O	100	DCM	1000 ml	
#3 100 mls DI H_2O	100	DCM	1000 ml	
#4 Silica Gel				
#5				
#6				
#7				

IF THIS INFORMATION IS NOT ACCURATE FOR ALL RUNS, NOTE ALL EXCEPTIONS.

The optional post test N_2 purge was not performed on these tests

Notebook No

PROJECT

Continued From Page 37

DATE	TIME	TEMP	RH Room	RH Des	~~Audit~~ Wgt	Recorded Wgt	CAL.	I
10/31A	0840	58.8	56	21	100	100.0000	Y	Am
↓	↓	↓	↓	↓	50	50.0002	↓	↓
					0.5	0.5000		
10/31P	1501	66.9	49	26	100	99.9998	Y	87
11/1A	0825	57.9	50	24	100	100.0000	Y	Am
11/1P	1307	67.8	44	28	100	99.9997	Y	S
2A	0858	59.6	48	22	100	99.9997	Y	S
11/2P	1610	67.5	44	25	100	99.9987	Y	87
3A	0825	57.0	43	21	100	99.9999	Y	S
11/3P	1521	70.1	38	22	100	100.0000	Y	8
4A	0820	57.0	47	21	100	100.0000	Y	Ar
11/4P	1615	68.0	43	24	100	100.0000	Y	Am
11/7A	0836	56.0	51	21	100	100.0003	Y	S
↓					50	50.0002	↓	↓
					0.5	0.4999		
11/7P	1620	68.7	44	25	100	100.0000	Y	Am
11/8A	0759	59.8	49	22	100	100.0000	Y	S
P	1517	67.9	44	30	100	100.0001	Y	S
11/9A	0830	62.9	46	21	100	100.0001	Y	Am

Continued on Page

Read and Understood By

Signed

Date

Signed

Date

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ROJECT

Notebook No.

Continued From Page 38

ATE	TIME	TEMP	RH Room	RH Des	Audit Weight	Recorded Weight	CAL	In
1' '2P	1622	72.7	46	26	100	100.0000	Y	Am
↓	↓	↓	↓	↓	50	50.0003	↓	↓
					0.5	0.4999		
1' 11A	0838	62.4	50	24	100	99.9998	Y	S
1 11P	1500	67.2	45	25	100	99.9998	Y	S
10/12A	0832	59.9	45	19	100	99.9999	Y	S
1 2P	1542	66.9	44	22	100	100.0000	Y	S
/13A	0823	59.5	46	20	100	100 0500	Y	S
1C 3P	1532	68.4	44	24	100	100.0001	Y	S
10/14A	0822	62.0	49	21	100	99.9999	Y	S
4P	16.30	[illegible].7	45	20-25	100	100.0001	Y	CB
10/17A	0844	57.6	53	21	100	100.0001		Am
↓		↓	↓	↓	50	50.0001		↓
					0.5	0.4999	↓	
1/17P	1645	68.2	49	29	100	100.0000	Y	Am
1C 8A	0810	60.2	54	24	100	100.0000	y	Amu
10/18P	1446	68.7	49	21	100	100.0000	Y	S
10 A	0844	61.7	51	23	100	100.0000	y	Am
10/19P	15:28	68.5	48	24	100	100.0000	Y	S
9 0A	08:26	62.5	52	23	100	100.0000	y	Am
0/20P	1552	69.5	48	26	100	99.9998	Y	S
0 1A	0820	61.3	53	26	100	100.0000	y	Am
0/21P	1654	66.3	47	21	100	100.0000	y	Amu
0 4A	0828	57.7	50	20	100	100.0000	y	Amu
↓					50	50.0001	y	
					0.5	0.4997	y	✓
0/ 1P	16:03	69.3	48	29	100	99.9998	Y	SA
0/25A	08 14	60.8	47	21	100	100.0001		Amu
9 5P	15:41	69.7	47	22	100	100.0000	Y	SA
0/26A	08:57	65.5	57	24	100	100.0001	Y	SA
1C 6P	1600	71.5	52	34	100	100.0000	y	Amu
9/27A	0747	62.1	55	35	100	100.0000	Y	SA
2 P	1506	70.1	50	33	100	100.000	Y	SA
/28A	0832	60.9	52	26	100	100.0000	y	Amu
0/	1517	69.0	45	31	100	99.9999	Y	SA

Continued on Page

Read and Understood By

Signed

Date

Signed

Date

Continued From Page

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With Beads

E		Run		m	TARE WEIGHT		
1945	6	11	9	200	65.7355 10/12A	65.7370 10/12P	65.7366 10/13A
1946	6743	12	0	240	65.7288 10/12A	65.7292 10/12P	
1947	6770	1	>PM10	60	66.2288 10/12A	66.2291 10/12P	
1948	6770		<PM10	40	67.4484 10/12A	67.4493 10/12P	67.4489 10/13A
1949	6770	1	B	70	81.4684 10/12A	81.4689 10/12P	
1950	6770		Cx	75	65.8009 10/12A	65.8016 10/12P	65.8015 10/13A
1951	6770		Cx	150	65.7364 10/12A	65.7370 10/12P	65.7374 10/13P
1952	6771	2	>PM10	110	67.0577 10/12A	67.0585 10/12P	67.0582 10/13A
1953	6771	2	<PM10	60	70.0049 10/12A	70.0062 10/12P	70.0058 10/13A
1954	6771	2	B	80	68.2653 10/12A	68.2661 10/12P	68.266 10/13A
1955	6771	2	Cx	75	65.1858 10/12A	65.1861 10/12P	65.1860 10/13A
1956	6771	2	Cx	150	65.8363 10/12A	65.8369 10/12P	65.8370 10/13A
1957	6772	1	B RO	40	71.1129 10/12P	71.1131 10/13A	
1958	6773	2	B	100	71.7023 10/12P	71.7027 10/13A	
1959	6774	3	B	220	71.4473 10/12P	71.4473 10/13A	
1960	6775	1	B	100	71.4431 10/12P	71.4431 10/13A	
1961	6776	2	B	150	70.7372 10/12P	70.7370 10/13A	70.7368 10/13P
1962	6777	3	B	140	70.7490 10/12P	70.7498 10/13A	70.7497 10/13P
1963	6778	1	B	160	71.6982 10/12P	71.6985 10/13A	
1964	6779	2	B	120	71.4454 10/12P	71.4460 10/13A	71.4462 10/13P
1965	6780	3	B	190	70.5815 10/12P	70.5817 10/13A	
1966	6781	1	C	400/480	65.7630 10/12P	65.7631 10/13A	
1967	6782	2	C	370/490	71.3969 10/12P	71.3973 10/13A	
1968	6783	3	C	490/600	71.1644 10/12P	71.1647 10/13A	
1969	6784	1	B	180	71.0153 10/12A	71.0154 10/12P	
1970	6784	1	D	70	70.3747 10/12A	70.3753 10/13A	70.3753 10/15P
1971	6784	1	Cx	150	70.2540 10/12A	70.2543 10/12P	
1972	6785	2	B	240	69.4288 10/12A	69.4287 10/12P	
1973	6785	2	D	90	69.6413 10/12A	69.6414 10/12P	
1974	6785	2	Cx	150	70.0274 10/12A	70.0275 10/12P	
1975	6786	3	B	160	70.2891 10/12A	70.2894 10/12P	
1976	6786	3	D	100	71.2935 10/12A	71.2937 10/12P	
1977	6786	3	Cx	150	71.0837 10/12A	71.0839 10/12P	
1978	6787	1	B	140	70.2134 10/12A	70.2140 10/12P	70.2137 10/13A
1979	6787	1	Cx	145	69.5503 10/12A	69.5505 10/12P	
1980	6787	1	Cx	75	71.1928 10/12A	71.1928 10/12P	

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BEAKER	FINAL WEIGHT				C/
1945	65.7911 10/31P	65.7901 11/1A	65.7908 11/1P		
1946	65.8341 10/31P	65.8332 11/1A	65.8339 11/1P		K
1947	66.2671 10/26A	66.2674 10/28P			
1948	67.4541 10/26P	67.4535 10/27A	67.4539 10/27P		Kim
1949	81.4733 10/26P	81.4725 10/27A	81.4726 10/27P		
1950	65.8046 10/26P	65.8041 10/27A			
1951	65.7381 10/26P	65.7375 10/27A	65.7376 10/27P		
1952	67.1176 10/28A	67.1173 10/28P			
1953	70.0154 10/26P	70.0147 10/27A	70.0145 10/27P		
1954	68.2814 10/26P	68.2806 10/27A	68.2807 10/27P		
1955	~~65.1917~~ 65.1924 10/26P	65.1917 10/27A	65.1918 10/27P		
1956	65.8382 10/26P	65.8378 10/27A			
1957	71.1320 10/25P	71.1324 10/26A			
1958	71.7144 10/25A	71.7159 10/25P	71.7158 10/26A		Jan
1959	71.4704 10/25P	71.4707 10/26A			
1960	71.4678 10/25A	71.4691 10/25P	71.4692 10/26A		
1961	70.7506 10/25A	70.7515 10/25P	70.7514 10/26A		
1962	70.7657 10/25A	70.7651 10/25P			
1963	71.7137 10/25A	71.7194 10/25P	71.7197 10/26A		
1964	71.4622 10/25A	71.4627 10/26A			
1965	70.5980 10/25A	70.5979 10/25P			
1966	65.7705 10/27P	65.7702 10/28A			
1967	71.4034 10/26P	71.4033 10/27P			Ft.
1968	71.1776 10/27P	71.1775 10/28A			
1969	71.0606 10/28P	71.0604 10/31A			
1970	70.3764 10/28A	70.3761 10/28P			Rough
1971	70.2549 10/27P	70.2549 10/28A			
1972	69.4558 10/28P	~~69.45~~ 69.4557 10/31A			
1973	69.6436 10/28A	69.6438 10/28P			
1974	70.0291 10/27P	70.0287 10/28A			
1975	70.3094 10/27P	70.3086 10/28A	70.3097 10/28P		
1976	71.2963 10/28P	71.2964 10/31A			
1977	71.0850 10/27P	71.0848 10/28A			
1978	70.2252 10/27P	70.2245 10/28A	70.2241 10/28P		
1979	69.6023 10/28A	69.6005 10/28P	69.5967 10/31A	69.5963 10/31P	LP C
1980	71.1944 10/27P	71.1943 10/28A			

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BEAKER	L	RUN	SEC	mLs	TARE WEIGHT			
150 1981	6788	2	B	160	78.3924 10/19A	78.3909 10/19P	78.3910 10/20A	
1982	6788	2	Ck	68	65.3685 10/19A	65.3688 10/19P		
1983	6788	2	Ck	150	79.5702 10/19A	79.5706 10/19P		
1984	6789	3	B	110	77.9157 10/19A	77.9154 10/19P		
1985	6789	3	Ck	133	65.9691 10/19A	65.9688 10/19P		
1986	6789	3	Ck	.75	63.8386 10/19A	63.8389 10/19P		
1987	BLANK		B	140	64.9520 10/19A	64.9514 10/19P	64.9525 10/20A	
1988	BLANK		Ck	150	65.0616 10/19A	65.0619 10/19P		
1989	6744	13	B	270	65.0920 10/19A	65.0921 10/19P		
1990	6745	14	B	260	65.1251 10/19A	65.1233 10/19P	65.1238 10/20A	
1991	6792	1	B		66.0647 10/19A	66.0646 10/19P		
1992	6792	1	D	80	65.9337 10/19A	65.9340 10/19P		
1993	6792	1	Ck	150	65.9692 10/20P	65.9699 10/21A	65.9689 10/21P	
1994	6793	2	B		67.2804 10/20P	67.2806 10/21A		
1995	6793	2	D	90	66.1699 10/20P	66.1711 10/21A	66.1701 10/21P	
1996	6793	2	Ck	150	81.2954 10/20P	81.2970 10/21A	81.2955 10/21P	
1997	6794	3	B		79.7559 10/20P	79.7554 10/21A		
1998	6794	3	D	100	80.4758 10/20P	80.4759 10/21A		
1999	6794	3	Ck	150	79.8165 10/20P	79.8175 10/21A	79.8163 10/21P	
2000	BLANK		B/D	150	66.7479 10/20P	66.7493 10/21A	66.7484 10/21P	
2001	BLANK		Ck	150	65.6531 10/20P	65.6541 10/21A	65.6529 10/21P	
2002	BLANK		B	200	66.0768 10/20P	66.0772 10/21A		
2003	6795	1	B	180	67.1090 10/20P	67.1103 10/21A	67.1092 10/21P	
2004	6795	1	D	190	66.6341 10/20P	65.6354 10/21A	65.6347 10/21P	65.6349 10/24A
2005	BLANK		C	250	68.6318 10/19A	68.6320 10/19P		
2006	6770	1	C	430/450	66.1780 10/19P	66.1788 10/20A	66.1771 10/20P	66.1785 10/21A
2007	6771	2	C	410/430	66.0589 10/19P	66.0597 10/20A	66.0581 10/20P	66.0592 10/21A
2008	6784	1	C	380/400	68.9885 10/19A	68.9888 10/19P		
2009	6785	2	C	460/480	66.5455 10/19P	66.5460 10/20A		
2010	6786	3	C	400/410	68.1169 10/19P	68.1178 10/20A	68.1159 10/20P	68.1175 10/21A
2011	6787	1	C	570/590	66.0860 10/19P	66.0868 10/20A	66.0851 10/20P	66.0861 10/21A
2012	6788	2	C	630/650	67.2093 10/20	67.2101 10/20A	67.2083 10/20P	67.2096 10/21A
2013	6789	3	C	700/720	66.0166 10/19A	66.0167 10/19P		
2014	BLANK		C	300	68.3085 10/19P	68.3090 10/20A		
2015	6792	1	C	510/530	67.3803 10/4	67.3794 10/7A	67.3799 10/7P	
2016	6793	2	C	490/510	67.2820 ✓	67.2812 10/7A	67.2817 10/7P	

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BEAKER	FINAL WEIGHT				C
1981	78.3963 10/27P	78.3962 10/28A			Loc
1982	65.4165 10/28A	65.4159 10/28P	65.4139 10/31A	65.4154 10/31P	
1983	79.5705 10/28A	79.5697 10/28P	79.5708 10/31A		
1984	77.9278 10/27A	77.9284 10/27P	77.9271 11/4A	77.9272 10/28P	
1985	66.0219 10/28A	66.0215 10/28P			
1986	63.8395 10/28A	63.8393 10/28P			
1987	64.9527 10/27P	64.9523 10/28A			
1988	65.0621 10/28P	65.0620 10/28P			
1989	65.1235 11/3P	65.1252 11/4A	65.1215 11/4P	65.1235 11/7A	
1990	65.1958 11/2P	65.1939 11/3A	65.1939 11/3P		
1991					Ci
1992	65.9357 11/4P	65.9349 11/7A	65.9355 11/7P		
1993	65.9693 11/2P	65.9691 11/3A			
1994					
1995	66.1730 11/4P	66.1724 11/7A	66.1727 11/7P		
1996	81.2979 11/2P	81.2975 11/3A			
1997					
1998	80.4774 11/4P	80.4759 11/7A	80.4778 11/7P		
1999	79.8177 11/2P	79.8175 11/3A			
2000					
2001	65.6541 11/2P	65.6537 11/3A			
2002	~~66.08~~ 66.0684 11/4A	66.0781 11/4P	66.0779 11/7A		KH
2003	67.1179 11/4P	67.1167 11/7A	67.1171 11/7P		RA
2004	65.6391 11/7P	65.6396 11/8A			
2005	68.6314 10/26P	68.6317 10/27A			Fr
2006	66.1871 10/26P	66.1882 10/27A	66.1879 10/27P		S
2007	66.0616 10/26P	66.0612 10/27A			
2008	68.9979 10/27P	68.9979 10/28A			Re
2009	66.5478 10/27P	66.5474 10/28A			
2010	68.1193 10/21P	68.1189 10/28A			
2011	66.0964 10/28P	66.0966 10/31A			Lo
2012	67.2238 10/28P	67.2238 10/31A			
2013	66.0305 10/28P	66.0306 10/31A			
2014	68.3086 10/27P	68.3082 10/28A			
2015	67.3810 11/2P	67.3804 11/3A	67.3813 11/3P		CE
2016	67.2832 11/2P	67.2838 11/3A	67.2841 11/3P		

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FILTER	TARE	FINAL WEIGHT				RUN	LAB JOB
347	0.5972	1.3092 3/21A	1.3115 3/21P	1.3114 3/22A		2	5297
348	0.5912	1.2087 3/21A	1.2086 3/21P			3	5298
349	0.5883	0.5728 3/29A	0.5701 3/29P	0.5666 3/30A	0.5645 3/30P	3	5351
350	0.6587	0.6216 3/29A	0.6221 3/29P			2	5350
351	0.5931						
352	0.5947	0.6468 3/25A	0.6535 3/28A	0.6506 3/28P	0.6493 3/29A	2	5329
353	0.5950	0.7524 3/25A	0.7027 3/28	0.6812 3/28P	0.6710 3/29A	3	5330
354	0.5996	0.6755 3/25A	0.6614 3/28A	0.6598 3/28P	0.6589 3/29A	1	5328
355	0.6516	0.6604 3/29A	0.6436 3/29P	0.6481 3/30A	0.6477 3/30P	1	5349
356	0.6101						
357	0.6098						
358	0.6156	0.7157 3/29A	0.7162 3/29P			2	5353
359	0.6144	0.6993 3/29A	0.6994 3/29P			3	5354
360	0.6576						
361	0.8188						
362	0.8231	1.1618 5/2A	1.1616 5/2P			2	5578
363	0.8129	0.8817 4/11	0.8811 4/12A	0.8812 4/12P		2	5407
364	0.8050	0.8671 4/11P	0.8666 4/12A			1	5406
365	0.8197						
366	0.8141	0.8875 4/11P	0.8868 4/12A	0.8874 4/12P		3	5408
367	0.8018	0.8730 4/11P	0.8726 4/12A			1	5409
368	0.8143	0.8691 4/11P	0.8680 4/12A	0.8675 4/12P		3	5411
369	0.8265	0.8827 4/11P	0.8826 4/12A			2	5410
370	0.6537	0.7091 3/29A	0.7103 3/29P	0.7099 3/30A		3	5357
371	0.5898	0.6358 3/29A	0.6340 3/29P	0.6336 3/30A		1	5355
372	0.5925	0.6518 3/29A	0.6499 3/29P	0.6487 3/30A	0.6486 3/30P	2	5356
373	0.5933						
374	0.5963	0.6601 9/23A	~~0.649~~ 0.6474 9/23P	0.6382 9/26A	0.6304 9/26P	1	6612
375	0.6500						
376	0.5956						
377	0.5905	0.5998 10/27A	0.6009 10/27P	0.5991 10/28A	0.5999 10/28A	1	6787
378	0.5900	0.8268 10/11A	0.8269 10/11P			2	6718
379	0.5956	0.6035 10/27A	0.6047 10/27P	0.6033 10/28A		3	6789
380	0.6525						
381	0.5890	1.6284 4/7A	0.6285 4/7P			3	5396
382	0.5939	0.6295 4/7A	0.6304 4/7P			4	5397

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354 0.6614 3/29P

349 0.5662 3/31A

353 0.6714 3/29P

374 0.6114 9/27A 0.6116 9/27P

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TER	RUN	LAB#	TARE	WEIGHT	
672			0.81312 9/9P	0.81308 9/10A	
673	13	6774	0.81003	0.81002 9/10A	
674	9	6740	0.80911	0.80913	
675	2	6635	0.80960	0.80950	0.80955 9/10P
676	BLANK		0.82177	0.82176	
677	Blank	6649	0.81540	0.81517	0.81512 9/10P
678	3	6644	0.81571	0.81571	
679	3	6648	0.81206	0.81210	
680	2	6643	0.81928	0.81923	
681	1	6630	0.81527	0.81536	0.81524 9/10P
682	1	6634	0.81213	0.81226	0.81225 9/10P
683	2	6639	0.80869	0.80868	
684			0.81545	0.81545	
685	1	6646	0.81103	0.81099	
686	3	6640	0.81076	0.81078	
687	Blank	6645	0.80920	0.80915	
688	3	6636	0.82227	0.82232	
689	2	6651	0.82739	0.82744	
690	1	6642	0.82677	0.82679	
691	1	6638	0.81653	0.81662	0.81654 9/10P
692	Blank	6633	0.81571	0.81578	0.81573 9/10P
693	Blank	6637	0.81954	0.81968	0.81966 9/10P
694	2	6647	0.81467 9/9P	0.81470	
695	3	6632	0.81180	0.81185	
696			0.81578	0.81574	
697			0.5883 10/12A	0.5924 10/13A	0.5927 10/14A
698			0.5864 10/12A	0.5869 10/13A	
699			0.5799 10/12A	0.5804 10/13A	
700			0.5848 10/12A	0.5853 10/13A	
701			0.5833 10/12A	0.5835 10/13A	
702			0.5881 10/12A	0.5888 10/13A	
703	2	6758	0.5927 10/12A	0.5933 10/13A	0.5935 10/14A
704			0.5878 10/12A	0.5881 10/13A	
705			0.5808 10/12A	0.5811 10/13A	
706			0.5868 10/12A	0.5871 10/13A	
707			0.5890 10/12A	0.5894 10/13A	

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Filter	Final Weight				CLIEN
672	~~0.96~~ 0.95050 9/25A	0.94347 9/26A	0.94285 9/27A		Kai
673	0.96187 9/27A	0.96163 9/27P	0.96041 9/28A		KAISE
674	0.96504 9/24A	0.96468 9/24P	0.96409 9/25A		KAISE
675	2.98025 9/23P	2.79570 9/26A	2.97494 9/26P		NORAN
676	0.8226 10/6A	0.82265 10/7A	0.82230 10/7P		NORANDA
677					
678	1.19235 9/23P	~~D#~~ 1.05494 9/26A	1.19262 9/26P		
679					
680	1.12186 9/23A	1.11835 9/23P	1.12405 9/26A		
681					
682	3.08678 9/23P	3.08420 9/26A	3.06976 9/26P		
683					
684					
685					
686					NORAND
687	0.80123 9/23A	0.80107 9/23P	0.80126 9/26A		
688	3.56184 9/23A	3.54750 9/23P	3.54651 9/26A		
689					
690	1.35660 9/23A	1.34676 9/23P	1.35826 9/26A		
691					
692					
693	0.81185 9/23P	0.83483 9/26A	0.81188 9/26P		
694					
695					
696					
697					
698					
699					
700					
701					
702					
703	0.5876 10/27A	0.5882 10/27P	0.5861 10/28A	0.5875 10/31A	Louisiana
704					
705					
706					
707					

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L.P. Montrose Gas Bag Analysis Results

10/25/94 Run 1 2.2% CO_2
17.3% O_2

10/25/94 Run 2 2.2% CO_2
17.3% O_2

10/25/94 Run 3 2.2% CO_2
17.1% O_2

Analyzed 10/28/94 on Servomex 1410B CO_2 analyzer by KSM
Servomex 1420B O_2 analyzer

APPENDIX C

Source and Process Information

AMTEST
AIR QUALITY, INC.

SOURCE AND PROCESS INFORMATION

CLIENT: L.P. Montrose

LOCATION: Montrose, CO

SAMPLE SITE: Dryer E-TU

TEST DATE: 11/2/94

CLIENT CONTACT: Sue Somers - LP Wisconsin   Dick Klopschinski - LP Montrose

OPERATION PERSONNEL: LP Operation Personnel

AGENCY REPRESENTATIVE: Charlie Cox   State of Colorado

AM TEST-AIR QUALITY PERSONNEL: Steve Mackey

TYPE OF PROCESS: Oriented Strand Board (OSB) Manufacturing Plant   Rotary Dryer

EQUIPMENT MANUFACTURER: MEC Rotary Kiln with Geoenergy E-Tube wet electrostatic precipitator

MODEL: MEC 60ft Rotary Kiln   CONSTRUCTED/INSTALLED: ______

IDENTIFICATION NO.: ______   DATE LAST TESTED: August 1994

PROCESS RATE: See L.P. Process Data to be provided to AmTest for inclusion in report

FUEL FIRING RATE: ______   TYPE OF FUEL: Sanderdust, Sanddust, Waferboard Fines

TYPE OF EMISSION CONTROL DEVICE: Multiclones & Geoenergy E-tube wet electrostatic precipitator

EQUIPMENT MANUFACTURER: Geoenergy   Jarrod Markley - (Geosafe Representative onsite)

PURPOSE OF TESTING: Compliance Determination

EMISSION STANDARD (in units): 7.44 lbs/hr in Permit (.030 gr/dscf was Geosafe's guarantee)

PROCESS DESCRIPTION:

This OSB manufacturing plant uses a MEC 60 ft triple pass rotary dryer to dry wood chips for OSB production. The wood furnish is primarily aspen with 25% pine. The dryer is fired with a suspension burner rated at 40 MMBTU/hr. Dryer exhaust gases are controlled by multiclones, followed by an ID fan, a quench duct, and Geoenergy E-Tube wet e.s.p. (25-28% Solids Content in Scrubber Water)

PROCESS SHUTDOWNS/PROBLEMS: None Noted

____
AUTHORIZED SIGNATURE

MONTROSE TESTING 10-25-94
PROCESS DATA

CONTENTS	PAGE
Test schedule and process data summary	2

MONTROSE DRYER TESTING 10-25-94, Pm

BOARD WEIGHTS / PRODUCTION	3
DRYER DATA SHEETS	4-5
DRYER CHARTS	6
PRESS CHARTS	7
PRESS REPORTS	8
E-TUBE READINGS	9-10

MONTROSE TESTING 10-25-94

TEST SCHEDULE

MONTROSE TESTING 10-25-94

DATE	POLLUTANT	RUN #1	RUN #2	RUN #3
10-25	PM	0816-0934	1018-1122	1213-1315

PROCESS DATA SUMMARY

MONTROSE TESTING 10-25-94

11.5 =Plant production rate in TONS per HOUR
1.96 =estimated TONS of dry fuel burned based on fuel measurement
27392 =LB per HOUR of furnish produced by the dryer
1168 =average dryer inlet temperature in deg. f.
43.3% =moisture content of incoming wood
5.5% =moisture content of wood after drying

MONTROSE TESTING 10-25-94 PM testing

DATA TIME: START= 08:15 END= 13:15 HOURS= 5.00
TOTAL HOURS = 5.00

BOARD WEIGHTS - LBS
weight of approximately every 25th untrimmed board

199	183	197
185	193	189
185	173	196
188	179	192
187	200	
178	191	
181	187	
188	191	
182	200	
182	194	

188.33 lb = average untrimmed mat weight

173.26 lb = average finished board weight (untrimmed mat weight-weight of trim)

8.0% = TRIM

PLANT PRODUCTION RATE
5.00 =hours during testing
83 =pressloads
664 =No. of (8' X 16') boards produced (no. of pressloads x 8 boards per load)
115045 =Lbs. finished product (no. of boards x weight of finished board)
23009 =Lbs. finished product produced per hour (lbs. of finished product / testing hours)
11.50 =Tons finished product per hour (lbs. of finished product per hour / 2000 lb)
note: the press was down fro the last 12 minutes of run no. 3, however the dryer contunued to operate at a constant rate, therefore production has been estimated using the rate from 08:00-13:00

DRYER PRODUCTION RATE:
27392 = lbs of dryer production per hour (lb. of finished product / (1-%trim + % fines))
8.0% =%FINES
8.0% =%TRIM
1168 =average dryer inlet temperature
43.3% =moisture content of incoming wood
5.5% =moisture content of wood after drying

DRYER FUEL BURNING RATE
5.147 =fuel calibration on lbs. per count
3802 =total counts during testing
5.00 =hours during testing
19569 =total lbs. of fuel burned during testing (calibration x total counts)
3914 =lbs of fuel burned per hour (total lbs fuel burned / testing hours)
1.96 = Tons of fuel burned per hour (lbs of fuel burned per hour / 2000 lbs.)
8600 =estimated BTU content per lb. of wood fuel
33.7 =estimated mmbtu input per hour (BTU content per lb. x lb. per hour)

DRYER DATA SHEET

DATE 25 OCTOBER 1994
BY Gary

PLANT MONTROSE, COLORADO

READINGS EVERY 10 MIN.

FUEL CALIBRATION:

TIME	OUTLET SET POINT	FEED RATE	DRYER INLET TEMP	DRYER OUTLET TEMP	FUEL COUNT	WET BIN LEVEL	DRY BIN LEVEL		EVERY HOUR FLAKE MOISTURE	
							SUR.	CORE	IN	OUT
800	220	84	1148	219	477464	3/4	3/4	3/4		5.2
810	219	86	1177	219	477601	3/4	1/2	1/2		
820	219	86	1194	217	477732	3/4	1/2	1/2		
830	217	88	1106	215	477856	Full	1/2	1/2	39.6	
840	217	89	1145	217	477984	Full	1/2	1/2		
850	217	90	1129	215	478106	Full	3/4	3/4		
900	216	90	1228	213	478232	Full	3/4	3/4		5.7
910	215	91	1244	214	478376	Full	3/4	3/4		
920	215	91	1291	215	478497	Full	3/4	3/4		
930	215	91	1259	216	478669	Full	3/4	3/4	45.8	
940	215	91	1235	216	478782	3/4	3/4	3/4		
950	215	91	1198	216	478906	Full	3/4	3/4		
1000	215	91	1172	215	479034	Full	3/4	3/4		5.7
1010	215	91	1178	216	479164	3/4	3/4	3/4		
1020	215	91	1120	217	479289	3/4	3/4	3/4		
1030	215	91	1079	215	479409	Full	3/4	3/4	46.5	
1040	215	91	1080	214	479539	Full	3/4	3/4		
1050	215	91	1114	215	479646	Full	3/4	3/4		
1100	215	91	1092	215	479754	Full	3/4	3/4		5.6
1110	215	91	1106	215	479886	Full	3/4	3/4		
1120	215	91	1109	215	480021	Full	3/4	3/4		
1130	215	91	1114	216	480140	Full	3/4	3/4	41.2	
1140	215	91	1122	214	480257	Full	3/4	3/4		
1150	215	91	1125	215	480395	Full	3/4	3/4		
1200	215	91	1160	214	480502	Full	3/4	3/4		5.2
1210	215	91	1192	215	480643	Full	3/4	3/4		
1220	215	91	1206	214	480756	Full	3/4	3/4		
1230	215	91	1183	215	480887	3/4	3/4	3/4	43.5	
1240	215	91	1195	215	481015	− 1/2	3/4	3/4		
1250	215	91	1235	215	481147	− 1/2	3/4	3/4		

DRYER DATA SHEET

DATE 25 OCTOBER 1994

BY Gary

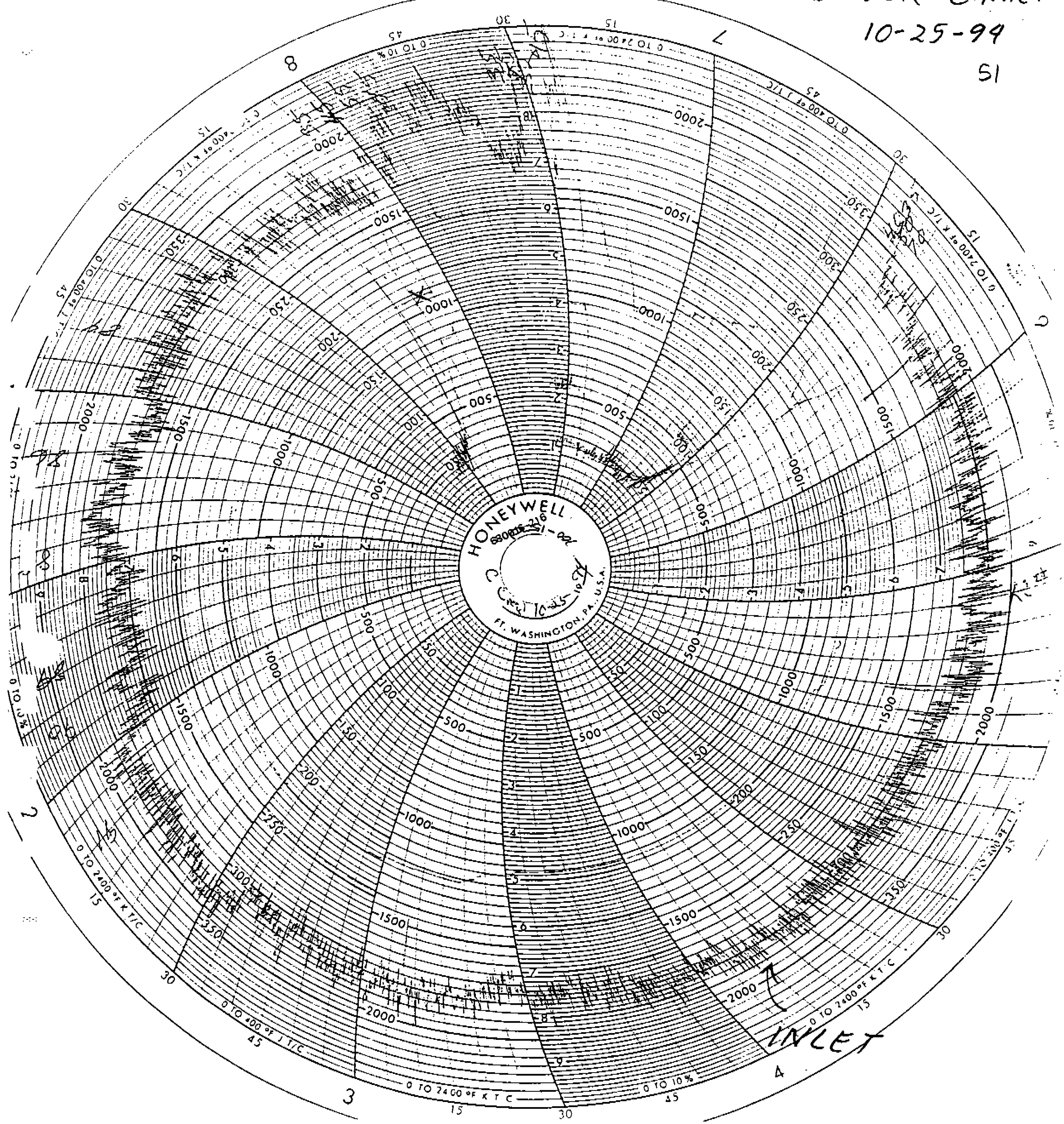
PLANT MONTROSE, COLORADO

READINGS EVERY 10 MIN.

FUEL CALIBRATION:

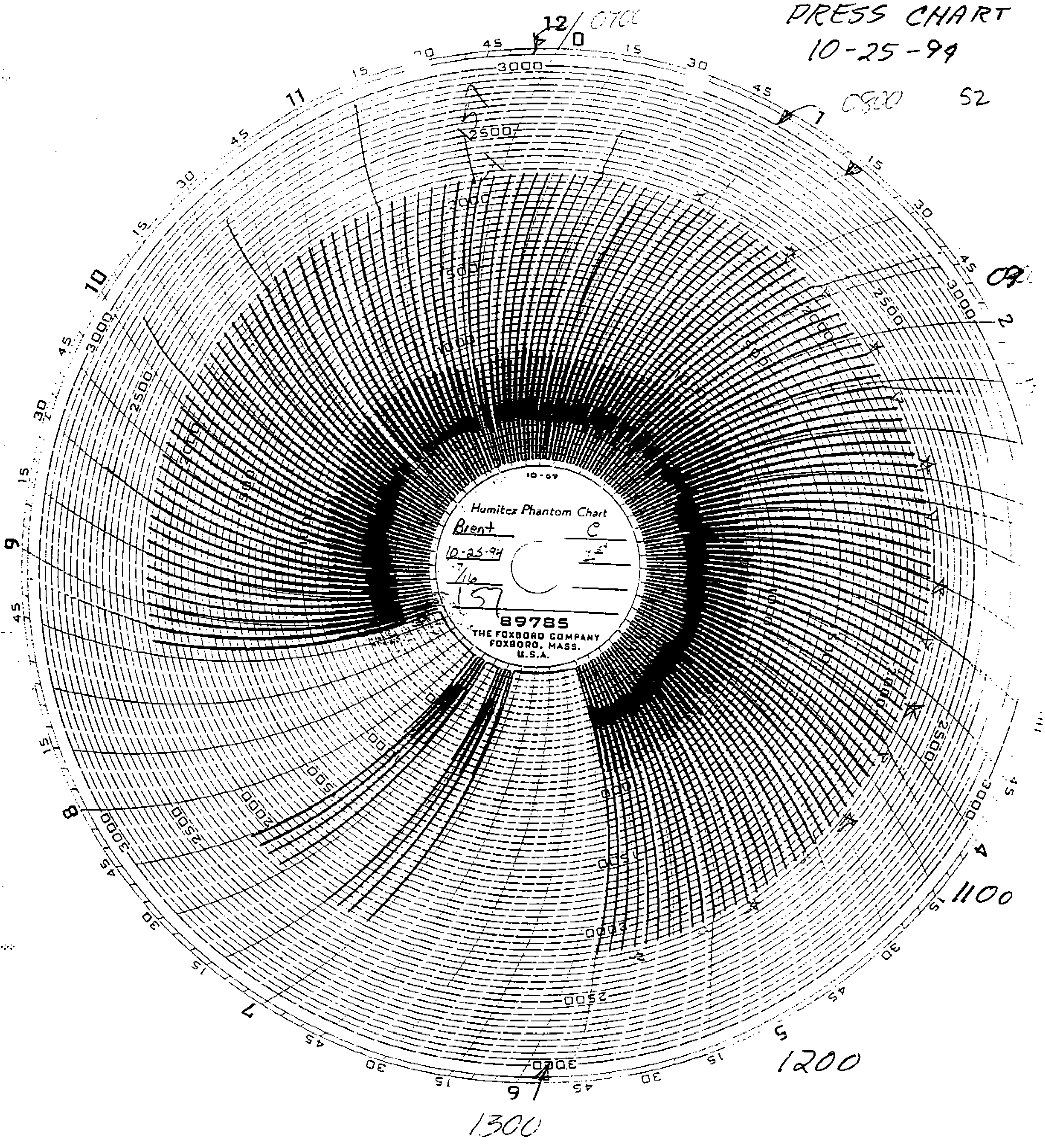
TIME	OUTLET SET POINT	FEED RATE	DRYER INLET TEMP	DRYER OUTLET TEMP	FUEL COUNT	WET BIN LEVEL	DRY BIN LEVEL		EVERY HOUR FLAKE MOISTURE	
							SUR.	CORE	IN	OUT
1300	215	91	1211	215	481285	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$		5.3
1310	215	91	1216	215	481403	3/4	Full	3/4		
						core full @ 1315				

DRYER CHART
10-25-94
51



INLET

PRESS CHART
10-25-94



PRESS REPORT

MONTROSE, COLORADO

OPERATOR Brent SHIFT 1st CREW C DATE 10-23-94

Thumbwheel setting

Surface______ Core______ Resin______

Flowmeter

Surface______lb Core______lb

Highest Board Wt______

Lowest Board Wt______

Thickness 7/16

Press Temp 195°

Pressloads 157

Total Footage 187,568

Total Downtime minutes 148

Former Setting

TSL______ Core______ BSL______

Dry Bin Thumbwheel Setting

Core______ Surface______

	Downtime		Downtime (mins.)				REASON FOR DOWNTIME
	From	To	M	E	O	QC	
	0704	0705			1		Changing Former/Core Dry Bin Live Bottom-[illegible]
	1303	1409	66				FCOS – High Speed Broken Bearing
	1410	1411	1				Mat shaft #1 6 T.O.
	1414	1415			1		Bleach Test on Mat
	1425	1439		14			FCOS Problems – changed circuit Boards
84	1441	1442		1			FCOS Missed A cut
	1451	1514	23				CoreFormer Rakebacks Loose
147	1518	1558	40				CORE Blender Plug/Outfeed
	1800	1801	1				FH 8' dropped in Press

Downtime Code: M – Mechanical E – Electrical O – Operator

READINGS EVERY 10 MIN.

E-TUBE DATA SHEET

DATE 25 OCTOBER 1994

PLANT: MONTROSE, COLORADO

BY Mike Kennedy

TIME	QUENCH CHAMBER TEMP	SOUTH TR SET			NORTH TR SET			INDICATE TIME FLUSH CYCLE
		KV	MA	SPARK RATE	KV	MA	SPARK RATE	
0800	128.1	45	160	27.7	49	150	26.8	
0810	128.7	46	190	27.7	48	150	27.9	
0820	129.1	44	190	28.0	48	160	27.6	
0830	126.2	45	200	27.8	48	150	28.0	
0840	127.8	44	190	28.0	48	150	27.8	
0850	127.8	44	200	28.0	48	150	28.0	
0900	130.5	44	200	27.9	48	150	27.7	0901 South
0910	130.4	48	110	27.8	47	150	27.8	
0920	132.1	47	130	27.8	46	180	27.9	
0930	133.3	47	190	27.7	47	180	27.9	
0940	130.9	46	180	27.8	46	180	27.9	
0950	130.5	46	180	27.7	47	180	27.8	
1000	129.6	46	180	27.8	47	180	27.8	
1010	130.9	45	170	27.7	46	180	27.8	1016 North
1020	127.9	45	170	27.9	48	110	27.9	
1030	127.2	44	170	27.8	48	140	27.6	
1040	126.8	44	170	27.9	48	170	27.8	
1050	127.3	45	210	28.0	49	160	28.0	
1110	128.8	45	230	27.9	48	180	27.7	
1120	128.3	45	210	27.7	49	170	27.7	
1130	128.7	44	210	27.9	48	180	27.9	1131 South
1140	128.4	47	130	27.9	47	170	27.8	
1150	129.0	47	130	27.8	48	170	27.7	
1200	129.2	47	160	27.9	48	170	27.9	
1210	130.8	46	170	27.9	46	180	27.9	
1220	131.1	46	180	27.7	47	170	27.8	
1230	130.2	46	180	27.8	47	170	27.8	
1240	130.7	45	200	28.0	47	170	27.8	1246 North
1250	132.7	45	160	27.9	49	90	28.0	
1300	132.5	45	170	27.7	49	140	27.4	

0

READINGS EVERY 10 MIN.

E-TUBE DATA SHEET

DATE 25 OCTOBER 1994

PLANT: MONTROSE, COLORADO

BY Mike Kennedy

TIME	QUENCH CHAMBER TEMP	SOUTH TR SET			NORTH TR SET			INDICATE TIME FLUSH CYCLE
		KV	MA	SPARK RATE	KV	MA	SPARK RATE	
1310	132.5	44	190	27.9	48	160	27.2	
1320	117.9	44	190	28.4	48	170	27.7	

APPENDIX D

Supporting Information

CROSS SECTIONAL AREA

Traverse Point	Distance (inches)
1	1.0
2	3.2
3	5.7
4	8.5
5	12.0
6	17.1
7	30.9
8	36.0
9	39.5
10	42.3
11	44.8
12	47.0

STACK DIMENSIONS

48-inch diameter circular stack

2 ports

A = 40 feet downstream

B = 14 feet upstream

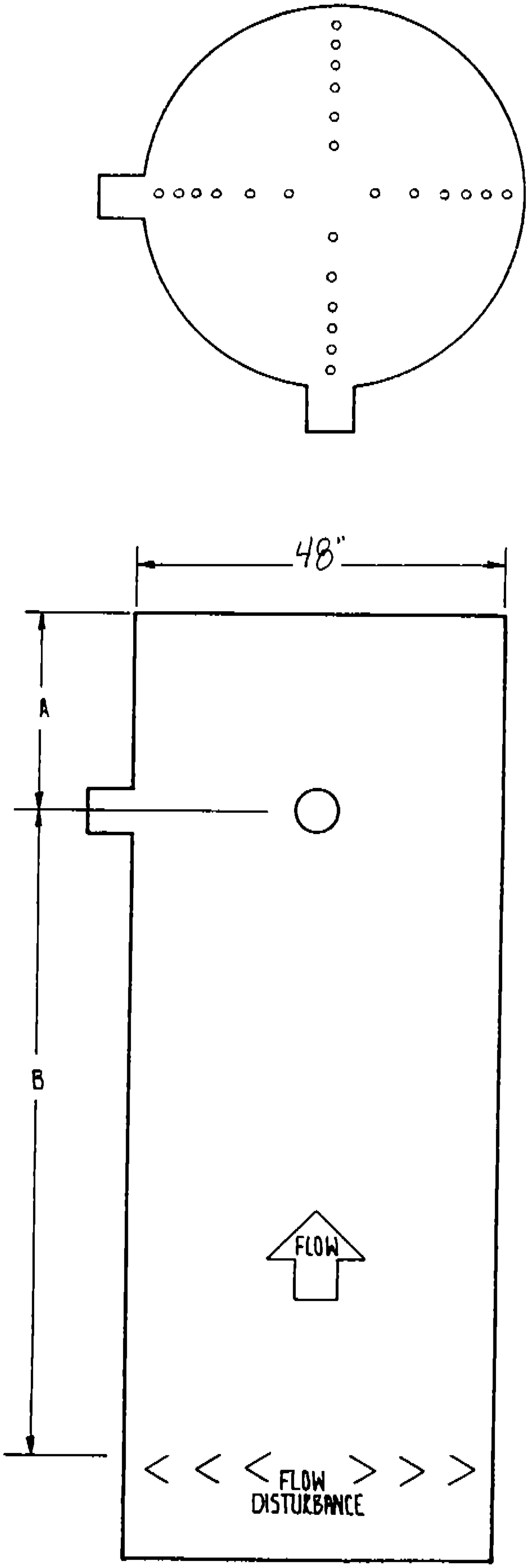


Figure 1. Location of Sampling Ports and Traverse Points

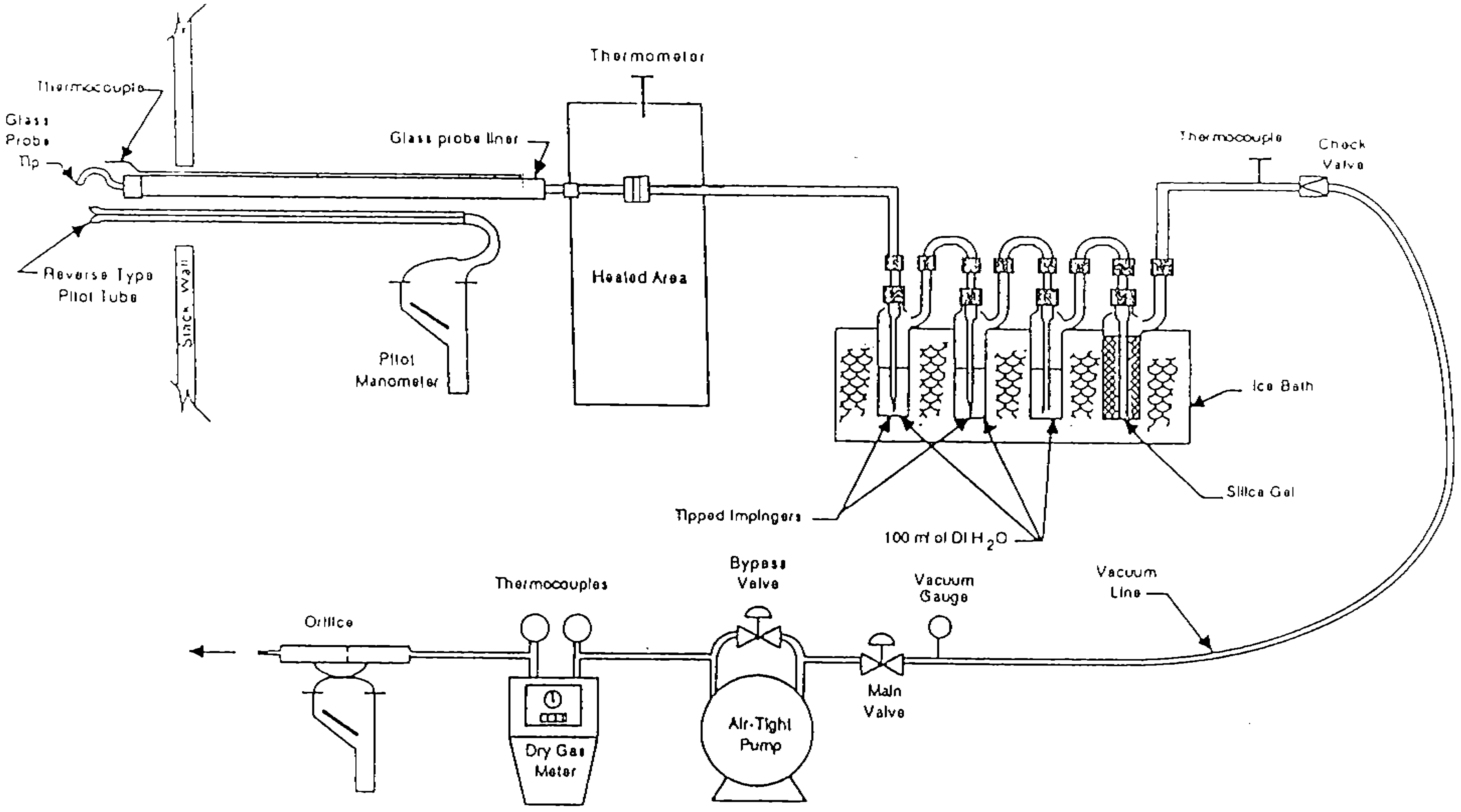


Figure: 2 EPA Method 202 Sample Train

METHOD 1 - LOCATION OF TRAVERSE POINTS

Circular Stacks

TRAVERSE POINT	DISTANCE, % of diameter
1	4.4
2	14.7
3	29.5
4	70.5
5	85.3
6	95.6

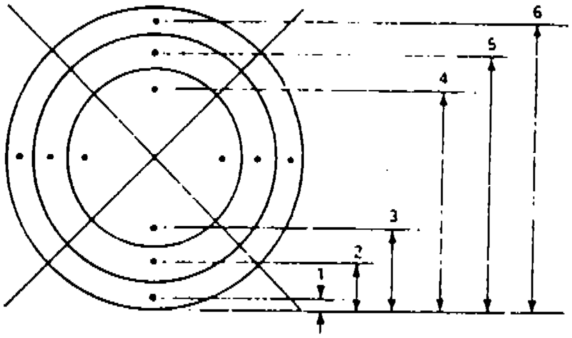


Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points indicated.

TABLE 1–2. LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

[Percent of stack diameter from inside wall to traverse point]

Traverse point number on a diameter	Number of traverse points on a diameter—											
	2	4	6	8	10	12	14	16	18	20	22	24
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8				96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	18.4
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	39.8
13							94.3	87.5	81.2	75.0	68.5	60.2
14							98.2	91.5	85.4	79.6	73.8	67.7
15								95.1	89.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	65.4	80.6
18									98.6	93.3	88.4	83.9

Rectangular Stacks

For a rectangular cross section, an equivalent diameter (D_e) shall be calculated from the following equation, to determine the upstream and downstream distances:

$$D_e = \frac{2LW}{(L+W)}$$

where L=length and W=width.

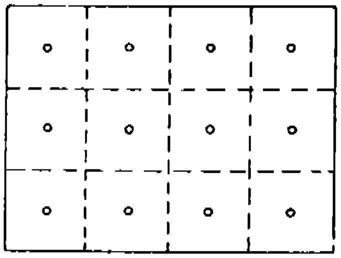


Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with a traverse point at centroid of each area.

60

METHOD 1 - MINIMUM NUMBER OF TRAVERSE POINTS

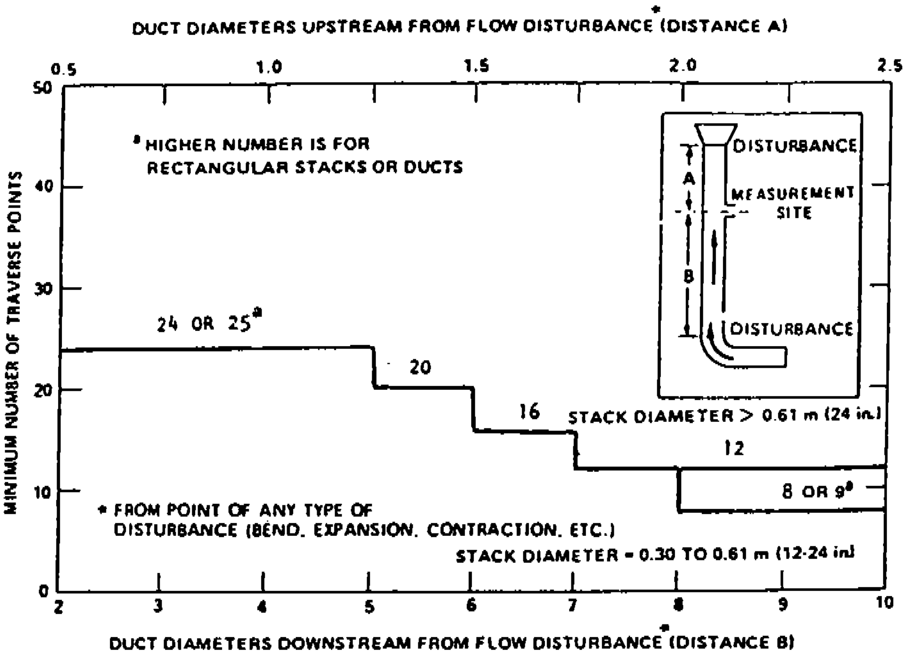


Figure 1-1. Minimum number of traverse points for particulate traverses.

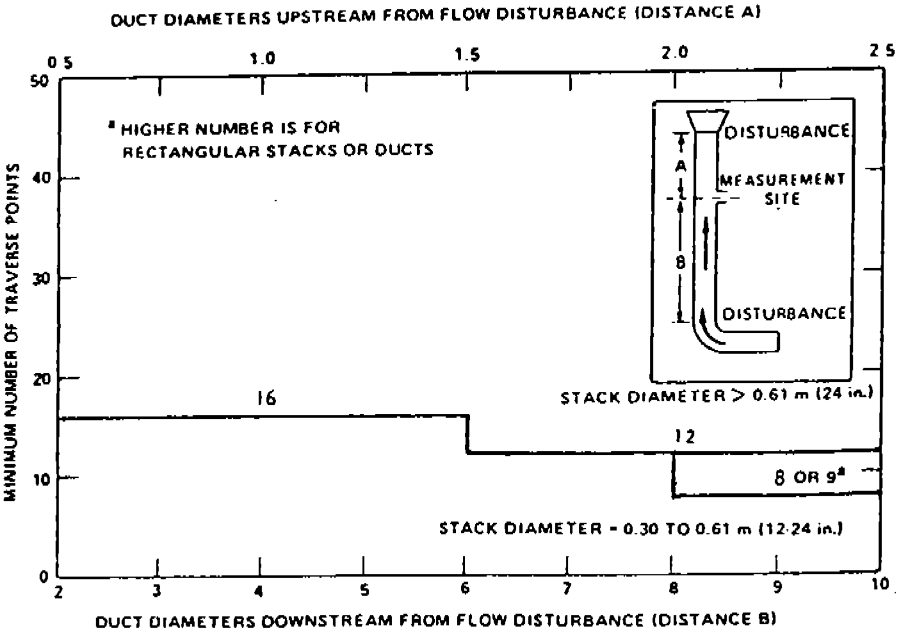


Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses.

METHOD 2 - STACK GAS VELOCITY AND VOLUMETRIC FLOW CALCULATIONS

5.1 Nomenclature.

A = Cross-sectional area of stack, m² (ft²).

B_{ws} = Water vapor in the gas stream (from Method 5 or Reference Method 4), proportion by volume.

C_p = Pitot tube coefficient, dimensionless.

K_p = Pitot tube constant,

$$34.97\ \frac{\text{m}}{\text{sec}}\left[\frac{(g/g\text{-mole})(\text{mm Hg})}{(^\circ\text{K})(\text{mm H}_2\text{O})}\right]^{1/2}$$

for the metric system and

$$85.49\ \frac{\text{ft}}{\text{sec}}\left[\frac{(\text{lb/lb-mole})(\text{in. Hg})}{(^\circ\text{R})(\text{in. H}_2\text{O})}\right]^{1/2}$$

for the English system.

M_d = Molecular weight of stack gas, dry basis (see Section 3.6) g/g-mole (lb/lb-mole).

M_s = Molecular weight of stack gas, wet basis, g/g-mole (lb/lb-mole).

$= M_d\ (1 - B_{ws}) + 18.0\ B_{ws}$

Eq. 2-5

P_{bar} = Barometric pressure at measurement site, mm Hg (in. Hg).

P_g = Stack static pressure, mm Hg (in. Hg).

P_s = Absolute stack gas pressure, mm Hg (in. Hg).

$= P_{bar} + P_g$ Eq. 2-6

Eq. 2-6

P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions, dscm/hr (dscf/hr).

t_s = Stack temperature, °C (°F).

T_s = Absolute stack temperature, °K, (°R).

$= 273 + t_s$ for metric.

Eq. 2-7

$= 460 + t_s$ for English.

Eq. 2-8

T_{std} = Standard absolute temperature, 293 °K (528° R).

v_s = Average stack gas velocity, m/sec (ft/sec).

Δ_p = Velocity head of stack gas, mm H₂O (in. H₂O).

3,600 = Conversion factor, sec/hr.

18.0 = Molecular weight of water, g/g-mole (lb/lb-mole).

5.2 Average Stack Gas Velocity.

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{T_{s(avg)}}{P_s M_s}}$$

Equation 2-9

5.3 Average Stack Gas Dry Volumetric Flow Rate.

$$Q_{sd} = 3{,}600(1 - B_{ws}) v_s A \left(\frac{T_{std}}{T_{s\ (avg)}}\right)\left(\frac{P_s}{P_{std}}\right)$$

Eq. 2-10

METHOD 3 - MOLECULAR WEIGHT AND EXCESS AIR CALCULATIONS

6.1 Nomenclature.

M_d = Dry molecular weight, g/g-mole (lb/lb-mole).

%EA = Percent excess air.

$\%CO_2$ = Percent CO_2 by volume (dry basis).

$\%O_2$ = Percent O_2 by volume (dry basis).

%CO = Percent CO by volume (dry basis).

$\%N_2$ = Percent N_2 by volume (dry basis).

0.264 = Ratio of O_2 to N_2 in air, v/v.

0.280 = Molecular weight of N_2 or CO, divided by 100.

0.320 = Molecular weight of O_2 divided by 100.

0.440 = Molecular weight of CO_2 divided by 100.

6.2 Percent Excess Air. Calculate the percent excess air (if applicable), by substituting the appropriate values of percent O_2, CO, and N_2 (obtained from Section 4.1.3 or 4.2.4) into Equation 3-1.

% EA =

$$\frac{\%O_2 - 0.5\%\ CO}{0.264\%\ N_2(\%O_2 - 0.5\%\ CO)} \times 100$$

Eq. 3-1

NOTE: The equation above assumes that ambient air is used as the source of O_2 and that the fuel does not contain appreciable amounts of N_2 (as do coke oven or blast furnace gases). For those cases when appreciable amounts of N_2 are present (coal, oil, and natural gas do not contain appreciable amounts of N_2) or when oxygen enrichment is used, alternate methods, subject to approval of the Administrator, are required.

6.3 Dry Molecular Weight. Use Equation 3-2 to calculate the dry molecular weight of the stack gas

$$M_d = 0.440(\%CO_2) + 0.320(\%O_2) + 0.280(\%N_2 + \%CO)$$

Eq. 3-2

METHOD 4 - STACK GAS MOISTURE CALCULATIONS

2.3.1 Nomenclature.

B_{ws} = Proportion of water vapor, by volume, in the gas stream.

M_w = Molecular weight of water, 18.0 g/g-mole (18.0 lb/lb-mole).

P_m = Absolute pressure (for this method, same as barometric pressure) at the dry gas meter, mm Hg (in. Hg).

P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

R = Ideal gas constant, 0.06236 (mm Hg) (m³)/(g-mole) (°K) for metric units and 21.85 (in. Hg) (ft³)/(lb-mole) (°R) for English units.

T_m = Absolute temperature at meter, °K (°R).

T_{std} = Standard absolute temperature, 293° K (528°R).

V_m = Dry gas volume measured by dry gas meter, dcm (dcf).

ΔV_m = Incremental dry gas volume measured by dry gas meter at each traverse point, dcm (dcf).

$V_{m(std)}$ = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscm (dscf).

$V_{wc(std)}$ = Volume of water vapor condensed corrected to standard conditions, scm (scf).

$V_{wsg(std)}$ = Volume of water vapor collected in silica gel corrected to standard conditions, scm (scf).

V_f = Final volume of condenser water, ml.

V_i = Initial volume, if any, of condenser water, ml.

W_f = Final weight of silica gel or silica gel plus impinger, g.

W_i = Initial weight of silica gel or silica gel plus impinger, g.

Y = Dry gas meter calibration factor.

ρ_w = Density of water, 0.9982 g/ml (0.002201 lb/ml).

2.3.2 Volume of Water Vapor Condensed.

$$V_{wc(std)} = \frac{(V_f - V_i)\rho_w R T_{std}}{P_{std} M_w}$$

$$= K_1(V_f - V_i)$$

Eq. 4-1

K_1 = 0.001333 m³/ml for metric units
= 0.04707 ft³/ml for English units

2.3.3 Volume of Water Vapor Collected in Silica Gel.

$$V_{wsg(std)} = \frac{(W_f - W_i) R T_{std}}{P_{std} M_w}$$

$$= K_2(W_f - W_i)$$

Eq. 4-2

Where:

K_2 = 0.001335 m³/g for metric units
= 0.04715 ft³/g for English units

2.3.4 Sample Gas Volume.

$$V_{m(std)} = V_m Y \frac{(P_m)(T_{std})}{(P_{std})(T_m)}$$

$$= K_3 Y \frac{V_m P_m}{T_m}$$

Eq. 4-3

Where:

K_3 = 0.3858 °K/mm Hg for metric units
= 17.64 °R/in. Hg for English units

NOTE: If the post-test leak rate (Section 2.2.6) exceeds the allowable rate, correct the value of V_m in Equation 4-3, as described in Section 6.3 of Method 5.

2.3.5 Moisture Content.

$$B_{ws} = \frac{V_{wc(std)} + V_{wsg(std)}}{V_{wc(std)} + V_{wsg(std)} + V_{m(std)}}$$

Eq. 4-4

NOTE: In saturated or moisture droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made, one using a value based upon the saturated conditions (see Section 1.2), and another based upon the results of the impinger analysis. The lower of these two values of B_{ws} shall be considered correct.

METHOD 5 - PARTICULATE EMISSION CALCULATIONS - (1)

6.1 Nomenclature.

A_n = Cross-sectional area of nozzle, m² (ft²).
B_{ws} = Water vapor in the gas stream, proportion by volume.
C_a = Acetone blank residue concentration, mg/g.
c_s = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, g/dscm (g/dscf).
I = Percent of isokinetic sampling.
L_a = Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to 0.0057 m³/min (0.02 cfm) or 4 percent of the average sampling rate, whichever is less.
L_i = Individual leakage rate observed during the leak check conducted prior to the "i^{th}" component change ($i=1, 2, 3....n$), m³/min (cfm).
L_p = Leakage rate observed during the post-test leak check, m³/min (cfm).
m_a = Mass of residue of acetone after evaporation, mg.
m_n = Total amount of particulate matter collected, mg.
M_w = Molecular weight of water, 18.0 g/g-mole (18.0lb/lb-mole).
P_{bar} = Barometric pressure at the sampling site, mm Hg (in. Hg).
P_s = Absolute stack gas pressure, mm Hg (in. Hg).
P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).
R = Ideal gas constant, 0.06236 mm Hg-m³/°K-g-mole (21.85 in. Hg-ft³/°R-lb-mole).
T_m = Absolute average dry gas meter temperature (see Figure 5-2), °K (°R).
T_s = Absolute average stack gas temperature (see Figure 5-2), °K (°R).
T_{std} = Standard absolute temperature, 293° K (528° R).
V_a = Volume of acetone blank, ml.
V_{aw} = Volume of acetone used in wash, ml.
V_{lc} = Total volume of liquid collected in impingers and silica gel (see Figure 5-3), ml.
V_m = Volume of gas sample as measured by dry gas meter, dcm (dscf).
$V_{m(std)}$ = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscm (dscf).
$V_{w(std)}$ = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf).
v_s = Stack gas velocity, calculated by Method 2, Equation 2-9, using data obtained from Method 5, m/sec (ft/sec).
W_a = Weight of residue in acetone wash, mg.
Y = Dry gas meter calibration factor.
ΔH = Average pressure differential across the orifice meter (see Figure 5-2), mm H₂O (in. H₂O).
ρ_a = Density of acetone, mg/ml (see label on bottle).
ρ_w = Density of water, 0.9982 g/ml (0.002201 lb/ml).
θ = Total sampling time, min.
θ_1 = Sampling time interval, from the beginning of a run until the first component change, min.
θ_i = Sampling time interval, between two successive component changes, beginning with the interval between the first and second changes, min.
θ_p = Sampling time interval, from the final (n^{th}) component change until the end of the sampling run, min.
13.6 = Specific gravity of mercury.
60 = Sec/min.
100 = Conversion to percent.

6.2 Average Dry Gas Meter Temperature and Average Orifice Pressure Drop. See data sheet (Figure 5-2).

6.3 Dry Gas Volume. Correct the sample volume measured by the dry gas meter to standard conditions (20° C, 760 mm Hg or 68° F, 29.92 in. Hg) by using Equation 5-1.

$$V_{m(std)} = V_m Y \left(\frac{T_{std}}{T_m}\right) \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{P_{std}}\right]$$

$$= K_1 V_m Y \frac{P_{bar} + (\Delta H/13.6)}{T_m}$$

Equation 5-1

Where;
K_1 = 0.3858 °K/mm Hg for metric units
= 17.64 °R/in. Hg for English units

NOTE: Equation 5-1 can be used as written unless the leakage rate observed during any of the mandatory leak checks (i.e., the post-test leak check or leak checks conducted prior to component changes) exceeds L_a. If L_p or L_i exceeds L_a, Equation 5-1 must be modified as follows:

(a) Case I. No component changes made during sampling run. In this case, replace V_m in Equation 5-1 with the expression:

$$[V_m - (L_p - L_a)\theta]$$

(b) Case II. One or more component changes made during the sampling run. In this case, replace V_m in Equation 5-1 by the expression:

$$\left[V_m - (L_1 - L_a)\theta_1 - \sum_{i=2}^{n} (L_i - L_a)\theta_i - (L_p - L_a)\theta_p\right]$$

and substitute only for those leakage rates (L_i or L_p) which exceed L_a.

6.4 Volume of Water Vapor.

METHOD 5 - PARTICULATE EMISSION CALCULATIONS - (2)

Equation 5-2

$$V_{w(std)} = V_{lc}\left(\frac{\rho_w}{M_w}\right)\left(\frac{RT_{std}}{P_{std}}\right) = K_2 V_{lc}$$

Where:

K_2=0.001333 m³/ml for metric units
=0.04707 ft³/ml for English units.

6.5 Moisture Content.

$$B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}}$$

Eq. 5-3

NOTE: In saturated or water droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made, one from the impinger analysis (Equation 5-3), and a second from the assumption of saturated conditions. The lower of the two values of B_w shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the Note of Section 1.2 of Method 4. For the purposes of this method, the average stack gas temperature from Figure 5-2 may be used to make this determination, provided that the accuracy of the in-stack temperature sensor is ±1° C (2° F).

6.6 Acetone Blank Concentration.

$$C_a = \frac{m_a}{V_a \rho_a} \qquad \text{Eq. 5-4}$$

6.7 Acetone Wash Blank.

$$W_a = C_a V_{aw} \rho_a \qquad \text{Eq. 5-5}$$

6.8 Total Particulate Weight. Determine the total particulate catch from the sum of the weights obtained from Containers 1 and 2 less the acetone blank (see Figure 5-3).

NOTE: Refer to Section 4.1.5 to assist in calculation of results involving two or more filter assemblies or two or more sampling trains.

6.9 Particulate Concentration.

$$c_s = (0.001\ g/mg)\ (m_n / V_{m(std)})$$

Eq. 5-6

6.10 Conversion Factors:

From	To	Multiply by
scf	m³	0.02832
g/ft³	gr/ft³	15.43
g/ft³	lb/ft³	2.205 × 10⁻³
g/ft³	g/m³	35.31

6.11 Isokinetic Variation.

6.11.1 Calculation From Raw Data.

$$I = \frac{100\ T_s[K_3 V_{lc} + (P_m/T_m)(P_{bar} + \Delta H/13.6)]}{60\theta v_s P_s A_n}$$

Eq. 5-7

Where:

K_3=0.003454 mm Hg – m³/ml – °K for metric units.
=0.002669-in. Hg – ft³/ml – °R for English units.

6.11.2 Calculation From Intermediate Values.

$$I = \frac{T_s V_{m(std)} P_{std}\, 100}{T_{std} v_s \theta A_n P_s 60 (1 - B_{ws})}$$

$$= K_4 \frac{T_s V_{m(std)}}{P_s V_s A_n \theta (1 - B_{ws})}$$

Equation 5-8

where:

K_4=4.320 for metric units
=0.09450 for English units.

6.12 Acceptable Results. If 90 percent < I < 110 percent, the results are acceptable. If the particulate results are low in comparison to the standard, and I is over 110 percent or less than 90 percent, the Administrator may accept the results.

NOMENCLATURE
METHOD 5 CALCULATIONS

Vm_{std} = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscm (dscf).

Y = Dry gas meter calibration factor

P_b = Barometric pressure at the sampling site, mm Hg (in. Hg)

H = Average pressure differential across the orifice meter, mm H_2O (in. H_2O)

T_m = Absolute average dry gas meter temperature, ° K (° R)

dscm = Dry standard cubic meters

dscf = Dry standard cubic feet

W_a = Weight of residue in acetone wash

M_a = Mass of residue of acetone after evaporation, mg

C_a = Acetone blank residue concentration, mg/g

V_a = Volume of acetone blank

V_{aw} = Volume of acetone used in wash, ml

M_n = Total amount of particulate matter collected, mg

C_s = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, mg/dscm (gr/dscf)

gr/dscf = grains per dry standard cubic foot

Vw_{std} = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf)

B_{ws} = Water vapor in the gas stream, proportion by volume

M_d = Molecular weight of stack gas, g/g-mole on dry basis

M_s = Molecular weight of stack gas, g/g-mole on wet basis

V_s = Stack gas velocity, calculated by Method 2, Equation 2-9, using data obtained from Method 5, m/sec (ft/sec)

C_p = Pitot tube coefficient, dimensionless

Δp = Velocity head of stack gas, mm H_2O (in. H_2O)

P_s = Absolute stack gas pressure, mm Hg (in. Hg)

NOMENCLATURE (continued)
METHOD 5 CALCULATIONS

Q_{std} = Dry volumetric stack gas flow rate corrected to standard conditions, dscm/hr (dscf/hr)

dscf/min = dry standard cubic feet per minute (also identified as dcfm or scfm)

acfm = actual cubic feet per minute

I = Percent of isokinetic sampling

A_n = Cross-sectional area of nozzle, m^2 (ft^2)

AMTEST
AIR QUALITY, INC.

POST TEST METER CALIBRATION AM TEST - AIR QUALITY, INC.

FILE NAME: POSTLPCO
METER BOX #: BLUE MAG
CALIBRATION DATE: 11/7/94
METHOD OF CALIB.: STANDARD DRY GAS METER (Method 5 Section 7.1)

TOTAL TIME min	DELTA H "H2O	METER VOL V1 cf	METER VOL V2 cf	TEMP IN deg F	TEMP OUT deg F	BARO. PRES. "Hg	STD DGM V1	STD DGM V2	ST.DGM TEMP IN deg F	ST.DGM TEMP OUT deg F	ST.DGM Yds FACTOR	Y FACTOR	DELTA H@
7.0	2.0	364.646	369.940	82.0	82.0	29.71	852.027	857.352	82.0	82.0	1.001	1.0019	1.995
8.0	2.0	369.940	376.007	82.0	81.0	29.71	857.352	863.473	82.0	82.0	1.001	1.0040	1.975
7.0	2.0	376.007	381.300	83.0	81.0	29.71	863.473	868.800	82.0	81.0	1.001	1.0034	1.993
7.0	2.0	381.300	386.634	83.0	81.0	29.71	868.800	874.180	82.0	82.0	1.001	1.0047	1.958
AVERAGE												1.003	1.980

AMTEST
AIR QUALITY, INC.

DRY GAS METER CALIBRATION
AM TEST - AIR QUALITY, INC.

FILE NAME: BLUE494
METER BOX #: BLUE MAGNEHELIC
CALIBRATION DATE: 4-19-94
METHOD OF CALIB.: STANDARD DRY GAS METER (Method 5 Section 7.1)

TOTAL TIME min	DELTA H "H2O	METER VOL V1 cf	METER VOL V2 cf	TEMP IN deg F	TEMP OUT deg F	BARO. PRES. "Hg	STD DGM V1	STD DGM V2	ST.DGM TEMP IN deg F	ST.DGM TEMP OUT deg F	ST.DGM Yds FACTOR	Y FACTOR	DELTA H@
11.21	0.5	548.549	552.892	64.0	62.0	29.74	772.500	776.800	61.0	63.0	1.001	0.9918	1.887
10.56	1.0	553.406	559.268	67.0	63.0	29.74	777.400	783.200	61.0	63.0	1.001	0.9936	1.837
12.78	1.5	560.072	568.666	70.0	65.0	29.74	783.900	792.400	62.0	63.0	1.001	0.9958	1.876
13.08	2.0	569.776	579.891	73.0	66.0	29.74	793.500	803.500	63.0	63.0	1.001	0.9970	1.893
12.26	2.5	580.807	591.527	76.0	68.0	29.74	804.400	815.000	66.0	63.0	1.001	0.9978	1.854
12.27	3.0	592.242	604.074	78.0	70.0	29.74	815.700	827.350	66.0	64.0	1.001	0.9951	1.841
11.90	4.0	604.689	617.714	79.0	71.0	29.74	828.000	840.900	68.0	64.0	1.001	0.9985	1.887
AVERAGE												0.996	1.868

PRESSURE SENSOR CALIBRATION DATA FORM

Date 1-4-94 Control Box # Blue Manometer

Ambient Temperature 70 °F Barometric Pressure 29.25 in Hg

	MAGNEHELIC GUAGE #	REFERENCE MANOMETER READING Inches H_2O	MAGNEHELIC GUAGE READING Inches H_2O	PRESSURE DIFFERENCE Inches H_2O	PRESSURE DIFFERENCE %
	Blue Mag	M5 Box			
High	0 – 1	0.20	0.21	0.01	5.0
		0.41	0.42	0.01	2.4
		0.61	0.63	0.02	3.3
		0.80	0.81	0.01	1.3
Low	0 – 1	0.20	0.20	0.00	0.0
		0.40	0.42	0.02	5.0
		0.61	0.62	0.01	1.6
		0.80	0.80	0.00	0.0
High	0 – 4	0.80	0.82	0.02	2.5
		1.60	1.63	0.03	1.9
		2.40	2.43	0.03	1.3
		3.22	3.24	0.02	0.6
Low	0 – 4	0.80	0.83	0.03	3.7
		1.60	1.62	0.02	1.3
		2.40	2.42	0.02	0.8
		3.20	3.23	0.03	0.9

$$\frac{(\text{ref pres. " } H_2O - \text{test pres. " } H_2O))}{(\text{ref pres. "} H_2O)} * 100 \le 5\%$$

VP

PRESSURE SENSOR CALIBRATION DATA FORM

Date 1 - 4 - 94 Control Box # Blue Manometer

Ambient Temperature 70 °F Barometric Pressure 29.25 in Hg

MAGNEHELIC GUAGE #	REFERENCE MANOMETER READING Inches H_2O	MAGNEHELIC GUAGE READING Inches H_2O	PRESSURE DIFFERENCE Inches H_2O	%
Blue Mag	M5 Box			
High 0 - 5	1.00	0.99	0.01	1.0
	2.00	~~1.98~~ 1.92	0.08	4.0
	3.00	2.87	0.13	4.3
	4.00	3.87	0.13	3.2
Low 0 - 5	1.00	0.99	0.01	1.0
	2.01	1.98	0.03	1.5
	2.95	2.89	0.06	2.0
	4.00	3.85	0.15	3.7
High 0 - 2	0.40	0.40	0.00	0.0
	0.81	0.82	0.01	1.2
	1.22	1.20	0.02	1.6
	1.60	1.58	0.02	1.3
Low 0 - 2	0.41	0.41	0.00	0.0
	0.80	0.77	0.03	3.8
	1.20	1.15	0.05	4.2
	1.60	1.54	0.06	3.8

$$\frac{(\text{ref pres. " }H_2O - \text{test pres. " }H_2O))}{(\text{ref pres. "}H_2O)} * 100 \leq 5\%$$

VP

[redacted] TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 6-21-93 Thermocouple Indicator # Blue KA11

Ambient Temperature 64 °F Barometric Pressure 294 in Hg

THERMOCOUPLE # OR REFERENCE	REFERENCE THERMOMETER TEMPERATURE °F	THERMOCOUPLE TEMPERATURE °F	TEMPERATURE DIFFERENCE °F	%
Blue	KAH			
Meter in	34	33	1	0.2%
	212	214	2	0.3%
Meter out	34	34	0	0-0
	212	216	4	0.6%

$$\frac{(\text{ref temp, °F} + 460) - (\text{test therm. temp, °F} + 460)}{(\text{ref temp, °F} + 460)} * 100 \leq 1.5\%$$

AMTEST
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STANDARD DRY GAS METER CALIBRATION DATA SUMMARY
AMTEST AIR QUALITY, INC.

PERFROMED BY HOMER R. DULIN CO.

Cal. DGM Ind, SCFH	Primary Standard SCFH	Yds
13.5	13.8	1.022
25.7	25.8	1.004
35.9	35.7	0.994
46.5	46.2	0.994
55.9	55.9	1.000
66.8	66.6	0.997
85.5	84.8	0.992
88.8	88.5	0.997
99.9	100.1	1.002
108.6	108.9	1.003
113.3	113.5	1.002
	AVG. Yds =	1.001

HOMER R. DULIN CO.

729 EAST WILLOW STREET
LONG BEACH, CALIFORNIA 90806
(310) 424-8533 (213) 636-4096 FAX (310) 426-7707

CERT. NO. 4-304-4

CALIBRATION CERTIFICATION

SUBMITTED BY: KRIS A. HANSEN CO.

FLOWMETER SERIAL No. 0302

MANUFACTURER EQUIMETER MFG. SERIAL No. 27688

TUBE No. FLOAT No.

MODEL NO.: T-110

REMARKS: CALIBRATED IN CFH AIR @ 14.7 PSIA & 70 DEG F.

ACCURACY: SEE DATA

INDICATED		ACTUAL	
CFH		CFH	
113.3		113.5	
108.6		108.9	
99.9		100.1	
88.8		88.5	
85.5		84.8	
66.8		66.6	
55.9		55.9	
46.5		46.2	
35.9		35.7	
25.7		25.8	
13.5		13.8	

Flowmeter Certified with HOMER R. DULIN CO.

Equipment No. 12400 Accuracy 0.2% Calib. Due 5-28-94

Procedure No. 101G

NIST Cert. No. 821/249576-92

Our standards are certified by or are traceable to the National Institute of Standards and Technology and comply with MIL-STD-45662A.

P.O. No. 06330 Shipper No.

4-18-94
CALIBRATION DATE

4-18-95
RECALIBRATION DATE

B. Richardson
CALIBRATION TECHNICIAN
B. RICHARDSON

TYPE S PITOT TUBE INSPECTION DATA FORM

Date 12-28-93 Pitot Tube # P5H

Client Louisiana-Pacific

Location Montrose CO

Site(s) Dryer E-tube stack

Test Date(s) 10-25-94

Pitot tube assembly level? ✓ yes _____ no

Pitot tube openings damaged? _____ yes (explain below) ✓ no

α_1 = 1.5 ° (<10°), α_2 = 2.5 ° (<10°), β_1 = 2.5 ° (<5°),

β_2 = 2.0 ° (<5°)

γ = 1.5 °, θ = 1.0 °, A = 1.118 cm (in.)

z = A sin γ = 0.0292 cm (in.); <0.32 cm (<1/8 in.),

w = A sin θ = 0.0195 cm (in.); <.08 cm (<1/32 in.)

P_A 0.559 cm (in.) P_b 0.559 cm (in.)

D_t = 0.375 cm (in.)

Comments:

Calibration required? _____ yes* ✓ no

*If yes, tag and take out of service until repaired.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 8/23/94 Thermocouple Indicator # BLUE MAG BOX

Ambient Temperature 66 °F Barometric Pressure 29.79 in Hg

THERMOCOUPLE # OR REFERENCE	REFERENCE THERMOMETER TEMPERATURE °F	THERMOCOUPLE TEMPERATURE °F	TEMPERATURE DIFFERENCE °F	TEMPERATURE DIFFERENCE %
TSF	~~33~~	~~31~~		
ICE BATH	33	31	2.0	0.41
	34	33	1.0	0.20
	34	33	1.0	0.20
BOILING WATER	208	209	1.0	0.15
	208	209	1.0	0.15
	208	209	1.0	0.15
BOILING OIL	362	362	0.0	0.0
	368	368	0.0	0.0
	374	374	0.0	0.0

$$\frac{(\text{ref temp. °F} + 460) - (\text{test therm. temp. °F} + 460)}{(\text{ref temp. °F} + 460)} \cdot 100 \leq 1.5\%$$

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AMTEST
AIR QUALITY, INC

RESUME OF KRIS A. HANSEN

PRESIDENT
AM TEST-AIR QUALITY, INC.
AM TEST ALASKA

EDUCATION

- B.S., Chemistry, Central Washington University, 1973
- Coursework and 2.5 years research completed towards M.S., Chemistry, Central Washington University
- Several workshops, courses and conferences annually, including a Continuous Emission Monitoring System (CEMS) Workshop, taught by Dr. James Jahnke in October 1992, an Advanced Emission Measurement Workshop in July 1993, a Title III MACT Workshop in 1994, a Title V Operating Permits Workshop in 1994 and Enhanced Monitoring Workshops in 1993 and 1994.

PROFESSIONAL MEMBERSHIPS

- Air and Waste Management Association (AWMA)
- Pacific Northwest International Section of AWMA (PNWIS)
- Source Evaluation Society (SES)

PROFESSIONAL EXPERIENCE

Am Test-Air Quality, Inc. was formed under the direction of Mr. Hansen in 1982. This company conducts full-service source testing activities. Mr. Hansen keeps current on recent developments in EPA methodology and has developed sampling and analysis techniques for many sources for which EPA guidelines are not available. He has worked at numerous types of industrial facilities, including oil and gas refineries, gas, oil and coal-fired power plants, nuclear plants, aluminum plants, wood products industries, smelters, incinerators, and other industrial sources throughout the United States and internationally. Mr. Hansen manages an experienced field testing and laboratory analysis staff. Mr. Hansen manages all phases of project development, including cost estimation, scheduling, sample collection, analysis and report preparation. He also manages all other aspects of the business, including business development and personnel issues.

Prior to joining Am Test, Inc., Mr. Hansen's professional experience included 4.5 years as the Manager of Laboratory services and a Project Leader for an environmental consulting firm which specialized in air quality studies, and 2 years as a laboratory instructor while attending graduate school at Central Washington University, where his research emphasis was in gas chemistry. Mr. Hansen has 18 years of professional experience.

Mr. Hansen has assisted in the instruction of the EPA 450 "Source Sampling for Particulate Pollutants" and the EPA 468 "Source Sampling and Analysis of Gaseous Pollutants" courses offered yearly by the EPA in cooperation with the University of Washington. Students are represented by industry and governmental agency personnel from across the U.S. and other nations. Mr. Hansen was the recipient of the 1987 PNWIS/APCA "Hardhat Award" which was presented in recognition of his contributions to the advancement of source sampling technology in the Pacific Northwest.

AMTEST
AIR QUALITY, INC.

RESUME OF
ANGELA F. BLAISDELL

VICE PRESIDENT/SR. TECHNICAL WRITER

EDUCATION

- B.S., Marine Resources, Western Washington University, Bellingham, Washington, 1980
- Minors in Chemistry and Biology
- Several workshops, courses and conferences annually, including a Continuous Emission Monitoring System (CEMS) Workshop, taught by Dr. James Jahnke in October 1992 and April 1993, a Title V Operating Permits Workshop in May 1993, an Advanced Emission Measurement Workshop in July 1993, a Title III MACT Workshop in 1994 and Enhanced Monitoring Workshops in 1993 and 1994.

PROFESSIONAL MEMBERSHIPS

- Air and Waste Management Association (A&WMA)
- Pacific Northwest International Section of A&WMA (PNWIS)
- Source Evaluation Society (SES)

PROFESSIONAL EXPERIENCE

Ms. Blaisdell has worked with Am Test-Air Quality, Inc. for the past 10 years and has had 14 years of professional experience in the field of air quality. She helps manage all aspects of source test projects, including initial client contact, scope of work preparation, scheduling, pre-test coordination, implementation of quality assurance programs for field sampling, analysis, data reduction, final data review and report preparation and review. She reviews current literature for each test method and incorporates the methodology into our testing and reporting protocol. Ms. Blaisdell recently assisted in the instruction of the EPA-APTI 464L "Continuous Emission Monitoring" course, the EPA 450 "Source Sampling for Particulate Pollutants" course and the EPA 502 Course "Hazardous Waste Incineration" offered by the EPA's Air Pollution Training Institute in cooperation with the University of Washington. She was the General Chair of the 1994 PNWIS Spring Specialty Conference on Enhanced Monitoring, and was a speaker at the 1990 and 1991 PNWIS annual meetings on the subject of continuous emission monitoring systems (CEMS). Angela is the current Treasurer and past secretary/treasurer for the Pacific Northwest International Section (PNWIS) of the Air and Waste Management Association (A&WMA) and is the past Chair for the Puget Sound Chapter of PNWIS. Ms. Blaisdell was the recipient of the 1991 PNWIS/A&WMA "Labcoat Award" which is presented each year to an individual to recognize his contribution to the advancement of source sampling methodology in the Pacific Northwest.

Prior to joining Am Test, Ms. Blaisdell acted as a Project Leader and Office Manager for an environmental engineering consulting firm in the Seattle area for 2 years. Experience with that firm involved sample collection, analysis and report preparation for source and ambient air, water and industrial hygiene studies. Ms. Blaisdell also worked on various research projects in the Chemistry department while attending Western Washington University.

AMTEST
AIR QUALITY, INC.

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RESUME OF
K. STEVEN MACKEY

SENIOR AIR QUALITY SPECIALIST

EDUCATION

- A.S., Mathematics, North Idaho College, Coeur d'Alene, Idaho, 1978
- Continuous Emission Monitoring System (CEMS) Workshop, taught by Dr. James Jahnke, April 1993.
- Professional training courses and specialty conferences

PROFESSIONAL MEMBERSHIPS

- Source Evaluation Society (SES)

PROFESSIONAL EXPERIENCE

Mr. Mackey has worked for Am Test-Air Quality Inc. for 5 years as a Senior Air Quality Specialist, and has 14 years experience in the field of air quality and industrial source emissions testing. Mr. Mackey conducts source testing and activities related to source emission testing, including field sampling, test equipment maintenance and calibration, test planning and preparation, and data reduction and evaluation. He has performed sampling for particulates, particle size distribution, sulfur and nitrogen oxides, reduced sulfur compounds, semi-volatile and volatile organic compounds, toxic air pollutants, metals, opacity, and other EPA methodology. Mr. Mackey is certified to observe opacity.

Prior to joining Am Test-Air Quality, Inc., Mr. Mackey was the Source Testing Coordinator for the State of Oregon Department of Environmental Quality (ODEQ for 1.5 years. This position was responsible for coordinating a statewide source sampling program and source quality assurance program for industrial air pollution sources. His work with ODEQ's Air Quality Division involved evaluating source tests, plant site source test observations, approving source test methods, and evaluating source self-monitoring practices.

Prior to his position with the State of Oregon, Mr. Mackey was a Field Supervisor for Omni Environmental Services in Beaverton, Oregon for 4 years. Experience with this firm was primarily in industrial source emission testing and field and laboratory woodstove emissions testing. In addition to source testing at a wide variety of industrial facilities, Mr. Mackey ran an extensive field study on woodstove performance in Vermont and New York involving specially designed sampling equipment. Prior to working with Omni, Mr. Mackey worked 4.5 years as a Project Leader and Field Technician for an environmental consulting firm which specialized in air quality studies. Experience with this firm involved extensive source testing and other emissions monitoring projects.

[afb\c\bp\res-ksm, 8/25/94]

AMTEST
AIR QUALITY, INC

RESUME OF
STACY AKIN

PROJECT ASSISTANT/TECHNICAL WRITER

EDUCATION

- B.S., Marine Biology, Roger Williams University, Bristol, Rhode Island, 1992

PROFESSIONAL EXPERIENCE

Ms. Akin began her employment with Am Test-Air Quality, Inc. in September 1993. She is responsible for pre-field preparation for air quality projects and preparation of sample trains, glassware, labware and sampling hardware to be used on each specific project. In the field, Ms. Akin has acted as a Project Assistant, assisting the Project Manager, Project Engineer, or Project Leader in setting up the equipment at each sample site, performing tests and recording data, recovering the samples after each test, performing any in-field analysis, and in demobilizing. When working in the field, she is responsible for properly labeling and identifying each sample, and initiating chain-of-custody procedures.

In the laboratory, Ms. Akin is experienced in gravimetric analysis of particulate matter samples and particle size distribution samples. She assists in preparation and analysis of samples for quantifying sulfur oxides, reduced sulfur compounds, toxic metals (including hexavalent chromium), semi-volatile compounds (including dioxins and furans), and volatile organic compounds.

In the office, Ms. Akin reduces the field data and inputs values into data reduction programs and performs by-hand calculations to verify computer program integrity.

Prior to her employment with Am Test, Ms. Akin worked in a large ophthalmology clinic as a receptionist and assistant bookkeeper. Her responsibilities included daily record keeping for the optical shop as well as monthly patient and insurance billings.

AMTEST
AIR QUALITY, INC.

RESUME OF
CASSIE B. HEATON

PROJECT ENGINEER/CHEMIST

EDUCATION

- B.A. in Chemistry, BSc in Chemical Engineering
  University of Colorado, Boulder, Colorado, 1990
- Engineer-in-Training; State of Colorado
- EPA 450 "Source Sampling for Particulate Pollutants Course", August 1992.

PROFESSIONAL EXPERIENCE

Ms. Heaton began her employment with Am Test-Air Quality, Inc. in January 1992. She performs technical writing of reports and word processing of proposals, test plans, and reports for the Senior Technical Writers to review. She performs data processing of field and laboratory analysis data using computerized data reduction programs, and performs by-hand calculations to verify computer program integrity. She also develops new computerized data reduction programs for field and laboratory analysis data and reviews other staff members data for accuracy.

Ms. Heaton is also experienced preparing and packing sampling equipment for mobilization to the test sites, and in assisting the Project Leaders to collect samples. She has assisted in handling and setting up the equipment at each sample site, running the control box and recording data, sample recovery, in-field analysis, data reduction, and demobilization.

In the laboratory, Ms. Heaton is experienced with gravimetric analysis of particulate matter samples and particle size distribution samples, wet chemical titrametric analysis and glassware preparation for organics and metals testing. She assists in preparation and analysis of samples for quantifying sulfur oxides, nitrogen oxides, hydrogen sulfide, toxic metals (including hexavalent chromium), semi-volatile compounds (including dioxins and furans), and volatile organic compounds.

AMTEST
AIR QUALITY, INC

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RESUME OF
ANNIKA M. WOEHR

PROJECT ASSISTANT/TECHNICAL WRITER

EDUCATION

- B.S., Biology, Florida Atlantic University, Boca Raton, Florida, 1992, emphasis in Marine Biology

PROFESSIONAL EXPERIENCE

Ms. Woehr began her employment with Am Test-Air Quality, Inc. in June 1994. She has been responsible for pre-field preparation for air quality projects and preparation of sample trains, glassware, labware and sampling hardware to be used on each specific project. In the field, Ms. Woehr has acted as a Project Assistant, assisting the Project Manager, Project Engineer, or Project Leader in setting up the equipment at each sample site, performing tests and recording data, recovering the samples after each test, performing any in-field analysis, and in demobilizing. When working in the field, she is responsible for properly labeling and identifying each sample, and initiating chain-of-custody procedures.

In the laboratory, Ms. Woehr is experienced in gravimetric analysis of particulate matter samples and particle size distribution samples. She assists in preparation and analysis of samples for quantifying sulfur oxides, reduced sulfur compounds, toxic metals (including hexavalent chromium), semi-volatile compounds (including dioxins and furans), and volatile organic compounds.

In the office, Ms. Woehr reduces the field data and inputs values into data reduction programs and performs by-hand calculations to verify computer program integrity.

Prior to joining Am Test, Annika worked through an employment agency for a coastal management firm restoring and building up sand dunes on beaches in Florida using native and endangered plants. She worked as a teacher assistant, office assistant, research assistant while attending Florida Atlantic University. One project involved maintaining sea turtle tanks in a laboratory. She also spent a summer working as a secretary in Geneva, Switzerland.

[afb\c\bp\res-amw, 8/25/94]

AMTEST
AIR QUALITY, INC.

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AM TEST-AIR QUALITY, INC.
CAPABILITIES

Am Test-Air Quality, Inc. is an independent company providing comprehensive air pollution testing services to industry and government. Am Test, Inc.'s Air Quality Division was developed in 1982 by Mr. Kris A. Hansen. On January 1, 1991, the Air Quality Division incorporated as a separate company named Am Test-Air Quality, Inc. Am Test-Air Quality's main office and laboratory facility is located in Preston, Washington. The Preston office employs a staff of 20 qualified, experienced engineers, chemists and scientists. In January 1993, Am Test-Air Quality, Inc. opened a branch office, Am Test Alaska in Anchorage, Alaska in order to better serve our many Alaskan clients. One aspect of the testing services provided by Am Test-Air Quality, Inc., which we feel is unsurpassed by other testing firms, is the quality and experience of our personnel. We utilize highly experienced, motivated personnel on all projects. We believe that the success of a project is dependent on the use of state-of-the-art equipment and experienced, knowledgeable personnel. We have performed source testing projects of all different sizes and difficulty levels. Typically, we dispatch test teams of one to ten individuals. On all projects, our attention to detail remains extremely high.

Am Test-Air Quality, Inc. performs source testing projects at all types of facilities throughout the United States and Canada. Some of the types of facilities tested include:

- Oil and Gas Refineries
- Pulp and Paper Mills
- Gas, Oil, Wood, Coal and Nuclear-Fired Power Plants
- Chemical Plants
- Aluminum Reduction Facilities
- Wood Products Industries
- Smelters
- Cement Kilns
- Hazardous Waste Incinerators
- Municipal and Medical Waste Combustors
- Landfill Gas Flares
- Wastewater and Sewage Treatment Facilities
- Coating and Finishing Facilities
- Manufacturers
- Superfund Clean-Up Sites
- Asphalt Plants

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Examples of the types of projects Am Test-Air Quality, Inc. becomes involved in include:

- Regulatory compliance with NSPS, MACT, BIF requirements
- Continuous emission monitoring system (CEMS) certifications
- Enhanced monitor certifications (CEMS, CRMS, CPMS)
- Emission inventories for MACT, NESHAP, SARA Title III and SIP determinations
- Air pollution control equipment warranty/guarantee/design testing
- Combustion or control device optimization
- Air toxics studies for hazardous air pollutants (HAPs)
- Particle size distribution studies (PM_{10})
- Soil remediation unit evaluations
- Vapor recovery system efficiency evaluations
- Destruction/capture efficiency studies
- Ammonia slip evaluations
- Pilot plant or engineering-scale trial burns
- Hands-on stack sampling training workshops
- Industry-agency liaison

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MANUAL EMISSIONS TESTING SERVICES

Am Test-Air Quality, Inc. performs all recognized EPA source test methods for many types of industries. We also perform NIOSH methods, BIF Regulation methods, SW-846 methods, toxic organic (TO) methods and are experienced at developing test methods for specialized applications where published methods do not exist. Am Test personnel keep current on new method development by attending training courses and utilizing the EMTIC bulletin board system (BBS). A partial list of pollutants measured using manual test methods follows:

- Particulate Matter
- Particle Size Distribution
- Sulfur Oxides
- Nitrogen Oxides
- Opacity Measurement
- Carbon Monoxide and Fixed Gases
- Hydrogen Sulfide
- Multi-Metals
    - Hexavalent Chromium
    - ICP Metals
    - Low-Level Mercury
- Particulate and Gaseous Fluoride
- Total Reduced Sulfur Compounds
- Volatile Organic Compounds
    - 8240 list of VOCs
    - Alcohols and Acetates
    - BTEX
    - Formaldehyde/Aldehydes
- Semi-Volatile Organic Compounds
    - Dioxin and Furan Isomers
    - PAHs
    - BNAs
    - PCBs
    - Pesticides and Herbicides
- Acid Gases
    - Hydrochloric Acid
    - Hydrofluoric Acid
    - Nitric Acid
    - Sulfuric Acid
- Chlorine, Chlorine Dioxide and Chloroform
- Ammonia and Urea
- Radionucleides
- Hazardous Air Pollutants (HAPs)

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CONTINUOUS EMISSION MONITORING SYSTEMS AND INSTRUMENTAL TESTING SERVICES

Am Test-Air Quality, Inc. has two (2) complete continuous emission monitor (CEM) instrument vans and a separate set of instruments which can be shipped to remote locations. We maintain an inventory of approximately 80 EPA Protocol 1 (or best available grade) certified calibration gas mixtures to tailor calibrations gases to each source. Each mobile laboratory is equipped with:

- O_2, CO_2, SO_2, NO_x, and CO analyzers
- Total hydrocarbon (THC) and non-methane hydrocarbon (NMHC) analyzers
- PC-based data acquisition systems for collecting and reducing data to provide on-site results
- Cylinder racks for calibration gases
- Heated or unheated Teflon sample transport lines
- Sample extraction systems, including sample probes, fine particulate filters, moisture removal systems, and Teflon lined sample pumps
- Laboratory bench space which can be equipped with analytical balances, wet chemical analysis equipment and instrumental methods, including gas chromatography

Am Test-Air Quality, Inc.'s mobile laboratories are used to perform New Source Performance Standards (NSPS) testing and to conduct continuous emission monitoring system (CEMS) performance specification testing and audits. We provide a variety of CEMS services, including:

- Performance Specification Tests (PST)
- Relative Accuracy Test Audits (RATA)
- Relative Accuracy Audits (RAA)
- Cylinder Gas Audits (CGA)
- Quality Assurance Plans (QAP)

In addition, Am Test-Air Quality, Inc.'s senior level staff are extremely knowledgeable in the field of CEMS and can assist in monitor selection, calibration gas selection, stratification testing to locate CEMS probes, sampling system troubleshooting, and act as a liaison with the regulatory agency.

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AM TEST LABORATORY

AmTest, Inc. is a full service analytical testing laboratory located in Redmond, Washington. It was organized to provide the highest caliber laboratory testing of environmental and industrial samples. Experienced environmental chemists and microbiologists have the best available equipment at their disposal. Experienced personnel, top-notch instrumentation, and a personal interest in your testing requirements assures:

- **Quick turnaround time for sample analysis**
- **Maximum quality control on projects**
- **Direct dialogue with the analytical staff**
- **Reasonable rates**

[redacted]ratory is departmentalized into the following disciplines:

AIR QUALITY	**Source and Ambient Testing**
ENVIRONMENTAL	**Water, Wastes, Tissue, Vegetation**
INDUSTRIAL	**Food, Materials Testing, Industrial Hygiene, Special Projects**
OIL AND FUELS	**Lubricating Oil, Fuel Analysis, Hydraulics, Contamination Analysis**
TRACE ORGANICS	**PCB's, Pesticides, Hazardous Wastes, Priority Pollutants**
MICROBIOLOGY	**Water, Wells, Food, Product Evaluation**

AmTest's laboratory utilizes the following instrumentation:

Finnigan Incos 50 GC/MS
Jarrell Ash ICP Plasma Emission Spectrometer
Gas Chromatographs: FID, EC, TC, N_2, P
Jarrell Ash Arc, Spark Emission Spectrometer
Xertex TOX Analyzer
Source Test Equipment-EPA Approved
Atomic Absorption Spectrometer-Flame
Atomic Absorption Spectrometer-Graphite Furnace
Atomic Absorption Spectrometer-Hydride Generation
UV/Visible Spectrometer
Infrared Spectrometer
High Performance Liquid Chromatograph

AmTest is one laboratory in a group of laboratories serving the West. Other facilities include:

AmTest, Inc., Portland, Oregon
AmTest of Arizona, Phoenix, Arizona
Can Test Ltd., Vancouver, B.C.
Loring Laboratories, Calgary, Alberta
Metropolitan Clinical Laboratories, Ltd., Vancouver, B.C.

Phone Mr. Shawn Moore, General Manager or Mr. Mark Fugiel, Technical Director, at (206)885-1664 for more details or a price quotation.