Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

Background Report Reference

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Title: Results of the May 9-12, 1994 Air Emission Compliance Tests at the Louisiana-Pacific Particleboard Plant in Missoula, Montana

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June 1994

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RESULTS OF THE MAY 9 - 12, 1994 AIR EMISSION COMPLIANCE TESTS AT THE LOUISIANA PACIFIC WAFERBOARD PLANT IN MISSOULA, MONTANA

Submitted to:

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Report Number 4-2837
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ABBREVIATIONS

ACFM	actual cubic feet per minute
cc (ml)	cubic centimeter (milliliter)
DSCFM	dry standard cubic foot of dry gas per minute
DSML	dry standard milliliter
DEG-F (°F)	degrees Fahrenheit
DIA.	diameter
FP	finished product for plant
FT/SEC	feet per second
g	gram
GPM	gallons per minute
GR/ACF	grains per actual cubic foot
GR/DSCF	grains per dry standard cubic foot
g/dscm	grams per dry standard cubic meter
HP	horsepower
HRS	hours
IN.	inches
IN.HG.	inches of mercury
IN.WC.	inches of water
LB	pound
LB/DSCF	pounds per dry standard cubic foot
LB/HR	pounds per hour
LB/10^6BTU	pounds per million British Thermal Units heat input
LB/MMBTU	pounds per million British Thermal Units heat input
LTPD	long tons per day
MW	megawatt
mg/Nm^3	milligrams per dry standard cubic meter
ug/Nm^3	micrograms per dry standard cubic meter
microns (um)	micrometer
MIN.	minutes
ng	nanograms
ohm-cm	ohm-centimeter
PM	particulate matter
PPH	pounds per hour
PPM	parts per million
ppmC	parts per million carbon
ppm,d	parts per million, dry
ppm,w	parts per million, wet
ppt	parts per trillion
PSI	pounds per square inch
SQ.FT.	square feet
TPD	tons per day
ug	micrograms
v/v	percent by volume
w/w	percent by weight
<	≤ (when following a number)

Standard conditions are defined as 68°F (20°C) and 29.92 IN. of mercury pressure.

g:\stack\wp\misc\abbrev.frm

1 INTRODUCTION

During the Period May 9 - 12, 1994 Interpoll Laboratories personnel conducted Air Emission Compliance tests at the Louisiana Pacific Corporation (LP) Waferboard Plant located in Missoula, Montana on the following sources:

Source	Parameters	Date
Geka Stack	NO_x	5-09-94
ROEMMC Stack	PM,NO_x,CO,CH_2O,THC's	5-10-94
'C' Dryer Stack	PM,NO_x,CO,CH_2O,THC's	5-10-94
'D' Dryer Stack	PM,NO_x,CO,CH_2O,THC's	5-10-94
Boards Coolers 1 & 2 Stack	PM,CO,CH_2O,THC's	5-11-94
Press Vents 1 & 2 Stack	PM,CO,CH_2O,THC's	5-11-94
Press Vents 3 & 4 Stack	PM,CO,CH_2O,THC's	5-11-94
North Pre-Dryer Stack	PM,NO_x,CO,CH_2O,THC's	5-12-94
South Pre-Dryer Stack	PM,NO_x,CO,CH_2O,THC's	5-12-94
Coen Stack	PM,NO_x,CO,THC's	5-12-94

On-site testing was performed by Scott Bainville, Ed Trowbridge, Gary Hove, Ken Rosenthal, Mark Kaehler, and Ken Nuessmeier. Coordination between testing activities and plant operation was provided by Sue Somers of LP. The tests were witnessed by Jay Sinnot and Susan Zazzali of the United States Environmental Protection Agency Region 8, Ken Anderson of the Missoula County Health Department, and Warren Norton of the Montana Department of Health and Environmental Sciences, Air Quality Bureau.

The thermal oil heater manufactured by GEKA supplies heat for the Line 2 Press. The GEKA unit has a capacity of 20 MMBTU and is fired by natural gas. Flue gas is emitted to the atmosphere via a 67 foot high, 24 inch diameter stack.

The ROEMMC tube is a 48" inside diameter refractory lined horizontal duct which conveys heat to the plants six particle board dryers. Heat for the dryers is supplied by the 50 MMBTU/HR ROEMMC sanderdust burner and 55 MMBTU/HR Babcock-Wilcox boiler.

Particleboard dryers which were sampled during this project included the Line 2 surface dryer (C), which is 32 feet long by 9 foot diameter and the Line 2 core dryer (D), which is a 28 foot long by 8 foot diameter. Both dryers are triple pass models manufactured by Heil. Emissions from each dryer are controlled by multicyclones manufactured by Polutrol and emitted to atmosphere via 36" diameter ducts at an elevation of approximately 40 feet.

The Line 2 continuous particleboard press is ventilated by four roof mounted axial fans. The fan housings are approximately 44" in diameter and emit to the atmosphere at an elevation of approximately 54 feet. After pressing, boards from Line 2 are cooled in a rotary board cooler which is ventilated by two four foot square ducts that emit to the atmosphere at an elevation of approximately 42 feet.

The predry system consists of two 12 foot diameter by 40 feet long triple pass rotary drum dryers manufactured by Guarantee Performance. Emissions are vented to the atmosphere via two 40" diameter, 90 feet high stacks. The predryer emissions are controlled by Polutrol multicyclones. Heat for the predryers is supplied by a 35 MMBTU/HR Coen sanderdust burner. In addition to supplying the predryers, excess exhaust from the Coen burner is vented to the atmosphere via a 48 inch diameter, 53 foot high stack.

Particulate evaluations were performed in accordance with EPA Methods 2-5, CFR Title 40, Part 60, Appendix A (revised July 1, 1993). A preliminary determination of the gas linear velocity profile was made at each test location before the first particulate determination to allow selection of the appropriate nozzle diameter for isokinetic sample withdrawal. An Interpoll Labs sampling train which meets or exceeds specifications in the above-cited reference was used to isokinetically extract particulate samples by means of a heated glass-lined probe. Wet catch samples were collected in the back half of the Method 5 sampling train and analyzed in accordance with EPA Method 202.

The oxides of nitrogen samples were collected at the Dryer test site during the particulate determinations using an all-glass Method 7 sampling train. A heated stainless steel probe was used to extract the samples from the exhaust stream. A plug of glass-wool was used in the end of the probe to remove particulate material.

The NO_x samples were collected in volume-calibrated two-liter all-glass flasks. An aliquot of 25 cc of absorbing solution was added to each flask on-site; the flask was closed; inserted into the sampling train; and evacuated. The probe was then purged and the sample collected over a 15 second interval. The flask was then closed; the flask removed from the sampling train; shook for two minutes and then secured for transport to the laboratory.

Upon arrival at the laboratory, the NO_x samples are logged in, placed in a designated area and maintained at 72 °F for 24 hours to allow completion of the conversion of NO to NO_2 and absorption in the acidified peroxide reagent. The flasks are then shook to complete absorption; attached to a mercury manometer and the static pressure and temperature recorded. The samples are then recovered and analyzed by ion chromatography.

Formaldehyde samples were collected using EPA Method 0011 (SW 846 3rd Ed.). The samples were collected isokinetically using a Method 5 sampling train with an aqueous acidic 2,4-dinitrophenylhydrazine absorbing solution and analyzed by high performance liquid chromatography.

Total gaseous hydrocarbon concentrations were determined instrumentally using a Ratfisch Model RS55 heated flame ionization detector (HFID) calibrated against propane in air standards. The THC concentration was continuously monitored by extracting a slipstream of exhaust gas by means of a heated probe and filter holder. A heat-traced teflon line was used to transport the sample gas from the filter holder outlet to the analyzer inlet.

Integrated flue gas samples were extracted from the dryer and thermal oil heater exhaust gas streams using a specially designed gas sampling system. Integrated flue gas samples were collected in 44-liter Tedlar bags housed in a protective aluminum container. After sampling was complete, the bags were sealed and returned to the laboratory for Orsat analysis. Prior to sampling, the Tedlar bags are leak checked at 15 IN.HG. vacuum with an in-line rotameter. Bags with any detectable inleakage are discarded. The integrated flue gas samples collected at each test site (except the Geka) were analyzed for carbon monoxide in accordance with EPA Method 10 (NDIR).

Testing on the ROEMMC Tube was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located > 5 stack diameters downstream of the

nearest flow disturbance and 2 stack diameters upstream of the stack exit. A 24-point traverse was used to collect the particulate and formaldehyde samples. Each traverse point was sampled 2.5 minutes to give a total sampling time of sixty minutes per run.

Testing on the 'C' and 'D' Dryers was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located 3 stack diameters from the nearest flow disturbance and 1.9 diameters from the stack exit. A 24-point traverse was used to collect representative particulate and formaldehyde samples. Each traverse point was sampled for 2.5 minutes for a total sampling time of 60 minutes per run.

Testing on the North and South Pre-Dryers was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located 5 stack diameters from the nearest flow disturbance and 3 diameters from the stack exit. A 20-point traverse was used to collect representative particulate and formaldehyde samples. Each traverse point was sampled for 3 minutes for a total sampling time of 60 minutes per run.

Testing on the Press Vents and the No. 1 & 2 Board Coolers was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located > 2 stack diameters downstream of the nearest flow disturbance and > 0.5 diameters upstream of the stack exit. A 24-point traverse was used to collect the particulate and formaldehyde samples. Each traverse point was sampled 2.5 minutes for a total sampling time of 60 minutes per run.

Testing on the Coen Stack was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located > 2 stack diameters downstream of the nearest flow disturbance and > 0.5 diameters upstream of the stack exit. A 24-point traverse was used to collect the particulate samples. Each traverse point was sampled 2.5 minutes for a total sampling time of 60 minutes per run.

The important results of the test are summarized in Section 2. Detailed results are presented in Section 3. Field data and all other supporting information are presented in the appendices.

2 SUMMARY AND DISCUSSION

The important results of the particulate emission compliance tests are summarized in Tables 1 - 9. The particulate results have been calculated using the dry plus wet catch ("a" Tables) and again with the dry catch only ("b" Tables). The oxides of nitrogen results are summarized in Table 10. The carbon monoxide results are summarized in Table 11. The formaldehyde results are summarized in Table 12. The total hydrocarbon results are summarized in Table 14. An overview of all results is presented in the table below:

SOURCE	PM (GR/DSCF)	PM (LB/HR)	NO_x (ppm,d)	NO_x (LB/HR)	CO (ppm,d)	CO (LB/HR)	CH_2O (ppm,d)	CH_2O (LB/HR)	THC's (ppmC,w)	THC's (LB/HR)
Geka	N/A	N/A	20	0.12	N/A	N/A	N/A	N/A	N/A	N/A
ROEMCC Tube	0.117	10.6	283	21.4	317	14.6	0.89	0.046	7	0.16
'C' Dryer	0.017	3.6	78	13.7	63	6.7	0.31	0.037	67	3.2
'D' Dryer	0.0271	4.2	71	9.2	80	6.3	0.46	0.039	110	4.0
B Cooler 1 & 2	0.0082	2.2	N/A	N/A	11	1.5	0.43	0.065	5	0.30
PV 1 & 2	0.012	3.2	N/A	N/A	14	1.9	0.42	0.059	22	1.3
PV 3 & 4	0.011	2.9	N/A	N/A	12	1.5	3.4	0.49	49	2.9
North Pre-Dryer	0.012	3.6	46	11.4	64	9.7	0.21	0.036	79	5.8
South Pre-Dryer	0.012	3.5	42	10.0	5.6	0.80	0.06	0.010	81	5.2
Coen Stack	0.065	3.8	206	10.0	79	2.3	N/A	N/A	< 1	< 0.01

No difficulties were encountered in the field by Interpoll Labs or in the laboratory evaluation of the samples which were conducted by Interpoll Labs. On the basis of this fact and a complete review of the entire data and results, it is our opinion that the results reported herein are accurate and closely reflect the actual values which existed at the time the test was performed.

Table 1a Summary of the Results of the May 10, 1994 Particulate Emission Test on the ROEMMC Tube at the Louisiana Pacific Plant Located in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-10-94	05-10-94	05-10-94
Time runs were done	(HRS)	1110/1212	1300/1403	1445/1547
* Process rate				
Volumetric flow				
actual	(ACFM)	30207	30224	31202
standard	(DSCFM)	10424	10463	10793
Gas temperature	(DEG-F)	834	838	827
Moisture content	(%V/V)	5.66	5.13	5.99
Gas composition	(%V/V,dry)			
carbon dioxide		5.60	5.50	5.80
oxygen		13.90	14.10	14.60
nitrogen		80.50	80.40	79.60
Isokinetic variation	(%)	100.2	99.4	100.6
Particulate concentration				
actual	(GR/ACF)	.0360	.0485	.0368
standard	(GR/DSCF)	0.104	0.140	0.106
Part. emission rate	(LB/HR)	9.32	12.57	9.84

* For process information - See Appendix N.

Note: Dry + Method 202 Wet Catch

Table 1b Summary of the Results of the May 10, 1994 Particulate Emission Test on the ROEMMC Tube at the Louisiana Pacific Plant Located in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-10-94	05-10-94	05-10-94
Time runs were done	(HRS)	1110/1212	1300/1403	1445/1547
Volumetric flow				
actual	(ACFM)	30207	30224	31202
standard	(DSCFM)	10424	10463	10793
Gas temperature	(DEG-F)	834	838	827
Moisture content	(%V/V)	5.66	5.13	5.99
Gas composition	(%V/V,dry)			
carbon dioxide		5.60	5.50	5.80
oxygen		13.90	14.10	14.60
nitrogen		80.50	80.40	79.60
Isokinetic variation	(%)	100.2	99.4	100.6
Particulate concentration				
actual	(GR/ACF)	.0334	.0297	.0325
standard	(GR/DSCF)	.0969	.0859	.0940
Part. emission rate	(LB/HR)	8.66	7.70	8.70

Note: Dry Catch Only

Table 2a Summary of the Results of the May 10, 1994 Particulate Emission Test on the 'C' Dryer Stack at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-10-94	05-10-94	05-10-94
Time runs were done	(HRS)	1110/1212	1300/1402	1445/1548
*Process rate				
Volumetric flow				
actual	(ACFM)	31670	32821	33525
standard	(DSCFM)	23986	24506	25385
Gas temperature	(DEG-F)	147	150	146
Moisture content	(%V/V)	2.51	3.45	2.76
Gas composition	(%V/V,dry)			
carbon dioxide		1.00	1.00	1.10
oxygen		19.00	19.80	19.80
nitrogen		80.00	79.20	79.10
Isokinetic variation	(%)	97.5	99.9	98.6
Particulate concentration				
actual	(GR/ACF)	.0121	.0122	.0140
standard	(GR/DSCF)	.0160	.0163	.0185
Part. emission rate	(LB/HR)	3.29	3.42	4.03

*For process information - See Appendix N.

Note: Dry + Method 202 Wet Catch

Table 2b Summary of the Results of the May 10, 1994 Particulate Emission Test on the 'C' Dryer Stack at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-10-94	05-10-94	05-10-94
Time runs were done	(HRS)	1110/1212	1300/1402	1445/1548
Volumetric flow				
actual	(ACFM)	31670	32821	33525
standard	(DSCFM)	23986	24506	25385
Gas temperature	(DEG-F)	147	150	146
Moisture content	(%V/V)	2.51	3.45	2.76
Gas composition	(%V/V,dry)			
carbon dioxide		1.00	1.00	1.10
oxygen		19.00	19.80	19.80
nitrogen		80.00	79.20	79.10
Isokinetic variation	(%)	97.5	99.9	98.6
Particulate concentration				
actual	(GR/ACF)	.00683	.00761	.00914
standard	(GR/DSCF)	.00903	.0102	.0121
Part. emission rate	(LB/HR)	1.86	2.14	2.63

Note: Dry Catch Only

Table 3a Summary of the Results of the May 10, 1994 Particulate Emission Testing on the 'D' Dryer Stack at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-10-94	05-10-94	05-10-94
Time runs were done	(HRS)	1110/1212	1300/1403	1445/1547
*Process rate				
Volumetric flow				
actual	(ACFM)	24693	26095	25384
standard	(DSCFM)	18163	18447	17680
Gas temperature	(DEG-F)	162	177	184
Moisture content	(%V/V)	3.24	4.78	5.24
Gas composition	(%V/V,dry)			
carbon dioxide		1.40	1.40	1.60
oxygen		19.40	19.40	19.30
nitrogen		79.20	79.20	79.10
Isokinetic variation	(%)	99.8	101.9	99.7
Particulate concentration				
actual	(GR/ACF)	.0196	.0184	.0199
standard	(GR/DSCF)	.0267	.0261	.0286
Part. emission rate	(LB/HR)	4.16	4.12	4.33

*For process information - See Appendix N.

Note: Dry + Method 202 Wet Catch

Table 3b Summary of the Results of the May 10, 1994 Particulate Emission Testing on the 'D' Dryer Stack at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-10-94	05-10-94	05-10-94
Time runs were done	(HRS)	1110/1212	1300/1403	1445/1547
Volumetric flow				
actual	(ACFM)	24693	26095	25384
standard	(DSCFM)	18163	18447	17680
Gas temperature	(DEG-F)	162	177	184
Moisture content	(%V/V)	3.24	4.78	5.24
Gas composition	(%V/V,dry)			
carbon dioxide		1.40	1.40	1.60
oxygen		19.40	19.40	19.30
nitrogen		79.20	79.20	79.10
Isokinetic variation	(%)	99.8	101.9	99.7
Particulate concentration				
actual	(GR/ACF)	.00885	.00911	.0118
standard	(GR/DSCF)	.0120	.0129	.0169
Part. emission rate	(LB/HR)	1.87	2.04	2.56

Note: Dry Catch Only

Table 4a Summary of the Results of the May 11, 1994 Particulate Emission Test on the No. 1 & 2 Board Coolers at the Louisiana Pacific Plant in Missoula, Montana.

ITEM	Run 1	Run 2	Run 3
Date of test	05-11-94	05-11-94	05-11-94
Time runs were done (HRS)	947/1050	1145/1247	1323/1425
*Process rate			
Volumetric flow			
actual (ACFM)	38196	38455	38044
standard (DSCFM)	32474	31958	30679
Gas temperature (DEG-F)	88	104	116
Moisture content (%V/V)	1.67	1.05	2.00
Gas composition (%V/V,dry)			
carbon dioxide	0.03	0.03	0.03
oxygen	20.90	20.90	20.90
nitrogen	79.07	79.07	79.07
Isokinetic variation (%)	99.5	99.2	100.9
Particulate concentration			
actual (GR/ACF)	.00765	.00741	.00531
standard (GR/DSCF)	.00900	.00892	.00659
Part. emission rate (LB/HR)	2.51	2.44	1.73

*For process information - See Appendix N.

Note: Dry + Method 202 Wet Catch

Table 4b Summary of the Results of the May 11, 1994 Particulate Emission Test on the No. 1 & 2 Board Coolers at the Louisiana Pacific Plant in Missoula, Montana.

ITEM	Run 1	Run 2	Run 3
Date of test	05-11-94	05-11-94	05-11-94
Time runs were done (HRS)	947/1050	1145/1247	1323/1425
Volumetric flow			
actual (ACFM)	38196	38455	38044
standard (DSCFM)	32474	31958	30679
Gas temperature (DEG-F)	88	104	116
Moisture content (%V/V)	1.67	1.05	2.00
Gas composition (%V/V,dry)			
carbon dioxide	0.03	0.03	0.03
oxygen	20.90	20.90	20.90
nitrogen	79.07	79.07	79.07
Isokinetic variation (%)	99.5	99.2	100.9
Particulate concentration			
actual (GR/ACF)	.00566	.00589	.00334
standard (GR/DSCF)	.00666	.00709	.00415
Part. emission rate (LB/HR)	1.85	1.94	1.09

Note: Dry Catch Only

Table 5a Summary of the Results of the May 11, 1994 Particulate Emission Test on the No. 3 & 4 Press Vents at the Louisiana Pacific Plant in Missoula, Montana.

ITEM	Run 1	Run 2	Run 3
Date of test	05-11-94	05-11-94	05-11-94
Time runs were done (HRS)	949/1053	1145/1250	1323/1428
*Process rate			
Volumetric flow			
actual (ACFM)	35079	34975	37429
standard (DSCFM)	29387	29223	31072
Gas temperature (DEG-F)	99	102	105
Moisture content (%V/V)	1.20	1.06	1.13
Gas composition (%V/V,dry)			
carbon dioxide	0.03	0.03	0.03
oxygen	20.90	20.90	20.90
nitrogen	79.07	79.07	79.07
Isokinetic variation (%)	99.5	99.6	100.0
Particulate concentration			
actual (GR/ACF)	.0125	.00822	.00793
standard (GR/DSCF)	.0149	.00985	.00956
Part. emission rate (LB/HR)	3.75	2.47	2.55

*For process information - See Appendix N.

Note: Dry + Method 202 Wet Catch

Table 5b Summary of the Results of the May 11, 1994 Particulate Emission Test on the No. 3 & 4 Press Vents at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-11-94	05-11-94	05-11-94
Time runs were done	(HRS)	949/1053	1145/1250	1323/1428
Volumetric flow				
actual	(ACFM)	35079	34975	37429
standard	(DSCFM)	29387	29223	31072
Gas temperature	(DEG-F)	99	102	105
Moisture content	(%V/V)	1.20	1.06	1.13
Gas composition	(%V/V,dry)			
carbon dioxide		0.03	0.03	0.03
oxygen		20.90	20.90	20.90
nitrogen		79.07	79.07	79.07
Isokinetic variation	(%)	99.5	99.6	100.0
Particulate concentration				
actual	(GR/ACF)	.0114	.00506	.00463
standard	(GR/DSCF)	.0136	.00605	.00558
Part. emission rate	(LB/HR)	3.44	1.52	1.49

Note: Dry Catch Only

Table 6b Summary of the Results of the May 11, 1994 Particulate Emission Test on the No. 1 & 2 Press Vents at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-11-94	05-11-94	05-11-94
Time runs were done	(HRS)	949/1053	1145/1250	1323/1425
Volumetric flow				
actual	(ACFM)	36702	36426	37834
standard	(DSCFM)	30650	29899	30955
Gas temperature	(DEG-F)	102	111	111
Moisture content	(%V/V)	1.05	1.23	1.47
Gas composition	(%V/V,dry)			
carbon dioxide		0.03	0.03	0.03
oxygen		20.90	20.90	20.90
nitrogen		79.07	79.07	79.07
Isokinetic variation	(%)	100.1	100.2	100.6
Particulate concentration				
actual	(GR/ACF)	.00707	.00404	.00252
standard	(GR/DSCF)	.00847	.00492	.00308
Part. emission rate	(LB/HR)	2.23	1.26	0.817

Note: Dry Catch Only

Table 7a Summary of the Results of the May 12, 1994 Particulate Emission Test on the North Pre-Dryer at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-12-94	05-12-94	05-12-94
Time runs were done	(HRS)	1630/1736	1812/1915	1948/2050
*Process rate				
Volumetric flow				
actual	(ACFM)	45499	43483	44284
standard	(DSCFM)	36010	33771	34418
Gas temperature	(DEG-F)	106	105	106
Moisture content	(%V/V)	4.95	6.83	6.62
Gas composition	(%V/V,dry)			
carbon dioxide		0.15	0.25	0.15
oxygen		20.70	20.60	20.70
nitrogen		79.15	79.15	79.15
Isokinetic variation	(%)	99.4	101.6	101.3
Particulate concentration				
actual	(GR/ACF)	.0101	.00906	.00948
standard	(GR/DSCF)	.0127	.0117	.0122
Part. emission rate	(LB/HR)	3.92	3.38	3.60

*For process information - See Appendix N.

Note: Dry + Method 202 Wet Catch

Table 7b Summary of the Results of the May 12, 1994 Particulate Emission Test on the North Pre-Dryer at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-12-94	05-12-94	05-12-94
Time runs were done	(HRS)	1630/1736	1812/1915	1948/2050
Volumetric flow				
actual	(ACFM)	45499	43483	44284
standard	(DSCFM)	36010	33771	34418
Gas temperature	(DEG-F)	106	105	106
Moisture content	(%V/V)	4.95	6.83	6.62
Gas composition	(%V/V,dry)			
carbon dioxide		0.15	0.25	0.15
oxygen		20.70	20.60	20.70
nitrogen		79.15	79.15	79.15
Isokinetic variation	(%)	99.4	101.6	101.3
Particulate concentration				
actual	(GR/ACF)	.00856	.00750	.00724
standard	(GR/DSCF)	.0108	.00967	.00932
Part. emission rate	(LB/HR)	3.34	2.80	2.75

Note: Dry Catch Only

Table 8a Summary of the Results of the May 12, 1994 Particulate Emission Test on the South Pre-Dryer at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-12-94	05-12-94	05-12-94
Time runs were done	(HRS)	1630/1736	1812/1915	1948/2050
*Process rate				
Volumetric flow				
actual	(ACFM)	42042	42963	42651
standard	(DSCFM)	32784	32881	33335
Gas temperature	(DEG-F)	108	108	109
Moisture content	(%V/V)	5.90	7.63	5.57
Gas composition	(%V/V,dry)			
carbon dioxide		0.70	0.80	0.60
oxygen		20.30	20.20	20.40
nitrogen		79.00	79.00	79.00
Isokinetic variation	(%)	100.4	101.3	100.0
Particulate concentration				
actual	(GR/ACF)	.0103	.00901	.00950
standard	(GR/DSCF)	.0132	.0118	.0122
Part. emission rate	(LB/HR)	3.70	3.32	3.47

*For process information - See Appendix N.

Note: Dry + Method 202 Wet Catch

Table 8b Summary of the Results of the May 12, 1994 Particulate Emission Test on the South Pre-Dryer at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-12-94	05-12-94	05-12-94
Time runs were done	(HRS)	1630/1736	1812/1915	1948/2050
Volumetric flow				
actual	(ACFM)	42042	42963	42651
standard	(DSCFM)	32784	32881	33335
Gas temperature	(DEG-F)	108	108	109
Moisture content	(%V/V)	5.90	7.63	5.57
Gas composition	(%V/V,dry)			
carbon dioxide		0.70	0.80	0.60
oxygen		20.30	20.20	20.40
nitrogen		79.00	79.00	79.00
Isokinetic variation	(%)	100.4	101.3	100.0
Particulate concentration				
actual	(GR/ACF)	.00889	.00741	.00873
standard	(GR/DSCF)	.0114	.00969	.0112
Part. emission rate	(LB/HR)	3.21	2.73	3.19

Note: Dry Catch Only

Table 9a Summary of the Results of the May 12, 1994 Particulate Emission Test on the Coen Stack at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-12-94	05-12-94	05-12-94
Time runs were done	(HRS)	1525/1738	1814/1917	1950/2054
*Process rate				
Volumetric flow				
actual	(ACFM)	21036	21160	21298
standard	(DSCFM)	6617	6906	6831
Gas temperature	(DEG-F)	929	883	893
Moisture content	(%V/V)	7.42	7.09	8.00
Gas composition	(%V/V,dry)			
carbon dioxide		4.00	3.80	3.90
oxygen		16.00	12.20	12.10
nitrogen		80.00	84.00	84.00
Isokinetic variation	(%)	101.6	99.3	100.2
Particulate concentration				
actual	(GR/ACF)	.0187	.0243	.0194
standard	(GR/DSCF)	.0594	.0746	.0604
Part. emission rate	(LB/HR)	3.37	4.41	3.54

*For process information - See Appendix N.

Note: Dry + Method 202 Wet Catch

Table 9b Summary of the Results of the May 12, 1994 Particulate Emission Test on the Coen Stack at the Louisiana Pacific Plant in Missoula, Montana.

ITEM		Run 1	Run 2	Run 3
Date of test		05-12-94	05-12-94	05-12-94
Time runs were done	(HRS)	1525/1738	1814/1917	1950/2054
Volumetric flow				
actual	(ACFM)	21036	21160	21298
standard	(DSCFM)	6617	6906	6831
Gas temperature	(DEG-F)	929	883	893
Moisture content	(%V/V)	7.42	7.09	8.00
Gas composition	(%V/V,dry)			
carbon dioxide		4.00	3.80	3.90
oxygen		16.00	12.20	12.10
nitrogen		80.00	84.00	84.00
Isokinetic variation	(%)	101.6	99.3	100.2
Particulate concentration				
actual	(GR/ACF)	.0183	.0230	.0190
standard	(GR/DSCF)	.0583	.0706	.0592
Part. emission rate	(LB/HR)	3.31	4.18	3.47

Note: Dry Catch Only

Table 10a. Summary of the May 9 & 10, 1994 **Oxides of Nitrogen** Emission Compliance Tests at the Louisiana Pacific Waferboard Plant in Missoula, Montana.

Date	Time (HRS)	Concentration (ppm,d)	Emission Factor (LB/10^6BTU)
(GEKA Stack)			
5-09-94	1700-1745	18	0.178
5-09-94	1800-1845	21	0.194
5-09-94	1900-1945	21	0.195
Avg.		20	0.189

Table 10b. Summary of the May 9 & 10, 1994 **Oxides of Nitrogen** Emission Compliance Tests at the Louisiana Pacific Waferboard Plant in Missoula, Montana.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
(ROEMMC Tube)			
5-10-94	1110-1212	257	19.2
5-10-94	1300-1403	305	22.8
5-10-94	1445-1547	287	22.2
Avg.		283	21.4
('C' Dryer)			
5-10-94	1110-1212	39	6.62
5-10-94	1300-1402	128	22.4
5-10-94	1445-1548	66	12.0
Avg.		78	13.7
('D' Dryer)			
5-10-94	1110-1212	69	8.94
5-10-94	1300-1403	70	9.23
5-10-94	1445-1547	74	9.30
Avg.		71	9.16

Table 10c. Summary of the May 12, 1994 **Oxides of Nitrogen** Emission Compliance Tests at the Louisiana Pacific Waferboard Plant in Missoula, Montana.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
(North Pre-Dryer)			
5-12-94	1630-1736	45	11.5
5-12-94	1812-1915	48	11.6
5-12-94	1948-2050	45	11.0
Avg.		46	11.4
(South Pre-Dryer)			
5-12-94	1630-1736	34	7.96
5-12-94	1812-1915	50	11.7
5-12-94	1948-2050	43	10.3
Avg.		42	10.0
(Coen Stack)			
5-12-94	1630-1738	226	10.7
5-12-94	1814-1917	196	9.71
5-12-94	1950-2054	197	9.65
Avg.		206	10.0

Table 11a. Summary of the May 10 & 11, 1994 **Carbon Monoxide** Emission Compliance Tests at the Louisiana Pacific Waferboard Plant in Missoula, Montana.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
(ROEMMC Tube)			
5-10-94	1110-1212	355	16.1
5-10-94	1300-1403	277	12.6
5-10-94	1445-1547	318	15.0
Avg.		317	14.6
('C' Dryer)			
5-10-94	1110-1212	80	8.37
5-10-94	1300-1402	55	5.88
5-10-94	1445-1548	53	5.87
Avg.		63	6.71
('D' Dryer)			
5-10-94	1110-1212	90	7.13
5-10-94	1300-1403	65	5.23
5-10-94	1445-1547	85	6.55
Avg.		80	6.30
(Board Coolers 1 & 2)			
5-11-94	0947-1050	10	1.42
5-11-94	1145-1247	12	1.67
5-11-94	1323-1425	10	1.34
Avg.		11	1.48
(Press Vents 3 & 4 Stack)			
5-11-94	0949-1053	10	1.28
5-11-94	1145-1250	15	1.91
5-11-94	1323-1428	10	1.36
Avg.		12	1.52

Table 11b. Summary of the May 11 & 12, 1994 **Carbon Monoxide** Emission Compliance Tests at the Louisiana Pacific Waferboard Plant in Missoula, Montana.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
(Press Vents 1 & 2 Stack)			
5-11-94	0949-1053	18	2.41
5-11-94	1145-1250	10	1.30
5-11-94	1323-1425	15	2.03
Avg.		14	1.91
(North Pre-Dryer Stack)			
5-12-94	1630-1736	46	7.22
5-12-94	1812-1915	27	3.98
5-12-94	1948-2050	120	18.0
Avg.		64	9.73
(South Pre-Dryer Stack)			
5-12-94	1630-1736	4.4	0.63
5-12-94	1812-1915	5.4	0.77
5-12-94	1948-2050	6.9	1.00
Avg.		5.6	0.80
(Coen Stack)			
5-12-94	1525-1738	87	2.51
5-12-94	1814-1917	75	2.26
5-12-94	1950-2054	75	2.23
Avg.		79	2.33

Table 12a. Summary of the May 10 & 11, 1994 **Formaldehyde** Emission Compliance Tests at the Louisiana Pacific Waferboard Plant in Missoula, Montana.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
(ROEMMC Tube)			
5-10-94	1915-2017	0.29	0.015
5-10-94	2058-2101	0.24	0.013
5-10-94	2242-2345	2.15	0.111
Avg.		0.89	0.046
('C' Dryer)			
5-10-94	1915-2018	0.20	0.023
5-10-94	2058-2203	0.21	0.025
5-10-94	2242-2345	0.52	0.062
Avg.		0.31	0.037
('D' Dryer)			
5-10-94	1915-2019	0.32	0.027
5-10-94	2058-2202	0.26	0.022
5-10-94	2242-2344	0.80	0.069
Avg.		0.46	0.039
(Board Cooler 1 & 2)			
5-11-94	1635-1738	0.36	0.054
5-11-94	1814-1918	0.34	0.051
5-11-94	1946-2050	0.59	0.091
Avg.		0.43	0.065
(Press Vent 3 & 4)			
5-11-94	1638-1744	4.2	0.61
5-11-94	1814-1920	4.1	0.58
5-11-94	1946-2050	1.9	0.27
Avg.		3.4	0.49

Table 12b. Summary of the May 11 & 12, 1994 **Formaldehyde** Emission Compliance Tests at the Louisiana Pacific Waferboard Plant in Missoula, Montana.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
(Press 1 & 2)			
5-11-94	1638-1744	0.38	0.053
5-11-94	1814-1920	0.49	0.069
5-11-94	1946-2053	0.38	0.054
Avg.		0.42	0.059
(North Pre-Dryer)			
5-12-94	0706-0816	0.40	0.070
5-12-94	0837-0940	0.13	0.022
5-12-94	1003-1105	0.09	0.016
Avg.		0.21	0.036
(South Pre-Dryer)			
5-10-94	1915-2019	0.08	0.013
5-10-94	2058-2202	0.06	0.0089
5-10-94	2242-2344	0.05	0.0081
Avg.		0.06	0.010

Table 13a. Summary of the May 10 - 12, 1994 **Total Hydrocarbons** Emission Compliance Tests at the Louisiana Pacific Waferboard Plant in Missoula, Montana.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
(ROEMMC Tube)			
5-10-94	1915-2017	4	0.10
5-10-94	2058-2101	3	0.06
5-10-94	2242-2345	15	0.32
Avg.		7	0.16
('C' Dryer)			
5-10-94	1915-2018	66	3.0
5-10-94	2058-2203	76	3.7
5-10-94	2242-2345	58	2.9
Avg.		67	3.2
('D' Dryer)			
5-10-94	1915-2019	88	3.1
5-10-94	2058-2202	115	4.2
5-10-94	2242-2344	128	4.6
Avg.		110	4.0
(Board Cooler 1 & 2)			
5-11-94	1635-1738	6	0.39
5-11-94	1814-1918	3	0.15
5-11-94	1946-2050	6	0.36
Avg.		5	0.30
(Press Vent 3 & 4)			
5-11-94	1638-1744	70	4.2
5-11-94	1814-1920	34	2.0
5-11-94	1946-2050	42	2.4
Avg.		49	2.9

Table 13b. Summary of the May 11 & 12, 1994 **Total Hydrocarbons** Emission Compliance Tests at the Louisiana Pacific Waferboard Plant in Missoula, Montana.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
(Press 1 & 2)			
5-11-94	1638-1744	46	2.6
5-11-94	1814-1920	14	0.8
5-11-94	1946-2053	7	0.4
Avg.		22	1.3
(North Pre-Dryer)			
5-12-94	0706-0816	77	5.6
5-12-94	0837-0940	67	4.9
5-12-94	1003-1105	93	6.9
Avg.		79	5.8
(South Pre-Dryer)			
5-10-94	1915-2019	70	4.5
5-10-94	2058-2202	64	4.1
5-10-94	2242-2344	110	7.1
Avg.		81	5.2
(Coen Stack)			
5-12-94	1630-1738	< 1	< 0.01
5-12-94	1814-1917	< 1	< 0.01
5-12-94	1950-2054	< 1	< 0.01
Avg.		< 1	< 0.01

3 RESULTS

The results of all field and laboratory evaluations are presented in this section. Gas composition (orsat and moisture) are presented first followed by the computer printout of the particulate, oxides of nitrogen, carbon monoxide, and formaldehyde results. Preliminary measurements including test port locations are given in the appendices.

The results have been calculated on a personal computer using programs written in Extended BASIC specifically for source testing calculations. EPA-published equations have been used as the basis of the calculation techniques in these programs.

The emission rates have been calculated using the product of the concentration times flow method.

3.1 Results of Orsat and Moisture Determinations

Test No. 2
REMMC Tube

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Dry basis (orsat)			
carbon dioxide.....	5.60	5.50	5.80
oxygen.....	13.90	14.10	14.60
nitrogen.....	80.50	80.40	79.60
Wet basis (orsat)			
carbon dioxide.....	5.28	5.22	5.45
oxygen.....	13.11	13.38	13.73
nitrogen.....	75.94	76.28	74.83
water vapor.....	5.66	5.13	5.99
Dry molecular weight.....	29.45	29.44	29.51
Wet molecular weight.....	28.80	28.86	28.82
Specific gravity.....	0.995	0.997	0.996
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.250	1.236	1.086

Test No. 3
C - Dryer Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Dry basis (orsat)			
carbon dioxide.....	1.00	1.00	1.10
oxygen.....	19.00	19.80	19.80
nitrogen.....	80.00	79.20	79.10
Wet basis (orsat)			
carbon dioxide.....	0.97	0.97	1.07
oxygen.....	18.52	19.12	19.25
nitrogen.....	77.99	76.47	76.92
water vapor.....	2.51	3.45	2.76
Dry molecular weight.....	28.92	28.95	28.97
Wet molecular weight.....	28.65	28.57	28.67
Specific gravity.....	0.990	0.987	0.990
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.900	1.100	1.000

Test No. 4
D - Dryer Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Dry basis (orsat)			
carbon dioxide.....	1.40	1.40	1.60
oxygen.....	19.40	19.40	19.30
nitrogen.....	79.20	79.20	79.10
Wet basis (orsat)			
carbon dioxide.....	1.35	1.33	1.52
oxygen.....	18.77	18.47	18.29
nitrogen.....	76.63	75.42	74.96
water vapor.....	3.24	4.78	5.24
Dry molecular weight.....	29.00	29.00	29.03
Wet molecular weight.....	28.64	28.47	28.45
Specific gravity.....	0.989	0.984	0.983
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.071	1.071	1.000

Test No. 5
ROEMMC Tube

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Dry basis (orsat)			
carbon dioxide.....	6.00	6.00	3.20
oxygen.....	14.60	14.60	16.80
nitrogen.....	79.40	79.40	80.00
Wet basis (orsat)			
carbon dioxide.....	5.70	5.74	3.05
oxygen.....	13.87	13.97	15.99
nitrogen.....	75.42	75.96	76.16
water vapor.....	5.01	4.34	4.80
Dry molecular weight.....	29.54	29.54	29.18
Wet molecular weight.....	28.97	29.04	28.65
Specific gravity.....	1.001	1.003	0.990
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.050	1.050	1.281

Test No. 6
C - Dryer Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Dry basis (orsat)			
carbon dioxide.....	1.00	1.00	0.65
oxygen.....	19.80	19.80	20.20
nitrogen.....	79.20	79.20	79.15
Wet basis (orsat)			
carbon dioxide.....	0.97	0.97	0.63
oxygen.....	19.28	19.21	19.60
nitrogen.....	77.10	76.84	76.78
water vapor.....	2.65	2.98	2.99
Dry molecular weight.....	28.95	28.95	28.91
Wet molecular weight.....	28.66	28.63	28.59
Specific gravity.....	0.990	0.989	0.987
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.100	1.100	1.077

Test No. 7
D - Dryer Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Dry basis (orsat)			
carbon dioxide.....	1.30	1.60	1.20
oxygen.....	19.50	19.10	19.70
nitrogen.....	79.20	79.30	79.10
Wet basis (orsat)			
carbon dioxide.....	1.25	1.52	1.14
oxygen.....	18.70	18.15	18.77
nitrogen.....	75.95	75.34	75.38
water vapor.....	4.10	4.99	4.70
Dry molecular weight.....	28.99	29.02	28.98
Wet molecular weight.....	28.54	28.47	28.46
Specific gravity.....	0.986	0.983	0.983
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.077	1.125	1.000

Test No. 8
Board Coolers 1 & 2 Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.55	20.68	20.48
nitrogen.....	77.75	78.24	77.49
water vapor.....	1.67	1.05	2.00
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.66	28.73	28.62
Specific gravity.....	0.990	0.992	0.989
Water mass flow.....(LB/HR)	0.00	0.00	0.00

Test No. 9
Press Vents 3 & 4 Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.65	20.68	20.66
nitrogen.....	78.12	78.23	78.17
water vapor.....	1.20	1.06	1.13
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.71	28.73	28.72
Specific gravity.....	0.992	0.992	0.992
Water mass flow.....(LB/HR)	0.00	0.00	0.00

Test No. 10
Press Vents 1 & 2 Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.68	20.64	20.59
nitrogen.....	78.24	78.10	77.91
water vapor.....	1.05	1.23	1.47
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.73	28.71	28.68
Specific gravity.....	0.992	0.992	0.991
Water mass flow.....(LB/HR)	0.00	0.00	0.00

Test No. 11
Board Coolers 1 & 2 Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.69	20.67	20.70
nitrogen.....	78.27	78.20	78.30
water vapor.....	1.01	1.09	0.97
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.73	28.72	28.74
Specific gravity.....	0.992	0.992	0.993
Water mass flow.....(LB/HR)	0.00	0.00	0.00

Test No. 12
Press Vents 3 & 4 Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.60	20.72	20.70
nitrogen.....	77.93	78.37	78.30
water vapor.....	1.44	0.88	0.97
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.68	28.74	28.74
Specific gravity.....	0.991	0.993	0.993
Water mass flow.....(LB/HR)	0.00	0.00	0.00

Test No. 13
Press Vents 1 & 2 Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.68	20.72	20.68
nitrogen.....	78.22	78.38	78.22
water vapor.....	1.08	0.87	1.07
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.72	28.75	28.72
Specific gravity.....	0.992	0.993	0.992
Water mass flow.....(LB/HR)	0.00	0.00	0.00

Test No. 14
North Pre Dryer Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Dry basis (orsat)			
carbon dioxide.....	0.35	0.40	0.40
oxygen.....	20.30	20.20	20.25
nitrogen.....	79.35	79.40	79.35
Wet basis (orsat)			
carbon dioxide.....	0.33	0.38	0.38
oxygen.....	19.32	19.18	19.06
nitrogen.....	75.51	75.40	74.70
water vapor.....	4.84	5.04	5.86
Dry molecular weight.....	28.87	28.87	28.87
Wet molecular weight.....	28.34	28.32	28.24
Specific gravity.....	0.979	0.978	0.975
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.714	1.750	1.625

Test No. 15
South Pre Dryer Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Dry basis (orsat)			
carbon dioxide.....	0.45	0.35	0.40
oxygen.....	20.20	20.30	20.25
nitrogen.....	79.35	79.35	79.35
Wet basis (orsat)			
carbon dioxide.....	0.43	0.33	0.38
oxygen.....	19.28	19.32	19.05
nitrogen.....	75.75	75.51	74.63
water vapor.....	4.53	4.84	5.94
Dry molecular weight.....	28.88	28.87	28.87
Wet molecular weight.....	28.39	28.34	28.23
Specific gravity.....	0.981	0.979	0.975
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.556	1.714	1.625

Test No. 16
North Pre Dryer Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Dry basis (orsat)			
carbon dioxide.....	0.15	0.25	0.15
oxygen.....	20.70	20.60	20.70
nitrogen.....	79.15	79.15	79.15
Wet basis (orsat)			
carbon dioxide.....	0.14	0.23	0.14
oxygen.....	19.68	19.19	19.33
nitrogen.....	75.23	73.75	73.91
water vapor.....	4.95	6.83	6.62
Dry molecular weight.....	28.85	28.86	28.85
Wet molecular weight.....	28.31	28.12	28.13
Specific gravity.....	0.978	0.971	0.972
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.333	1.200	1.333

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Test No. 17
South Pre Dryer Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Dry basis (orsat)			
carbon dioxide.....	0.70	0.80	0.60
oxygen.....	20.30	20.20	20.40
nitrogen.....	79.00	79.00	79.00
Wet basis (orsat)			
carbon dioxide.....	0.66	0.74	0.57
oxygen.....	19.10	18.66	19.26
nitrogen.....	74.34	72.97	74.60
water vapor.....	5.90	7.63	5.57
Dry molecular weight.....	28.92	28.94	28.91
Wet molecular weight.....	28.28	28.10	28.30
Specific gravity.....	0.977	0.971	0.978
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	0.857	0.875	0.833

Test No. 18
Coen Stack

Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Dry basis (orsat)			
carbon dioxide.....	4.00	3.80	3.90
oxygen.....	16.00	12.20	12.10
nitrogen.....	80.00	84.00	84.00
Wet basis (orsat)			
carbon dioxide.....	3.70	3.53	3.59
oxygen.....	14.81	11.34	11.13
nitrogen.....	74.06	78.05	77.28
water vapor.....	7.42	7.09	8.00
Dry molecular weight.....	29.28	29.10	29.11
Wet molecular weight.....	28.44	28.31	28.22
Specific gravity.....	0.982	0.978	0.975
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.225	2.289	2.256

3.2 Results of Particulate Determinations

Test No. 2
REMMC Tube

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Time run start/end.....(HRS)	1110/1212	1300/1403	1445/1547
Static pressure.....(IN.WC)	-0.48	-0.48	-0.48
Cross sectional area (SQ.FT)	14.19	14.19	14.19
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	36.0	40.0	47.0
desiccant.....(GRAMS)	22.0	12.0	17.0
total.....(GRAMS)	58.0	52.0	64.0
Total particulate material..			
.....collected(grams)	0.3081	0.4120	0.3267
Gas meter coefficient.....	0.9954	0.9954	0.9954
Barometric pressure..(IN.HG)	26.85	26.87	26.87
Avg. orif.pres.drop..(IN.WC)	2.07	2.08	2.32
Avg. gas meter temp..(DEF-F)	75.7	83.2	95.8
Volume through gas meter....			
at meter conditions...(CF)	51.49	51.92	55.46
standard conditions.(DSCF)	45.57	45.35	47.38
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.435	.435	.435
Avg.stack gas temp ..(DEG-F)	834	838	827
Volumetric flow rate.....			
actual.....(ACFM)	30207	30224	31202
dry standard.....(DSCFM)	10424	10463	10793
Isokinetic variation.....(%)	100.2	99.4	100.6
Particulate concentration...			
actual.....(GR/ACF)	0.03599	0.04850	0.03679
dry standard.....(GR/DSCF)	0.10432	0.14016	0.10639
Particle mass rate...(LB/HR)	9.321	12.570	9.842

Test No. 3
C - Dryer Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Time run start/end.....(HRS)	1110/1212	1300/1402	1445/1548
Static pressure.....(IN.WC)	-1.50	-1.50	-1.50
Cross sectional area (SQ.FT)	6.49	6.49	6.49
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	6.0	17.0	17.0
desiccant.....(GRAMS)	16.0	15.0	9.0
total.....(GRAMS)	22.0	32.0	26.0
Total particulate material..			
.....collected(grams)	0.0418	0.0446	0.0519
Gas meter coefficient.....	1.0041	1.0041	1.0041
Barometric pressure..(IN.HG)	26.85	26.85	26.85
Avg. orif.pres.drop..(IN.WC)	1.81	2.02	2.12
Avg. gas meter temp..(DEF-F)	80.3	92.3	95.1
Volume through gas meter....			
at meter conditions...(CF)	45.60	48.75	50.10
standard conditions.(DSCF)	40.34	42.21	43.17
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.185	.185	.185
Avg.stack gas temp ..(DEG-F)	147	150	146
Volumetric flow rate.....			
actual.....(ACFM)	31670	32821	33525
dry standard.....(DSCFM)	23986	24506	25385
Isokinetic variation.....(%)	97.5	99.9	98.6
Particulate concentration...			
actual.....(GR/ACF)	0.01210	0.01216	0.01403
dry standard.....(GR/DSCF)	0.01598	0.01629	0.01854
Particle mass rate...(LB/HR)	3.285	3.422	4.034

Test No. 4
D - Dryer Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Time run start/end.....(HRS)	1110/1212	1300/1403	1445/1547
Static pressure.....(IN.WC)	-0.56	-0.56	-0.56
Cross sectional area (SQ.FT)	6.49	6.49	6.49
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	15.0	38.0	45.0
desiccant.....(GRAMS)	23.0	21.0	16.0
total.....(GRAMS)	38.0	59.0	61.0
Total particulate material..			
.....collected(grams)	0.0926	0.0936	0.0964
Gas meter coefficient.....	0.9961	0.9961	0.9961
Barometric pressure..(IN.HG)	26.85	26.85	26.85
Avg. orif.pres.drop..(IN.WC)	2.90	3.11	2.85
Avg. gas meter temp..(DEF-F)	84.4	88.5	98.3
Volume through gas meter....			
at meter conditions...(CF)	61.20	63.91	61.09
standard conditions.(DSCF)	53.46	55.44	52.03
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.242	.242	.242
Avg.stack gas temp ..(DEG-F)	162	177	184
Volumetric flow rate.....			
actual.....(ACFM)	24693	26095	25384
dry standard.....(DSCFM)	18163	18447	17680
Isokinetic variation.....(%)	99.8	101.9	99.7
Particulate concentration...			
actual.....(GR/ACF)	0.01964	0.01842	0.01990
dry standard.....(GR/DSCF)	0.02672	0.02606	0.02858
Particle mass rate...(LB/HR)	4.159	4.121	4.331

Test No. 8
Board Coolers 1 & 2 Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Time run start/end.....(HRS)	947/1050	1145/1247	1323/1425
Static pressure.....(IN.WC)	-1.40	-1.40	-1.40
Cross sectional area (SQ.FT)	10.56	10.56	10.56
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	2.0	1.0	7.0
desiccant.....(GRAMS)	11.0	7.0	8.0
total.....(GRAMS)	13.0	8.0	15.0
Total particulate material..			
.....collected(grams)	0.0211	0.0205	0.0148
Gas meter coefficient.....	0.9954	0.9954	0.9954
Barometric pressure..(IN.HG)	26.95	26.95	26.95
Avg. orif.pres.drop..(IN.WC)	1.30	1.27	1.23
Avg. gas meter temp..(DEF-F)	73.1	82.5	94.1
Volume through gas meter....			
at meter conditions...(CF)	40.56	40.50	40.38
standard conditions.(DSCF)	36.13	35.45	34.60
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.190	.190	.190
Avg.stack gas temp ..(DEG-F)	88	104	116
Volumetric flow rate.....			
actual.....(ACFM)	38196	38455	38044
dry standard.....(DSCFM)	32474	31958	30679
Isokinetic variation.....(%)	99.5	99.2	100.9
Particulate concentration...			
actual.....(GR/ACF)	0.00765	0.00741	0.00531
dry standard.....(GR/DSCF)	0.00900	0.00892	0.00659
Particle mass rate...(LB/HR)	2.506	2.442	1.734

Test No. 9
Press Vents 3 & 4 Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Time run start/end.....(HRS)	949/1053	1145/1250	1323/1428
Static pressure.....(IN.WC)	-1.01	-1.01	-1.01
Cross sectional area (SQ.FT)	10.56	10.56	10.56
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	0.0	0.0	0.0
desiccant.....(GRAMS)	8.0	7.0	8.0
total.....(GRAMS)	8.0	7.0	8.0
Total particulate material..			
.....collected(grams)	0.0299	0.0197	0.0204
Gas meter coefficient.....	1.0041	1.0041	1.0041
Barometric pressure..(IN.HG)	26.95	26.95	26.95
Avg. orif.pres.drop..(IN.WC)	1.05	1.08	1.23
Avg. gas meter temp..(DEF-F)	80.2	101.9	103.6
Volume through gas meter....			
at meter conditions...(CF)	34.97	36.20	38.75
standard conditions.(DSCF)	30.99	30.84	32.93
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.185	.185	.185
Avg.stack gas temp ..(DEG-F)	99	102	105
Volumetric flow rate.....			
actual.....(ACFM)	35079	34975	37429
dry standard.....(DSCFM)	29387	29223	31072
Isokinetic variation.....(%)	99.5	99.6	100.0
Particulate concentration...			
actual.....(GR/ACF)	0.01246	0.00822	0.00793
dry standard.....(GR/DSCF)	0.01488	0.00985	0.00956
Particle mass rate...(LB/HR)	3.749	2.467	2.546

Test No. 10
Press Vents 1 & 2 Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Time run start/end.....(HRS)	949/1053	1145/1250	1323/1425
Static pressure.....(IN.WC)	-1.15	-1.15	-1.15
Cross sectional area (SQ.FT)	10.56	10.56	10.56
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	0.0	0.0	0.0
desiccant.....(GRAMS)	7.0	8.0	10.0
total.....(GRAMS)	7.0	8.0	10.0
Total particulate material..			
.....collected(grams)	0.0343	0.0210	0.0191
Gas meter coefficient.....	0.9961	0.9961	0.9961
Barometric pressure..(IN.HG)	26.95	26.95	26.95
Avg. orif.pres.drop..(IN.WC)	0.97	0.95	1.03
Avg. gas meter temp..(DEF-F)	81.5	94.9	102.9
Volume through gas meter....			
at meter conditions...(CF)	35.51	35.52	37.44
standard conditions.(DSCF)	31.14	30.39	31.59
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.181	.181	.181
Avg.stack gas temp ..(DEG-F)	102	111	111
Volumetric flow rate.....			
actual.....(ACFM)	36702	36426	37834
dry standard.....(DSCFM)	30650	29899	30955
Isokinetic variation.....(%)	100.1	100.2	100.6
Particulate concentration...			
actual.....(GR/ACF)	0.01419	0.00875	0.00763
dry standard.....(GR/DSCF)	0.01699	0.01066	0.00932
Particle mass rate...(LB/HR)	4.465	2.732	2.474

Test No. 16
North Pre Dryer Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Time run start/end.....(HRS)	1630/1736	1812/1915	1948/2050
Static pressure.....(IN.WC)	-0.75	-0.75	-0.75
Cross sectional area (SQ.FT)	9.62	9.62	9.62
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	30.0	51.0	51.0
desiccant.....(GRAMS)	16.0	11.0	10.0
total.....(GRAMS)	46.0	62.0	61.0
Total particulate material..			
.....collected(grams)	0.0343	0.0302	0.0321
Gas meter coefficient.....	1.0041	1.0041	1.0041
Barometric pressure..(IN.HG)	26.75	26.75	26.75
Avg. orif.pres.drop..(IN.WC)	1.94	1.76	1.83
Avg. gas meter temp..(DEF-F)	89.7	87.4	84.6
Volume through gas meter....			
at meter conditions...(CF)	48.05	45.88	46.40
standard conditions.(DSCF)	41.64	39.90	40.57
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.185	.185	.185
Avg.stack gas temp ..(DEG-F)	106	105	106
Volumetric flow rate.....			
actual.....(ACFM)	45499	43483	44284
dry standard.....(DSCFM)	36010	33771	34418
Isokinetic variation.....(%)	99.4	101.6	101.3
Particulate concentration...			
actual.....(GR/ACF)	0.01005	0.00906	0.00948
dry standard.....(GR/DSCF)	0.01270	0.01167	0.01220
Particle mass rate...(LB/HR)	3.921	3.379	3.598

Test No. 17
South Pre Dryer Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Time run start/end.....(HRS)	1630/1736	1812/1915	1948/2050
Static pressure.....(IN.WC)	-1.10	-1.10	-1.10
Cross sectional area (SQ.FT)	8.30	8.30	8.30
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	55.0	69.0	53.0
desiccant.....(GRAMS)	8.0	15.0	7.0
total.....(GRAMS)	63.0	84.0	60.0
Total particulate material..			
.....collected(grams)	0.0404	0.0366	0.0378
Gas meter coefficient.....	0.9961	0.9961	0.9961
Barometric pressure..(IN.HG)	26.75	26.75	26.75
Avg. orif.pres.drop..(IN.WC)	2.27	2.32	2.33
Avg. gas meter temp..(DEF-F)	86.9	86.5	83.4
Volume through gas meter....			
at meter conditions...(CF)	54.74	55.36	55.06
standard conditions.(DSCF)	47.34	47.92	47.93
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.191	.191	.191
Avg.stack gas temp ..(DEG-F)	108	108	109
Volumetric flow rate.....			
actual.....(ACFM)	42042	42963	42651
dry standard.....(DSCFM)	32784	32881	33335
Isokinetic variation.....(%)	100.4	101.3	100.0
Particulate concentration...			
actual.....(GR/ACF)	0.01026	0.00901	0.00950
dry standard.....(GR/DSCF)	0.01316	0.01178	0.01216
Particle mass rate...(LB/HR)	3.699	3.319	3.474

Test No. 18
Coen Stack

Results of Particulate Loading Determinations-------Method 5

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Time run start/end.....(HRS)	1525/1738	1814/1917	1950/2054
Static pressure.....(IN.WC)	0.50	0.50	0.50
Cross sectional area (SQ.FT)	10.56	10.56	10.56
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	50.0	51.0	59.0
desiccant.....(GRAMS)	17.0	14.0	15.0
total.....(GRAMS)	67.0	65.0	74.0
Total particulate material..			
.....collected(grams)	0.1517	0.1941	0.1572
Gas meter coefficient.....	0.9954	0.9954	0.9954
Barometric pressure..(IN.HG)	26.70	26.70	26.70
Avg. orif.pres.drop..(IN.WC)	1.57	1.63	1.62
Avg. gas meter temp..(DEF-F)	79.4	79.3	78.1
Volume through gas meter....			
at meter conditions...(CF)	45.16	46.01	45.84
standard conditions.(DSCF)	39.42	40.18	40.12
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.435	.435	.435
Avg.stack gas temp ..(DEG-F)	929	883	893
Volumetric flow rate.....			
actual.....(ACFM)	21036	21160	21298
dry standard.....(DSCFM)	6617	6906	6831
Isokinetic variation.....(%)	101.6	99.3	100.2
Particulate concentration...			
actual.....(GR/ACF)	0.01868	0.02432	0.01938
dry standard.....(GR/DSCF)	0.05940	0.07456	0.06045
Particle mass rate...(LB/HR)	3.369	4.414	3.539

3.3 Results of Oxides of Nitrogen Determinations

Test No. 1
GEKA Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 1A	Run 1B	Run 1C	Run 1D
Date of run.....	05-09-94	05-09-94	05-09-94	05-09-94
Time of run.....(HRS)	1700	1715	1730	1745
Flask number.....	19	20	21	22
Volume of flask.....(ML)	2069	2060	2068	2031
Data: time of sampling				
flask temperature..(DEG-F)	94.00	94.00	94.00	93.00
bar. press.....(IN.HG)	26.74	26.74	26.74	26.74
flask vacuum.....(IN.HG)	24.80	25.00	24.90	25.10
flask abs. press...(IN.HG)	1.94	1.74	1.84	1.64
Data: Time of Flask Opening				
flask temperature..(DEG-F)	49.00	49.00	49.00	49.00
lab. bar. press....(IN.HG)	26.85	26.85	26.85	26.85
flask static press.(IN.HG)	-1.90	-4.50	-4.10	-1.20
flask abs. press...(IN.HG)	24.95	22.35	22.75	25.65
Volume gas sampled....(DSML)	1641	1463	1491	1678
Moisture content.....(%V/V)	0.00	0.00	0.00	0.00
Oxygen content....(%V/V,DRY)	18.65	18.65	18.65	18.65
Nitrate in gas sample...(JG)	53.5	52.5	51.0	130.0
NO2 in gas sample.....(JG)	39.7	39.0	37.8	96.5
NOx Concentration				
(GR/DSCF).....	0.0106	0.0116	0.0111	0.0251
(MG/DSCM).....	24	27	25	57
(PPM-DRY).....	13	14	13	30
(PPM-WET).....	13	14	13	30
NOX Emission rate....(LB/HR)	0.08	0.09	0.08	0.19
NOx emission factor..... .....(LB/MMBTU)*	0.129	0.142	0.135	0.306

* F = 9190 DSCF/MMBTU

Test No. 1
GEKA Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 2A	Run 2B	Run 2C	Run 2D
Date of run.....	05-09-94	05-09-94	05-09-94	05-09-94
Time of run.....(HRS)	1800	1815	1830	1845
Flask number.....	23	24	43	44
Volume of flask.....(ML)	2056	2031	2088	2090
Data: time of sampling				
flask temperature..(DEG-F)	90.00	90.00	88.00	88.00
bar. press.....(IN.HG)	26.74	26.74	26.74	26.74
flask vacuum.....(IN.HG)	25.00	24.40	24.50	24.50
flask abs. press...(IN.HG)	1.74	2.34	2.24	2.24
Data: Time of Flask Opening				
flask temperature..(DEG-F)	49.00	49.00	49.00	49.00
lab. bar. press....(IN.HG)	26.85	26.85	26.85	26.85
flask static press.(IN.HG)	-3.70	-2.90	-2.90	-3.30
flask abs. press...(IN.HG)	23.15	23.95	23.95	23.55
Volume gas sampled....(DSML)	1516	1514	1564	1536
Moisture content.....(%V/V)	0.00	0.00	0.00	0.00
Oxygen content....(%V/V,DRY)	18.40	18.40	18.40	18.40
Nitrate in gas sample...(µG)	51.0	63.5	150.0	71.0
NO2 in gas sample.....(µG)	37.8	47.1	111.3	52.7
NOx Concentration				
(GR/DSCF).....	0.0109	0.0136	0.0311	0.0150
(MG/DSCM).....	25	31	71	34
(PPM-DRY).....	13	16	37	18
(PPM-WET).....	13	16	37	18
NOX Emission rate....(LB/HR)	0.08	0.10	0.23	0.11
NOx emission factor..... .....(LB/MMBTU)*	0.120	0.149	0.341	0.164

* F = 9190 DSCF/MMBTU

Test No. 1
GEKA Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 3A	Run 3B	Run 3C	Run 3D
Date of run.....	05-09-94	05-09-94	05-09-94	05-09-94
Time of run.....(HRS)	1900	1915	1930	1945
Flask number.....	45	46	47	48
Volume of flask.....(ML)	2086	2090	2074	2102
Data: time of sampling				
flask temperature..(DEG-F)	87.00	88.00	88.00	85.00
bar. press.....(IN.HG)	26.74	26.74	26.74	26.74
flask vacuum.....(IN.HG)	24.50	24.60	24.50	24.50
flask abs. press...(IN.HG)	2.24	2.14	2.24	2.24
Data: Time of Flask Opening				
flask temperature..(DEG-F)	49.00	49.00	49.00	49.00
lab. bar. press....(IN.HG)	26.85	26.85	26.85	26.85
flask static press.(IN.HG)	-3.00	3.80	-3.40	-3.00
flask abs. press...(IN.HG)	23.85	30.65	23.45	23.85
Volume gas sampled....(DSML)	1555	2051	1517	1566
Moisture content.....(%V/V)	0.00	0.00	0.00	0.00
Oxygen content....(%V/V,DRY)	18.60	18.60	18.60	18.60
Nitrate in gas sample...(JG)	66.5	58.0	87.5	114.0
NO2 in gas sample.....(JG)	49.3	43.0	64.9	84.6
NOx Concentration				
(GR/DSCF).....	0.0139	0.0092	0.0187	0.0236
(MG/DSCM).....	32	21	43	54
(PPM-DRY).....	17	11	22	28
(PPM-WET).....	17	11	22	28
NOX Emission rate....(LB/HR)	0.10	0.07	0.14	0.17
NOx emission factor..... .....(LB/MMBTU)*	0.165	0.109	0.223	0.282

* F = 9190 DSCF/MMBTU

Test No. 2
ROEMMC Tube

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 1A	Run 1B	Run 1C	Run 1D
Date of run.....	05-10-94	05-10-94	05-10-94	05-10-94
Time of run.....(HRS)	1112	1127	1142	1157
Flask number.....	1	2	3	4
Volume of flask.....(ML)	2086	2063	2055	2116
Data: time of sampling				
flask temperature..(DEG-F)	98.00	98.00	98.00	99.00
bar. press.....(IN.HG)	26.87	26.87	26.87	26.87
flask vacuum.....(IN.HG)	25.80	25.70	25.90	25.90
flask abs. press...(IN.HG)	1.07	1.17	0.97	0.97
Data: Time of Flask Opening				
flask temperature..(DEG-F)	78.00	78.00	78.00	78.00
lab. bar. press....(IN.HG)	26.95	26.95	26.95	26.95
flask static press.(IN.HG)	0.80	-0.40	-1.50	-2.40
flask abs. press...(IN.HG)	27.75	26.55	25.45	24.55
Volume gas sampled....(DSML)	1806	1699	1632	1619
Moisture content.....(%V/V)	5.66	5.66	5.66	5.66
Nitrate in gas sample...(JG)	1150.0	1030.0	1110.0	1170.0
NO2 in gas sample.....(JG)	853.3	764.2	823.6	868.1
NOx Concentration				
(GR/DSCF).....	0.2065	0.1966	0.2206	0.2343
(MG/DSCM).....	473	450	505	536
(PPM-DRY).....	247	235	264	280
(PPM-WET).....	233	222	249	264
NOX Emission rate....(LB/HR)	18.45	17.57	19.71	20.93

Test No. 2
ROEMMC Tube

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 2A	Run 2B	Run 2C	Run 2D
Date of run.....	05-10-94	05-10-94	05-10-94	05-10-94
Time of run.....(HRS)	1302	1317	1332	1349
Flask number.....	5	6	55	56
Volume of flask.....(ML)	2057	2100	2086	2069
Data: time of sampling				
flask temperature..(DEG-F)	100.00	100.00	100.00	101.00
bar. press.....(IN.HG)	26.87	26.87	26.87	26.87
flask vacuum.....(IN.HG)	25.80	25.80	25.80	25.60
flask abs. press...(IN.HG)	1.07	1.07	1.07	1.27
Data: Time of Flask Opening				
flask temperature..(DEG-F)	78.00	77.00	76.00	76.00
lab. bar. press....(IN.HG)	26.95	26.95	26.95	26.95
flask static press.(IN.HG)	-2.00	1.60	-0.80	-1.60
flask abs. press...(IN.HG)	24.95	28.55	26.15	25.35
Volume gas sampled....(DSML)	1594	1876	1704	1624
Moisture content.....(%V/V)	5.13	5.13	5.13	5.13
Nitrate in gas sample...(JG)	1160.0	1730.0	1240.0	1240.0
NO2 in gas sample.....(JG)	860.7	1283.6	920.1	920.1
<u>NOx Concentration</u>				
(GR/DSCF).....	0.2360	0.2990	0.2359	0.2476
(MG/DSCM).....	540	684	540	567
(PPM-DRY).....	282	358	282	296
(PPM-WET).....	268	339	268	281
NOX Emission rate....(LB/HR)	21.16	26.82	21.16	22.21

Test No. 2
ROEMMC Tube

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 3A	Run 3B	Run 3C	Run 3D
Date of run.....	05-10-94	05-10-94	05-10-94	05-10-94
Time of run.....(HRS)	1447	1459	1515	1530
Flask number.....	57	58	59	60
Volume of flask.....(ML)	2062	2085	2077	2066
Data: time of sampling				
flask temperature..(DEG-F)	103.00	104.00	104.00	104.00
bar. press.....(IN.HG)	26.87	26.87	26.87	26.87
flask vacuum.....(IN.HG)	25.90	25.90	25.90	25.80
flask abs. press...(IN.HG)	0.97	0.97	0.97	1.07
Data: Time of Flask Opening				
flask temperature..(DEG-F)	75.00	75.00	75.00	75.00
lab. bar. press....(IN.HG)	26.95	26.95	26.95	26.95
flask static press.(IN.HG)	-1.10	-1.50	-3.70	-0.60
flask abs. press...(IN.HG)	25.85	25.45	23.25	26.35
Volume gas sampled....(DSML)	1674	1666	1511	1705
Moisture content.....(%V/V)	5.99	5.99	5.99	5.99
Nitrate in gas sample...(JG)	955.0	1450.0	1150.0	1290.0
NO2 in gas sample.....(JG)	708.6	1075.9	853.3	957.2
NOx Concentration				
(GR/DSCF).....	0.1850	0.2822	0.2468	0.2453
(MG/DSCM).....	423	646	565	561
(PPM-DRY).....	221	338	295	294
(PPM-WET).....	208	317	278	276
NOX Emission rate....(LB/HR)	17.11	26.11	22.83	22.70

Test No. 3
C - Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 1A	Run 1B	Run 1C	Run 1D
Date of run.....	05-10-94	05-10-94	05-10-94	05-10-94
Time of run.....(HRS)	1115	1130	1145	1200
Flask number.....	19	20	21	22
Volume of flask.....(ML)	2069	2060	2068	2031
Data: time of sampling				
flask temperature..(DEG-F)	69.00	69.00	69.00	69.00
bar. press.....(IN.HG)	26.85	26.85	26.85	26.85
flask vacuum.....(IN.HG)	24.50	24.50	24.50	24.00
flask abs. press...(IN.HG)	2.35	2.35	2.35	2.85
Data: Time of Flask Opening				
flask temperature..(DEG-F)	76.00	76.00	76.00	76.00
lab. bar. press....(IN.HG)	26.95	26.95	26.95	26.95
flask static press.(IN.HG)	0.02	-1.90	-0.60	1.20
flask abs. press...(IN.HG)	26.97	25.05	26.35	28.15
Volume gas sampled....(DSML)	1654	1518	1612	1668
Moisture content.....(%V/V)	2.51	2.51	2.51	2.51
Nitrate in gas sample...(JG)	145.0	179.0	134.0	181.0
NO2 in gas sample.....(JG)	107.6	132.8	99.4	134.3
NOx Concentration				
(GR/DSCF).....	0.0284	0.0382	0.0270	0.0352
(MG/DSCM).....	65	87	62	81
(PPM-DRY).....	34	46	32	42
(PPM-WET).....	33	45	31	41
NOX Emission rate....(LB/HR)	5.84	7.86	5.54	7.23

Test No. 3
C - Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 2A	Run 2B	Run 2C	Run 2D
Date of run.....	05-10-94	05-10-94	05-10-94	05-10-94
Time of run.....(HRS)	1305	1316	1335	1347
Flask number.....	23	24	43	44
Volume of flask.....(ML)	2056	2031	2088	2090
Data: time of sampling				
flask temperature..(DEG-F)	70.00	70.00	70.00	70.00
bar. press.....(IN.HG)	26.85	26.85	26.85	26.85
flask vacuum.....(IN.HG)	24.80	24.30	24.50	24.20
flask abs. press...(IN.HG)	2.05	2.55	2.35	2.65
Data: Time of Flask Opening				
flask temperature..(DEG-F)	76.00	77.00	70.00	70.00
lab. bar. press....(IN.HG)	26.95	26.95	26.95	26.95
flask static press.(IN.HG)	0.90	1.10	-1.00	-1.50
flask abs. press...(IN.HG)	27.85	28.05	25.95	25.45
Volume gas sampled....(DSML)	1723	1678	1620	1567
Moisture content.....(%V/V)	3.45	3.45	3.45	3.45
Nitrate in gas sample...(JG)		630.0	545.0	432.0
NO2 in gas sample.....(JG)		467.4	404.4	320.5
NOx Concentration				
(GR/DSCF).....		0.1217	0.1091	0.0894
(MG/DSCM).....		279	250	205
(PPM-DRY).....		146	130	107
(PPM-WET).....		141	126	103
NOX Emission rate....(LB/HR)		25.57	22.91	18.78

* Note: Run 2a, no sample collected.

Test No. 3
C - Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 3A	Run 3B	Run 3C	Run 3D
Date of run.....	05-10-94	05-10-94	05-10-94	05-10-94
Time of run.....(HRS)	1445	1500	1515	1530
Flask number.....	45	46	47	48
Volume of flask.....(ML)	2086	2090	2074	2102
Data: time of sampling				
flask temperature..(DEG-F)	70.00	76.00	77.00	78.00
bar. press.....(IN.HG)	26.85	26.85	26.85	26.85
flask vacuum.....(IN.HG)	24.50	24.80	25.00	25.00
flask abs. press...(IN.HG)	2.35	2.05	1.85	1.85
Data: Time of Flask Opening				
flask temperature..(DEG-F)	75.00	75.00	75.00	76.00
lab. bar. press....(IN.HG)	26.95	26.95	26.95	26.95
flask static press.(IN.HG)	-1.10	-1.55	-0.05	-1.20
flask abs. press...(IN.HG)	25.85	25.40	26.90	25.75
Volume gas sampled....(DSML)	1595	1590	1693	1634
Moisture content.....(%V/V)	2.76	2.76	2.76	2.76
Nitrate in gas sample...(JG)	303.0	275.0	281.0	246.0
NO2 in gas sample.....(JG)	224.8	204.0	208.5	182.5
NOx Concentration				
(GR/DSCF).....	0.0616	0.0561	0.0538	0.0488
(MG/DSCM).....	141	128	123	112
(PPM-DRY).....	74	67	64	58
(PPM-WET).....	72	65	63	57
NOX Emission rate....(LB/HR)	13.40	12.20	11.71	10.62

Test No. 4
D - Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 1A	Run 1B	Run 1C	Run 1D
Date of run.....	05-10-94	05-10-94	05-10-94	05-10-94
Time of run.....(HRS)	1118	1132	1147	1151
Flask number.....	67	68	69	70
Volume of flask.....(ML)	2073	2101	2069	2071
Data: time of sampling				
flask temperature..(DEG-F)	69.00	69.00	69.00	69.00
bar. press.....(IN.HG)	26.85	26.85	26.85	26.85
flask vacuum.....(IN.HG)	24.50	24.60	24.60	25.00
flask abs. press...(IN.HG)	2.35	2.25	2.25	1.85
Data: Time of Flask Opening				
flask temperature..(DEG-F)	65.00	65.00	65.00	65.00
lab. bar. press....(IN.HG)	26.95	26.95	26.95	26.95
flask static press.(IN.HG)	-1.00	-1.50	-1.80	-1.80
flask abs. press...(IN.HG)	25.95	25.45	25.15	25.15
Volume gas sampled....(DSML)	1625	1619	1574	1603
Moisture content.....(%V/V)	3.24	3.24	3.24	3.24
Nitrate in gas sample...(JG)	290.0	292.0	271.0	284.0
NO2 in gas sample.....(JG)	215.2	216.7	201.1	210.7
NOx Concentration				
(GR/DSCF).....	0.0579	0.0585	0.0558	0.0575
(MG/DSCM).....	132	134	128	131
(PPM-DRY).....	69	70	67	69
(PPM-WET).....	67	68	65	67
NOX Emission rate....(LB/HR)	9.01	9.10	8.69	8.94

Test No. 4
D - Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 2A	Run 2B	Run 2C	Run 2D
Date of run.....	05-10-94	05-10-94	05-10-94	05-10-94
Time of run.....(HRS)	1302	1315	1330	1345
Flask number.....	71	72	25	26
Volume of flask.....(ML)	2038	2092	2100	2035
Data: time of sampling				
flask temperature..(DEG-F)	70.00	70.00	70.00	70.00
bar. press.....(IN.HG)	26.85	26.85	26.85	26.85
flask vacuum.....(IN.HG)	25.00	25.20	25.10	24.80
flask abs. press...(IN.HG)	1.85	1.65	1.75	2.05
Data: Time of Flask Opening				
flask temperature..(DEG-F)	70.00	70.00	72.00	72.00
lab. bar. press....(IN.HG)	26.95	26.95	26.95	26.95
flask static press.(IN.HG)	-1.00	-2.80	-2.10	-0.05
flask abs. press...(IN.HG)	25.95	24.15	24.85	26.90
Volume gas sampled....(DSML)	1615	1548	1589	1656
Moisture content.....(%V/V)	4.78	4.78	4.78	4.78
Nitrate in gas sample...(JG)	301.0	262.0	300.0	291.0
NO2 in gas sample.....(JG)	223.3	194.4	222.6	215.9
NOx Concentration				
(GR/DSCF).....	0.0604	0.0549	0.0612	0.0570
(MG/DSCM).....	138	126	140	130
(PPM-DRY).....	72	66	73	68
(PPM-WET).....	69	63	70	65
NOX Emission rate....(LB/HR)	9.56	8.68	9.68	9.01

Test No. 4
D - Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 3A	Run 3B	Run 3C	Run 3D
Date of run.....	05-10-94	05-10-94	05-10-94	05-10-94
Time of run.....(HRS)	1447	1502	1517	1535
Flask number.....	27	29	30	34
Volume of flask.....(ML)	2054	2068	2071	2071
Data: time of sampling				
flask temperature..(DEG-F)	70.00	72.00	74.00	76.00
bar. press.....(IN.HG)	26.85	26.85	26.85	26.85
flask vacuum.....(IN.HG)	24.80	25.00	25.00	24.50
flask abs. press...(IN.HG)	2.05	1.85	1.85	2.35
Data: Time of Flask Opening				
flask temperature..(DEG-F)	72.00	74.00	74.00	76.00
lab. bar. press....(IN.HG)	26.95	26.95	26.95	26.95
flask static press.(IN.HG)	-2.05	-2.55	-2.50	-1.80
flask abs. press...(IN.HG)	24.90	24.40	24.45	25.15
Volume gas sampled....(DSML)	1537	1521	1527	1535
Moisture content.....(%V/V)	5.24	5.24	5.24	5.24
Nitrate in gas sample...(JG)	331.0	282.0	255.0	
NO2 in gas sample.....(JG)	245.6	209.2	189.2	
NOx Concentration				
(GR/DSCF).....	0.0698	0.0601	0.0541	
(MG/DSCM).....	160	138	124	
(PPM-DRY).....	84	72	65	
(PPM-WET).....	79	68	61	
NOX Emission rate....(LB/HR)	10.58	9.11	8.20	

* Note: Run 3D, no sample collected.

Test No. 16
North Pre Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 1A	Run 1B	Run 1C	Run 1D
Date of run.....	05-12-94	05-12-94	05-12-94	05-12-94
Time of run.....(HRS)	1632	1647	1702	1717
Flask number.....	25	26	27	29
Volume of flask.....(ML)	2100	2035	2054	2068
Data: time of sampling				
flask temperature..(DEG-F)	74.00	74.00	74.00	74.00
bar. press.....(IN.HG)	26.75	26.75	26.75	26.75
flask vacuum.....(IN.HG)	24.50	24.50	25.00	25.00
flask abs. press...(IN.HG)	2.25	2.25	1.75	1.75
Data: Time of Flask Opening				
flask temperature..(DEG-F)	72.00	72.00	72.00	72.00
lab. bar. press....(IN.HG)	29.45	29.45	29.45	29.45
flask static press.(IN.HG)	-3.70	-1.20	-3.70	-1.80
flask abs. press...(IN.HG)	25.75	28.25	25.75	27.65
Volume gas sampled....(DSML)	1617	1733	1615	1755
Moisture content.....(%V/V)	4.95	4.95	4.95	4.95
Nitrate in gas sample...(JG)	247.0	156.0	169.0	195.0
NO2 in gas sample.....(JG)	183.3	115.7	125.4	144.7
NOx Concentration				
(GR/DSCF).....	0.0495	0.0292	0.0339	0.0360
(MG/DSCM).....	113	67	78	82
(PPM-DRY).....	59	35	41	43
(PPM-WET).....	56	33	39	41
NOX Emission rate....(LB/HR)	15.28	9.01	10.47	11.12

Test No. 16
North Pre Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 2A	Run 2B	Run 2C	Run 2D
Date of run.....	05-12-94	05-12-94	05-12-94	05-12-94
Time of run.....(HRS)	1814	1832	1847	1902
Flask number.....	30	34	67	68
Volume of flask.....(ML)	2071	2071	2073	2101
Data: time of sampling				
flask temperature..(DEG-F)	72.00	72.00	72.00	72.00
bar. press.....(IN.HG)	26.75	26.75	26.75	26.75
flask vacuum.....(IN.HG)	25.00	25.00	24.80	24.60
flask abs. press...(IN.HG)	1.75	1.75	1.95	2.15
Data: Time of Flask Opening				
flask temperature..(DEG-F)	72.00	72.00	72.00	72.00
lab. bar. press....(IN.HG)	29.45	29.45	29.45	29.45
flask static press.(IN.HG)	-3.75	-0.60	-2.85	-1.90
flask abs. press...(IN.HG)	25.70	28.85	26.60	27.55
Volume gas sampled....(DSML)	1625	1838	1674	1748
Moisture content.....(%V/V)	6.83	6.83	6.83	6.83
Nitrate in gas sample...(JG)	204.0	264.0	201.0	183.0
NO2 in gas sample.....(JG)	151.4	195.9	149.1	135.8
NOx Concentration				
(GR/DSCF).....	0.0407	0.0466	0.0389	0.0339
(MG/DSCM).....	93	107	89	78
(PPM-DRY).....	49	56	47	41
(PPM-WET).....	45	52	43	38
NOX Emission rate....(LB/HR)	11.78	13.48	11.27	9.82

Test No. 16
North Pre Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 3A	Run 3B	Run 3C	Run 3D
Date of run.....	05-12-94	05-12-94	05-12-94	05-12-94
Time of run.....(HRS)	1950	2002	2017	2032
Flask number.....	69	70	71	72
Volume of flask.....(ML)	2069	2071	2038	2092
Data: time of sampling				
flask temperature..(DEG-F)	70.00	70.00	70.00	70.00
bar. press.....(IN.HG)	26.75	26.75	26.75	26.75
flask vacuum.....(IN.HG)	24.80	24.80	25.00	25.00
flask abs. press...(IN.HG)	1.95	1.95	1.75	1.75
Data: Time of Flask Opening				
flask temperature..(DEG-F)	72.00	72.00	72.00	72.00
lab. bar. press....(IN.HG)	29.45	29.45	29.45	29.45
flask static press.(IN.HG)	-1.50	-1.80	-3.55	-1.60
flask abs. press...(IN.HG)	27.95	27.65	25.90	27.85
Volume gas sampled....(DSML)	1762	1743	1611	1788
Moisture content.....(%V/V)	6.62	6.62	6.62	6.62
Nitrate in gas sample...(JG)	203.0	188.0	198.0	204.0
NO2 in gas sample.....(JG)	150.6	139.5	146.9	151.4
<u>NOx Concentration</u>				
(GR/DSCF).....	0.0374	0.0350	0.0398	0.0370
(MG/DSCM).....	86	80	91	85
(PPM-DRY).....	45	42	48	44
(PPM-WET).....	42	39	45	41
NOX Emission rate....(LB/HR)	11.02	10.32	11.75	10.91

Test No. 17
South Pre Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 1A	Run 1B	Run 1C	Run 1D
Date of run.....	05-12-94	05-12-94	05-12-94	05-12-94
Time of run.....(HRS)	1630	1645	1700	1715
Flask number.....	1	2	3	4
Volume of flask.....(ML)	2086	2063	2055	2116
Data: time of sampling				
flask temperature..(DEG-F)	74.00	74.00	74.00	74.00
bar. press.....(IN.HG)	26.75	26.75	26.75	26.75
flask vacuum.....(IN.HG)	24.00	24.50	24.30	24.40
flask abs. press...(IN.HG)	2.75	2.25	2.45	2.35
Data: Time of Flask Opening				
flask temperature..(DEG-F)	72.00	72.00	72.00	72.00
lab. bar. press....(IN.HG)	29.45	29.45	29.45	29.45
flask static press.(IN.HG)	-0.80	0.00	0.00	-1.70
flask abs. press...(IN.HG)	28.65	29.45	29.45	27.75
Volume gas sampled....(DSML)	1771	1839	1818	1762
Moisture content.....(%V/V)	5.90	5.90	5.90	5.90
Nitrate in gas sample...(JG)	118.0	158.0	170.0	182.0
NO2 in gas sample.....(JG)	87.6	117.2	126.1	135.0
NOx Concentration				
(GR/DSCF).....	0.0216	0.0279	0.0303	0.0335
(MG/DSCM).....	49	64	69	77
(PPM-DRY).....	26	33	36	40
(PPM-WET).....	24	31	34	38
NOX Emission rate....(LB/HR)	6.07	7.83	8.52	9.41

Test No. 17
South Pre Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 2A	Run 2B	Run 2C	Run 2D
Date of run.....	05-12-94	05-12-94	05-12-94	05-12-94
Time of run.....(HRS)	1812	1830	1845	1900
Flask number.....	5	6	55	56
Volume of flask.....(ML)	2057	2100	2086	2069
Data: time of sampling				
flask temperature..(DEG-F)	72.00	72.00	72.00	72.00
bar. press.....(IN.HG)	26.75	26.75	26.75	26.75
flask vacuum.....(IN.HG)	24.40	24.60	24.60	25.00
flask abs. press...(IN.HG)	2.35	2.15	2.15	1.75
Data: Time of Flask Opening				
flask temperature..(DEG-F)	72.00	72.00	72.00	72.00
lab. bar. press....(IN.HG)	29.45	29.45	29.45	29.45
flask static press.(IN.HG)	-0.40	-0.70	-4.30	-1.05
flask abs. press...(IN.HG)	29.05	28.75	25.15	28.40
Volume gas sampled....(DSML)	1799	1830	1572	1806
Moisture content.....(%V/V)	7.63	7.63	7.63	7.63
Nitrate in gas sample...(JG)		226.0	220.0	217.0
NO2 in gas sample.....(JG)		167.7	163.2	161.0
NOx Concentration				
(GR/DSCF).....		0.0400	0.0454	0.0390
(MG/DSCM).....		92	104	89
(PPM-DRY).....		48	54	47
(PPM-WET).....		44	50	43
NOX Emission rate....(LB/HR)		11.29	12.79	10.98

* Note: Run 2a, no sample collected.

Test No. 17
South Pre Dryer Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 3A	Run 3B	Run 3C	Run 3D
Date of run.....	05-12-94	05-12-94	05-12-94	05-12-94
Time of run.....(HRS)	1948	2000	2015	2030
Flask number.....	57	58	59	60
Volume of flask.....(ML)	2062	2085	2077	2066
Data: time of sampling				
flask temperature..(DEG-F)	70.00	70.00	70.00	70.00
bar. press.....(IN.HG)	26.75	26.75	26.75	26.75
flask vacuum.....(IN.HG)	25.00	25.00	25.00	25.00
flask abs. press...(IN.HG)	1.75	1.75	1.75	1.75
Data: Time of Flask Opening				
flask temperature..(DEG-F)	72.00	72.00	72.00	72.00
lab. bar. press....(IN.HG)	29.45	29.45	29.45	29.45
flask static press.(IN.HG)	-2.30	-3.70	-0.35	-1.20
flask abs. press...(IN.HG)	27.15	25.75	29.10	28.25
Volume gas sampled....(DSML)	1715	1639	1860	1793
Moisture content.....(%V/V)	5.57	5.57	5.57	5.57
Nitrate in gas sample...(JG)	207.0	207.0	197.0	166.0
NO2 in gas sample.....(JG)	153.6	153.6	146.2	123.2
NOx Concentration				
(GR/DSCF).....	0.0391	0.0410	0.0343	0.0300
(MG/DSCM).....	90	94	79	69
(PPM-DRY).....	47	49	41	36
(PPM-WET).....	44	46	39	34
NOX Emission rate....(LB/HR)	11.18	11.70	9.81	8.58

Test No. 18
Coen Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 1A	Run 1B	Run 1C	Run 1D
Date of run.....	05-12-94	05-12-94	05-12-94	05-12-94
Time of run.....(HRS)	1632	1646	1659	1710
Flask number.....	43	30	45	46
Volume of flask.....(ML)	2088	2071	2086	2090
Data: time of sampling				
flask temperature..(DEG-F)	76.00	76.00	84.00	92.00
bar. press.....(IN.HG)	26.70	26.70	26.70	26.70
flask vacuum.....(IN.HG)	27.80	27.80	27.80	27.75
flask abs. press...(IN.HG)	-1.10	-1.10	-1.10	-1.05
Data: Time of Flask Opening				
flask temperature..(DEG-F)	72.00	72.00	72.00	72.00
lab. bar. press....(IN.HG)	29.45	29.45	29.45	29.45
flask static press.(IN.HG)	-2.50	-3.05	-3.20	-3.20
flask abs. press...(IN.HG)	26.95	26.40	26.25	26.25
Volume gas sampled....(DSML)	1918	1865	1868	1867
Moisture content.....(%V/V)	7.42	7.42	7.42	7.42
Nitrate in gas sample...(JG)	1230.0	820.0	1120.0	1210.0
NO2 in gas sample.....(JG)	912.6	608.4	831.0	897.8
NOx Concentration				
(GR/DSCF).....	0.2079	0.1425	0.1945	0.2102
(MG/DSCM).....	476	326	445	481
(PPM-DRY).....	249	171	233	251
(PPM-WET).....	230	158	215	233
NOX Emission rate....(LB/HR)	11.79	8.08	11.03	11.92

Test No. 18
Coen Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 2A	Run 2B	Run 2C	Run 2D
Date of run.....	05-12-94	05-12-94	05-12-94	05-12-94
Time of run.....(HRS)	1816	1830	1845	1858
Flask number.....	47	48	19	20
Volume of flask.....(ML)	2074	2102	2069	2060
Data: time of sampling				
flask temperature..(DEG-F)	99.00	100.00	105.00	110.00
bar. press.....(IN.HG)	26.70	26.70	26.70	26.70
flask vacuum.....(IN.HG)	27.60	27.70	27.70	27.80
flask abs. press...(IN.HG)	-0.90	-1.00	-1.00	-1.10
Data: Time of Flask Opening				
flask temperature..(DEG-F)	72.00	72.00	72.00	72.00
lab. bar. press....(IN.HG)	29.45	29.45	29.45	29.45
flask static press.(IN.HG)	-1.70	-3.30	0.00	-1.70
flask abs. press...(IN.HG)	27.75	26.15	29.45	27.75
Volume gas sampled....(DSML)	1944	1867	2060	1942
Moisture content.....(%V/V)	7.09	7.09	7.09	7.09
Nitrate in gas sample...(JG)		1070.0	990.0	900.0
NO2 in gas sample.....(JG)		793.9	734.6	667.8
NOx Concentration				
(GR/DSCF).....		0.1859	0.1558	0.1503
(MG/DSCM).....		425	357	344
(PPM-DRY).....		222	186	180
(PPM-WET).....		207	173	167
NOX Emission rate....(LB/HR)		11.00	9.22	8.90

* Note: Run 2a, no sample collected.

Test No. 18
Coen Stack

Results of Oxides of Nitrogen (NOx) Determinations---------Method 7

	Run 3A	Run 3B	Run 3C	Run 3D
Date of run.....	05-12-94	05-12-94	05-12-94	05-12-94
Time of run.....(HRS)	1954	2012	2026	2040
Flask number.....	21	22	23	24
Volume of flask.....(ML)	2068	2031	2056	2031
Data: time of sampling				
flask temperature..(DEG-F)	110.00	110.00	115.00	115.00
bar. press.....(IN.HG)	26.70	26.70	26.70	26.70
flask vacuum.....(IN.HG)	27.60	27.65	27.70	27.80
flask abs. press...(IN.HG)	-0.90	-0.95	-1.00	-1.10
Data: Time of Flask Opening				
flask temperature..(DEG-F)	72.00	72.00	72.00	72.00
lab. bar. press....(IN.HG)	29.45	29.45	29.45	29.45
flask static press.(IN.HG)	-0.20	-0.10	-0.20	0.10
flask abs. press...(IN.HG)	29.25	29.35	29.25	29.55
Volume gas sampled....(DSML)	2039	2011	2032	2033
Moisture content.....(%V/V)	8.00	8.00	8.00	8.00
Nitrate in gas sample...(JG)	890.0	965.0	1090.0	1180.0
NO2 in gas sample.....(JG)	660.4	716.0	808.8	875.5
NOx Concentration				
(GR/DSCF).....	0.1416	0.1556	0.1739	0.1882
(MG/DSCM).....	324	356	398	431
(PPM-DRY).....	169	186	208	225
(PPM-WET).....	156	171	191	207
NOX Emission rate....(LB/HR)	8.29	9.11	10.18	11.02

3.4 Results of Carbon Monoxide Determinations

Test No. 2
ROEMMC Tube

Results of CO Determinations ----------Method 10

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Time run start/end.....(HRS)	1110/1212	1300/1403	1445/1547
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	5.66	5.13	5.99
O2 Concentration.....(%V/V)	5.60	5.50	5.80
Volumetric flow rate (DSCFM)	10424	10463	10793
CO concentration.....			
(GR/DSCF).....	0.1806	0.1410	0.1618
(MG/DSCM).....	413.57	322.70	370.47
(PPM-WET).....	334.91	262.79	298.95
(PPM-DRY).....	355.00	277.00	318.00
(PPM-DRY @ 7% O2).....	322.73	250.19	292.89
CO emission rate.....(LB/HR)	16.139	12.640	14.969

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 3
C - Dryer Stack

Results of CO Determinations ----------Method 10

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Time run start/end.....(HRS)	1110/1212	1300/1402	1445/1548
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	2.51	3.45	2.76
O2 Concentration.....(%V/V)	1.00	1.00	1.10
Volumetric flow rate (DSCFM)	23986	24506	25385
CO concentration.....			
(GR/DSCF).....	0.0407	0.0280	0.0270
(MG/DSCM).....	93.20	64.08	61.75
(PPM-WET).....	77.99	53.10	51.54
(PPM-DRY).....	80.00	55.00	53.00
(PPM-DRY @ 7% O2).....	56.00	38.50	37.29
CO emission rate.....(LB/HR)	8.369	5.878	5.868

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 4
D - Dryer Stack

Results of CO Determinations ----------Method 10

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Time run start/end.....(HRS)	1110/1212	1300/1403	1445/1547
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	3.24	4.78	5.24
O2 Concentration.....(%V/V)	1.40	1.40	1.60
Volumetric flow rate (DSCFM)	18163	18447	17680
CO concentration.....			
(GR/DSCF).....	0.0458	0.0331	0.0433
(MG/DSCM).....	104.85	75.73	99.02
(PPM-WET).....	87.08	61.89	80.55
(PPM-DRY).....	90.00	65.00	85.00
(PPM-DRY @ 7% O2).....	64.29	46.43	61.34
CO emission rate.....(LB/HR)	7.129	5.230	6.554

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 8
Board Coolers 1 & 2 Stack

Results of CO Determinations ----------Method 10

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Time run start/end.....(HRS)	0947/1050	1145/1247	1323/1425
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	1.67	1.05	2.00
O2 Concentration.....(%V/V)	20.90	20.90	20.90
Volumetric flow rate (DSCFM)	32474	31958	30679
CO concentration.....			
(GR/DSCF).....	0.0051	0.0061	0.0051
(MG/DSCM).....	11.65	13.98	11.65
(PPM-WET).....	9.83	11.87	9.80
(PPM-DRY).....	10.00	12.00	10.00
(PPM-DRY @ 7% O2).....	%1399.99	%1679.99	%1399.99
CO emission rate.....(LB/HR)	1.416	1.673	1.338

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 9
Press Vents 3 & 4 Stack

Results of CO Determinations ----------Method 10

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Time run start/end.....(HRS)	0949/1053	1145/1250	1323/1428
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	1.20	1.06	1.13
O2 Concentration.....(%V/V)	20.90	20.90	20.90
Volumetric flow rate (DSCFM)	29387	29223	31072
CO concentration.....			
(GR/DSCF).....	0.0051	0.0076	0.0051
(MG/DSCM).....	11.65	17.47	11.65
(PPM-WET).....	9.88	14.84	9.89
(PPM-DRY).....	10.00	15.00	10.00
(PPM-DRY @ 7% O2).....	%1399.99	%2099.99	%1399.99
CO emission rate.....(LB/HR)	1.282	1.912	1.355

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 10
Press Vents 1 & 2 Stack

Results of CO Determinations ----------Method 10

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Time run start/end.....(HRS)	0949/1053	1145/1250	1323/1425
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	1.05	1.23	1.47
O2 Concentration.....(%V/V)	20.90	20.90	20.90
Volumetric flow rate (DSCFM)	30650	29899	30955
CO concentration.....			
(GR/DSCF).....	0.0092	0.0051	0.0076
(MG/DSCM).....	20.97	11.65	17.47
(PPM-WET).....	17.81	9.88	14.78
(PPM-DRY).....	18.00	10.00	15.00
(PPM-DRY @ 7% O2).....	%2519.99	%1399.99	%2099.99
CO emission rate.....(LB/HR)	2.406	1.304	2.025

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 16
North Pre Dryer Stack

Results of CO Determinations ----------Method 10

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Time run start/end.....(HRS)	1630/1736	1812/1915	1948/2050
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	4.95	6.83	6.62
O2 Concentration.....(%V/V)	20.70	20.60	20.70
Volumetric flow rate (DSCFM)	36010	33771	34418
CO concentration.....			
(GR/DSCF).....	0.0234	0.0137	0.0611
(MG/DSCM).....	53.59	31.45	139.80
(PPM-WET).....	43.72	25.16	112.06
(PPM-DRY).....	46.00	27.00	120.00
(PPM-DRY @ 7% O2).....	%2146.67	945.00	%5600.01
CO emission rate.....(LB/HR)	7.224	3.977	18.013

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 17
South Pre Dryer Stack

Results of CO Determinations ----------Method 10

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Time run start/end.....(HRS)	1630/1736	1812/1915	1948/2050
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	5.90	7.63	5.57
O2 Concentration.....(%V/V)	20.30	20.20	20.40
Volumetric flow rate (DSCFM)	32784	32881	33335
CO concentration.....			
(GR/DSCF).....	0.0022	0.0027	0.0035
(MG/DSCM).....	5.13	6.29	8.04
(PPM-WET).....	4.14	4.99	6.52
(PPM-DRY).....	4.40	5.40	6.90
(PPM-DRY @ 7% O2).....	88.00	94.50	161.00
CO emission rate.....(LB/HR)	0.629	0.774	1.003

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 18
Coen Stack

Results of CO Determinations ----------Method 10

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Time run start/end.....(HRS)	1525/1738	1814/1917	1950/2054
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	7.42	7.09	8.00
O2 Concentration.....(%V/V)	16.00	12.20	12.10
Volumetric flow rate (DSCFM)	6617	6906	6831
CO concentration.....			
(GR/DSCF).....	0.0443	0.0382	0.0382
(MG/DSCM).....	101.35	87.38	87.38
(PPM-WET).....	80.54	69.68	69.00
(PPM-DRY).....	87.00	75.00	75.00
(PPM-DRY @ 7% O2).....	243.60	119.32	117.98
CO emission rate.....(LB/HR)	2.511	2.259	2.234

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

3.5 Results of Formaldehyde Determinations

Test No. 5
ROEMMC Tube

Results of Formaldehyde Tests ---------- EPA Method 0011

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Time run start/end.....(HRS)	1915/2017	2058/2101	2242/2345
Static pressure.....(IN.WC)	-0.48	-0.48	-0.48
Cross sectional area (SQ.FT)	14.19	14.19	14.19
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	27.0	25.0	35.0
desiccant.....(GRAMS)	27.0	22.0	16.0
total.....(GRAMS)	54.0	47.0	51.0
Formaldehyde in sample..(uG)	489	412	3610
Gas meter coefficient.....	0.9954	0.9954	0.9954
Barometric pressure..(IN.HG)	26.87	26.87	26.87
Avg. orif.pres.drop..(IN.WC)	2.34	2.40	2.28
Avg. gas meter temp..(DEF-F)	82.3	82.3	80.4
Volume through gas meter....			
at meter conditions...(CF)	55.16	55.80	54.31
standard conditions.(DSCF)	48.30	48.87	47.71
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.435	.435	.435
Avg.stack gas temp ..(DEG-F)	792	870	872
Volumetric flow rate.....			
actual.....(ACFM)	30761	33053	32543
dry standard.....(DSCFM)	11050	11262	11012
Isokinetic variation.....(%)	100.2	99.5	99.3
CH2O concentration.....			
(GR/DSCF).....	0.0002	0.0001	0.0012
(MG/DSCM).....	0.36	0.30	2.69
(PPM-DRY).....	0.29	0.24	2.15
(PPM-WET).....	0.27	0.23	2.05
CH2O emission rate...(LB/HR)	0.01489	0.01264	0.11084

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 6
C - Dryer Stack

Results of Formaldehyde Tests ---------- EPA Method 0011

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Time run start/end.....(HRS)	1915/2018	2058/2203	2242/2345
Static pressure.....(IN.WC)	-1.50	-1.50	-1.50
Cross sectional area (SQ.FT)	6.49	6.49	6.49
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	10.0	14.0	16.0
desiccant.....(GRAMS)	14.0	14.0	13.0
total.....(GRAMS)	24.0	28.0	29.0
Formaldehyde in sample..(uG)	299	325	805
Gas meter coefficient.....	1.0041	1.0041	1.0041
Barometric pressure..(IN.HG)	26.85	26.85	26.85
Avg. orif.pres.drop..(IN.WC)	1.96	2.09	2.21
Avg. gas meter temp..(DEF-F)	88.0	90.9	88.0
Volume through gas meter....			
at meter conditions...(CF)	47.70	49.55	50.80
standard conditions.(DSCF)	41.62	43.02	44.35
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.185	.185	.185
Avg.stack gas temp ..(DEG-F)	144	156	147
Volumetric flow rate.....			
actual.....(ACFM)	31185	33529	34209
dry standard.....(DSCFM)	23728	24933	25782
Isokinetic variation.....(%)	101.7	100.1	99.8
CH2O concentration.....			
(GR/DSCF).....	0.0001	0.0001	0.0003
(MG/DSCM).....	0.26	0.27	0.65
(PPM-DRY).....	0.20	0.21	0.52
(PPM-WET).....	0.20	0.21	0.50
CH2O emission rate...(LB/HR)	0.02266	0.02504	0.06224

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 7
D - Dryer Stack

Results of Formaldehyde Tests ---------- EPA Method 0011

	Run 1	Run 2	Run 3
Date of run	05-10-94	05-10-94	05-10-94
Time run start/end.....(HRS)	1915/2019	2058/2202	2242/2344
Static pressure.....(IN.WC)	-0.56	-0.56	-0.56
Cross sectional area (SQ.FT)	6.49	6.49	6.49
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	27.0	39.0	37.0
desiccant.....(GRAMS)	21.0	22.0	20.0
total.....(GRAMS)	48.0	61.0	57.0
Formaldehyde in sample..(uG)	585	494	1530
Gas meter coefficient.....	0.9961	0.9961	0.9961
Barometric pressure..(IN.HG)	26.85	26.85	26.85
Avg. orif.pres.drop..(IN.WC)	2.87	3.07	2.98
Avg. gas meter temp..(DEF-F)	91.5	90.8	85.2
Volume through gas meter....			
at meter conditions...(CF)	61.38	63.36	62.41
standard conditions.(DSCF)	52.92	54.73	54.45
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.242	.242	.242
Avg.stack gas temp ..(DEG-F)	178	182	177
Volumetric flow rate.....			
actual.....(ACFM)	25380	26325	26162
dry standard.....(DSCFM)	18062	18433	18508
Isokinetic variation.....(%)	99.3	100.6	99.7
CH2O concentration.....			
(GR/DSCF).....	0.0002	0.0001	0.0004
(MG/DSCM).....	0.39	0.32	1.00
(PPM-DRY).....	0.32	0.26	0.80
(PPM-WET).....	0.30	0.24	0.76
CH2O emission rate...(LB/HR)	0.02660	0.02218	0.06932

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 11
Board Coolers 1 & 2 Stack

Results of Formaldehyde Tests ---------- EPA Method 0011

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Time run start/end.....(HRS)	1635/1738	1814/1918	1946/2050
Static pressure.....(IN.WC)	-1.40	-1.40	-1.40
Cross sectional area (SQ.FT)	10.56	10.56	10.56
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	0.0	1.0	0.0
desiccant.....(GRAMS)	10.0	10.0	10.0
total.....(GRAMS)	10.0	11.0	10.0
Formaldehyde in sample..(uG)	585	553	992
Gas meter coefficient.....	0.9954	0.9954	0.9954
Barometric pressure..(IN.HG)	26.95	26.95	26.95
Avg. orif.pres.drop..(IN.WC)	2.16	2.25	2.31
Avg. gas meter temp..(DEF-F)	89.2	92.4	90.2
Volume through gas meter....			
at meter conditions...(CF)	53.08	54.39	55.41
standard conditions.(DSCF)	46.01	46.88	47.96
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.190	.190	.190
Avg.stack gas temp ..(DEG-F)	105	101	104
Volumetric flow rate.....			
actual.....(ACFM)	38293	38750	39556
dry standard.....(DSCFM)	31803	32389	32927
Isokinetic variation.....(%)	129.4	129.4	130.3
CH2O concentration.....			
(GR/DSCF).....	0.0002	0.0002	0.0003
(MG/DSCM).....	0.45	0.42	0.74
(PPM-DRY).....	0.36	0.34	0.59
(PPM-WET).....	0.36	0.33	0.58
CH2O emission rate...(LB/HR)	0.05378	0.05082	0.09061

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 12
Press Vents 3 & 4 Stack

Results of Formaldehyde Tests ---------- EPA Method 0011

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Time run start/end.....(HRS)	1638/1744	1814/1920	1946/2050
Static pressure.....(IN.WC)	-1.00	-1.00	-1.00
Cross sectional area (SQ.FT)	10.56	10.56	10.56
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	0.0	0.0	0.0
desiccant.....(GRAMS)	15.0	9.0	10.0
total.....(GRAMS)	15.0	9.0	10.0
Formaldehyde in sample..(uG)	7170	6760	3130
Gas meter coefficient.....	1.0041	1.0041	1.0041
Barometric pressure..(IN.HG)	26.95	26.95	26.95
Avg. orif.pres.drop..(IN.WC)	2.62	2.55	2.57
Avg. gas meter temp..(DEF-F)	95.1	97.7	93.8
Volume through gas meter....			
at meter conditions...(CF)	56.00	55.20	55.30
standard conditions.(DSCF)	48.50	47.58	48.00
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.224	.224	.224
Avg.stack gas temp ..(DEG-F)	107	112	108
Volumetric flow rate.....			
actual.....(ACFM)	37757	37411	37508
dry standard.....(DSCFM)	31118	30771	31027
Isokinetic variation.....(%)	100.3	99.5	99.5
CH2O concentration.....			
(GR/DSCF).....	0.0023	0.0022	0.0010
(MG/DSCM).....	5.26	5.05	2.32
(PPM-DRY).....	4.21	4.05	1.86
(PPM-WET).....	4.15	4.01	1.84
CH2O emission rate...(LB/HR)	0.61253	0.58205	0.26935

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 13
Press Vents 1 & 2 Stack

Results of Formaldehyde Tests ---------- EPA Method 0011

	Run 1	Run 2	Run 3
Date of run	05-11-94	05-11-94	05-11-94
Time run start/end.....(HRS)	1638/1744	1814/1920	1946/2053
Static pressure.....(IN.WC)	-1.15	-1.15	-1.15
Cross sectional area (SQ.FT)	10.56	10.56	10.56
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	-1.0	0.0	0.0
desiccant.....(GRAMS)	12.0	9.0	11.0
total.....(GRAMS)	11.0	9.0	11.0
Formaldehyde in sample..(uG)	754	825	646
Gas meter coefficient.....	0.9961	0.9961	0.9961
Barometric pressure..(IN.HG)	26.95	26.95	26.95
Avg. orif.pres.drop..(IN.WC)	2.33	2.38	2.35
Avg. gas meter temp..(DEF-F)	95.7	97.6	95.0
Volume through gas meter....			
at meter conditions...(CF)	55.62	56.35	55.86
standard conditions.(DSCF)	47.70	48.17	47.97
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.227	.227	.227
Avg.stack gas temp ..(DEG-F)	102	112	122
Volumetric flow rate.....			
actual.....(ACFM)	35863	36738	37239
dry standard.....(DSCFM)	29953	30159	29997
Isokinetic variation.....(%)	99.8	100.1	100.2
CH2O concentration.....			
(GR/DSCF).....	0.0002	0.0003	0.0002
(MG/DSCM).....	0.48	0.61	0.48
(PPM-DRY).....	0.38	0.49	0.38
(PPM-WET).....	0.38	0.48	0.38
CH2O emission rate...(LB/HR)	0.05340	0.06874	0.05375

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 14
North Pre Dryer Stack

Results of Formaldehyde Tests ---------- EPA Method 0011

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Time run start/end.....(HRS)	706/ 816	837/ 940	1003/1105
Static pressure.....(IN.WC)	-0.75	-0.75	-0.75
Cross sectional area (SQ.FT)	9.62	9.62	9.62
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	36.0	37.0	45.0
desiccant.....(GRAMS)	13.0	14.0	16.0
total.....(GRAMS)	49.0	51.0	61.0
Formaldehyde in sample..(uG)	644	200	147
Gas meter coefficient.....	1.0041	1.0041	1.0041
Barometric pressure..(IN.HG)	26.75	26.75	26.75
Avg. orif.pres.drop..(IN.WC)	2.21	2.22	2.33
Avg. gas meter temp..(DEF-F)	71.5	75.0	78.7
Volume through gas meter....			
at meter conditions...(CF)	50.60	50.85	52.20
standard conditions.(DSCF)	45.38	45.31	46.21
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.190	.190	.190
Avg.stack gas temp ..(DEG-F)	120	130	110
Volumetric flow rate.....			
actual.....(ACFM)	48047	48915	48088
dry standard.....(DSCFM)	37121	37101	37398
Isokinetic variation.....(%)	99.6	99.5	100.7
CH2O concentration.....			
(GR/DSCF).....	0.0002	0.0001	0.0000
(MG/DSCM).....	0.50	0.16	0.11
(PPM-DRY).....	0.40	0.13	0.09
(PPM-WET).....	0.38	0.12	0.09
CH2O emission rate...(LB/HR)	0.07007	0.02178	0.01583

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 15
South Pre Dryer Stack

Results of Formaldehyde Tests ---------- EPA Method 0011

	Run 1	Run 2	Run 3
Date of run	05-12-94	05-12-94	05-12-94
Time run start/end.....(HRS)	706/ 814	837/ 939	1003/1106
Static pressure.....(IN.WC)	-1.10	-1.10	-1.10
Cross sectional area (SQ.FT)	8.30	8.30	8.30
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	34.0	36.0	48.0
desiccant.....(GRAMS)	13.0	14.0	15.0
total.....(GRAMS)	47.0	50.0	63.0
Formaldehyde in sample..(uG)	139	96	88
Gas meter coefficient.....	0.9961	0.9961	0.9961
Barometric pressure..(IN.HG)	26.75	26.75	26.75
Avg. orif.pres.drop..(IN.WC)	2.18	2.15	2.23
Avg. gas meter temp..(DEF-F)	76.9	79.5	82.8
Volume through gas meter....			
at meter conditions...(CF)	53.00	52.87	53.96
standard conditions.(DSCF)	46.68	46.33	47.01
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.191	.191	.191
Avg.stack gas temp ..(DEG-F)	133	140	120
Volumetric flow rate.....			
actual.....(ACFM)	43272	43425	42738
dry standard.....(DSCFM)	32769	32388	32599
Isokinetic variation.....(%)	99.0	99.5	100.3
CH2O concentration.....			
(GR/DSCF).....	0.0000	0.0000	0.0000
(MG/DSCM).....	0.11	0.07	0.07
(PPM-DRY).....	0.08	0.06	0.05
(PPM-WET).....	0.08	0.06	0.05
CH2O emission rate...(LB/HR)	0.01298	0.00889	0.00813

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

APPENDIX A

RESULTS OF VOLUMETRIC FLOW RATE DETERMINATIONS

Test No. 1
GEKA Stack

Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	04-09-94
Time of Determination.....(HRS)	1712
Barometric pressure.....(IN.HG)	26.74
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	20
Duct area.....(SQ.FT)	2.18
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.23
Avg. gas temp.....(DEG-F)	471
Moisture content.....(% V/V)	0.00
Avg. linear velocity.....(FT/SEC)	13.0
Gas density.....(LB/ACF)	.03809
Molecular weight.....(LB/LBMOLE)	28.95
Mass flow of gas.....(LB/HR)	3879
Volumetric flow rate.....	
actual.....(ACFM)	1698
dry standard.....(DSCFM)	860

Test No. 2
ROEMMC Tube

Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	05-10-94
Time of Determination.....(HRS)	740
Barometric pressure.....(IN.HG)	26.85
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	51
Duct area.....(SQ.FT)	14.19
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.48
Avg. gas temp.....(DEG-F)	846
Moisture content.....(% V/V)	5.50
Avg. linear velocity.....(FT/SEC)	33.9
Gas density.....(LB/ACF)	.02712
Molecular weight.....(LB/LBMOLE)	29.45
Mass flow of gas.....(LB/HR)	46896
Volumetric flow rate.....	
actual.....(ACFM)	28821
dry standard.....(DSCFM)	9868

Test No. 3
C - Dryer Stack

Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	05-10-94
Time of Determination.....(HRS)	950
Barometric pressure.....(IN.HG)	26.85
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	34.5
Duct area.....(SQ.FT)	6.49
Direction of flow.....	UP
Static pressure.....(IN.WC)	-1.5
Avg. gas temp.....(DEG-F)	162
Moisture content.....(% V/V)	2.51
Avg. linear velocity.....(FT/SEC)	80.9
Gas density.....(LB/ACF)	.05644
Molecular weight.....(LB/LBMOLE)	28.92
Mass flow of gas.....(LB/HR)	106660
Volumetric flow rate.....	
actual.....(ACFM)	31499
dry standard.....(DSCFM)	23297

Test No. 4
D - Dryer Stack

Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	05-10-94
Time of Determination.....(HRS)	1025
Barometric pressure.....(IN.HG)	26.85
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	34.5
Duct area.....(SQ.FT)	6.49
Direction of flow.....	DOWN
Static pressure.....(IN.WC)	-.56
Avg. gas temp.....(DEG-F)	167
Moisture content.....(% V/V)	3.24
Avg. linear velocity.....(FT/SEC)	63.7
Gas density.....(LB/ACF)	.05613
Molecular weight.....(LB/LBMOLE)	29.00
Mass flow of gas.....(LB/HR)	83563
Volumetric flow rate.....	
actual.....(ACFM)	24814
dry standard.....(DSCFM)	18116

Test No. 8
Board Coolers 1 & 2 Stack

Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	05-11-94
Time of Determination.....(HRS)	730
Barometric pressure.....(IN.HG)	26.95
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	44
Duct area.....(SQ.FT)	10.56
Direction of flow.....	UP
Static pressure.....(IN.WC)	-1.4
Avg. gas temp.....(DEG-F)	86
Moisture content.....(% V/V)	1.50
Avg. linear velocity.....(FT/SEC)	60.1
Gas density.....(LB/ACF)	.06462
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	147666
Volumetric flow rate.....	
actual.....(ACFM)	38085
dry standard.....(DSCFM)	32551

Test No. 9
Press Vents 3 & 4 Stack

Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	05-11-94
Time of Determination.....(HRS)	827
Barometric pressure.....(IN.HG)	26.95
Pitot tube coefficient.....	.84
Number of sampling ports.....	4
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	44
Duct area.....(SQ.FT)	10.56
Direction of flow.....	UP
Static pressure.....(IN.WC)	-1.005
Avg. gas temp.....(DEG-F)	83
Moisture content.....(% V/V)	1.20
Avg. linear velocity.....(FT/SEC)	52.5
Gas density.....(LB/ACF)	.06518
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	130056
Volumetric flow rate.....	
actual.....(ACFM)	33254
dry standard.....(DSCFM)	28723

Test No. 10
Press Vents 1 & 2 Stack

Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	05-11-94
Time of Determination.....(HRS)	901
Barometric pressure.....(IN.HG)	26.95
Pitot tube coefficient.....	.84
Number of sampling ports.....	4
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	44
Duct area.....(SQ.FT)	10.56
Direction of flow.....	UP
Static pressure.....(IN.WC)	-1.15
Avg. gas temp.....(DEG-F)	91
Moisture content.....(% V/V)	1.05
Avg. linear velocity.....(FT/SEC)	56.8
Gas density.....(LB/ACF)	.06419
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	138642
Volumetric flow rate.....	
actual.....(ACFM)	35999
dry standard.....(DSCFM)	30649

Test No. 13
Press Vents 1 & 2 Stack

Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	05-11-94
Time of Determination.....(HRS)	1630
Barometric pressure.....(IN.HG)	26.95
Pitot tube coefficient.....	.84
Number of sampling ports.....	4
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	44
Duct area.....(SQ.FT)	10.56
Direction of flow.....	UP
Static pressure.....(IN.WC)	-1.15
Avg. gas temp.....(DEG-F)	87
Moisture content.....(% V/V)	1.08
Avg. linear velocity.....(FT/SEC)	53.4
Gas density.....(LB/ACF)	.06465
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	131152
Volumetric flow rate.....	
actual.....(ACFM)	33810
dry standard.....(DSCFM)	28989

Test No. 14
North Pre Dryer Stack

Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	05-12-94
Time of Determination.....(HRS)	645
Barometric pressure.....(IN.HG)	26.75
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	20
Shape of duct.....	Round
Stack diameter.....(IN)	42
Duct area.....(SQ.FT)	9.62
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.75
Avg. gas temp.....(DEG-F)	144
Moisture content.....(% V/V)	4.84
Avg. linear velocity.....(FT/SEC)	80.5
Gas density.....(LB/ACF)	.05745
Molecular weight.....(LB/LBMOLE)	28.87
Mass flow of gas.....(LB/HR)	160275
Volumetric flow rate.....	
actual.....(ACFM)	46496
dry standard.....(DSCFM)	34536

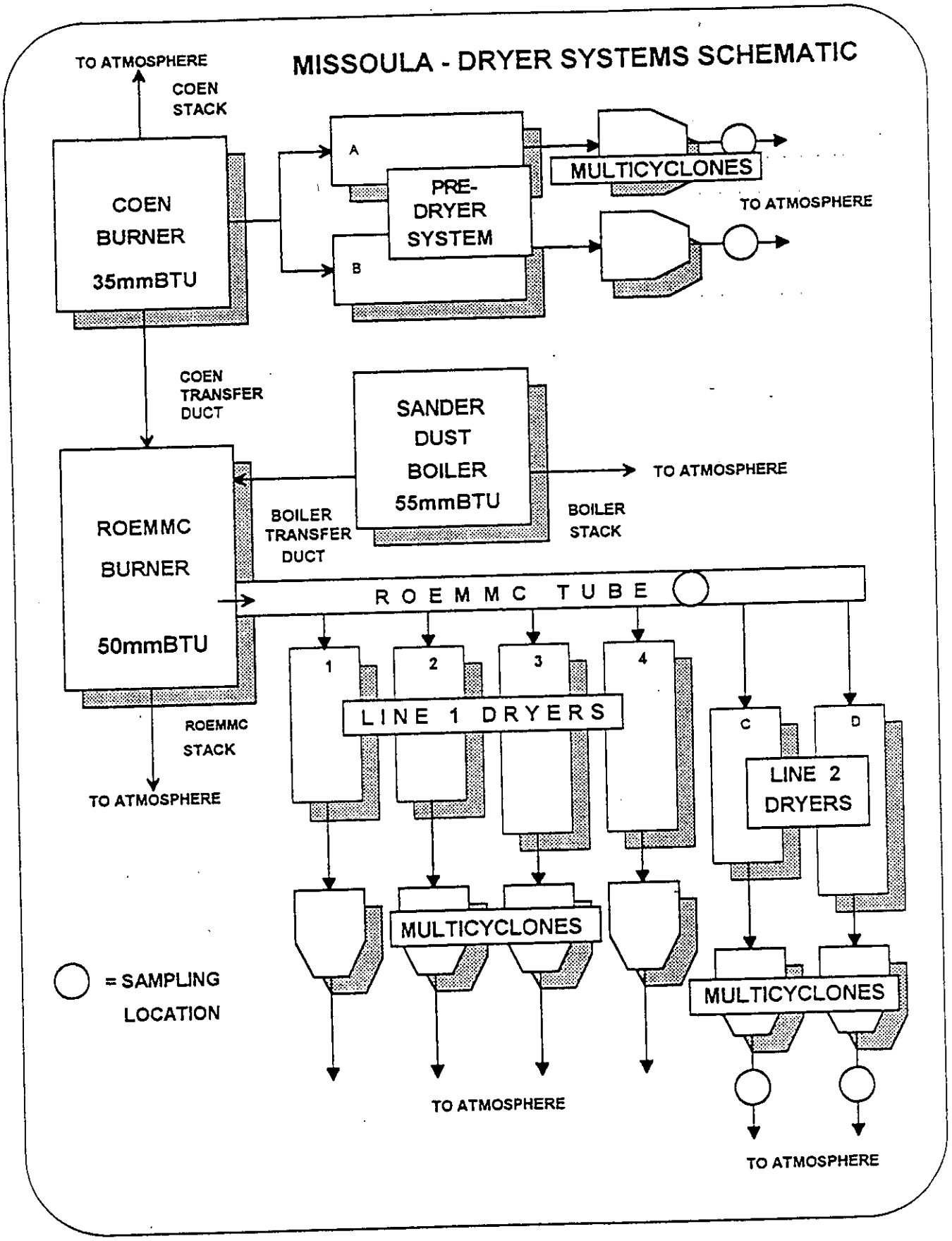
Test No. 15
South Pre Dryer Stack

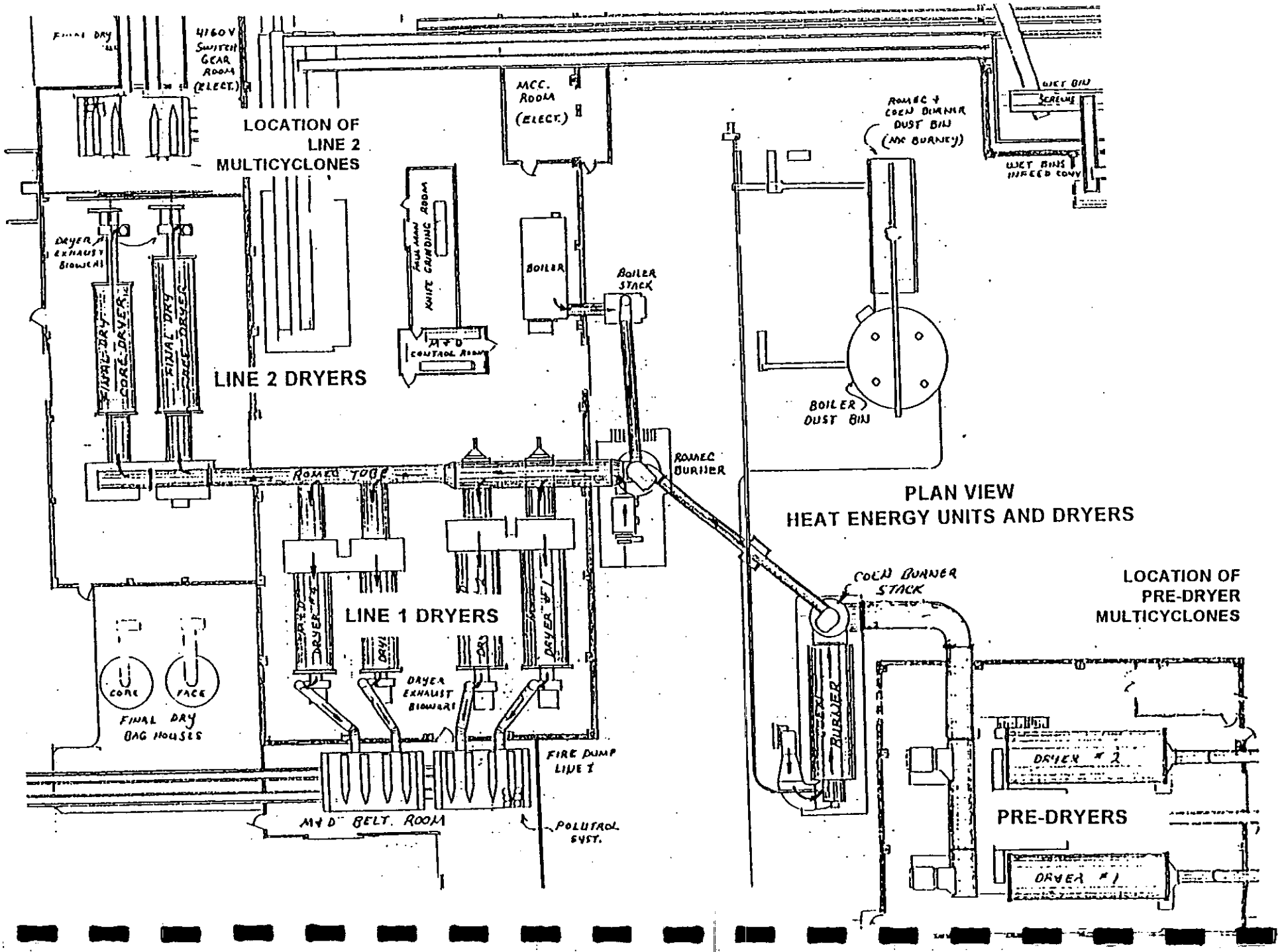
Results of Volumetric Flow Rate Determination-------Method 2

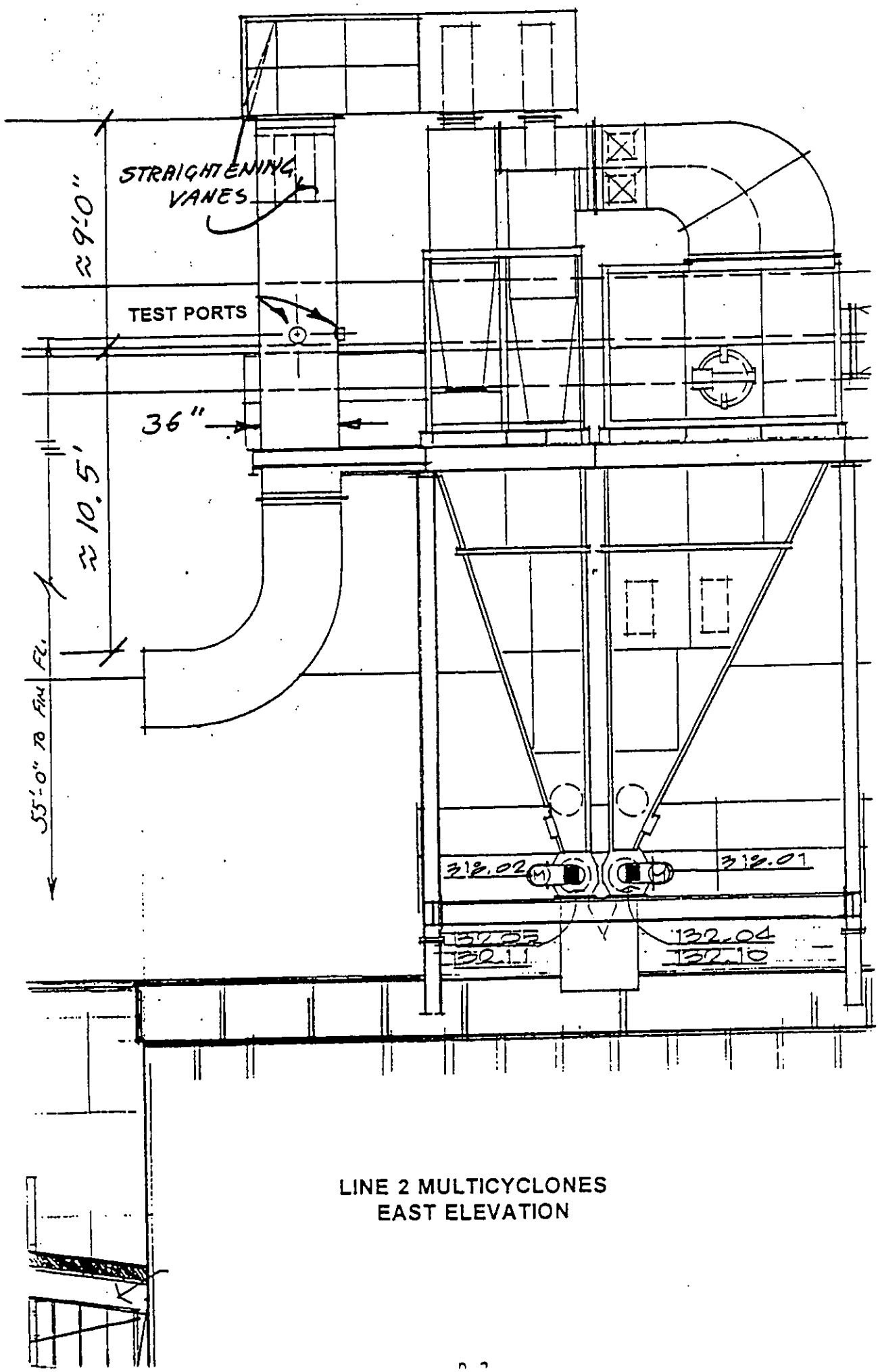
Date of Determination.....	05-12-94
Time of Determination.....(HRS)	655
Barometric pressure.....(IN.HG)	26.75
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	20
Shape of duct.....	Round
Stack diameter.....(IN)	39
Duct area.....(SQ.FT)	8.30
Direction of flow.....	UP
Static pressure.....(IN.WC)	-1.1
Avg. gas temp.....(DEG-F)	137
Moisture content.....(% V/V)	4.53
Avg. linear velocity.....(FT/SEC)	85.5
Gas density.....(LB/ACF)	.05811
Molecular weight.....(LB/LBMOLE)	28.88
Mass flow of gas.....(LB/HR)	148374
Volumetric flow rate.....	
actual.....(ACFM)	42553
dry standard.....(DSCFM)	32025

APPENDIX B

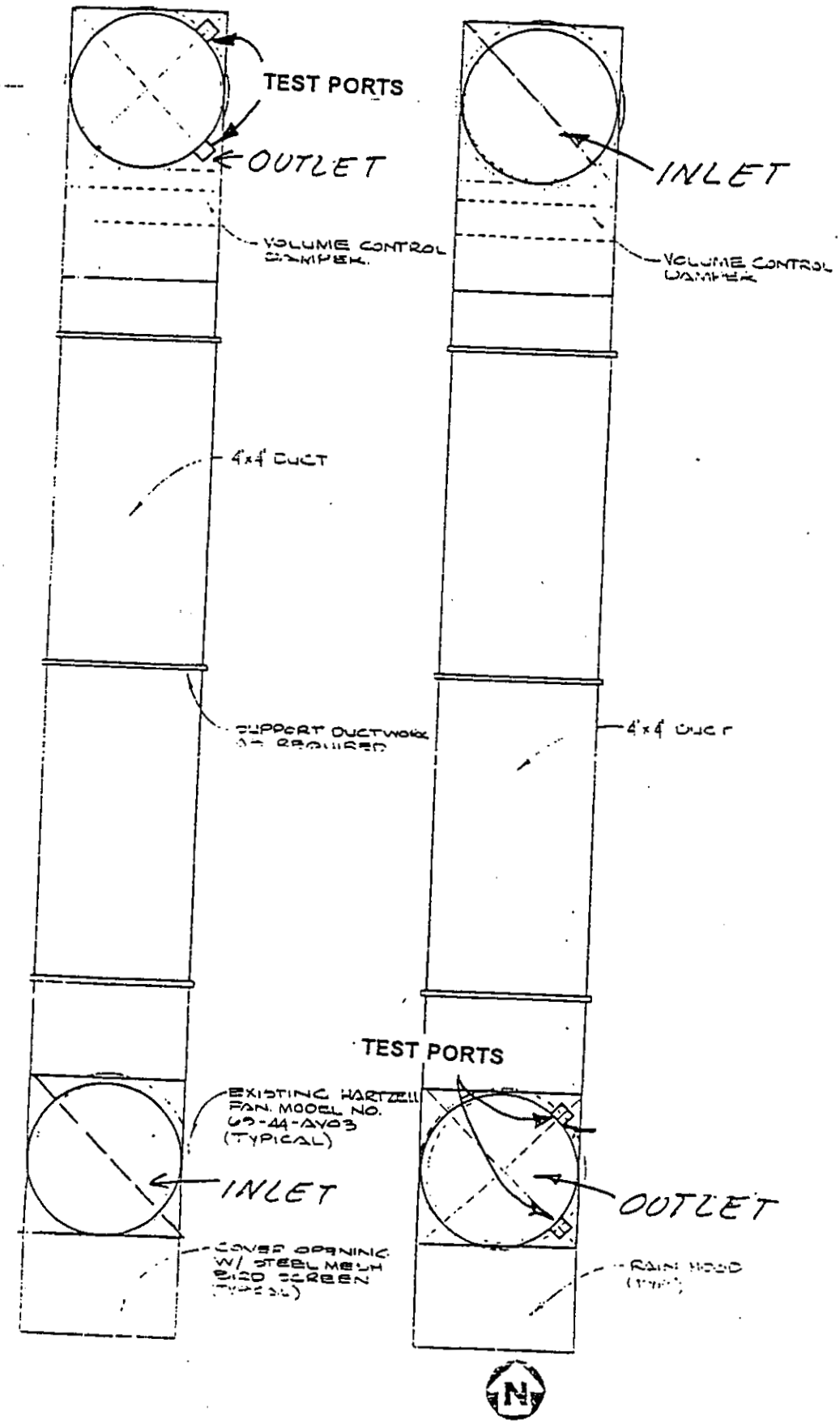
LOCATION OF TEST PORTS


MISSOULA - DRYER SYSTEMS SCHEMATIC
TO ATMOSPHERE
COEN STACK
COEN BURNER 35mmBTU
A
B
PRE-DRYER SYSTEM
MULTICYCLONES
TO ATMOSPHERE
COEN TRANSFER DUCT
SANDER DUST BOILER 55mmBTU
TO ATMOSPHERE
BOILER TRANSFER DUCT
BOILER STACK
ROEMMC BURNER 50mmBTU
ROEMMC TUBE
1
2
3
4
LINE 1 DRYERS
C
D
LINE 2 DRYERS
ROEMMC STACK
TO ATMOSPHERE
MULTICYCLONES
MULTICYCLONES
= SAMPLING LOCATION
TO ATMOSPHERE
TO ATMOSPHERE

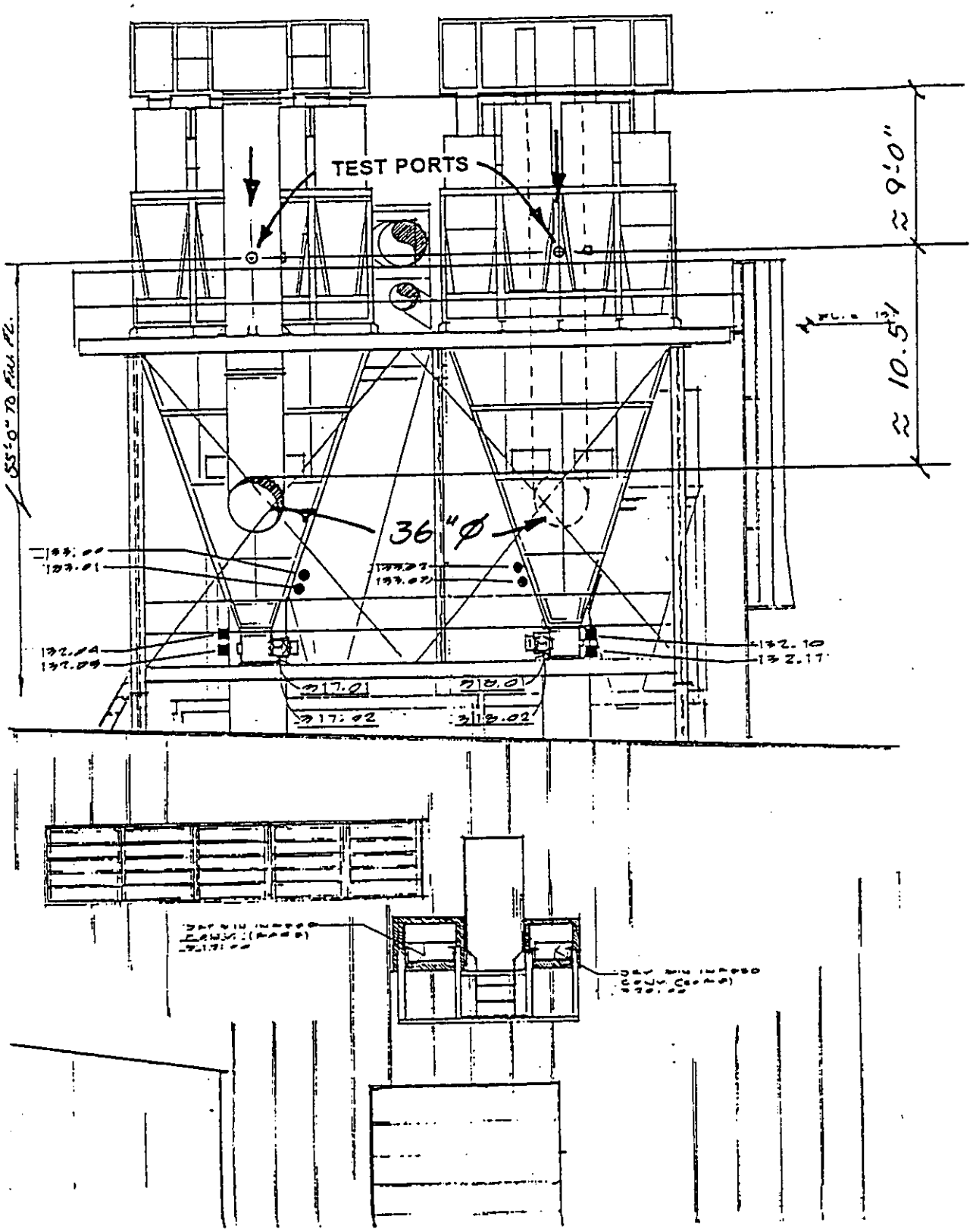

LOCATION OF
LINE 2
MULTICYCLONES
LINE 2 DRYERS
LINE 1 DRYERS
PLAN VIEW
HEAT ENERGY UNITS AND DRYERS
LOCATION OF
PRE-DRYER
MULTICYCLONES
PRE-DRYERS
BOILER
BOILER STACK
BOILER DUST BIN
ROMEC BURNER
COEN BURNER STACK
FINAL DRY BAG HOUSES
M&D BELT ROOM
FIRE DUMP LINE 1
POLUTROL SYST.
MCC ROOM (ELECT.)
4160V SWITCH GEAR ROOM (ELECT.)
WET BIN SCREENS
WET BINS INFEED CONV
DRYER #2
DRYER #1



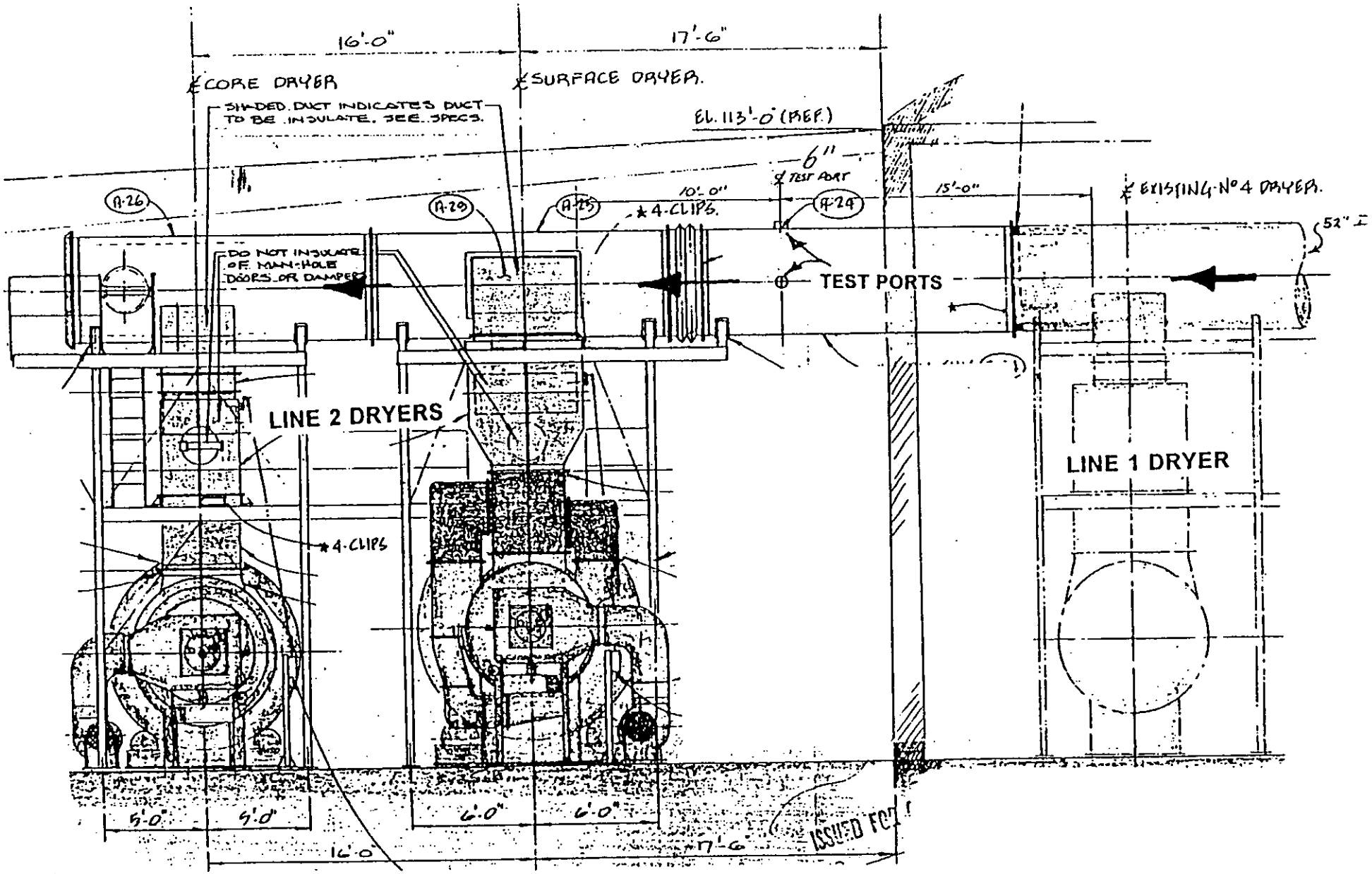
LINE 2 MULTICYCLONES
EAST ELEVATION



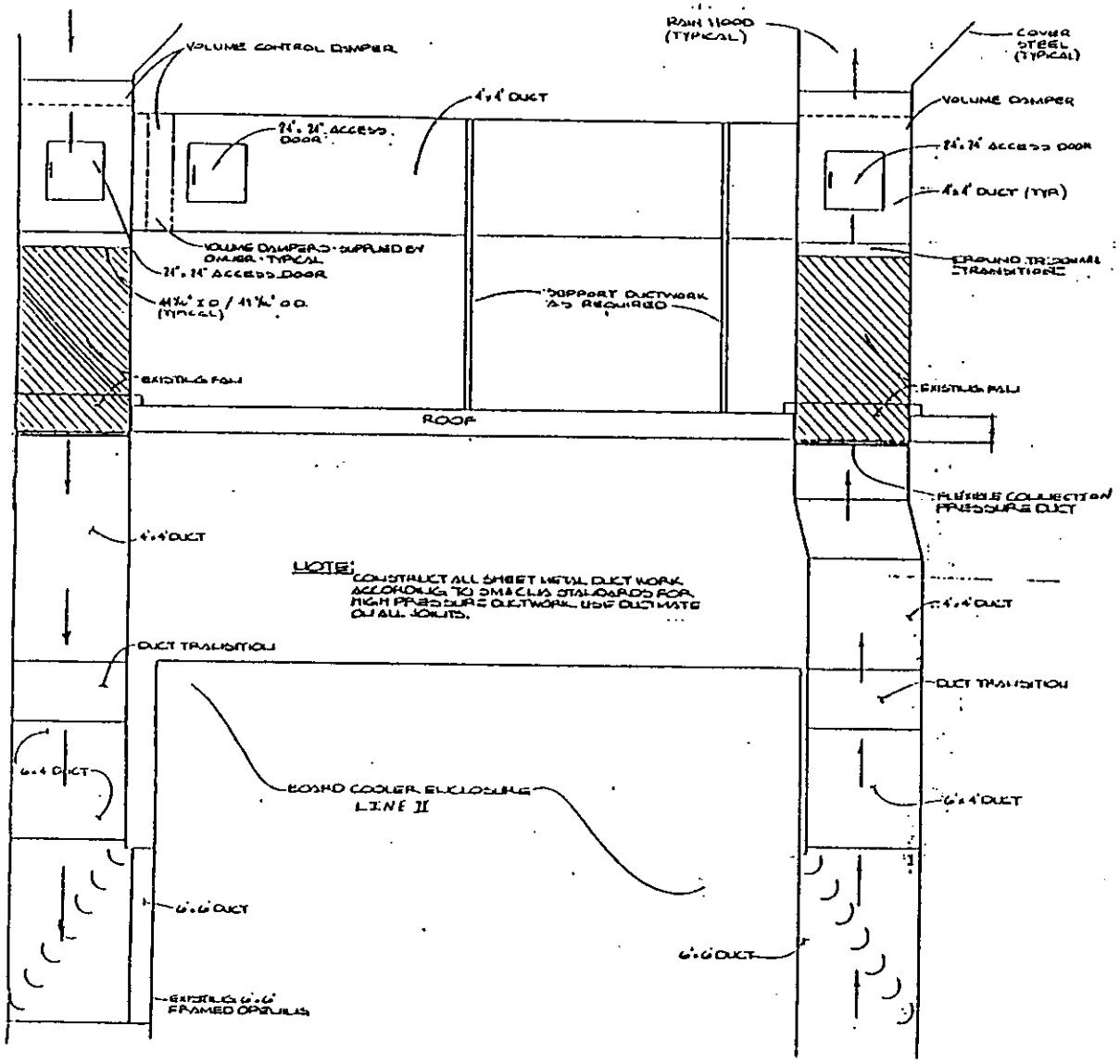
LINE 2 BOARD COOLER
PLAN VIEW



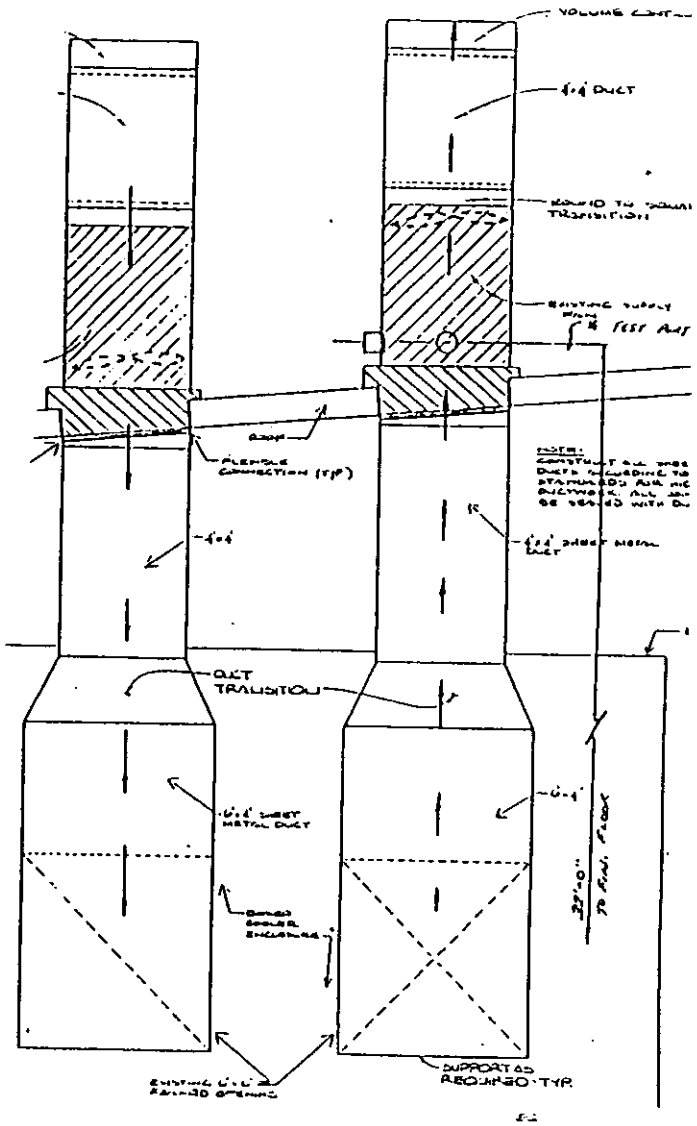
LINE 2 MULTICYCLONES
SOUTH ELEVATION



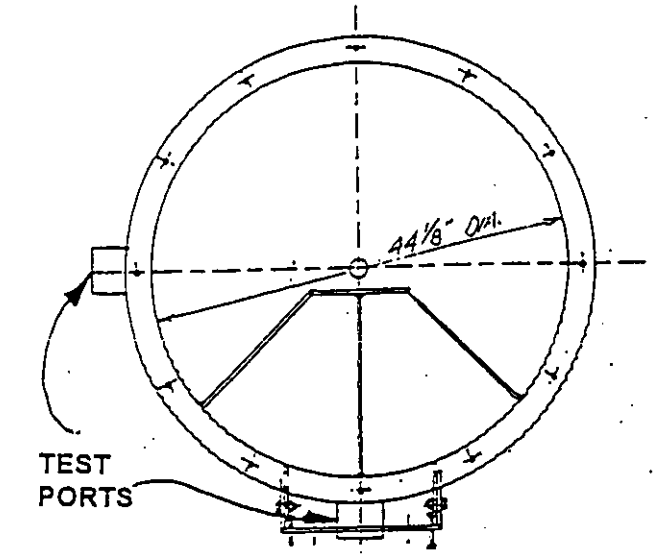
ROEMMC TUBE ELEVATION
PORTION BETWEEN LINE 1 AND LINE 2 DRYERS



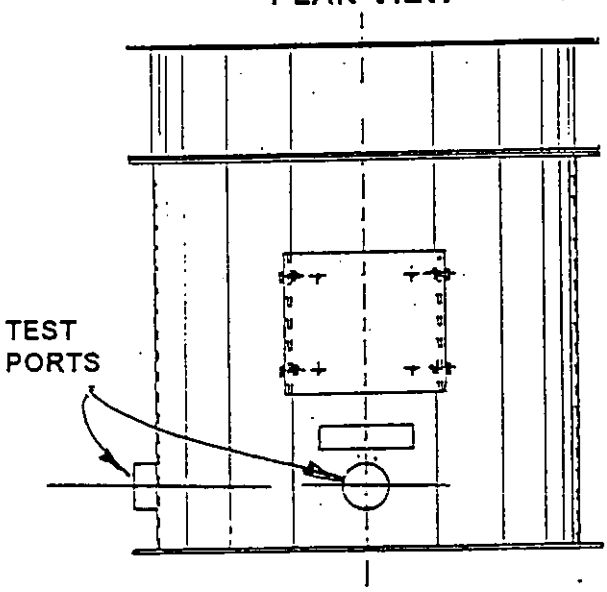
LINE 2 BOARD COOLER
EAST ELEVATION
SIDE VIEW



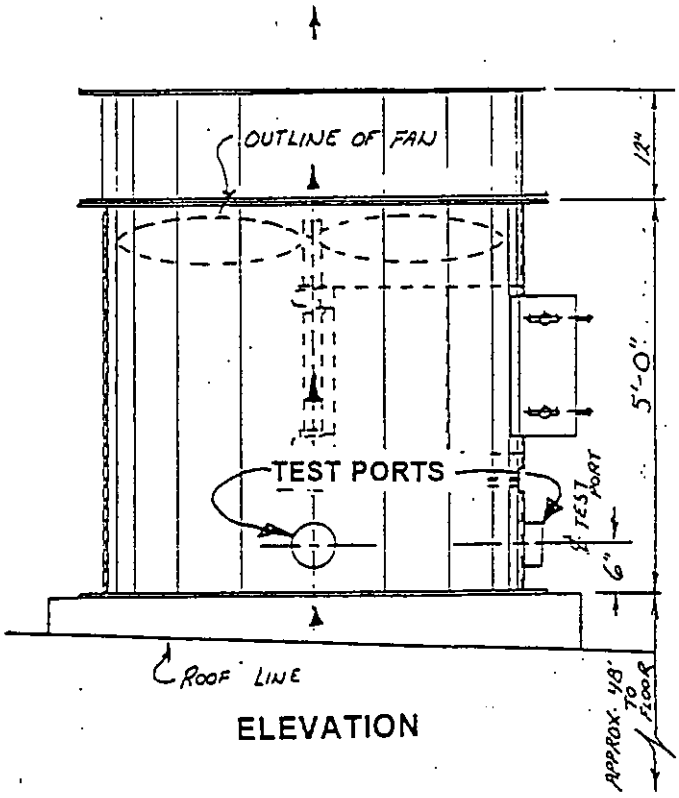
LINE 2 BOARD COOLER
SOUTH ELEVATION
END VIEW



PLAN VIEW

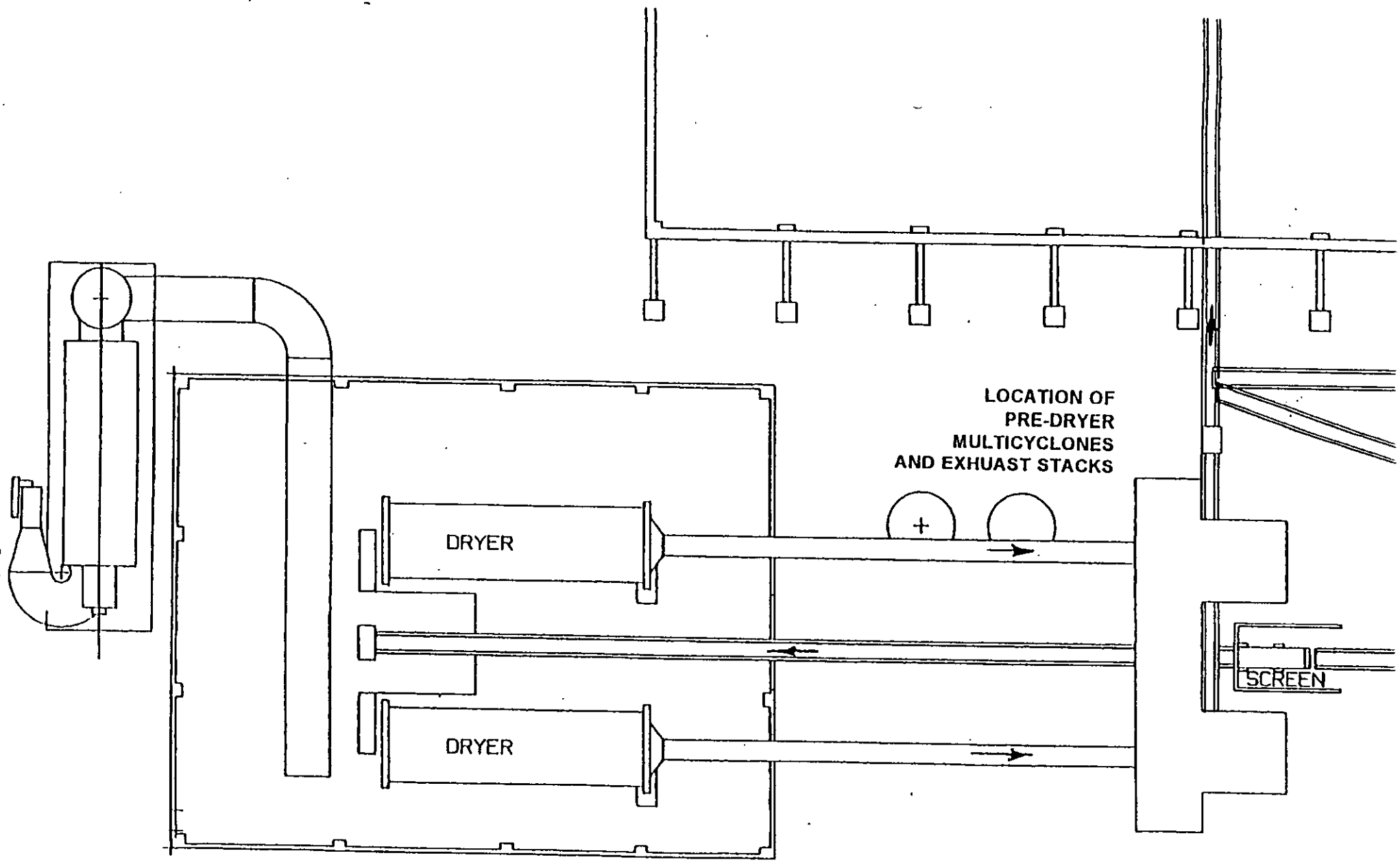


ELEVATION

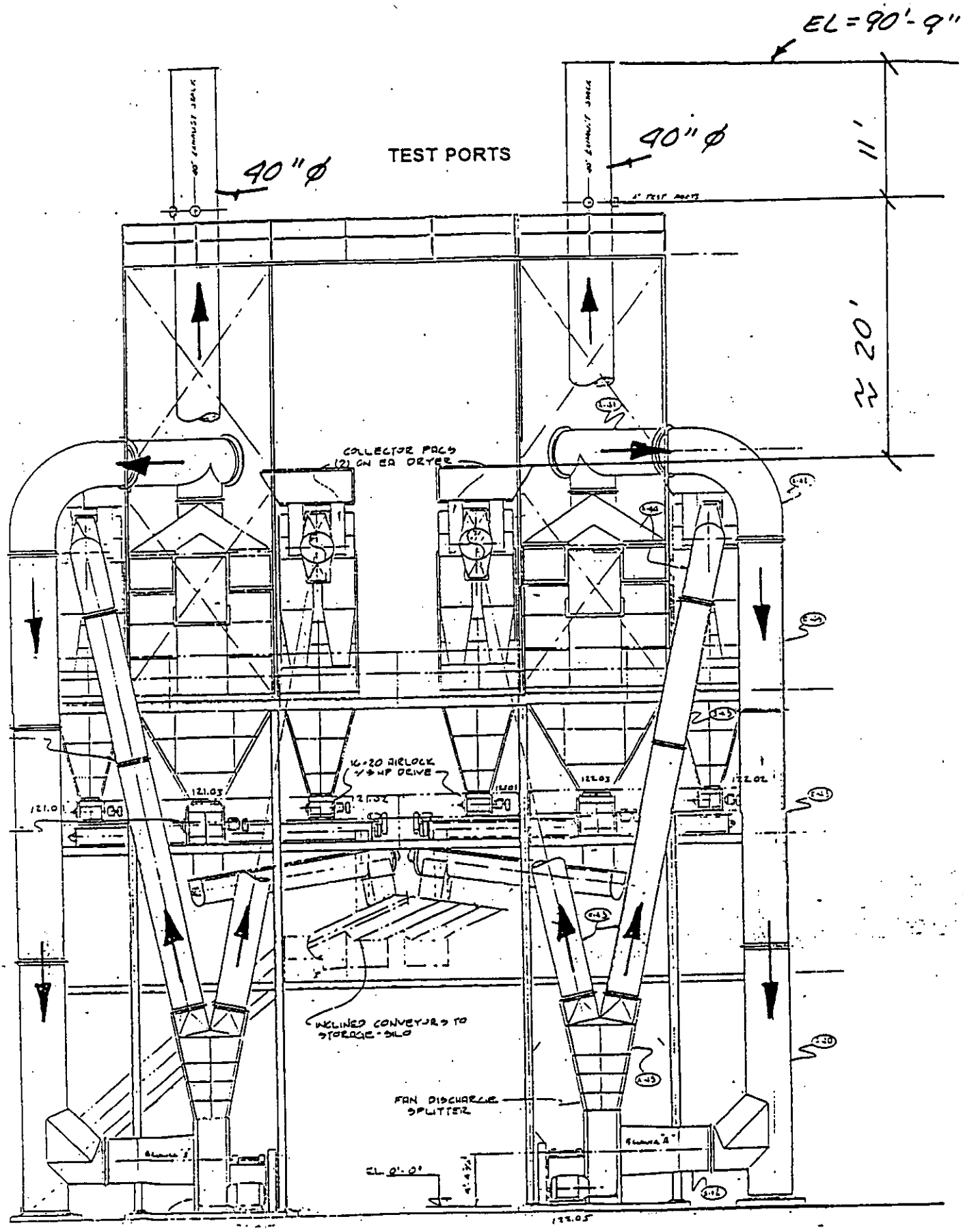


ELEVATION

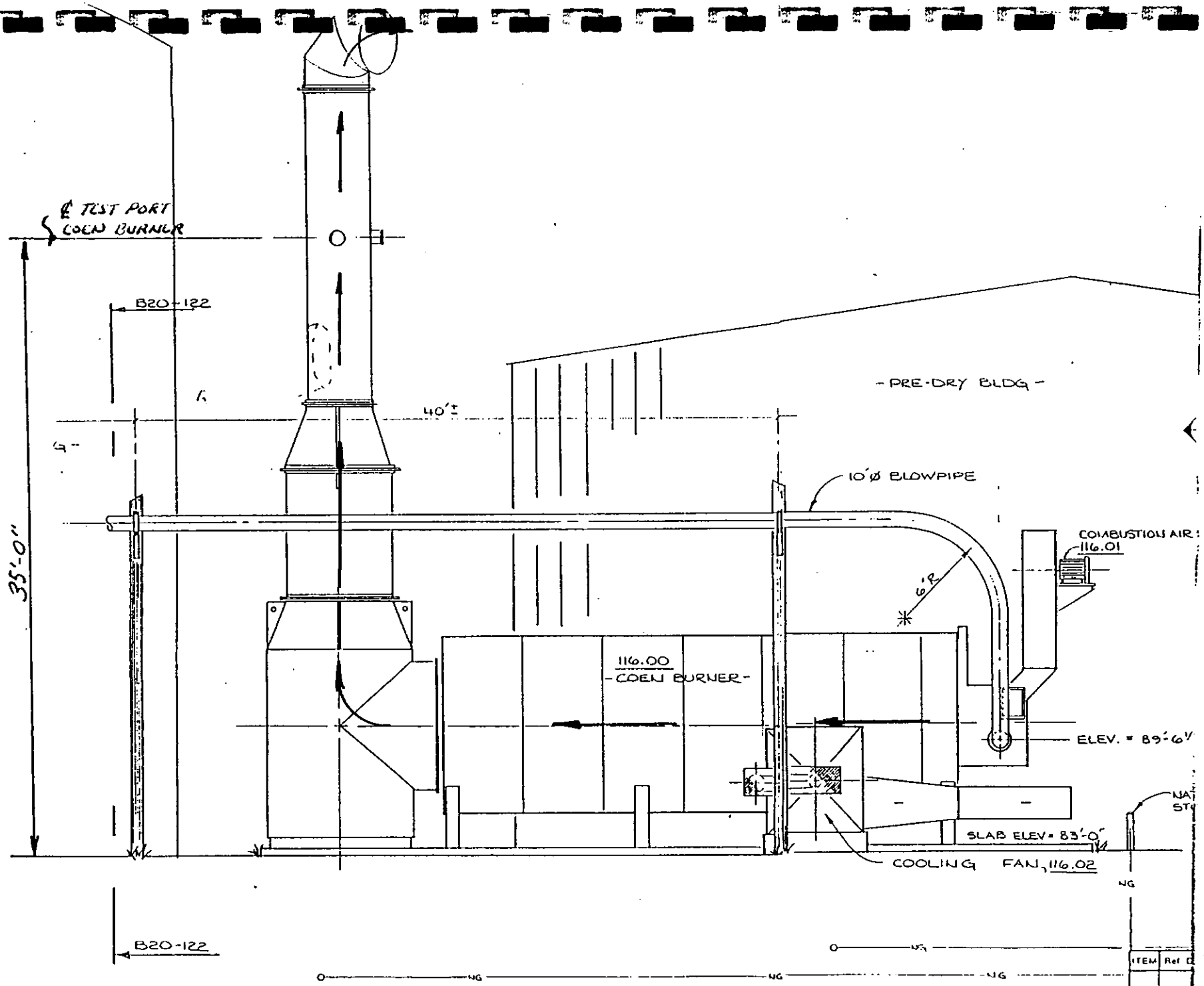
LINE 2 PRESS VENTS



PRE-DRYER SYSTEM
PLAN VIEW



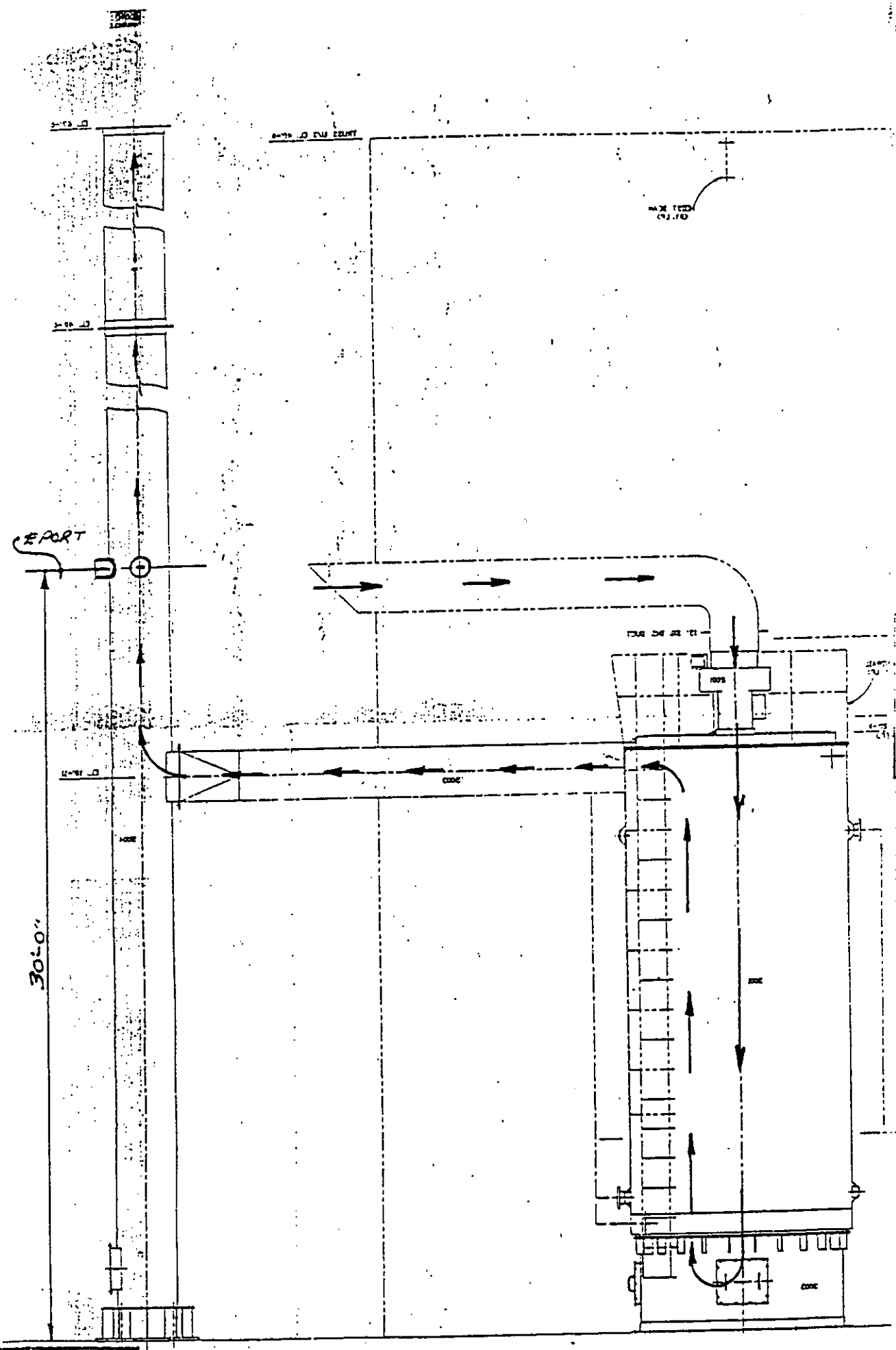
PRE-DRYER SYSTEM
END ELEVATION



ELEVATION OF
- COEN BURNER -

STACK
35,700 ACFM
AT +750°F

R-11



B-12 ELEVATION GEKA

BURNER

STACK
7200 ACFM
~ 400°F

APPENDIX C

GEKA FIELD DATA SHEETS

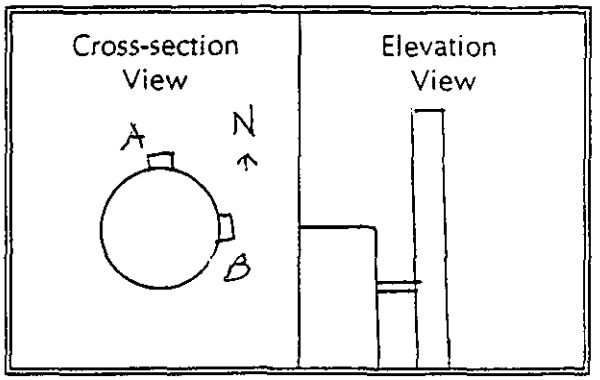
A = 21" DIAMETERS
12 points
B = 6 DIAMETERS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LP MISSOULA
Source: GEKA
Test: 1-1- Run 1 Date 4-9-94
Stack Dimen.: 20" IN.
Dry Bulb: 471 °F Wet bulb: ~~471~~ °F 115
Manometer: ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.74 IN.HG
Static Pressure: -.23 IN.WC
Operators: KR
Pitot No.: 29 V 4 C_p .84

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 8" IN.		Time Start: 1712 HRS	
A 1	.044	.88	8.88	.015	471
2	.146	2.92	10.92	.03	
3	.296	5.92	13.92	.03	
4	.704	14.08	22.08	.035	
5	.854	17.08	25.08	.025	
6	.956	19.12	27.12	.02	
B 1				.02	471
2				.025	
3				.03	
4				.03	
5				.035	
6				.035	

Temp. Meas. Device & S/N: POT 2K
Time End: 1725 HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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BOXES 4, 8

Interpoll Laboratories
(612)786-6020

EPA Method 7 Sample Collection
Field Data Sheet

Job LP / MISSOULA
Test Location GEKA
STACK

Date 5-9-94
Fuel Type Natural Gas
Technician GH + KR

Bar. Pressure 26.74 IN.HG.
Sample Train No. BLUE
Pump No. 29A

No.	Test Run Point	Flask No.	Time (HRS)	Vacuum (IN.HG.)	Flask Temp. (°F)	Leak Rate <0.4 IN.HG./MIN.
1	1-1-1	19	1700	24.8	94	■ Yes ☐ No
2	1-1-2	20	1715	25.0	94	■ Yes ☐ No
3	1-1-3	21	1730	24.9	94	■ Yes ☐ No
4	1-1 1	22	1745	25.1	93	■ Yes ☐ No
5	1-2-1	23	1800	25.0	90	■ Yes ☐ No
6	1-2 2	24	1815	24.4	90	■ Yes ☐ No
7	1-2 3	43	1830	24.5	88	■ Yes ☐ No
8	1-2-1	44	1845	24.5	88	■ Yes ☐ No
9	1-3-1	45	1900	24.5	87	■ Yes ☐ No
10	1-3-2	46	1915	24.6	88	■ Yes ☐ No
11	1-3·3	47	1930	24.5	88	■ Yes ☐ No
12	1-3-1	48	1945	24.5	85	■ Yes ☐ No
13						☐ Yes ☐ No
14						☐ Yes ☐ No
15						☐ Yes ☐ No
16						☐ Yes ☐ No
17						☐ Yes ☐ No
18						☐ Yes ☐ No
19						☐ Yes ☐ No
20						☐ Yes ☐ No
21						☐ Yes ☐ No
22						☐ Yes ☐ No
23						☐ Yes ☐ No
24						☐ Yes ☐ No
25						☐ Yes ☐ No
26						☐ Yes ☐ No
27						☐ Yes ☐ No

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APPENDIX D

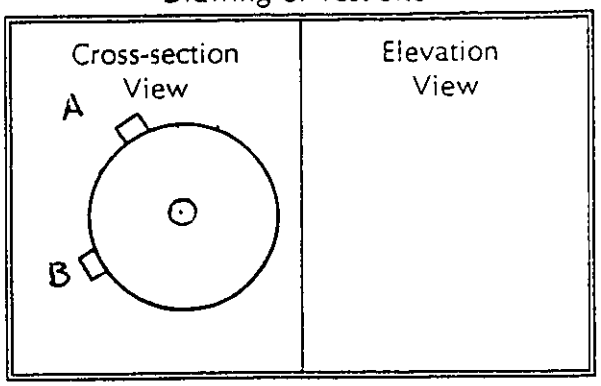
ROEMMC FIELD DATA SHEETS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LP- Missouri
Source: Roasting Tube
Test: 2 Run: 0 Date: 5-10-94
Stack Dimen.: 51 IN.
Dry Bulb: 845 °F Wet bulb: ____ °F
Manometer: ☐ Reg. ☒ Exp ☐ Elec.
Barometric Pressure: 26.85 IN.HG
Static Pressure: — .48 IN.WC
Operators: SB + KR
Pitot No.: WC-1 C_p .840

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 15	IN.	Time Start: 0740	HRS
A - 1	.021	1.07	16.07	.120	846
2	.067	3.42	18.42	.130	846
3	.118	6.02	21.02	.145	846
4	.177	9.03	24.03	.150	846
5	.250	12.75	27.75	.150	847
6	.356	18.16	33.16	.145	847
7	.644	32.84	47.84	.145	847
8	.750	38.25	53.25	.135	846
9	.823	41.97	56.57	.140	846
10	.882	44.98	59.58	.130	846
11	.933	47.58	62.58	.100	846
12	.979	49.93	64.93	.120	846
B - 1				.090	846
2	NOx P.M. 1/6	8.5	23.5	.110	846
3	3/6	25.5	40.5	.125	846
4	5/6	42.5	57.5	.130	846
5				.145	845
6		34.03	FT/sec	.150	845
7		28,964	ACFM	.150	845
8		9,625.3	DSCFM	.140	845
9		≈ 8%	H_2O	.140	845
10		≈ 15%	O_2	.135	845
11				.130	845
12				.115	845

Temp. Meas. Device & S/N: Digital TC PDT 29 | 0751 | Time End: HRS

R or nothing = reg. manometer; S = expanded; E = electronic

032594-G:\STACK\WP\FORMS\S-392.1

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - [illegible]
Source Recuperator Tube
Method 1-5 Filter holder: 4" Glass
Date 5-15-91 Test 2 Run 1
No. of traverse points 12
Filter type: 4" Quartz fiber

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6055

Recovery solvent(s)
☒acetone PW
☒other(s) MeCl2 - Trip. Rinse

No. of probe wash bottles: 1
Sample recovered by: SB

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	541	505	36
Impinger No. 3			
Condenser			
Desiccant	1484	1463	22
Total			58

Integrated Gas Sampling Data:

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 1110
Sampling rate: 400
Box No. 29 Bag No. 1
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1212 (HRS)
cc/min Operator: SB

S/N of O_2 Analyzer used to monitor train outlet: 11

123093-G:\STACK\WP\METHODS\S-0046RR

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP - Missoula
Source: Roemac Tube
Date: 5-10-94 Test 2 Run 1

Operators: SB + RK
Meter Box No. 10 ΔH@ 1.77 IN WC
Counter cont: 9454

Pitot No. [illegible] Cp .840
Bar. Press. 26.85 inHg H2O 5 %
Nozzle No. 4-7 Nozzle Dia .235 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1100)	(300.50)											
A - 6	5	304.45	.145	1.84	4.51	5	860	257	252	39	68	68	13.8
5	10	308.45	.140	1.95	8.82	5	840	251	252	39	70	68	15.4
4	15	313.00	.145	2.03	3.05	6	839	258	254	44	73	68	15.4
3	20	317.32	.145	2.05	7.30	6	831	257	254	45	77	68	14.6
2	25	321.62	.150	2.12	1.64	6	834	257	255	46	82	70	14.1
1	30	326.00	.152	2.15	6.02	6	840	256	253	47	82	71	14.0
B - 6	35	330.32	.160	2.26	6.57	7	845	251	254	48	84	70	15.2
5	40	335.00	.165	2.33	5.07	7	846	254	256	47	85	71	15.4
4	45	339.32	.150	2.17	9.48	7	845	254	242	48	86	72	15.5
3	50	343.40	.140	2.03	3.75	7	817	254	250	47	87	73	15.4
2	55	347.90	.135	1.96	7.94	6	818	255	251	46	87	74	15.1
1	60	351.99	.125	1.82	1.99	6	815	255	254	45	88	75	13.6
	(1212)												
	θ = 60	Vm = 51.49		ΔH = 2.07							Avg. = 75.7		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - Missoula
Source Roemac Tube
Method 1-5 Filter holder: 4" Glass
Sample Train Leak Check:

Date 7-10-94 Test 2 Run 2
No. of traverse points 12
Filter type: 4" Glass filter

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6054

Recovery solvent(s)
☒ acetone DW
☒ other(s) Macer - Imp. Rinse

No. of probe wash bottles: 1
Sample recovered by: SB

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	548	508	40
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1542	1530	12
Total			52

Integrated Gas Sampling Data:

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00 cc/min at 15 in. Hg.
Time start: 1300 (HRS) Time end: 1403 (HRS)
Sampling rate: 400 cc/min Operator: SB

Box No. 29 Bag No. 2
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 11

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP - Missoula
Source: Rotunda Tube
Date: 5-10-94 Test: 2 Run: 2

Operators: SB - KR
Meter Box No.: 10 ΔH@: 1.79 IN WC
Counter coeff.: .9954

Pitot No.: 00-1 Cp: .840
Bar. Press.: 26.27 inHg H2O: 3.7 %
Nozzle No.: 9-7 Nozzle Dia: .435 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1800)	(357.30)											
B-6	5	356.84	.160	2.28	6.80	6	820	251	250	49	76	74	15.2
5	10	361.25	.170	2.42	1.45	6	819	251	250	48	80	75	15.4
4	15	366.10	.170	2.45	6.3	6	807	250	254	49	83	76	14.4
3	20	370.52	.150	2.12	0.50	7	837	251	254	49	87	76	13.6
2	25	374.88	.145	2.06	4.81	6	835	254	251	49	87	76	13.6
1	30	378.80	.125	1.78	8.83	6	832	254	250	51	89	76	13.2
A-6	35	382.99	.135	1.92	2.99	6	840	250	254	54	92	78	14.4
5	40	387.30	.145	2.07	7.38	6	837	251	253	51	93	78	13.4
4	45	391.70	.150	2.12	1.71	6	856	254	256	50	93	78	12.9
3	50	396.00	.145	2.04	6.02	6	858	255	256	50	94	80	12.1
2	55	400.10	.135	1.90	0.19	7	861	254	256	50	95	80	14.2
1	60	404.22	.125	1.78	4.22	5	851	254	255	51	97	82	13.3
	(1403)												
	θ = 60	Vm = 51.92		ΔH 2.05							Avg. =	76	

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - [illegible]
Source Roomme Tube
Method 1-5 Filter holder: 4" Glass

Date [illegible] Test 2 Run 3
No. of traverse points 12
Filter type: 4" [illegible]

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: 0.00 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

6059

Recovery solvent(s)

☑ acetone PW
☒ other(s) MeCl2 Trap Rinse

No. of probe wash bottles: 1
Sample recovered by: SB

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	555	508	47
Impinger No. 3			
Condenser			
Desiccant	1420	1403	17
Total			64

Integrated Gas Sampling Data:

Bag Pump No. 228
Bag Material: 5-layer Aluminized Ted...
Pretest leak check: 00
Time start: 1445
Sampling rate: 400

Box No. 29 Bag No. 3
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1547 (HRS)
cc/min Operator: SB

S/N of O_2 Analyzer used to monitor train outlet: 11

123093-G:\STACK\WP\METHODS\S-0046RR

LP-011

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP- Missouri
Source: Rotamac - TUBE
Date: 5-10-94 Test: 2 Run: 3

Operators: SB + KR
Meter Box No.: 10 ΔH@: 1.79 IN WC
Gasmeter coeff.: .9954

Pitot No.: WC-1 Cp: .840
Bar. Press.: 26.87 inHg H2O: 5.0 %
Nozzle No.: 4-7 Nozzle Dia: .435 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry Gas Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1145)	(404.50)											
A - 6	5	408.84	.125	1.78	8.51	6	850	254	251	49	89	87	14.9
5	10	412.90	.140	2.03	2.82	7	836	254	251	49	94	87	14.5
4	15	417.20	.145	2.12	7.22	7	835	256	257	51	97	88	14.3
3	20	421.70	.155	2.27	1.79	8	836	254	256	51	99	89	14.5
2	25	426.50	.165	2.45	6.53	8	822	256	258	52	100	89	12.5
1	30	431.00	.150	2.22	6.06	7	827	254	257	50	102	89	12.6
B - 6	35	435.60	.154	2.30	5.66	7	815	252	256	51	103	89	12.6
5	40	440.44	.165	2.44	0.43	8	820	251	254	51	105	92	14.5
4	45	445.30	.175	2.63	5.37	8	815	254	256	51	105	93	14.7
3	50	450.20	.180	2.71	0.79	8	813	254	256	52	106	94	14.2
2	55	455.32	.180	2.65	5.36	8	814	254	256	54	107	95	14.3
1	60	459.96	.150	2.27	9.94	8	812	255	254	52	108	96	12.5
	(1347)												
	θ = 60	Vm = 55.46		ΔH = 2.32							Avg. = 95.8		

S-0037R

Interpoll Laboratories
(612)786-6020

EPA Method 7 Sample Collection
Field Data Sheet

Job LP MISSOULA Date 5-10-94 Bar. Pressure 26.87 IN.HG.
Test Location Revenmec Tube Fuel Type Lead Dust Sample Train No. NO. 3
Technician KR + SB Pump No. 1

No.	Test Run Point	Flask No.	Time (HRS)	Vacuum (IN.HG.)	Flask Temp. (°F)	Leak Rate <0.4 IN.HG./MIN.
1	2-1-3	1	1112	25.8	98	☑ Yes ☐ No
2	2-1-2	2	1127	25.7	98	☑ Yes ☐ No
3	2-1-1	3	1142	25.9	98	☑ Yes ☐ No
4	2-1-1	4	1157	25.9	99	☑ Yes ☐ No
5	2-2-2	5	1302	25.8	100	☑ Yes ☐ No
6	2-2-3	6	1317	25.8	100	☑ Yes ☐ No
7	2-2-3	55	1332	25.8	100	☑ Yes ☐ No
8	2-2-2	56	1349	25.6	101	☑ Yes ☐ No
9	2-3-1	57	1447	25.9	103	☑ Yes ☐ No
10	2-3-1	58	1459	25.9	104	☑ Yes ☐ No
11	2-3-2	59	1515	25.9	104	☑ Yes ☐ No
12	2-3-3	60	1530	25.8	104	☑ Yes ☐ No
13						☐ Yes ☐ No
14						☐ Yes ☐ No
15						☐ Yes ☐ No
16						☐ Yes ☐ No
17						☐ Yes ☐ No
18						☐ Yes ☐ No
19						☐ Yes ☐ No
20						☐ Yes ☐ No
21						☐ Yes ☐ No
22						☐ Yes ☐ No
23						☐ Yes ☐ No
24						☐ Yes ☐ No
25						☐ Yes ☐ No
26						☐ Yes ☐ No
27						☐ Yes ☐ No

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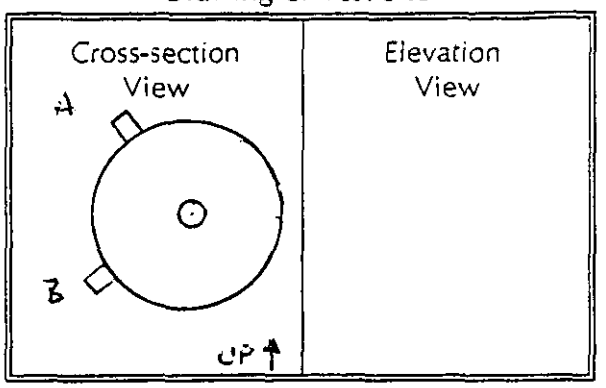
INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LP - Missoula
Source: Roemac Tube
Test: 5 Run: 0 Date: 5-10-94
Stack Dimen.: 51 IN.
Dry Bulb: 520 °F Wet bulb: °F
Manometer: ☐ Reg. ☒ Exp ☐ Elec.
Barometric Pressure: 26.87 IN.HG
Static Pressure: -.48 IN.WC
Operators: JB + KR
Pitot No.: WC-1 C_p: .840

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 15	IN.	Time Start:	HRS
A-1	.044	2.24	17.24		
2	.146	7.45	22.45		
3	.296	15.10	30.10		
4	.704	35.90	50.90		
5	.854	43.55	58.55		
6	.956	48.76	63.76		
B-1					
2					
3					
4					
5					
6					

Temp. Meas. Device & S/N: Digital T/C - PDT-29 | Time End: HRS

R or nothing = reg. manometer; S = expanded; E = electronic

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. Missoula
Source Roemmc Tube
Method 0011 Filter holder: N/A

Date 5-10-91 Test 5 Run 1
No. of traverse points 12
Filter type: N/A

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 12 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:
N/A

Recovery solvent(s)
☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles: N/A - In imp. Acid Bottle
Sample recovered by: SB

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	504	477	27
Impinger No. 3			
Condenser			
Desiccant	1547	1520	27
Total			54

Integrated Gas Sampling Data:

Bag Pump No. 2213
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 1915
Sampling rate: 400

Box No. 29 Bag No. 1
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 2017 (HRS)
cc/min Operator: SB

S/N of O_2 Analyzer used to monitor train outlet: 11

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP - Missoula
Source: Exhaust Tube
Date: 5-10-94 Test: 3 Run: 1

Operators: SB + KR
Meter Box No.: 10 ΔH@ 1.75 IN WC
Counter coeff.: .9754

Pitot No.: WC-1 Cp: .840
Bar. Press.: 26.87 inHg H2O: 5 %
Nozzle No.: 4-7 Nozzle Dia.: .435 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1915)	(459.90)											
B - 6	5	464.20	.125	1.98	4.18	6	745	251	254	49	79	79	14.8
5	10	468.68	.150	2.26	8.68	7	767	251	252	50	79	79	14.8
4	15	473.33	.165	2.47	3.39	7	773	257	254	50	81	79	15.2
3	20	478.26	.175	2.63	8.25	8	773	250	251	48	82	78	15.8
2	25	482.81	.165	2.48	2.97	8	772	254	255	47	84	78	13.4
1	30	487.57	.150	2.27	7.49	8	768	254	251	46	86	78	15.1
B - 6	35	491.92	.145	2.13	1.87	8	806	254	251	45	88	78	15.2
5	40	496.34	.150	2.17	6.30	8	827	254	251	44	89	79	15.5
4	45	500.90	.165	2.39	0.95	7	830	254	251	44	89	79	15.0
3	50	505.62	.170	2.46	5.66	7	832	251	251	43	91	79	14.8
2	55	510.83	.170	2.52	6.44	7	800	248	246	41	91	80	13.8
1	60	515.06	.160	2.35	5.06	7	815	247	247	43	91	80	13.9
	(2027)												
	θ = 60	Vm = 55.14		ΔH = 2.14							Avg. = 82.5		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - Mennaulu
Source Rotomix Tube
Method 0011 Filter holder: N/A
Sample Train Leak Check:

Date 5-10-94 Test 5 Run 2
No. of traverse points 12
Filter type: N/A

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 11 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:
N/A

Recovery solvent(s)
☐ acetone
☒ other(s) MeOH

No. of probe wash bottles: N/A -- In Imp Catch Bottle
Sample recovered by: SB

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	9	474	25
Impinger No. 3			
Condenser			
Desiccant	1532	1510	22
Total			47

Integrated Gas Sampling Data:

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 2058
Sampling rate: 400

Box No. 3 Bag No. 2
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 2101 (HRS)
cc/min Operator: SB

S/N of O_2 Analyzer used to monitor train outlet: 11

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP - Monroe
Source: Reference Tube
Date: 5-15-94 Test: 5 Run: 2

Operators: SB + KIL
Meter Box No.: 10 ΔH@ 1.75 IN WC
Gasmeter coeff.: .9954

Pitot No.: 2-1 Cp: .840
Bar. Press.: 28.47 inHg H2O 5" x
Nozzle No.: 7-1 Nozzle Dia: .375 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(2058)	(515.85)											
A - 6	5	520.30	.150	2.20	0.30	6	811	248	250	48	78	75	15.3
5	10	524.70	.160	2.24	4.78	6	857	248	251	46	80	77	15.8
4	15	529.30	.165	2.31	9.33	6	859	247	250	46	84	77	15.7
3	20	531.10	.180	2.54	9.44	7	855	246	251	46	85	77	15.1
2	25	538.88	.180	2.45	8.80	8	906	247	254	44	86	77	13.9
1	30	543.20	.170	2.30	3.35	8	914	251	250	42	88	77	15.4
B - 6	35	547.60	.150	2.09	7.69	7	876	255	250	42	89	77	14.0
5	40	552.62	.185	2.62	2.56	8	854	254	252	41	90	78	14.0
4	45	557.62	.195	2.68	7.48	8	897	254	254	40	91	78	15.7
3	50	562.03	.180	2.54	2.27	8	866	254	254	40	91	78	15.7
2	55	566.99	.175	2.46	6.99	8	869	254	251	41	91	79	14.2
1	60	571.65	.170	2.39	1.65	7	870	254	251	41	91	79	14.3
	(2101)												
	θ = 60	Vm = 55.80		ΔH 2.40							Avg. = 82.3		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - Missoula
Source Roemme Tube
Method 0011 Filter holder: N/A

Date 5-10-91 Test 5 Run 3
No. of traverse points 12
Filter type: N/A

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: 0.00 cfm at 12 in. Hg. (vac) ☑

Particulate Catch Data:

No. of filters used:

N/A

Recovery solvent(s)

☐ acetone
☑ other(s) MeCl2

No. of probe wash bottles: N/A - FH4 Top Catch Bottle
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	510	475	35
Impinger No. 3			
Condenser			
Desiccant	1563	1547	16
Total			51

Integrated Gas Sampling Data:

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 2242
Sampling rate: 400

Box No. 29 Bag No. 3
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 2345 (HRS)
cc/min Operator: SJS

S/N of O_2 Analyzer used to monitor train outlet: 11

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CF-011

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. Mussale
Source: Rotunda Tube
Date: 6-10-94 Test: 5 Run: 3

Operators: JS + KR
Meter Box No.: 10 ΔH@: 1.79 IN WC
Meter coeff.: .9950

Pitot No.: 4C-1 Cp: .840
Bar. Press.: 26.87 inHg H2O: 5 %
Nozzle No.: 4-7 Nozzle Dia: .435 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (v/v)
	(0242)	(572.60)											
A - 6	5	576.99	.150	2.09	6.94	6	879	251	254	42	76	76	15.0
5	10	581.40	.160	2.22	1.39	6	864	254	254	43	78	76	14.7
4	15	585.60	.155	1.99	5.61	6	975	255	256	44	79	75	16.5
3	20	590.20	.159	2.31	0.19	6	790	254	257	41	81	75	16.9
2	25	594.82	.160	2.37	4.79	7	785	254	251	40	84	75	17.4
1	30	599.30	.165	2.32	5.36	7	856	254	251	40	87	75	15.7
B - 6	35	603.75	.155	2.21	3.82	7	843	254	251	41	88	75	15.7
5	40	608.40	.165	2.40	8.46	7	819	254	251	41	89	76	15.7
4	45	613.10	.180	2.45	3.16	8	908	254	254	40	89	76	15.6
3	50	617.72	.175	2.38	2.79	8	911	254	251	40	90	76	15.8
2	55	622.30	.170	2.30	2.35	8	918	251	254	40	90	77	15.0
1	60	626.91	.170	2.30	6.91	8	920	254	256	39	91	77	14.7
	(0345)												
	θ = 60	Vm = 54.31		ΔH @ 2.08							Avg. =	80.4	

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APPENDIX E

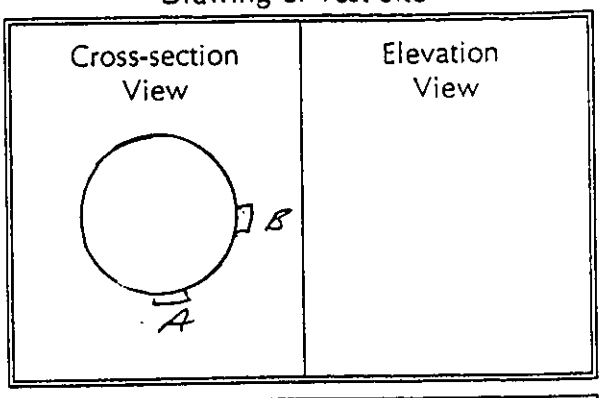
DRYER FIELD DATA SHEETS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LOUISIANA PACIFIC, MISSOULA, MONT
Source: "C" DRYER STACK
Test: 3 Run: 1 Date: 5-10-94
Stack Dimen.: 34.5 IN.
Dry Bulb: °F Wet bulb: °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.85 IN.HG
Static Pressure: — 1.50 IN.WC
Operators: E. TROWBRIDGE - G. HOVO
Pitot No.: C_p .840

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 2 IN.		Time Start: 0950 HRS	
A 1	.021	.72	2.72	.90	
2	.067	2.31	4.31	.90	
3	.118	4.07	6.07	1.10	
4	.177	6.11	8.11	1.50	
5	.250	8.63	10.63	2.20	
6	.356	12.28	14.28	2.40	
7	.644	22.21	24.21	2.30	162
8	.750	25.88	27.88	2.20	
9	.823	28.39	30.39	2.10	
10	.882	30.43	32.43	1.90	
11	.935	32.19	34.19	1.90	
12	.979	33.78	35.78	1.75	
B 1				.74	
2				.90	
3				1.40	
4				1.30	
5				1.70	162
6				2.00	
7				2.30	
8				1.70	
9				1.30	
10		ET/SIC	52.22	1.50	
11		ACFM	32027	1.50	
12		DSCFM	17437	1.40	

Temp. Meas. Device & S/N: PDT-34
Time End: 1105 HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/Missoula
Source "C" DRYER STACK
Method 5 Filter holder: 4" GLASS
Date 5-10-94 Test 3 Run 1
No. of traverse points 24
Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☐
Post test: 0 cfm at 14 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6479

Recovery solvent(s)
☒ acetone
☒ other(s)

No. of probe wash bottles: 1
Sample recovered by: ET

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		100	
Impinger No. 2		100	6
Impinger No. 3		0	
Condenser			
Desiccant	1468	1452	16
Total			22

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1111 (HRS) Time end: 1211 (HRS)
Sampling rate: 400 cc/min Operator: E.T.
Box No. 7 Bag No. 1
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. MISSOULA
Source: "C" DRYER STACK
Date: 5-16-94 Test: 3 Run: 1

Operators: E. Hawkins / Doc-G. Hoke
Meter Box No.: 4 ΔH: 1.94 IN WC
Counter coeff.: 1.004
Pitot No.: 221-4 Cp: .848
Bar. Press.: 26.85 inHg H2O %
Nozzle No.: 3-3 Nozzle Dia: .185 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1110	495.50											
B 12	2.5	496.82	.78	.86	6.83	4.0	147	253	260		76	76	19.3
11	5	488.35	1.0	1.10	8.33	4.7	137	254	260	46	77	76	19.4
10	7.5	499.70	.90	.99	9.75	4.5	137				77	76	19.2
9	10	501.40	1.20	1.33	1.39	6.0	137	256	258	46	77	76	19.4
8	12.5	502.90	1.05	1.15	2.92	5.5	140				78	76	19.2
7	15	505.01	2.10	2.30	5.08	10.0	143	255	254	39	79	76	19.2
6	17.5	507.40	2.50	2.73	7.43	13.0	144				80	77	19.4
5	20	509.65	2.40	2.63	9.74	13.0	144	252	252	39	81	77	19.6
4	22.5	511.69	1.90	2.08	1.79	11.5	145				81	77	19.3
3	25	513.90	2.15	2.34	3.98	12.5	147	250	249	42	81	77	19.2
2	27.5	515.70	1.30	1.42	5.68	9.0	147				82	78	19.3
1	30	517.34	1.20	1.30	7.31	7.0	151	250	252	43	83	78	19.2
A 12	32.5	519.28	1.70	1.85	9.25	8.0	150				83	78	19.1
11	35	521.30	1.80	1.95	1.25	8.2	152	254	255	45	84	79	19.5
10	37.5	523.21	1.90	2.06	3.30	8.5	154				85	79	19.6
9	40	525.45	2.20	2.38	5.51	11.0	154	252	250	45	86	79	19.6
8	42.5	527.70	2.40	2.60	7.82	13.0	154				86	80	19.4
7	45	530.12	2.40	2.60	0.13	13.2	154	250	254	46	86	80	19.7
6	47.5	532.22	2.20	2.39	2.34	12.0	154				86	80	19.6
5	50	534.27	1.70	1.87	4.29	10.0	148	249	255	46	86	80	19.7
4	52.5	536.10	1.40	1.54	6.07	8.0	148				86	80	19.7
3	55	537.80	1.40	1.53	7.84	8.0	151	247	253	45	86	81	19.7
2	57.5	539.50	1.20	1.31	9.49	7.0	153				86	81	19.5
1	60	541.10	1.10	1.20	1.06	6.0	150	248	250	42	86	81	19.5
	(12/2)												
	θ = 60	Vm = 45.60		ΔH = 1.81							Avg. = 80.3		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/MISSOULA
Source "C" DRYER STACK
Method 5 Filter holder: 4" GLASS

Date 5-10-97 Test 3 Run 2
No. of traverse points 24
Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 15 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:
6482

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: ET

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		100	
Impinger No. 2		100	17
Impinger No. 3		0	
Condenser			
Desiccant	1468	1453	15
Total			32

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1301
Sampling rate: 400

Box No. 7 Bag No. 2
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1401 (HRS)
cc/min Operator: ET

S/N of O_2 Analyzer used to monitor train outlet: 3

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CF-011

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LPI/NISSULA
Source HCN PLANT STACK
Date 5-10-94 Test 3 Run 2

Operators ET-GN
Meter Box No. 4 ΔH 1.94 IN WC
Counter coeff. 1.0041

Pitot No. 221-4 Cp .840
Bar. Press. 26.85 inHg H2O %
Nozzle No. 3-3 Nozzle Dia .185 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1300	541.50											
A 12	2.5	543.43	1.70	1.88	3.46	7.0	160	245	252	42	82	81	19.5
11	5	545.47	1.80	2.00	5.48	7.6	160				83	81	19.7
10	7.5	547.52	1.80	2.01	7.50	7.8	158	247	250	42	84	82	19.8
9	10	549.60	2.2	2.41	9.72	9.5	170				84	82	19.6
8	12.5	551.95	2.40	2.63	2.04	11.0	168	251	254	44	85	82	19.8
7	15	554.40	2.40	2.69	4.39	11.0	155				87	84	19.7
6	17.5	556.70	2.40	2.72	6.76	11.2	150	254	256	45	90	86	19.7
5	20	559.00	2.20	2.51	9.03	10.0	150				92	87	19.5
4	22.5	561.05	1.70	1.94	1.04	10.0	151	256	260	45	93	88	19.5
3	25	562.90	1.40	1.61	2.87	8.0	150				97	92	19.4
2	27.5	564.70	1.30	1.51	4.65	7.0	145	250	261	44	98	92	19.4
1	30	566.30	1.10	1.28	6.30	6.0	145				98	92	19.4
B 12	32.5	567.70	.80	.92	7.69	4.0	151	248	254	42	98	92	19.4
11	35	569.20	.90	1.04	9.17	4.5	159				98	93	19.4
10	37.5	570.81	1.10	1.28	0.81	5.0	148	256	257	43	100	94	19.4
9	40	572.56	1.30	1.52	2.60	6.2	145				101	94	19.6
8	42.5	574.67	1.80	2.10	4.71	8.0	146	252	260	44	101	94	19.5
7	45	576.80	2.00	2.35	6.93	10.0	142				102	94	19.2
6	47.5	579.04	2.00	2.35	9.15	10.2	144	253	257	44	102	95	19.6
5	50	581.47	2.40	2.81	1.58	14.0	145				101	95	19.2
4	52.5	583.76	2.10	2.46	3.86	13.0	145	250	254	45	101	95	19.2
3	55	586.15	2.30	2.71	6.24	14.0	142				100	94	19.7
2	57.5	588.41	1.90	2.23	8.41	13.0	142	250	255	44	100	94	19.2
1	60	590.25	1.30	1.53	0.21	8.0	142				100	94	19.2
	(1402)												
	θ = 60	Vm = 48.75		ΔH 2.02							Avg. = 92.3		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/MISSOULA
Source "C" DRYER STACK
Method 5 Filter holder: 4" GLASS
Date 5-10-94 Test 3 Run 3
No. of traverse points 24
Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 15 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6576

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: ET

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	531	514	
Impinger No. 2			17
Impinger No. 3		0	
Condenser			
Desiccant	1477	1468	9
Total			26

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 1444 (HRS) Time end: 1547 (HRS)
Sampling rate: 400 cc/min Operator: ET
Box No. 7 Bag No. 3
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/MIZZOULA
Source "C" DRYER STACK
Date 5-10-94 Test 3 Run 3

Operators ET-GH
Meter Box No. 4 ΔH@ 1.94 IN WC
Gasmeter coeff. 1.0041

Pitot No. 204-4 Cp .840
Bar. Press. 26.55 inHg H2O %
Nozzle No. 3-3 Nozzle Dia .183 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Des. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1445	590.60											
B 12	2.5	591.92	.70	.80	1.90	3.8	150	251	254	43	91	90	19.2
11	5	593.36	.88	1.01	3.35	4.0	145				92	90	19.2
10	7.5	595.01	1.10	1.26	4.97	5.8	145	254	252	43	93	90	19.0
9	10	596.55	1.30	1.35	6.52	6.2	144				94	90	19.2
8	12.5	598.65	1.80	2.06	8.59	8.0	145	256	255	44	94	91	19.3
7	15	600.90	2.10	2.41	0.83	10.8	145				95	91	19.1
6	17.5	603.30	2.40	2.75	3.23	14.0	145	254	258	44	96	91	19.3
5	20	605.68	2.50	2.86	5.67	14.2	146				96	91	19.3
4	22.5	608.03	2.20	2.53	7.96	13.0	145	255	253	44	96	91	19.0
3	25	610.25	2.00	2.29	0.15	12.0	146				96	91	19.2
2	27.5	612.30	1.70	1.95	2.17	9.0	145	252	250	43	96	92	18.8
1	30	614.10	1.40	1.61	4.01	7.	144				96	92	18.9
A 12	32.5	616.19	1.80	2.07	6.09	9.0	146	250	248	42	96	92	19.0
11	35	618.25	1.80	2.06	8.17	9.0	148				98	93	18.9
10	37.5	620.50	2.10	2.41	0.42	10.2	147	253	251	44	99	93	18.9
9	40	622.75	2.10	2.41	2.67	10.2	148				101	95	18.9
8	42.5	625.20	2.40	2.76		14.	148	250	252	45	101	95	18.9
7	45	627.60	2.50	2.88	7.53	14.2	148				101	96	18.9
6	47.5	630.05	2.50	2.89	0.00	14.2	147	253	255	46	101	96	18.9
5	50	632.25	2.30	2.66	2.36	14.0	146				101	96	19.1
4	52.5	634.55	2.00	2.31	4.57	13.0	146	252	257	46	101	96	19.1
3	55	636.80	2.00	2.32	6.78	13.0	145				101	96	18.8
2	57.5	638.85	1.70	1.97	8.82	10.0	145	250	254	46	101	96	19.1
1	60	640.70	1.30	1.51	0.61	9.0	145				101	96	
	(1548)												
	θ = 60	Vm = 50.10		ΔH = 2.12							Avg. = 95.1		

S-0037R

Interpoll Laboratories
(612)786-6020

EPA Method 7 Sample Collection
Field Data Sheet

Job LP MISSOULA Date 5-10-94 Bar. Pressure 26.85 IN.HG.
Test Location 3 Fuel Type _____ Sample Train No. [illegible]
Technician [illegible] Pump No. 29 [illegible]

No.	Test Run Point	Flask No.	Time (HRS)	Vacuum (IN.HG.)	Flask Temp. (°F)	Leak Rate <0.4 IN.HG./MIN.
1	3-1-1	19	1115	24.5	69	☒ Yes ☐ No
2	3-1-2	20	1130	24.5	69	☒ Yes ☐ No
3	3-1-3	21	1145	24.5	69	☒ Yes ☐ No
4	3-1-1	22	1200	24.0	69	☒ Yes ☐ No
5	3-2-1	23	1305	24.8	70	☒ Yes ☐ No
6	3-2-2	24	1316	24.3	70	☒ Yes ☐ No
7	3-2-3	43	1335	24.5	70	☒ Yes ☐ No
8	3-2-1	44	1347	24.0	70	☒ Yes ☐ No
9	3-3-1	45	1445	24.5	74	☒ Yes ☐ No
10	3-3-2	46	1500	24.8	76	☒ Yes ☐ No
11	3-3-3	47	1515	25.0	77	☒ Yes ☐ No
12	3-3-1	48	1530	25.0	78	☒ Yes ☐ No
13						☐ Yes ☐ No
14						☐ Yes ☐ No
15						☐ Yes ☐ No
16						☐ Yes ☐ No
17						☐ Yes ☐ No
18						☐ Yes ☐ No
19						☐ Yes ☐ No
20						☐ Yes ☐ No
21						☐ Yes ☐ No
22						☐ Yes ☐ No
23						☐ Yes ☐ No
24						☐ Yes ☐ No
25						☐ Yes ☐ No
26						☐ Yes ☐ No
27						☐ Yes ☐ No

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/MISSOULA
Source "C" DRYER STACK
Method Small Filter holder: —
Sample Train Leak Check:

Date 5-10-94 Test 6 Run 1
No. of traverse points 24
Filter type: —

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 12 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: —

Recovery solvent(s)

☐ acetone
☒ other(s) MECL2

No. of probe wash bottles: 1
Sample recovered by: MK

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	210	200	10
Impinger No. 3			
Condenser			
Desiccant	1467	1453	14
Total			24

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1416
Sampling rate: 400

Box No. 7 Bag No. 1
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 2017 (HRS)
cc/min Operator: ET

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/MISSOULA
Source "TC" DRYER STACK
Date 5-10-94 Test 6 Run 1

Operators ET-GH
Meter Box No. 4 ΔH@ 1.94 IN WC
Gasmeter coeff. 1.0041

Pitot No. 22V-4 Cp .84
Bar. Press. 26.85 inHg H2O x
Nozzle No. 3-5 Nozzle Dia .185 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	15	641.70											
A-12	2.5	643.90	2.00	2.46	3.46	8.0	140	252	255	40	91	90	20.1
11	5	646.25	2.00	2.43	6.4	7.8	141				92	90	20.1
10	7.5	648.40	2.10	2.54	8.51	8.0	146	255	257	40	92	91	19.9
9	10	650.75	2.20	2.66	0.86	8.5	146				93	92	19.9
8	12.5	653.10	2.30	2.78	3.26	8.5	147	254	255	41	94	92	19.8
7	15	655.65	2.40	2.90	5.72	9.0	147				92	90	19.9
6	17.5	658.01	2.40	2.89	8.17	9.5	147	256	253	41	94	90	19.7
5	20	660.18	1.80	2.02	0.14	8.0	145				94	90	20.1
4	22.5	661.90	1.30	1.46	1.83	5.0	145	254	250	41	94	93	19.9
3	25	663.55	1.10	1.34	3.50	4.0	145				93	91	20.0
2	27.5	665.20	1.10	1.34	5.17	4.0	143	251	249	41	93	91	19.8
1	30	666.80	1.00	1.22	6.77	3.8	143				93	91	20.0
B-12	32.5	668.22	.80	.97	8.20	3.2	143	250	252	40	90	86	19.9
11	35	669.60	.75	.91	9.57	3.2	143				92	86	20.0
10	37.5	671.22	1.00	1.22	1.16	3.8	140	253	255	42	93	87	20.0
9	40	672.85	1.10	1.33	2.83	4.0	145				93	87	19.9
8	42.5	674.90	1.80	2.17	4.95	6.5	147	255	254	42	93	87	19.9
7	45	676.90	1.50	1.81	6.89	6.0	145				95	88	19.7
6	47.5	679.02	1.90	2.31	9.09	7.0	142	257	256	42	96	88	19.6
5	50	681.50	2.40	2.91	1.54	9.0	145				96	88	19.5
4	52.5	683.50	1.70	2.06	3.62	7.0	145	254	252	42	96	89	19.6
3	55	685.40	1.20	1.47	5.37	5.0	140				96	89	19.9
2	57.5	687.42	1.60	1.96	7.39	7.0	140	252	250	42	96	89	19.6
1	60	689.40	1.50	1.84	9.55	6.0	140				96	89	19.8
	(2018)												
	θ = 60	Vm = 47.70		ΔH = 1.86							Avg. = 88.0		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/MISSOULA
Source "C" DRYER STACK
Method 5001/ Filter holder: —
Date 5-10-94 Test 6 Run 2
No. of traverse points 24
Filter type: —

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: N/A

Recovery solvent(s)
☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: GH

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	214	200	14
Impinger No. 3			
Condenser			
Desiccant	1482	1468	14
Total			28

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 2059 (HRS) Time end: 2203 (HRS)
Sampling rate: 400 cc/min Operator: ET
Box No. 7 Bag No. 2
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/MISSOULA
Source "C" DRYER STACK
Date 5-10-94 Test 6 Run 2

Operators ET GH
Meter Box No. 4 ΔH@ 1.94 IN WC
Gasmeter coeff. 1.0041

Pitot No. 72V-4 Cp .840
Bar. Press. 26.85 inHg H2O %
Nozzle No. 3-3 Nozzle Dia .185 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (xx/v)
	2058	689.80											
B 12	2.5	691.15	.70	.80	1.09	3.0	153	247	251	40	88	87	19.3
11	5	692.53	.85	.97	2.51	3.0	156				88	87	19.7
10	7.5	694.32	1.40	1.60	4.32	4.0	156	252	255	40	89	87	19.8
9	10	696.40	1.90	2.17	6.44	6.0	156				91	88	19.8
8	12.5	698.60	2.00	2.28	8.62	6.5	156	254	252	40	91	88	19.8
7	15	700.75	2.20	2.51	0.90	7.5	157				92	88	19.6
6	17.5	702.80	1.60	1.83	2.84	7.0	157	255	254	42	93	88	19.7
5	20	704.60	1.20	1.37	4.54	4.0	157				93	88	19.8
4	22.5	706.20	1.10	1.26	6.16	4.0	157	252	251	42	93	88	19.7
3	25	708.20	1.70	1.94	8.17	6.0	157				93	88	19.8
2	27.5	710.40	2.00	2.29	0.34	7.0	157	250	248	42	93	88	19.7
1	30	712.35	1.60	1.83	2.30	6.0	157				94	88	19.6
A 12	32.5	714.41	1.80	2.06	4.37	6.2	156	253	251	40	94	88	19.8
11	35	716.63	2.10	2.40	6.60	7.0	157				94	88	19.9
10	37.5	718.84	2.20	2.51	8.89	7.2	157	254	255	42	95	88	20.1
9	40	721.20	2.30	2.63	1.22	7.8	157				95	89	20.2
8	42.5	723.55	2.40	2.77	3.62	8.0	153	256	253	42	95	89	20.4
7	45	726.00	2.40	2.77	6.02	8.0	153				95	89	20.1
6	47.5	728.32	2.40	2.77	9.42	8.0	153	254	250	42	96	90	20.1
5	50	730.40	2.20	2.54	0.71	7.9	154				96	90	20.1
4	52.5	732.90	2.10	2.42	2.96	7.8	154	253	249	44	96	90	20.2
3	55	735.13	2.00	2.30	5.15	7.5	157				96	90	20.2
2	57.5	737.25	1.80	2.07	7.25	7.0	155	250	248	43	96	90	20.3
1	60	739.35	1.80	2.08	9.31	7.0	154				96	90	20.2
	(2203)												
	θ = 60	Vm = 49.55		ΔH = 2.09							Avg. = 90.7		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/MISSOULA
Source "C"
Method SCAQMD Filter holder: N/A
Date 5-10-94 Test 6 Run 3
No. of traverse points 24
Filter type: N/A

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: N/A

Recovery solvent(s)
☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: GH

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			16
Impinger No. 3			
Condenser			
Desiccant	1480	1467	13
Total			29

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: (HRS) Time end: 1 (HRS)
Sampling rate: 400 cc/min Operator: ET
Box No. 7 Bag No. 3
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/MISSOULA
Source 42" DRYER STACK
Date 5-10-94 Test 6 Run 3

Operators ET-GH
Meter Box No. 7 ΔH 1.94 IN WC
Counter coeff. 1.0041

Pitot No. 224 Cp .84
Bar. Press. 26.85 inHg H2O %
Nozzle No. 3-3 Nozzle Dia .185 IN.

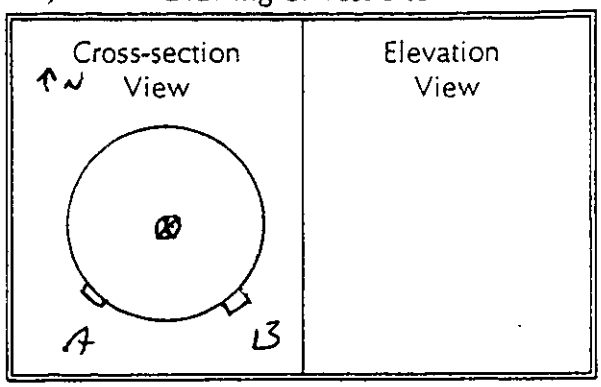
Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperature (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	2242	739.90											
A 12	2.5	742.05	1.80	2.09	1.98	6.0	145	247	250	42	85	84	19.8
11	5	744.21	2.10	2.39	4.20	6.9	149				86	84	20.4
10	7.5	746.50	2.30	2.63	6.52	7.4	148	248	252	42	87	85	20.7
9	10	748.80	2.30	2.62	8.84	7.5	150				87	85	20.7
8	12.5	751.20	2.50	2.86	1.27	8.0	149	251	250	43	89	86	20.9
7	15	753.60	2.50	2.86	3.70	8.1	149				89	86	20.8
6	17.5	756.00	2.30	2.64	6.03	7.9	148	254	253	43	89	86	20.8
5	20	758.25	2.30	2.64	8.36	7.9	148				89	86	20.7
4	22.5	760.60	2.20	2.53	0.64	7.8	148	253	250	44	90	86	20.4
3	25	762.90	2.30	2.64	2.98	8.0	149				90	86	20.6
2	27.5	765.25	2.20	2.53	5.26	8.0	148	250	248	44	90	86	20.6
1	30	767.35	1.80	2.08	7.34	7.5	146				90	86	20.6
B 12	32.5	768.90	.90	1.04	8.80	3.8	148	252	247	42	90	86	20.3
11	35	770.40	.95	1.09	0.31	3.8	148				90	86	20.5
10	37.5	771.99	1.10	1.26	1.93	4.0	149	256	251	44	91	86	20.3
9	40	773.77	1.30	1.49	3.69	4.2	149				91	86	20.5
8	42.5	775.50	1.30	1.49	5.45	4.2	151	254	250	44	91	86	20.5
7	45	777.38	1.50	1.72	7.34	5.1	151				91	86	20.5
6	47.5	779.70	2.40	2.75	9.72	8.5	149	255	249	44	93	87	20.6
5	50	782.12	2.50	2.88	2.16	8.0	149				93	87	20.6
4	52.5	784.50	2.20	2.56	4.47	8.8	143	257	251	44	93	87	20.6
3	55	786.85	2.20	2.57	6.77	8.8	141				93	87	20.4
2	57.5	789.10	2.00	2.33	8.97	8.7	141	254	250	44	93	87	20.6
1	60	790.70	1.20	1.40	0.68	5.4	141				93	87	20.6
	(2345)												
	θ = 60	Vm = 50.80		ΔH = 2.21							Avg. = 88.0		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula, MT
Source: 'D' Dryer / Stack
Test: 4 Run: 0 Date: 5-10-94
Stack Dimen.: 34.5 IN.
Dry Bulb: 167 °F Wet bulb: 86 °F
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.
Barometric Pressure: 26.85 IN.HG
Static Pressure: -.56 IN.WC
Operators: M. Koehler + K. Nussmeier
Pitot No.: 22U-4 C_p: .84

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 2 IN.		Time Start: 1025 HRS	
A-1	.021	.72	2.72	~~.52~~ 1.18	
2	.067	2.31	4.31	~~.51~~ 1.20	
3	.118	4.07	6.07	~~.53~~ 1.25	
4	.177	6.11	8.11	~~.53~~ 1.23	
5	.250	8.63	10.63	~~.51~~ 1.15	
6	.356	12.28	14.28	~~.45~~ 1.08	
7	.644	22.21	24.21	~~.32~~ 1.06	
8	.750	25.88	27.88	~~.28~~ .99	
9	.823	28.39	30.39	~~.14~~ .89	
10	.882	30.43	32.43	~~.14~~ .79	167
11	.933	32.19	34.19	~~.13~~ .69	
12	.979	33.78	35.78	~~.10~~ .66	
B-1				1.03	
2				1.06	
3				1.13	
4				1.18	
5				1.22	
6				1.19	
7				1.05	
8		63.78 ft/sec		.91	
9		ACFM 24844		.95	
10		DSCFM 17809		.69	
11				.47	
12				.55	

Temp. Meas. Device & S/N: PDT-21 / TC
Time End: 1042 HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula MT
Source 'D' Dryer / Stack
Method 5 Filter holder: Glass
Sample Train Leak Check:

Date 5-10-94 Test 4 Run 1
No. of traverse points 24
Filter type: 4" G.F.

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.02 cfm at 11 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6481

Recovery solvent(s)
☒ acetone
☒ other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: M. Kaehler + K. Nuelmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	510	495	15
Impinger No. 3			
Condenser			
Desiccant	1433	1410	23
Total			38

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1110
Sampling rate: 400 cc/min

Box No. 23 Bag No. 1
Size: 44 L
cc/min at .5 in. Hg.
(HRS) Time end: 1212 (HRS)
Operator: M. Kaehler

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. / Missoula, MT
Source D. Dryer / Stack
Date 5-10-94 Test 4 Run 1

Operators M. Kuehler + K. Kuezmacer
Meter Box No. 9 ΔH@ 1.28 IN WC
Counter coeff. .9961

Pitot No. 296-Y Cp .84
Bar. Press. 26.85 inHg H2O 5 %
Nozzle No. 3-4 Nozzle Dia .242 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1110	624.20											
A-12	2.5	626.67	1.17	3.32	6.42	7	163	232	248	36	74	74	19.6
11	5	629.77	1.26	3.57	9.73	7	163	245	254	35	75	75	19.9
10	7.5	632.56	1.24	3.53	2.53	7	162	254	257	35	76	75	20.0
9	10	635.38	1.22	3.47	5.31	7	162	249	253	35	80	75	20.1
8	12.5	637.94	1.00	2.86	2.85	6	162	251	246	38	82	76	19.9
7	15	640.45	1.00	2.87	0.38	6	162	244	249	38	83	76	20.1
6	17.5	642.94	.96	2.75	2.97	6	164	246	254	38	84	77	19.8
5	20	645.27	.84	2.41	5.20	5	163	250	251	38	86	78	20.1
4	22.5	647.55	.82	2.36	7.52	5	163	253	256	39	87	78	20.0
3	25	649.81	.75	2.16	9.73	4.5	164	245	257	39	88	79	19.7
2	27.5	652.03	.77	2.22	1.98	4.5	164	248	257	39	88	81	19.9
1	30	654.17	.68	1.98	4.10	4	159	252	260	39	89	81	19.8
B-12	32.5	656.75	1.03	2.99	6.71	6	161	250	256	40	89	82	19.5
11	35	659.45	1.09	3.17	9.39	5.5	161	243	255	40	90	81	19.9
10	37.5	662.05	1.07	3.13	2.07	5.5	161	245	253	40	92	84	19.4
9	40	664.99	1.28	3.73	4.99	8	162	247	258	40	94	83	19.8
8	42.5	667.85	1.27	3.70	7.89	8	162	251	247	42	92	84	19.6
7	45	670.73	1.22	3.55	0.73	8	162	250	252	42	92	85	19.8
6	47.5	673.52	1.15	3.35	3.50	5.5	163	250	255	42	93	85	19.8
5	50	676.27	1.07	3.12	6.17	7	163	246	254	42	94	85	19.7
4	52.5	678.74	.95	2.77	8.69	6	163	247	258	42	94	86	19.8
3	55	681.15	.84	2.46	1.07	5	163	245	257	41	94	86	19.5
2	57.5	683.45	.81	2.37	3.40	5	163	249	253	41	95	87	19.7
1	60	685.40	.57	1.68	5.37	3.5	161	246	250	41	95	87	19.7
	1212												
	θ = 60	Vm = 61.20		ΔH 2.90							Avg. = 84.4		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source 'D' Dryer / Stack
Method 5 Filter holder: Glass

Date 5-10-94 Test 4 Run 2
No. of traverse points 24
Filter type: 4" G/F

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test <0.02 cfm at 12 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6057

Recovery solvent(s)
☒ acetone
☒ other(s) $MeCl_2$

No. of probe wash bottles: 1
Sample recovered by: M. Kaehler & K. Nuesmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			38
Impinger No. 3			
Condenser			
Desiccant	1453	1432	21
Total			59

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1300
Sampling rate: 400

Box No. 28 Bag No. 2
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1403 (HRS)
cc/min Operator: M. Kaehler

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Missoula, MT
Source: O. Dryer 1st stk
Date: 5-10-94 Test: 4 Run: 2

Operators: M. Knobloch + K. Nuernberger
Meter Box No.: 9 ΔH@: 1.28 IN WC
Barometer coeff.: .9961

Pitot No.: 29V-4 Cp: .84
Bar. Press.: 26.35 inHg H2O: 3.2 %
Nozzle No.: 3-4 Nozzle Dia: .242 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1300	686.40											
B-12	2.5	689.15	1.03	3.09	9.04	6	160	240	247	41	85	83	19.5
11	5	691.77	1.08	3.23	1.74	6.5	161	238	251	41	87	85	19.2
10	7.5	694.55	1.15	3.40	4.52	7	180	244	248	42	91	86	19.6
9	10	697.37	1.21	3.62	7.40	7.5	165	249	245	42	92	86	19.5
8	12.5	700.15	1.25	3.75	0.32	8	164	252	250	42	92	87	19.3
7	15	703.30	1.29	3.81	3.27	8	174	253	247	43	93	87	19.6
6	17.5	706.12	1.20	3.51	6.10	7.5	181	249	252	43	94	87	19.2
5	20	708.91	1.18	3.45	8.91	7	181	248	247	43	94	87	19.3
4	22.5	711.25	.79	2.32	1.22	5	180	245	251	43	95	88	19.1
3	25	713.45	.71	2.09	3.42	4	180	245	255	44	94	88	19.1
2	27.5	715.60	.68	2.00	5.57	4	180	241	260	44	95	88	19.3
1	30	717.71	.63	1.86	7.64	4	178	238	257	44	97	88	19.5
A-12	32.5	720.40	1.14	3.37	0.42	7	178	243	255	44	95	88	19.1
11	35	723.35	1.22	3.59	3.29	7.5	181	240	252	45	97	89	19.1
10	37.5	726.18	1.21	3.56	6.15	7.5	181	245	258	45	98	90	19.2
9	40	729.10	1.25	3.67	9.05	7.5	183	246	259	45	99	90	19.4
8	42.5	732.07	1.27	3.72	1.98	7.5	195	250	263	45	99	91	19.5
7	45	734.90	1.12	3.29	4.74	7	185	254	260	47	99	91	19.0
6	47.5	737.52	1.10	3.23	7.47	7	184	253	265	47	99	91	19.3
5	50	740.10	1.04	3.06	0.13	6.5	183	247	263	47	99	91	19.5
4	52.5	742.72	.97	2.88	2.71	6	191	243	268	47	99	92	19.6
3	55	745.20	.96	2.84	5.27	6	191	245	268	47	100	92	19.6
2	57.5	747.90	.97	2.88	7.86	6	179	249	264	47	100	92	19.5
1	60	750.31	.81	2.41	0.22	5	179	252	260	48	101	92	19.1
	(1403)												
	θ = 60	Vm = 63.91		^H 3.11							Avg. = 88.5		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source 'D' Dryer / Stack
Method 5 Filter holder: Glass

Date 5-10-94 Test 4 Run 3
No. of traverse points 24
Filter type: 4" G.F.

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: <0.02 cfm at 12 in. Hg. (vac) ☑

Particulate Catch Data:

No. of filters used: 6577

Recovery solvent(s)
☑ acetone
☑ other(s) $MeCl_2$

No. of probe wash bottles: 1
Sample recovered by: M. Kuehlert & Nuesmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	537	492	45
Impinger No. 2			
Impinger No. 3			
Condenser	1449	1433	
Desiccant	~~1409~~	~~1433~~	16
Total			61

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1445
Sampling rate: 400

Box No. 23 Bag No. 3
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 1547 (HRS)
cc/min Operator: M. Kuehlert

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. Missoula, MT
Source: "D" Dryer / Stack
Date: 5-10-94 Test: 4 Run: 3

Operators: M. Koehler & K. Neyenesch
Meter Box No.: 9 ΔH@ 1.25 IN WC
Counter coeff.: .9961

Pitot No.: L96-21 Cp: .84
Bar. Press.: 26.85 inHg H2O: 5 %
Nozzle No.: 3-4 Nozzle Dia: .242 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1445	750.60											
A-12	2.5	753.30	1.10	3.13	3.27	6	178	237	259	45	92	91	19.5
11	5	756.10	1.20	3.42	6.07	6.5	180	240	255	44	94	91	19.5
10	7.5	758.98	1.23	3.50	8.91	6.5	181	245	249	43	96	92	19.3
9	10	761.80	1.25	3.56	1.77	7	183	243	256	43	97	92	19.4
8	12.5	764.64	1.27	3.62	4.66	7	183	250	252	43	98	92	19.1
7	15	767.26	1.09	3.08	7.33	6	183	253	260	44	100	93	18.9
6	17.5	769.94	1.07	3.06	9.99	6	184	255	257	44	100	93	18.8
5	20	772.60	1.09	3.11	2.69	6	185	251	255	44	101	93	19.4
4	22.5	775.15	.98	2.80	5.23	6	186	256	252	45	102	94	18.8
3	25	777.80	.97	2.77	7.77	5.5	186	254	247	45	102	94	19.3
2	27.5	779.99	.72	2.06	9.96	4	186	257	251	47	102	94	18.9
1	30	781.94	.55	1.59	1.89	3	181	253	255	47	102	95	19.2
B-12	32.5	784.57	1.05	3.01	4.54	6	185	249	257	47	102	95	19.4
11	35	787.30	1.11	3.17	7.25	6.5	186	248	262	47	103	95	19.3
10	37.5	790.07	1.14	3.25	0.00	7	188	251	262	47	105	96	19.2
9	40	792.92	1.21	3.46	2.85	7.5	188	247	263	49	105	97	19.1
8	42.5	795.75	1.23	3.52	5.71	7.5	187	250	266	49	105	97	19.5
7	45	798.42	1.07	3.07	8.39	6.5	187	252	260	49	105	97	19.6
6	47.5	801.14	1.05	3.02	1.05	6.5	186	246	257	49	105	97	19.1
5	50	803.70	1.02	2.93	3.67	6	186	254	249	50	105	97	19.3
4	52.5	806.30	.98	2.81	6.23	6	187	257	248	51	106	98	19.7
3	55	808.57	.76	2.20	8.50	4.5	184	250	252	51	107	99	19.7
2	57.5	809.99	.31	.91	9.97	2	174	245	257	51	105	98	19.3
1	60	811.69	.47	1.38	1.78	2	174	243	260	51	105	98	19.6
	(1547)												
	θ = 60	Vm = 61.09		ΔH 2.85							Avg. = 98.3		

S-0037R

Interpoll Laboratories
(612)786-6020

EPA Method 7 Sample Collection
Field Data Sheet

Job LP-MISSOULA Date 5-10-94 Bar. Pressure 26.85 IN.HG.
Test Location DRYERS Fuel Type / Sample Train No. BLUE
4 Technician GH Pump No. 29A

No.	Test Run Point	Flask No.	Time (HRS)	Vacuum (IN.HG.)	Flask Temp. (°F)	Leak Rate <0.4 IN.HG./MIN.
1	4-1-1	67	1118	24.5	69	☒ Yes ☐ No
2	4-1-2	68	1132	24.6	69	☒ Yes ☐ No
3	4-1-3	69	1147	24.6	69	☒ Yes ☐ No
4	4-1-1	70	1151	25.0	69	☒ Yes ☐ No
5	4-2-1	71	1302	25.0	70	☒ Yes ☐ No
6	4-2-2	72	1315	25.2	70	☒ Yes ☐ No
7	4-2-3	25	1330	25.1	70	☒ Yes ☐ No
8	4-2-1	26	1345	24.8	70	☒ Yes ☐ No
9	4-3-1	27	1447	24.8	70	☒ Yes ☐ No
10	4-3-2	29	1502	25.0	72	☒ Yes ☐ No
11	4-3-3	30	1517	25.0	74	☒ Yes ☐ No
12	4-3-1	34	1535	24.5	76	☒ Yes ☐ No
13						☐ Yes ☐ No
14						☐ Yes ☐ No
15						☐ Yes ☐ No
16						☐ Yes ☐ No
17						☐ Yes ☐ No
18						☐ Yes ☐ No
19						☐ Yes ☐ No
20						☐ Yes ☐ No
21						☐ Yes ☐ No
22						☐ Yes ☐ No
23						☐ Yes ☐ No
24						☐ Yes ☐ No
25						☐ Yes ☐ No
26						☐ Yes ☐ No
27						☐ Yes ☐ No

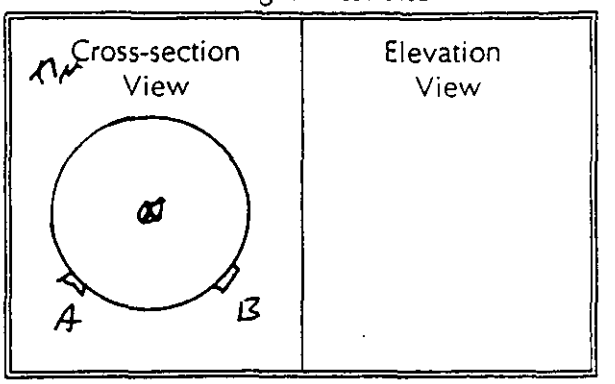
S-263R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula, MT
Source: 'D' Dryer / Stack
Test: 2 Run: 0 Date: 5-10-94
Stack Dimen.: 34.5 IN.
Dry Bulb: 165 °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.85 IN.HG
Static Pressure: -.56 IN.WC
Operators: M. Kochert K. Nuesmeier
Pitot No.: 29V-4 C_p: .84

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length:	IN.	Time Start:	HRS
		Refer to Test No. 4 / Run 0			
		for Pts and Flows			

Temp. Meas. Device & S/N: | Time End: HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source 'D' Dryer / Stack
Method 0011 Filter holder: NA

Date 5-10-94 Test 7 Run 1
No. of traverse points 24
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test < 0.02 cfm at 14 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

Recovery solvent(s)

☐ acetone
☑ other(s) $MeCl_2$

No. of probe wash bottles:
Sample recovered by: M. Kaehler + K. Nyesmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			
Impinger No. 3			27
Condenser			
Desiccant	1448	1427	21
Total			48

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1915
Sampling rate: 400

Box No. 23 Bag No. 1
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 2019 (HRS)
cc/min Operator: M. Kaehler

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Missoula, MT
Source: D Dryer / Stack
Date: 5-10-94 Test: 7 Run: 1

Operators: M. Kuehler + K. Nussmeier
Meter Box No.: 4 ΔH@: 1.28 IN WC
Cassette cont.: 9961

Pitot No.: 290-4 Cp: .84
Bar. Press.: 26.51 inHg H2O: 5 %
Nozzle No.: 3-4 Nozzle Dia: .242 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1915	812.20											
B-12	2.5	814.90	1.10	3.20	4.42	11	175	233	248	43	87	87	19.7
11	5	817.64	1.15	3.29	2.66	11	173	240	251	43	88	87	19.5
10	7.5	820.34	1.13	3.23	0.37	11	174	242	253	43	89	87	19.4
9	10	823.07	1.16	3.31	3.12	12	175	237	245	43	89	87	19.4
8	12.5	825.90	1.22	3.47	5.93	12.5	176	240	254	43	90	88	19.0
7	15	828.68	1.13	3.22	8.65	12	178	245	251	44	90	88	19.0
6	17.5	831.30	1.07	3.04	1.28	11	179	243	255	44	91	88	19.3
5	20	833.82	.96	2.73	3.79	9	179	247	255	44	91	88	19.3
4	22.5	836.25	.87	2.48	6.17	8	179	244	252	46	93	89	19.3
3	25	838.44	.76	2.17	8.41	7	179	248	257	46	94	89	19.0
2	27.5	840.50	.64	1.84	0.47	5.5	175	246	259	46	95	89	19.4
1	30	842.60	.61	1.78	2.50	5	168	250	263	47	96	90	19.4
A-12	32.5	845.31	1.17	3.38	5.29	11.5	173	253	260	47	95	90	19.3
11	35	848.32	1.32	3.77	8.23	12	179	249	261	47	96	90	19.0
10	37.5	851.17	1.28	3.65	1.13	12	180	252	257	48	96	90	19.3
9	40	854.10	1.28	3.66	4.03	12	179	247	258	48	96	91	19.2
8	42.5	856.94	1.33	3.80	6.98	12.5	180	248	255	49	95	91	19.1
7	45	859.73	1.12	3.20	9.70	11.5	180	249	257	47	95	91	18.9
6	47.5	862.37	1.06	3.04	2.34	11.5	179	247	250	47	95	91	19.4
5	50	865.08	1.04	2.97	4.96	11.5	180	251	252	47	96	91	18.8
4	52.5	867.47	.89	2.55	7.39	7.5	180	244	256	49	96	91	18.9
3	55	869.44	.58	1.66	9.35	5	180	247	255	48	97	91	19.1
2	57.5	871.43	.60	1.72	1.35	5	180	250	259	48	98	92	19.4
1	60	873.58	.63	1.81	3.40	5	180	252	253	47	99	92	19.4
	(2019)												
	θ = 60	Vm = 61.38		ΔH 2.87							Avg. = 91.5		

S-00378

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source 'D' Dryer / Stack
Method 0071 Filter holder: NA
Date 5-10-94 Test 7 Run 2
No. of traverse points 24
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 13 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles:
Sample recovered by: M. Kaehler K. Niesmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			39
Impinger No. 3			
Condenser			
Desiccant	1405	1383	22
Total			61

Integrated Gas Sampling Data:

Bag Pump No. 294
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 2058
Sampling rate: 400

Box No. 23 Bag No. 2
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 2202 (HRS)
cc/min Operator: M. Kaehler

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. / Missoula, MT. Operators M. Kuehler / K. Nusmeier Pitot No. 240-4 Cp .84
Source 'D' Dryer / Stack Meter Box No. 9 ΔH@ 1.78 IN WC Bar. Press. 26.85 inHg H2O 4.25%
Date 5-10-94 Test 7 Run 2 Counter coeff. .9961 Nozzle No. 3-4 Nozzle Dia .242 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	2058	873.90											
A-12	2.5	876.70	1.18	3.42	6.70	10	177	237	257	43	89	88	19.3
11	5	879.52	1.30	3.74	9.61	12	178	243	260	44	89	89	19.4
10	7.5	882.49	1.31	3.77	2.55	12	178	244	253	44	90	88	19.3
9	10	885.43	1.34	3.86	5.52	12.5	178	250	259	42	90	88	19.0
8	12.5	888.37	1.30	3.74	8.44	12.5	179	245	262	42	91	88	19.2
7	15	891.03	1.07	3.08	1.09	11	179	242	264	43	91	88	19.4
6	17.5	893.77	1.05	3.02	3.72	11	180	239	267	43	91	89	19.0
5	20	896.35	1.07	3.08	6.38	10	180	245	263	43	92	88	19.3
4	22.5	899.15	1.07	3.08	9.04	10	180	241	260	43	93	89	19.4
3	25	901.44	.83	2.39	1.38	7.5	181	237	265	43	93	89	19.4
2	27.5	903.51	.62	1.79	3.42	5.5	180	242	261	45	94	89	19.1
1	30	905.35	.49	1.42	5.23	4	178	245	258	45	95	89	19.2
B-12	32.5	908.20	1.19	3.44	8.04	12	179	246	255	45	95	89	18.9
11	35	910.78	1.12	3.22	0.77	11.5	183	249	252	46	95	89	19.1
10	37.5	913.51	1.10	3.16	3.46	11	183	247	252	46	95	89	18.9
9	40	916.39	1.31	3.76	6.40	13	184	247	258	46	95	89	19.2
8	42.5	919.27	1.27	3.64	9.29	12.5	184	243	255	48	94	89	19.3
7	45	922.00	1.18	3.38	2.08	12	185	243	259	48	94	89	18.9
6	47.5	924.80	1.15	3.29	4.83	12	185	245	256	48	94	89	19.0
5	50	927.45	1.09	3.12	7.50	11	186	249	257	48	94	89	18.9
4	52.5	930.11	1.03	2.95	0.10	11	186	246	261	48	94	90	19.2
3	55	932.64	.91	2.60	2.55	9	187	247	263	49	94	89	19.4
2	57.5	934.97	.84	2.40	4.90	8	188	245	260	48	94	89	19.3
1	60	937.26	.77	2.20	7.16	7.5	188	242	261	48	95	90	19.1
	(2202)												
	θ = 60	Vm = 63.36		ΔH 3.07							Avg. = 90.8		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.R. / Missoula, MT
Source 'D' Dryer / Stack
Method 0011 Filter holder: NA
Date 5-10-94 Test 2 Run 3
No. of traverse points 24
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: <0.02 cfm at 14 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles:
Sample recovered by: M. Hachlert K. Nuesmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			37
Impinger No. 3			
Condenser			
Desiccant	1464	1446	20
Total			57

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 2246
Sampling rate: 400
Box No. 23 Bag No. 3
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 2344 (HRS)
cc/min Operator: M. Hachlert

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Missoula, MT
Source: D. Dryer / S. Frank
Date: 5-10-94 Test 7 Run 3

Operators: M. Kuehl / K. Nelsmeier
Meter Box No. 9 ΔH@ 1.79 IN WC
Counter cont. 9461

Pitot No. 196-4 Cp .84
Bar. Press. 26.85 inHg H2O .5 %
Nozzle No. 5-4 Nozzle Dia. .242 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	22.12	932.20											
B-12	2.5	940.15	.97	2.75	0.21	8	184	237	250	48	84	84	19.2
11	5.0	942.77	.98	2.75	2.70	9	183	242	254	48	85	84	20.3
10	7.5	945.27	.97	2.72	5.19	9	182	245	258	48	86	84	20.4
9	10	947.80	.95	2.67	7.66	9	181	246	261	46	87	84	20.4
8	12.5	950.20	1.03	2.93	0.24	9.5	175	243	262	46	88	84	20.8
7	15	953.23	1.22	3.44	3.03	11.5	180	247	263	45	88	84	20.6
6	17.5	955.87	1.20	3.35	5.79	12	187	251	257	45	87	84	20.6
5	20	958.54	1.13	3.17	8.48	11	193	255	258	45	87	84	20.3
4	22.5	961.17	1.10	3.10	1.13	11	181	253	264	45	87	84	20.0
3	25	963.85	1.06	2.99	3.74	11	179	250	262	46	87	84	19.9
2	27.5	966.44	1.04	2.94	6.32	10	178	252	259	46	87	84	19.7
1	30	968.94	.94	2.67	8.79	9.5	177	248	257	46	88	84	19.5
A-12	32.5	971.63	1.19	3.36	1.55	11.5	179	253	252	45	86	83	19.3
11	35	974.43	1.21	3.45	4.35	12	172	255	248	45	87	83	19.6
10	37.5	977.24	1.25	3.56	7.18	12.5	173	254	251	45	87	83	19.4
9	40	980.15	1.28	3.64	0.06	12.5	174	253	246	45	87	83	19.7
8	42.5	982.90	1.22	3.47	2.86	12	174	249	248	45	87	83	19.7
7	45	985.62	1.10	3.13	5.53	11.5	173	245	251	45	87	83	19.7
6	47.5	988.25	1.07	3.05	8.16	11	173	247	255	44	86	83	19.8
5	50	990.85	1.07	3.05	0.79	11	173	245	255	44	87	83	19.8
4	52.5	993.31	.88	2.51	3.17	9	173	249	252	44	87	83	19.7
3	55	995.59	.84	2.39	5.51	9	174	250	257	46	88	83	19.5
2	57.5	997.86	.81	2.31	7.90	8	174	253	257	46	88	83	19.7
1	60	1000.11	.75	2.14	0.01	7	173	252	257	46	88	83	19.4
	(2344)												
	θ = 60	Vm = 62.41		ΔH 2.99							Avg. = 85.2		

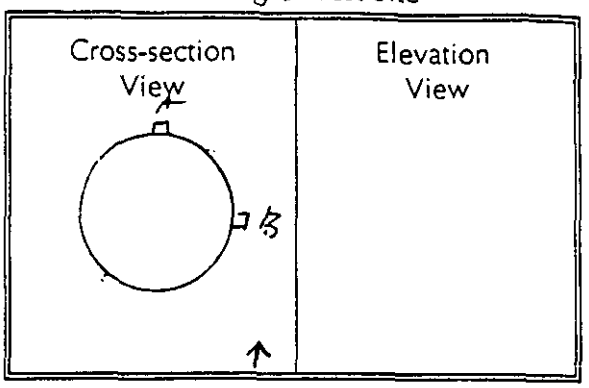
S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LP/MISSOULA
Source: NORTH PRE-DRYER STACK
Test: 14 Run A Date 5-12-94
Stack Dimen.: 42 IN.
Dry Bulb: °F Wet bulb: °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 24.75 IN.HG
Static Pressure: -.75 IN.WC
Operators: E. TROWBRIDGE - 6 HOUR
Pitot No.: 22V-4 C_p .84

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 2.5 IN.		Time Start: 0645 HRS	
A 1	.026	1.09	3.59	1.40	
2	.082	3.44	5.94	1.3	
3	.146	6.13	8.63	1.4	
4	.226	9.49	11.99	1.60	
5	.342	14.36	16.86	1.70	145
6	.658	27.64	30.14	1.75	
7	.774	32.51	35.01	1.70	
8	.854	35.87	38.37	1.60	
9	.918	38.55	41.05	1.40	
10	.974	40.91	43.41	1.20	
B 1				1.2	
2				1.4	
3				1.65	
4				1.8	142
5				1.95	
6				1.95	
7				1.9	
8				1.8	
9				1.75	
10				1.6	
Temp. Meas. Device & S/N: PDT 34				Time End: 0700 HRS	

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/MISSOULA
Source NORTH PREDRYER
Method 5001 Filter holder: N/A
Sample Train Leak Check:

Date 5-12-94 Test 14 Run 1
No. of traverse points 20
Filter type: NA

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒ ☐
Post test: 0 cfm at 9 in. Hg. (vac) ☒ ☐

Particulate Catch Data:

No. of filters used:

NA

Recovery solvent(s)

☐ acetone
☒ other(s)

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	511	475	36
Impinger No. 2		~~200~~	
Impinger No. 3			
Condenser			
Desiccant	1457	1444	13
Total			49

Integrated Gas Sampling Data:

Bag Pump No. 28A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0 cc/min at 15 in. Hg.
Time start: 0707 (HRS) Time end: 0815 (HRS)
Sampling rate: 400 cc/min Operator: EF

Box No. 29 Bag No. 1
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP/MISSOULA
Source: NORTH PRE DRYER STACK
Date: 5-12-94 Test: #4 Run: 1

Operators: ET-GH
Meter Box No.: 4 ΔH@ 1.74 IN WC
Gasmeter cont.: 10041

Pitot No.: 226-8 Cp: .843
Bar. Press.: 26.75 inHg H2O x
Nozzle No.: 9455 Nozzle Dia: .190 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Water (inWC)	Dry Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	0706	69.70											
B 10	3.0	72.12	1.50	1.95	2.09	6	110	247	250	40	71	70	20.4
9	6	74.50	1.65	2.08	4.54	6	117				71	70	20.3
8	9.0	77.10	1.90	2.39	7.17	7	116	249	248	40	71	70	20.3
7	12	79.78	1.90	2.42	9.82	7	110				71	70	20.2
6	15	82.50	2.00	2.54	2.53	7	111	252	254	40	72	70	20.2
5	18	85.10	1.90	2.42	5.17	7	111				72	70	20.3
4	21	87.80	1.85	2.37	7.79	7	107	250	256	42	72	70	20.4
3	24	90.30	1.60	2.05	0.23	6	108				73	70	20.4
2	27	92.65	1.50	1.88	2.56	6	122	247	255	42	73	70	20.4
1	30	94.90	1.43	1.80	4.85	6	112				71	70	20.6
A 10	33	97.20	1.45	1.80	7.14	6	117	248	253	40	71	70	20.6
9	36	99.50	1.60	1.95	9.52	6	135				73	70	20.6
8	39	102.00	1.70	2.09	1.98	7	132	250	256	42	75	70	20.7
7	42	104.50	1.80	2.21	4.57	7	135				75	70	20.6
6	45	107.10	2.00	2.46	7.19	7	128	250	253	42	75	70	20.6
5	48	109.90	2.10	2.57	9.92	7	135				76	71	20.6
4	51	112.65	2.10	2.62	2.66	7	124	248	250	42	76	71	20.6
3	54	115.35	2.00	2.50	5.37	7	124				76	71	20.6
2	57	117.65	1.40	1.75	7.62	6	123	245	251	42	76	71	20.7
1	60	120.30	1.80	2.25	0.18	6	122				76	71	20.7
	0816												
	θ = 60	Vm = 50.60		ΔH = 2.21							Avg. = 71.5		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/MISSOULA
Source NORTH 100 DRYER STACK
Method _____ Filter holder: N/A
Date 5-12-94 Test 14 Run 2
No. of traverse points 20
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☐
Post test: ____ cfm at _____ in. Hg. (vac) ☐

Particulate Catch Data:

No. of filters used:

_____
_____

Recovery solvent(s)

☐acetone_____
☐other(s)_____

No. of probe wash bottles: _____
Sample recovered by: _____

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	237	200	37
Impinger No. 3			
Condenser			
Desiccant	1445	1431	14
Total			51

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: _____
Sampling rate: 400

Box No. 29 Bag No. 2
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: _____ (HRS)
cc/min Operator: ET

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/MISSOULA
Source NORTH PREDRYER STACK
Date 5-12-94 Test 14 Run 2

Operators EF-GH
Meter Box No. 4 ΔH 1.44 IN WC
Gasmeter coeff. 1.0047

Pitot No. 22V-4 Cp .840
Bar. Press. 26.75 inHg H2O x
Nozzle No. GLASS Nozzle Dia .170 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	0837	120.40											
A 10	3	122.62	1.40	1.68	2.60		147				72	69	20.7
9	6	124.96	1.65	1.98	5.00		145				74	70	20.7
8	9	127.50	1.80	2.17	7.51		143				75	70	20.7
7	12	130.10	1.90	2.34	0.12		131				75	70	20.7
6	15	132.70	2.00	2.44	2.78		138				77	71	20.8
5	18	135.45	2.10	2.57	5.51		138				78	71	20.8
4	21	138.23	2.00	2.50	8.21		124				78	72	20.8
3	24	140.90	2.10	2.60	0.96		132				78	72	20.8
2	27	143.40	1.60	1.98	3.37		132				78	72	20.8
1	30	145.60	1.30	1.63	5.55		124				78	72	20.8
B 10	33	147.90	1.60	2.00	7.91		126				78	72	20.7
9	36	150.50	1.75	2.16	0.49		128				79	72	20.7
8	39	153.10	1.95	2.45	3.16		124				80	73	20.7
7	42	155.80	2.00	2.51	5.87		124				80	73	20.7
6	45	158.55	2.00	2.51	8.58		124				80	73	20.7
5	48	161.25	1.90	2.39	1.23		123				80	73	20.7
4	51	163.86	1.90	2.40	3.88		121				80	73	20.7
3	54	166.50	1.80	2.26	6.45		124				80	73	20.7
2	57	168.90	1.60	2.01	8.88		124				81	74	20.7
1	60	171.25	1.50	1.89	1.23		124				81	74	20.7
	(0940)												
	θ = 60	Vm = 50.85		ΔH = 1.22							Avg. = 75.0		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/MISSOULA
Source NORTH PRE DRYER STACK
Method 5017 Filter holder: NA

Date 5-12-94 Test 14 Run 3
No. of traverse points 20
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

Recovery solvent(s)

☐ acetone
☐ other(s)

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	245	200	45
Impinger No. 3			
Condenser			
Desiccant	1473	1457	16
Total			61

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start:
Sampling rate: 400 cc/min

Box No. 29 Bag No. 3
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: (HRS)
Operator: ET

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP / MISSOULA
Source NORTH TRE DRYER STACK
Date 5-12-94 Test 14 Run 3

Operators ET GH
Meter Box No. 4 ΔH@ 1.90 IN WC
Gasmeter coeff. 1.0041

Pitot No. 22V-4 Cp .84
Bar. Press. 26.75 inHg H2O %
Nozzle No. GLASS Nozzle Dia .190 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1003	172.50											
B 10	3	175.00	1.60	2.07	4.97	6	115	248	251	40	77	73	20.0
4	4	177.50	1.75	2.24	7.52	6.5	118				79	74	20.7
8	9	180.15	1.90	2.46	0.20	7	111	251	250	41	80	75	20.7
7	12	182.78	1.95	2.53	2.93	7	111				81	75	20.7
6	15	185.60	1.95	2.52	5.64	7	115	251	254	40	82	75	20.8
5	18	188.30	1.90	2.43	8.31	7	121				82	76	20.8
4	21	190.40	1.88	2.44	0.99	8	112	251	255	40	83	76	20.8
3	24	193.72	1.90	2.51	3.70	8	104				83	76	20.8
2	27	196.40	1.80	2.38	6.35	8	102	250	254	40	83	76	20.7
1	30	198.	1.40	1.85	8.68	8	105				83	76	20.7
A 10	33	201.11	1.50	1.98	1.10	6	105	247	252	42	83	76	20.7
9	36	203.65	1.70	2.22	3.66	7	109				83	76	20.7
8	39	206.20	1.80	2.35	6.28	7	111	249	250	42	83	76	20.7
7	42	208.85	1.80	2.34	8.91	7	112				82	76	20.8
6	45	211.65	2.00	2.58	1.66	8	117	253	252	42	82	76	20.8
5	48	214.40	2.10	2.74	4.49	9	110				82	76	20.7
4	51	217.30	2.10	2.75	7.53	9	107	255	250	42	82	76	20.8
3	54	220.10	2.00	2.62	0.11	8	107				82	76	20.8
2	57	222.60	1.40	1.84		6.5	105	252	248	42	82	76	20.8
1	60	224.70	1.30	1.70	4.68	6.0	108				82	76	20.8
	(11)												
	θ = 60	Vm = 52.20		ΔH = 2.37							Avg. = 78.7		

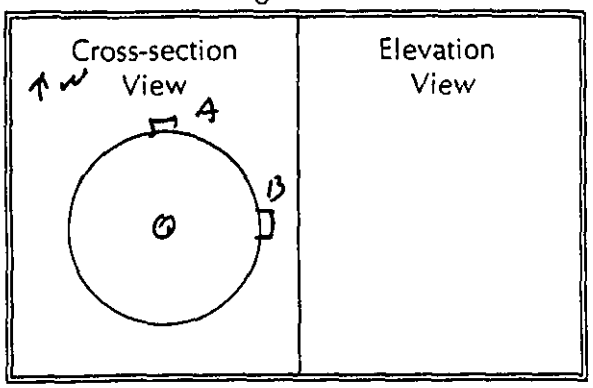
S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula, MT
Source: North Pre Dryer / Stack
Test: 16 Run: 0 Date: 5-12-94
Stack Dimen.: ~~39~~ 42 IN.
Dry Bulb: 105 °F Wet bulb: _____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.75 IN.HG
Static Pressure: -.75 IN.WC
Operators: M. Buehler + G. Hoe
Pitot No.: 22U-4 C_p: .84

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 2.5 IN.		Time Start:	HRS
A-1					
2					
3					
4					
5					
6		Pts and Flows			
7		from previous test			
8		No. 14			
9					
10					
B-1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
Temp. Meas. Device & S/N:		PDT-31		Time End:	HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
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Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job UP/Missouri
Source North Fork Dryer Stack
Method _____ Filter holder: 4" Glass
Date 5-12-94 Test 16 Run 1
No. of traverse points 20
Filter type: 4" Glass Fiber

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: <0.01 cfm at 2 in. Hg. (vac) ☑

Particulate Catch Data:

No. of filters used: 6334

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: MK

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		304	
Impinger No. 2	334	~~208~~	30
Impinger No. 3			
Condenser			
Desiccant	~~1453~~	~~1445~~	~~8~~
	1368	1360	16
Total			46

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1630
Sampling rate: 400
Box No. 29 Bag No. 1
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1730 (HRS)
cc/min Operator: ET

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/Missouri
Source NORTH PRODUCT STACK
Date 5-12-94 Test 16 Run 1

Operators ET-GH
Meter Box No. 4 ΔH@ 1.84 IN WC
Gasmeter coeff. 1.0041

Pitot No. 22V-4 Cp .84
Bar. Press. 24.75 inHg Hzd ✓ ✗
Nozzle No. 3-3 Nozzle Dia .185 in.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1630	225.00											
10	3	227.00	1.23	1.45	7.06	4	108	243	256	44	85	84	20.7
9	6	229.25	1.38	1.64	9.27	4.5	107	244	260	44	86	84	20.7
8	9	231.61	1.67	1.88	1.70	4.5	109	250	266	44	87	84	20.6
7	12	234.18	1.82	2.17	4.24	5.5	105	247	263	45	88	85	20.7
6	15	236.75	1.80	2.15	6.78	5	106	244	260	45	89	85	20.6
5	18	239.33	1.79	2.14	9.30	5	107	243	257	45	91	86	20.7
4	21	241.80	1.76	2.12	1.82	5	103	251	256	45	92	86	20.8
3	24	244.29	1.72	2.08	4.32	5	103	253	258	44	93	87	20.8
2	27	246.73	1.52	1.84	6.66	4.5	104	248	261	44	93	87	20.8
1	30	248.84	1.39	1.69	8.91	4	104	247	263	44	94	88	20.8
10	33	251.15	1.33	1.60	1.11	3	107	244	260	42	92	87	20.8
9	36	253.55	1.58	1.90	3.49	4	106	245	259	42	94	88	20.7
8	39	256.00	1.80	2.16	6.04	5	107	246	264	42	95	88	20.8
7	42	258.60	1.85	2.22	8.63	5	104	249	260	45	95	89	20.8
6	45	261.09	1.80	2.17	1.18	5	107	250	260	45	96	89	20.8
5	48	263.67	1.79	2.15	3.73	5	106	253	255	45	96	89	20.8
4	51	266.17	1.73	2.09	6.24	5	107	253	257	46	96	89	20.8
3	54	268.60	1.58	1.91	8.64	5	106	248	261	46	96	89	20.7
2	57	270.95	1.40	1.70	0.90	4.5	105	247	263	47	96	89	20.8
1	60	273.05	1.38	1.67	3.15	4	104	250	260	47	95	89	20.7
	1736												
	θ = 60	Vm = 48.05		ΔH@ .94							Avg. =	88.7	

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P./Missoula, MT
Source North Pre Dryer/Stack
Method 5 Filter holder: Glass
Sample Train Leak Check:

Date 5-12-94 Test 16 Run 2
No. of traverse points 20
Filter type: 4" Glass

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: 0.002 cfm at 7 in. Hg. (vac) ☑

Particulate Catch Data:

No. of filters used:
6335

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: Mikkelsen & Stone

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	551	500	51
Impinger No. 3			
Condenser			
Desiccant	1527	1516	11
Total			62

Integrated Gas Sampling Data:

Bag Pump No. 22A-
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1812
Sampling rate: 40.0

Box No. 29 Bag No. 2
Size: 44 L
cc/min at 0 in. Hg.
(HRS) Time end: 1915 (HRS)
cc/min Operator: Mikkelsen

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Missoula, MT
Source: North Pole Plant / Stack
Date: 5-12-94 Test 1/6 Run 2

Operators: M. Kuehler + G. Howe
Meter Box No.: 4 ΔH@ 1.94 IN WC
Counter cont.: 1.0041

Pitot No.: 22U-4 Cp .84
Bar. Press.: 26.75 inHg H2O 5 %
Nozzle No.: ~~[illegible]~~ 3-3 Nozzle Dia .185 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1812	(273.40)											
10	3	275.20	1.50	1.82	5.73	4	104	243	249	44	93	83	20.7
9	6	278.10	1.58	1.89	8.10	4	105	250	250	44	85	84	20.7
8	9	280.40	1.50	1.80	0.41	4	103	246	260	44	86	81	20.6
7	12	282.85	1.23	2.07	2.90	4	106	252	255	44	88	84	20.7
6	15	285.35	1.75	2.11	5.40	4.5	104	250	253	43	89	84	20.6
5	18	287.84	1.76	2.12	7.91	4.5	104	247	257	43	90	85	20.5
4	21	290.40	1.68	2.02	0.37	4.5	105	245	261	44	91	85	20.8
3	24	292.80	1.65	2.03	2.84	4	104	251	263	44	92	85	20.8
2	27	295.20	1.65	1.99	5.28	4	105	250	260	46	91	85	20.8
1	30	297.57	1.63	1.96	7.70	4	107	250	259	48	92	85	20.8
10	33	299.63	1.05	1.27	9.65	3.5	105	255	264	44	89	85	20.7
9	36	301.67	1.15	1.38	1.69	3.5	106	252	261	49	90	85	20.9
8	39	303.91	1.30	1.56	3.85	4	106	248	265	47	91	85	20.8
7	42	306.42	1.75	2.11	6.36	4.5	106	253	265	47	92	86	20.8
6	45	308.80	1.77	2.14	8.89	4.5	105	246	262	47	92	86	20.7
5	48	311.24	1.64	1.98	1.33	4.5	105	244	260	47	92	86	20.7
4	51	313.40	1.23	1.48	3.44	4	106	250	257	48	92	96	20.7
3	54	315.41	1.08	1.31	5.42	3	105	249	258	48	91	96	20.7
2	57	317.29	1.07	1.29	7.38	3	108	250	255	48	91	96	20.9
1	60	319.28	1.00	1.21	9.29	3	104	253	257	50	91	96	20.8
	(1915)	(~~[illegible]~~)											
	θ = 60	Vm = 45.88		ΔH ~~[illegible]~~ 1.26							Avg. = 87.4		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P./Missoula, MT
Source North Pre Dryer/Stack
Method 5 Filter holder: Glass
Date 5/1/94 Test 16 Run 3
No. of traverse points 20
Filter type: 4" G.F.

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test < 0.02 cfm at 7 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:
6349

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: M. Kuehler + G. Howe

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	557	506	51
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1398	1378	10
Total			61

Integrated Gas Sampling Data:

Bag Pump No. 2LA
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1948
Sampling rate: 400

Box No. 29 Bag No. 3
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 2050 (HRS)
cc/min Operator: M. Kuehler

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.B./Missoula, MT. Operators: McKeehan + C. Hoye Pitot No.: L2V-4 Cp: .84
Source: North Pit Dryer / Stack Meter Box No.: 4 ΔH@: 1.77 IN WC Bar. Press.: 26.75 inHg H2O .5 x
Date: 5-12-94 Test: 16 Run: 3 Gasmeter coeff.: 1.0041 Nozzle No.: 3-3 Nozzle Dia: .105 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1948)	319.50											
10	3	321.54	1.15	1.39	1.54	4	106	153	161	48	80	80	20.7
9	6	323.60	1.18	1.41	3.57	4	104	150	163	49	82	80	20.7
8	9	325.80	1.40	1.67	5.80	4.5	104	152	160	49	83	81	20.6
7	12	328.15	1.60	1.90	8.17	5	107	147	157	49	85	81	20.6
6	15	330.80	1.81	2.15	0.69	5	107	145	156	50	86	82	20.8
5	18	333.26	1.78	2.12	3.20	5	107	149	155	50	87	82	20.8
4	21	335.58	1.60	1.91	5.59	5	107	145	155	50	87	82	20.8
3	24	337.66	1.20	1.43	7.65	4	108	146	153	50	88	82	20.7
2	27	339.70	1.10	1.31	9.63	4	108	150	150	48	88	83	20.7
1	30	341.54	1.05	1.26	1.57	3.5	106	151	149	47	88	83	20.7
10	33	343.85	1.51	1.81	3.89	4	107	152	155	47	86	82	20.6
9	36	346.30	1.61	1.92	6.20	4.5	107	150	158	47	88	82	20.5
8	39	348.63	1.70	2.03	8.74	4.5	107	148	152	47	89	83	20.5
7	42	351.30	1.87	2.25	1.32	5	105	147	160	47	89	83	20.6
6	45	353.79	1.83	2.20	3.83	5	105	145	161	46	89	83	20.6
5	48	356.35	1.77	2.12	6.39	5	107	148	163	46	89	83	20.6
4	51	358.82	1.70	2.04	8.86	4.5	105	148	165	46	89	83	20.5
3	54	361.20	1.60	1.92	1.25	4.5	105	151	160	48	89	83	20.5
2	57	363.57	1.55	1.87	3.61	4.5	104	152	157	48	89	83	20.6
1	60	365.90	1.50	1.81	5.96	4.5	104	150	158	48	89	83	20.6
	(2050)												
	θ = 60	Vm = 46.40		ΔH 1.93							Avg. =	84.6	

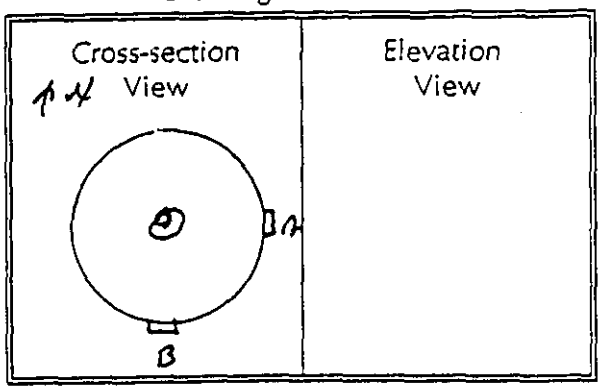
S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula MT
Source: South Pre Dryer / Stack
Test: 15 Run: 0 Date: 5-12-94
Stack Dimen.: 39 IN.
Dry Bulb: 132 °F Wet bulb: _____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.75 IN.HG
Static Pressure: -1.1 IN.WC
Operators: [illegible]
Pitot No.: 29V-4 C_p .84

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 6.25 IN.		Time Start: 0655 HRS	
A-1	.026	1.01	7.26	1.20	
2	.082	3.20	9.45	1.50	
3	.146	5.69	11.94	1.60	
4	.226	8.18	15.06	1.85	
5	.342	13.34	19.59	2.10	
6	.659	25.66	31.91	2.10	
7	.774	29.02	35.27	1.90	
8	.854	33.31	39.56	1.70	
9	.918	35.80	42.05	1.60	
10	.974	37.99	44.24	1.40	137
B-1				1.75	
2				1.80	
3				1.88	
4				1.95	
5				2.10	
6				2.05	
7				2.08	
8				1.93	
9				1.88	
10				1.75	

Temp. Meas. Device & S/N: PDT-31/TC
Time End: 0700 HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source South Pre Dryer/Stack
Method 0011 Filter holder: NA
Date 5-12-94 Test 15 Run 1
No. of traverse points 29
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: <0.02 cfm at 8 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: NA

Recovery solvent(s)
☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	506	472	34
Impinger No. 3			
Condenser			
Desiccant	1501	1488	13
Total			47

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 0206
Sampling rate: 400 cc/min
Box No. 24 Bag No. 1
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 0614 (HRS)
Operator: [illegible]

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Missoula, MT
Source: South Pole Dryer / Stack
Date: 5-11-94 Test: 15 Run: 1

Operators: M. Buckley / G. Howe
Meter Box No.: 9 ΔH@ 1.78 IN WC
Calibrator coeff.: .9961

Pitot No.: 191-4 Cp: .81
Bar. Press.: 26.75 inHg H2O: 5 %
Nozzle No.: Glass Nozzle Dia.: .191 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	0206	280.10											
A-10	3	282.50	1.58	1.80	2.51	4	132	237	253	43	73	74	20.4
9	6	284.92	1.62	1.87	4.96	4.5	134	245	257	43	74	74	20.3
8	9	287.45	1.70	1.99	2.49	4.5	126	240	254	43	75	74	20.2
7	12	290.07	1.86	2.18	0.15	5.5	124	243	250	44	76	74	20.3
6	15	293.00	2.20	2.57	3.02	7	127	248	247	44	77	74	20.3
5	18	295.77	2.10	2.45	5.84	7	127	250	252	43	78	75	20.4
4	21	298.40	1.80	2.11	8.46	6	126	246	255	43	79	75	20.4
3	24	300.92	1.65	1.95	0.97	5	124	249	257	44	79	75	20.3
2	27	303.30	1.50	1.77	3.36	5	125	253	260	44	80	75	19.9
1	30	305.65	1.43	1.69	5.71	5	124	255	254	45	76	73	19.4
B-10	33	308.41	1.97	2.31	8.44	6	124	251	257	45	77	74	19.3
9	36	311.14	2.03	2.34	1.19	6	136	247	257	45	79	74	19.4
8	39	314.00	2.11	2.44	4.00	6	135	250	253	45	81	75	19.5
7	42	316.71	2.05	2.35	6.76	6	141	245	256	45	81	75	19.6
6	45	319.55	2.18	2.44	9.60	6.5	143	248	257	45	82	75	19.5
5	48	322.35	2.07	2.37	2.38	6.5	143	251	252	47	82	76	19.5
4	51	325.00	1.95	2.23	5.07	6	143	246	258	47	83	75	19.4
3	54	327.74	1.42	2.20	7.75	5.5	144	242	255	47	83	76	19.4
2	57	330.41	1.88	2.27	0.46	6	144	245	252	48	84	76	19.4
1	60	333.10	1.84	2.17	3.12	6	144	243	254	48	84	77	19.3
	(0814)												
	θ = 60	Vm = 53.00		~H 2.18							Avg. = 76.9		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source South Pre Dryer / Stack
Method 0021 Filter holder: NA

Date 5-12-94 Test 15 Run 2
No. of traverse points 20
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test 0.02 cfm at 9 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

NA

Recovery solvent(s)

☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: M. Knechtel / G. Howe

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	509	473	36
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1360	1346	14
		1	
Total			50

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 0837
Sampling rate: 400

Box No. 24 Bag No. 2
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 0939 (HRS)
cc/min Operator: M. Knechtel

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P./Missoula, MT
Source Bonthe Pre. Dryer / Stack
Date 5-12-94 Test 15 Run 2

Operators M. Lockhart + K. Longstaff
Meter Box No. 9 ΔH@ 1.78 IN WC
Gasmeter coeff. .9961

Pitot No. 210-4 Cp .84
Bar. Press. 26.25 inHg H2O 4.8 %
Nozzle No. Glass Nozzle Dia .191 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Gas. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	0837	331.75											
B-10	3	334.25	1.78	1.99	4.26	5	159	237	254	47	76	74	19.6
9	6	337.00	2.10	2.36	7.04	6	152	237	254	46	77	74	19.6
8	9	339.80	2.15	2.43	9.84	6	150	238	251	46	78	74	19.6
7	12	342.57	2.12	2.39	2.62	6	152	236	254	45	80	74	20.0
6	15	345.40	2.22	2.53	5.49	7	145	239	251	44	81	76	20.0
5	18	348.33	2.23	2.56	8.39	7	137	245	256	44	81	75	20.1
4	21	351.10	2.08	2.39	1.17	6.5	142	249	253	44	82	76	20.5
3	24	353.85	2.00	2.29	3.90	6.5	145	247	258	46	82	76	20.4
2	27	356.57	1.95	2.26	6.62	6.5	137	244	255	46	83	76	20.4
1	30	359.22	1.92	2.23	9.31	6	137	250	257	46	83	76	20.2
A-10	33	361.50	1.35	1.57	1.57	4	138	258	253	46	82	76	20.0
9	36	363.81	1.41	1.64	3.88	4	138	257	250	46	82	77	19.9
8	39	366.47	1.90	2.21	6.57	6	137	257	252	45	84	77	19.8
7	42	369.42	2.14	2.49	9.42	7	137	255	253	47	85	78	19.8
6	45	372.06	1.83	2.13	2.06	6	138	252	256	48	85	78	19.7
5	48	374.55	1.66	1.95	4.58	5	134	256	252	48	85	78	19.7
4	51	377.00	1.61	1.89	7.07	5	134	258	257	48	86	78	19.6
3	54	379.64	1.72	2.03	9.65	5.5	131	254	255	50	86	78	19.6
2	57	382.10	1.63	1.92	2.15	5	133	255	252	50	86	78	19.7
1	60	384.62	1.55	1.82	4.60	5	133	249	253	50	87	79	19.6
	(0939)												
	θ = 60	Vm = 52.87		ΔH 2.15							Avg. = 79.5		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula MT
Source South Pile Dryer Stack
Method 0011 Filter holder: NA
Date 5-12-94 Test 15 Run 3
No. of traverse points 20
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: <0.02 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

NA

Recovery solvent(s)

☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	517	469	48
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1516	1501	15
Total			63

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0 cc/min at 20 in. Hg.
Time start: 1003 (HRS) Time end: 1106 (HRS)
Sampling rate: 400 cc/min Operator: M. Koehler

Box No. 24 Bag No. 3
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. / Missoula, MT
Source South Pre Dryer (Stack)
Date 5-12-94 Test 15 Run 3

Operators M. Kuehler + K. Nseismeier
Meter Box No. 9 ΔH@ 1.28 IN WC
Barometer model. 19961

Pitot No. 29V-4 Cp .84
Bar. Press. 26.75 inHg H2O 5 %
Nozzle No. Glass Nozzle Dia .191 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry Vol. (cf)	VAC. (inHg)	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1003)	386.50											
10	3	388.96	1.55	1.83	8.94	5	126	243	260	47	81	77	19.1
9	6	391.40	1.61	1.91	1.43	5	124	240	263	47	93	77	19.2
8	9	394.07	1.73	2.06	9.02	6	121	246	258	47	94	78	19.4
7	12	396.93	2.21	2.64	8.98	8	120	249	256	45	85	78	19.3
6	15	399.94	2.18	2.59	9.87	8	123	253	256	45	86	79	19.3
5	18	402.51	1.83	2.18	2.54	7	123	255	260	45	86	79	19.3
4	21	405.02	1.72	2.04	5.13	6.5	127	255	259	47	86	79	19.3
3	24	407.70	1.67	1.99	7.68	6	125	250	249	47	86	79	19.3
2	27	410.09	1.45	1.73	0.06	5	124	247	252	47	97	80	19.2
1	30	412.37	1.40	1.69	2.41	5	122	251	250	47	97	80	19.2
10	33	415.17	1.89	2.26	5.13	6.5	122	249	255	48	85	79	19.2
9	36	417.97	2.01	2.39	7.93	7	125	245	251	48	86	79	19.2
8	39	420.86	2.00	2.42	0.74	7	114	245	253	47	97	80	19.2
7	42	423.60	2.15	2.61	3.67	6.5	114	243	250	47	97	80	19.2
6	45	426.57	2.18	2.64	6.61	6.5	115	247	252	47	88	80	19.2
5	48	429.40	2.05	2.47	9.45	8	119	250	253	48	88	80	19.2
4	51	432.17	1.98	2.39	2.25	8	118	248	256	48	89	80	19.2
3	54	435.00	2.00	2.41	5.07	8	118	245	251	49	89	80	19.3
2	57	437.80	1.92	2.33	7.84	7.5	114	242	253	49	88	81	19.1
1	60	440.46	1.72	2.10	0.46	6.5	113	243	250	51	88	81	19.1
	(1106)												
	θ = 60	Vm = 53.96		ΔH 2.23							Avg. = 82.8		

S-0037R

Interpoll Laboratories
(612)786-6020

EPA Method 7 Sample Collection
Field Data Sheet

Job LP MISSOULA Date 5-12-94 Bar. Pressure 26.75 IN.HG.
Test Location PRE DRYER Fuel Type _____ Sample Train No. BLUE
N. STACK Technician GH Pump No. 29A

No.	Test Run Point	Flask No.	Time (HRS)	Vacuum (IN.HG.)	Flask Temp. (°F)	Leak Rate <0.4 IN.HG./MIN.
1	16-1-1	25	1632	24.5	74	☒ Yes ☐ No
2	16-1-2	26	1647	24.5	74	☒ Yes ☐ No
3	16-1-3	27	1702	25.0	74	☒ Yes ☐ No
4	16-1-1	29	1717	25.0	74	☒ Yes ☐ No
5	16-2-1	30	1814	25.0	72	☒ Yes ☐ No
6	16-2-2	34	1832	25.0	72	☒ Yes ☐ No
7	16-2-3	67	1847	24.8	72	☒ Yes ☐ No
8	16-2-1	68	1902	24.6	72	☒ Yes ☐ No
9	16-3-1	69	1950	24.8	70	☒ Yes ☐ No
10	16-3-2	70	2002	24.8	70	☒ Yes ☐ No
11	16-3-3	71	2017	25.0	70	☒ Yes ☐ No
12	16-3 1	72	2032	25.0	70	☒ Yes ☐ No
13						☐ Yes ☐ No
14						☐ Yes ☐ No
15						☐ Yes ☐ No
16						☐ Yes ☐ No
17						☐ Yes ☐ No
18						☐ Yes ☐ No
19						☐ Yes ☐ No
20						☐ Yes ☐ No
21						☐ Yes ☐ No
22						☐ Yes ☐ No
23						☐ Yes ☐ No
24						☐ Yes ☐ No
25						☐ Yes ☐ No
26						☐ Yes ☐ No
27						☐ Yes ☐ No

S-263R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula, MT
Source: South Pit Dryer / Stack
Test: 17 Run: 0 Date: 5-12-94
Stack Dimen.: 39 IN.
Dry Bulb: 108 °F Wet bulb: _____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.75 IN.HG
Static Pressure: -1.1 IN.WC
Operators: M. Kuehl + K. Nuessmeier
Pitot No.: 29V-4 C_p: .84

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length:	IN.	Time Start:	HRS
		Refer to Test No. 15			
		for pts and		Flows	

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P./Missoula MT
Source South Pole Dryer/Stack
Method 5 Filter holder: Glass
Sample Train Leak Check:

Date 5/12/94 Test 12 Run 1
No. of traverse points 20
Filter type: 4" G.F.

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: <0.02 cfm at 13 in. Hg. (vac) ☑

Particulate Catch Data:

No. of filters used: 6485

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: M. Rochlitzer + K. Wassmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	545	490	55
Impinger No. 3			
Condenser			
Desiccant		~~1360~~	
	1453	1445	8
Total			63

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1630
Sampling rate: 400

Box No. 24 Bag No. 1
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 1730 (HRS)
cc/min Operator: M. Rochlitzer

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. / Missoula, MT
Source South Pre Dryer / Stack
Date 5-12-94 Test 12 Run 1

Operators Wylie Hallett & R. Dressgage
Meter Box No. 9 ΔH@ 1.78 IN WC
Gasmeter coeff. .9961

Pitot No. 246-4 Cp .84
Bar. Press. 26.25 inHg H2O 5 %
Nozzle No. Glass Nozzle Dia .197 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1630	440.80											
B 10	3	443.44	1.81	2.18	3.47	9	118	243	260	48	82	80	20.4
9	6	446.35	2.05	2.46	6.30	10	119	240	261	48	83	81	20.4
8	9	449.07	2.00	2.42	9.11	10	115	246	257	49	84	81	20.4
7	12	451.97	2.03	2.45	1.94	10	116	249	255	47	84	81	20.4
6	15	454.87	2.15	2.62	4.87	11	109	247	250	47	85	81	20.4
5	18	457.82	2.10	2.58	7.78	11	106	250	253	47	86	83	20.4
4	21	460.68	2.03	2.53	0.66	11	100	252	257	47	86	84	20.3
3	24	463.60	2.02	2.51	3.54	11	101	253	260	47	87	85	20.3
2	27	466.33	1.93	2.38	6.34	10.5	107	250	261	50	88	85	20.2
1	30	469.19	1.95	2.42	9.16	10.5	105	255	263	50	88	85	20.2
A 10	33	471.47	1.22	1.51	1.40	6.5	105	248	260	50	87	86	20.2
9	36	473.95	1.52	1.87	3.88	7	110	247	257	51	90	86	20.3
8	39	476.70	1.83	2.27	6.62	10	109	246	258	51	92	87	20.3
7	42	479.44	1.82	2.26	9.36	10	107	246	255	52	92	87	20.3
6	45	482.25	2.07	2.57	2.28	11	106	250	254	52	93	87	20.3
5	48	485.05	1.91	2.38	5.09	10	106	251	260	52	93	88	20.3
4	51	487.72	1.75	2.19	7.79	10	105	248	261	52	94	88	20.3
3	54	490.43	1.60	1.99	0.36	9	107	252	260	49	93	88	20.4
2	57	492.97	1.56	1.94	2.91	9	107	250	257	49	94	89	20.4
1	60	495.54	1.86	1.96	5.46	9	103	247	255	50	94	89	20.4
	(1236)												
	θ = 60	Vm = 54.74		ΔH 2.27							Avg. =	86.9	

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula MT
Source South Pre Dryer
Method I Filter holder: Glass

Date 5-12-94 Test 17 Run 2
No. of traverse points 20
Filter type: 4" G.F.

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: <0.02 cfm at 13 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

6336

Recovery solvent(s)

☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: M. Koehler + K. Nuessmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	573	504	69
Impinger No. 3			
Condenser			
Desiccant	1488	1473	15
Total			84

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0 cc/min at 20 in. Hg.
Time start: 1812 (HRS) Time end: 1915 (HRS)
Sampling rate: 400 cc/min Operator: M. Koehler

Box No. 24 Bag No. 2
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Missoula MT
Source: South Pre. Dryer / Stack
Date: 5-13-94 Test: 17 Run: 2

Operators: McKeehlert / K. Weissner
Meter Box No.: 9 ΔH@: 1.78 IN WC
Counter coeff.: .9961

Pitot No.: LAU-4 Cp: .84
Bar. Press.: 26.75 inHg H2O: 3.8 %
Nozzle No.: Glass Nozzle Dia: .191 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1812	496.00											
10	3	498.54	1.40	1.70	8.37	6	108	245	250	47	84	84	20.4
9	6	500.87	1.60	1.95	0.90	8	103	243	252	47	87	85	20.3
8	9	503.59	1.88	2.28	3.64	10	108	247	255	47	88	85	20.4
7	12	506.44	2.04	2.48	6.50	11	108	247	257	46	89	86	20.4
6	15	509.37	2.10	2.55	9.40	12	108	247	253	46	89	86	20.5
5	18	512.25	2.10	2.56	2.31	12	107	250	258	46	89	86	20.3
4	21	515.03	1.96	2.39	5.12	12	107	249	259	46	89	86	20.3
3	24	517.80	1.87	2.28	7.86	11	107	251	260	46	88	85	20.3
2	27	520.42	1.58	1.92	0.38	10	109	253	262	45	88	85	20.4
1	30	522.96	1.58	1.92	2.90	10	107	250	260	46	89	85	20.4
10	33	525.62	1.77	2.15	5.57	11	107	252	261	45	87	85	20.4
9	36	528.80	2.05	2.49	8.43	12	107	250	258	46	88	85	20.3
8	39	531.35	2.05	2.49	1.29	12	108	247	257	48	88	86	20.3
7	42	534.15	2.10	2.55	4.19	12	108	248	253	48	89	85	20.3
6	45	537.10	2.08	2.53	2.08	12	107	254	255	48	88	85	20.2
5	48	540.10	2.15	2.61	0.02	12	108	253	257	48	88	85	20.2
4	51	542.92	2.12	2.56	2.92	12	110	250	257	48	88	85	20.3
3	54	545.70	1.98	2.39	5.73	11	111	245	256	49	88	85	20.3
2	57	548.52	1.93	2.33	8.50	11	112	240	254	49	87	85	20.1
1	60	551.36	1.91	2.31	1.26	10	110	243	251	49	88	85	20.4
	(1915)												
	θ = 60	Vm = 55.36		ΔH 2.32							Avg. =	86.5	

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source South Pce Dryer / Stack
Method 5 Filter holder: Glass
Sample Train Leak Check:

Date 5-12-94 Test 17 Run 3
No. of traverse points 20
Filter type: 4" G.F.

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test <0.02 cfm at 13 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6350

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: M. Kuehler + K. Niessmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	555	502	53
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1460	1453	7
Total			60

Integrated Gas Sampling Data:

Bag Pump No. 291
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1948
Sampling rate: 400

Box No. 24 Bag No. 3
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 2050 (HRS)
cc/min Operator: M. Kuehler

S/N of O_2 Analyzer used to monitor train outlet: 9

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Missoula MT
Source: South Pre Dryer (Exit)
Date: 5/12-94 Test 12 Run 3

Operators: M. Kuehlwein / K. Nussmeier
Meter Box No. 9 ΔH@ 1.79 IN WC
Gasmeter coeff. .9961

Pitot No. L96-4 Cp .84
Bar. Press. 26.75 inHg H2O .5 %
Nozzle No. 6/64 Nozzle Dia .191 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1948	(551.75)											
10	3	554.33	1.72	2.12	4.39	9	109	243	257	47	81	81	20.4
9	6	557.44	2.04	2.48	2.24	11	109	245	255	47	83	81	20.4
8	9	560.56	2.00	2.44	0.60	11	110	247	251	47	84	82	20.3
7	12	563.00	2.16	2.63	3.00	12	110	250	256	47	84	82	20.3
6	15	565.86	2.19	2.66	5.95	12	110	252	254	47	84	82	20.4
5	18	568.87	2.21	2.70	8.92	12	109	249	252	49	85	82	20.5
4	21	571.87	2.23	2.72	1.91	12	110	246	253	49	85	82	20.5
3	24	574.81	2.15	2.63	4.85	12	108	250	257	49	85	82	20.4
2	27	577.60	1.98	2.42	7.66	11	110	251	258	50	85	82	20.4
1	30	580.40	1.95	2.39	0.46	11	108	254	259	51	85	82	20.4
	33	582.60	1.19	1.46	2.66	8	108	252	252	51	83	81	20.5
	36	584.90	1.17	1.43	4.82	8	108	252	255	51	85	82	20.5
	39	587.44	1.60	1.96	7.36	9	108	247	255	51	86	82	20.5
	42	589.95	1.70	2.09	9.98	9	108	248	257	53	87	82	20.5
	45	592.60	1.72	2.11	2.62	10	108	245	250	53	87	83	20.6
	48	595.51	2.18	2.67	5.58	12	109	244	251	53	87	82	20.6
	51	598.47	2.13	2.61	8.51	12	108	246	253	52	87	82	20.6
	54	601.33	2.10	2.58	1.42	12	108	250	255	52	86	82	20.5
	57	604.09	1.90	2.33	4.19	11	108	253	255	52	86	82	20.5
	60	606.81	1.77	2.18	6.88	10	106	250	255	52	86	82	20.5
	(2050)												
	θ = 60	Vm 52.98		ΔH 2.37							Avg. = 83.4		

55.06

S-0037R

Interpoll Laboratories
(612)786-6020

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EPA Method 7 Sample Collection
Field Data Sheet

Job LP MISSOULA Date 5-12-94 Bar. Pressure 26.75 IN.HG.
Test Location PREHEATER Fuel Type _____ Sample Train No. GRN
S. STACK Technician CH Pump No. 29 A

	No.	Test Run Point	Flask No.	Time (HRS)	Vacuum (IN.HG.)	Flask Temp. (°F)	Leak Rate <0.4 IN.HG./MIN.
1630-1735	1	17-1-1	1	1630	24.0	74	☒ Yes ☐ No
	2	17-1-2	2	1645	24.5	74	☒ Yes ☐ No
	3	17-1-3	3	1700	24.3	74	☒ Yes ☐ No
	4	17-1-1	4	1715	24.4	70	☒ Yes ☐ No
812-1915	5	17-2-1	5	1812	24.4	72	☒ Yes ☐ No
	6	17-2 3	6	1830	24.6	72	☒ Yes ☐ No
	7	17-2-3	55	1845	24.6	72	☒ Yes ☐ No
	8	17-2-1	56	1900	25.0	72	☒ Yes ☐ No
	9	17-3-1	57	1948	25.0	70	☒ Yes ☐ No
1948-2050	10	17-3-2	58	2000	25.0	70	☒ Yes ☐ No
	11	17-3-3	59	2015	25.0	70	☒ Yes ☐ No
	12	17-3-1	60	2030	25.0	70	☒ Yes ☐ No
	13						☐ Yes ☐ No
	14						☐ Yes ☐ No
	15						☐ Yes ☐ No
	16						☐ Yes ☐ No
	17						☐ Yes ☐ No
	18						☐ Yes ☐ No
	19						☐ Yes ☐ No
	20						☐ Yes ☐ No
	21						☐ Yes ☐ No
	22						☐ Yes ☐ No
	23						☐ Yes ☐ No
	24						☐ Yes ☐ No
	25						☐ Yes ☐ No
	26						☐ Yes ☐ No
	27						☐ Yes ☐ No

S-263R

APPENDIX F

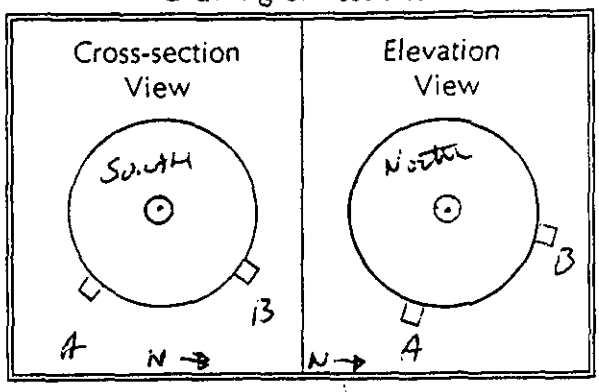
BOARD COOLERS 1 & 2 FIELD DATA SHEETS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LP - [illegible]
Source: Board Cooler 1+2 Stack
Test: 2 Run: 0 Date: 5-11-94
Stack Dimen.: 44 IN.
Dry Bulb: 86 °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.95 IN.HG
Static Pressure: -1.40 IN.WC
Operators: SB + KR
Pitot No.: 290-5 C_p: .840

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 4.75	IN.	Time Start: 0730	HRS
A	1 .044	1.94	6.69	.73	86
	2 .146	6.42	11.17	1.15	
	3 .296	13.02	17.77	1.10	86
	4 .704	30.98	35.73	1.12	
	5 .854	37.58	42.33	1.30	86
	6 .956	42.06	46.81	.65	
B	1			.70	86
	2			1.05	
	3			1.05	86
	4			.93	
	5			1.10	86
	6			1.10	
A	1				
	2				
	3				
	4				
	5				
	6				
B	1				
	2				
	3				
	4				
	5				
	6				

Temp. Meas. Device & S/N: Digital T/C - DOT 29 | 0745 Time End: HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - Minnesota
Source Boiler 1+2 Stack
Method 1-5 Filter holder: 4" C-Class

Date 5-11-91 Test 8 Run 1
No. of traverse points 24
Filter type: 4" Glass filter

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6060

Recovery solvent(s)
☒ acetone 7w
☒ other(s) Meek - Imp Rinse

No. of probe wash bottles: 1
Sample recovered by: SB

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	508	506	2
Impinger No. 3			
Condenser			
Desiccant	14	14	11
Total			13

Integrated Gas Sampling Data:

Bag Pump No. 22B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00 cc/min at 15 in. Hg.
Time start: 0947 (HRS) Time end: 1050 (HRS)
Sampling rate: 400 cc/min Operator: SB

Box No. 29 Bag No. 1
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 11

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CF-011

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP - Missouri
Source: Burd Cooler #2 Stack
Date: 5-11-94 Test: 8 Run: 1

Operators: SJ + KR
Meter Box No.: 10 ΔH@ 1.79 IN WC
Gasmeter coeff.: .9954

Pitot No.: 29V-5 Cp .840
Bar. Press.: 26.95 inHg H2O 2 %
Nozzle No.: 4-3 Nozzle Dia .180 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(0917)	(637.65)											
2nH B - 6	0.5	639.36	1.10	1.39	9.36	6	81	Ambient	Air	44	65	64	20.9
5	5	641.14	1.20	1.56	1.21	7	81				67	63	Ambient
4	7.5	643.00	1.12	1.46	3.00	7	81			45	69	63	air
3	10	644.82	.92	1.20	4.62	7	81				71	64	
2	12.5	646.46	1.02	1.33	6.33	7	82			46	73	64	
1	15	648.00	1.03	1.35	8.05	7	81				74	64	
A - 6	17.5	649.80	.64	.84	9.41	5	82			44	75	64	
5	20	651.44	1.28	1.68	1.34	7	81				76	65	
4	22.5	653.22	1.25	1.64	3.24	6	82			43	77	65	
3	25	654.97	1.00	1.31	4.94	6	85				79	66	
2	27.5	656.79	1.10	1.44	6.73	6	86			44	81	66	
1	30	658.20	.64	.84	8.10	4	87				81	67	
10nH A - 6	32.5	659.96	1.15	1.50	9.92	6	87			41	82	67	
5	35	661.85	1.20	1.58	1.79	7	86				82	68	
4	37.5	663.55	.97	1.28	3.48	6	84			41	84	68	
3	40	665.17	1.00	1.32	5.20	5	85				84	69	
2	42.5	666.81	.93	1.23	6.84	5	84			40	84	69	
1	45	668.74	.64	.82	8.21	4	100				85	70	
B - 6	47.5	669.88	.99	1.28	9.91	6	97			41	85	70	
5	50	671.78	1.20	1.56	1.78	7	96				85	71	
4	52.5	673.57	.94	1.21	3.42	6	103			44	86	71	
3	55	675.13	.88	1.12	5.01	5	104				86	71	
2	57.5	676.73	1.02	1.31	6.72	5	102			41	86	71	
1	60	678.21	.75	.98	8.21	5	91				86	72	
	(1050)												
	θ = 60	Vm = 40.56		ΔH 1.30							Avg. = 73.1		

F-3

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP - Missoula
Source Board Dryer 142 Stack
Method 1-5 Filter holder: 4" Glass

Date 5-11-94 Test 8 Run 2
No. of traverse points 24
Filter type: 4" Glass fiber

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 12 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

6579

Recovery solvent(s)

☒ acetone DW
☒ other(s) Meth Imp Rinse

No. of probe wash bottles: 1
Sample recovered by: SB

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	505	504	1
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1493	1486	7
Total			8

Integrated Gas Sampling Data:

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00 cc/min at 15 in. Hg.
Time start: 1145 (HRS) Time end: 1247 (HRS)
Sampling rate: 4.00 cc/min Operator: SB

Box No. 29 Bag No. 2
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 11

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CF-011

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP - Missoula
Source: Board Coker 1&2 stack
Date: 5-11-91 Test: 8 Run: 2

Operators: SB + KR
Meter Box No.: 10 ΔH@: 1.74 IN WC
Counter cont.: 9954

Pitot No.: 270.5 Cp: .840
Bar. Press.: 26.95 inHg H2O: 2 %
Nozzle No.: 4-3 Nozzle Dia: .190 IN.

	Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
		(1145)	(678.45)											
bottom	B - 6	2.5	680.21	1.15	1.49	0.24	6	92	Ambient	Air	41	73	73	20.9
	5	5	682.05	1.21	1.54	2.11	6	103			41	103	73	Ambient
	4	7.5	683.84	.98	1.28	3.82	6	104			42	103	77	Air
	3	10	685.70	1.15	1.50	5.67	6	105			42	79	73	
	2	12.5	687.65	1.02	1.33	7.39	6	93			43	80	73	
	1 A	15	688.74	.62	.80	8.74	6	95			43	81	73	
	A - 6	17.5	690.45	.98	1.29	0.44	6	87			44	82	73	
	5	20	692.31	1.20	1.54	2.29	5	104			44	82	73	
	4	22.5	693.89	.89	1.14	3.89	5	105			43	86	73	
	3	25	695.55	.99	1.23	5.55	5	125			41	87	74	
	2	27.5	697.17	.94	1.17	7.17	5	123			40	88	74	
	1 A	30	698.68	.79	1.02	8.68	5	105			41	89	74	
F-5 Switch	B - 6	32.5	700.29	.89	1.16	0.29	5	105			42	88	75	
	5	35	702.07	1.1	1.41	2.07	5	108			42	90	75	
	4	37.5	703.91	1.2	1.54	3.93	5	109			39	92	76	
	3	40	705.39	1.1	1.40	5.71	5	114			39	92	76	
	2	42.5	707.39	.98	1.24	7.34	5	117			41	93	77	
	1 A	45.0	708.91	.80	1.02	8.91	5	113			47	94	77	
	-6	47.5	710.49	.85	1.09	0.49	5	112			44	93	78	
	5	50	712.11	.89	1.16	2.11		101			44	93	78	
	4	52.5	713.87	.87	1.13	3.71		104				95	78	
	3	55	715.33	.87	1.15	5.33		94				96	79	
	2	57.5	717.08	1.0	1.34	7.08		89				97	80	
	1 A	60	718.95	1.1	1.47	8.91		89				97	80	
		(1247)												
		θ = 60	Vm = 40.50		ΔH = 1.27							Avg. = 82.5		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - Missoula
Source Board Cooler 102 Stack
Method 5 Filter holder: 4" Glass

Date 5-11-91 Test 8 Run 3
No. of traverse points 20
Filter type: 4" Glass fiber

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: ____ cfm at _____ in. Hg. (vac) ☐

Particulate Catch Data:

No. of filters used: 6591

Recovery solvent(s)
☒ acetone PW
☒ other(s) Mecl2 - Emp Rinse

No. of probe wash bottles: 1
Sample recovered by: SB

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	508	501	7
Impinger No. 3			
Condenser			
Desiccant	1437	1429	8
Total			15

Integrated Gas Sampling Data:

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00 cc/min at 15 in. Hg.
Time start: 1323 (HRS) Time end: 1425 (HRS)
Sampling rate: 400 cc/min Operator: SB

Box No. 29 Bag No. 3
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 11

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: CP MISSOULA
Source: BOARD COOLER NO 1 - 5 STACK
Date: 5-11-94 Test: 8 Run: 3

Operators: GA, KR
Meter Box No.: 10 ΔH@ 1.79 IN WC
Counter cont.: 9954

Pitot No.: 3905 Cp: .84
Bar. Press.: 26.95 inHg H2O: 1.0 %
Nozzle No.: 4-3 Nozzle Dia: .196 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1323)	(719.20)											
A - 6	2.5	721.02	1.1	1.48	1.02	5	91			42	88	85	AMBIENT
5	5	722.75	1.0	1.31	2.75	5	109			43	90	75	
4	7.5	724.43	.95	1.25	4.43	5	104			42	92	85	
3	10	726.09	.88	1.16	6.06	5	107			41	94	85	
2	12.5	727.80	1.0	1.33	7.80	5	103			40	96	86	
1	15	729.56	1.0	1.35	9.56	5	97			39	96	86	
B - 6	17.5	731.08	.75	1.00	1.08	5	105			40	98	87	
5	20	732.79	.95	1.27	2.79	5	105			41	99	87	
4	22.5	734.62	1.1	1.47	4.60	5	121			42	100	87	
3	25	736.30	.98	1.26	6.30	5	129			42	100	88	
2	27.5	738.11	1.1	1.42	8.11	5	128			43	101	88	
1	30	739.78	.94	1.21	9.78	5	130			43	102	88	
B - 6	32.5	741.60	1.2	1.54	1.60	5	130			42	101	89	
5	35	743.45	1.1	1.43	3.98	5	123			42	103	90	
4	37.5	744.99	.75	.98	4.99	5	123			42	103	90	
3	40	746.62	.89	1.14	6.62	5	131			43	103	90	
2	42.5	748.23	.87	1.13	8.23	5	126			43	104	91	
1	45	749.48	.49	.66	9.48	5	101			44	104	91	
A - 6	47.5	751.13	.88	1.18	1.13	5	109			44	102	92	
5	50	752.96	1.1	1.44	2.96	5	123			41	103	92	
4	52.5	754.65	.94	1.24	4.65	5	119			42	104	92	
3	55	756.20	.79	1.03	6.20	5	124			43	104	92	
2	57.5	757.76	.80	1.05	7.76	5	121			42	105	93	
1	60	759.55	1.0	1.32	9.51	5	119			42	105	93	
	(1425)												
	θ = 60	Vm = 40.37		ΔH = 1.23							Avg. = 91.1		

S-0037R

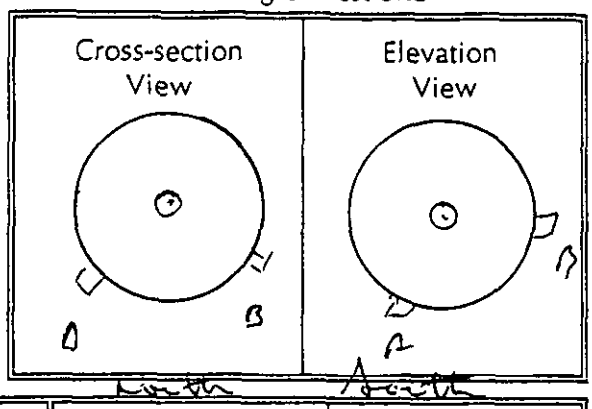
F-7 Matter

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LP MISSOULA
Source: BOARD COLER NO 1 - 2 STACK
Test: 11 Run 0 Date 5-11-94
Stack Dimen.: 94" IN.
Dry Bulb: 84 °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.95 IN.HG
Static Pressure: -1.40 IN.WC
Operators: SB + KR
Pitot No.: 2905 C_p .84

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 4.75 IN.		Time Start:	HRS
South C 1	.094	1.94	6.69		
2	.646	6.42	11.17		
3	.296	13.02	17.77		
4	.704	30.98	35.77		
5	.854	37.58	42.33		
6	.956	42.06	46.81		
B 1					
2					
3					
4					
5					
6					
North A 1					
2					
3					
4					
5					
6					
B 1					
2					
3					
4					
5					
6					
Temp. Meas. Device & S/N: PDT NO 29				Time End:	HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP MISSOULA Date 5-11-94 Test 11 Run 1
Source BOARD COOLER NO 1 & 2 No. of traverse points 24
Method 0011 Filter holder: NONE STACK Filter type: NONE

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: 0.00 cfm at 10 in. Hg. (vac) ☑

Particulate Catch Data:

No. of filters used: NONE

Recovery solvent(s)
☐ acetone
☒ other(s) MECL

No. of probe wash bottles: 1
Sample recovered by: SJ

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	473	473	0
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1540	1440	10
Total			10

Integrated Gas Sampling Data: N/A ambient air

Bag Pump No. _____ Box No. _____ Bag No. _____
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: _____ cc/min at _____ in. Hg.
Time start: _____ (HRS) Time end: _____ (HRS)
Sampling rate: _____ cc/min Operator: _____

S/N of O_2 Analyzer used to monitor train outlet: _____

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP MISSOULA
Source: BOARD COOLER NO 1-2 STACK
Date: 5-11-94 Test: 11 Run: 1

Operators: GH KR
Meter Box No.: 10 ΔH@ 1.79 IN WC
Gasmeter coeff.: .9954

Pitot No.: 29US Cp .84
Bar. Press.: 26.95 inHg H2O 2 %
Nozzle No.: 4-3 Nozzle Dia .190 IN.

	Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
		(1635)	759.90											
NORTH	B 6	25	762.09	.94	2.09	2.09	6	109	Ambient	Temp	42	84	83	20.9
	5	5	764.40	1.1	2.38	4.40	8	114			42	84	83	
	4	7.5	766.71	1.1	2.36	6.71	8	119			42	86	84	
	3	10	769.13	1.2	2.60	9.13	8	115			41	88	84	
	2	12.5	771.21	.88	1.91	1.21	6	114			42	89	83	
	1	15	773.14	.75	1.63	3.14	7	113			42	90	83	
	A 6	17.5	775.54	1.2	2.55	5.54	8	126			44	91	84	
	5	20	777.98	1.2	2.63	7.98	8	109			38	92	84	
	4	22.5	780.33	1.1	2.43	0.33	8	106			39	93	84	
	3	25	782.53	.95	2.12	2.53	8	101			40	93	84	
	2	27.5	784.73	.96	2.13	4.73	8	105			41	94	84	
	1	30	786.79	.84	1.87	6.79	8	103			42	95	84	
SOUTH	B 6	32.5	788.87	.85	1.88	8.87	8	107			41	95	84	
	5	35	790.98	.87	1.96	0.98	8	97			42	95	84	
	4	37.5	793.36	1.1	2.48	3.36	8	97			45	96	85	
	3	40	795.58	.95	2.18	5.58	6	89			45	97	85	
	2	42.5	797.87	1.0	2.29	7.87	7	89			45	98	85	
	1	45	800.27	1.1	2.51	0.27	7	91			44	98	85	
	A 6	47.5	802.20	.72	1.63	2.20	7	96			44	99	85	
	5	50	804.42	.95	2.15	4.42	7	97			44	98	86	
	4	52.5	806.68	1.0	2.29	6.68	7	103			44	99	86	
	3	55	808.86	.93	2.07	8.86	7	108			44	99	86	
	2	57.5	811.23	1.1	2.46	1.23	7	105			45	100	87	
	1	60	812.98	.59	1.34	2.98	8	99			45	100	87	
		(1738) θ = 60	Vm = 52.80		ΔH 2.16							Avg. =	89.2	

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L-P MISSOULA
Date 5-11-94 Test 11 Run 2
Source BOARD COOLER NO 1 - 2 STACK
No. of traverse points 24
Method 0011 Filter holder: NONE
Filter type: NONE

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

NONE

Recovery solvent(s)

☐ acetone
☒ other(s) $MECl_2$

No. of probe wash bottles: 1
Sample recovered by: C

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	428	427	1
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1520	1510	10
Total			11

Integrated Gas Sampling Data: AMBIENT

Bag Pump No. _____
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: _____
Time start: _____
Sampling rate: _____

Box No. _____ Bag No. _____
Size: 44 L
cc/min at _____ in. Hg.
(HRS) Time end: _____ (HRS)
cc/min Operator: _____

S/N of O_2 Analyzer used to monitor train outlet: _____

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: SP MISSOULA
Source: BOARD COOLER NO 1-2 STACK
Date: 5-11-94 Test: 11 Run: 2

Operators:
Meter Box No.: 10 ΔH@: 1.79 IN WC
Counter coeff.: .9954

Pitot No.: 2905 Cp: .84
Bar. Press.: 26.95 inHg H2O: 2 %
Nozzle No.: 1-3 Nozzle Dia: .120 IN.

	Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
		(1814)	(813.30)											
SOUTH	A - 6	2.5	815.64	1.1	2.42	5.64	7	109	Cabin	Temp	39	88	86	20.9
	5	5	817.88	1.0	2.20	7.88	7	107			40	89	86	
	4	7.5	820.23	1.1	2.42	0.22	7	109			41	89	86	
	3	10	822.39	.92	2.04	2.37	7	105			42	92	86	
	2	12.5	824.59	.95	2.15	4.58	7	95			42	95	86	
	1	15	826.55	.75	1.69	6.55	7	97			43	96	86	
	B - 6	17.5	828.60	.82	1.83	8.60	7	104			40	96	87	
	5	20	830.87	~~.90~~ .99	2.26	0.87	6	92			40	97	87	
	4	22.5	833.37	1.2	2.75	3.37	7	89			41	98	87	
	3	25	835.56	.90	2.08	5.56	7	87			42	99	87	
	2	27.5	837.96	1.1	2.52	7.96	7	90			42	99	87	
	1	30	840.06	.84	1.93	0.06	7	91			42	99	87	
NORTH	B - 6	32.5	842.31	.99	2.26	2.31	7	93			41	98	88	
	5	35	844.74	1.1	2.52	4.74	7	95			43	99	89	
	4	37.5	847.02	1.0	2.27	7.02	6	98			42	100	88	
	3	40	849.26	.98	2.18	9.26	6	108			40	100	88	
	2	42.5	851.36	.86	1.93	1.36	6	104			40	101	88	
	1	45	853.52	.90	2.01	3.52	6	107			41	101	88	
	A 6	47.5	856.00	1.2	2.69	6.00	6	105			42	100	87	
	5	50	858.48	1.2	2.68	8.48	6	107			43	100	87	
	4	52.5	860.71	.98	2.18	0.71	7	108			40	101	89	
	3	55	863.18	1.2	2.65	3.18	7	114			39	101	89	
	2	57.5	865.44	1.0	2.22	5.44	7	110			38	101	89	
	1	60	867.69	.96	2.20	7.69	7	92			38	101	89	
		(1918)												
		θ = 60	Vm = 54.39		ΔH 2.25							Avg. = 92.4		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP MISSOULA Date 5-11-94 Test 11 Run 3
Source BOARD COOLER NO 1-2 STACK No. of traverse points 24
Method _____ Filter holder: _____ Filter type: NONE

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 15 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: NONE

Recovery solvent(s)
☐ acetone _____
☒ other(s) MECl2

No. of probe wash bottles: 1
Sample recovered by: _____

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	477	477	0
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1503	1493	10
Total			10

Integrated Gas Sampling Data: Ambient Air

Bag Pump No. _____ Box No. _____ Bag No. _____
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: _____ cc/min at _____ in. Hg.
Time start: _____ (HRS) Time end: _____ (HRS)
Sampling rate: _____ cc/min Operator: _____

S/N of O_2 Analyzer used to monitor train outlet: _____

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LF MISSOULA
Source: BARO COOLER NO 1 - 2
Date: 5-11-94 Test: 11 Run: 3

Operators: G.H. KR
Meter Box No.: 10 ΔH@: 1.79 IN WC
Gasmeter coeff.: .9954

Pitot No.: 2905 Cp: .84
Bar. Press.: 26.95 inHg H2O: 2 %
Nozzle No.: 4-3 Nozzle Dia: .190 IN.

	Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (xx/v)
		1946	868.00											
NORTH A	6	2.5	870.46	1.2	2.60	0.46	8	109	Ambient	Air	39	88	88	20.9
	5	5	872.91	1.2	2.64	2.91	8	108			40	88	87	
	4	7.5	875.11	.98	2.13	5.11	7	114			41	90	87	
	3	10	877.45	1.1	2.41	7.45	8	111			41	91	87	
	2	12.5	879.81	1.1	2.45	9.81	8	103			41	92	87	
	1	15	882.04	.98	2.18	2.04	8	103			39	92	87	
B	6	17.5	884.50	1.2	2.65	4.50	8	108			40	93	87	
	5	20	886.95	1.2	2.65	6.95	8	108			41	94	80	
	4	22.5	889.08	.90	1.99	9.08	8	109			42	95	86	
	3	25	891.20	.88	1.97	1.20	8	103			40	95	86	
	2	27.5	893.26	.84	1.85	3.26	8	110			40	96	86	
	1	30	895.45	.96	2.10	5.45	8	115			41	96	86	
	6	32.5	897.80	1.1	2.41	7.80	8	115			41	95	86	
	5	35	900.14	1.1	2.42	0.14	8	111			41	96	86	
	4	37.5	902.60	1.2	2.65	2.60	8	109			42	96	86	
	3	40	904.87	1.0	2.24	4.87	8	102			42	97	86	
	2	42.5	907.24	1.1	2.46	7.24	8	102			43	97	86	
	1	45	909.61	1.1	2.47	9.61	8	101			43	97	86	
	6	47.5	912.00	1.1	2.50	2.00	8	93			44	96	86	
	5	50	914.29	1.0	2.28	4.29	8	91			41	96	86	
	4	52.5	916.55	.98	2.24	6.55	8	91			37	97	86	
	3	55	918.73	.91	2.08	8.73	8	90			40	97	86	
	2	57.5	920.91	.91	2.08	0.91	8	90			41	97	86	
	1	60	923.41	.87	1.98	3.04	8	91			42	97	86	
		(2050)												
		θ = 60	Vm = 55.41		ΔH = 2.31							Avg. = 90.2		

APPENDIX G

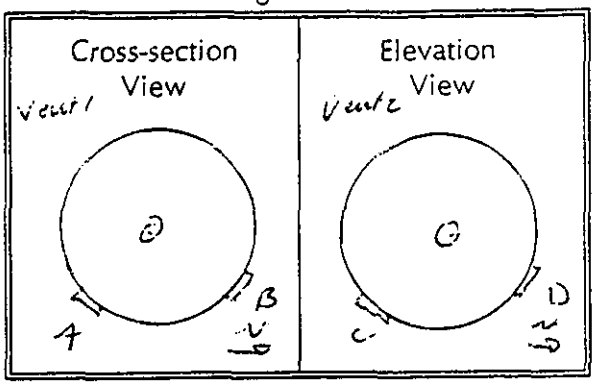
PRESS VENT FIELD DATA SHEETS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

job L.P. / Missoula, MT
Source Nos 1+2 Press Vent / Stacks
Test 10 Run 0 Date 5-11-94
Stack Dimen. 44 IN.
Dry Bulb 87 °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 26.95 IN.HG
Static Pressure -1.15 IN.WC
Operators M. Kuhlert + K. Nuesmeier
Pitot No. 29U-4 C_p .84

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 2.5 IN.		Time Start: 0901 HRS	
A-1	.044	1.94	4.44	.55	
2	.146	6.42	8.92	.78	
3	.296	13.02	15.52	.76	
4	.704	30.97	33.49	1.03	
5	.854	37.58	40.08	1.10	
6	.956	42.06	44.56	1.15	99
B-1				.62	
2				.80	
3				.84	
4				.93	
5				1.07	
6				1.06	
C-1				1.04	
2				.92	
3				.97	
4				.93	93
5				.95	
6				.80	
D-1				.86	
2				.84	
3				.92	
4				.73	
5				.90	
6				.97	

-1.20

-1.10

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 0913 HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source Nos 1+2 Power Plant / Stack
Method 5 Filter holder: Glass
Date 5-11-94 Test 10 Run 1
No. of traverse points 24
Filter type: 4" G.F.

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: < 0.02 cfm at 7 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6599

Recovery solvent(s)
☒ acetone
☒ other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: M. Kaehler & K. Nyessmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	498	498	—
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1414	1407	7
Total			7

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 0949
Sampling rate: 400

Box No. 23 Bag No. 1
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 1053 (HRS)
cc/min Operator: M. Kaehler

S/N of O_2 Analyzer used to monitor train outlet: NA

123093-G:\STACK\WP\METHODS\S-0046RR

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: E.P. / Missoula, MT
Source: D Dryer / Stack
Date: 5-11-94 Test: 10 Run: 1

Operators: M Kuehler / K Neuzmeier
Meter Box No.: 9 ΔH: 1.78 IN WC
Gasmeter coeff.: .9961

Pitot No.: 290-4 Cp: .84
Bar. Press.: 26.95 inHg H2O: 1 %
Nozzle No.: 3-5 Nozzle Dia: .191 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Des. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	0949	00.50											20.9
D-6	2.5	2.13	.99	1.06	2.03	2.5	95	Ambient		45	72	72	
5	5	3.53	.95	1.01	3.53	2.5	99			44	73	72	
4	7.5	5.14	.90	.96	5.00	2	100			44	74	73	
3	10	6.49	.89	.94	6.44	2	100			45	75	73	
2	12.5	7.94	.86	.93	7.89	2	90			45	76	74	
1	15	9.30	.87	.95	9.35	2	88			45	77	74	
C-6	17.5	10.85	.99	1.07	0.89	2.5	97			43	80	75	
5	20	12.40	.97	1.03	2.42	2.5	105			43	82	76	
4	22.5	13.99	.86	.92	3.86	2	105			43	83	76	
3	25	15.15	.66	.70	5.12	2	107			43	84	76	
2	27.5	16.63	.86	.92	6.56	2	107			43	85	77	
1	30	18.12	.94	1.01	8.07	2.5	102			44	86	78	
B-6	32.5	19.74	1.02	1.10	9.65	2.5	105			44	85	79	
5	35	21.29	1.01	1.09	1.21	2.5	108			44	88	79	
4	37.5	22.80	1.01	1.09	2.79	2.5	106			44	88	80	
3	40	24.25	.84	.91	4.23	2	102			44	89	80	
2	42.5	25.65	.86	.93	5.68	2	103			45	89	81	
1	45	27.13	.81	.88	7.10	2	102			45	91	83	
A-6	47.5	28.76	.98	1.08	8.67	2	98			45	90	83	
5	50	30.31	1.01	1.10	0.25	2.5	104			45	91	84	
4	52.5	31.91	1.00	1.08	1.82	2.5	107			45	92	84	
3	55	33.25	.71	.77	3.15	2	107			45	93	85	
2	57.5	34.49	.70	.76	4.47	2	107			45	92	86	
1	60	35.01	.85	.94	5.94	2	98			45	93	85	
	1052										Avg. = 81.5		
	θ = 60	Vm = 35.51		ΔH = .97									

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source No. 1+2 Press Vent / Stack
Method 5 Filter holder: Glass
Sample Train Leak Check:

Date 5-11-94 Test 10 Run 2
No. of traverse points 24
Filter type: 4" G.F.

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: <0.02 cfm at 5 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6604

Recovery solvent(s)
☒ acetone
☒ other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: M. Kuehler + K. Niessmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	295	295	—
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1409	1400	9
Total			8

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1145
Sampling rate: 400

Box No. 23 Bag No. 2
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 1250 (HRS)
cc/min Operator: M. Kuehler

S/N of O_2 Analyzer used to monitor train outlet: NA

123093-G:\STACK\WP\METHODS\S-0046RR

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Missoula, MT
Source: No. 142 Press Dryer / Stack
Date: 5-11-94 Test: 10 Run: 2

Operators: M. Kaehler + K. Nosmeier
Meter Box No.: 9 ΔH@: 1.29 IN WC
Counter coeff.: .9961

Pitot No.: 29V-4 Cp: .84
Bar. Press.: 26.95 inHg H2O: 1 %
Nozzle No.: 3.3 Nozzle Dia: .187 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Des. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1145	36.30											
A-6	2.5	37.92	.94	1.00	7.80	2	109	Ambient		54	86	95	20.9
5	5	39.33	.87	.93	9.26	2	111			53	89	95	
4	7.5	40.75	.85	.91	0.70	2	111			51	91	87	
3	10	42.27	.97	.94	2.17	2	110			50	92	87	
2	12.5	43.40	.55	.59	3.34	2	109			50	93	87	
1	15	44.79	.78	.84	4.74	2	109			50	93	88	
B-6	17.5	46.45	1.04	1.12	6.34	2.5	113			51	94	90	
5	20	47.99	1.05	1.13	7.96	2.5	113			50	96	90	
4	22.5	49.70	1.02	1.11	9.56	2.5	111			50	97	90	
3	25	50.95	.68	.74	0.07	2	111			50	97	91	
2	27.5	52.42	.93	.90	2.32	2	110			50	97	91	
1	30	53.84	.86	.94	3.79	2	108			50	99	91	
C-6	32.5	55.42	.97	1.05	5.36	2	112			53	99	92	
5	35	56.85	.85	.92	6.92	2	113			52	101	94	
4	37.5	58.39	.99	.97	8.33	2	113			52	101	94	
3	40	59.87	.87	.95	9.92	2	110			50	101	94	
2	42.5	61.47	.93	1.03	1.37	2.5	104			48	102	95	
1	45	62.99	.92	1.03	2.92	2.5	98			49	103	95	
D-6	47.5	64.51	.98	1.07	4.50	2.5	111			50	102	95	
5	50	66.10	.95	1.03	6.06	2.5	115			51	104	96	
4	52.5	67.63	.88	.96	7.55	2	117			51	104	96	
3	55	69.14	.83	.90	9.01	2	115			51	104	96	
2	57.5	70.59	.85	.93	0.49	2	115			51	105	97	
1	60	71.92	.64	.71	1.78	2	104			52	104	97	
	(1250)												
	θ = 60	Vm = 35.62		ΔH = .95							Avg. = 94.9		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source Mis 142 Press vent/Stacks
Method 5 Filter holder: Glass
Date 5-11-94 Test 10 Run 3
No. of traverse points 24
Filter type: 4" G.F.

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: <0.02 cfm at 5 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6484

Recovery solvent(s)
☒ acetone
☒ other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: M. Kuehler

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1494	1484	10
Total			10

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0 cc/min at 20 in. Hg.
Time start: 1323 (HRS) Time end: 1425 (HRS)
Sampling rate: 400 cc/min Operator: M. Kuehler
Box No. 23 Bag No. 3
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: NA

123093-G:\STACK\WP\METHODS\S-0046RR

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Missoula, MT
Source: Nos 1 & 2 Press vent / Stacks
Date: 5-11-94 Test: 10 Run: 3

Operators: M. Boehlert / K. Wagner
Meter Box No.: 9 ΔH@: 1.78 IN WC
Counter conf.: .9961

Pitot No.: 294-4 Cp: .84
Bar. Press.: 26.85 inHg H2O: 1 %
Nozzle No.: 3 3 Nozzle Dia: .191 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1323	72.10											
D-6	2.5	73.80	1.05	1.14	3.72	2.5	113	Ambient		50	97	96	20.9
5	5	75.43	1.00	1.10	5.32	2.5	108			50	99	97	
4	7.5	76.98	1.00	1.09	6.91	2.5	115			49	99	97	
3	10	78.52	.93	1.01	8.45	2	114			49	101	97	
2	12.5	79.97	.87	.95	9.94	2	114			50	102	98	
1	15	81.48	.89	.99	1.46	2	105			51	103	98	
C-6	17.5	83.18	1.01	1.11	3.07	2.5	110			51	102	98	
5	20	84.77	1.01	1.11	4.69	2.5	112			51	104	99	
4	22.5	86.15	.89	.98	6.20	2	112			51	105	99	
3	25	87.85	.97	1.08	7.80	2.5	104			52	106	99	
2	27.5	89.38	.95	1.06	9.38	2.5	104			52	105	98	
1	30	90.97	.94	1.05	0.95	2.5	101			53	105	99	
B-6	32.5	92.55	1.03	1.15	2.60	2.5	101			53	107	101	
5	35	94.22	.98	1.08	4.19	2.5	114			53	108	101	
4	37.5	95.80	.93	1.02	5.74	2	118			53	108	101	
3	40	97.28	.83	.90	7.21	2	120			54	109	102	
2	42.5	98.72	.77	.84	8.61	2	123			54	109	102	
1	45	99.95	.72	.79	9.98	2	115			56	109	102	
A-6	47.5	101.50	.96	1.07	1.57	2.5	110			56	109	102	
5	50	103.20	.95	1.05	3.15	2	110			56	110	103	
4	52.5	104.68	.93	1.09	4.76	2.5	109			56	110	103	
3	55	106.25	.88	.98	6.29	2	109			56	110	103	
2	57.5	107.90	.95	1.06	7.87	2.5	109			56	110	103	
1	60	109.54	.95	1.06	9.41	2	109			56	111	104	
	(1425)												
	θ = 60	Vm = 37.44		ΔH @ 1.03							Avg. = 102.9		

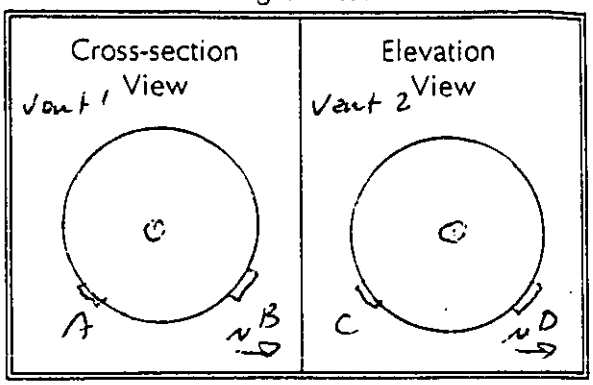
S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula, MT
Source: Nos 1+2 Precs Vent / Stacks
Test: 13 Run: 0 Date: 5-11-94
Stack Dimen.: 44 IN.
Dry Bulb: 87 °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.95 IN.HG
Static Pressure: -1.15 IN.WC
Operators: M. Kahler + R. Nuemeier
Pitot No.: 294-4 C_p .84

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 2.5 IN.		Time Start: 1630 HRS	
A-1	.044	1.94	4.44	.78	
2	.146	6.42	8.92	.79	
3	.296	13.02	15.52	.93	
4	.704	30.97	33.49	.85	
5	.854	37.58	40.08	.67	
6	.956	42.06	44.56	.60	
B-1				.48	
2				.55	
3				.67	
4				.84	↑
5				.95	
6				1.00	87
C-1				1.03	↓
2				1.08	
3				.97	
4				.95	
5				.88	
6				.93	
D-1				.67	
2				.73	
3				.75	
4				.84	
5				.62	
6				.60	

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 1633 HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
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Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source Nos 1+2 Press Vent / Stack
Method 0011 Filter holder: NA
Date 5-11-94 Test 13 Run 1
No. of traverse points 24
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.02 cfm at 12 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: NA

Recovery solvent(s)
☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: M. Koehler + K. Niessmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	469	470	(1)
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1420	1408	12
Total			11

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1638
Sampling rate: 400
Box No. 24 Bag No. 1
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 1744 (HRS)
cc/min Operator: M. Koehler

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. / Missoula, MT
Source Nos. 1 + 2 Press Vent / Stack
Date 5-11-94 Test 23 Run 1

Operators Milbrath + Weissmann
Meter Box No. 9 ΔH@ 1.78 IN WC
Gasmeter coeff. .9961

Pitot No. 29V-4 Cp .84
Bar. Press. 26.95 inHg H2O 1 %
Nozzle No. Glass Nozzle Dia. .225 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1638	109.80											
A-6	2.5	112.45	1.06	2.90	2.39	10	99	Ambient		45	91	91	20.9
5	5	114.95	1.00	2.70	4.97	9	100			47	92	91	
4	7.5	117.51	1.07	2.89	7.44	10	100			47	93	91	
3	10	119.70	.81	2.20	9.69	7	98			47	94	92	
2	12.5	121.99	.84	2.28	1.98	7	98			48	95	92	
1	15	124.47	.95	2.58	4.42	8	98			48	96	92	
B-6	17.5	127.09	1.08	2.93	2.02	9.5	99			46	97	92	
5	20	129.48	.91	2.47	9.41	8	100			45	97	92	
4	22.5	131.85	.87	2.36	1.74	7.5	101			44	97	93	
3	25	134.15	.85	2.31	4.05	7.5	101			45	98	93	
2	27.5	136.25	.81	2.20	6.31	7.5	101			45	98	93	
1	30	138.36	.58	1.58	8.22	5	101			45	99	93	
C-6	32.5	140.67	.84	2.27	0.51	7	105			45	98	93	
5	35	142.96	.87	2.35	2.84	7.5	105			46	100	94	
4	37.5	144.77	.57	1.55	4.73	5	104			46	100	94	
3	40	146.90	.79	2.14	6.96	6.5	104			48	100	94	
2	42.5	149.35	.85	2.30	9.27	7.5	105			48	101	95	
1	45	151.62	.89	2.43	1.65	8	100			48	102	95	
D-6	47.5	154.00	.90	2.47	4.04	8	97			48	100	93	
5	50	156.44	.94	2.56	6.48	8	101			49	101	95	
4	52.5	158.80	.92	2.51	8.89	8	101			49	102	95	
3	55	160.90	.63	1.71	0.89	5.5	105			51	102	95	
2	57.5	163.14	.87	2.19	3.14	7	107			50	103	95	
1	60	165.42	.78	2.11	5.36	6.5	107			50	103	95	
	1744												
	θ = 60	Vm = ~~55.62~~ 55.12		ΔH 2.33							Avg. = 95.7		

S-0037R

INTERPOLL LABORATORIES, INC.
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Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Missoula, MT
Source No. 1+2 Press Vent / Stack
Method 0051 Filter holder: NA

Date 6-11-94 Test 13 Run 2
No. of traverse points 24
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: <0.02 cfm at 12 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

NA

Recovery solvent(s)

☐ acetone
☒ other(s) $MeCl_2$

No. of probe wash bottles: 1
Sample recovered by: M. Koehler & K. Nuessmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	476	476	—
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1509	1500	9
Total			9

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1914
Sampling rate: 400

Box No. 24 Bag No. 2
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 1920 (HRS)
cc/min Operator: M. Koehler

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: A.P. / Missoula, MT
Source: No. 1 & Press Vent / Stack
Date: 5-17-94 Test: 13 Run: 2

Operators: Michael & K. Wiesman
Meter Box No.: 9 ΔH@ 1.79 IN WC
Barometer coeff.: .9961

Pitot No.: 12V-4 Cp: .84
Bar. Press.: 26.95 inHg H2O x
Nozzle No.: Glass Nozzle Dia: .222 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1814	165.70											
D-6	2.5	168.05	.94	2.53	8.11	7.5	112	Amb	amb	49	93	92	20.9
5	5	170.55	.95	2.53	0.52	8	113			49	95	92	
4	7.5	172.25	.78	2.08	2.71	6	114			49	97	93	
3	10	174.99	.92	2.19	4.98	7	114			50	97	93	
2	12.5	177.25	.81	2.17	7.20	7	114			50	99	94	
1	15	179.58	.83	2.22	9.47	7	115			50	99	94	
C-6	17.5	181.99	.97	2.66	1.95	8.5	113			50	99	94	
5	20	184.48	.98	2.63	4.42	8.5	114			52	100	94	
4	22.5	186.84	.91	2.44	6.75	8	114			52	100	94	
3	25	189.40	1.02	2.74	9.31	9	114			49	101	95	
2	27.5	191.72	.85	2.31	1.63	7.5	107			48	101	95	
1	30	193.97	.80	2.17	3.97	6.5	110			48	102	95	
B-6	32.5	196.43	.99	2.67	6.36	8	113			48	100	95	
5	35	198.95	1.02	2.74	8.88	8.5	113			47	102	95	
4	37.5	201.44	1.01	2.74	1.40	8.5	109			47	102	95	
3	40	204.00	.92	2.49	3.81	8	111			47	102	95	
2	42.5	205.92	.73	1.98	5.95	6	111			48	103	95	
1	45	208.20	.75	2.03	8.13	6	112			48	103	96	
A-6	47.5	210.72	.98	2.65	0.61	8	112			48	102	95	
5	50	212.93	.80	2.16	2.95	6.5	112			50	102	96	
4	52.5	215.17	.81	2.18	5.10	6.5	114			50	103	96	
3	55	217.30	.76	2.05	7.29	6	114			50	103	97	
2	57.5	219.72	.90	2.43	9.67	7	114			51	104	96	
1	60	222.05	.82	2.23	1.95	6	110			51	104	96	
	(1920)												
	θ = 60	Vm = 56.35		ΔH 2.38							Avg. =	97.6	

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job W.P./Missoula, MT
Source No. 1 & 2 Precipitator / Stacks
Method 0011 Filter holder: NA
Date 5-1-94 Test 13 Run 3
No. of traverse points 24
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test 0.02 cfm at 12 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: NA

Recovery solvent(s)
☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: M. Kuehler + K. Wessmeier

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	200	200	0
Impinger No. 3			
Condenser			
Desiccant	1431	1420	11
Total			11

Integrated Gas Sampling Data:

Bag Pump No. 294
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1946
Sampling rate: 400

Box No. 24 Bag No. 3
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 2053 (HRS)
cc/min Operator: M. Kuehler

S/N of O_2 Analyzer used to monitor train outlet: 3

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: [illegible] Missoula, MT
Source: Nos 1+2 Press Jent / Stack
Date: 5-11-98 Test: 3 Run: 3

Operators: M. Kuehl + M. Weissmann
Meter Box No.: 9 ΔH@ 1.78 IN WC
Gasmeter coeff.: .9961

Pitot No.: CPV-4 Cp: .84
Bar. Press.: 26.95 inHg H2O X
Nozzle No.: 6 Nozz Dia: .227 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1946	222.40											
A-6	2.5	224.85	1.01	2.67	4.88	2.5	124	Ambient		48	92	91	20.9
5	5	227.32	.98	2.56	7.30	8	123			46	93	92	
4	7.5	229.84	1.01	2.65	9.77	8	123			46	95	92	
3	10	232.14	.87	2.29	2.07	7	121			47	95	91	
2	12.5	234.45	.91	2.40	4.42	7.5	120			47	97	92	
1	15	236.92	.97	2.56	6.55	8	120			47	97	91	
B-6	17.5	239.43	1.00	2.65	9.32	8	118			48	95	91	
5	20	241.93	1.05	2.76	1.94	8.5	122			50	97	91	
4	22.5	244.35	.99	2.61	4.29	8	122			50	98	91	
3	25	246.83	.98	2.58	6.72	8	122			51	99	92	
2	27.5	249.44	.83	2.18	8.97	6.5	124			51	98	92	
1	30	251.31	.73	1.92	1.08	6	124			51	99	92	
C-6	32.5	253.62	.92	2.42	3.44	7.5	124			51	99	93	
5	35	255.93	.95	2.51	5.95	7.5	123			51	99	93	
4	37.5	258.30	.93	2.45	8.23	7	123			52	99	93	
3	40	260.15	.57	1.51	0.11	5	120			52	99	93	
2	42.5	262.35	.73	1.93	2.22	5.5	121			52	100	93	
1	45	264.69	.90	2.38	4.57	6	121			49	100	93	
D-6	47.5	267.20	1.02	2.70	7.07	7.5	121			49	99	93	
5	50	269.53	1.02	2.69	9.56	7.5	123			49	99	93	
4	52.5	271.94	.91	2.40	1.92	7	124			48	100	93	
3	55	273.89	.69	1.82	3.97	6	124			48	100	93	
2	57.5	276.14	.68	1.79	6.01	6	124			49	100	93	
1	60	278.16	.78	2.06	8.20	6.5	123			49	100	93	
	2053												
	θ = 60	Vm = 55.96		ΔH 2.35							Avg. =	95.0	

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LP/Missoula
Source: No 3 + 4 Press Vent Stack
Test: 9 Run: 2 Date: 5-11-94
Stack Dimen.: 44 IN.
Dry Bulb: °F Wet bulb: °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.45 IN.HG
Static Pressure: No3 -1.05 No4 -.96 IN.WC
Operators: E. Trowbridge - G. Hovr
Pitot No.: 22V-4 C_p: .840

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 2 1/2 IN.		Time Start: 0827 HRS	
3-A 1	.044	1.94	4.44	.64	
2	.146	6.42	9.92	.56	
3	.246	13.02	15.52	.75	
4	.704	30.97	33.48	.62	
5	.854	37.58	40.08	.94	85
6	.956	42.06	44.56	.45	
B 1				.80	
2				.81	
3				.79	
4				.76	85
5				.85	
6				.86	
4-A 1				.74	
2				.79	
3				.75	80
4				.60	
5				.78	
6				.76	
B 1				.75	
2		52.04		.80	
3		32.970		.78	
4		28.329		.57	80
5				.85	
6				.82	

Temp. Meas. Device & S/N: PDT-34 Time End: 0855 HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
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Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job 2P/MISSOULA
Source NO 3+4 Press Vent
Method 28E Filter holder: 4" GLASS
Date 5-11-94 Test 9 Run 1
No. of traverse points 24
Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 5 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6601

Recovery solvent(s)
☒acetone
☐other(s)

No. of probe wash bottles: 1
Sample recovered by: ET

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	200	200	0
Impinger No. 3			
Condenser			
Desiccant	1492	1484	8
Total			8

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 0919
Sampling rate: 400
Box No. 7 Bag No. 1
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1053 (HRS)
cc/min Operator: ET

S/N of O_2 Analyzer used to monitor train outlet: _____

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LSI MISSOULA
Source No 3 V-4 Pure Vat Stack
Date 5-11-84 Test 4 Run 1

Operators E J Rowbridge G Hoke
Meter Box No. 4 ΔH@ 1.94 IN WC
Gasmeter coeff. 1.0041

Pitot No. 22V-4 Cp .840
Bar. Press. 26.85 inHg H2O x
Nozzle No. 3-3 Nozzle Dia .185 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (xx/v)
	0949	791.70											
3B- 6	2.5	793.20	.86	1.08	3.17	3.5	97			49	68	67	
5	5	794.65	.86	1.07	4.43	3.5	97				70	67	
4	7.5	796.00	.72	.88	5.96	3.0	103			43	72	68	
3	10	797.18	.57	.70	7.15	2.5	104				74	69	
2	12.5	798.39	.57	.71	8.35	2.5	99			43	75	69	
1	15	799.76	.78	.97	9.74	3.0	99				77	70	
3A 6	17.5	801.28	.93	1.16	1.27	3.5	100			44	78	71	
5	20	802.83	.92	1.15	2.80	3.5	100				80	72	
4	22.5	804.11	.67	.83	4.10	2.9	106			44	81	72	
3	25	805.40	.65	.81	5.38	2.9	101				82	73	
2	27.5	806.75	.72	.91	6.74	3.0	97			44	83	74	
1	30	808.00	.65	.81	8.02	2.9	109				84	75	
4B - 6	32.5	809.42	1.05	1.33	9.67	3.8	98			44	84	76	
5	35	811.31	1.05	1.34	1.32	3.8	96				87	77	
4	37.5	812.65	.70	.89	2.67	3.2	100			44	88	78	
3	40	813.93	.62	.79	3.94	3.0	98				89	79	
2	42.5	815.46	.93	1.19	5.51	3.5	96			44	91	81	
1	45	817.02	.92	1.18	7.07	3.6	96				92	81	
4A -6	47.5	818.76	1.10	1.41	8.77	4.0	99			45	92	82	
5	50	820.42	1.10	1.41	9.48	4.0	98				94	83	
4	52.5	821.74	.65	.84	1.80	3.0	97			45	95	84	
3	55	823.30	.91	1.17	3.36	3.6	99				96	85	
2	57.5	825.03	.98	1.27	4.98	3.8	97			45	97	86	
1	60	826.67	.98	1.27	6.61	3.8	98				98	87	
	(1053)												
	θ = 60	Vm = 34.97		ΔH = 1.15							Avg. = 80.2		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LPI [illegible]
Source NO 3+4 PRESS VENT STACK
Method 29 Filter holder: 4" GLASS

Date 11-4-94 Test 9 Run 2
No. of traverse points 24
Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg (vac) ☒
Post test: 0 cfm at 5 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:
6605

Recovery solvent(s)
☑ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: MAK

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	200	200	0
Impinger No. 3			
Condenser			
Desiccant	1476	1469	7
Total			7

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1146
Sampling rate: 400

Box No. 7 Bag No. 2
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1249 (HRS)
cc/min Operator: ET

S/N of O_2 Analyzer used to monitor train outlet: _____

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CF-011

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/MISSOULA
Source No 3 & 4 Press Vent Stack
Date 5-11-94 Test 2 Run 2

Operators ET-GH
Meter Box No. 4 ΔH@ 1.94 IN WC
Counter cont. 110041

Pitot No. 224-9 Cp .84
Bar. Press. 26.85 inHg H2O x
Nozzle No. 2-3 Nozzle Dia .195 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1145	826.90											
4B-6	2.5	828.55	1.00	1.31	8.55	4.5	99				91	88	
5	5	831.16	.95	1.22	2.15	3.3	103				91	88	
4	7.5	831.70	.85	1.10	1.66	3.2	103				97	90	
3	10	833.20	.88	1.14	3.20	3.2	104				98	93	
2	12.5	834.80	.90	1.17	4.76	3.3	104				100	94	
1	15	836.33	.92	1.21	6.36	3.3	101				103	96	
4A-6	17.5	838.00	.96	1.27	7.99	3.4	100				103	96	
5	20	839.65	.96	1.27	9.63	3.4	100				104	97	
4	22.5	841.25	.92	1.22	1.24	3.3	98				106	98	
3	25	842.05	.68	.90	2.62	3.0	102				106	98	
2	27.5	844.20	.85	1.13	4.17	3.2	97				107	99	
1	30	845.70	.83	1.11	5.71	5.2	95				108	100	
3-6	32.5	847.37	.94	1.25	7.38	3.3	101				108	100	
5	35	848.85	.80	1.06	8.84	3.2	102				107	101	
4	37.5	850.23	.68	.90	0.23	3.0	102				109	101	
3	40	851.68	.75	.99	1.69	3.1	104				110	100	
2	42.5	853.12	.72	.95	3.11	3.1	104				110	101	
1	45	854.47	.65	.86	4.47	3.0	102				110	102	
3-6	47.5	856.05	.86	1.14	6.03	3.2	105				111	102	
5	50	857.60	.86	1.14	7.59	3.2	105				111	102	
4	52.5	859.10	.75	.99	9.05	3.1	104				111	103	
3	55	860.35	.58	.77	0.34	2.8	102				111	103	
2	57.5	861.65	.57	.76	1.62	2.8	102				111	103	
1	60	863.10	.75	1.00	3.09	3.2	100				111	103	
	(1250)												
	θ = 60	Vm = 36.20		ΔH 1.08							Avg. = 101.9		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/MISSOULA
Source NO 3+4 PRESS VENT STACKS
Method 28 Filter holder: 4" GLASS
Date 5-11-91 Test 4 Run 3
No. of traverse points 24
Filter type: 4" GLASS FIBER

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 5 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:
10483

Recovery solvent(s)
☑ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: ET

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	200	200	0
Impinger No. 3			
Condenser			
Desiccant	1488	1480	8
Total			8

Integrated Gas Sampling Data:

Bag Pump No. 22A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1324
Sampling rate: 429
Box No. 7 Bag No. 3
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1427 (HRS)
cc/min Operator: ET

S/N of O_2 Analyzer used to monitor train outlet: _____

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CF-011

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/MISSOULA
Source No 5 & 4 Power Plant Stack
Date 5-11-94 Test 4 Run 3

Operators ET - GH
Meter Box No. 4 ΔH 1.94 IN WC
Gasmeter coeff. 1.0041

Pitot No. 22V-4 Cp .840
Bar. Press. 26.95 inHg H2O x
Nozzle No. 3-3 Nozzle Dia .185 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dry Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impy.	Gas/In	Gas/Out	Oxygen (%v/v)
	1323	863.30											
3A - 6	2.5	864.95	.95	1.25	4.93	3.7	105				99	98	
5	5	866.60	.92	1.21	6.52	3.7	103				99	98	
4	7.5	868.20	.82	1.07	8.03	3.2	106				101	98	
3	10	869.60	.80	1.05	9.52	3.2	105				103	99	
2	12.5	871.11	.82	1.09	1.04	3.2	102				104	99	
1	15	872.45	.68	.90	2.42	3.0	102				105	99	
3B - 6	17.5	874.15	1.00	1.32	4.10	3.8	105				105	100	
5	20	875.78	.95	1.26	5.73	3.7	102				106	100	
4	22.5	877.28	.80	1.06	7.24	3.1	104				107	100	
3	25	878.85	.86	1.13	8.79	3.2	108				107	100	
2	27.5	880.32	.80	1.05	0.29	3.1	108				108	100	
1	30	881.75	.74	.98	1.73	3.0	108				108	101	
4B - 6	32.5	883.50	1.10	1.45	3.49	3.9	107				108	101	
5	35	885.28	1.10	1.45	5.25	3.9	108				108	101	
4	37.5	886.99	1.00	1.33	6.95	3.8	104				109	102	
3	40	888.61	.98	1.30	8.60	3.8	104				109	102	
2	42.5	890.40	1.05	1.39	0.32	3.8	106				109	102	
1	45	892.04	1.00	1.33	2.00	3.8	105				109	102	
4A - 6	47.5	893.72	1.10	1.46	3.77	4.0	106				109	102	
5	50	895.50	1.10	1.46	5.53	4.0	105				109	102	
4	52.5	897.15	.95	1.27	7.18	3.5	103				109	102	
3	55	898.80	.97	1.29	8.84	3.5	104				109	102	
2	57.5	900.50	.98	1.31	0.51	3.5	103				109	103	
1	60	902.05	.82	1.09	2.04	3.1	103				109	103	
	(1428)												
	θ = 60	Vm = 38.75		ΔH = 1.23							Avg. = 103.6		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/MISSOULA
Source NO 3+4 Pulverized Stack
Method 5001 Filter holder: N/A

Date 5-11-94 Test 12 Run 1
No. of traverse points 24
Filter type: N/A

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: N/A

Recovery solvent(s)
☐ acetone
☒ other(s)

No. of probe wash bottles: 1
Sample recovered by: MK

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	200	200	0
Impinger No. 3			
Condenser			
Desiccant	1399	1384	15
Total			15

Integrated Gas Sampling Data:

Bag Pump No. _____
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: _____
Time start: _____
Sampling rate: _____

Box No. _____ Bag No. _____
Size: 44 L
cc/min at _____ in. Hg.
(HRS) Time end: _____ (HRS)
cc/min Operator: _____

S/N of O_2 Analyzer used to monitor train outlet: _____

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP/Missoula
Source: NO 3 & 4 Press Vent Stack
Date: 5-11-94 Test: 12 Run: 1

Operators: ET - GH
Meter Box No.: 4 ΔH@ 1.94 IN WC
Counter coeff.: 1.0041

Pitot No.: 22V-4 Cp: .840
Bar. Press.: 22.45 inHg H2O: x
Nozzle No.: glass Nozzle Dia: .224 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1635	902.30											
4B-6	2.5	904.05	1.20	3.33	4.92	9.0	109				90	89	
5	6	907.55	1.18	3.25	2.51	9	107				90	90	
4	7.5	909.75	.90	2.49	9.79	7	107				91	90	
3	10	912.15	.96	2.65	2.12	7	108				92	90	
2	12.5	914.53	.99	2.73	4.49	7	108				94	91	
1	15	916.79	.94	2.60	6.82	7	108				95	91	
4A-6	17.5	919.40	1.18	3.27	9.42	9	107				94	91	
5	20	921.85	1.08	2.99	1.91	8	107				96	92	
4	22.5	924.47	1.09	3.02	4.41	8	109				97	92	
3	25	926.78	1.05	2.91	6.87	8	109				98	92	
2	27.5	929.30	1.06	2.96	9.35	8	106				99	92	
1	30	931.62	.95	2.67	1.71	8	103				99	92	
3A-6	32.5	934.10	1.00	2.81	4.13	8	103				99	93	
5	35	936.55	1.00	2.81	6.55	8	104				99	93	
4	37.5	938.62	.75	2.10	8.64	6	107				100	93	
3	40	940.62	.65	1.82	0.60	5.5	107				100	94	
2	42.5	942.85	.86	2.39	2.83	6.0	110				101	94	
1	45	945.10	.82	2.29	5.02	6.0	109				102	94	
3B-6	47.5	947.40	.93	2.60	7.35	7.0	109				102	94	
5	50	949.70	.92	2.58	9.68	7.0	106				102	94	
4	52.5	951.94	.84	2.36	1.90	6.0	106				102	94	
3	55	954.25	.95	2.67	4.26	6.0	106				102	94	
2	57.5	956.38	.75	2.10	6.36	6.0	108				103	95	
1	60	958.30	.58	1.62	8.41		110				103	95	
	(1744)												
	θ = 60	Vm = 56.000		ΔH = 2.62							Avg. = 95.1		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/Missoula
Source No 3 & 4 Fugitive Stacks
Method 5001/ Filter holder: N-A
Date 5-11-94 Test 12 Run 2
No. of traverse points 24
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☐
Post test: 0 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used:

NA

Recovery solvent(s)

☐acetone
☒other(s)

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	200	200	0
Impinger No. 3			
Condenser			
Desiccant	1346	1337	9
Total			9

Integrated Gas Sampling Data:

Bag Pump No.
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: cc/min at in. Hg.
Time start: (HRS) Time end: (HRS)
Sampling rate: cc/min Operator:

Box No. Bag No.
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet:

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/MISSOULA
Source NO 2+4 Pulp Kiln STACK
Date 5-11-94 Test 12 Run 2

Operators ET-4+
Meter Box No. 4 ΔH@ 1.94 IN WC
Gasmeter coeff. 1.0041

Pitot No. 22Y-4 Cp .840
Bar. Press. 26.95 inHg H2O %
Nozzle No. GLASS Nozzle Dia. .254 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impy.	Gas/In	Gas/Out	Oxygen (%v/v)
	1814	958.80											
3B - 6	2.5	961.09	.93	2.58	1.11	6.0	108				94	92	
5	5	963.40	.93	2.56	3.42	6.0	110				95	93	
4	7.5	965.60	.84	2.32	5.61	5.8	110				94	93	
3	10	967.70	.70	1.92	7.62	5.5	113				99	93	
2	12.5	969.70	.75	2.06	9.69	5.5	113				99	94	
1	15	971.66	.62	1.72	1.59	4.8	111				100	94	
3A - 6	17.5	974.05	.98	2.71	3.97	7.0	110				100	94	
5	20	976.40	1.00	2.77	6.38	7.0	110				100	94	
4	22.5	978.30	.62	1.71	8.27	5.0	112				101	95	
3	25	980.70	.60	1.66	0.14	5.0	112				101	95	
2	27.5	982.40	.86	2.36	2.37	6.0	117				102	95	
1	30	984.60	.82	2.26	4.55	6.0	114				102	95	
4A - 6	32.5	987.06	1.10	3.03	7.06	8.0	115				102	95	
5	35	989.57	1.10	3.04	9.58	8.0	113				102	95	
4	37.5	992.13	1.15	3.18	2.16	9.0	111				102	96	
3	40	994.65	1.10	3.04	4.69	9.0	113				102	96	
2	42.5	997.20	1.05	2.91	7.16	9.0	112				102	96	
1	45	999.60	1.00	2.77	9.57	8.0	111				102	96	
4B 6	47.5	1002.08	1.10	3.05	2.10	9.0	110				102	96	
5	50	1004.60	1.10	3.04	4.62	9.0	112				102	96	
4	52.5	1006.90	.94	2.60	6.96	8.0	112				102	96	
3	55	1009.30	.96	2.67	9.33	8.0	110				102	96	
2	57.5	1011.64	.92	2.56	1.64	8.0	110				102	96	
1	60	1014.00	.95	2.65	4.00	8.0	108				102	96	
	(1920)												
	θ = 60	Vm = 55.20		ΔH 2.55							Avg. = 97.7		

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LSI/MISSOULA
Source No 3 & 4 Bulk Vent Stacks
Method 5/017 Filter holder: NA

Date 5-11-94 Test 12 Run 3
No. of traverse points 24
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 9 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: NA

Recovery solvent(s)
☐ acetone
☒ other(s)

No. of probe wash bottles: 1
Sample recovered by: MK

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	200	200	0
Impinger No. 3			
Condenser			
Desiccant	1409	1399	10
Total			10

Integrated Gas Sampling Data:

Bag Pump No. _____
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: _____
Time start: _____
Sampling rate: _____

Box No. _____ Bag No. _____
Size: 44 L
cc/min at _____ in. Hg.
(HRS) Time end: _____ (HRS)
cc/min Operator: _____

S/N of O_2 Analyzer used to monitor train outlet: _____

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INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/MISSOULA
Source No 3+4 Press Vent Stacks
Date 5-11-94 Test 12 Run 3

Operators ET-GH
Meter Box No. 4 ΔH 1.94 IN WC
Counter coeff. 1.0041

Pitot No. 221-84 Cp .840
Bar. Press. 26.75 inHg
Nozzle No. 42A55 Nozzle Dia .224 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1946	14.20											
4B-6	2.5	16.70	1.10	3.06	6.73	8.0	112				92	91	
5	5	19.20	1.10	3.04	9.25	8.0	110				92	91	
4	7.5	21.60	.95	2.62	1.56	7.0	111				94	92	
3	10	23.95	.96	2.64	3.81	7.0	111				95	92	
2	12.5	26.40	1.05	2.90	6.34	7.5	113				96	92	
1	15	28.60	.87	2.42	8.61	7.0	109				96	92	
4A-6	17.5	31.11	1.10	3.05	1.12	8.0	110				96	92	
5	20	33.70	1.10	3.06	3.65	8.0	108				96	92	
4	22.5	36.25	1.15	3.19	6.22	8.0	110				98	92	
3	25	38.70	1.10	3.07	8.75	8.0	108				97	92	
2	27.5	41.20	1.05	2.93	1.21	7.7	108				97	92	
1	30	43.62	1.00	2.79	3.62	7.6	108				97	92	
3A-6	32.5	45.72	1.00	2.80	5.70	7.0	106				97	92	
5	35	48.12	1.00	2.80	8.11	7.0	106				97	92	
4	37.5	50.42	.90	2.52	0.40		107				97	92	
3	40	52.30	.60	1.69	2.28	5.0	104				97	92	
2	42.5	54.47	.80	2.25	4.45	6.0	104				97	92	
1	45	56.75	.90	2.52	6.74	7.0	105				97	92	
3B-6	47.5	59.10	.93	2.60	9.07	7.0	106				97	92	
5	50	61.40	.90	2.52	1.36	7.0	105				96	91	
4	52.5	63.48	.75	2.09	3.45	6.0	107				96	91	
3	55	65.50	.70	1.96	5.47	6.0	107				96	91	
2	57.5	67.60	.75	2.10	7.56	6.0	106				96	91	
1	60	69.50	.60	1.68	9.43	5.0	106				96	91	
	(2050)												
	θ = 60	Vm = 55.31		ΔH = 29							Avg. = 93.8		

S-0037R

APPENDIX H

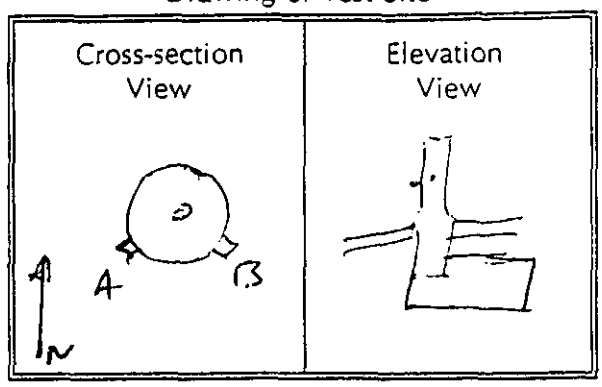
COEN STACK FIELD DATA SHEETS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LP - Missoula
Source: Coen Stack
Test: 18 Run: 0 Date: 5-12-94
Stack Dimen.: 44 IN.
Dry Bulb: 102.4 °F Wet bulb: ____ °F
Manometer: ☐ Reg. ☒ Exp ☐ Elec.
Barometric Pressure: 26.70 IN.HG
Static Pressure: +.50 IN.WC
Operators: SB + KR
Pitot No.: WC-1 C_p: .840

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 8	IN.	Time Start:	HRS
A-1	.021	.92	2.92		
2	.067	2.95	10.95		
3	.118	5.19	13.19		
4	.177	7.79	15.79		
5	.250	11.00	19.00		
6	.356	15.66	23.66		
7	.644	28.34	36.34		
8	.750	33.00	41.00		
9	.823	36.21	44.21		
10	.882	38.81	46.81		
11	.933	41.05	49.05		
12	.979	43.08	51.08		
B-1					
2					
3		Nox Pnts			
4		7.33	15.33		
5		22.00	30.00		
6		36.67	44.67		
7					
8					
9					
10					
11					
12					

Temp. Meas. Device & S/N: Digital T/C - POT - 29 | Time End: HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - Missoula
Source Green Stack
Method 202 Filter holder: 4" Glass

Date 5-12-91 Test 18 Run 1
No. of traverse points 24
Filter type: 4" GF.

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 000 cfm at 10 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6582

Recovery solvent(s)
☒ acetone DW
☒ other(s) MECL2 Tap Rinse

No. of probe wash bottles: 1
Sample recovered by: SB

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	561	511	50
Impinger No. 3			
Condenser			
Desiccant	1512	1495	17
Total			67

Integrated Gas Sampling Data:

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 1030
Sampling rate: 400

Box No. 5 Bag No. 1
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1738 (HRS)
cc/min Operator: SB

S/N of O_2 Analyzer used to monitor train outlet: 11

123093-G:\STACK\WP\METHODS\S-0046RR

CF-011

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP - Missoula
Source: Coen Stack
Date: 5-12-97 Test: 1B Run: 2

Operators: SJ + KR
Meter Box No.: 6 ΔH: 1.77 IN WC
Gasmeter coeff.: 99.54

Pitot No.: WC-1 Cp: .840
Bar. Press.: 26.75 inHg H2O: 3 %
Nozzle No.: 4-2 Nozzle Dia: .375 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
530	(1525)	(923.77)											
A -12	2.5	925.41	.100	1.20	5.40	6	1060	241	250	45	75	75	16.5
11	5	927.25	.125	1.51	7.24	6	1068				76	75	16.5
10	7.5	929.20	.130	1.77	9.23	6	893	241	251	45	77	75	16.0
9	10	931.60	.120	1.57	1.11	6	950				79	75	16.4
8	12.5	933.08	.120	1.73	3.09	6	932	240	254	46	79	75	16.4
7	15	935.06	.130	1.72	5.05	5	938				80	75	16.5
6	17.5	937.00	.135	1.78	7.06	5	944	241	254	44	81	74	16.6
5	20	938.72	.100	1.31	8.98	5	951				83	75	16.5
4	22.5	940.66	.120	1.60	0.68	5	932	241	254	41	83	75	16.5
3	25	942.80	.130	2.01	2.81	6	928				84	75	16.5
2	27.5	944.76	.130	1.71	4.78	6	950	241	252	41	85	75	16.6
1	30	946.51	.100	1.40	6.55	5	873				85	75	16.6
B - 12	32.5	948.30	.105	1.44	8.36	5	899	244	254	40	80	76	16.6
11	35	950.20	.120	1.60	0.26	5	930				85	76	16.5
10	37.5	952.21	.130	1.73	2.24	5	933	241	251	40	86	76	16.5
9	40	954.24	.130	1.73	4.22	6	914				86	76	16.5
8	42.5	956.21	.125	1.73	6.20	6	885	241	251	42	87	76	16.6
7	45	958.20	.120	1.60	8.16	6	892				88	76	16.5
6	47.5	960.01	.110	1.52	0.00	6	890	241	250	41	87	76	16.4
5	50	961.80	.100	1.47	1.83	5	808				87	76	16.5
4	52.5	963.64	.105	1.41	3.62	5	932	250	251	40	87	76	16.7
3	55	965.32	.100	1.32	5.35	5	958				87	76	16.7
2	57.5	967.10	.105	1.44	7.15	5	902	251	250	41	87	76	16.7
1	60	968.43	.100	1.39	8.53	5	891				87	76	16.7
	(1738)												
	θ = 60	Vm = 45.16		ΔH = 1.57							Avg. = 79.7		

H-3

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - Missoula
Source Coke Stack
Method 5/17 Filter holder: Glass

Date 5-12-94 Test CD Run 2
No. of traverse points 24
Filter type: 4" GFF

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: 0.02 cfm at 15 in. Hg. (vac) ☑

Particulate Catch Data:

No. of filters used: 6583

Recovery solvent(s)
☑ acetone DW
☑ other(s) MeCl2 - Imp wash

No. of probe wash bottles: 1
Sample recovered by: SR

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	555	504	51
Impinger No. 3			
Condenser			
Desiccant	1520	1506	14
Total			65

Integrated Gas Sampling Data:

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00 cc/min at 15 in. Hg.
Time start: 1814 (HRS) Time end: 1917 (HRS)
Sampling rate: 400 cc/min Operator: SB

Box No. 5 Bag No. 2
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 11

123093-G:\STACK\WP\METHODS\S-0046RR

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: LP - Missoula
Source: Coke Stack
Date: 5-12-94 Test: 12 Run: 3

Operators: SB + KL
Meter Box No.: 10 ΔH: 1.79 IN WC
Counter coeff.: .9854

Pitot No.: WC-1 Cp: .840
Bar. Press.: 24.60 inHg H2O: 7 %
Nozzle No.: 4-2 Nozzle Dia: .411 IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1814)	(969.10)											
B - 12	2.5	970.80	.105	1.31	0.82	5	980	241	240	44	75	75	16.8
11	5	972.72	.125	1.68	2.76	5	867				76	74	16.3
10	7.5	974.74	.130	1.72	4.72	4	848	246	246	41	79	74	16.3
9	10	976.70	.130	1.72	6.68	5	851				79	74	16.3
8	12.5	978.72	.128	1.73	8.66	5	862	241	246	41	79	74	16.3
7	15	980.60	.135	1.74	0.63	5	924				81	74	16.4
6	17.5	982.52	.130	1.62	2.55	5	874	240	246	41	82	74	16.4
5	20	984.54	.130	1.76	4.54	5	859				83	74	16.4
4	22.5	986.51	.130	1.72	6.51	5	872	241	246	41	85	75	16.4
3	25	988.42	.120	1.67	8.46	5	832				85	75	16.6
2	27.5	990.36	.120	1.61	0.37	5	882	241	246	40	85	75	16.4
1	30	992.10	.100	1.39	2.4	5	835				85	76	16.6
A - 12	32.5	993.92	.100	1.39	3.92	5	830	241	246	41	86	75	16.5
11	35	995.70	.105	1.45	5.73	5	841				86	75	16.5
10	37.5	997.52	.110	1.49	7.57	4	809	240	246	44	86	75	16.5
9	40	999.50	.125	1.69	9.52	5	874				86	76	16.5
8	42.5	1001.51	.135	1.80	1.55	5	889	240	246	41	86	76	16.5
7	45	1003.66	.140	1.85	3.60	6	899				86	76	16.5
6	47.5	1005.66	.135	1.82	5.63	6	872	241	244	40	86	76	16.4
5	50	1007.66	.135	1.80	7.65	6	888				86	76	16.7
4	52.5	1009.50	.120	1.60	9.55	5	844	241	246	42	86	76	16.7
3	55	1011.40	.125	1.66	1.49	5	899				86	76	16.7
2	57.5	1013.25	.120	1.60	3.40	5	890	241	246	42	86	76	16.6
1	60	1015.11	.100	1.30	5.11	5	927				86	76	16.6
	(1917)												
	θ = 60	Vm = 46.01		ΔH = 1.67							Avg. = 79.3		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP. Minneola
Source Coke Stack
Method 5/17 Filter holder: Glass

Date 5-12-94 Test 18 Run 3
No. of traverse points 24
Filter type: 4" Glass

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 15 in. Hg. (vac) ☒

Particulate Catch Data:

No. of filters used: 6584

Recovery solvent(s)
☒ acetone DW
☒ other(s) Mucky

No. of probe wash bottles: 1
Sample recovered by: SB

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	556	497	59
Impinger No. 3			
Condenser			
Desiccant	1527	1512	15
Total			74

Integrated Gas Sampling Data:

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00 cc/min at 15 in. Hg.
Time start: 1950 (HRS) Time end: 2054 (HRS)
Sampling rate: 400 cc/min Operator: SB

Box No. 5 Bag No. 3
Size: 44 L

S/N of O_2 Analyzer used to monitor train outlet: 41

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CF-011

INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. Missoula
Source: Green Stack
Date: 5-12-94 Test: 18 Run: 3

Operators: [illegible]
Meter Box No.: 10 ΔH@: 1.79 IN WC
Barometer coeff.: 29.94

Pitot No.: [illegible] Cp: .840
Bar. Press.: 29.70 inHg H2O: 5 %
Nozzle No.: [illegible] Nozzle Dia: [illegible] IN.

Traverse Point No.	Sampling Time (min)	Sample Volume (cf)	Velocity Head (inWC)	Orifice Meter (inWC)	Dec. Vol. (cf)	VAC. inHg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	(1950)	(1015.25)											
A - 12	2.5	1017.02	.100	1.36	0.00	5	864	241	250	40	74	74	16.6
11	5	1018.84	.120	1.58	8.88	5	859				77	73	16.6
10	7.5	1020.80	.125	1.67	0.81	5	874	241	251	40	78	73	16.6
9	10	1022.72	.130	1.75	0.80	5	862				79	74	16.5
8	12.5	1024.84	.135	1.78	9.80	5	884	240	251	41	81	73	16.5
7	15	1026.27	.135	1.74	6.78	5	877				82	73	16.5
6	17.5	1028.82	.140	1.85	8.82	5	884	241	250	44	82	73	16.6
5	20	1030.80	.130	1.72	0.79	6	890				82	73	16.6
4	21.5	1032.70	.125	1.65	2.71	5	897	244	254	44	82	74	16.5
3	25	1034.64	.120	1.58	4.60	5	899				83	74	16.8
2	27.5	1036.42	.115	1.50	6.44	5	915	241	254	42	84	74	16.8
1	30	1038.21	.105	1.36	8.20	6	921				85	74	16.5
B - 12	32.5	1040.00	.110	1.46	0.02	5	889	241	251	41	85	74	16.5
11	35	1041.86	.115	1.53	1.88	5	892				85	74	16.2
10	37.5	1043.74	.120	1.60	3.78	5	888	241	256	42	85	74	16.2
9	40	1045.80	.140	1.86	5.83	8	894				84	74	16.4
8	42.5	1047.84	.140	1.85	7.87	8	899	244	254	41	84	74	16.6
7	45	1049.94	.140	1.86	9.96	8	890	241			84	74	16.6
6	47.5	1051.92	.135	1.83	1.55	6	862	244	256	41	84	74	16.8
5	50	1053.80	.125	1.65	3.89	6	897				84	74	16.7
4	52.5	1055.76	.120	1.59	5.78	6	892	241	255	41	84	74	16.8
3	55	1057.62	.110	1.46	7.60	6	890				84	74	16.6
2	57.5	1059.36	.105	1.39	9.37	6	869	241	256	41	84	74	16.5
1	60	1061.09	.100	1.30	1.09	5	924				84	74	16.8
	(2054)												
	θ = 60	Vm = 45.84		ΔH = 1.62							Avg. = 78.1		

S-0037R

Interpoll Laboratories
(612)786-6020

EPA Method 7 Sample Collection
Field Data Sheet

Job LP - Missoula
Test Location Coen Stack
Date 5-12-94
Fuel Type wood dust
Technician KR
Bar. Pressure 26.70 IN.HG.
Sample Train No. 3
Pump No. 29

No.	Test Run Point	Flask No.	Time (HRS)	Vacuum (IN.HG.)	Flask Temp. (°F)	Leak Rate <0.4 IN.HG./MIN.
1	18-1-A	43	1632	27.80	70	☒ Yes ☐ No
2	18-1-B	30	1646	27.80	76	☒ Yes ☐ No
3	18-1-C	45	1659	27.80	84	☒ Yes ☐ No
4	18-1-D	46	1710	27.75	92	☒ Yes ☐ No
5	18-2-A	47	1816	27.60	94	☒ Yes ☐ No
6	18-2-B	48	1830	27.70	100	☒ Yes ☐ No
7	18-2-C	19	1845	27.70	105	☒ Yes ☐ No
8	18-2-D	20	1858	27.80	110	☒ Yes ☐ No
9	18-3-A	21	1954	27.60	110	☒ Yes ☐ No
10	18-3-B	22	2012	27.65	110	☒ Yes ☐ No
11	18-3-C	23	2026	27.70	115	☒ Yes ☐ No
12	18-3-D	24	2040	27.80	115	☒ Yes ☐ No
13						☐ Yes ☐ No
14						☐ Yes ☐ No
15						☐ Yes ☐ No
16						☐ Yes ☐ No
17						☐ Yes ☐ No
18						☐ Yes ☐ No
19						☐ Yes ☐ No
20						☐ Yes ☐ No
21						☐ Yes ☐ No
22						☐ Yes ☐ No
23						☐ Yes ☐ No
24						☐ Yes ☐ No
25						☐ Yes ☐ No
26						☐ Yes ☐ No
27						☐ Yes ☐ No

S-263R

APPENDIX I

INTERPOLL LABORATORIES ANALYTICAL DATA

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Interpoll Laboratories
(612) 786-6020

EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job L.P. / Missoula MT
Team Leader ~~[illegible]~~ G. Howe
Date Submitted 5-9-94
Test No. 1
Date of Analysis 5-10-94

Source Geka
Test Site Stack
Date of Test 5-9-94
No. of Runs Completed 3
Technician Mark Baeker

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
1/1		1	0.00	1.30	19.95	1.30	18.65	1.731
		2	0.00	1.30	19.95	1.30	18.65	1.731
	☑ B ☐ F	Avg				1.30	18.65	
1/2		1	0.00	1.40	19.80	1.40	18.40	1.786
		2	0.00	1.40	19.80	1.40	18.40	1.786
	☑ B ☐ F	Avg				1.40	18.40	
1/3		1	0.00	1.40	20.00	1.40	18.60	1.643
		2	0.00	1.40	20.00	1.40	18.60	1.643
	☑ B ☐ F	Avg				1.40	18.60	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☑ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type:	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

ISC-04-BR

Interpoll Laboratories
(612) 786-6020

EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job: LP - Missoula
Team Leader: SJ
Date Submitted: 5-10-90
Test No.: 5-10-90
Date of Analysis: 5-10-90

Source: Rdmnc
Test Site: TUBE
Date of Test: 5-10-90
No. of Runs Completed: 3
Technician: SB

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
2/0		1	0.00	0.00	20.90	0.00	20.9	—
		2	0.00	0.00	20.90	0.00	20.9	—
	☒ B ☐ F	Avg				0.00	20.9	
2/1		1	0.00	5.60	19.50	5.60	13.9	1.25
		2	0.00	5.60	19.50	5.60	13.9	1.25
	☒ B ☐ F	Avg				5.60	13.9	
2/2		1	0.00	5.50	19.60	5.50	14.10	1.24
		2	0.00	5.50	19.60	5.50	14.10	1.24
	☒ B ☐ F	Avg				5.50	14.10	
2/3		1	0.00	5.80	20.40	5.80	14.60	1.09
		2	0.00	5.80	20.40	5.80	14.60	1.09
	☒ B ☐ F	Avg				5.80	14.60	
5/1		1	0.00	6.00	20.60	6.00	14.6	1.05
		2	0.00	6.00	20.6	6.00	14.6	1.05
	☐ B ☒ F	Avg				6.00	14.6	
5/2		1	0.00	6.00	20.6	6.00	14.6	1.05
		2	0.00	6.00	20.6	6.00	14.6	1.05
	☐ B ☒ F	Avg				6.00	14.6	
5/3		1	0.00	3.20	20.0	3.20	16.8	1.25
		2	0.00	3.20	20.0	3.20	16.8	1.25
	☐ B ☒ F	Avg				3.20	16.8	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☒ Ambient Air QA Check
☒ Orsat Analyzer System Leak Check
☐ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

LSC-04-BR

Interpoll Laboratories
(612) 786-6020

FD
Test 3

EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job L.P. / Missoula MT
Team Leader Ed Trowbridge
Date Submitted 5-10-94
Test No. 3
Date of Analysis 5-11-94

Source 'C' Dryer
Test Site Stack
Date of Test 5-10-94
No. of Runs Completed 3
Technician S. Bainville

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
3/6		1	0.00	0.00	20.90	0.00	20.9	—
		2	0.00	0.00	20.90	0.00	20.9	—
	☐ B ☐ F	Avg				0.00	20.9	
3/1		1	0.00	1.00	20.8	1.00	19.8	1.10
		2	0.00	1.00	20.8	1.00	19.8	1.10
	☒ B ☐ F	Avg				1.00	19.8	
3/2		1	0.00	1.00	20.8	1.00	19.8	1.10
		2	0.00	1.00	20.8	1.00	19.8	1.10
	☒ B ☐ F	Avg				1.00	19.8	
3/3		1	~~0.00~~	1.10	20.9	1.10	19.8	1.00
		2	0.00	1.10	20.9	1.10	19.8	1.00
	☒ B ☐ F	Avg				1.10	19.8	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☒ Ambient Air QA Check
☒ Orsat Analyzer System Leak Check
☒ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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Interpoll Laboratories
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MARK
Test 4

EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job L.P. / Missoula, MT
Team Leader M. Kuehler
Date Submitted 5-10-94
Test No. 4
Date of Analysis 5-11-94

Source 'D' Dryer
Test Site Stack
Date of Test 5-10-94
No. of Runs Completed 3
Technician S. Bainville

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
		1		~~1.4~~	~~20.4~~			
		2		1.2	20.8	1.2	19.6	~~DR~~
	☐ B ☐ F	Avg						
4/1		1	0.00	1.40	20.8	1.40	19.4	1.07
		2	0.00	1.40	20.8	1.40	19.4	1.07
	☒ B ☐ F	Avg				1.40	19.4	
4/2		1	0.00	1.40	20.8	1.40	19.4	1.07
		2	0.00	1.40	20.8	1.40	19.4	1.07
	☒ B ☐ F	Avg				1.40	19.4	
4/3		1	0.00	1.60	20.9	1.60	19.3	1.00
		2	0.00	1.60	20.9	1.60	19.3	1.00
	☒ B ☐ F	Avg				1.60	19.3	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☒ Ambient Air QA Check
☒ Orsat Analyzer System Leak Check
☒ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job L.P. / Missoula, MT
Team Leader E. Trowbridge
Date Submitted 5-10-94
Test No. 6
Date of Analysis 5-11-94

Source 'C' Dryer
Test Site Stack
Date of Test 5-10-94
No. of Runs Completed 3
Technician S. Bainville

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
6/1		1	0.00	1.00	20.80	1.00	19.80	1.100
		2	0.00	1.00	20.80	1.00	19.80	1.100
	☒ B ☐ F	Avg				1.00	19.80	
6/2		1	0.00	1.00	20.80	1.00	19.80	1.100
		2	0.00	1.00	20.80	1.00	19.80	1.100
	☒ B ☐ F	Avg				1.00	19.80	
6/3		1	0.00	.65	20.85	.65	20.20	1.077
		2	0.00	.65	20.85	.65	20.20	1.077
	☒ B ☐ F	Avg				.65	20.20	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☒ Ambient Air QA Check
☒ Orsat Analyzer System Leak Check
☒ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job L.P. / Missoula MT
Team Leader M. Kuehler
Date Submitted 5-10-94
Test No. 7
Date of Analysis 5-11-94

Source 'D' Dryer
Test Site stack
Date of Test 5-10-94
No. of Runs Completed 3
Technician Mark Kuehler

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
7/1		1	0.00	1.30	20.80	1.30	19.50	1.077
		2	0.00	1.30	20.80	1.30	19.50	1.077
	☒ B ☐ F	Avg				1.30	19.50	
7/2		1	0.00	1.60	20.70	1.60	19.10	1.125
		2	0.00	1.60	20.70	1.60	19.10	1.125
	☒ B ☐ F	Avg				1.60	19.10	
7/3		1	0.00	1.20	20.90	1.20	19.70	1.000
		2	0.00	1.20	20.90	1.20	19.70	1.000
	☒ B ☐ F	Avg				1.20	19.70	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☒ Ambient Air QA Check
☒ Orsat Analyzer System Leak Check
☒ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job L.P. / Missoula MT
Team Leader E. Trowbridge
Date Submitted 5-12-94
Test No. 14
Date of Analysis 5-12-94

Source North Pre Dryer
Test Site Stack
Date of Test 5-12-94
No. of Runs Completed 3
Technician Mark Bachler

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
14/1		1	0.00	.35	20.65	.35	20.30	1.714
		2	0.00	.35	20.65	.35	20.30	1.714
	☒ B ☐ F	Avg				.35	20.30	
14/2		1	0.00	.40	20.60	~~20.60~~ .40	20.20	1.750
		2	0.00	.40	20.60	~~20.40~~ .40	20.20	1.75
	☒ B ☐ F	Avg				.40	20.20	
14/3		1	0.00	.40	20.65	.40	20.25	1.625
		2	0.00	.40	20.65	.40	20.25	1.625
	☒ B ☐ F	Avg				.40	20.25	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☐ Ambient Air QA Check
☐ Orsat Analyzer System Leak Check
☐ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job L.P. / Missoula, MT
Team Leader ~~E. Tomlinson~~ M. Kochler
Date Submitted 5-12-94
Test No. 6
Date of Analysis 5-12-94

Source South Pre Dryer
Test Site Stack
Date of Test 5-12-94
No. of Runs Completed 3
Technician Mark Kochler

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
15/1		1	0.00	.45	20.65	.45	20.20	1.556
		2	0.00	.45	20.65	.45	20.20	1.556
	☒ B ☐ F	Avg				.45	20.20	
15/2		1	0.00	.35	20.65	.35	20.30	1.714
		2	0.00	.35	20.65	.35	20.30	1.714
	☒ B ☐ F	Avg				.35	20.30	
15/3		1	0.00	.40	20.65	.40	20.25	1.625
		2	0.00	.40	20.65	.40	20.25	1.625
	☒ B ☐ F	Avg				.40	20.25	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☐ Ambient Air QA Check
☐ Orsat Analyzer System Leak Check
☐ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job: LP-Missoula
Team Leader: MK
Date Submitted: 5-16-94
Test No.: 16
Date of Analysis: 5-16-94

Source: North Pole Dryer
Test Site: STACK
Date of Test: 5-12-94
No. of Runs Completed: 3
Technician: SB

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
16/1	☒ B ☐ F	1	0.00	.15	20.85	.15	20.7	1.33
		2	0.00	.15	20.85	.15	20.7	1.33
		Avg				.15	20.7	
16/2	☒ B ☐ F	1	0.00	.25	20.85	.25	20.6	1.2
		2	0.00	.25	20.85	.25	20.6	1.2
		Avg				.25	20.6	
16/3	☒ B ☐ F	1	0.00	.15	20.85	.15	20.7	1.33
		2	0.00	.15	20.85	.15	20.7	1.33
		Avg				.15	20.7	
	☐ B ☐ F	1						
		2						
		Avg						
	☐ B ☐ F	1						
		2						
		Avg						
	☐ B ☐ F	1						
		2						
		Avg						
	☐ B ☐ F	1						
		2						
		Avg						
	☐ B ☐ F	1						
		2						
		Avg						
	☐ B ☐ F	1						
		2						
		Avg						

☐ Ambient Air QA Check
☐ Orsat Analyzer System Leak Check
☐ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

LSC-04-RP

#23

Interpoll Laboratories
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EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job: L.P. Missoula
Team Leader: MK
Date Submitted: 5-23-94
Test No.: 12
Date of Analysis: 5-23-94

Source: South Pre Dryer
Test Site: Stack
Date of Test: 5-12-94
No. of Runs Completed: 3
Technician: C. Helseson

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
17/1		1	0.00	0.70	21.00	0.70	20.30	
12/1 op	2837-145	2	0.00	0.70	21.00	0.70	20.30	
	☑ B ☐ F	Avg				0.70	20.30	
17/2		1	0.00	0.80	21.00	0.80	20.20	
12/2 op	-146	2	0.00	0.80	21.00	0.80	20.20	
	☑ B ☐ F	Avg				0.80	20.20	
17/3		1	0.00	0.60	21.00	0.60	20.40	
12/3 op	-147	2	0.00	0.60	21.00	0.60	20.40	
	☑ B ☐ F	Avg				0.60	20.40	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job: LP- Missoula
Team Leader: SJ
Date Submitted: 5-16-94
Test No.: 18
Date of Analysis: 5-16-94

Source: Coen
Test Site: Stack
Date of Test: 5-12-94
No. of Runs Completed: 3
Technician: SB

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
19/6		1	0.00	0.00	20.9	0.00	20.9	–
		2	0.00	0.00	20.9	0.00	20.9	–
	☐ B ☐ F	Avg				0.00	20.9	
18/1		1	0.00	4.00	20.00	4.0	16.0	1.23
		2	0.00	4.00	20.0	4.0	16.0	1.23
	☒ B ☐ F	Avg				4.0	16.0	
18/2		1	0.00	3.80	16.00	3.8	12.2	2.29
		2	0.00	3.80	16.00	3.8	12.2	2.29
	☒ B ☐ F	Avg				3.8	12.2	
18/3		1	0.00	3.90	16.00	3.9	12.1	2.26
		2	0.00	3.90	16.00	3.9	12.1	2.26
	☒ B ☐ F	Avg				3.9	12.1	
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						
		1						
		2						
	☐ B ☐ F	Avg						

☐ Ambient Air QA Check
☐ Orsat Analyzer System Leak Check
☐ F_o Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

Fuel Type	FO Range
Coal:	
Anthracite/Lignite	1.016–1.130
Bituminous	1.083–1.230
Oil:	
Distillate	1.260–1.413
Residual	1.210–1.370
Gas:	
Natural	1.600–1.836
Propane	1.434–1.586
Butane	1.405–1.553
Wood/Wood Bark	1.000–1.130

Interpoll Laboratories
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EPA Method 5 Data Reporting Sheet
Impinger Catch/Wisconsin Protocol M-202

Job L.P. Missoula
Team Leader SB
Date Submitted 5-23-94
Test No. 2
Date of Analysis 6-9-94

Source ROE MMC
Test Site Tube
Date of Test 5-10-94
No. of Runs Completed 3
Technician C. Helgeson

		Solvent Phase	Aqueous Phase
0	Test 2 Run 0 Field Blank Log Number 2837-01I Comments	Dish No. 27 Dish Tare Wt. 52.4441 g Dish+Sample Wt. 52.4449 g Sample Wt. 0.0008 g	Dish No. 39 Dish Tare Wt. 49.4339 g Dish+Sample Wt. 49.4339 g Sample Wt. ~~0.0008~~ 0.0000 g TM/4/94
1	Test 2 Run 1 Log Number -02I Comments	Dish No. 32 Dish Tare Wt. 57.8070 g Dish+Sample Wt 57.8254 g Sample Wt. 0.0184 g	Dish No. 50 Dish Tare Wt. 45.4620 g Dish+Sample Wt. 45.4677 g Sample Wt. 0.0057 g
2	Test 2 Run 2 Log Number -03I Comments	Dish No. 32A Dish Tare Wt. 42.4927 g Dish+Sample Wt. 42.5069 g Sample Wt. 0.0142 g	Dish No. 52 Dish Tare Wt. 49.8023 g Dish+Sample Wt. 49.8292 g Sample Wt. 0.0269 g
3	Test 2 Run 3 Log Number -04I Comments	Dish No. 33 Dish Tare Wt. 47.9416 g Dish+Sample Wt. 47.9557 g Sample Wt. 0.0141 g	Dish No. 53 Dish Tare Wt. 47.4049 g Dish+Sample Wt. 47.4310 g Sample Wt. 0.0261 g
4	Test ____ Run ____ Log Number Comments	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g
5	Test ____ Run ____ Log Number Comments	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g

Results Solvent Phase: Blank Solvent Wt. ____ g

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0176	0.0134	0.0133		

Results Aqueous Phase:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0054	0.0266	0.0258		

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Interpoll Laboratories
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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job: LP / MISSOULA
Team Leader: SB
Date Submitted: 5-23-94
Test No.: 2
Date of Analysis: 6-2-94
Transport Leakage: [X] None [ ] _____ ml

Source: ROE MMC
Test Site: TUBE
Date of Test: 5-10-94
No. of Runs Completed: 3
Technician: J. SIMONS
Solvent: ACETONE

Test 2 Run 0 Field Blank Log Number 2837-01P Vol. of Solvent 100 ml *Solvent Residue 4.0 ug/ml	Dish No. 401 Dish Tare Wt. 49.5242 g Dish+Sample Wt. 49.5246 g Sample Wt. 0.0004 g
Test 2 Run 1 Vol. of Solvent 70 ml Log Number 2837-02P Comments	Dish No. 403 Dish Tare Wt. 47.0960 g Dish+Sample Wt. 47.1508 g Sample Wt. 0.0548 g
Test 2 Run 2 Vol. of Solvent 85 ml Log Number 2837-03P Comments	Dish No. 404 Dish Tare Wt. 47.6386 g Dish+Sample Wt. 47.6776 g Sample Wt. 0.0390 g
Test 2 Run 3 Vol. of Solvent 105 ml Log Number 2837-04P Comments	Dish No. 405 Dish Tare Wt. 48.4886 g Dish+Sample Wt. 48.5074 g Sample Wt. .0188 g
Test ____ Run ____ Vol. of Solvent ____ ml Log Number Comments	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g
Test ____ Run ____ Vol. of Solvent ____ ml Log Number Comments	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g

*Solvent Residue ___ ug/ml = [(Sample Wt. ____ g)(10⁶)]/Vol. of Sol. ____ ml
EPA-M5 Acetone Residue Blank Spec. ≤ 7.3 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0545	0.0387	0.0184	I-13	

LSC-01YR

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EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job: LP/MISSOULA
Team Leader: SB
Date Submitted: 5-23-94
Test No.: 2
Date of Analysis: 6-2-94

Source: ROE MMC
Test Site: TUBE
Date of Test: 5-10-94
No. of Runs Completed: 3
Technician: C. Helgeson

0	Test 2 Run 0 Field Blank Log Number 2837-01F Comments	Filter No. 6058 Filter Type 4" GF Filter Tare Wt. .9022 g Filter+Sample Wt. .9023 g Sample Wt. 0.0001 g	
1	Test 2 Run 1 Log Number 2837-02F Comments	Filter No. 6055 Filter Type 4" GF Filter Tare Wt. .8855 g Filter+Sample Wt. 1.1173 g Sample Wt. 0.2318 g	
2	Test 2 Run 2 Log Number 2837-03F Comments	Filter No. 6056 Filter Type 4" GF Filter Tare Wt. .8939 g Filter+Sample Wt. 1.1077 g Sample Wt. 0.2138 g	
3	Test 2 Run 3 Log Number 2837-04F Comments	Filter No. 6059 Filter Type 4" GF Filter Tare Wt. .8971 g Filter+Sample Wt. 1.1674 g Sample Wt. 0.2703 g	
4	Test ____ Run ____ Log Number ____ Comments	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g	
5	Test ____ Run ____ Log Number ____ Comments	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g	

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.2318	0.2138	0.2703		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.3093	0.2925	0.3278		

LSC-02PR

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EPA Method 5 Data Reporting Sheet
Impinger Catch/Wisconsin Protocol M-202

Job L.P. Missoula
Team Leader CT
Date Submitted 5-23-94
Test No. 3
Date of Analysis 6-9-94

Source C Dryer
Test Site Stack
Date of Test 5-10-94
No. of Runs Completed 3
Technician C. Helgeson

		Solvent Phase	Aqueous Phase
0	Test ___ Run 0 Field Blank Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g
1	Test 3 Run 1 Log Number 2837-061 Comments ___	Dish No. 51 Dish Tare Wt. 48.8508 g Dish+Sample Wt. 48.8597 g Sample Wt. 0.0089 g	Dish No. 55 Dish Tare Wt. 47.7746 g Dish+Sample Wt. 47.7861 g Sample Wt. 0.0115 g
2	Test 3 Run 2 Log Number -071 Comments ___	Dish No. 52A Dish Tare Wt. 50.8889 g Dish+Sample Wt. 50.8977 g Sample Wt. 0.0088 g	Dish No. 56 Dish Tare Wt. 47.7532 g Dish+Sample Wt. 47.7634 g Sample Wt. 0.0102 g
3	Test 3 Run 3 Log Number -081 Comments ___	Dish No. 54 Dish Tare Wt. 49.6686 g Dish+Sample Wt. 49.6758 g Sample Wt. 0.0072 g	Dish No. 200 Dish Tare Wt. 44.9359 g Dish+Sample Wt. 44.9491 g Sample Wt. 0.0132 g
4	Test ___ Run ___ Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g
5	Test ___ Run ___ Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g

Results Solvent Phase: Blank Solvent Wt. ___ g

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0081	0.0080	0.0064		

Results Aqueous Phase:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0112	0.0099	0.0129		

LSC-03WYR

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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job: LP / MISSOULA
Team Leader: ET
Date Submitted: 5-23-94
Test No.: 3
Date of Analysis: 6-2-94
Transport Leakage ☒ None ☐ _____ ml

Source: "C" DRYER
Test Site: STACK
Date of Test: 5-10-94
No. of Runs Completed: 3
Technician: J. SIMONS
Solvent: ACETONE

Test 3 Run 0 Field Blank Log Number 2837-05P Vol. of Solvent 150 ml *Solvent Residue 4.0 ug/ml	Dish No. 98 Dish Tare Wt. 47.2102 g Dish+Sample Wt. 47.2108 g Sample Wt. 0.0006 g
Test 3 Run 1 Vol. of Solvent 120 ml Log Number 2837-06P Comments	Dish No. 102 Dish Tare Wt. 44.3237 g Dish+Sample Wt. 44.3331 g Sample Wt. 0.0094 g
Test 3 Run 2 Vol. of Solvent 100 ml Log Number 2837-07P Comments	Dish No. 105 Dish Tare Wt. 47.8610 g Dish+Sample Wt. 47.8705 g Sample Wt. 0.0095 g
Test 3 Run 3 Vol. of Solvent 120 ml Log Number 2837-08P Comments	Dish No. 115 Dish Tare Wt. 45.0682 g Dish+Sample Wt. 45.0819 g Sample Wt. 0.0137 g
Test ____ Run ____ Vol. of Solvent ____ ml Log Number Comments	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g
Test ____ Run ____ Vol. of Solvent ____ ml Log Number Comments	Dish No. Dish Tare Wt. g Dish+Sample Wt. g Sample Wt. g

*Solvent Residue ___ ug/ml = [(Sample Wt. ____ g)(10⁶)]/Vol. of Sol. ____ ml
EPA-M5 Acetone Residue Blank Spec. ≤ 7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0089	0.0091	0.0132	I-16	

LSC-01YR

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EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job: LP/MISSOULA
Team Leader: ET
Date Submitted: 5-23-94
Test No.: 3
Date of Analysis: 6-2-94

Source: "C" DRYER
Test Site: STACK
Date of Test: 5-10-94
No. of Runs Completed: 3
Technician: C. Helgeson

0	Test 3 Run 0 Field Blank Log Number 2837-05F Comments	Filter No.	6578	
		Filter Type	4" GF	
		Filter Tare Wt.	.8924	g
		Filter+Sample Wt.	.8926	g
		Sample Wt.	0.0002	g
1	Test 3 Run 1 Log Number 2837-06 Comments	Filter No.	6479	
		Filter Type	4" GF	
		Filter Tare Wt.	.9490	g
		Filter+Sample Wt.	.9637	g
		Sample Wt.	0.0147	g
2	Test 3 Run 2 Log Number 2837-07 Comments	Filter No.	6482	
		Filter Type	4" GF	
		Filter Tare Wt.	.9384	g
		Filter+Sample Wt.	.9572	g
		Sample Wt.	0.0188	g
3	Test 3 Run 3 Log Number 2837-08 Comments	Filter No.	6576	
		Filter Type	4" GF	
		Filter Tare Wt.	.8970	g
		Filter+Sample Wt.	.9176	g
		Sample Wt.	0.0206	g
4	Test ____ Run ____ Log Number Comments	Filter No.		
		Filter Type		
		Filter Tare Wt.		g
		Filter+Sample Wt.		g
		Sample Wt.		g
5	Test ____ Run ____ Log Number Comments	Filter No.		
		Filter Type		
		Filter Tare Wt.		g
		Filter+Sample Wt.		g
		Sample Wt.		g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0147	0.0188	0.0206		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0429	0.0458	0.0531		

LSC-02PR

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EPA Method 5 Data Reporting Sheet
Impinger Catch/Wisconsin Protocol M-202

Job L.P. Missoula
Team Leader AK
Date Submitted 5-23-94
Test No. 4
Date of Analysis 6-9-94

Source D Dryer
Test Site Stack
Date of Test 5-10-94
No. of Runs Completed 3
Technician C. Halgeson

		Solvent Phase	Aqueous Phase
0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 4 Run 1 Log Number 2737-09I Comments ____	Dish No. 62 Dish Tare Wt. 43.1548 g Dish+Sample Wt. 43.1957 g Sample Wt. 0.0409 g	Dish No. 203 Dish Tare Wt. 46.8679 g Dish+Sample Wt. 46.8802 g Sample Wt. 0.0123 g
2	Test 4 Run 2 Log Number -10I Comments ____	Dish No. 63 Dish Tare Wt. 50.4251 g Dish+Sample Wt. 50.4481 g Sample Wt. 0.0230 g	Dish No. 325 Dish Tare Wt. 47.6598 g Dish+Sample Wt. 47.6864 g Sample Wt. 0.0266 g
3	Test 4 Run 3 Log Number -11I Comments ____	Dish No. 209 Dish Tare Wt. 43.2128 g Dish+Sample Wt. 43.2352 g Sample Wt. 0.0224 g	Dish No. 340 Dish Tare Wt. 47.9130 g Dish+Sample Wt. 47.9322 g Sample Wt. 0.0192 g
4	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

Results Solvent Phase: Blank Solvent Wt. ____ g

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0401	0.0222	0.0216		

Results Aqueous Phase:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0120	0.0263	0.0189		

LSC-03WYR

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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job: LP/MISSOULA
Team Leader: MK
Date Submitted: 5-23-94
Test No.: 4
Date of Analysis: 6-2-94
Transport Leakage ☐ None ☐ _____ ml

Source: "D" DRYER
Test Site: STACK
Date of Test: 5-10-94
No. of Runs Completed: 3
Technician: J. SIMONS
Solvent: ACETONE

Test ____ Run 0	Dish No. ____
Field Blank	Dish Tare Wt. ____ g
Log Number ____	Dish+Sample Wt. ____ g
Vol. of Solvent ____ ml	Sample Wt. ____ g
*Solvent Residue ____ ug/ml	
Test 4 Run 1	Dish No. 322
Vol. of Solvent 70 ml	Dish Tare Wt. 44.2269 g
Log Number 2837-09P	Dish+Sample Wt. 44.2423 g
Comments ____	Sample Wt. 0.0154 g
Test 4 Run 2	Dish No. 323
Vol. of Solvent 100 ml	Dish Tare Wt. 43.4718 g
Log Number 2837-10P	Dish+Sample Wt. 43.4845 g
Comments ____	Sample Wt. 0.0127 g
Test 4 Run 3	Dish No. 328
Vol. of Solvent 60 ml	Dish Tare Wt. 41.9655 g
Log Number 2837-11P	Dish+Sample Wt. 41.9840 g
Comments ____	Sample Wt. 0.0185 g
Test ____ Run ____	Dish No. ____
Vol. of Solvent ____ ml	Dish Tare Wt. ____ g
Log Number ____	Dish+Sample Wt. ____ g
Comments ____	Sample Wt. ____ g
Test ____ Run ____	Dish No. ____
Vol. of Solvent ____ ml	Dish Tare Wt. ____ g
Log Number ____	Dish+Sample Wt. ____ g
Comments ____	Sample Wt. ____ g

*Solvent Residue ____ ug/ml = [(Sample Wt. ____ g)(10⁶)]/Vol. of Sol. ____ ml
EPA-M5 Acetone Residue Blank Spec. ≤ 7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0153	0.0123	0.0183	I-19	

LSC-01YR

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EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job: LP / MISSOULA
Team Leader: MK
Date Submitted:
Test No.:
Date of Analysis:

Source: "D" DRYER
Test Site: STACK
Date of Test: 5-10-94
No. of Runs Completed: 3
Technician:

0	Test ___ Run 0 Field Blank Log Number ___ Comments ___	Filter No. ___ Filter Type ___ Filter Tare Wt. ___ g Filter+Sample Wt. ___ g Sample Wt. ___ g	
1	Test 4 Run 1 Log Number 2837-09F Comments ___	Filter No. 6481 Filter Type 4" GF Filter Tare Wt. .9514 g Filter+Sample Wt. .9778 g Sample Wt. 0.0264 g	
2	Test 4 Run 2 Log Number 2837-10F Comments ___	Filter No. 6057 Filter Type 4" GF Filter Tare Wt. .8886 g Filter+Sample Wt. .9226 g Sample Wt. 0.0340 g	
3	Test 4 Run 3 Log Number 2837-11F Comments ___	Filter No. 6577 Filter Type 4" GF Filter Tare Wt. .8966 g Filter+Sample Wt. .9353 g Sample Wt. 0.0387 g	
4	Test ___ Run ___ Log Number ___ Comments ___	Filter No. ___ Filter Type ___ Filter Tare Wt. ___ g Filter+Sample Wt. ___ g Sample Wt. ___ g	
5	Test ___ Run ___ Log Number ___ Comments ___	Filter No. ___ Filter Type ___ Filter Tare Wt. ___ g Filter+Sample Wt. ___ g Sample Wt. ___ g	

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0264	0.0340	0.0387		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0938	0.0948	0.0975		

LSC-02PR

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EPA Method 5 Data Reporting Sheet
Impinger Catch/Wisconsin Protocol M-202

Job L.P. Missoula
Team Leader SB
Date Submitted 5-23-94
Test No. 8
Date of Analysis 6-9-94

Source Cooler 1+2
Test Site Stack
Date of Test 5-11-94
No. of Runs Completed 3
Technician C. Halgeson

		Solvent Phase	Aqueous Phase
0	Test ___ Run 0 Field Blank Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g
1	Test 8 Run 1 Log Number 2837-12I Comments ___	Dish No. 520 Dish Tare Wt. 48.5265 g Dish+Sample Wt. 48.5311 g Sample Wt. 0.0046 g	Dish No. 341 Dish Tare Wt. 47.6591 g Dish+Sample Wt. 47.6622 g Sample Wt. 0.0031 g
2	Test 8 Run 2 Log Number -13I Comments ___	Dish No. 522 Dish Tare Wt. 47.0000 g Dish+Sample Wt. 47.0032 g Sample Wt. 0.0032 g	Dish No. 411 Dish Tare Wt. 46.6835 g Dish+Sample Wt. 46.6867 g Sample Wt. 0.0032 g
3	Test 8 Run 3 Log Number -14I Comments ___	Dish No. 604 Dish Tare Wt. 50.1433 g Dish+Sample Wt. 50.1474 g Sample Wt. 0.0041 g	Dish No. 512 Dish Tare Wt. 49.3554 g Dish+Sample Wt. 49.3590 g Sample Wt. 0.0036 g
4	Test ___ Run ___ Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g
5	Test ___ Run ___ Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g

Results Solvent Phase: Blank Solvent Wt. ___ g

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0038	0.0024	0.0033		

Results Aqueous Phase:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0028	0.0029	0.0033		

LSC-03WYR

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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job: LP / MISSOULA
Team Leader: SB
Date Submitted: 5-23-94
Test No.: 8
Date of Analysis: 6-2-94
Transport Leakage ☒ None ☐ _____ ml

Source: BOARD COOLER
Test Site: STACK
Date of Test: 5-11-94
No. of Runs Completed: 3
Technician: J. SIMONS
Solvent: ACETONE

Test ____ Run 0	Dish No. ____
Field Blank	Dish Tare Wt. ____ g
Log Number ____	Dish+Sample Wt. ____ g
Vol. of Solvent ____ ml	Sample Wt. ____ g
*Solvent Residue ____ ug/ml	
Test 8 Run 1	Dish No. 206
Vol. of Solvent 60 ml	Dish Tare Wt. 48.6369 g
Log Number 2837-12P	Dish+Sample Wt. 48.6522 g
Comments ____	Sample Wt. 0.0153 g
Test 8 Run 2	Dish No. 508
Vol. of Solvent 70 ml	Dish Tare Wt. 46.5024 g
Log Number -13P	Dish+Sample Wt. 46.5317 g
Comments ____	Sample Wt. 0.0146 g
Test 8 Run 3	Dish No. 519
Vol. of Solvent 30 ml	Dish Tare Wt. 49.0534 g
Log Number -14P	Dish+Sample Wt. 49.0614 g
Comments ____	Sample Wt. 0.0080 g
Test ____ Run ____	Dish No. ____
Vol. of Solvent ____ ml	Dish Tare Wt. ____ g
Log Number ____	Dish+Sample Wt. ____ g
Comments ____	Sample Wt. ____ g
Test ____ Run ____	Dish No. ____
Vol. of Solvent ____ ml	Dish Tare Wt. ____ g
Log Number ____	Dish+Sample Wt. ____ g
Comments ____	Sample Wt. ____ g

*Solvent Residue ____ ug/ml = [(Sample Wt. ____ g)(10^6)]/Vol. of Sol. ____ ml
EPA-M5 Acetone Residue Blank Spec. ≤ 7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0151	0.0143	0.0079	I-22	

LSC-01YR

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EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job L.P. Missoula
Team Leader SB
Date Submitted 5-23-94
Test No. 8
Date of Analysis 6-10-94

Source Board Cooler 1+2
Test Site Stack
Date of Test 5-11-94
No. of Runs Completed 3
Technician C. Helgeson

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
1	Test 8 Run 1 Log Number 2837-12 F Comments ____	Filter No. 6060 Filter Type 4" 6F Filter Tare Wt. .8977 g Filter+Sample Wt. .8982 g Sample Wt. 0.0005 g
2	Test 8 Run 2 Log Number -13F Comments ____	Filter No. 6579 Filter Type 4" 6F Filter Tare Wt. .8820 g Filter+Sample Wt. .8840 g Sample Wt. 0.0020 g
3	Test 8 Run 3 Log Number -14F Comments ____	Filter No. 6581 Filter Type 4" 6F Filter Tare Wt. .8944 g Filter+Sample Wt. .8958 g Sample Wt. 0.0014 g
4	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0005	0.0020	0.0014		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0222	0.0216	0.0159		

LSC-02PR

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EPA Method 5 Data Reporting Sheet
Impinger Catch/Wisconsin Protocol

Job L.P. Missoula
Team Leader ET
Date Submitted 5-23-94
Test No. 9
Date of Analysis 6-9-94

Source #3+4 Press Vent
Test Site Stack
Date of Test 5-11-94
No. of Runs Completed 3
Technician C. Helgeson

		Solvent Phase	Aqueous Phase
0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 9 Run 1 Log Number 2837-15I Comments ____	Dish No. 1 Dish Tare Wt. 51.9713 g Dish+Sample Wt. 51.9727 g Sample Wt. 0.0014 g	Dish No. 513 Dish Tare Wt. 47.4122 g Dish+Sample Wt. 47.4155 g Sample Wt. 0.0033 g
2	Test 9 Run 2 Log Number -16F Comments ____	Dish No. 3 Dish Tare Wt. 52.1192 g Dish+Sample Wt. 52.1264 g Sample Wt. 0.0072 g	Dish No. 518 Dish Tare Wt. 48.1009 g Dish+Sample Wt. 48.1035 g Sample Wt. 0.0026 g
3	Test 9 Run 3 Log Number -17I Comments ____	Dish No. 9 Dish Tare Wt. 47.9747 g Dish+Sample Wt. 47.9802 g Sample Wt. 0.0055 g	Dish No. 521 Dish Tare Wt. 50.5944 g Dish+Sample Wt. 50.5996 g Sample Wt. 0.0052 g
4	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

Results Solvent Phase: Blank Solvent Wt. ____ g

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0006	0.0064	0.0047		

Results Aqueous Phase:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0030	0.0023	0.0049		

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LSC-03WYR

Interpoll Laboratories
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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job L. P. Missoula
Team Leader ET
Date Submitted 5-23-94
Test No. 9
Date of Analysis 6-2-94
Transport Leakage [X] None [ ] _____ ml

Source #3+4 Press Vent
Test Site Stack
Date of Test 5-11-94
No. of Runs Completed 4
Technician J. Simons
Solvent Acetone

0	Test ____ Run 0 ~ Field Blank Log Number ____ Vol. of Solvent ____ ml *Solvent Residue ____ ug/ml	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 9 Run 1 Vol. of Solvent 80 ml Log Number 2837-15P Comments ____	Dish No. 64 Dish Tare Wt. 43.1470 g Dish+Sample Wt. 43.1680 g Sample Wt. 0.0210 g
2	Test 9 Run 2 Vol. of Solvent 100 ml Log Number -16P Comments ____	Dish No. 65 Dish Tare Wt. 44.6566 g Dish+Sample Wt. 44.6651 g Sample Wt. 0.0085 g
3	Test 9 Run 3 Vol. of Solvent 80 ml Log Number -17P Comments ____	Dish No. 69 Dish Tare Wt. 47.9893 g Dish+Sample Wt. 47.9983 g Sample Wt. 0.0090 g
4	Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

*Solvent Residue ____ ug/ml = [(Sample Wt. ____ g)(10^6)]/Vol. of Sol. ____ ml
EPA-M5 Acetone Residue Blank Spec. ≤ 7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0207	0.0681	0.0089	I-25	

LSC-01YR

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EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job L.P. Missoula
Team Leader C.T.
Date Submitted 5-23-94
Test No. 9
Date of Analysis 6-10-94

Source #3+4 Press vent
Test Site Stack
Date of Test 5-11-94
No. of Runs Completed 3
Technician C. Helgeson

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
1	Test 9 Run 1 Log Number 2837-15 F Comments ____	Filter No. 6601 Filter Type 4"6F Filter Tare Wt. .9385 g Filter+Sample Wt. .9452 g Sample Wt. 0.0067 g
2	Test 9 Run 2 Log Number -16 F Comments ____	Filter No. 6605 Filter Type 4"6F Filter Tare Wt. .9291 g Filter+Sample Wt. .9331 g Sample Wt. 0.0040 g
3	Test 9 Run 3 Log Number -17 F Comments ____	Filter No. 6483 Filter Type 4"6F Filter Tare Wt. .9434 g Filter+Sample Wt. .9464 g Sample Wt. 0.0030 g
4	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0067	0.0040	0.0030		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0310	0.0208	0.0215		

LSC-02PR

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EPA Method 5 Data Reporting Sheet
Impinger Catch/Wisconsin Protocol

Job L.P. Missoula
Team Leader MK
Date Submitted 5-23-94
Test No. 10
Date of Analysis 6-8-94

Source #1+2 Press Vent
Test Site Stack
Date of Test 5-11-94
No. of Runs Completed 3
Technician C. Helgeson

		Solvent Phase	Aqueous Phase
0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 10 Run 1 Log Number 2537-18I Comments ____	Dish No. 10 Dish Tare Wt. 47.5457 g Dish+Sample Wt. 47.5611 g Sample Wt. 0.0154 g	Dish No. 524 Dish Tare Wt. 48.0397 g Dish+Sample Wt. 48.0437 g Sample Wt. 0.0040 g
2	Test 10 Run 2 Log Number -19I Comments ____	Dish No. 13 Dish Tare Wt. 45.7211 g Dish+Sample Wt. 45.7323 g Sample Wt. 0.0112 g	Dish No. 601 Dish Tare Wt. 47.6645 g Dish+Sample Wt. 47.6668 g Sample Wt. 0.0023 g
3	Test 10 Run 3 Log Number -20I Comments ____	Dish No. 17 Dish Tare Wt. 48.3915 g Dish+Sample Wt. 48.4040 g Sample Wt. 0.0125 g	Dish No. 612 Dish Tare Wt. 49.6237 g Dish+Sample Wt. 49.6262 g Sample Wt. 0.0025 g
4	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

Results Solvent Phase: Blank Solvent Wt. ____ g

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0146	0.0104	0.0117		

Results Aqueous Phase:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0037	0.0020	0.0022		

LSC-03WYR

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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job: LP / MISSOULA
Team Leader: MK
Date Submitted: 5-23-94
Test No.: 10
Date of Analysis: 6-2-94
Transport Leakage: [X] None [ ] _____ ml

Source: NOS 1 & 2 PRESS VENT
Test Site: STACK
Date of Test: 5-11-94
No. of Runs Completed: 3
Technician: J. SIMONS
Solvent: ACETONE

Test ____ Run 0 Field Blank Log Number ____ Vol. of Solvent ____ ml *Solvent Residue ____ ug/ml	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
Test 10 Run 1 Vol. of Solvent 70 ml Log Number 2837-18P Comments ____	Dish No. 119 Dish Tare Wt. 47.7643 g Dish+Sample Wt. 47.7799 g Sample Wt. 0.0156 g
Test 10 Run 2 Vol. of Solvent 110 ml Log Number -19P Comments ____	Dish No. 175 Dish Tare Wt. 53.0278 g Dish+Sample Wt. 53.0369 g Sample Wt. 0.0091 g
Test 10 Run 3 Vol. of Solvent 80 ml Log Number -20P Comments ____	Dish No. 206 Dish Tare Wt. 47.8182 g Dish+Sample Wt. 47.8238 g Sample Wt. 0.0056 g
Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

*Solvent Residue ___ ug/ml = [(Sample Wt. ____ g)(10⁶)]/Vol. of Sol. ____ ml
EPA-M5 Acetone Residue Blank Spec. ≤7.3 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0153	0.0087	0.0053	I-28	

LSC-01YR

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(612) 786-6020

EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job L.P. Missoula
Team Leader MK
Date Submitted 5-23-94
Test No. 10
Date of Analysis 6-10-94

Source #1+2 Press Vent
Test Site Stack
Date of Test 5-11-94
No. of Runs Completed 3
Technician C. Helgeson

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
1	Test 10 Run 1 Log Number 2837-18F Comments ____	Filter No. 6599 Filter Type 4"GF Filter Tare Wt. .9394 g Filter+Sample Wt. .9412 g Sample Wt. 0.0018 g
2	Test 10 Run 2 Log Number -19F Comments ____	Filter No. 6604 Filter Type 4"GF Filter Tare Wt. .9302 g Filter+Sample Wt. .9312 g Sample Wt. 0.0010 g
3	Test 10 Run 3 Log Number -20F Comments ____	Filter No. 6484 Filter Type 4"GF Filter Tare Wt. .9345 g Filter+Sample Wt. .9355 g Sample Wt. 0.0010 g
4	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0018	0.0010	0.0010		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0354	0.0221	0.0202		

LSC-02PR

Interpoll Laboratories
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EPA Method 5 Data Reporting Sheet
Impinger Catch/Wisconsin Protocol

Job L.P. Missoula
Team Leader MK
Date Submitted 5-23-94
Test No. 16
Date of Analysis 6-9-94

Source North Pre Dryer
Test Site Stack
Date of Test 5-12-94
No. of Runs Completed 3
Technician C. Helgeson

		Solvent Phase	Aqueous Phase
0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
1	Test 16 Run 1 Log Number 2837-21 I Comments ____	Dish No. 6 Dish Tare Wt. 48.2717 g Dish+Sample Wt. 48.2775 g Sample Wt. 0.0058 g	Dish No. 4 Dish Tare Wt. 47.3799 g Dish+Sample Wt. 47.3814 g Sample Wt. 0.0015 g
2	Test 16 Run 2 Log Number -22 I Comments ____	Dish No. 8 Dish Tare Wt. 46.9759 g Dish+Sample Wt. 46.9804 g Sample Wt. 0.0045 g	Dish No. 5 Dish Tare Wt. 50.6817 g Dish+Sample Wt. 50.6846 g Sample Wt. 0.0029 g
3	Test 16 Run 3 Log Number -23 I Comments ____	Dish No. 18 Dish Tare Wt. 49.9869 g Dish+Sample Wt. 49.9936 g Sample Wt. 0.0067 g	Dish No. 21 Dish Tare Wt. 47.5276 g Dish+Sample Wt. 47.5307 g Sample Wt. 0.0031 g
4	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

Results Solvent Phase: Blank Solvent Wt. ____ g

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0050	0.0037	0.0059		

Results Aqueous Phase:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0012	0.0026	0.0028		

LSC-03WYR

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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job: LP/MISSOULA
Team Leader: MK
Date Submitted: 5-23-94
Test No.: 16
Date of Analysis: 6-2-94
Transport Leakage: ☒ None ☐ _____ ml

Source: NORTH PRE DRYER
Test Site: STACK
Date of Test: 5-12-94
No. of Runs Completed: 3
Technician: J. SIMONS
Solvent: ACETONE

Test ____ Run 0 ~ Field Blank Log Number ____ Vol. of Solvent ____ ml *Solvent Residue ____ ug/ml	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
Test 16 Run 1 Vol. of Solvent 100 ml Log Number 2537-21P Comments ____	Dish No. 314 Dish Tare Wt. 44.0332 g Dish+Sample Wt. 44.0387 g Sample Wt. 0.0055 g
Test 16 Run 2 Vol. of Solvent 70 ml Log Number -22P Comments ____	Dish No. 400 Dish Tare Wt. 47.1026 g Dish+Sample Wt. 47.1085 g Sample Wt. 0.0059 g
Test 16 Run 3 Vol. of Solvent 50 ml Log Number -23P Comments ____	Dish No. 407 Dish Tare Wt. 47.9926 g Dish+Sample Wt. 47.9982 g Sample Wt. 0.0056 g
Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g
Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g

*Solvent Residue ____ ug/ml = [(Sample Wt. ____ g)(10^6)]/Vol. of Sol. ____ ml
EPA-MS Acetone Residue Blank Spec. ≤ 7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0051	0.0056	0.0054	I-31	

LSC-01YR

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(612) 786-6020

EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job L. P. Mazolla
Team Leader MK
Date Submitted 5-23-94
Test No. 16
Date of Analysis 6-10-94

Source North Pre Dryer
Test Site Stack
Date of Test 5-12-94
No. of Runs Completed 3
Technician C. Helgeson

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
1	Test 16 Run 1 Log Number 2837-21F Comments ____	Filter No. 6334 Filter Type 4"6F Filter Tare Wt. .9163 g Filter+Sample Wt. .9404 g Sample Wt. 0.0241 g
2	Test 16 Run 2 Log Number -22F Comments ____	Filter No. 6335 Filter Type 4"6F Filter Tare Wt. .9160 g Filter+Sample Wt. .9354 g Sample Wt. 0.0194 g
3	Test 16 Run 3 Log Number -23F Comments ____	Filter No. 6349 Filter Type 4"6F Filter Tare Wt. .9448 g Filter+Sample Wt. .9639 g Sample Wt. 0.0191 g
4	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0241	0.0194	0.0191		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0354	0.0313	0.0332		

LSC-02PR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Impinger Catch/Wisconsin Protocol

Job L.P. Missoula
Team Leader MK
Date Submitted 5-23-94
Test No. 17
Date of Analysis 6-9-94

Source South Pre Dryer
Test Site Stack
Date of Test 5-19-94
No. of Runs Completed 3
Technician C. Helgeson

		Solvent Phase	Aqueous Phase
0	Test ___ Run 0 Field Blank Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g
1	Test 17 Run 1 Log Number 2337-24I Comments ___	Dish No. 19 Dish Tare Wt. 48.9568 g Dish+Sample Wt. 48.9627 g Sample Wt. 0.0059 g	Dish No. 28 Dish Tare Wt. 46.0412 g Dish+Sample Wt. 46.0429 g Sample Wt. 0.0014 g
2	Test 17 Run 2 Log Number -25I Comments ___	Dish No. 22 Dish Tare Wt. 51.3600 g Dish+Sample Wt. 51.3674 g Sample Wt. 0.0074 g	Dish No. 34 Dish Tare Wt. 47.2497 g Dish+Sample Wt. 47.2510 g Sample Wt. 0.0013 g
3	Test 17 Run 3 Log Number -26I Comments ___	Dish No. 23 Dish Tare Wt. 46.0847 g Dish+Sample Wt. 46.0889 g Sample Wt. 0.0042 g	Dish No. 35 Dish Tare Wt. 51.0929 g Dish+Sample Wt. 51.0940 g Sample Wt. 0.0011 g
4	Test ___ Run ___ Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g
5	Test ___ Run ___ Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g

Results Solvent Phase: Blank Solvent Wt. ___ g

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0051	0.0066	0.0034		

Results Aqueous Phase:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0014	0.0010	0.0008		

LSC-03WYR

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EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job: LP / MISSOULA
Team Leader: MK
Date Submitted: 5-23-94
Test No.: 17
Date of Analysis: 6-2-94
Transport Leakage ☒ None ☐ _____ ml

Source: SOUTH PRE DRYER
Test Site: STACK
Date of Test: 5-12-94
No. of Runs Completed: 3
Technician: J. SIMONS
Solvent: ACETONE

Test ____ Run 0	Dish No. ____
Field Blank	Dish Tare Wt. ____ g
Log Number ____	Dish+Sample Wt. ____ g
Vol. of Solvent ____ ml	Sample Wt. ____ g
*Solvent Residue ____ ug/ml	
Test 17 Run 1	Dish No. 409
Vol. of Solvent 100 ml	Dish Tare Wt. 46.1901 g
Log Number 2837-24 P	Dish+Sample Wt. 46.2005 g
Comments ____	Sample Wt. 0.0104 g
Test 17 Run 2	Dish No. 410
Vol. of Solvent 60 ml	Dish Tare Wt. 50.5564 g
Log Number -25 P	Dish+Sample Wt. 50.5628 g
Comments ____	Sample Wt. 0.0064 g
Test 17 Run 3	Dish No. 415
Vol. of Solvent 50 ml	Dish Tare Wt. 45.0825 g
Log Number -26 P	Dish+Sample Wt. 45.0934 g
Comments ____	Sample Wt. 0.0109 g
Test ____ Run ____	Dish No. ____
Vol. of Solvent ____ ml	Dish Tare Wt. ____ g
Log Number ____	Dish+Sample Wt. ____ g
Comments ____	Sample Wt. ____ g
Test ____ Run ____	Dish No. ____
Vol. of Solvent ____ ml	Dish Tare Wt. ____ g
Log Number ____	Dish+Sample Wt. ____ g
Comments ____	Sample Wt. ____ g

*Solvent Residue ____ ug/ml = [(Sample Wt. ____ g)(10⁶)]/Vol. of Sol. ____ ml
EPA-M5 Acetone Residue Blank Spec. ≤7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0100	0.0062	0.0107	I-34	

LSC-01YR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job L.P. Missoula
Team Leader AK
Date Submitted 5-23-94
Test No. 17
Date of Analysis 6-10-94

Source South Pre Dryer
Test Site Stack
Date of Test 5-12-94
No. of Runs Completed 3
Technician C. Helgeson

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
1	Test 17 Run 1 Log Number 2837-24P Comments ____	Filter No. 6485 Filter Type 4"GF Filter Tare Wt. .9467 g Filter+Sample Wt. .9717 g Sample Wt. 0.0250 g
2	Test 17 Run 2 Log Number -25F Comments ____	Filter No. 6336 Filter Type 4"GF Filter Tare Wt. .8695 g Filter+Sample Wt. .8934 g Sample Wt. 0.0239 g
3	Test 17 Run 3 Log Number -26F Comments ____	Filter No. 6350 Filter Type 4"GF Filter Tare Wt. .9435 g Filter+Sample Wt. .9675 g Sample Wt. 0.0240 g
4	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0250	0.0239	0.0240		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0415	0.0377	0.0389		

LSC-02PR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job L.P. Missoula
Team Leader SB
Date Submitted 5-23-94
Test No. 18
Date of Analysis 6-10-94

Source Coen
Test Site Stack
Date of Test 5-12-94
No. of Runs Completed 3
Technician C. Helgeson

0	Test ____ Run 0 Field Blank Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
1	Test 18 Run 1 Log Number 2837-27F Comments ____	Filter No. 6582 Filter Type 4"GF Filter Tare Wt. .8848 g Filter+Sample Wt. 1.0215 g Sample Wt. 0.1367 g
2	Test 18 Run 2 Log Number -28F Comments ____	Filter No. 6583 Filter Type 4"GF Filter Tare Wt. .8967 g Filter+Sample Wt. 1.0492 g Sample Wt. 0.1525 g
3	Test 18 Run 3 Log Number -29F Comments ____	Filter No. 6584 Filter Type 4"GF Filter Tare Wt. .8920 g Filter+Sample Wt. 1.0337 g Sample Wt. 0.1417 g
4	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g
5	Test ____ Run ____ Log Number ____ Comments ____	Filter No. ____ Filter Type ____ Filter Tare Wt. ____ g Filter+Sample Wt. ____ g Sample Wt. ____ g

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.1367	0.1525	0.1417		

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.1529	0.1953	0.1583		

LSC-02PR

Interpoll Laboratories
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EPA Method 5 Data Reporting Sheet
Impinger Catch/Wisconsin Protocol M-202

Job L.P. Missoula
Team Leader SB
Date Submitted 5-23-94
Test No. 18
Date of Analysis 6-9-94

Source Coen
Test Site Stack
Date of Test 5-12-94
No. of Runs Completed 3
Technician C. Helgeson

		Solvent Phase	Aqueous Phase
0	Test ___ Run 0 Field Blank Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g
1	Test 18 Run 1 Log Number 2837-27I Comments ___	Dish No. 25 Dish Tare Wt. 44.3446 g Dish+Sample Wt. 44.3491 g Sample Wt. 0.0045 g	Dish No. 36 Dish Tare Wt. 43.5647 g Dish+Sample Wt. 43.5653 g Sample Wt. 0.0006 g
2	Test 18 Run 2 Log Number -28I Comments ___	Dish No. 26 Dish Tare Wt. 48.3842 g Dish+Sample Wt. 48.3917 g Sample Wt. 0.0075 g	Dish No. 38 Dish Tare Wt. 48.6496 g Dish+Sample Wt. 48.6546 g Sample Wt. 0.0050 g
3	Test 18 Run 3 Log Number -29I Comments ___	Dish No. 29 Dish Tare Wt. 48.8867 g Dish+Sample Wt. 48.8910 g Sample Wt. 0.0043 g	Dish No. 41 Dish Tare Wt. 45.3218 g Dish+Sample Wt. 45.3230 g Sample Wt. 0.0012 g
4	Test ___ Run ___ Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g
5	Test ___ Run ___ Log Number ___ Comments ___	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g	Dish No. ___ Dish Tare Wt. ___ g Dish+Sample Wt. ___ g Sample Wt. ___ g

Results Solvent Phase: Blank Solvent Wt. ___ g

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0037	0.0067	0.0035		

Results Aqueous Phase:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0003	0.0047	0.0009		

LSC-03WYR

Interpoll Laboratories
(612) 786-6020

EPA Method 5 Data Reporting Sheet
Probe/Cyclone Wash

Job: LP / MISSOULA
Team Leader: SB
Date Submitted: 5-23-94
Test No.: 18
Date of Analysis: 6-2-94
Transport Leakage: ☒ None ☐ _____ ml

Source: COEN
Test Site: STACK
Date of Test: 5-12-94
No. of Runs Completed: 3
Technician: J. SIMONS
Solvent: ACETONE

	Test ____ Run 0 ~ Field Blank Log Number ____ Vol. of Solvent ____ ml *Solvent Residue ____ ug/ml	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	
1	Test 18 Run 1 Vol. of Solvent 80 ml Log Number 2837-27 P Comments ____	Dish No. 311 Dish Tare Wt. 43.8102 g Dish+Sample Wt. 43.8227 g Sample Wt. 0.0125 g	
	Test 18 Run 2 Vol. of Solvent 70 ml Log Number -28 P Comments ____	Dish No. 312 Dish Tare Wt. 45.2370 g Dish+Sample Wt. 45.2687 g Sample Wt. 0.0317 g	
3	Test 18 Run 3 Vol. of Solvent 60 ml Log Number -29 P Comments ____	Dish No. 313 Dish Tare Wt. 46.4573 g Dish+Sample Wt. 46.4697 g Sample Wt. 0.0124 g	
	Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	
5	Test ____ Run ____ Vol. of Solvent ____ ml Log Number ____ Comments ____	Dish No. ____ Dish Tare Wt. ____ g Dish+Sample Wt. ____ g Sample Wt. ____ g	

*Solvent Residue ____ ug/ml = [(Sample Wt. ____ g)(10⁶)]/Vol. of Sol. ____ ml
EPA-M5 Acetone Residue Blank Spec. ≤ 7.8 ug/ml

Results:

Field Blk.	Run 1	Run 2	Run 3	Run 4	Run 5
	0.0122	0.0314	0.0122	I-37	

LSC-01YR

EPA Method 202 Calculations

Report No. 4-2837

Louisiana Pacific - Missoula

Date: 10-May-94

ROEMMC Tube Stack

RUN	Vic (ml)	Sulfate (mg/ml)	Mc (mg)	Mr (mg)	Mi (mg)	Mo (mg)	Mb (mg)	CPM (mg)	ENTER IN COMPUTER (g)
1	250	2.13E-03	0.10	5.4	5.30	17.6	1.1	21.80	0.021802
2	250	7.70E-04	0.04	26.6	26.56	134	1.1	159.46	0.159465
3	250	5.90E-04	0.03	25.8	25.77	13.3	1.1	37.97	0.037973

EPA Method 201A/202 Totals

RUN	Probe (mg)	Filter (mg)	CPM (mg)	Total (mg)
1	54.5	231.8	21.80	308.102
2	38.7	213.8	159.46	411.9646
3	18.4	270.3	37.97	326.6729

Date: 10-May-94

C Dryer Stack

RUN	Vic (ml)	Sulfate (mg/ml)	(mg)	(mg)	(mg)	Mo (mg)	Mb (mg)	CPM (mg)	ENTER IN COMPUTER (g)
1	250	6.40E-04	0.03	11.2	11.17	8.1	1.1	18.17	0.018171
2	250	2.85E-03	0.13	9.9	9.77	8	1.1	16.67	0.016669
3	250	2.70E-03	0.12	12.9	12.78	6.4	1.1	18.08	0.018076

EPA Method 201A/202 Totals

RUN	Probe (mg)	Filter (mg)	CPM (mg)	Total (mg)
1	8.9	14.7	18.17	41.77056
2	9.1	18.8	16.67	44.5689
3	13.2	20.6	18.08	51.8758

Date: 10-May-94

D Dryer Stack

RUN	Vic (ml)	Sulfate (mg/ml)	Mc (mg)	Mr (mg)	Mi (mg)	Mo (mg)	Mb (mg)	CPM (mg)	ENTER IN COMPUTER (g)
1	250	3.13E-03	0.14	12	11.86	40.1	1.1	50.86	0.050856
2	250	1.40E-03	0.06	26.3	26.24	22.2	1.1	47.34	0.047336
3	250	1.03E-03	0.05	18.9	18.85	21.6	1.1	39.35	0.039353

EPA Method 201A/202 Totals

RUN	Probe (mg)	Filter (mg)	CPM (mg)	Total (mg)
1	15.3	26.4	50.86	92.55602
2	12.3	34	47.34	93.6356
3	18.3	38.7	39.35	96.35262

Date: 11-May-94

Board Coolers 1&2 Stack

RUN	Vic (ml)	Sulfate (mg/ml)	Mc (mg)	Mr (mg)	Mi (mg)	Mo (mg)	Mb (mg)	CPM (mg)	ENTER IN COMPUTER (g)
1	250	3.60E-04	0.02	2.8	2.78	3.8	1.1	5.48	0.005483
2	250	3.60E-04	0.02	2.9	2.88	2.4	1.1	4.18	0.004183
3	250	3.20E-04	0.01	3.3	3.29	3.3	1.1	5.49	0.005485

EPA Method 201A/202 Totals

RUN	Probe (mg)	Filter (mg)	CPM (mg)	Total (mg)
1	15.1	0.5	5.48	21.08344
2	14.3	2	4.18	20.48344
3	7.9	1.4	5.49	14.78528

Date: 11-May-94

Press Vents 3 & 4 Stack

RUN	Vic (ml)	Sulfate (mg/ml)	Mc (mg)	Mr (mg)	Mi (mg)	Mo (mg)	Mb (mg)	CPM (mg)	ENTER IN COMPUTER (g)
1	250	2.20E-04	0.01	3	2.99	0.6	1.1	2.49	0.00249
2	250	3.50E-04	0.02	2.3	2.28	6.4	1.1	7.58	0.007584
3	250	5.00E-05	0.00	4.9	4.90	4.7	1.1	8.50	0.008498

EPA Method 201A/202 Totals

RUN	Probe (mg)	Filter (mg)	CPM (mg)	Total (mg)
1	20.7	6.7	2.49	29.88988
2	8.1	4	7.58	19.6839
3	8.9	3	8.50	20.3977

Date: 11-May-94

Press Vents 1 & 2 Stack

RUN	Vic (ml)	Sulfate (mg/ml)	Mc (mg)	Mr (mg)	Mi (mg)	Mo (mg)	Mb (mg)	CPM (mg)	ENTER IN COMPUTER (g)
1	250	1.80E-04	0.01	3.7	3.69	14.6	1.1	17.19	0.017192
2	250	9.00E-05	0.00	2	2.00	10.4	1.1	11.30	0.011296
3	250	3.20E-04	0.01	2.2	2.19	11.7	1.1	12.79	0.012785

EPA Method 201A/202 Totals

RUN	Probe (mg)	Filter (mg)	CPM (mg)	Total (mg)
1	15.3	1.8	17.19	34.29172
2	8.7	1	11.30	20.99586
3	5.3	1	12.79	19.08528

Date: 12-May-94

North Pre-Dryer Stack

RUN	Vic (ml)	Sulfate (mg/ml)	Mc (mg)	Mr (mg)	Mi (mg)	Mo (mg)	Mb (mg)	CPM (mg)	ENTER IN COMPUTER (g)
1	250	3.80E-04	0.02	1.2	1.18	5	1.1	5.08	0.005083
2	250	3.10E-04	0.01	2.6	2.59	3.7	1.1	5.19	0.005186
3	250	6.10E-04	0.03	2.8	2.77	5.9	1.1	7.57	0.007572

EPA Method 201A/202 Totals

RUN	Probe (mg)	Filter (mg)	CPM (mg)	Total (mg)
1	5.1	24.1	5.08	34.28252
2	5.6	19.4	5.19	30.18574
3	5.4	19.1	7.57	32.07194

Date: 12-May-94

South Pre-Dryer Stack

RUN	Vic (ml)	Sulfate (mg/ml)	Mc (mg)	Mr (mg)	Mi (mg)	Mo (mg)	Mb (mg)	CPM (mg)	ENTER IN COMPUTER (g)
1	250	4.20E-04	0.02	1.4	1.38	5.1	1.1	5.38	0.005381
2	250	6.60E-04	0.03	1	0.97	6.6	1.1	6.47	0.00647
3	250	7.80E-04	0.04	0.8	0.76	3.4	1.1	3.06	0.003064

EPA Method 201A/202 Totals

RUN	Probe (mg)	Filter (mg)	CPM (mg)	Total (mg)
1	10	25	5.38	40.38068
2	6.2	23.9	6.47	36.56964
3	10.7	24	3.06	37.76412

Date: 12-May-94

Coen Stack

RUN	Vic (ml)	Sulfate (mg/ml)	Mc (mg)	Mr (mg)	Mi (mg)	Mo (mg)	Mb (mg)	CPM (mg)	ENTER IN COMPUTER (g)
1	250	1.20E-03	0.06	0.3	0.24	3.7	1.1	2.84	0.002845
2	250	1.20E-03	0.06	4.7	4.64	6.7	1.1	10.24	0.010245
3	250	1.00E-03	0.05	0.9	0.85	3.5	1.1	3.25	0.003254

EPA Method 201A/202 Totals

RUN	Probe (mg)	Filter (mg)	CPM (mg)	Total (mg)
1	12.2	136.7	2.84	151.7448
2	31.4	152.5	10.24	194.1448
3	12.2	141.7	3.25	157.154

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Ion Chromatography Laboratory

DIONEX MODEL 4000i WITH ANION MICRO MEMBRANE SUPRESSION

Analyst: KLJ Date of Analysis: _____

Job: L.P. Missoula Source: _____ Site: _____

Chromatography Conditions

Column		Flow Rate	Eluent	Flow Rate	Suppressor Acid
	AS3	ml/min	2.4 mM Na_2CO_3 & 3.0 mM $NaHCO_3$	10 ml/min	~~12.5~~ 25 mM Sulfuric Acid
X	AS4A	2 ml/min	1.8 mM Na_2CO_3 & 1.7 mM $NaHCO_3$	ml/min	
	AS5	ml/min	100 mM NaOH	X	Isocratic
		ml/min			Gradient(List program below)

Gradient Program	Time (Min.)									
Eluent	0.0									
% A										
% B										

Sulfate + Sulfite as Sulfate

Results of Sulfate Determination

Sample Name	Interpoll Log Number	Tot. Sample Volume (ml)	Dilution	Solution Conc.(ug/ml)	Total ug Sulfate/ml	meq of Sulfate
$T_2 R_0$	2837-01 I		1	0.63	0.63	
Rosmc R_1	-02 I		20	2.13	43	
R_2	-03 I		100	0.77	77	
R_3	-04 I		100	0.59	59	
$T_3 R_0$	-05 I		No Sample			
Dryer R_1	-06 I		20	0.64	13	
R_2	-07 I		5	2.85	14	
R_3	-08 I		5	2.70	14	

Total ug = (Sample Vol.) x (Dilution) x (Solution Conc.)
meq = Total ug / 48000

SEE C.H. for Aliquots

LSC-08RR

Interpoll Laboratories, Inc.
(612)786-6020

Ion Chromatography Laboratory

DIONEX MODEL 40001 WITH ANION MICRO MEMBRANE SUPRESSION

Analyst: KLG Date of Analysis: _____

Job: LP Missoula Source: _____ Site: _____

Chromatography Conditions

Column		Flow Rate	Eluent	Flow Rate	Suppressor Acid
	AS3	ml/min	2.4 mM Na_2CO_3 & 3.0 mM $NaHCO_3$	10 ml/min	~~12.5~~ 25 mM Sulfuric Acid
X	AS4A	2 ml/min	1.8 mM Na_2CO_3 & 1.7 mM $NaHCO_3$	ml/min	
	AS5	ml/min	100 mM NaOH	X	Isocratic
		ml/min			Gradient(List program below)

Gradient Program	Time (Min.)									
Eluent	0.0									
% A										
% B										

Sulfate and Sulfite as Sulfate

Results of Sulfate Determination

Sample Name		Interpoll Log Number	Tot. Sample Volume (ml)	Dilution	Solution Conc.(ug/ml)	Total ug Sulfate	meq of Sulfate
Dryer	T_4R_1	2837-09 I		5	3.13	16	
	T_4R_2	-10 I		20	1.40	28	
	R_3	-11 I		20	1.03	21	
Board Cooler No 1 & 2	T_8R_1	-12 I		1	0.36	0.36	
	R_2	-13 I		1	0.36	0.36	
	R_3	-14 I		1	0.32	0.32	
No 3 & 4 Press Vents	T_9R_1	-15 I		1	0.22	0.22	
	R_2	-16 I		1	0.35	0.35	

Total ug = (Sample Vol.) x (Dilution) x (Solution Conc.)
meq = Total ug / 48000

LSC-08RR

Interpoll Laboratories, Inc.
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Ion Chromatography Laboratory

DIONEX MODEL 40001 WITH ANION MICRO MEMBRANE SUPRESSION

Analyst: KZG Date of Analysis: _____

Job: L.P. Missoula Source: _____ Site: _____

Chromatography Conditions

Column		Flow Rate	Eluent	Flow Rate	Suppressor Acid
	AS3	ml/min	2.4 mM Na_2CO_3 & 3.0 mM $NaHCO_3$	10 ml/min	~~12.5~~ 25 mM Sulfuric Acid
X	AS4A	2 ml/min	1.8 mM Na_2CO_3 & 1.7 mM $NaHCO_3$	ml/min	
	AS5	ml/min	100 mM NaOH	X	Isocratic
		ml/min			Gradient(List program below)

Gradient Program	Time (Min.)									
Eluent	0.0									
% A										
% B										

Sulfate and Sulfite as Sulfate

Results of Sulfate Determination

Sample Name	Interpoll Log Number	Tot. Sample Volume (ml)	Dilution	Solution Conc.(ug/ml)	Total ug Sulfate	meq of Sulfate
No. 3&4 Press vents T_9R_3	2837-17 I		1	0.05	0.05	
No. 1&2 Press vents $T_{10}R_1$	-18 I		1	0.18	0.18	
R_2	-19 I		1	0.09	0.09	
R_3	-20 I		1	0.32	0.32	
North Pre-Dryer $T_{16}R_1$	-21 I		1	0.38	0.38	
R_2	-22 I		1	0.31	0.31	
R_3	-23 I		1	0.61	0.61	
South Pre-Dryer $T_{17}R_1$	-24 I		1	0.42	0.42	

Total ug = (Sample Vol.) x (Dilution) x (Solution Conc.)
meq = Total ug / 48000

See C.H. for Aliquots

LSC-08RR

Interpoll Laboratories, Inc.
(612)786-6020

Ion Chromatography Laboratory

DIONEX MODEL 40001 WITH ANION MICRO MEMBRANE SUPRESSION

Analyst: KZJ Date of Analysis: _____

Job: L.P. Missoula Source: _____ Site: _____

Chromatography Conditions

Column		Flow Rate	Eluent	Flow Rate	Suppressor Acid
	AS3	ml/min	2.4 mM Na_2CO_3 & 3.0 mM $NaHCO_3$	10 ml/min	~~12.5~~ 25 mM Sulfuric Acid
X	AS4A	2 ml/min	1.8 mM Na_2CO_3 & 1.7 mM $NaHCO_3$	ml/min	
	AS5	ml/min	100 mM NaOH	X	Isocratic
		ml/min			Gradient(List program below)

Gradient Program	Time (Min.)									
Eluent	0.0									
% A										
% B										

Sulfate and Sulfite as Sulfate

Results of Sulfate Determination

Sample Name	Interpoll Log Number	Tot. Sample Volume (ml)	Dilution	Solution Conc.(ug/ml)	Total ug Sulfate	meq of Sulfate
South Pre-prep $T_{17}R_2$	2837-25I		1	0.66	0.66	
R_3	-26I		1	0.78	0.78	
Lion Stack $T_{18}R_1$	-27I		20	1.2	24	
R_2	-28I		20	1.2	24	
R_3	-29I		20	1.0	20	

Total ug = (Sample Vol.) x (Dilution) x (Solution Conc.)
meq = Total ug / 48000

See C.H. for Aliquots

LSC-08RR

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EPA Method 7A Recovery and Analysis Data Sheet (1)

**********SOURCE**********	**********RECOVERY**********	**********ANALYTICAL**********
Job LP- Missoula, MT	Date of Recovery 5-10-94	Date of Analysis 5/31/94
Source Geka, Stack	Recovered by MK	Analyst KYG
Date of Sampling 5-9-94	Recovery volume * 500 ml	Eluent AS4A
Test No(s) 1	Barometric at time 26.85 IN.HG.	Chromatograph: Dionex System 4000i

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$C_{RS} = DF(C_{DS})$ $\quad M_{NO_3} = (C_{RS} - \overline{C}_B)V_R$ $\quad \overline{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$

where: C_{RS} = concentration of nitrate in 500 ml recovered sample in ug/ml

DF = dilution factor

C_{DS} = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

M_{NO_3} = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

C_B = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

C_{B1}, C_{B2}, C_{B3} = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

V_R = recovery volume for samples and field blanks in ml

* must bring to volume in lab

S-340(1)

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EPA Method 7A Recovery and Analysis Data Sheet (2)

	Sample Log ID No.	Flask No.	Test/ Run	Final Flask Conditions t_f (°F)	+	-	ΔP_g (IN.HG.)	Chrom Run No.	DF	Nitrate Concentration (ug/ml) Uncorr. for blank C_{RS}	Corr. for blank (C_{RS} - C_B)	Total nitrate in Sample (ug) ($M_{NO_3^-}$)
1	2837-61	19	1-1	49		-	1.90		1	0.107	0.107	53.5
2	-62	20	1-1	49		-	4.50		1	0.105	0.105	52.5
3	-63	21	1-1	49		-	4.10		1	0.102	0.102	51.0
4	-64	22	1-1	49		-	1.20		1	0.259	0.259	130
5	-65	23	1-2	49		-	3.70		1	0.102	0.102	51.0
6	-66	24	1-2	49		-	2.90		1	0.127	0.127	63.5
7	-67	43	1-2	49		-	2.9		1	0.299	0.299	150
8	-68	44	1-2	49		-	3.3		1	0.142	0.142	71.0
9	-69	45	1-3	49		-	3.0		1	0.133	0.133	66.5
10	-70	46	1-3	49		-	3.8		1	0.116	0.116	58.0
11	-71	47	1-3	49		-	3.8		1	0.175	0.175	87.5
12	-72	48	1-3	49		-	3.0		1	0.227	0.227	114
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
Blank 1									1	CB1		
Blank 2									1	CB2		
Blank 3									1	CB3		

$\bar{C}_B$ = _____

S-340(2) R-9/85

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EPA Method 7A Recovery and Analysis Data Sheet (1)

**********SOURCE**********	**********RECOVERY**********	**********ANALYTICAL**********
Job LD- Massmoke	Date of Recovery 5-11-94	Date of Analysis 5/31/94
Source Roanne Tube	Recovered by SB	Analyst KLO
Date of Sampling 5-10-94	Recovery volume * 500 ml	Eluent ASHA
Test No(s) 2	Barometric at time 26.95 IN.HG.	Chromatograph: Dionex System 4000i

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$$C_{RS} = DF(C_{DS}) \qquad M_{NO_3} = (C_{RS} - \overline{C}_B)V_R \qquad \overline{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$$

where: C_{RS} = concentration of nitrate in 500 ml recovered sample in ug/ml

DF = dilution factor

C_{DS} = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

M_{NO_3} = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

C_B = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

C_{B1}, C_{B2}, C_{B3} = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

V_R = recovery volume for samples and field blanks in ml

* must bring to volume in lab

S-340(1)

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EPA Method 7A Recovery and Analysis Data Sheet (2)

	Sample Log ID No.	Flask No.	Test/ Run	Final Flask Conditions t_f (°F)	+	-	ΔP_g (IN.HG.)	Chrom Run No.	DF	Nitrate Concentration (ug/ml) Uncorr. for blank C_{RS}	Corr. for blank ($C_{RS} - C_B$)	Total nitrate in Sample (ug) ($M_{NO_3^-}$)
1	2837-73	1	2-1	78	+		0.80		1	2.30	2.30	1150
2	-74	2	2-1	78		-	0.40		1	2.06	2.06	1030
3	-75	3	2-1	78		-	1.50		1	2.21	2.21	1110
4	-76	4	2-1	78		-	2.40		1	2.34	2.34	1170
5	-77	5	2-2	78		-	2.00		1	2.31	2.31	1160
6	-78	6	2-2	77	+		1.60		1	3.45	3.45	1730
7	-79	55	2-2	76		-	0.80		1	2.48	2.48	1240
8	-80	56	2-2	76		-	1.60		1	2.48	2.48	1240
9	-81	57	2-3	75		-	1.10		1	1.91	1.91	955
10	-82	58	2-3	75		-	1.30		1	2.90	2.90	1450
11	-83	59	2-3	75		-	3.70		1	2.30	2.30	1150
12	-84	60	2-3	75		-	0.60		1	2.58	2.58	1290
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
Blank 1									1	CB1		
Blank 2									1	CB2		
Blank 3									1	CB3		

$\bar{C}_B$ = _____

S-340(2) R-9/85

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EPA Method 7A Recovery and Analysis Data Sheet (1)

**********SOURCE**********	**********RECOVERY**********	**********ANALYTICAL**********
Job LP - Massuola	Date of Recovery 5-11-94	Date of Analysis 5/31/94
Source C-Dryer Stack	Recovered by SB	Analyst KLG
Date of Sampling 5-10-94	Recovery volume * 500 ml	Eluent ASYA
Test No(s) 3	Barometric at time 26.95 IN.HG.	Chromatograph: Dionex System 4000i

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$C_{RS} = DF(C_{DS})$ $\quad M_{NO_3} = (C_{RS} - \overline{C}_B)V_R$ $\quad \overline{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$

where: C_{RS} = concentration of nitrate in 500 ml recovered sample in ug/ml

DF = dilution factor

C_{DS} = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

M_{NO_3} = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

C_B = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

C_{B1}, C_{B2}, C_{B3} = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

V_R = recovery volume for samples and field blanks in ml

* must bring to volume in lab.

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EPA Method 7A Recovery and Analysis Data Sheet (2)

	Sample Log ID No.	Flask No.	Test/ Run	Final Flask Conditions t_f (°F)	+	-	ΔP_g (IN.HG.)	Chrom Run No.	DF	Nitrate Concentration (ug/ml) Uncorr. for blank C_{RS}	Corr. for blank ($C_{RS} - C_B$)	Total nitrate in Sample (ug) ($M_{NO_3^-}$)
1	0837-85	19	3-1	76	+		0.02		1	0.290	0.290	145
2	-86	20	3-1	76		-	1.90		1	0.358	0.358	179
3	-87	21	3-1	76		-	0.60		1	0.268	0.268	134
4	-88	22	3-1	76	+		1.20		1	0.361	0.361	181
5	-89	23	3-2	76	+		0.90		1	0.056	0.056	28.0
6	-90	24	3-2	77	+		1.10		1	1.26	1.26	630
7	-91	43	3-2	70		-	1.00		1	1.09	1.09	545
8	-92	44	3-2	76		-	1.50		1	0.863	0.863	432
9	-93	45	3-3	75		-	1.60		1	0.605	0.605	303
10	-94	46	3.3	75		-	1.55		1	0.550	0.550	275
11	-95	47	3-3	75		-	0.05		1	0.561	0.561	281
12	-96	48	3-3	76		-	1.20		1	0.492	0.492	246.
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$\bar{C}_B$ = _____

S-340(2) R-9/85

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EPA Method 7A Recovery and Analysis Data Sheet (1)

**********SOURCE**********	**********RECOVERY**********	**********ANALYTICAL**********
Job LP - Missoula	Date of Recovery 5-11-94	Date of Analysis 5-31-94
Source D - Dryer Stack	Recovered by SB	Analyst KLA
Date of Sampling 5-10-94	Recovery volume * 500 ml	Eluent ASH7
Test No(s) 4	Barometric at time 26-95 IN.HG.	Chromatograph: Dionex System 4000i

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$$C_{RS} = DF(C_{DS}) \qquad M_{NO_3} = (C_{RS} - \overline{C}_B)V_R \qquad \overline{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$$

where: C_{RS} = concentration of nitrate in 500 ml recovered sample in ug/ml

DF = dilution factor

C_{DS} = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

M_{NO_3} = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

C_B = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

C_{B1}, C_{B2}, C_{B3} = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

V_R = recovery volume for samples and field blanks in ml

* must bring to volume in lab

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EPA Method 7A Recovery and Analysis Data Sheet (2)

	Sample Log ID No.	Flask No.	Test/ Run	Final Flask Conditions t_f (°F)	+	-	ΔP_g (IN.HG.)	Chrom Run No.	DF	Nitrate Concentration (ug/ml) Uncorr. for blank C_{RS}	Corr. for blank (C_{RS} - $\bar{C}_B$)	Total nitrate in Sample (ug) ($M_{NO_3^-}$)
1	2837-97	67	4-1	65		—	1.00		1	0.579	0.579	290
2	-98	68	4-1	65		—	1.50		1	0.583	0.583	292
3	-99	69	4-1	65		—	1.80		1	0.541	0.541	271
4	-100	70	4-1	65		—	1.80		1	0.567	0.567	284
5	-101	71	4-2	70		—	1.00		1	0.601	0.601	301
6	-102	72	4-2	70		—	2.80		1	0.523	0.523	262
7	-103	25	4-2	72		—	2.10		1	0.600	0.600	300
8	-104	26	4-2	72		—	0.05		1	0.582	0.582	291
9	-105	27	4-3	72		—	2.05		1	0.661	0.661	331
10	-106	29	4-3	74		—	2.55		1	0.564	0.564	282
11	-107	30	4-3	74		—	2.50		1	0.510	0.510	255
12	-108	31	4-3	76		—	1.80		1	0.057	0.057	28.5
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EPA Method 7A Recovery and Analysis Data Sheet (1)

**********SOURCE**********	**********RECOVERY**********	**********ANALYTICAL**********
Job LP - Missoula	Date of Recovery 5-25-94	Date of Analysis 5-31-94
Source N. Pre Dryer Stack	Recovered by J. SIMONS	Analyst KLG
Date of Sampling 5/12/94	Recovery volume 500 ml	Eluent ASGA
Test No(s) 16	Barometric at time 29.453 IN.HG.	Chromatograph: Dionex System 4000i

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$$C_{RS} = DF(C_{DS}) \qquad M_{NO_3} = (C_{RS} - \overline{C}_B)V_R \qquad \overline{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$$

where: C_{RS} = concentration of nitrate in 500 ml recovered sample in ug/ml

DF = dilution factor

C_{DS} = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

M_{NO_3} = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

C_B = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

C_{B1}, C_{B2}, C_{B3} = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

V_R = recovery volume for samples and field blanks in ml

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EPA Method 7A Recovery and Analysis Data Sheet (2)

	Sample Log ID No.	Flask No.	Test/ Run	Final Flask Conditions t_f (°F)	+	-	ΔP_g (IN.HG.)	Chrom Run No.	DF	Nitrate Concentration (ug/ml) Uncorr. for blank C_{RS}	Corr. for blank (C_{RS} - C_B)	Total nitrate in Sample (ug) ($M_{NO_3^-}$)
1	2837-109	25	16-1-1	72		X	3.70		1	0.494	0.494	217
2	-110	26	16-1-2			X	1.20		1	0.311	0.311	156
3	-111	27	16-1-3			X	3.70		1	0.337	0.337	169
4	-112	29	16-1-1			X	1.80		1	0.389	0.389	195
5	-113	30	16-2-1			X	3.75		1	0.408	0.408	204
6	-114	34	16-2-2			X	0.60		1	0.528	0.528	264
7	-115	67	16-2-3			X	2.85		1	0.401	0.401	201
8	-116	68	16-2-1			X	1.90		1	0.364	0.366	183
9	-117	69	16-3-1			X	1.50		1	0.406	0.406	203
10	-118	70	16-3-2			X	1.80		1	0.376	0.376	188
11	-119	71	16-3-3			X	3.55		1	0.396	0.396	198
12	-120	72	16-3-1			X	1.60		1	0.408	0.408	204
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$\bar{C}_B$ = _____

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EPA Method 7A Recovery and Analysis Data Sheet (1)

**********SOURCE**********	**********RECOVERY**********	**********ANALYTICAL**********
Job LP - Missoula	Date of Recovery 5-25-94	Date of Analysis 5-31-94
Source S. Pre Dryer Stack	Recovered by J. SIMONS	Analyst KLG
Date of Sampling 5/12/94	Recovery volume 500 ml	Eluent ASHF
Test No(s) 17	Barometric at time 29.453 IN.HG.	Chromatograph: Dionex System 4000i

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$C_{RS} = DF(C_{DS})$ $\quad M_{NO_3} = (C_{RS} - \overline{C}_B)V_R$ $\quad \overline{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$

where: C_{RS} = concentration of nitrate in 500 ml recovered sample in ug/ml

DF = dilution factor

C_{DS} = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

M_{NO_3} = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

C_B = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

C_{B1}, C_{B2}, C_{B3} = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

V_R = recovery volume for samples and field blanks in ml

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EPA Method 7A Recovery and Analysis Data Sheet (2)

	Sample Log ID No.	Flask No.	Test/ Run	Final Flask Conditions t_f (°F)	+	-	ΔP_g (IN.HG.)	Chrom Run No.	DF	Nitrate Concentration (ug/ml) Uncorr. for blank C_{RS}	Corr. for blank ($C_{RS} - \bar{C}_B$)	Total nitrate in Sample (ug) (M_{NO_3})
1	2837-121	1	17-1-1	72		X	0.80		1	0.236	0.236	118
2	-122	2	17-1-2				0.00		1	0.315	0.315	158
3	-123	3	17-1-3				0.00		1	0.340	0.340	170
4	-124	4	17-1-1			X	1.70		1	0.364	0.364	182
5	-125	5	17-2-1			X	0.40		1	0.059	0.059	29.5
6	-126	6	17-2-2			X	0.70		1	0.452	0.452	226
7	-127	55	17-2-3			X	4.30		1	0.439	0.439	220
8	-128	56	17-2-1			X	1.05		1	0.433	0.433	217
9	-129	57	17-3-1			X	2.30		1	0.413	0.413	207
10	-130	58	17-3-2			X	3.70		1	0.413	0.413	207
11	-131	59	17-3-3			X	0.35		1	0.393	0.393	197
12	-132	60	17-3-1			X	1.20		1	0.331	0.331	166
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$\bar{C}_B$ = _____

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EPA Method 7A Recovery and Analysis Data Sheet (1)

**********SOURCE**********	**********RECOVERY**********	**********ANALYTICAL**********
Job LP - Missoula	Date of Recovery 5-25-94	Date of Analysis 5-31-94
Source Coen Stack	Recovered by J. SIMONS	Analyst KPG
Date of Sampling 5/12/94	Recovery volume 500 ml	Eluent AS4A
Test No(s) 18	Barometric at time 29.453 IN.HG.	Chromatograph: Dionex System 4000i

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$$C_{RS} = DF(C_{DS}) \qquad M_{NO_3} = (C_{RS} - \overline{C}_B)V_R \qquad \overline{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$$

where: C_{RS} = concentration of nitrate in 500 ml recovered sample in ug/ml

DF = dilution factor

C_{DS} = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

M_{NO_3} = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

C_B = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

C_{B1}, C_{B2}, C_{B3} = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

V_R = recovery volume for samples and field blanks in ml

S-340(1)

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EPA Method 7A Recovery and Analysis Data Sheet (2)

	Sample Log ID No.	Flask No.	Test/ Run	Final Flask Conditions t_f (°F)	+	-	ΔP_g (IN.HG.)	Chrom Run No.	DF	Nitrate Concentration (ug/ml) Uncorr. for blank C_{RS}	Corr. for blank ($C_{RS} - \bar{C}_B$)	Total nitrate in Sample (ug) ($M_{NO_3^-}$)
1	2837-133	43	18-1-1	72		X	2.50		1	2.45	2.45	1230
2	-134	30	18-1-2			X	3.05		1	1.64	1.64	820
3	-135	45	18-1-3			X	3.20		1	2.23	2.23	1120
4	-136	46	18-1-1			X	3.20		1	2.42	2.42	1210
5	-137	47	18-2-1			X	1.70		1	0.00	0.00	0.00
6	-138	48	18-2-2			X	3.30		1	2.14	2.14	1070
7	-139	19	18-2-3				0.00		1	1.98	1.98	990
8	-140	20	18-2-1			X	1.70		1	1.80	1.80	900
9	-141	21	18-3-1			X	0.20		1	1.78	1.78	890
10	-142	22	18-3-2			X	0.10		1	1.93	1.93	965
11	-143	23	18-3-3			X	0.20		1	2.17	2.17	1090
12	-144	24	18-3-1	↓	X		0.10		1	2.36	2.36	1180
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$\bar{C}_B$ = _____

S-340(2) R-9/85

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S-305RR
(9/90)

EPA Method 10 NDIR Analysis

Job Name L.P. / Missoula, MT
Source D. Dryer / Stack
Date of Analysis 5-10-94
Technician Mark Haakler

NDIR Analyzer: ☒ Fugi ACS Model 3300
☐ Mon. Lab Model 8310
☐ Dasibi Model 3003
Range: 0 - 500 ppm
Flow rate: 1000 cc/min

Pretest Calibration	Conc.	Reading	Vendor	Cyl. Number
Zero gas:	0 ppm	0 ppm		
Upscale gas:	146 ppm	138 ppm		
Upscale gas:	312 ppm	307 ppm		
Upscale gas:	ppm	ppm		

Post-test Calibration	Conc.	Reading	Vendor	Cyl. Number
Zero gas:	ppm	ppm		
Upscale gas:	ppm	ppm		
Upscale gas:	ppm	ppm		
Upscale gas:	ppm	ppm		

Sample Description Test/Run	Sample Log Number	CO Conc. (ppm, Dry) Dilution Factor	Reading	Actual ppm
4/1		1	90	90
4/2		1	65	65
4/3		1	85	85
3/1		1	80	90
3/2		1	55	55
3/3		1	53	53
2/1		1	355	355
2/2		1	277	277
2/3		1	318	318

Sample Description Test/Run	Sample Log Number	CO Conc. (ppm, Dry) Dilution Factor	Reading	Actual ppm

Note 1: If sample dilution is requried the sample is diluted with CO-free gas prior to analysis.
Note 2: The Fugi ACS model 3300 has a rejection ratio for CO to CO_2 greater then 100,000: 1 and the Mon. Labs Model 8310 and Dasibi Model 3003 have rejection ratios greater then 200,000:1 and thus CO_2 removal prior to analysis is not required.
Note 3: The analyzer must be zeroed and spanned immediately before and after sample analysis. Additional checks may be performed between sample analyses if required.

EPA Method 10 NDIR Analysis

ob Name L.P. / Missoula, MT
ource Press Vents 3+4, Press Vents 1+2, Board Cooler 1+2
ate of Analysis 5-11-94
echnician Mark Buchler

NDIR Analyzer: ☒ Fugi ACS Model 3300
☐ Mon. Lab Model 8310
☐ Dasibi Model 3003
Range: 0 - 500 ppm
Flow rate: 1000 cc/min

Pretest Calibration	Conc.	Reading	Vendor	Cyl. Number
ero gas:	0 ppm	0 ppm		
pscale gas:	146 ppm	138 ppm		
pscale gas:	312 ppm	307 ppm		
pscale gas:	ppm	ppm		

Post-test Calibration	Conc.	Reading	Vendor	Cyl. Number
Zero gas:	ppm	ppm		
Upscale gas:	ppm	ppm		
Upscale gas:	ppm	ppm		
Upscale gas:	ppm	ppm		

Sample Description Test/Run	Sample Log Number	CO Conc. (ppm, Dry) Dilution Factor	Reading	Actual ppm
9/1		1	~~15~~ 10	~~15~~ 10
9/2		1	15	15
9/3		1	10	10
10/1		1	18	18
10/2		1	10	10
10/3		1	15	15
8/1		1	10	10
8/2		1	12	12
8/3		1	10	10

Sample Description Test/Run	Sample Log Number	CO Conc. (ppm, Dry) Dilution Factor	Reading	Actual ppm

ote 1: If sample dilution is requried the sample is diluted with CO-free gas prior to analysis.
ote 2: The Fugi ACS model 3300 has a rejection ratio for CO to CO_2 greater then 100,000: 1 and the Mon. Labs Model 8310 and Dasibi Model 3003 have rejection ratios greater then 200,000:1 and thus CO_2 removal prior to analysis is not required.
ote 3: The analyzer must be zeroed and spanned immediately before and after sample analysis. Additional checks may be performed between sample analyses if required.

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S-305R
(1/90)

EPA Method 10 NDIR Analysis

Job Name LP - missouri
Source North pre dryer stack
Date of Analysis 5-16-94
Technician RA

NDIR Analyzer: Fuji ACS Model 3300
Mon. Lab Model 8310
Dasibi Model 3003
Range: 0 - 500 ppm
Flow rate: 100 cc/min

Pretest Calibration

	Conc.	Reading	Vendor
Zero gas:	0 ppm	0 ppm	Nitrogen Specialty Gases
Upscale gas:	150 ppm	142 ppm	
Upscale gas:	239 ppm	238 ppm	
Upscale gase	ppm	ppm	Vendor:

Post-test Calibration

	Conc.	Reading	Vendor
Zero gas:	0 ppm	ppm	Nitrogen
Upscale gas:	150 ppm	ppm	Specialty
Upscale gas:	239 ppm	ppm	Gases
Upscale gase	ppm	ppm	Vendor:

Sample Description Test/Run	Sample Log Number	CO Conc. (ppm, Dry) Dilution Factor	Reading	Actual ppm
16-1		0	46	46
16-2		0	27	27
16-3		0	120	120

Sample Description Test/Run	Sample Log Number	CO Conc. (ppm, Dry) Dilution Factor	Reading	Actual ppm

Note 1: If sample dilution is requried the sample is diluted with CO-free gas prior to analysis.
Note 2: The Fuji ACS model 3300 has a rejection ratio for CO to CO_2 greater than 100,000: 1 and the Mon. Labs Model 8310 and Dasibi Model 3003 have rejection ratios greater than 200,000:1 and thus CO_2 removal prior to analysis is not required.
Note 3: The analyzer must be zeroed and spanned immediately before and after sample analysis. Additiona checks may be performed between sample analyses if required.

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(9/90)

EPA Method 10 NDIR Analysis

Job Name L.P. Missoula
Source South Pre Dryer
Date of Analysis 5-23-94
Technician C. Helgeson

NDIR Analyzer: ☐ Fugi ACS Model 3300
☐ Mon. Lab Model 8310
☑ Dasibi Model 3003
Range: 0 - 200 ppm
Flow rate: 1000 cc/min

Pretest Calibration

	Conc.	Reading	Vendor	Cyl. Number
Zero gas:	0 ppm	0 ppm	Scott	AAL 17431
Upscale gas:	41.5 ppm	41.5 ppm	National	CC 52502
Upscale gas:	204 ppm	204 ppm	National	CC 81624
Upscale gas:	ppm	ppm		

Post-test Calibration

	Conc.	Reading	Vendor	Cyl. Number
Zero gas:	0 ppm	0 ppm	Scott	AAL 17431
Upscale gas:	41.5 ppm	41.5 ppm	National	CC 52502
Upscale gas:	204 ppm	204 ppm	National	CC 81624
Upscale gas:	ppm	ppm		

Sample Description Test/Run	Sample Log Number	CO Conc. (ppm, Dry) Dilution Factor	Reading	Actual ppm
~~0034~~ 17/1	2837-145	—	4.4	4.4
~~0034~~ 17/2	-146	—	5.4	5.4
~~0034~~ 17/3	-147	—	6.9	6.9

Sample Description Test/Run	Sample Log Number	CO Conc. (ppm, Dry) Dilution Factor	Reading	Actual ppm

Note 1: If sample dilution is requried the sample is diluted with CO-free gas prior to analysis.
Note 2: The Fugi ACS model 3300 has a rejection ratio for CO to CO_2 greater then 100,000: 1 and the Mon. Labs Model 8310 and Dasibi Model 3003 have rejection ratios greater then 200,000:1 and thus CO_2 removal prior to analysis is not required.
Note 3: The analyzer must be zeroed and spanned immediately before and after sample analysis. Additional checks may be performed between sample analyses if required.

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S-305R
(1/90)

EPA Method 10 NDIR Analysis

Job Name: LP-Mussala
Source: Gen. Stack
Date of Analysis: 5-16-91
Technician: RA

NDIR Analyzer: Fugi ACS Model 3300
Mon. Lab Model 8310
Dasibi Model 3003
Range: 0 - 500 ppm
Folw rate: 1000 cc/min

Pretest Calibration

	Conc.		Reading			
Zero gas:	0	ppm	0	ppm	Vendor:	National Specialty Gases
Upscale gas:	150	ppm	142	ppm	Vendor:	Scott
Upscale gas:	239	ppm	238	ppm	Vendor:	Scott
Upscale gase		ppm		ppm	Vendor:	

Post-test Calibration

	Conc.		Reading			
Zero gas:	0	ppm	0	ppm	Vendor:	National Specialty Gases
Upscale gas:	150	ppm		ppm	Vendor:	Scott
Upscale gas:	237	ppm		ppm	Vendor:	Scott
Upscale gase		ppm		ppm	Vendor:	

Sample Description Test/Run	Sample Log Number	CO Conc. (ppm, Dry)		
		Dilution Factor	Reading	Actual ppm
18-1		0	87	87
18-2		0	75	75
18-3		0	75	75

Sample Description Test/Run	Sample Log Number	CO Conc. (ppm, Dry)		
		Dilution Factor	Reading	Actual ppm

Note 1: If sample dilution is requried the sample is diluted with CO-free gas prior to analysis.
Note 2: The Fugi ACS model 3300 has a rejection ratio for CO to CO_2 greater than 100,000: 1 and the Mon. Labs Model 8310 and Dasibi Model 3003 have rejection ratios greater than 200,000:1 and thus CO_2 removal prior to analysis is not required.
Note 3: The analyzer must be zeroed and spanned immediately before and after sample analysis. Additiona checks may be performed between sample analyses if required.

INTERPOLL LABORATORIES INC.

Formaldehyde Results By EPA Method 0011
For L.P. Missoula Collected 5/10/94

Item	Field Spike			Test 5			
	Actual	Found	% Recovery	F. Blank	Run 1	Run 2	Run 3
Roemmc Tube							
Log #		2837-30		2837-31	2837-32	2837-33	2837-34
Date Analyzed		6/9/94		6/9/94	6/9/94	6/9/94	6/10/94
Mass (ug)**	**750**	**634**	**84.5**	**7.64**	**489**	**412**	**3610**

Item	Field Spike			Test 6			
	Actual	Found	% Recovery	F. Blank	Run 1	Run 2	Run 3
"C" Dryer Stack							
Log #		2837-35		2837-36	2837-37	2837-38	2837-39
Date Analyzed		6/10/94		6/10/94	6/10/94	6/10/94	6/10/94
Mass (ug)**	**750**	**726**	**96.8**	**1.90**	**299**	**325**	**805**

** = Total Mass of formaldehyde in the sample in ug.

INTERPOLL LABORATORIES INC.

Formaldehyde Results By EPA Method 0011
For L.P. Missoula Collected 5/10/94

Item	Field Spike			Test 7			
	Actual	Found	% Recovery	F. Blank	Run 1	Run 2	Run 3
"D" Dryer Stack							
Log #		2837-40		2837-41	2837-42	2837-43	2837-44
Date Analyzed		6/10/94		6/10/94	6/10/94	6/10/94	6/10/94
Mass (ug)**	**750**	**804**	**107**	**2.03**	**585**	**494**	**1530**

** = Total Mass of formaldehyde in the sample in ug.

LPM2837.XLS

INTERPOLL LABORATORIES INC.

Formaldehyde Results By EPA Method 0011
For L.P. Missoula Collected 5/11-12/94

Item	Test 11		
	Run 1	Run 2	Run 3
Board Coolers			
Log #	2837-45	2837-46	2837-47
Date Analyzed	6/10/94	6/10/94	6/10/94
Mass (ug)**	**585**	**553**	**992**

Item	Test 12		
	Run 1	Run 2	Run 3
Press Vents 3&4			
Log #	2837-48	2837-49	2837-50
Date Analyzed	6/10/94	6/10/94	6/10/94
Mass (ug)**	**7170**	**6760**	**3130**

Item	Test 13		
	Run 1	Run 2	Run 3
Press Vents 1&2			
Log #	2837-51	2837-52	2837-53
Date Analyzed	6/10/94	6/10/94	6/10/94
Mass (ug)**	**754**	**825**	**646**

Item	Test 14		
	Run 1	Run 2	Run 3
N Pre-Dryer			
Log #	2837-54	2837-55	2837-56
Date Analyzed	6/10/94	6/10/94	6/10/94
Mass (ug)**	**644**	**200**	**147**

Item	Test 15		
	Run 1	Run 2	Run 3
S Pre-Dryer			
Log #	2837-57	2837-58	2837-59
Date Analyzed	6/10/94	6/10/94	6/10/94
Mass (ug)**	**139**	**95.6**	**88.1**

** = Total Mass of formaldehyde in the sample in ug.

LPM2837.XLS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L & P MISSOULA Source: GEK/1 Site: GEKA STACK Log No. 2937
Field Engineer: K.R Date of Test: 5-9-94 Test No. 1 No. of Runs 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
0	**Probe Wash:** ☐ Acetone ☐ $MeCl_2$	☐DI Water ☐_____	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
0	**Filter:** ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
0	**Impingers:** ☐DI Water ☐3% H_2O_2 ☐1N NaOH ☐2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐_____	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		
3	**Integrated Gas:** ☒Tedlar Bag	☐_____	☒EPA M-3 ☐_____	☐EPA M-10		Analyzed in Field
12	**Oxides of Nitrogen:**		☐EPA M-7A ☐_____			Transferred in Field
0	**Fuel Lab:** ☐Fuel Sample	☐Aggregate	☐Per S-0163			
0	**Particle Sizing:**		☐X-Ray Sdgraph ☐_____	☐Cascade Imp		
0	**Miscellaneous:**	☐_____	☐_____			

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☒Natural Gas ☐RDF ☐_____

Relinquished by/Affiliation	Accepted by/Affiliation	Date
George Hauer	Bob Sorg, Interpoll	5/23/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: LP- Missoula Source: Roomme Site: TU-3e Log No.: 2837
Field Engineer: SB Date of Test: 5-10-94 Test No.: 2 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
4	Probe Wash: ☒ Acetone ☐ $MeCl_2$	☐ DI Water ☐	☒ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☐		
4	Filter: ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		
4	Impingers: ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☐	☐ MN Protocol ☐ WI Protocol ☒ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☐		
3	Integrated Gas: ☒ Tedlar Bag	☐	☒ EPA M-3 ☐	☒ EPA M-10		Bags in field
12	Oxides of Nitrogen:		☒ EPA M-7A ☐			Recovered in field
0	Fuel Lab: ☐ Fuel Sample	☐ Aggregate	☐ Per S-0163			
0	Particle Sizing:		☐ X-Ray Sdgraph ☐	☐ Cascade Imp		
4	Miscellaneous:	☒ $MeCl_2$	☒ M-202 Rinse			

Fuel Type: Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite Wood: ☐ Wood Waste ☒ Dust ☐ Bark Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6 Misc: ☐ Natural Gas ☐ RDF ☐

Relinquished by/Affiliation	Accepted by/Affiliation	Date
Scott D Ramillo / Interpoll Labs	Bob Berg, Intrpol	5/23/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: LP/MISSOULA Source: "C" DRYER Site: STACK Log No.: 2837
Field Engineer: E TRUMBRIDGE Date of Test: 5-10-94 Test No.: 3 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
4	Probe Wash: ☒ Acetone ☒ $MeCl_2$	☐ DI Water ☐ _____	☒ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☐ _____		
4	Filter: ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☐ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		
4	Impingers: ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☒ MeCl	☐ MN Protocol ☐ WI Protocol ☒ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☐ _____		
3	Integrated Gas: ☒ Tedlar Bag	☐ _____	☒ EPA M-3 ☐ _____	☒ EPA M-10		Analyzed on Field
12	Oxides of Nitrogen:		☒ EPA M-7A ☐ _____			
—	Fuel Lab: ☐ Fuel Sample	☐ Aggregate	☐ Per S-0163			
—	Particle Sizing:		☐ X-Ray Sdgraph ☐ _____	☐ Cascade Imp		
—	Miscellaneous:	☐ _____	☐ _____			

Fuel Type: Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite Wood: ☐ Wood Waste ☐ Dust ☐ Bark Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6 Misc: ☒ Natural Gas ☐ RDF ☐ _____

Relinquished by/Affiliation	Accepted by/Affiliation	Date
E. Trumbridge / Interpoll	Bob Sing, Interpoll	5/23/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L.P. / Missoula, MT Source: 'D' Dryer Site: Stack Log No.: 2037
Field Engineer: M. Koehler Date of Test: 5-10-94 Test No.: 4 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	**Probe Wash:** ☒ Acetone ☐ $MeCl_2$	☐ DI Water ☐ _____	☒ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☐ _____		
3	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		
3	**Impingers:** ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☒ $MeCl_2$ Rinse	☐ MN Protocol ☐ WI Protocol ☒ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☒ MT Protocol		
3	**Integrated Gas:** ☒ Tedlar Bag	☐ _____	☒ EPA M-3 ☐ _____	☒ EPA M-10		Analyzed in Field
12	**Oxides of Nitrogen:**		☒ EPA M-7A ☐ _____			Partial Recovery in Field
—	**Fuel Lab:** ☐ Fuel Sample	☐ Aggregate	☐ Per S-0163			
—	**Particle Sizing:**		☐ X-Ray Sdgraph ☐ _____	☐ Cascade Imp		
—	**Miscellaneous:**	☐ _____	☐ _____			

Fuel Type: Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite Wood: ☒ Wood Waste ☐ Dust ☐ Bark Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6 Misc: ☒ Natural Gas ☐ RDF ☐ _____

Relinquished by/Affiliation	Accepted by/Affiliation	Date
Mark Barbee / Interpoll Labs	R. Berg, Interpoll	5/13/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: LP - Missoula Source: Revenue 1 Site: Tube Log No.: 2837
Field Engineer: SB Date of Test: 5-10-94 Test No.: 5 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
0	**Probe Wash:** ☐ Acetone ☐ $MeCl_2$	☐DI Water ☐_____	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
0	**Filter:** ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
4	**Impingers:** ☐DI Water ☐3% H_2O_2 ☐1N NaOH ☒2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐_____	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☒ 0011		
3	**Integrated Gas:** ☒Tedlar Bag	☐_____	☒EPA M-3 ☐_____	☒EPA M-10		Recovered in Field
0	**Oxides of Nitrogen:**		☐EPA M-7A ☐_____			
0	**Fuel Lab:** ☐Fuel Sample	☐Aggregate	☐Per S-0163			
0	**Particle Sizing:**		☐X-Ray Sdgraph ☐_____	☐Cascade Imp		
1	**Miscellaneous:**	☒Field Spike	☒ 0011			

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☒Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐_____

Relinquished by/Affiliation	Accepted by/Affiliation	Date
Scott D Crawford / Interpoll Labs	Bob Sang, Interpoll	5/23/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: LP/MISSOULA Source: "C" DRYER Site: STACK Log No. 2837
Field Engineer: E TROWBRIDGE Date of Test: 5-10-94 Test No. 6 No. of Runs 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
	Probe Wash: ☐ Acetone ☐ $MeCl_2$	☐DI Water ☐_____	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
	Filter: ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
4	**Impingers:** ☐DI Water ☐3% H_2O_2 ☐1N NaOH ☒2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐_____	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		
3	**Integrated Gas:** ☒Tedlar Bag	☐_____	☒EPA M-3 ☐_____	☐EPA M-10		Analyzed in field
	Oxides of Nitrogen:		☐EPA M-7A ☐_____			
	Fuel Lab: ☐Fuel Sample	☐Aggregate	☐Per S-0163			
	Particle Sizing:		☐X-Ray Sdgraph ☐_____	☐Cascade Imp		
	Miscellaneous:	☐_____	☐_____			

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☒Natural Gas ☐RDF ☐_____

Relinquished by/Affiliation	Accepted by/Affiliation	Date
E Trowbridge / Interpoll Labs	B Berg, Interpoll	5/13/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L.P. / Missoula, MT Source: 'D' Dryer' Site: Stack Log No.: 2837
Field Engineer: M. Kaehler Date of Test: 5-10-94 Test No.: 7 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3+1	**Probe Wash:** ☐ Acetone ☒ $MeCl_2$	☐DI Water ☐	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☒ 0011		
—	**Filter:** ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
3+1	**Impingers:** ☐DI Water ☐3% H_2O_2 ☐1N NaOH ☒2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☒ 0011		
3	**Integrated Gas:** ☐Tedlar Bag	☐	☒EPA M-3 ☐	☐EPA M-10		Analyzed on Site
—	**Oxides of Nitrogen:**		☐EPA M-7A ☐			
—	**Fuel Lab:** ☐Fuel Sample	☐Aggregate	☐Per S-0163			
—	**Particle Sizing:**		☐X-Ray Sdgraph ☐	☐Cascade Imp		
—	**Miscellaneous:**	☐	☐			

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☒Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐

Relinquished by/Affiliation	Accepted by/Affiliation	Date
Mark Kaehler / Interpoll Labs	[illegible], Interpoll	5/23/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: LP - Missoula | Source: Board Cooler 1/2 | Site: Stack | Log No.: 2337
Field Engineer: SJ | Date of Test: 5-11-94 | Test No.: 8 | No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	**Probe Wash:** ☒ Acetone ☐ $MeCl_2$	☐ DI Water ☐ _____	☒ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☐ _____		
3	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		
3	**Impingers:** ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☐ _____	☐ MN Protocol ☐ WI Protocol ☒ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☐ _____		
3	**Integrated Gas:** ☒ Tedlar Bag	☐ _____	☒ EPA M-3 ☐ _____	☒ EPA M-10		Done in field Calibrat Gas
0	**Oxides of Nitrogen:**		☐ EPA M-7A ☐ _____			
0	**Fuel Lab:** ☐ Fuel Sample	☐ Aggregate	☐ Per S-0163			
0	**Particle Sizing:**		☐ X-Ray Sdgraph ☐ _____	☐ Cascade Imp		
3	**Miscellaneous:**	☒ $MeCl_2$ Rinse	☒ M202			

Fuel Type: Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite | Wood: ☐ Wood Waste ☐ Dust ☐ Bark | Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6 | Misc: ☐ Natural Gas ☐ RDF ☒ Calibrat Gas

Relinquished by/Affiliation	Accepted by/Affiliation	Date
Scott D Belbe / Interpoll Labs	Bill Bay, Interpoll	5/23/94 1000

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: LP/Missoula Source: No 3 & 4 Pulverizer Site: Stack Log No.: 2837
Field Engineer: E Trawicke Date of Test: 5-11-94 Test No.: 9 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	Probe Wash: ☒ Acetone ☐ $MeCl_2$	☐ DI Water ☐ _____	☒ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☐ _____		
3	Filter: ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		
	Impingers: ☐ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☐ _____	☐ MN Protocol ☐ WI Protocol ☐ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☐ _____		
3	Integrated Gas: ☒ Tedlar Bag	☐ _____	☒ EPA M-3 ☐ _____	☒ EPA M-10		Analyzed on Feedstock
	Oxides of Nitrogen:		☐ EPA M-7A ☐ _____			
	Fuel Lab: ☐ Fuel Sample	☐ Aggregate	☐ Per S-0163			
	Particle Sizing:		☐ X-Ray Sdgraph ☐ _____	☐ Cascade Imp		
	Miscellaneous:	☐ _____	☐ _____			

Fuel Type:
Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite
Wood: ☐ Wood Waste ☐ Dust ☐ Bark
Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6
Misc: ☐ Natural Gas ☐ RDF ☐ _____

Relinquished by/Affiliation	Accepted by/Affiliation	Date
E Trawicke / Interpoll Labs	B Bay, Interpoll	5/23/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L.P. / Missoula, MT Source: Nos 1+2 Press Vent Site: Stacks Log No. 2637
Field Engineer: M. Kuehler Date of Test: 5-11-94 Test No. 10 No. of Runs 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	**Probe Wash:** ☒ Acetone ☐ $MeCl_2$	☐ DI Water ☐ _____	☒ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☐ _____		
3	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		
3	**Impingers:** ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☐ _____	☐ MN Protocol ☐ WI Protocol ☒ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☒ MT Protocol		
3	**Integrated Gas:** ☐ Tedlar Bag	☐ _____	☐ EPA M-3 ☐ _____	☒ EPA M-10		Ambient Air
—	**Oxides of Nitrogen:**		☐ EPA M-7A ☐ _____			
—	**Fuel Lab:** ☐ Fuel Sample	☐ Aggregate	☐ Per S-0163			
—	**Particle Sizing:**		☐ X-Ray Sdgraph ☐ _____	☐ Cascade Imp		
—	**Miscellaneous:**	☐ _____	☐ _____			

Fuel Type: NA
Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite
Wood: ☐ Wood Waste ☐ Dust ☐ Bark
Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6
Misc: ☐ Natural Gas ☐ RDF ☐ _____

Relinquished by/Affiliation	Accepted by/Affiliation	Date
Mark Kuehler / Interpoll Labs	Bob Sorg, Interpoll	5/23/94 1000

033094-G:\STACK\WP\FORMS\S-27B.2

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: LPMISSOULA Source: BOARD COOLER Site: NO 1 & 2 STACK Log No.: 2837
Field Engineer: SB Date of Test: 5-11-94 Test No.: 11 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	**Probe Wash:** ☐ Acetone ☒ $MeCl_2$	☐DI Water ☐_____	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
0	**Filter:** ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
3	**Impingers:** ☐DI Water ☐3% H_2O_2 ☐1N NaOH ☒2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐_____	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		
3	**Integrated Gas:** ☒Tedlar Bag	☐_____	☒EPA M-3 ☐_____	☒EPA M-10		None in field
0	**Oxides of Nitrogen:**		☐EPA M-7A ☐_____			
0	**Fuel Lab:** ☐Fuel Sample	☐Aggregate	☐Per S-0163			
0	**Particle Sizing:**		☐X-Ray Sdgraph ☐_____	☐Cascade Imp		
	Miscellaneous:	☐_____	☐_____			

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☒Natural Gas

Relinquished by/Affiliation	Accepted by/Affiliation	Date
[illegible] / Interpoll Lab	[illegible], Interpoll	5/23/94 1000

033094-G:\STACK\WP\FORMS\S-278.2

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L/Missoula Source: NO3x4/[illegible] Site: Stacks Log No.: 2837
Field Engineer: E Trowbridge Date of Test: 5-11-94 Test No.: 12 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
	Probe Wash: ☐ Acetone ☐ $MeCl_2$	☐DI Water ☐_____	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
0	**Filter:** ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
3	**Impingers:** ☐DI Water ☐3% H_2O_2 ☐1N NaOH ☒2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐_____	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☒Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		
0	**Integrated Gas:** ☐Tedlar Bag	☐_____	☐EPA M-3 ☐_____	☐EPA M-10		
	Oxides of Nitrogen:		☐EPA M-7A ☐_____			
	Fuel Lab: ☐Fuel Sample	☐Aggregate	☐Per S-0163			
	Particle Sizing:		☐X-Ray Sdgraph ☐_____	☐Cascade Imp		
	Miscellaneous:	☐_____	☐_____			

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐_____

Relinquished by/Affiliation	Accepted by/Affiliation	Date
E Trowbridge Interpoll Labs	B Bay, Interpoll	5/13/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L.P. / Missoula, MT Source: No. 1+2 Prosvent Site: Stack Log No.: 2837
Field Engineer: M. Buehler Date of Test: 5/1/94 Test No.: 13 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	**Probe Wash:** ☐ Acetone ☒ $MeCl_2$	☐DI Water ☐	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☐		Added to Imp. catch
—	**Filter:** ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
3	**Impingers:** ☐DI Water ☐3% H_2O_2 ☐1N NaOH ☒2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☒ 0011		
~~3~~	**Integrated Gas:** ☐Tedlar Bag	☐	☐EPA M-3 ☐	☐EPA M-10		Amb. air
—	**Oxides of Nitrogen:**		☐EPA M-7A ☐			
—	**Fuel Lab:** ☐Fuel Sample	☐Aggregate	☐Per S-0163			
—	**Particle Sizing:**		☐X-Ray Sdgraph ☐	☐Cascade Imp		
—	**Miscellaneous:**	☐	☐			

Fuel Type: NA
Coal: ☐Bituminous ☐Anthracite ☐Lignite
Wood: ☐Wood Waste ☐Dust ☐Bark
Oil: ☐Waste Oil ☐No. 2 ☐No. 6
Misc: ☐Natural Gas ☐RDF ☐

Relinquished by/Affiliation	Accepted by/Affiliation	Date
Mark Buehler	Bob Berg, Interpoll	5/23/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: LP/Missoula Source: North Pole Dryer Site: Stack Log No.: 2837
Field Engineer: E. Trowbridge Date of Test: 5-12-94 Test No.: 1 4 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
	Probe Wash: ☐ Acetone ☐ $MeCl_2$	☐DI Water ☐_____	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
	Filter: ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
3	Impingers: ☐DI Water ☐3% H_2O_2 ☐1N NaOH ☒2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐_____	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		
3	Integrated Gas: ☒Tedlar Bag	☐_____	☒EPA M-3 ☐_____	☒EPA M-10		Analyzed on Fuel
	Oxides of Nitrogen:		☐EPA M-7A ☐_____			
	Fuel Lab: ☐Fuel Sample	☐Aggregate	☐Per S-0163			
	Particle Sizing:		☐X-Ray Sdgraph ☐_____	☐Cascade Imp		
	Miscellaneous:	☐_____	☐_____			

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐_____

Relinquished by/Affiliation	Accepted by/Affiliation	Date
E. Trowbridge / Interpoll Labs	Bob Bay, Interpoll	5/13/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L.P. / Missoula, MT Source: South Pre Dryer Site: Stack Log No.: 2837
Field Engineer: M. Kuehler Date of Test: 5/12-94 Test No.: 15 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	Probe Wash: ☐ Acetone ☒ $MeCl_2$	☐ DI Water ☐	☐ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☒ 0011		Aldehyde to temp. lab
—	Filter: ☐ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☐ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		
3	Impingers: ☐ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☒ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☐	☐ MN Protocol ☐ WI Protocol ☐ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☒ 0011		
3	Integrated Gas: ☒ Tedlar Bag	☐	☒ EPA M-3 ☐	☐ EPA M-10		Analyzed in Field
—	Oxides of Nitrogen:		☐ EPA M-7A ☐			
—	Fuel Lab: ☐ Fuel Sample	☐ Aggregate	☐ Per S-0163			
—	Particle Sizing:		☐ X-Ray Sdgraph ☐	☐ Cascade Imp		
—	Miscellaneous:	☐	☐			

Fuel Type: Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite Wood: ☐ Wood Waste ☐ Dust ☐ Bark Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6 Misc: ☒ Natural Gas ☐ RDF ☐

Relinquished by/Affiliation	Accepted by/Affiliation	Date
Mark Kuehler / Interpoll Labs	[illegible], Interpoll	5/13/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L.P. / Missoula, MT Source: North Pole Dryer Site: Stack Log No.: 2037
Field Engineer: M. Kuehler Date of Test: 5-12-94 Test No.: 16 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	Probe Wash: ☒ Acetone ☐ $MeCl_2$	☐ DI Water ☐ _____	☒ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☐ _____		
3	Filter: ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		
3 3	Impingers: ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☒ $MeCl_2$ Rinse	☐ MN Protocol ☐ WI Protocol ☐ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☒ MT Protocol		
3	Integrated Gas: ☒ Tedlar Bag	☐ _____	☒ EPA M-3 ☐ _____	☒ EPA M-10		Analyzed on Field
12	Oxides of Nitrogen:		☒ EPA M-7A ☐ _____			
—	Fuel Lab: ☐ Fuel Sample	☐ Aggregate	☐ Per S-0163			
—	Particle Sizing:		☐ X-Ray Sdgraph ☐ _____	☐ Cascade Imp		
—	Miscellaneous:	☐ _____	☐ _____			

Fuel Type: Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite Wood: ☐ Wood Waste ☐ Dust ☐ Bark Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6 Misc: ☒ Natural Gas ☐ RDF ☐ _____

Relinquished by/Affiliation	Accepted by/Affiliation	Date
Mark Boehler / Interpoll Labs	Bob Bay, Interpoll	5/13/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L.P./Missoula, MT Source: South Pre Dryer Site: Stack Log No.: 2837
Field Engineer: M. Koehler Date of Test: 5-12-94 Test No.: 37 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	**Probe Wash:** ☒ Acetone ☐ $MeCl_2$	☐ DI Water ☐ _____	☒ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☐ _____		
3	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		
3 3	**Impingers:** ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☒ MeCl2 Rinse	☐ MN Protocol ☐ WI Protocol ☒ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☒ MT Protocol		
3	**Integrated Gas:** ☒ Tedlar Bag	☐ _____	☒ EPA M-3 ☐ _____	☒ EPA M-10		
1L	**Oxides of Nitrogen:**		☐ EPA M-7A ☐ _____			
—	**Fuel Lab:** ☐ Fuel Sample	☐ Aggregate	☐ Per S-0163			
—	**Particle Sizing:**		☐ X-Ray Sdgraph ☐ _____	☐ Cascade Imp		
—	**Miscellaneous:**	☐ _____	☐ _____			

Fuel Type:
Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite
Wood: ☐ Wood Waste ☐ Dust ☐ Bark
Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6
Misc: ☒ Natural Gas ☐ RDF ☐ _____

Relinquished by/Affiliation	Accepted by/Affiliation	Date
Mark Koehler / Interpoll Labs	[illegible], Interpoll	5/13/94 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: GP - Missoula Source: Oven Site: Stack Log No.: 2837
Field Engineer: SB Date of Test: 5-12-94 Test No.: 18 No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	Probe Wash: ☒ Acetone ☐ $MeCl_2$	☐ DI Water ☐ _____	☒ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☐ _____		
3	Filter: ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		
3	Impingers: ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☐ _____	☐ MN Protocol ☐ WI Protocol ☒ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☐ _____		
3	Integrated Gas: ☒ Tedlar Bag	☐ _____	☒ EPA M-3 ☐ _____	☒ EPA M-10		
12	Oxides of Nitrogen:		☒ EPA M-7A ☐ _____			
0	Fuel Lab: ☐ Fuel Sample	☐ Aggregate	☐ Per S-0163			
0	Particle Sizing:		☐ X-Ray Sdgraph ☐ _____	☐ Cascade Imp		
3	Miscellaneous:	☒ Meth Rinse	☒ M-202			

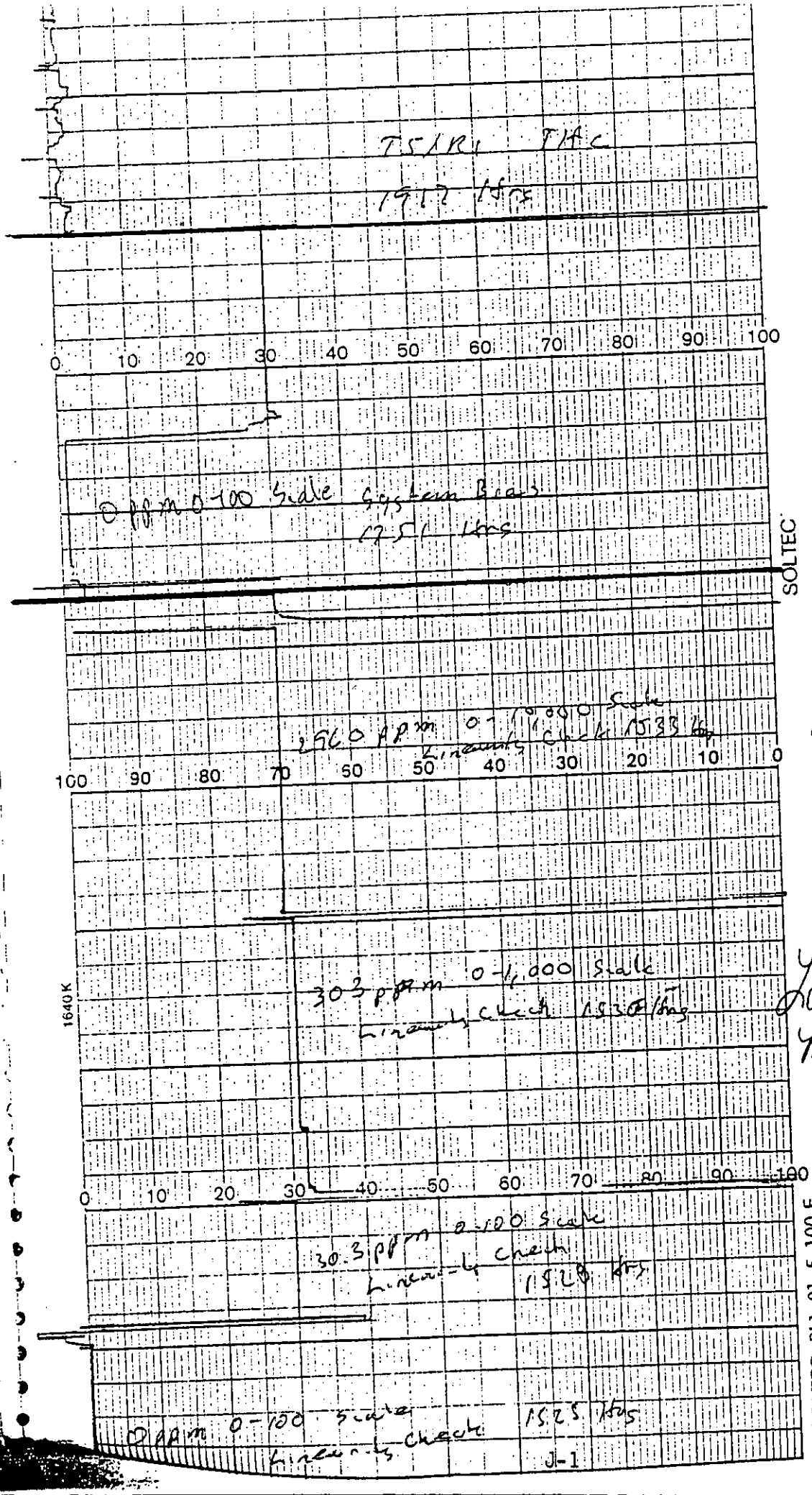
Fuel Type: Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite Wood: ☐ Wood Waste ☒ ~~Dust~~ ☐ Bark Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6 Misc: ☐ Natural Gas ☐ RDF ☐ _____

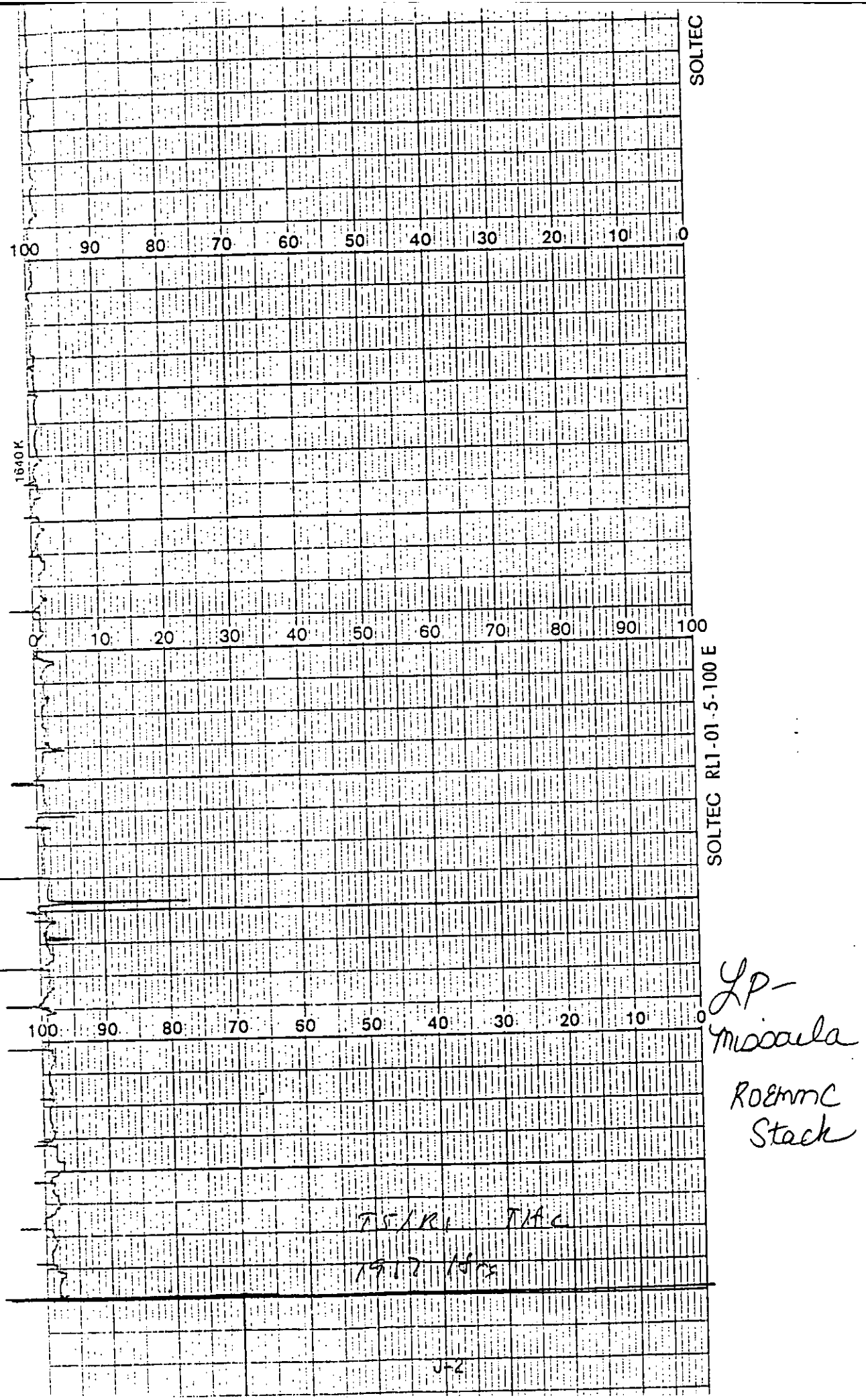
Relinquished by/Affiliation	Accepted by/Affiliation	Date
[illegible] / Interpoll Labs	[illegible], Interpoll	5/13/94 1006

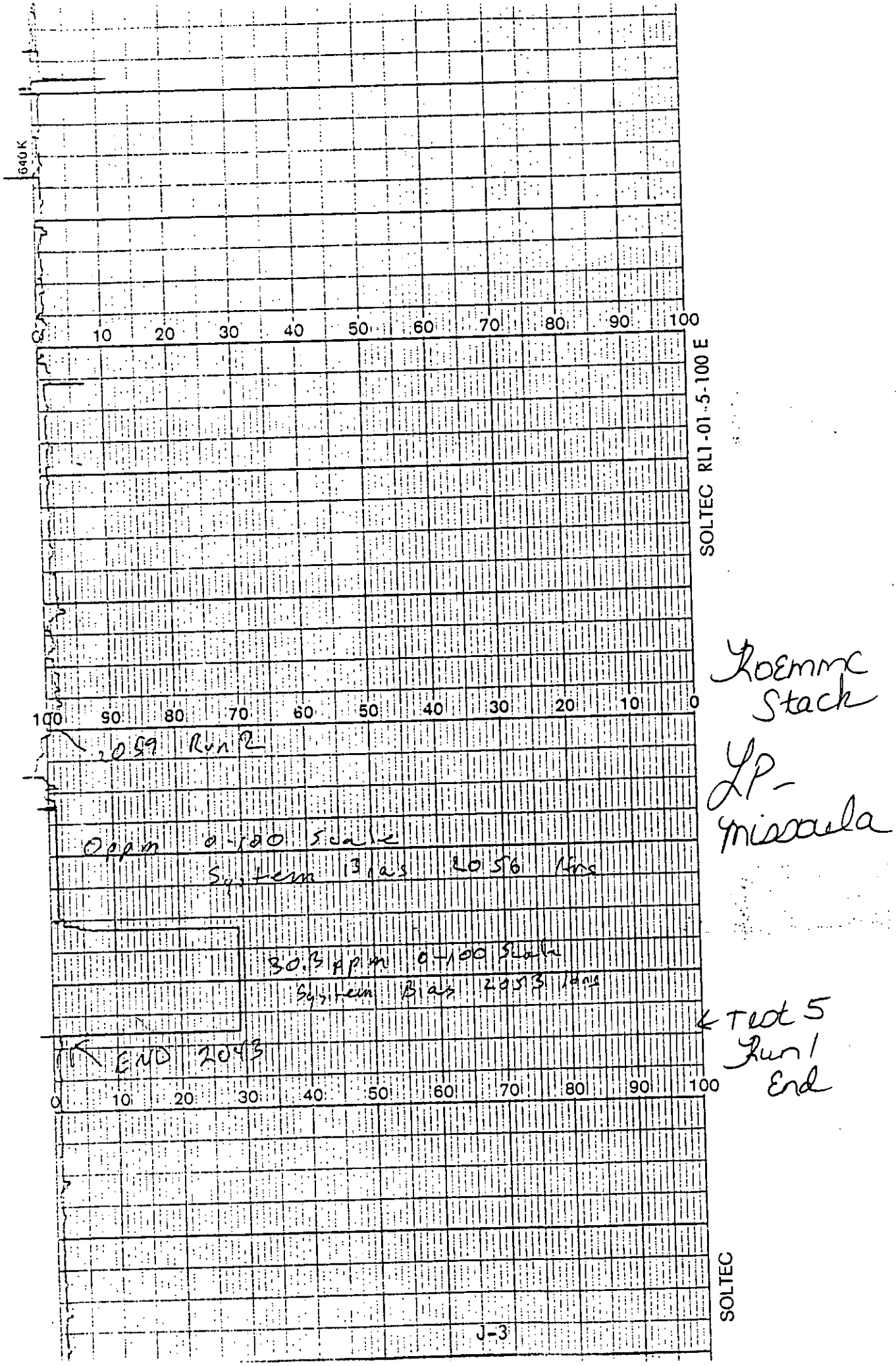
033094-G:\STACK\WP\FORMS\S-278.2

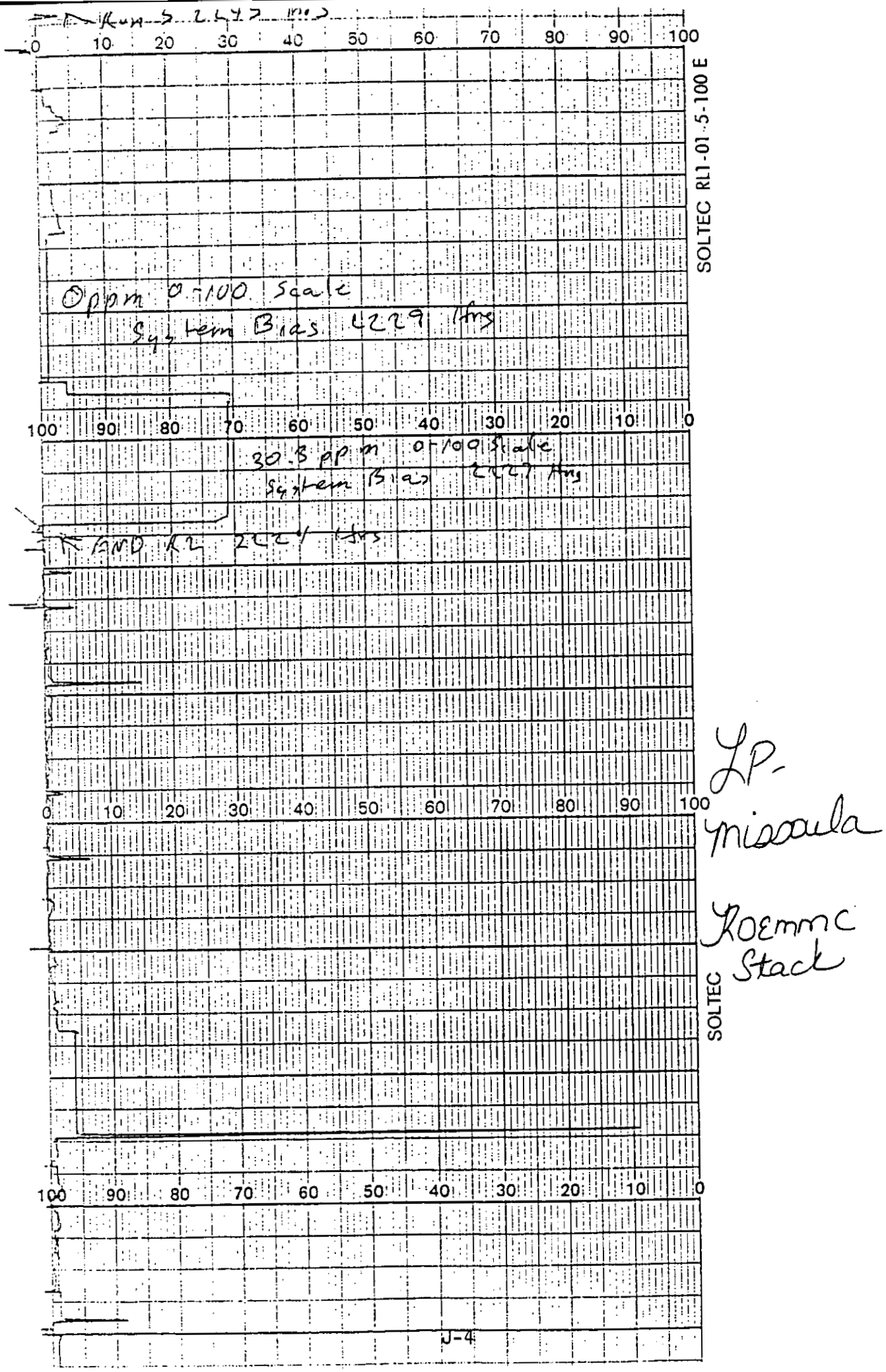
APPENDIX J

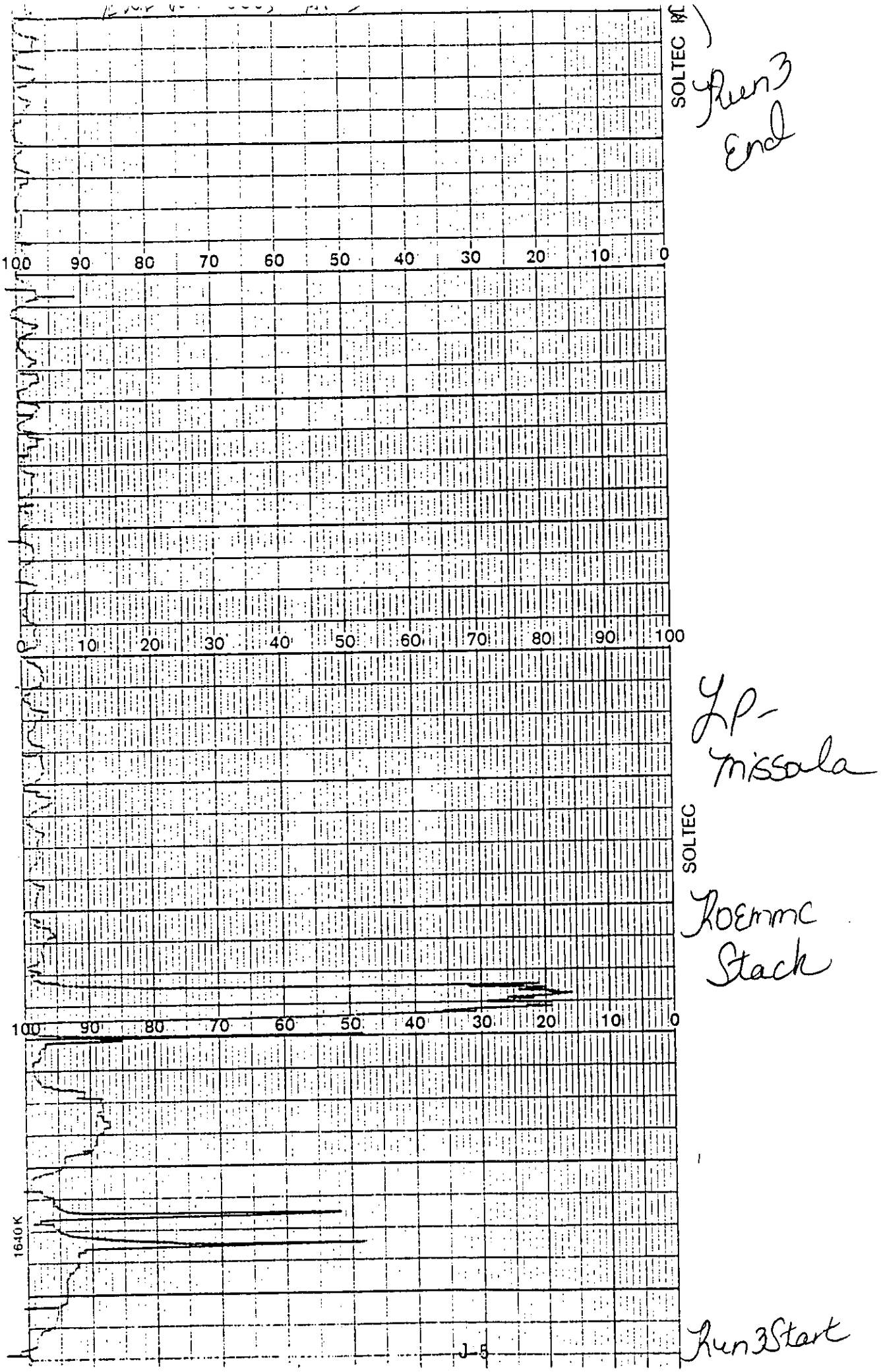
TOTAL HYDROCARBONS STRIPCHARTS

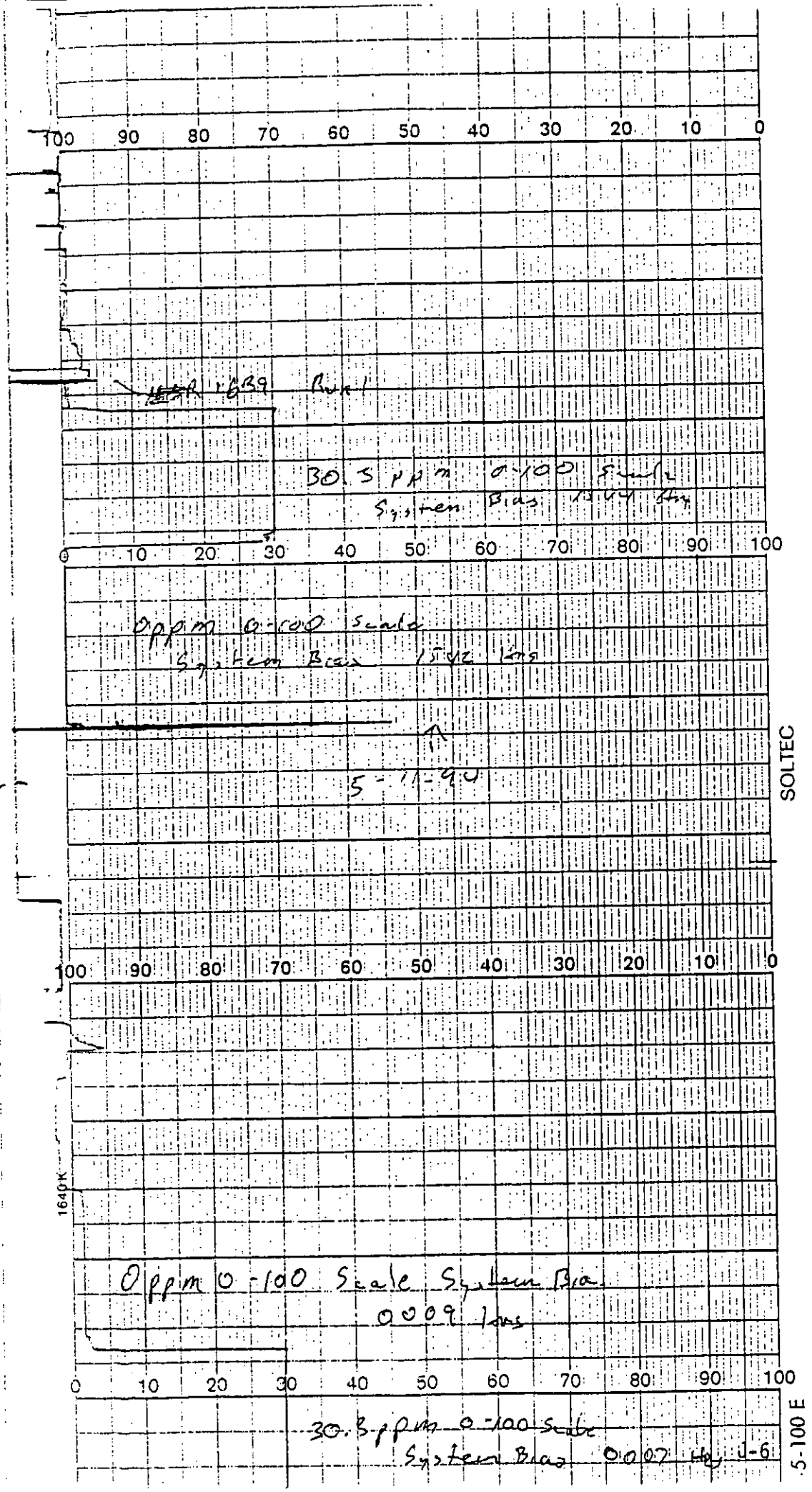

TSIR THC
1912 hrs
0 10 20 30 40 50 60 70 80 90 100
0 ppm 0-100 Scale System Bias
1951 hrs
SOLTEC
2960 ppm 0-10,000 Scale
Linearity check 1533 hrs
100 90 80 70 60 50 40 30 20 10 0
Roemmc Stack
1640K
303 ppm 0-1,000 Scale
Linearity check 1530 hrs
Louisiana Pacific
Missoula
Montana
0 10 20 30 40 50 60 70 80 90 100
30.3 ppm 0-100 Scale
Linearity check
1528 hrs
0 ppm 0-100 Scale
Linearity check 1525 hrs
SOLTEC RLI-01-5-100 E


SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K
10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0
LP-
Missoula
Roemmc
Stack
TSIR1 TIA
1912 1915


640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0
2059 Run 2
0ppm 0-100 Scale
System Bias 2056 hrs
30.3 ppm 0-100 Scale
System Bias 2053 hrs
END 2043
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
Roemmc Stack
LP-Missoula
Test 5 Run 1 End


Run 5 2442 hrs
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
0ppm 0-100 Scale
System Bias 4229 Hrs
100 90 80 70 60 50 40 30 20 10 0
30.8 ppm 0-100 Scale
System Bias 2227 Hrs
Run R2 2221 Hrs
LP-
Missoula
Roemmc
Stack
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0


SOLTEC
Run 3 End
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
LP-Missoula
SOLTEC
Roemmc Stack
100 90 80 70 60 50 40 30 20 10 0
1640 K
Run 3 Start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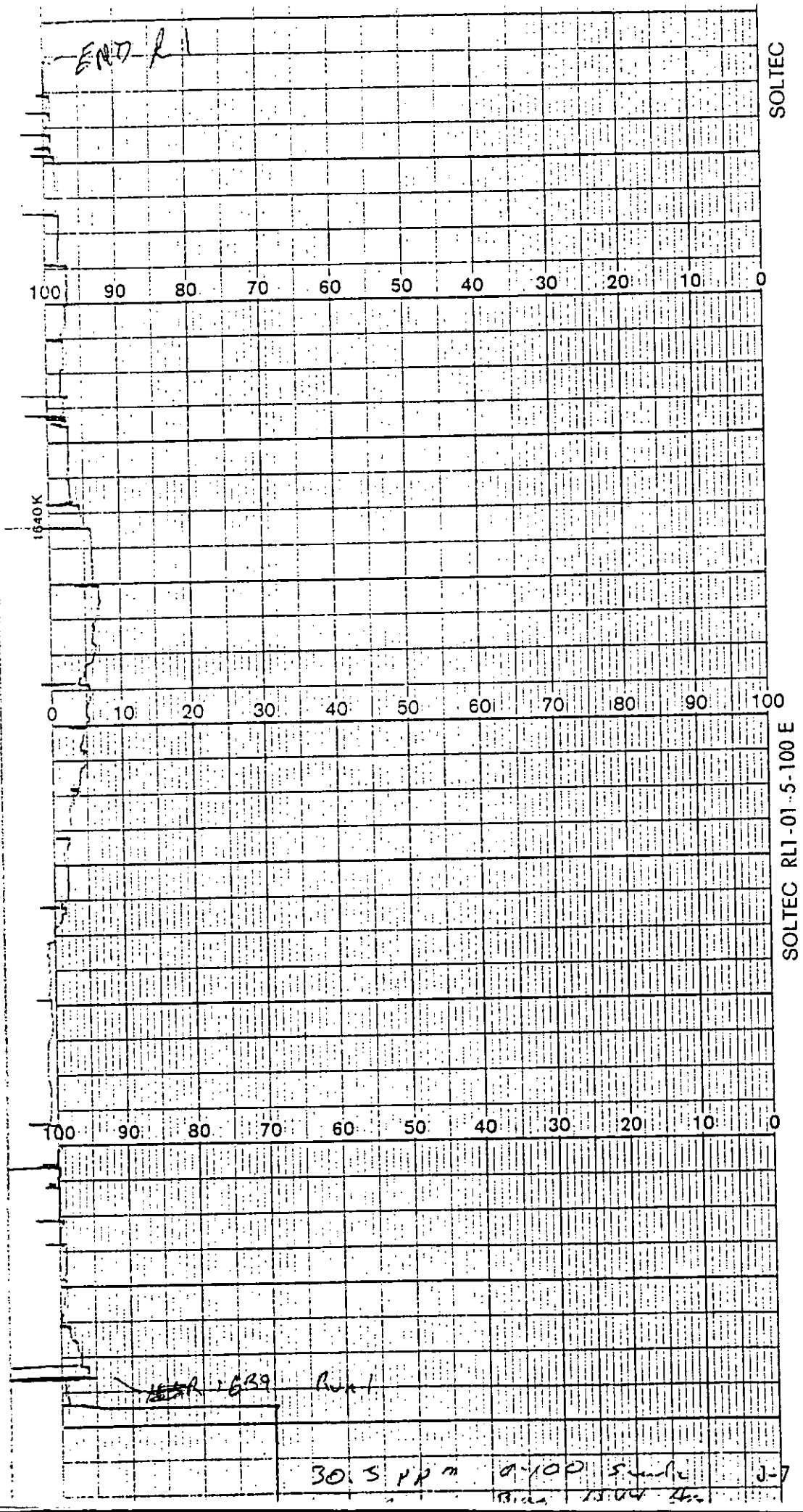
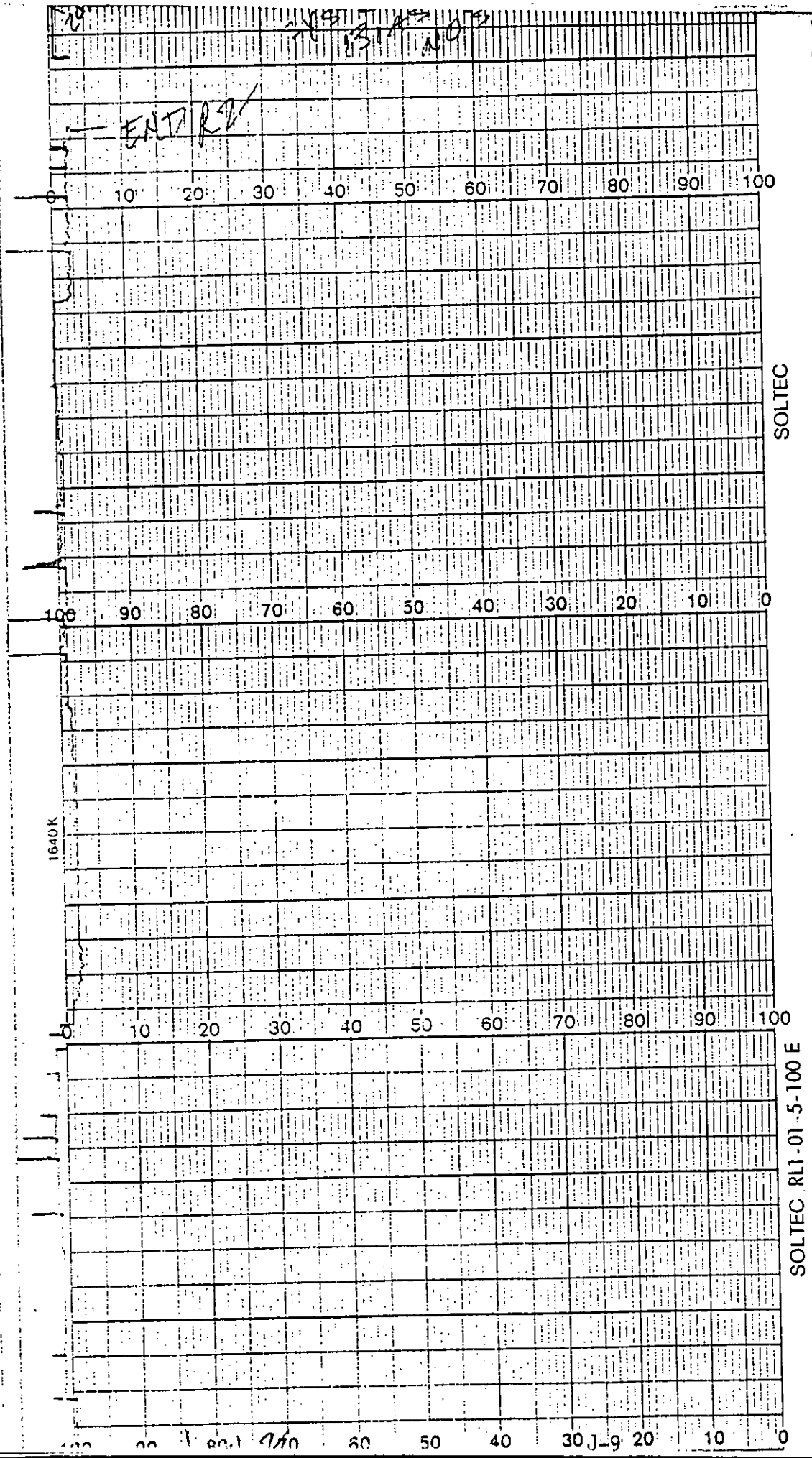
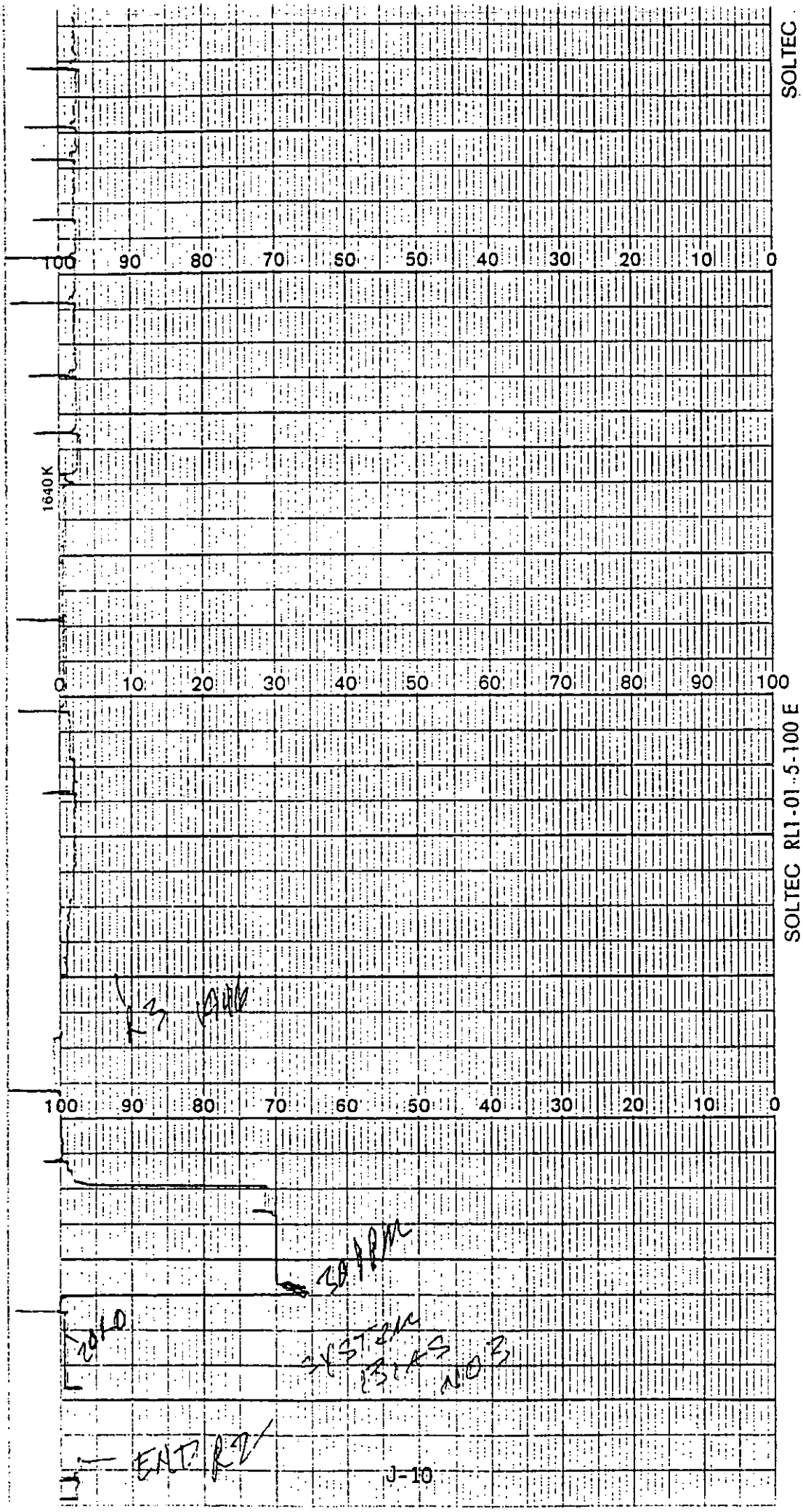
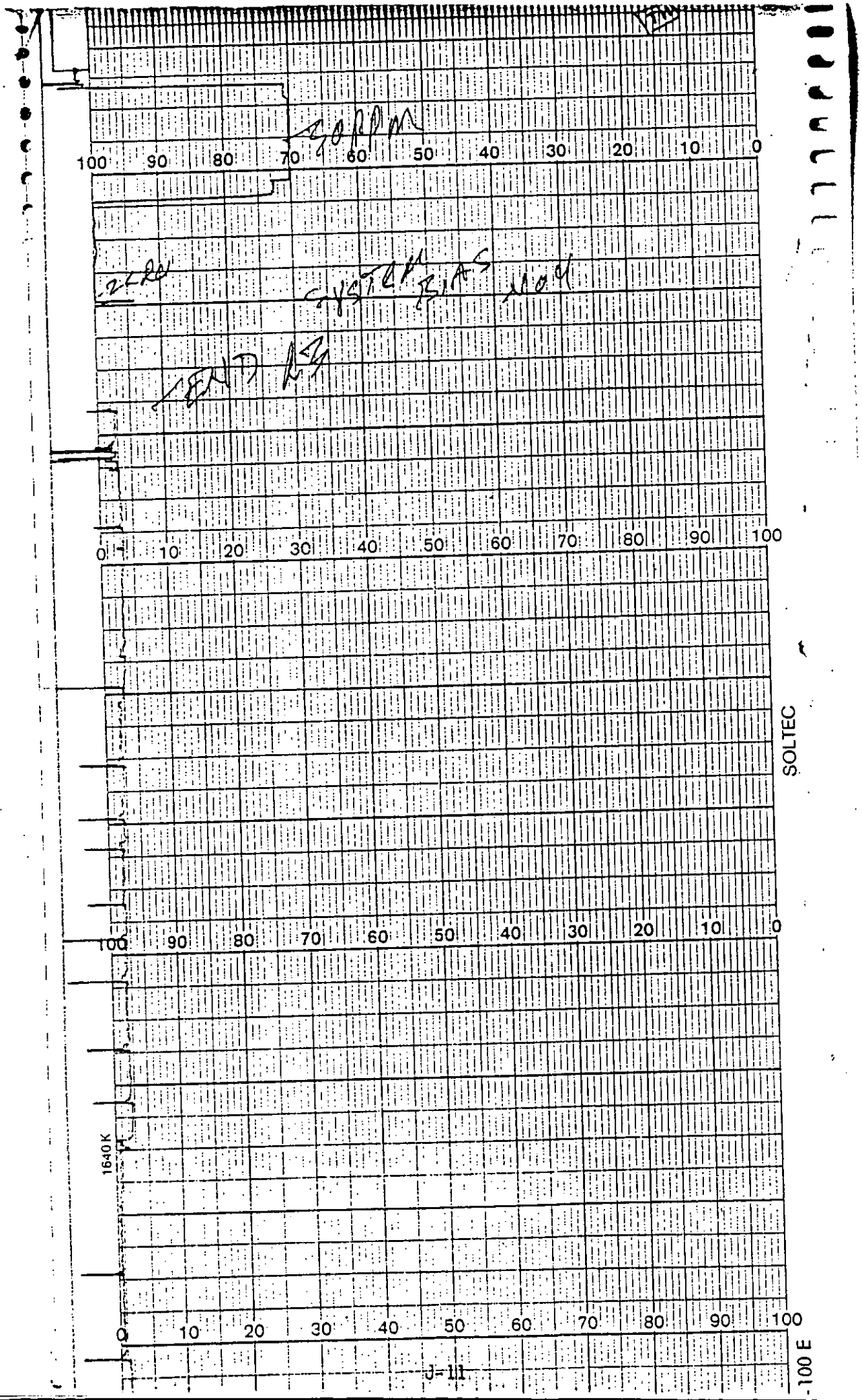
1639 Bank
30.5 ppm 0-100 Scale
System Bias 1.44 Hz
0 10 20 30 40 50 60 70 80 90 100
0ppm 0-100 Scale
System Bias 1.52 Hz
5-11-90
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K
0ppm 0-100 Scale System Bias
0.009 Hz
0 10 20 30 40 50 60 70 80 90 100
30.3 ppm 0-100 Scale
System Bias 0.007 Hz
5-100 E

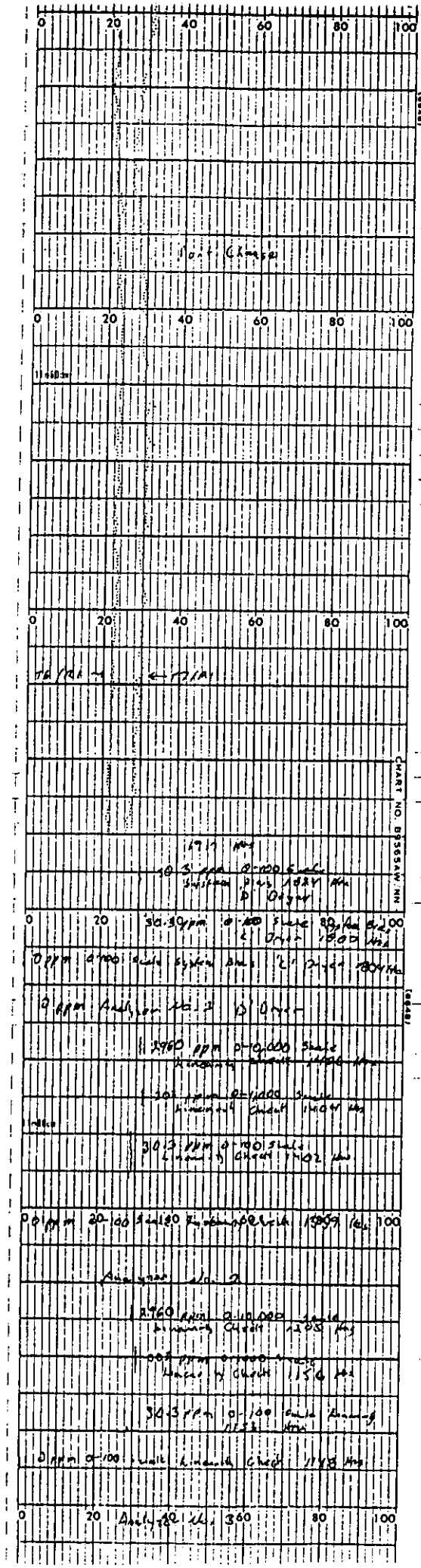

END R1
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640 K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0
R-639 Run 1
30.5 μm 0-100 Simulu

1640 K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
SOLTEC


ENTRY
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0

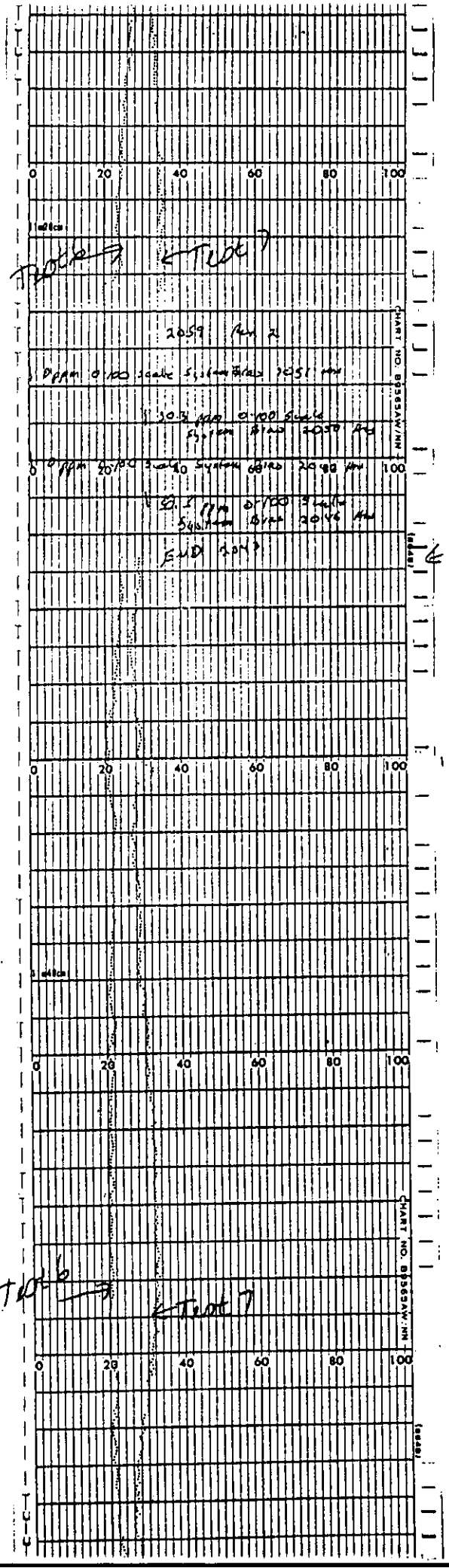

SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0
ENTRY


100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640 K
0 10 20 30 40 50 60 70 80 90 100
100 E

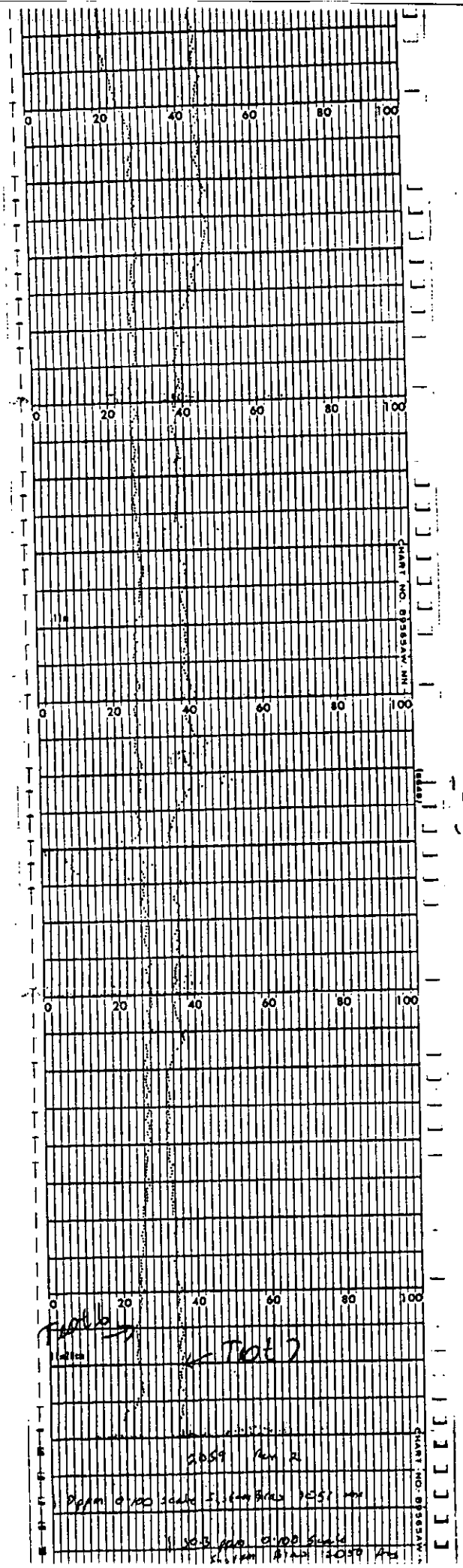


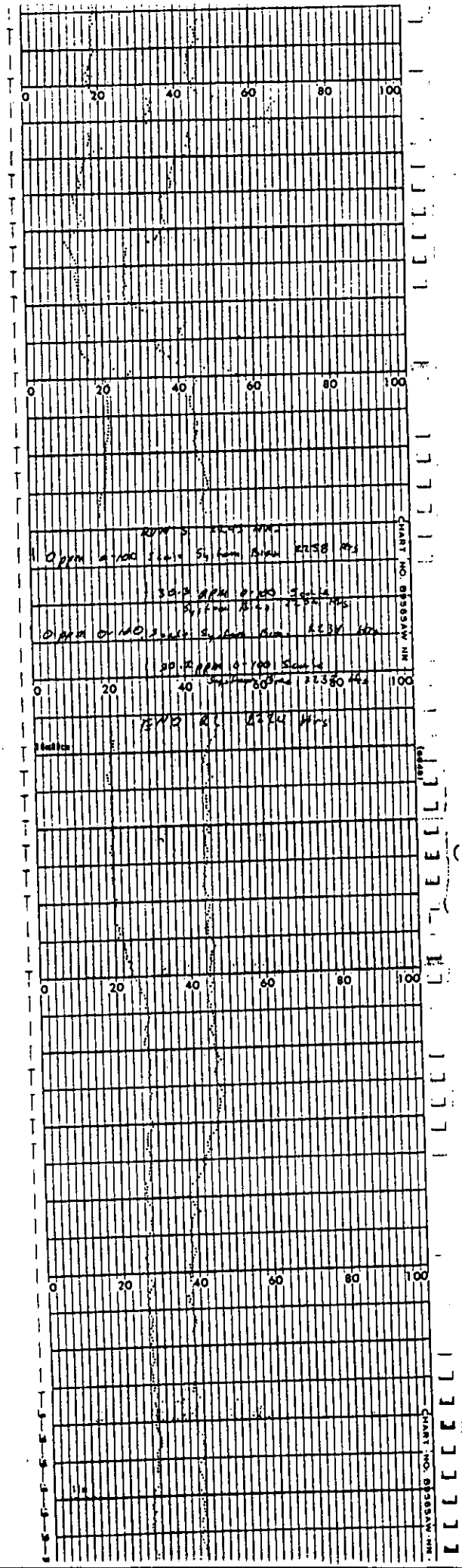
Test 7 = 'D' Dryer
Test 6 = 'C' Dryer

Louisiana Pacific
Missoula
Test 7
'D' Dryer Stack



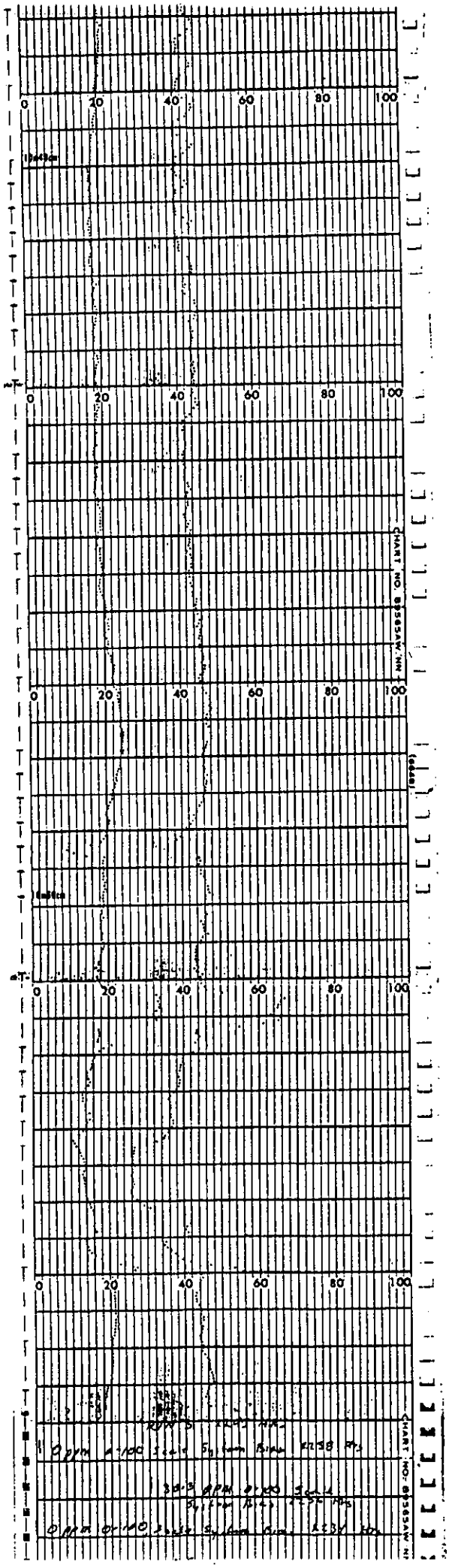
'C' Dryer = Test 6
'D' Dryer = Test 7

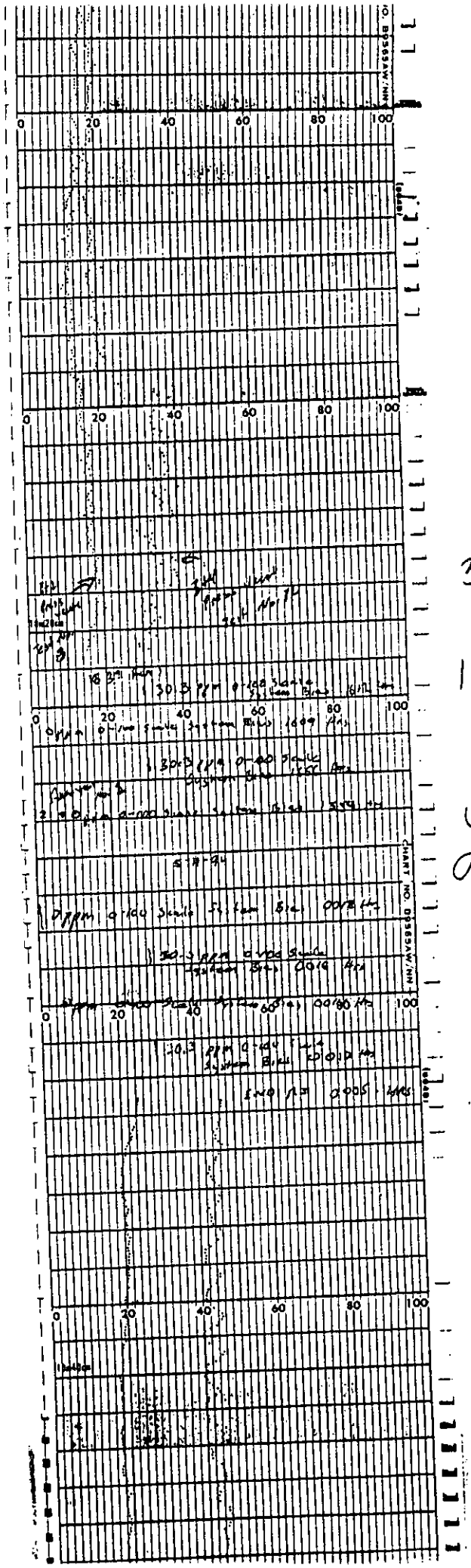

0
20
40
60
80
100
CHART NO. 8955SAW, NH
'C' Dryer = Test 6
'D' Dryer = Test 7
Test 6
Test 7



LP-Missoula

'C' Dryer = T6
D' Dryer = T7

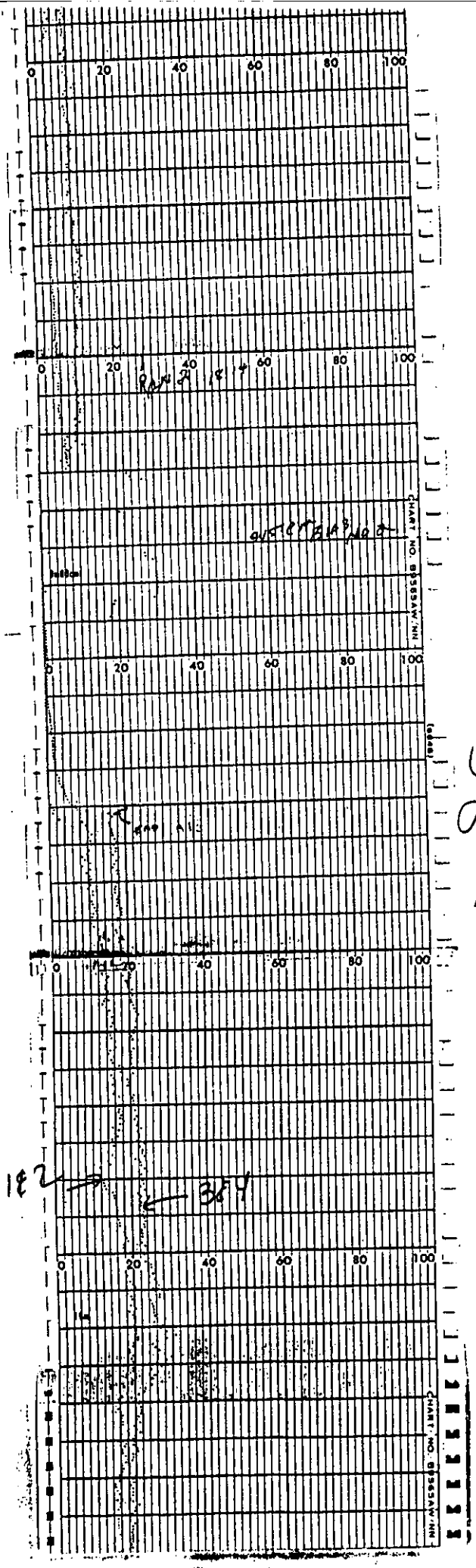

0
20
40
60
80
100
CHART NO. B5595AW-NN

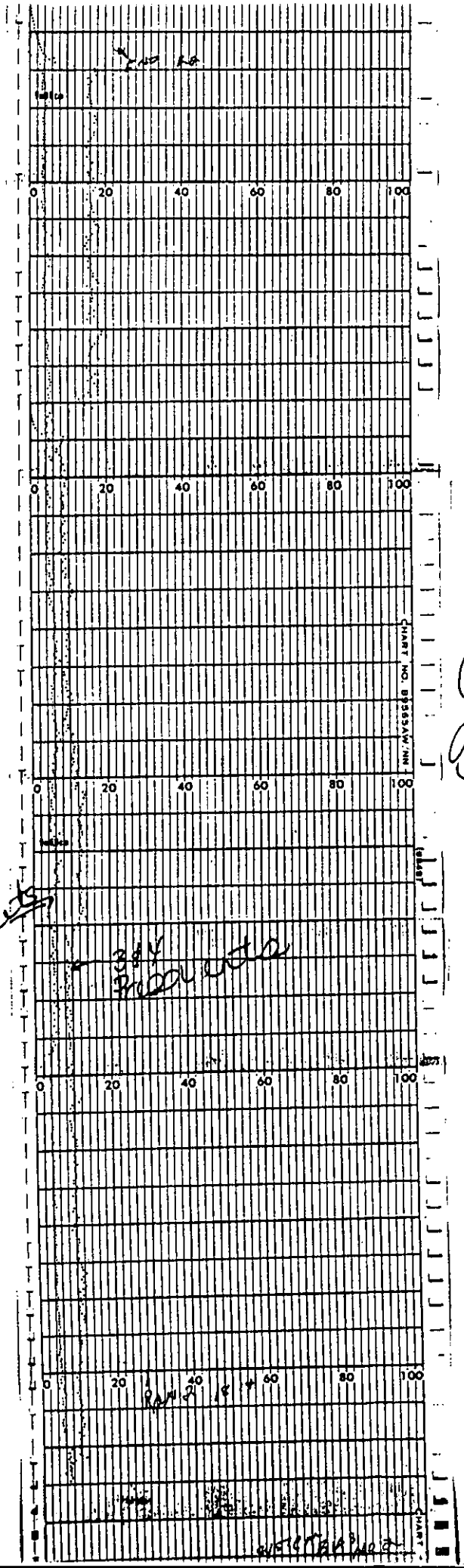


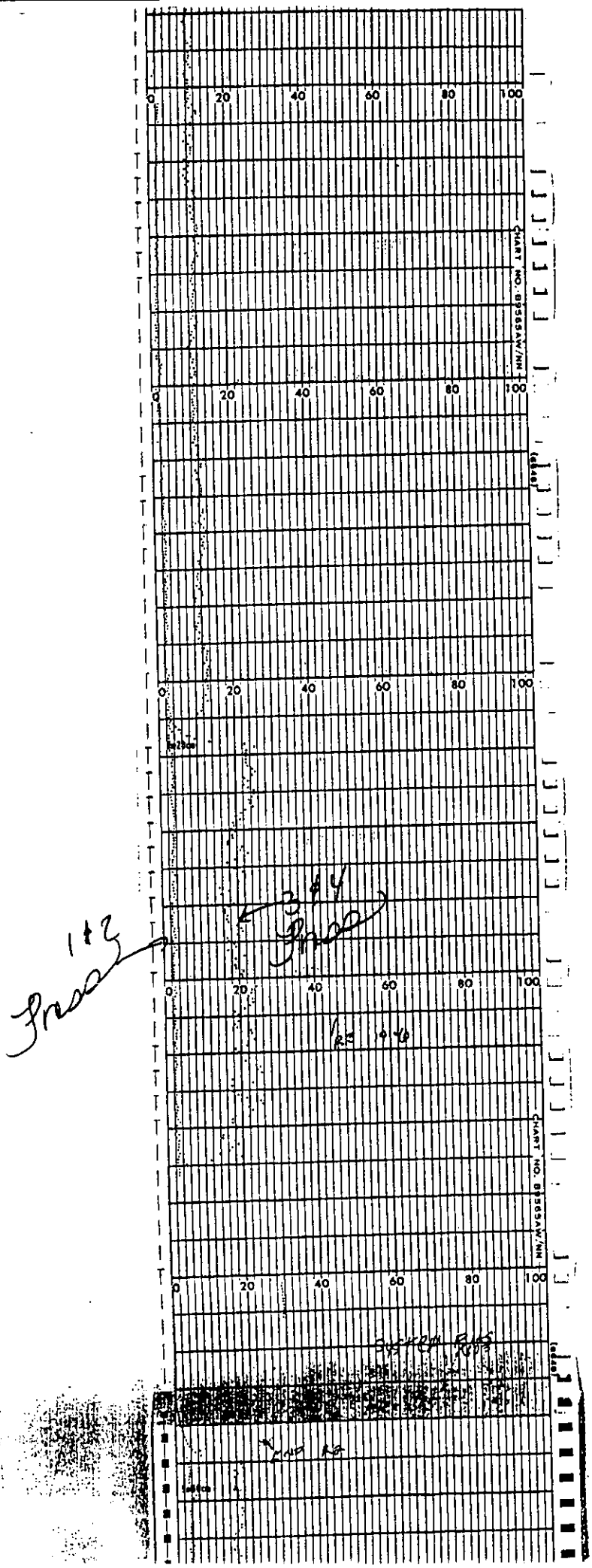
38 H Press = Test 12

182 Press
Vent = Test 13

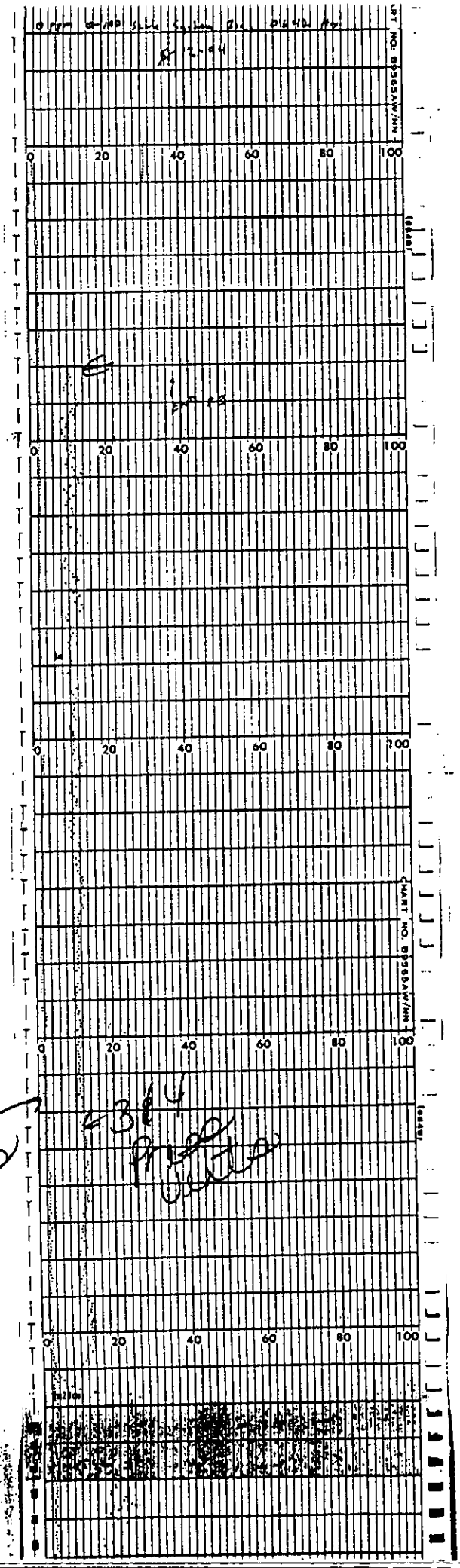
LP-
Missoula


0
20
40
60
80
100
CHART NO. B 5555 AW. INC.
LP.
Missoula
182
364

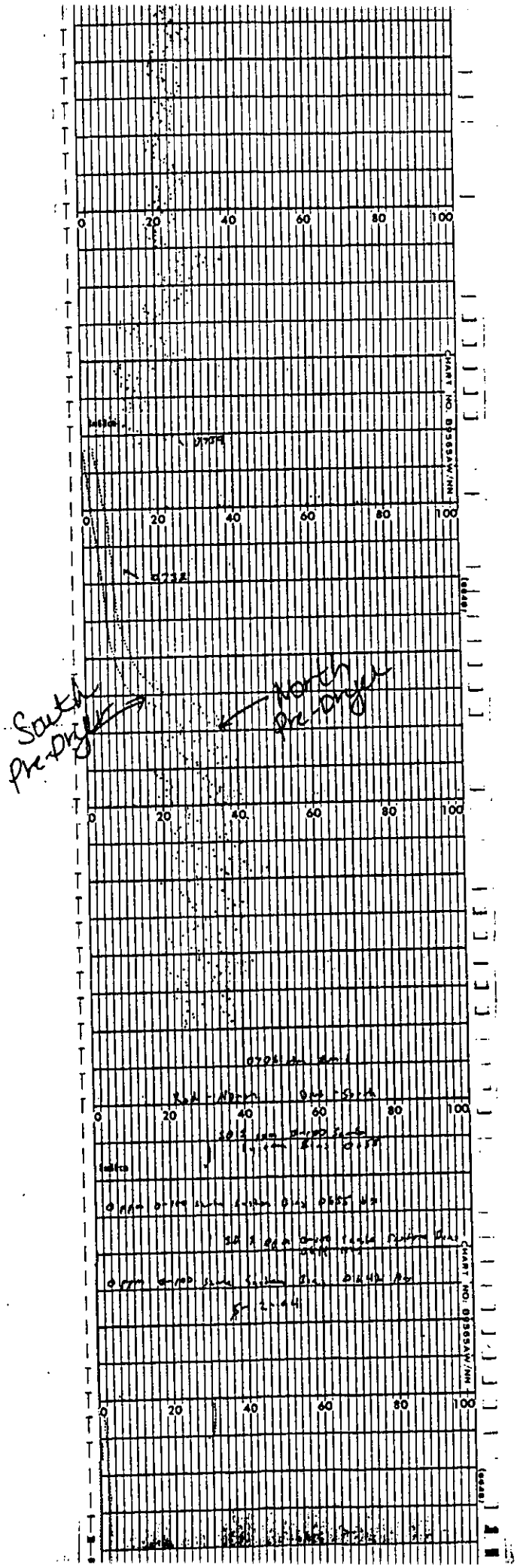

0
20
40
60
80
100
CHART NO. 85554M-MN
LP-
Missoula
THC's
182
Products

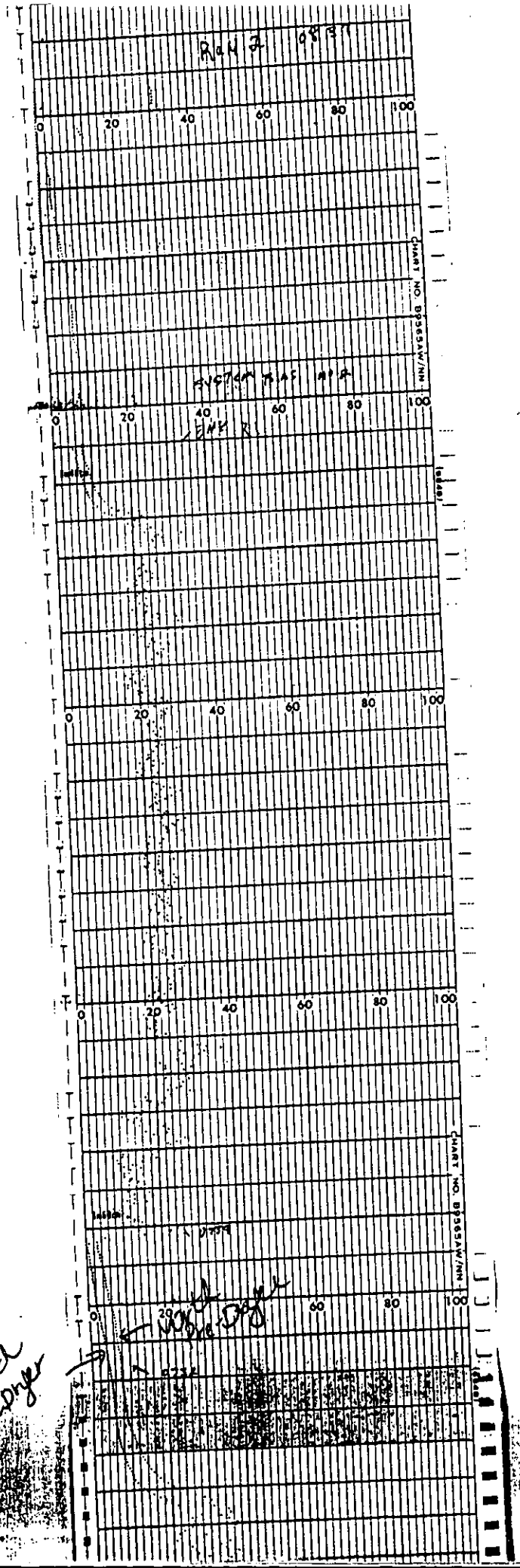


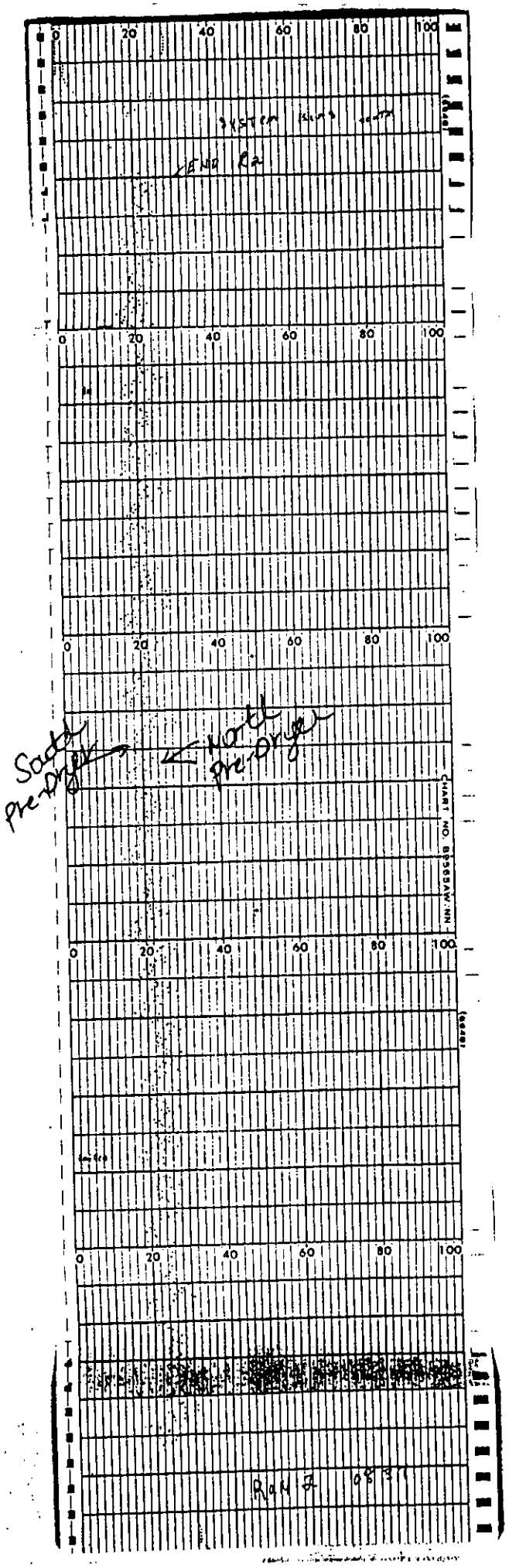
LP-
Missoula
THE's

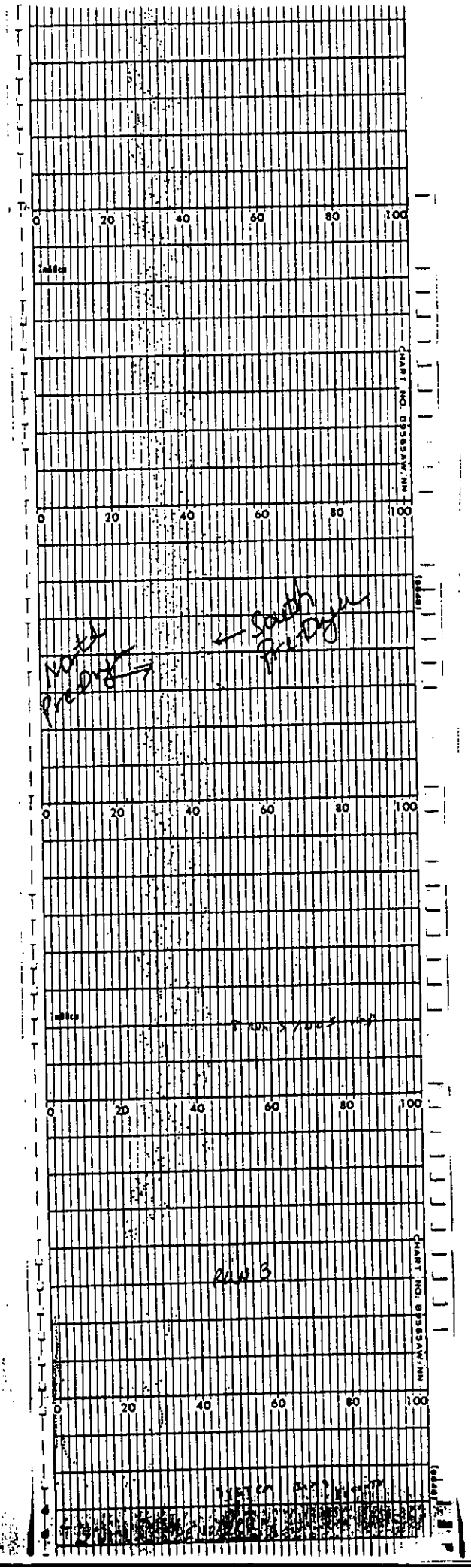


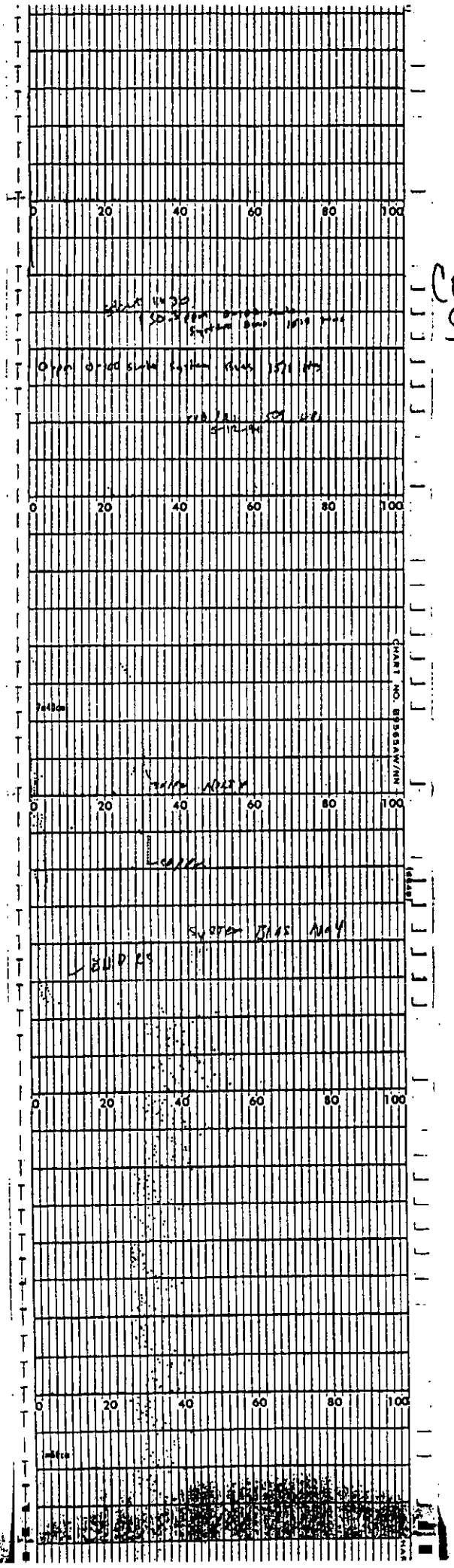
LP-
Missoula
THC's


0
20
40
60
80
100
CHART NO. B5555A W/MM
South Pre-Dredge
North Pre-Dredge


Run 7 08:31
0 20 40 60 80 100
CHART NO. B9959AW/NN
System Start up
Link 2
0 20 40 60 80 100
0 20 40 60 80 100
CHART NO. B9959AW/NN
0 20 40 60 80 100
North Re-Dryer
South Re-Dryer


0 20 40 60 80 100
Run 72
South Pre-Dredge
North Pre-Dredge
CHART NO. B9569AW.NN
Run 7 08311


0 20 40 60 80 100
CHART NO. 8 SSSSAN NN
North Predryer
South Pre-Dryer
Run 3



Coen Stack THC's

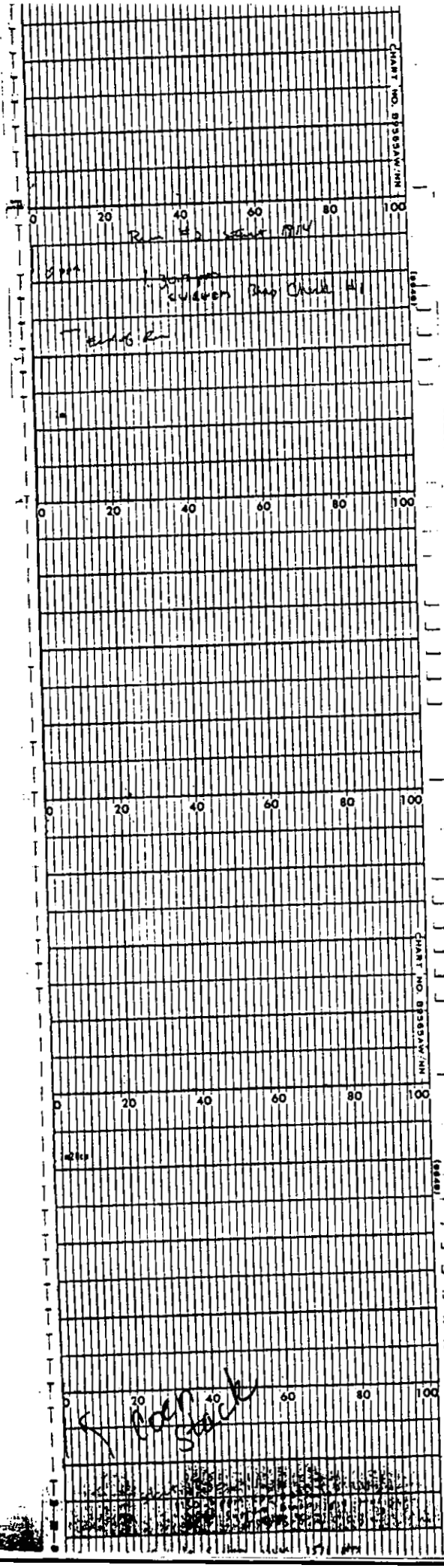


CHART NO. 8355AW-MN
0
20
40
60
80
100
Run #2 [illegible]
Start
[illegible] Run Check #1
Third Run
LP
Missoula
THC's
Coon Stack

APPENDIX K

THC ANALYZER SPECIFICATIONS

Ratfisch INSTRUMENTE

TOTAL HYDROCARBON ANALYZER (FLAME IONIZATION
Model RS 55

TECHNICAL DATES

MAINS : 115V/60H
RECORDER OUTPUT : 0 - 5 V / 4-20mA

MODEL: X Manual switching
__ Solenoid valves

HOUSING: __ Case, __ 19"-Rack

MEASURING RANGES:
1 = 0 – 10 C_1-
2 = 0 – 100 C_1
3 = 0 – 1,000 C_1
4 = 0 – 10,000 C_1

SPECIAL OPTIONS:

Flame out alarm .....
1 Alarm .....
Sample line .....
.....

ANALYZER CONDITIONS:

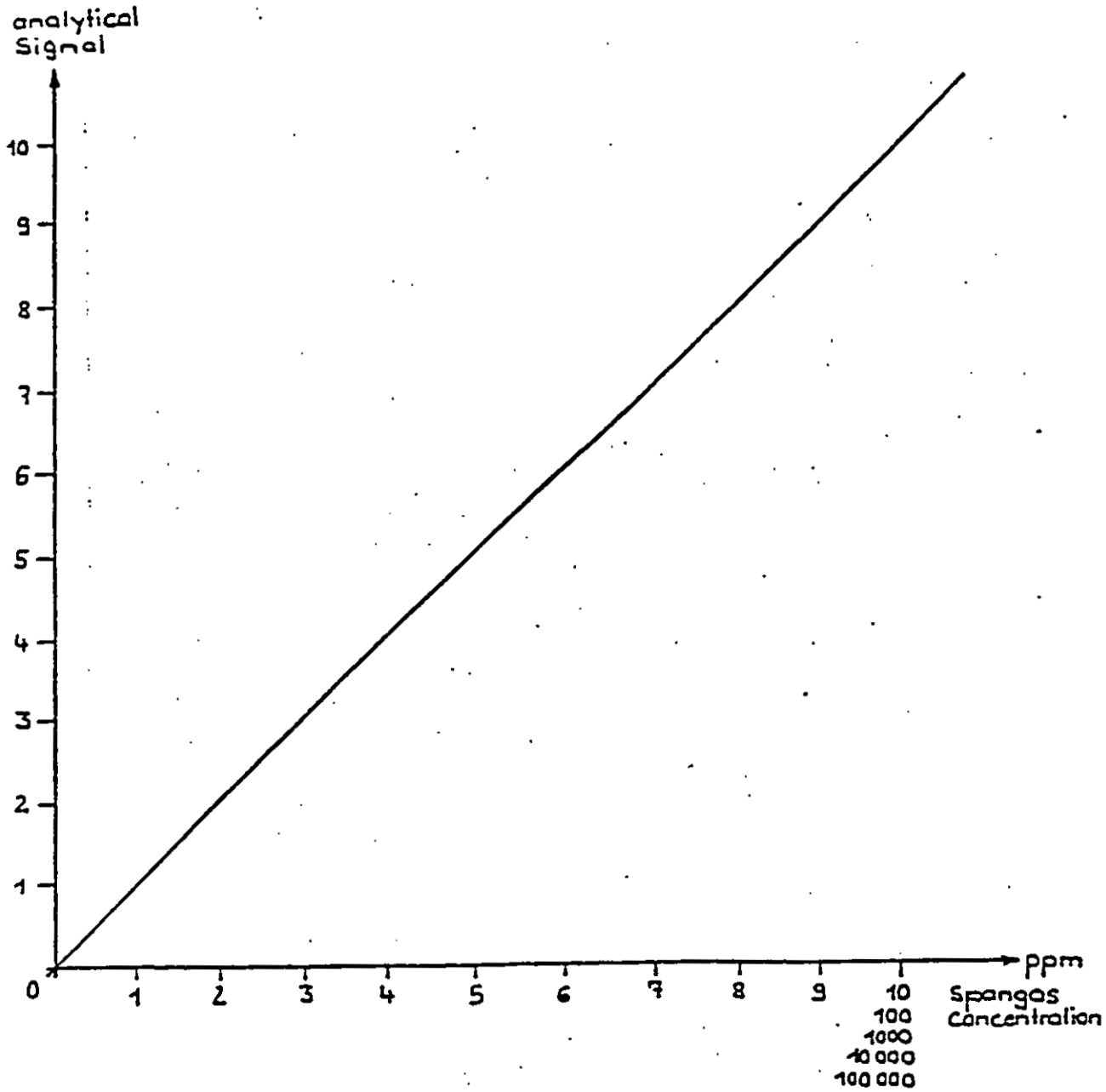
Temperature : 160 °C

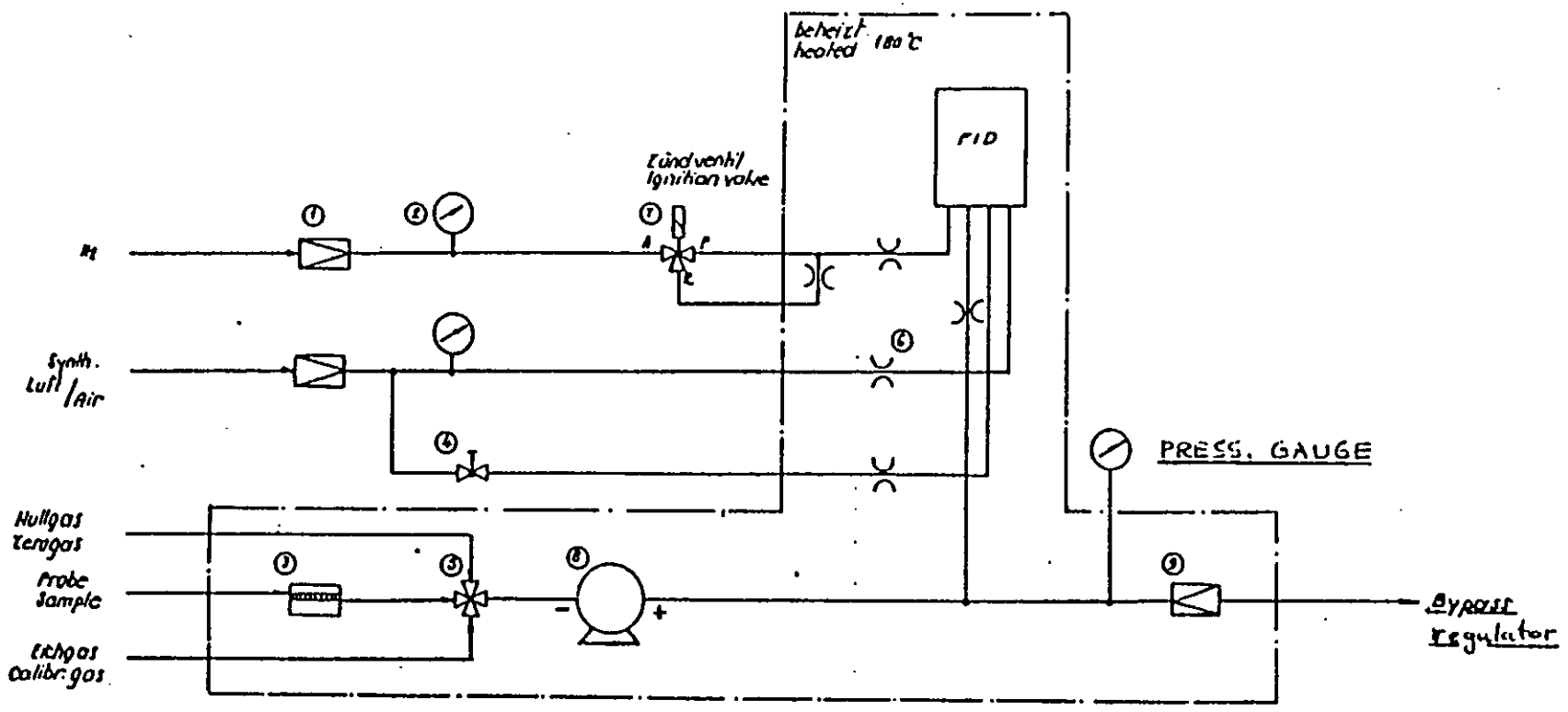
Zero Point : 3,90
Gain : 7,70

Pressure Setting : Sample/Spangas/Zerogas : 200 mbar
Fuel: Hydrogen : 0,35 bar
Combustion Air : 0,80 bar

Span Gases : 300 ppm C_1
24.000 ppm C_1

CALIBRATION DIAGRAMM





1 Druckregler
Pressure regulator
2 Manometer
Gauge
3 Filter
4 Nadelventil
Needle valve
5 3 Wege Ventil
3 way valve
6 Kapillare
capillary
7 Magnetventil
solenoid valve
8 Pumpe
pump
9 Rückdruckregler
Back pressure regulator

Zündventil
Ignition valve

P-A angezogen
energised

R-A stromlos
at rest

Handumschaltung
Manuel switching

Ratfisch INSTRUMENTE

FLAMMEN IONISATIONS DETEKTOR
Flame Ionisation Detector

Fließplan
Flowdiagram

RS 55

13.04.88

K-3

APPENDIX L

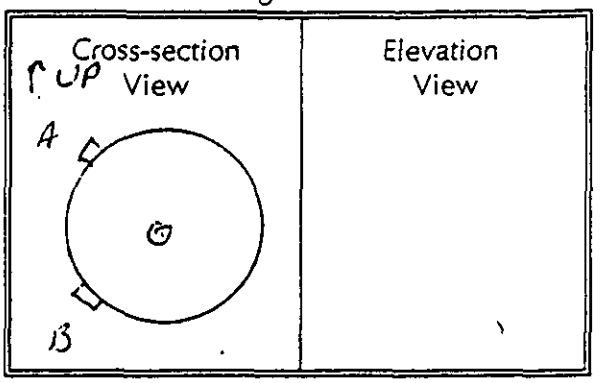
MEASUREMENT SYSTEMS PERFORMANCE SPECIFICATIONS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula, MT
Source: Aeroma Tube
Test: 5 Run: 0 Date: 5-10-94
Stack Dimen.: 51 IN.
Dry Bulb: 900 °F Wet bulb: °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.85 IN.HG
Static Pressure: -.48 IN.WC
Operators: M. Kaehler + K. Rosenthal
Pitot No.: INST C_p: NA

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 15 IN.		Time Start: NA HRS	
	1/6	8.50	23.50		
	3/6	25.50	40.50	~~900~~	900
	5/6	42.50	57.50		

Temp. Meas. Device & S/N: K. Rosenthal's
Time End: NA HRS

R or nothing = reg. manometer; S = expanded; E = electronic

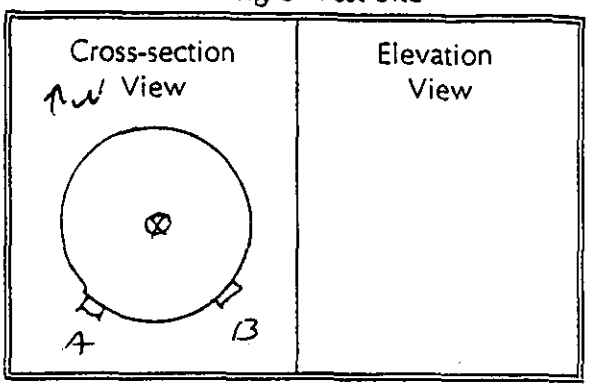
032594-G:\STACK\WP\FORMS\S-392.1

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula, MT
Source: "C" Dryer / Stack
Test: 6 Run: 0 Date: 5-10-94
Stack Dimen.: 34.5 IN.
Dry Bulb: 157 °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.85 IN.HG
Static Pressure: NA IN.WC
Operators: Michael G. Howe
Pitot No.: INST C_p: NA

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 2 IN.		Time Start: NA HRS	
	1/6	5.75	7.75		
	3/6	17.25	19.25		157
	5/6	28.75	30.75		

Temp. Meas. Device & S/N: G-Nowe
Time End: NA HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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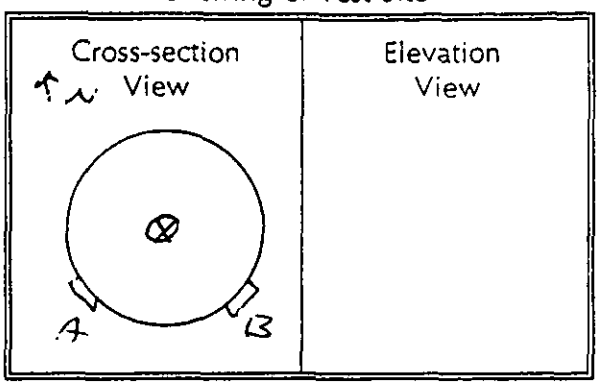
INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula, MT
Source: 'D' Dryer 1st stack
Test: 7 Run: 2 Date: 5-10-94
Stack Dimen.: 34.5 IN.
Dry Bulb: 167 °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.85 IN.HG
Static Pressure: NA IN.WC
Operators: W. Kaehler + K. Nessmeier
Pitot No.: INST C_p: NA

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 2 IN.		Time Start: NA HRS	
	1/6	5.75	7.75		
	3/6	17.25	19.25		167
	5/6	28.75	30.75		

Temp. Meas. Device & S/N: PDT-31 / TC
N
Time End: NA HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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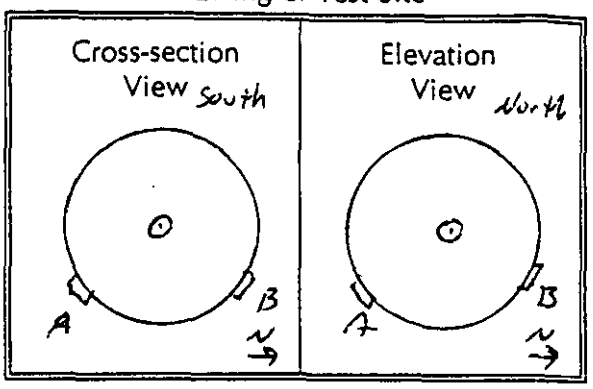
INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula, MT
Source: No. 1+2 Board Cooler / Stack
Test: #11 Run 0 Date 5-11-94
Stack Dimen.: 44 IN.
Dry Bulb: 66 °F Wet bulb: ____ °F
Manometer: ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.95 IN.HG
Static Pressure: -1.40 IN.WC
Operators: M. Kuehler / K. Rosenthal
Pitot No.: FNST C_p: NA

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 4.75 IN.		Time Start: NA HRS	
	1/6	7.33	12.09		
	3/6	22.00	26.75		86
	5/6	36.67	41.42		

Temp. Meas. Device & S/N: PDT-24 / TC
Time End: NA HRS

R or nothing = reg. manometer; S = expanded; E = electronic

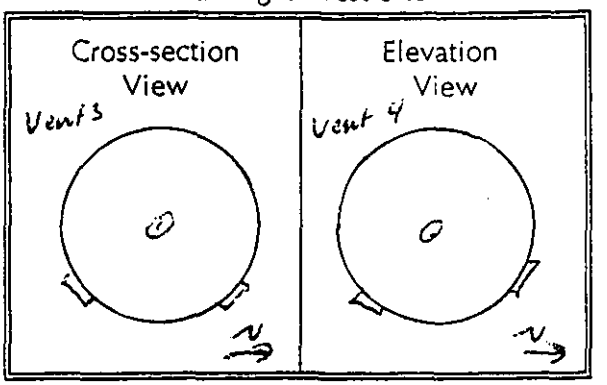
032594-G:\STACK\WP\FORMS\S-392.1

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula MT
Source: Nos 3+4 Press Vents / Stack
Test: 12 Run: 0 Date: 5-11-94
Stack Dimen.: 44 IN.
Dry Bulb: 92 °F Wet bulb: ____ °F
Manometer: ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 26.95 IN.HG
Static Pressure: NA IN.WC
Operators: M. Koehler + G. Howe
Pitot No.: INST C_p: NA

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 2.5 IN.		Time Start: NA HRS	
	1/6	7.33	9.93		
	3/6	22.00	24.50		92
	5/6	36.67	39.17		

Temp. Meas. Device & S/N: E. Trowbridge
Time End: NA HRS

R or nothing = reg. manometer; S = expanded; E = electronic

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Missoula MT
Source: North Pie Dryer / Stack
Test: 14 Run: 0 Date: 5-12-94
Stack Dimen.: 42 IN.
Dry Bulb: ____ °F Wet bulb: ____ °F
Manometer: ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: ____ IN.HG
Static Pressure: ____ IN.WC
Operators: M. Kaehler + K. Nuessmeier
Pitot No.: INST C_p: NA

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 21.5 IN.		Time Start: NA HRS	
C-1	1/6	7.00	9.50		
2	3/6	21.00	23.50		
3	5/6	35.00	37.50		

Temp. Meas. Device & S/N: PDT-31/TC
Time End: NA HRS

R or nothing = reg. manometer; S = expanded; E = electronic

032594-G:\STACK\WP\FORMS\S-392.1

INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job L.P. / Missoula, MT
Test 5 Run 0 Date 5-10-94
Operator M. Koehler

THC Calibration (Low Range): Analyzer No. 4 Time (HRS) 1525

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0	0	0	100	0
Low Level	30.3	30	.3	100	.3
Mid Level	303	310	7	1,000	.7
High Level	2960	3100	140	10,000	1.4

THC Calibration (High Range): Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0				
Span					

O_2 Calibration: Time (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

CO_2 Calibration: Time: (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

Must be within 2% of the span for each calibration gas.

121593-G:\STACK\WP\FORMS\S-420-14

INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job: L.P. / Missoula, MT
Test: 6 Run: 0 Date: 5-10-94
Operator: M Kaehler

THC Calibration (Low Range): Analyzer No. 3 Time (HRS) 1148

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0	0	0	100	0
Low Level	30.3	30	.3	100	.3
Mid Level	303	308	5	1,000	.5
High Level	2960	2964	4	10,000	.04

THC Calibration (High Range): Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0				
Span					

O_2 Calibration: Time (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

CO_2 Calibration: Time: (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

Must be within 2% of the span for each calibration gas.

121593-G:\STACK\WP\FORMS\S-420-14

INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job: L.P.I
Test: 7 Run: 0 Date: 5-10-94
Operator: M. Kuehler

THC Calibration (Low Range): Analyzer No. 2 Time (HRS) 1352

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0	0	0	100	0
Low Level	30.3	29	1.3	100	1.3
Mid Level	303	318	15	1,000	1.5
High Level	2960	3116	156	10,000	1.56

THC Calibration (High Range): Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0				
Span					

O_2 Calibration: Time (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

CO_2 Calibration: Time: (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

Must be within 2% of the span for each calibration gas.

121593-G:\STACK\WP\FORMS\S-420-14

INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job L.P. / Missoula, MT
Test 811 Run 9 Date 5-10-94
Operator M. Kuehler

THC Calibration (Low Range): Time (HRS) 1525

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0	0	0	100	0
Low Level	30.3	30	.3	100	.3
Mid Level	303	310	.2	1,000	.7
High Level	2960	3100	.140	10,000	1.4

THC Calibration (High Range): Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0				
Span					

O_2 Calibration: Time (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

CO_2 Calibration: Time: (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

Must be within 2% of the span for each calibration gas.

121593-G:\STACK\WP\FORMS\S-420-14

INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job L.P. / Missoula, MT
Test 12 Run C Date 5-10-94
Operator M. Kaehler

THC Calibration (Low Range): Analyzer No. 3 Time (HRS) 1149

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0	0	0	100	0
Low Level	30.3	30	.3	100	.3
Mid Level	303	308	5	1,000	.5
High Level	2960	2964	4	10,000	.04

THC Calibration (High Range): Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0				
Span					

O_2 Calibration: Time (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

CO_2 Calibration: Time: (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

Must be within 2% of the span for each calibration gas.

121593-G:\STACK\WP\FORMS\S-420-14

INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job: L.P. / Missoula, MT
Test: 13 Run: 0 Date: 5/10/94
Operator: M. Kuehler

THC Calibration (Low Range): Time (HRS) 1556

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0	0	0	100	0
Low Level	30.3	29	1.3	100	1.3
Mid Level	303	318	15	1,000	1.5
High Level	2960	3116	156	10,000	1.56

THC Calibration (High Range): Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0				
Span					

O_2 Calibration: Time (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

CO_2 Calibration: Time: (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

Must be within 2% of the span for each calibration gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job L.P. / Missoula, MT
Test 14 Run 0 Date 5-10-99
Operator M. Kaehler

THC Calibration (Low Range): Time (HRS) 1352

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0	0	0	100	0
Low Level	30.3	29	1.3	100	1.3
Mid Level	303	318	15	1,000	1.5
High Level	2960	3116	156	10,000	1.56

THC Calibration (High Range): Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0				
Span					

O_2 Calibration: Time (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

CO_2 Calibration: Time: (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

Must be within 2% of the span for each calibration gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job L.P. / Missoula, MT
Test 15 Run 0 Date 5-10-94
Operator M. Kaehler

THC Calibration (Low Range): Time (HRS) 1148

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0	0	0	100	0
Low Level	30.3	30	.3	100	.3
Mid Level	303	308	5	1,000	.5
High Level	2960	2964	4	10,000	.04

THC Calibration (High Range): Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0				
Span					

O_2 Calibration: Time (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

CO_2 Calibration: Time: (HRS)

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

Must be within 2% of the span for each calibration gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job LP-Missoula
Test 18 Run _____ Date 5-12-94
Operator _____

THC Calibration (Low Range): Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0				
Low Level	30.3	30	.3	100	
Mid Level					
High Level					

THC Calibration (High Range): Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent Of Span
Zero Gas	0				
Span					

O_2 Calibration: Time (HRS)_____

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

CO_2 Calibration: Time: (HRS)_____

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent Of Span
Zero Gas	0				
Mid Level					
High Level					

Must be within 2% of the span for each calibration gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

THC System Bias Check

Job: L.P. / Missoula, MT Source: Thermo Tube
Test: 5 Run: 1, 2, 3 Date: 5-10-94 Site: —
Operator: M. Kuehler Analyzer No. 4

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
				Cal. Err.	Sys. Bias			
1	1750	Zero Gas	0	0	1	1	100	1
		Upscale	30.3	30	30	0	100	0
2	2053	Zero Gas	0	0	1	1	100	1
		Upscale	30.3	30	29	0	100	0
3	2227	Zero Gas	0	0	1	1	100	1
		Upscale	30.3	30	29	1	100	1
4	0007	Zero Gas	0	0	1.5	1	100	1
		Upscale	30.3	30	30	0	100	0
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

T/HC System Bias Check

Job: L.P. / Missoula MT
Source: 'C' Dryer
Test: 6 Run: 1, 2, 3 Date: 5-10-94
Site: Stack
Operator: M. Kuehler
Analyzer No. 3 Blue Dot

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Cal. Err.	Analyzer Resp (PPM) Sys. Bias	Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
1	1800	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
2	2045	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	31	1	100	1
3	2230	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
4	0012	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

THC System Bias Check

Job: L.P. / Missoula, MT Source: "D" Dryer
Test: 7 Run: 1, 2, 3 Date: 5-10-94 Site: Stack
Operator: McKechlor Analyzer No. 2 Red Dots

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Cal. Err.	Analyzer Resp (PPM) Sys. Bias	Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
1	1820	Zero Gas	0	0	0	0	100	
		Upscale	30.3	30	30	0	100	
2	2049	Zero Gas	0	0	0	0	100	
		Upscale	30.3	30	31	1	100	
3	2236	Zero Gas	0	0	1	1	100	
		Upscale	30.3	30	30	0	100	
4	0015	Zero Gas	0	0				
		Upscale	30.3	30	29	1	100	
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

TitC System Bias Check

Job L.P. / Missoula, MT Source Nos 1+2 Board Cooler
Test 11 Run 1, 2, 3 Date 5-4-94 Site Stack
Operator M. Koehler Analyzer No. 4

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
				Cal. Err.	Sys. Bias			
1	1542	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
2	1753	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
3	1948	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
4	2143	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

THC System Bias Check

Job: L.P. / Missoula, MT
Source: Nos 3+4 Press vent
Test: 12 Run: 1, 2, 3 Date: 5-11-94
Site: Stacks
Operator: M. Kaeiker
Analyzer No. 3

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Cal. Err.	Analyzer Resp (PPM) Sys. Bias	Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
1	1607	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	31	1	100	1
2	1753	Zero Gas	0	0	1	1	100	1.0
		Upscale	30.3	30	30	0	100	0
3	1928	Zero Gas	0	0	0	0	100	0
		Upscale	31.7	30	29	1	100	1.0
4	2103	Zero Gas	0	0	1	1	100	1
		Upscale	30.3	30	31	1	100	1
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

THC System Bias Check

Job: L.P. / Missoula, MT
Source: Nos 1+2 Press Vent / ~~Stack~~
Test: 13 Run: 1,2,3 Date: 5-1-94
Site: Stack 5
Operator: M. Kuehler
Analyzer No. 2 Red.

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Cal. Err.	Analyzer Resp (PPM) Sys. Bias	Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
1	1554	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
2	1753	Zero Gas	0	0	0	0	100	0
		Upscale	31.3	30	30	0	100	0
3	1928	Zero Gas	0	0	1	1	100	1.0
		Upscale	30.3	30	29	1	100	1.0
4	2103	Zero Gas	0	0	1	1	100	1
		Upscale	30.3	30	29	1	100	1
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

THC System Bias Check

Job L.P. / Missoula, MT Source NORTH
Test 14 Run 1,2,3 Date 5-12-94 Site Stack
Operator M. Kaehler Analyzer No. 2 N

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
				Cal. Err.	Sys. Bias			
1	0641	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
2	0820	Zero Gas	0	0	1	1	100	1.0
		Upscale	30.3	30	31	1	100	1.0
3	0945	Zero Gas	0	0	1	1	100	1
		Upscale	30.3	30	29	1	100	1
4	1115	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

THC System Bias Check

Job: L.P. / Missoula, MT
Source: South Pre Dryer
Test: 15 Run: 1,2,3 Date: 5-12-94
Site: Stack
Operator: McKeehan
Analyzer No. 3

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Cal. Err.	Analyzer Resp (PPM) Sys. Bias	Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
1	0654	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
2	0820	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	30	0	100	0
3	0945	Zero Gas	0	0	1	1	100	1
		Upscale	30.3	30	31	1	100	1
4	1112	Zero Gas	0	0	0	0	100	0
		Upscale	30.3	30	31	1	100	1
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

033194-G:\STACK\WP\FORMS\S-120-11

INTERPOLL LABORATORIES, INC
(612) 786-6020

THC System Bias Check

Job: LP/MISSOULA Source: COEN
Test: 18 Run: 1-3 Date: 5-12-93 Site: STACK
Operator:

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Cal. Err.	Analyzer Resp (PPM) Sys. Bias	Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
1	1510	Zero Gas	0	0			100	
		Upscale	38.3	30			100	
2	1740	Zero Gas	0		0		100	
		Upscale	30.3		31		100	
3	1925	Zero Gas	0		1		100	
		Upscale	30.3		31		100	
4	2055	Zero Gas	0		1		100	
		Upscale	30.3		30		100	
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

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APPENDIX M

CALIBRATION GAS CERTIFICATION SHEETS

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-29868 CYLINDER #:CC100138 CYL. PRESSURE:2000PSIG
EXPIRATION DATE:3/8/97 LAST ANALYSIS DATE:3/8/94
CUSTOMER:TWIN CITY OXYGEN P.O.# 9082

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #: 1667B
CYL #: CLM5293
CONC.: 47.3PPM

INSTRUMENT:BECKMAN THC
MODEL #:400
SERIAL #:1003052
LAST CAL.:3/1/94

COMPONENT:PROPANE		COMPONENT:		COMPONENT:	
MEAN CONC:30.3PPM		MEAN CONC:		MEAN CONC:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC.	
DATE:3/8/94	DATE:	DATE:	DATE:	DATE:	DATE:
30.2PPM					
30.3PPM					
30.3PPM					

BALANCE GAS:AIR

REPLICATE DATA — COMPONENT:PROPANE

DATE: 3/8/94						DATE:		
Z	0	R	286.3	C	182.8	Z	R	C
R	286.3	Z	0	C	183.4	R	Z	C
Z	0	C	183.4	R	286.3	Z	C	R

REPLICATE DATA — COMPONENT:

DATE:			DATE:		
Z	R	C	Z	R	C
R	Z	C	R	Z	C
Z	C	R	Z	C	R

REPLICATE DATA — COMPONENT:

DATE:			DATE:		
Z	R	C	Z	R	C
R	Z	C	R	Z	C
Z	C	R	Z	C	R

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Richard Sykes APPROVED BY:

"THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY, THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH ITS RENDERING OF THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE."

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-29870 CYLINDER #:CC98059 CYL. PRESSURE:2000PSIG
EXPIRATION DATE:3/8/97 LAST ANALYSIS DATE:3/8/94
CUSTOMER:TWIN CITY OXYGEN P.O.# 9082

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #: 1669B
CYL #: CLM789
CONC.: 464PPM

INSTRUMENT:BECKMAN THC
MODEL #:400
SERIAL #:1003052
LAST CAL.:3/1/94

COMPONENT:PROPANE		COMPONENT:		COMPONENT:	
MEAN CONC:303PPM		MEAN CONC:		MEAN CONC:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC.	
DATE:3/8/94	DATE:	DATE:	DATE:	DATE:	DATE:
303PPM					
303PPM					
304PPM					

BALANCE GAS:AIR

REPLICATE DATA COMPONENT:PROPANE

DATE: 3/8/94						DATE:		
Z	0	R	321.2	C	209.7	Z	R	C
R	321.1	Z	0	C	209.7	R	Z	C
Z	0	C	210.4	R	321.2	Z	C	R

REPLICATE DATA COMPONENT:

DATE:			DATE:		
Z	R	C	Z	R	C
R	Z	C	R	Z	C
Z	C	R	Z	C	R

REPLICATE DATA COMPONENT:

DATE:			DATE:		
Z	R	C	Z	R	C
R	Z	C	R	Z	C
Z	C	R	Z	C	R

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Richard Sykes APPROVED BY:

"THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY, THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH ITS RENDERING OF THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE."

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-29868 . CYLINDER #:CC100138 CYL. PRESSURE:2000PSIG
EXPIRATION DATE:3/8/97 LAST ANALYSIS DATE:3/8/94
CUSTOMER:TWIN CITY OXYGEN P.O.# 9082

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #: 1667B
CYL #: CLM5293
CONC.: 47.3PPM

INSTRUMENT:BECKMAN THC
MODEL #:400
SERIAL #:1003052
LAST CAL.:3/1/94

COMPONENT:PROPANE		COMPONENT:		COMPONENT:	
MEAN CONC:30.3PPM		MEAN CONC:		MEAN CONC:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC.	
DATE:3/8/94	DATE:	DATE:	DATE:	DATE:	DATE:
30.2PPM					
30.3PPM					
30.3PPM					

BALANCE GAS:AIR

REPLICATE DATA

DATE: 3/8/94

Z	0	R	286.3	C	182.8
R	286.3	Z	0	C	183.4
Z	0	C	183.4	R	286.3

COMPONENT:PROPANE

DATE:

Z	R	C
R	Z	C
Z	C	R

REPLICATE DATA

DATE:

Z	R	C
R	Z	C
Z	C	R

COMPONENT:

DATE:

Z	R	C
R	Z	C
Z	C	R

REPLICATE DATA

DATE:

Z	R	C
R	Z	C
Z	C	R

COMPONENT:

DATE:

Z	R	C
R	Z	C
Z	C	R

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Richard Sykes APPROVED BY:

"THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY, THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH ITS RENDERING OF THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE."

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-29870 CYLINDER #:CC98059 CYL. PRESSURE:2000PSIG
EXPIRATION DATE:3/8/97 LAST ANALYSIS DATE:3/8/94
CUSTOMER:TWIN CITY OXYGEN P.O.# 9082

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #: 1669B
CYL #: CLM789
CONC.: 464PPM

INSTRUMENT:BECKMAN THC
MODEL #:400
SERIAL #:1003052
LAST CAL.:3/1/94

COMPONENT:PROPANE
MEAN CONC:303PPM
REPLICATE CONC.
DATE:3/8/94 DATE:
303PPM
303PPM
304PPM

COMPONENT:
MEAN CONC:
REPLICATE CONC.
DATE: DATE:

COMPONENT:
MEAN CONC:
REPLICATE CONC.
DATE: DATE:

BALANCE GAS:AIR

REPLICATE DATA

DATE: 3/8/94

Z	0	R	321.2	C	209.7
R	321.1	Z	0	C	209.7
Z	0	C	210.4	R	321.2

COMPONENT:PROPANE

DATE:

Z	R	C
R	Z	C
Z	C	R

REPLICATE DATA

DATE:

Z	R	C
R	Z	C
Z	C	R

COMPONENT:

DATE:

Z	R	C
R	Z	C
Z	C	R

REPLICATE DATA

DATE:

Z	R	C
R	Z	C
Z	C	R

COMPONENT:

DATE:

Z	R	C
R	Z	C
Z	C	R

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Richard Sykes APPROVED BY:

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APPENDIX N

PROCESS RATE INFORMATION

Louisiana-Pacific Corporation
Northern Division
Rt. 8, Box 8263
Hayward, Wisconsin 54843
(715) 634-3454

LETTER OF TRANSMITTAL

DATE: 6/15/94	JOB NO.
ATTENTION: Sheri Palcher	
RE: Missoula Test	

TO Interpoll Laboratories, Inc.
4500 Ball Road
Circle Pines, MN 55014-1819

WE ARE SENDING YOU

[X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop Drwgs. [ ] Prints [ ] Plans [ ] Samples [ ] Specifications

[ ] Copy of Letter [ ] Change Order [ ] _____

COPIES	DATE	NO.	DESCRIPTION
1			Process Data (100 Pages)
1			Stack Sketches

THESE ARE TRANSMITTED as checked below:

[ ] For Approval [ ] Approved As Submitted [ ] Submit ____ copies for distribution

[X] For Your Use [ ] Approved As Noted [ ] Return ____ corrected prints

[X] As Requested [ ] Returned For Corrections [ ] _____

[ ] For Review & Comment [ ] Resubmit ____ copies for approval [ ] _____

[ ] FOR BIDS DUE _____ 199 .

REMARKS

Copy To: A. E. Cavadeas, File

Signed: Sue Somers

Missoula testing - May 9-12, 1994
PROCESS DATA

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Note : Coen Stack testing for formaldehyde was cancelled due to high temperature conditions a the site. Formaldehyde condentrations for this type of source are expected to be at or near non-detectable levels.

Missoula testing - May 9-12, 1994
TEST SCHEDULE

MISSOULA THERMAL OIL HEATER TESTING 5-9-94, NOx

DATE	POLLUTANT	RUN #1	RUN #2	RUN #3
5-9	NOx	1700-1800	1800-1900	1900-2000

MISSOULA DRYER TESTING 5-10-94

DATE	POLLUTANT	RUN #1	RUN #2	RUN #3
5-10	PM	1110-1212	1300-1402	1445-1548
5-10	CO	1110-1212	1300-1402	1445-1548
5-10	NOx	1110-1212	1300-1402	1445-1548
5-10	HCHO	1915-2017	2058-2101	2242-2345
5-10	VOC	1915-2017	2058-2101	2242-2345

MISSOULA PRESS VENT/BOARD COOLER TESTING 5-11-94

DATE	POLLUTANT	RUN #1	RUN #2	RUN #3
5-11	PM	0947-1053	1145-1250	1323-1428
5-11	CO	0947-1053	1145-1250	1323-1428
5-11	NOx	0947-1053	1145-1250	1323-1428
5-11	HCHO	1632-1738	1814-1918	1946-2053
5-11	VOC			

MISSOULA PRE-DRYER TESTING 5-10-94

DATE	POLLUTANT	RUN #1	RUN #2	RUN #3
5-12	PM	1630-1736	1814-1917	1950-2054
5-12	CO	1630-1736	1814-1917	1950-2054
5-12	NOx	1630-1736	1814-1917	1950-2054
5-12	HCHO	0706-0816	0837-0943	1003-1106
5-12	VOC	1630-1736	1814-1917	1950-2054

Missoula testing - May 9-12, 1994
Process data summary

	max	min	target (90%)	pm,co,nox	hcho,voc
surface dryer (5)					
throughput (wet, lb. per hour)	18000	-	16200	15080	16552
finished product (ton/hour)	-	-	-	12.58	12.73
inlet temp. deg. F.	450	200	-	259	237
outlet temp. deg. f.	180	130	-	139	128
inlet moisture	18.00%	9.00%	-	14.56%	12.92%
outlet moisture	4.40%	3.20%	-	3.94%	3.60%
wax (% as applied)	1.50%	0.50%	-	1.31%	1.52%
core dryer (6)					
throughput (wet, lb. per hour)	12000	-	10800	13980	12910
finished product (ton/hour)	-	-	-	12.58	12.73
inlet temp. deg. F.	430	200	-	315	320
outlet temp. deg. f.	210	160	-	163	160
inlet moisture	18.00%	9.00%	-	11.84%	15.76%
outlet moisture	3.80%	2.80%	-	3.24%	3.52%
wax (% as applied)	1.50%	0.50%	-	1.03%	1.33%
press/board coolers	max	min	target (90%)	pm,co,nox	hcho,voc
throughput (lb./hr,material through scales, no resin	27000	-	24300	25839	26104
finished product (ton/hour)	-	-	-	12.5	13.04
face resin % as applied	8.00%	6.50%	-	7.69%	7.55%
core resin % as applied	7.00%	5.50%	-	5.19%	4.94%
face wax % as applied	1.50%	0.50%	-	1.22%	1.43%
core wax % as applied	1.50%	0.50%	-	1.10%	1.19%
catalyst % as applied	0.50%	0.05%	-	0.040%	0.046%
predryers	max	avg	target (90%)	pm,co,nox,voc	hcho
throughput (wet, lb. per hour,each)	15,000	5,000	13,500	19,393	20,324
North dryer (predryer A)					
inlet temp. deg. F.	350	200		348	310
outlet temp. deg. f.	170	75		94	99
inlet moisture	50.0%	30.0%		42.1%	38.3%
outet moisture	28.3%	6.2%		20.6%	11.2%
South dryer (predryer B)					
inlet temp. deg. F.	350	200		348	310
outlet temp. deg. f.	170	75		94	97
inlet moisture	50.0%	30.0%		42.1%	38.3%
outet moisture	28.3%	6.2%		20.6%	11.0%
Coen burner mmBTU input		-	-	18.88	22.40

Note : Coen Stack testing for formaldehyde was cancelled due to high temperature conditions a the site. Formaldehyde condentrations for this type of source are expected to be at or near non-detectable levels.

1. INTRODUCTION

This test protocol has been prepared in response to item V.C., paragraph no 121 of the consent decree entered into between the USEPA and Louisiana Pacific Corporation on September 30, 1993. This portion of the decree states the following:

> "Not later than 90 days after entry of the Decree, LP shall submit a testing and evaluation protocol sufficient to determine whether any prior construction activities at its ...Missoula, Montana facilities were subject to the review and permitting provisions of the PSD or New Source review programs for any of the regulated pollutants. If testing is needed to determine whether such requirements were applicable to any of LP's prior construction activities at the plant, such testing shall be conducted at maximum plant capacity considering applicable Federally-enforceable permit limits."

The protocol has been revised during May 1994 to address several comments contained in correspondence from EPA Region 8 dated April 18 1994, and the State of Montana, dated February 2, 1994. Copies of the correspondence is attached as Appendix G.

This protocol describes a proposed emissions testing and evaluation strategy to be used to determine the PSD and or NSR applicability of prior construction activities at the plant. To make this determination, the major sources constructed during the 1987 plant expansion will be sampled. During sampling, the plant will be operated in the manner required to acheive near-maximum production rates during the time of year testing occurs. A table of normal plant parameter operating ranges is attached as Table 2.

The original particleboard plant was existing in the Missoula area prior to 1970. The

original mill has a capacity of one hundred million square feet of board on a 3/4 inch basis. The expansion increased this production capability by approximately 50%. The expansion added Line 2, consisting of two particleboard dryers, heated by the heat energy units from the existing plant, and a continuous press line heated by a new natural gas fired Geka thermal oil heater. The expansion also added a predryer system consisting of two rotary drum dryers heated by a Coen sanderdust burner. Operation of the predry system began in early 1994.

The 1986 permit application for the plant expansion determined that by combining emission offsets gained from modification of the existing plant along with expected emissions from the expansion, significance levels for a major modification would not be exceeded. The State of Montana issued the initial permit for the modification on September 15, 1986. On August 9,1993 the amended permit was issued. Copies of these permits are included as Appendix C.

2. PLANT DESCRIPTION

Missoula particleboard plant consists of four separate manufacturing areas. These areas are briefly described below.

Line 1: Construction of the original manufacturing line began in 1969 and the plant became operational in 1970. Emission sources included four dryers, a batch press, and a board cooler. Dryer emissions are controlled by multicyclones. Heat for the process is supplied by a 50 mmBTU/hr Roemmc burner which provides heat for the dryers and a 55 mmBTU/hr Babcock-Wilcox boiler, which provides heat for the press and the dryers. Both the Roemmc burner and the boiler burn dry sanderdust. A natural gas pilot also provides heat for these units. The Roemmc unit includes a cyclonic ash separator to remove non-combustibles from the gas stream prior to discharge. Emissions from the boiler are controlled by a cyclone. Dryer emissions are controlled by multicyclones. Line 1 includes a board cooler which is vented to the atmosphere.

Line 2: This second production line consists of two additional dryers installed along the same Roemmc tube which provides heat to the Line 1 dryers. Multicyclones control dryer emissions. A continuous press line was also added. Heat for the dryers is supplied by the original Roemmc burner and Babcock-Wilcox boiler. A 20 mmBTU/hr natural gas fired Geka thermal oil heater supplies heat for the line 2 press. A board cooler is also an emission source on line 2.

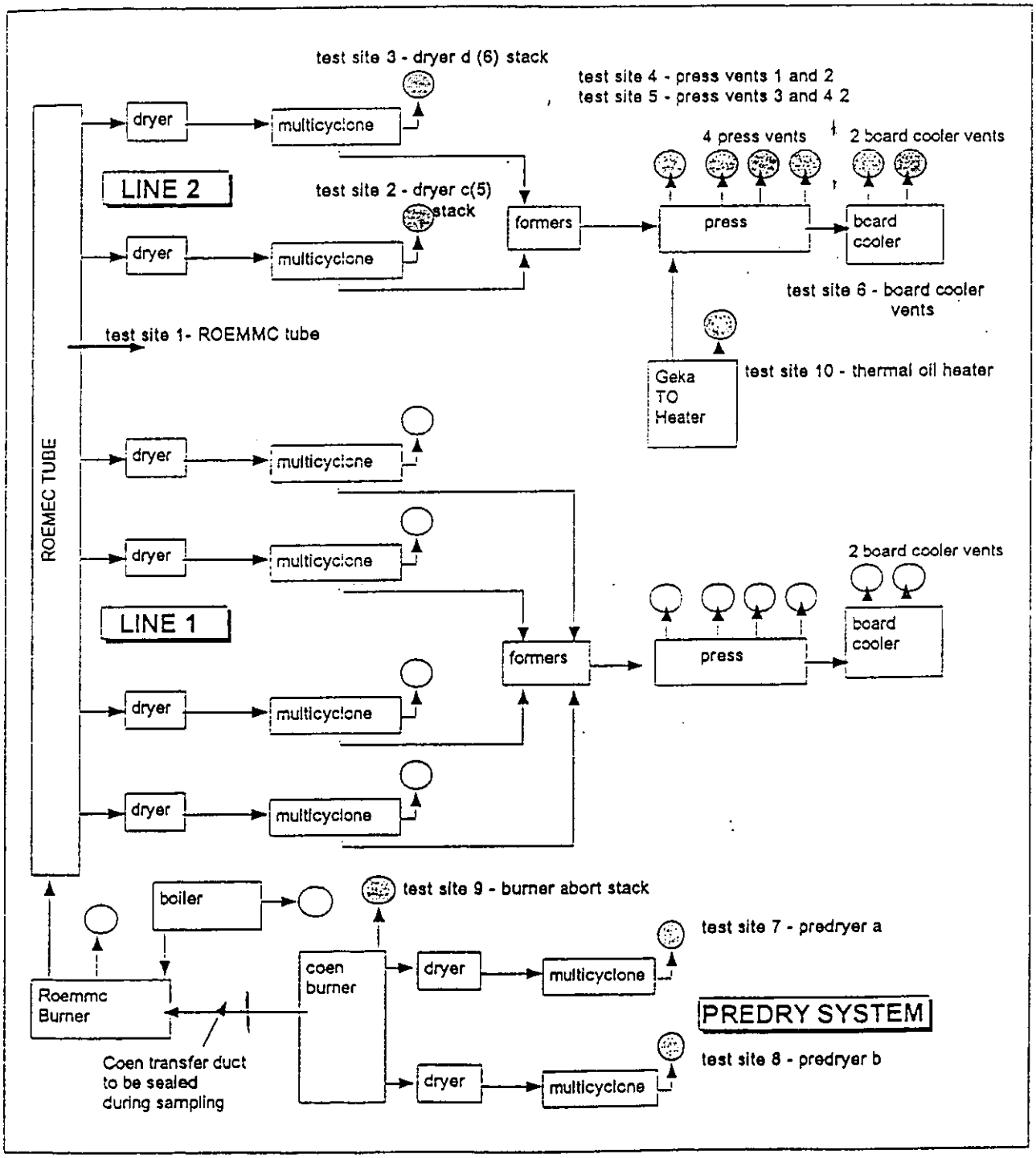
Pre-drying system: Installation of a pre-drying is system was completed in early 1994. This system consists of two rotary drum dryers heated by 35 mmBTU/hr Coen sanderdust burner.

Remanufacturing Line: This series of processes, known as the Reman line, apply various coatings to the particleboard.

MISSOULA MONTANA PARTICLEBOARD PLANT

EMISSION SOURCE FLOW DIAGRAM

(not including material handling contol equipment or Reman Line vents)



05/04/94

7

FLOWA.WK4

3. DESCRIPTION OF THE SAMPLING PLAN

The plant will be tested for the major criteria pollutants generally anticipated from a particleboard manufacturing facility including VOC, TSP, CO, and NOX. Formaldehyde emissions will also be sampled. A summary of the test plan is shown on Table 1. The test methods to be used for each pollutant are as follows:

TSP - EPA method 5 with back half by method 202

VOC - EPA method 25A

CO - EPA method 10

NOx - EPA method 7 or 7E

Formaldehyde (HCHO) - EPA method 0011

3A. Line 2 Dryers (Dryers C and D)

Sampling Locations

Dryer outlet emissions will be sampled after the multiclones for TSP, CO, VOC, NOx and Formaldehyde. In order to determine which portion of the dryer emissions can be attributed to the heat energy units, a third location, in the Roemmc Tube, will be sampled simultaneously. The mass rate of emissions from this third location, prior to the new dryers will be subtracted from the sum of the emissions from both Line 2 dryers to determine the emission rate of the new equipment.

Extensions to the multiclone discharge are installed and will be used to provide an appropriate sampling location. A sketch of the sampling ports after the dryer discharge and at the Roemmc Tube are provided in Appendix A.

Process rate: The dryers will operate at the rate required to come within 90% of the record production rate of 13 tons per hour for Line 2. The dryer production rate during testing will be determined by monitoring the scales located prior to the blenders. The press process rate will be determined by monitoring the weight of the final product as determined by scales located prior to the formers and deducting trim loss. These figures will be verified by footage and density calculations.

Summary of Dryer Operating Data

1) The moisture content of wet and dry wafers will be recorded during testing.

2) During sampling the plant will process 100% softwood.

3) The dryer inlet and outlet temperatures during testing will be recorded.

4) Estimated airflow rate for dryer C (5) is 40,000 acfm and for dryer D (6) is 25,000 acfm. Actual airflow rate will be determined during testing. Airflow rates at the Roemmc Tube will also be determined during testing.

5) The fuels to be burned in the heat energy units during testing are dry fines and natural gas.

6) The C dryer drum is 8.75' in diameter and 32' long.The D dryer drum is 7.5' in diameter and 28' long.

7) Dryer production rate (the amount of material produced by the dryers) will be monitored by the weigh scales located prior to the

blenders. The level of the surge bins, before and after testing, (located between the dryers and the blender scales), will be taken into account when determining dryer production rates.

8) Press production rate (finished product) in tons, will be calculated.

3B. Press Vent and Board Coolers

Sampling Locations

Press vent and board cooler exhausts will be sampled for TSP, CO, VOC, and Formaldehyde. Sketches of the sampling locations for these sources are included in Appendix B. The line 2 press is ventilated by four roof-top axial fans. Emissions from each of the four vents are expected to be similar. Each vent will be sampled for one half of a sampling run. This procedure effectively will treat each pair of vents as one source while providing adequate data to determine emissions from the press. Line 2 vents no. 1 and 2 will be treated as a pair, 3 and 4 will also be treated as a pair. The Line 2 board cooler emits from two 38,000 acfm ducts. One half of each sampling run will be conducted in each of the two board cooler ducts.

Process rate -The presses and board coolers will operate at the rate required to be within 90% of the record Line 2 production rate of 13 tons per hour. During sampling of the press vents and board coolers the production rate of the press will be monitored and recorded., including the line speed, board thickness produced, and number of boards produced. The usage rate of wax, resin and catalyst, along with press temperature will also be monitored. Wax, resin and catalyst are normally applied at the rates shown in Table 2. The press process rate will be determined by monitoring the weight of the final product as determined by scales located prior to the formers

and deducting trim loss. These figures will be verified by footage and density calculations.

Summary Press and Board Cooler Operating Data:

1) Nominal board thickness and density will be recorded.

2) The number of sheet produced per hour will be determined by piece count.

3) Pounds of resin used per hour will be recorded.

4) Pounds of wax used per hour will be recorded.

5) Type of resin used will be recorded.

6) Press temperature will be recorded.

7) There are four exhaust fans with a design airflow of 30,000 acfm each above the press. The board cooler is ventilated by two exhaust fans with an estimated airflow of 38,000 acfm each. Actual acfm will be determined during sampling.

8) Forming line speed will be recorded.

9) Press production rate (finished product) in tons, will be calculated.

10) Amount of catalyst used will be monitored.

3C. Pre-Drying System (dryers A and B)

Sampling Locations

The pre-dryer system will be sampled for TSP, CO, VOC, NOx and Formaldehyde. Each dryer exhausts through multicyclones to the atmosphere. In addition, excess heat from the Coen burner is exhausted by a separate stack. A sketch of this equipment, including the pollution

control equipment is enclosed as Appendix C.

Process Rate

Each dryer is rated at a maximum feed rate of 24,000 lbs of wet material per hour. It has been estimated that the system has operated at a maximum rate of 15,000 lbs of wet material infeed per hour since startup. It is anticipated that testing will be performed at rate that is within 90% of the 15,000 lb. rate. The amount of wet feed delivered to each dryer will be determined by weighing truckloads of material prior to introducing the material into the predry system and monitoring the time required for the material to move through the predry system. Heat for the dryers is provided by a Coen Burner rated at 35 mmBTU per hour. The Coen burner will operate at the rate required to reduce the moisture content of the wet feed, anticipated to be approximately 30 to 50% moisture, to the required dry moisture content of approximately 15%. The firing rate of the Coen burner will be estimated by logging the number of revolutions of the fuel delivery augers. The augers will be calibrated to provide the pounds of fuel delivered for each count. The BTU value of the fuel will be provided by analysis of a sample.

Summary of Pre-dryer Operating Data

1) The moisture content of wet and dry wafers will be recorded during testing.

2) The plant will process 100% softwood.

3) The dryer inlet and outlet temperatures during testing will be recorded.

4) Estimated airflow rate for each dryer is 33,000 acfm. Actual airflow rate will be determined during testing.

5) The fuels to be burned in the Coen Burner is dry wood dust. The BTU content of the fuel will be provided by analysis.

6) The dryer drums are each 12' in diameter by 42' long.

7) Dryer infeed rate, (lbs of wet material processed per hour), will be determined by weighing truckloads of material prior to introducing the material into the predry system and monitoring the time required for the material to move through the predry system.

3D. Geka Thermal Oil Heater

Sampling Locations

The Geka thermal oil heater will be sampled for NOx as requested by EPA Region 8. A sketch of this equipment is enclosed as Appendix H.

Process Rate

The thermal oil heater is rated at 20 mmBTU per hour and is fired by natural gas. The unit will operate at the rate required to achieve near-maximum production rate for Line 2. Actual firing rate will be estimated using efficiency calculations and verified by f factor.

Summary of Thermal Oil Heater Operating Data

1) The temperature of the incoming (cool) oil will be monitored during testing.

2) The temperature of the outgoing (hot) oil will be monitored during

testing.

3) Nominal board thickness and density will be recorded.

4) Forming line speed will be recorded.

5) Press production rate (finished product) in tons, will be calculated.

TABLE 1

EMISSIONS TESTING AT MISSOULA, MONTANA
TESTING REQUIRED

SOURCE	SUBSTANCE	METHOD	
1 ROEMMC TUBE acfm= 20000 temp= 1000 deg.f. diam.= 52"	TSP VOC CO NOX HCHO	method 5 w/ method 202 back half method 25A method 10 method 7 method 0011	Testing to be conducted simutanously from these sources three teams one day
2 PARTICLEBOARD DRYER C (5) acfm= 30000 temp= 170-190 deg.f diam.= 36"	TSP VOC CO NOX HCHO	method 5 w/ method 202 back half method 25A method 10 method 7 method 0011	
3 PARTICLEBOARD DRYER D (6) acfm= 30000 temp= 170-190 deg.f diam.= 36"	TSP VOC CO NOX HCHO	method 5 w/ method 202 back half method 25A method 10 method 7 method 0011	
4 LINE 2 PRESS VENTS 1 AND 2 acfm= 33000 EACH temp= 70-110 deg f. diam.= 44"	TSP VOC CO HCHO	method 5 w/ method 202 back half method 25A method 10 method 0011	Testing to be conducted simutanously from these sources three teams one day
5 LINE 2 PRESS VENTS 3 AND 4 acfm= 33000 EACH temp= 70-110 deg f. diam.= 44"	TSP VOC CO HCHO	method 5 w/ method 202 back half method 25A method 10 method 0011	
6 LINE 2 BOARD COOLER duct 1 and 2 acfm= 38000 EACH temp= 60-100 deg f. diam.= 48"	TSP VOC CO HCHO	method 5 w/ method 202 back half method 25A method 10 (real time) method 0011	
7 PREDRYER DRYER A acfm= 45000 temp= 170-190 deg.f diam.= 42"	TSP VOC CO NOX HCHO	method 5 w/ method 202 back half method 25A method 10 method 7 method 0011	Testing to be conducted simutanously from these sources two teams one day
8 PREDRYER DRYER B acfm= 45000 temp= 170-190 deg.f diam.= 42"	TSP VOC CO NOX HCHO	method 5 w/ method 202 back half method 25A method 10 method 7 method 0011	
9 Coen Stack acfm= 33000 temp= 750-1500 deg.f diam.= 33"	TSP VOC CO NOX HCHO	method 5 w/ method 202 back half method 25A method 10 method 7 or 7E method 0011	
10 GEKA THERMAL OIL HEATER acfm= 7200 temp= 460 deg. f diam.= 22"	NOX	method 7	

Table 2
Missoula Particleboard Plant - LINE 2 - Estimated ranges of Operating parameters

DRYERS corrected 5-11-94 SMS

material throughput in lbs per hour			inlet temperatures degrees f.**			inlet moisture %		
dryer 6 ~~dryer 5~~	12000	maximum*	dryer 5	450	maximum	dryer 5	18.0%	maximum
				200	minimum		9.0%	minimum
dryer 5 ~~dryer 6~~	18000	maximum*	dryer 6	430	maximum	dryer 6	18.0%	maximum
				200	minimum		10.0%	minimum

outlet temperatures degrees f.**			outlet moisture %		
dryer 5	180	maximum	dryer 5	4.4%	maximum
	130	minimum		3.2%	minimum
dryer 6	210	maximum	dryer 6	3.8%	maximum
	160	minimum		2.8%	minimum

PRE-DRYER note: system began operation in March 1994, this data based on approx two weeks of operation

material throughput in lbs per hour			inlet temperatures degrees f.			inlet moisture %		
predryers	15000	maximum	predryers	350	maximum	predryers	50.0%	maximum
	5000	average		200	minimum		30.0%	minimum
				294	average		44.9%	average

outlet temperatures degrees f.			outlet moisture %		
predryers	170	maximum	predryers	28.3%	maximum
	75	minimum		6.2%	minimum
	105	average		17.7%	average

PRESS

material throughput in lbs per hour

27000	maximum*	
21320	average	

resin usage			wax usage			catalyst		
face	8.00%	maximum	face	1.50%	maximum	core	0.50%	maximum
	6.50%	minimum		0.50%	minimum	core	0.05%	minimum
	7.20%	average		1.00%	average		note: catalyst is used as req'd to adjust the ph of the furnish	
core	7.00%	maximum	core	1.50%	maximum			
	5.50%	minimum		0.50%	minimum			
	6.50%	average		1.00%	average			

*based on record production day for Line 2 (wet weights) (thayer scale)
**based on 24 hour averages from Jan-Mar 1994

MISSOULA THERMAL OIL HEATER TESTING 5-9-94, NOx

DATA TIME START= 17:00 END= 20:00 HOURS= 3.00

LINE 2 PRESS PRODUCTION RATE - pressed to11/16", finished to 5/8

During the the thermal oil heater testing, the Line 2 press ran at a rate compareble to that during testing on subsequent days. The press produced 11/16" inch thick board which is sanded to 5/8", at a Line speed of 21 feet per minute.

47551 =total pounds of face material through scales during testing
29663 =total pounds of core material through scales during testing
77214 =total pounds of material into press during testing (sum of face and core)
25738 =total pounds of material into press per hour during testing (sum of face and core)

Since conditions during the Geka test were similiar to testing on the folowing day, the tons of press production have been determined by ratioing the wood weight through the scales against the weights and production calculated for testing on May 10, 1994

25864 =May 10 total pounds of material into press per hour during testing (sum of face and core)
12.58 =May 10 total tons of finished product per hour

25738 =total pounds of material into press per hour during GEKA testing (sum of face and core)
12.52 =total tons of finished product per hour during GEKA testing (by ratio)

The BTU per hour input rate to the GEKA during testing will be determined by f factor.

PRODUCTION REPORT LINE #1 09-May-94

	TODAY STANDARD	TODAY ACTUAL	MTD STANDARD	MTD ACTUAL
RAWBOARD 3/4 BASIS	316,000	278,524.00	2,528,000	2,467,496.94
NET SHIFTS OPERATED	2	2	16	16
NET SHIFT AVERAGE	158,000	139,262.00	158,000	154,218.56

	SHIFTS WORKED	TOTAL TODAY	TOTAL MTD
SHIFT A	4	0.00	575,678.81
SHIFT B	4	147,598.47	635,881.58
SHIFT C	4	0.00	637,436.34
SHIFT D	4	130,925.53	618,500.22

	SHIFT AVERAGE
SHIFT A	143,919.70
SHIFT B	158,970.39
SHIFT C	159,359.08
SHIFT D	154,625.05
SHIFT AVERAGE NET	154,218.56 (UNSCHEDULED DT)

	TODAY	MTD
WOOD SHAVINGS USEAGE	425.49	3664.8

PRODUCTION REPORT LINE #2

	TODAY STANDARD	TODAY ACTUAL	MTD STANDARD	MTD ACTUAL
RAWBOARD 3/4 BASIS	134,000	170,678.03	1,072,000	1,172,977.79
NET SHIFTS OPERATED	2	2	16	15.5
NET SHIFT AVERAGE	67,000	85,339.02	67,000	73,311.11

	SHIFTS WORKED	TOTAL TODAY		TOTAL MTD
SHIFT A	3.5	0.00		269,789.80
SHIFT B	4	89,696.09		313,620.77
SHIFT C	4	0.00		313,137.65
SHIFT D	4	80,981.94	COMBINED	276,429.56
			LINE 1 & 2	

	SHIFT AVERAGE	SHIFT AVERAGE
SHIFT A	77,082.80	221,003
SHIFT B	78,405.19	237,376
SHIFT C	78,284.41	237,643
SHIFT D	69,107.39	223,732
SHIFT AVERAGE NET	75,719.95 (UNSCHEDULED DT)	

	TODAY	MTD	TOTAL PRODUCTION LINE 1&2 MTD
WOOD SHAVINGS USEAGE	217.63	1661.32	3,640,475

TODAYS TOTAL PRODUCTION 3/4 BASIS 449,202.03

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MISSOULA 5-9-94 GEKA TESTING

READINGS EVERY 10 MIN

TIME	LINE SPEED	TARGET DENSITY ONCE/HR	ACTUAL DENSITY ONCE/HR	TOTAL LBS	PRESS TEMP CENTER
		TARGET	TIME ACTUAL	4 SIDE 50R / 6 SIDE 60R	
★ 1520	FPM 21.0	45.0#	3 SHIFT START @1522 = 45.2 REQ TEST	130.937 / 85.513	SET 200° ACT 19
1530	21.0			133.648 / 85.155	" 190°
1540	21.0		thick .677	136.664 / 87.015	" 19
1550	21.0			138.915 / 88.336	" 19
1600	21.0			141 588 / 89975	" 190°
1610	21.0			144 260 / 91520	" 19
★ 1620	21.0	45.0#	@ 1624 = 45.0 STRIP	146970 / 93100	" 19
1630	21.0			149660 / 94630	" 190°
1640	21.0		.674	152370 / 96210	" 190
1650	21.0			155100 / 97810	" 19
1700	21.0			157765 / 99508	" 195°
1710	21.0			161067 / 101528	" 19
★ 1720	21.0	45.0#	@ 1723 = 45.4 STRIP	163502 / 103016	" 19
1730	21.0			166564 / 104930	" 195
1740	21.0		.665	168757 / 106234	" 19
1750	21.0		FINISH 3 SHIFT START 2 SHIFT	171 471 / 107873	" 19
1800	21.0			174 073 / 109463	" 195
1810	21.0			176500 / 110928	" 194
★ 1820	21.0	45.0#	@ 1821 = 44.8 REQ TEST	179095 / 112436	" 19
1830	21.0			181193 / 114147	" 193
1840	21.0		.661	184519 / 115728	" 193
1850	21.0			187303 / 117507	" 194
1900	21.0			189694 / 119059	" 194
1910	21.0		45.9	192160 / 120645	" 19
★ 1920	21.0	45.0#	@ 1920 = STRIP	194667 / 122275	" 194
1930	21.0			197308 / 123783	" 194
1940	21.0		.665	199999 / 125721	" 194
1950	21.0			202798 / 127492	" 19
2000	21.0			205416 / 129171	" 193
2010	21.0			207780 / 130687	" 193
★ 2020	21.0	45.0#	@ = FINISH 3 SHIFT REQ TEST	210079 / 132633	" 193
2030					"
2040					"
2050					"
2100					"
2110					"
2120		45.0#	@ = STRIP		"
2130					"
2140					"
2150					"

★ Reject 1932-1934 for metal.

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MISSOULA GERA TESTING 5-9-94

TIME	SET POINT	ACT TEMP °F	FLUE GAS TEMP	GAS OUT TEMP
1650	500	506	700	1275
1700	"	496	786	1218
1710	"	496	824	1361
1720	"	495	680	1213
1730	"	506	730	1332
1740		501	790	1254
1750		504	844	1420
1800		496	680	1206
1810		495	695	1274
1820		499	837	1407
1830		507	730	1410
1840		507	704	1341
1850		503	708	1267
1900		499	680	1231
1910		495	685	1200
1920		495	800	1192
1930		477	1057	1371
1940		495	718	1201
1950		495	670	1270
2000		506	736	1425
2010				
2020				
2030				
2040				
2050				
2100				
2110				
2120				
2130				
2140				
2150				
2200				

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MAY 31 '94 09:38AM

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To Sue Somers	From Mary Law
Co.	Co. L.P. Missoula

LINE II PRODUCTION

SHIFT D

THICKNESS 12/16

DISTANCE WEDGES 116.70 mm

PRE PRESS SHIM BLOCKS 125 mm

DATE 9 MAY 94

WEIGHT 25.2 lbs/ft

LINE SPEED 18.0 ft/min

BULK DENSITY 15.2 lbs/cu ft

11/16 WT = 23.1 WEDGE = 15.30 ∠3 = 21.0 TEMP = 200° C

PRESS TEMPERATURE CONTROL SETTINGS

Inlet Pump 1 170 Sec.1 (Infeed) 180 Sec.2 (Middle) 190 Sec.3 (Outfeed) 165

Inlet Pump 2 ____ ____ ____ ____

	RESIN USAGE (lbs)	WAX USAGE (lbs)	WOOD USAGE
FACE	26855	3327	169.710
CORE	13525	3704	106.825

* NOTE:
FOR TEST D SHIFT
WOOD WEIGHT (START)
FACE: 130,937
CORE: 83,513
FINISH D SHIFT
FACE: 169.710
CORE: 106.825
61745

RESIN STORAGE TANK LEVELS

1. 17-0
2. 3-6
3. 9-0
4. Filling

DOWN TIME REPORT

TIME IN	TIME OUT	OPER	MECH	ELEC	CODE	DESCRIPTION	COMMENTS	DOWN TIME
					200	STORAGE		
					210	MILLING & DRY		
					220	BLENDING AREA		
20°					230	FORMING MACHINE		
					240	PREPRESS		
18°					250	PRESS		
					260	FLYING SAWS		
					270	COOLING WHEEL		
					280	SAWS		
					290	START		
1304	1322	✓			300	MISCELLANEOUS	STOP CHANGE TO 11/16	.18

Total Downtime .18 TOTAL

SAW REPORT

THICKNESS	CUT SIZE	NUMBER OF PIECES GOOD	BAD
12/16	44 X 47	508	0
	49 X 121 & 85	84 EA	0 EA
	49 X 85	1232	0
11/16	44 X 110	1140	0

508
84 EA
1232 (718 TO GO)
1140 (3360) TO GO

MD 6765

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LINE II PRODUCTION LOG

SHIFT B

THICKNESS 11/16

DISTANCE WEDGES 15.30 mm

PRE PRESS SHIM BLOCKS 125 mm

DATE 9 MAY 94

WEIGHT 23.1 lbs/ft

LINE SPEED 21.0 ft/min

BULK DENSITY 14.9 lbs/cu ft

PRESS TEMPERATURE CONTROL SETTINGS

Inlet Pump 1 175 Sec.1 (Infeed) 185 Sec.2 (Middle) 200 Sec.3 (Outfeed) 170

Inlet Pump 2 ____ ____ ____ ____

	RESIN USAGE (lbs)	WAX USAGE (lbs)	WOOD USAGE
FACE	23392	4261	188510
CORE	14,709	3463	84765

217.63

RESIN STORAGE TANK LEVELS

1 12' 3 6'

2 0 4 16'

DOWN TIME REPORT

TIME IN	TIME OUT	OPER	MECH	ELEC	CODE	DESCRIPTION	COMMENTS	DOWN TIME
					200	STORAGE		
					210	MILLING & DRY		
					220	BLENDING AREA		
					230	FORMING MACHINE		
					240	PREPRESS		
3 00					250	PRESS		
	6				260	FLYING SAWS		
					270	COOLING WHEEL		
					280	SAWS		
					290	START		
					300	MISCELLANEOUS	Metal 3X	06

Total Downtime .06

SAW REPORT

THICKNESS	CUT SIZE	NUMBER OF PIECES GOOD	BAD	TOTAL
11/16	49 X 110			3160

380 To Go

22

MISSOULA DRYER TESTING 5-10-94 PM, CO, Nox

DATA TIME: START= 11:00 END= 16:00 HOURS= 5.00

TOTAL HOURS = 5.00

LINE 2 PRESS PRODUCTION RATE - pressed to11/16", finished to 5/8

5.00 =hours during testing
PRODUCTION RATE BY BOARD COUNT
5/8" =marketed thickness of boards produced
612 = no of boards produced (49"x109")
168 = no of boards produced (49"x145")
168 = no of boards produced (49"x74")
194 = no of boards produced (49"x121")
194 = no of boards produced (49"x97")

trimmed width	trimmed length	trimmed cubic feet	out of press width	out of press length	out of press cubic feet	% of trim
49	109	1182	51	109.75	1239	4.58%
49	145	432	51	145.75	452	4.42%
49	74	220	51	74.75	232	4.89%
49	121	416	51	121.75	436	4.51%
49	97	334	51	97.75	350	4.66%
				weighted average =		4.60%

45.42 = average actual density of board produced (lb/cubic foot)
0.67 = average actual thickness of board produced
48.69 = average nominal density of board produced
(lb./cubic foot)((.6875/actual thickness) x actual density))
2583.84 =total nominal cubic feet of board produced
125,808 =total pounds of finished board produced during testing
25,162 =total pounds of finished board produced per hour during testing
62.90 =total tons of finished board produced during testing
12.58 =total tons of finished board produced per hour during testing

41341 = footage produced during testing (3/4" basis)
8268 = footage produced per hour during testing (3/4" basis)
198439 = equivalent daily footage (3/4" basis)

79800 =total pounds of face material through scales during testing
49521 =total pounds of core material through scales during testing
4973 =total pounds of face resin through scales during testing at 100% solids.(solids = 50.2%)
3631 =total pounds of core resin through scales during testing at 100% solids. (solids = 57.4 %)
137925 =total pounds of material into press during testing (sum of material and resin)
27585 =total pounds of material into press per hour during testing (sum of material and resin)
69 =total tons of material into press during testing (sum of material and resin)
13.79 =total tons of material into press per hour during testing (sum of material and resin)
8.79% = percentage of loss (trim and water) from material into press and finished product

1.31% = face wax as a % of finished product as applied
1.03% =core wax as a % of finished product as applied
0.64% = face wax as a % of finished product (100% solids)
0.50% =core wax as a % of finished product (100% solids)

MISSOULA DRYER TESTING 5-10-94 PM, CO, Nox

DATA TIME: START= 11:00 END= 16:00 HOURS= 5.00

TOTAL HOURS = 5.00

DRYER PRODUCTION RATE:

surface dryer (dryer 5)

75,400	=total pounds of face material through scales during testing (wet)
15,080	=total lbs wet infeed per hour
14.6%	=moisture content of incoming wood (surface)
3.9%	=moisture content of wood after drying (surface)
1647	=total wax usage during testing as applied
329	=wax usage per hour during testing as applied
807	=total wax usage during testing at 100% solids (solids = 49%)
161	=wax usage per hour during testing at 100% solids (solids = 49%)
67,064	=total lbs dry material produced during testing(calculated)
13,413	=total lbs dry material produced per hour
259	=averge inlet temperature
139	=average outlet temperature

core dryer (dryer 6)

69,900	=total pounds of core material through scales during testing (wet)
13,980	=total lbs wet infeed per hour
11.8%	=moisture content of incoming wood (core))
3.2%	=moisture content of wood after drying (core)
1293	=total wax usage during testing as applied
259	=wax usage per hour during testing as applied
634	=total wax usage during testing at 100% solids (solids = 49%)
127	=wax usage per hour during testing at 100% solids (solids = 49%)
63,687	=total lbs dry material produced during testing(calculated)
12,737	=total lbs dry material produced per hour
315	=averge inlet temperature
163	=average outlet temperature

MISSOULA DRYER TESTING 5-10-94 formaldehyde, VOC

DATA TIME START= 19:00 END= 23:50 HOURS= 4.83

TOTAL HOURS = 4.83

LINE 2 PRESS PRODUCTION RATE - pressed to11/16", finished to 5/8

4.83 =hours during testing
PRODUCTION RATE BY BOARD COUNT
5/8" =marketed thickness of boards produced
608 = no of boards produced (49"x121")
662 = no of boards produced (49"x97")
54 = no of boards produced (49"x122")

trimmed width	trimmed length	trimmed cubic feet	untrimmed width	untrimmed length	untrimmed cubic feet	% of trim
49	121	1304	51	121.75	1365	4.51%
49	97	1138	51	97.75	1194	4.66%
49	122	117	51	122.75	122	4.51%

44.88 = average actual density of board produced (lb/cubic foot)
0.67 = average actual thickness of board produced
48.08 = average nominal density of board produced
(lb./cubic foot)((.6875/actual thickness) x actual density))
2558.64 =total nominal cubic feet of board produced
123,026 =total pounds of finished board produced during testing
25,454 =total pounds of finished board produced per hour during testing
61.51 =total tons of finished board produced during testing
12.73 =total tons of finished board produced per hour during testing

40938 = footage produced during testing (3/4" basis)
8470 = footage produced per hour during testing (3/4" basis)
203280 = equivalent daily footage (3/4" basis)

77850 =total pounds of face material through scales during testing
46850 =total pounds of core material through scales during testing
4796 =total pounds of face resin through scales during testing at 100% solids.(solids = 50.2%)
3397 =total pounds of core resin through scales during testing at 100% solids. (solids = 57.4 %)
132893 =total pounds of material into press during testing (sum of material and resin)
27495 =total pounds of material into press per hour during testing (sum of material and resin)
66 =total tons of material into press during testing (sum of material and resin)
13.75 =total tons of material into press per hour during testing (sum of material and resin)
7.42% = percentage of loss (trim and water) from material into press and finished product

1.52% = face wax as a % of finished product as applied
1.33% =core wax as a % of finished product as applied
0.25% = face wax as a % of finished product (100% solids)
0.44% =core wax as a % of finished product (100% solids)

MISSOULA DRYER TESTING 5-10-94 formaldehyde, VOC

DATA TIME START= 19:00 END= 23:50 HOURS= 4.83

TOTAL HOURS = 4.83

DRYER PRODUCTION RATE:

surface dryer

80,000	=total pounds of face material through scales during testing (wet)
16,552	=total lbs wet infeed per hour
12.9%	=moisture content of incoming wood (surface)
3.6%	=moisture content of wood after drying (surface)
624	=total wax usage during testing as applied
129	=wax usage per hour during testing as applied
306	=total wax usage during testing at 100% solids (solids = 49%)
63	=wax usage per hour during testing at 100% solids (solids = 49%)
72,266	=total lbs dry material produced during testing(calculated)
14,453	=total lbs dry material produced per hour
237	=averge inlet temperature
128	=average outlet temperature

core dryer

62,400	=total pounds of core material through scales during testing (wet)
12,910	=total lbs wet infeed per hour
15.8%	=moisture content of incoming wood (core))
3.5%	=moisture content of wood after drying (core)
1114	=total wax usage during testing as applied
230	=wax usage per hour during testing as applied
546	=total wax usage during testing at 100% solids (solids = 49%)
113	=wax usage per hour during testing at 100% solids (solids = 49%)
54,484	=total lbs dry material produced during testing(calculated)
10,897	=total lbs dry material produced per hour
320	=averge inlet temperature
160	=average outlet temperature

MISSOULA DRYER TESTING 5-10-94 formaldehyde, VOC

DATA TIME START= 19:00 END= 23:50 HOURS= 4.83

TOTAL HOURS = 4.83

DRYER PRODUCTION RATE:

surface dryer

80,000	=total pounds of face material through scales during testing (wet)
16,552	=total lbs wet infeed per hour
12.9%	=moisture content of incoming wood (surface)
3.6%	=moisture content of wood after drying (surface)
624	=total wax usage during testing as applied
129	=wax usage per hour during testing as applied
306	=total wax usage during testing at 100% solids (solids = 49%)
63	=wax usage per hour during testing at 100% solids (solids = 49%)
72,266	=total lbs dry material produced during testing(calculated)
14,453	=total lbs dry material produced per hour
237	=averge inlet temperature
128	=average outlet temperature

core dryer

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12,910	=total lbs wet infeed per hour
15.8%	=moisture content of incoming wood (core))
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230	=wax usage per hour during testing as applied
546	=total wax usage during testing at 100% solids (solids = 49%)
113	=wax usage per hour during testing at 100% solids (solids = 49%)
54,484	=total lbs dry material produced during testing(calculated)
10,897	=total lbs dry material produced per hour
320	=averge inlet temperature
160	=average outlet temperature

PRODUCTION REPORT LINE #1 10-May-94

	TODAY		MTD	
	STANDARD	ACTUAL	STANDARD	ACTUAL
RAWBOARD 3/4 BASIS	316,000	275,012.54	2,844,000	2,742,509.49
NET SHIFTS OPERATED	2	2	18	18
NET SHIFT AVERAGE	158,000	137,506.27	158,000	152,361.64

	SHIFTS WORKED	TOTAL TODAY	TOTAL MTD
SHIFT A	5	147,598.47	723,277.29
SHIFT B	4	0.00	635,881.58
SHIFT C	5	127,414.07	764,850.40
SHIFT D	4	0.00	618,500.22

	SHIFT AVERAGE
SHIFT A	144,655.46
SHIFT B	158,970.39
SHIFT C	152,970.08
SHIFT D	154,625.05
SHIFT AVERAGE NET	152,805.25 (UNSCHEDULED DT)

	TODAY	MTD
WOOD SHAVINGS USEAGE	420.95	4085.75

PRODUCTION REPORT LINE #2

	TODAY		MTD	
	STANDARD	ACTUAL	STANDARD	ACTUAL
RAWBOARD 3/4 BASIS	134,000	179,233.74	1,206,000	1,352,211.53
NET SHIFTS OPERATED	2	2	18	17.5
NET SHIFT AVERAGE	67,000	89,616.87	67,000	75,122.86

	SHIFTS WORKED	TOTAL TODAY		TOTAL MTD
SHIFT A	4.5	89,660.48		359,450.28
SHIFT B	4	0.00		313,620.77
SHIFT C	5	89,573.26		402,710.91
SHIFT D	4	0.00	COMBINED	276,429.56
			LINE 1 & 2	

	SHIFT AVERAGE	SHIFT AVERAGE	
SHIFT A	79,877.84	224,533	
SHIFT B	78,405.19	237,376	
SHIFT C	80,542.18	233,512	
SHIFT D	69,107.39	223,732	TOTAL
SHIFT AVERAGE NET	76,983.15 (UNSCHEDULED DT)		PRODUCTION LINE 1&2 MTD

	TODAY	MTD	
WOOD SHAVINGS USEAGE	244.27	1905.59	4,094,721

TODAYS TOTAL PRODUCTION 3/4 BASIS 454,246.28

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5-10-94

by Keith O

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Missoula testing

M&D readings – dryer testing

*moisture readings and wax levels once per hour, other readings once every 10 minutes.

time	face temp in deg f.	face temp out deg f.	core temp in deg f.	core temp out deg f.	face material in lbs. (wet)	core material in lbs. (wet)	once per hour: face wax lbs	core wax lbs	face moisture in %	face moisture out %	core moisture in %	core moisture out %
0730	243	144	310	145	28800	25850						
0740	246	145	312	162	30800	28200						
0750	247	148	321	162	32150	30400						
0800	246	155	324	164	33900	33400						
0810	241	154	312	166	35500	35500	809	658	11.4	3.6	9.4	3.0
0820	257	150	313	162	37900	39000						
0830	245	157	318	180	40200	42100						
0840	244	140	315	164	42700	45200						
0850	241	138	294	164	44300	46700						
0900	243	135	283	164	47700	49000						
0910	246	134	273	162	50400	50900	1123	917	11.0	3.8	10.0	3.0
0920	256	135	274	161	52900	52300						
0930	257	138	272	160	55700	54600						
0940	253	144	265	159	57800	55600						
0950	251	144	269	157	59000	57500	~~1386~~	~~1104~~				
1000	232	142	264	154	62700	61400	1386	1104	13.4	3.8	10.0	3.1
1010	230	141	274	154	60000	63200						
1020	229	141	274	153	63900	64800						
1030	226	140	274	153	66300	65600						
1040	224	137	277	154	68300	67600						
1050	225	133	272	158	70400	69600						
1100	227	130	247	159	74200	72100	(1665)*	(1313)*				
1110	229	130	265	159	76300	73900	1712	1318	11.4	4.09	9.4	3.0
1120	232	128	264	157	78900	75700						
1130	237	130	269	154	81300	77200						
1140	274	139	296	158	84000	79100						
1150	278	143	302	158	86800	81300						
1200	279	144	310	159	89200	83300						
1210	275	149	318	162	92100	86600	2042	1573	13.8	3.8	9.6	3.2
1220	274	150	317	161	94200	89400						

5-10-94

by Keith O

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Missoula testing

M&D readings – dryer testing

*moisture readings and wax levels once per hour, other readings once every 10 minutes.

time	face temp in deg f	face temp out deg f	core temp in deg f	core temp out deg f	face material in lbs. (wet)	core material in lbs. (wet)	once per hour: face wax lbs	core wax lbs	face moisture in %	face moisture out %	core moisture in %	core moisture out %
1230	248	145	320	163	97100	92400						
1240	243	145	322	162	98800	94400						
1250	241	141	323	162	101300	97000						
1300	240	140	323	163	103700	99500						
1310	241	137	324	163	106300	102100	2366	1875	16.4	3.8	12.6	3.4
1320	244	134	330	165	109500	105200						
1330	244	137	329	166	112400	108000						
1340	244	138	327	167	114700	110400						
1350	257	137	312	164	116900	112300						
1400	252	135	313	162	119300	114500						
1410	254	134	319	162	121800	116800	2494	2135	16.0	4.0	13.0	3.2
1420	258	137	324	162	125200	120000						
1430	254	140	328	163	127400	122200						
1440	244	140	334	164	130100	124700						
1450	263	140	337	162	132000	126700						
1500	244	140	348	164	134900	129800						
1510	244	138	345	166	137200	131900	3037	2416	15.0	4.1	14.6	3.4
1520	259	136	329	166	139900	134200						
1530	262	138	320	168	143700	137700						
1540	259	138	313	168	145000	138400						
1550	262	140	311	166	147500	140250						
1600	263	141	310	165	149600	142000	(3312)*	(2606)*				
1610	258	140	303	162	152300	144200	3368	2644	16.0	4.0	14.0	3.6
1620	254	140	308	160	155200	146600						
1630	257	139	312	161	157500	148600						
1640	253	142	310	160	159900	151400						
1650	249	138	316	160	162100	153400						
1700	251	136	317	161	165100	155900						
1710	254	136	311	164	167700	157800	3495	2893	14.8	3.8	12.0	3.4
1720	251	137	314	162	169800	159900						

Pot Setting

Fnce	Cor.
42	22
42	22
42	22
42	22
42	22
40	22
40	24
42	24
40	24
42	24
42	24
42	24
40	24
41	24
41	24
41	22
41	24

*: ESTIMATED BY PROPORTION

10-May-94

29

N-31

16,000/12,000

5-10-94

by Keith 1750 & Douglas 1800 →

page 3 of 9

Missoula testing

M&D readings – dryer testing

*moisture readings and wax levels once per hour, other readings once every 10 minutes.

time	face temp in deg f	face temp out deg f	core temp in deg f	core temp out deg f	face material in lbs. (wet)	core material in lbs. (wet)	face wax lbs	core wax lbs	face moisture in %	face moisture out %	core moisture in %	core moisture out %	Feed acres Pot. setting Face	Core
							once per hour							
1730	251	134	317	157	172400	162100								
1740	253	133	324	140	175400	164600								
1750	256	137	335	142	177400	166700								
1800	259	146	340	163	180100	169900								
1810	252	148	339	164	181000	171100								
1820	244	142	346	163	183900	174100								
1830	245	140	357	164	185700	175900	4072	3214	12.8	4.2	15.8	3.8	38/26	24
1840	240	137	346	167	188600	178500								
1850	237	135	328	168	190900	180400								
1900	235	134	325	167	193700	182600	(4198)*	(3299)*						
1910	239	133	321	168	196500	184700								
1920	234	133	317	165	199000	186700								
1930	238	134	318	165	202000	189000	4450	3470	12.2	3.8	14.8	3.4	38/28	22
1940	231	132	322	165	204838	191159								
1950	236	132	324	165	207685	193255								
2000	234	133	322	172	209858	194885								
2010	238	133	321	166	212300	196700								
2020	244	134	318	164	216100	199500								
2030	249	135	326	166	217800	200700	4822	3705	11.4	3.6	17.8	3.6	38/28	22
2040	251	137	319	167	220600	202800								
2050	243	137	323	164	222900	204700								
2100	244	136	332	163	225900	207400	No wax							
2110	250	137	333	164	228200	209400								
2120	252	137	341	166	231400	211800								
2130	253	135	341	164	234400	214200	4922	3918	13.4	34	15.2	38		
2140	252	135	366	168	237150	216500	(reset)							
2150	248	137	357	166	239600	218700	to zero							
2200	250	136	361	168	242200	221200								
2210							No wax							
2220	241	131	333	167	248100	225400								

30

* ESTIMATED BY PROPORTION

by [illegible]
page 9 of 9

Missoula testing

M&D readings – dryer testing

*moisture readings and wax levels once per hour, other readings once every 10 minutes.

time	face temp in deg f.	face temp out deg f.	core temp in deg f.	core temp out deg f.	face material in lbs. (wet)	core material in lbs. (wet)	face wax lbs	core wax lbs	face moisture in %	face moisture out %	core moisture in %	core moisture out %	feedscrew Pot. settlin Face	core
							once per hour							
2230	244	131	342	166	251000	227600	X	4160	12.2	3.4	14.0	3.4	38/32	26
2240	243	128	329	166	254700	230300								
2250	254	129	339	164	256900	231900	(2255 to 2258 material flow off)				(Rommik)			
2300	232	135	303	165	259300	233700	No wt							
2310	249	132	352	161	261700	235600								
2320	253	129	366	164	265400	238600								
2330	252	127	357	163	267400	240200	X	4350	15.4	3.8	17.0	3.4	38/32	26
2340	252	126	359	164	270900	243000								
2350	250	124	351	163	273700	245000		(4413)*						
2400														

* ESTIMATED BY PROPORTION

31

Line 2 M & D Dryer Report

Shift C Board Size 11/16 Date 5-10-99

	# 5 Dryer (face)						# 6 Dryer (core)						
	Temp.		Moisture		Wet Bins		Temp.		Moisture		Blender		
TIME	IN	OUT	ANL.	CENCO	FACE	CORE	IN	OUT	ANL.	CENCO	TIME	FACE	CORE
6:00	225	141	3.7	3.8			340	181	4.4	3.0	6:20	9.6	8.8
7:20"	266	154	3.5	3.6			310	184	3.0	3.2	7:00"	9.4	8.6
8:10"					11.4	9.4					7:20"	9.6	8.4
8:20"	257	150	3.6	3.6			312	162	3.1	3.0	8:30"	9.4	8.4
9:12	246	134	3.3		11.0	10.0	273	142	3.0		9:30"	9.6	8.6
10:10"	232	142	3.6	3.8			264	154	3.2	3.4	10:33"	9.8	8.8
11:10"	229	130	4.0	4.0			264	159	3.2	3.0	11:35"	9.2	8.4
12:10pm	275	144	3.7	3.8			310	159	3.4	3.2	12:35"	9.9	8.8
13:10"	261	137	3.5	3.4			330	184	3.1	3.4	1320	9.6	8.6
14:10"	254	136	3.5	4.0			319	162	3.4	3.2	14:20"	9.9	8.8
15:10"	264	138	3.6	4.1	15.0	14.6	345	166	3.4	3.4	1520"	9.6	8.6
16:10"	258	140	3.9	4.0			303	162	3.5	3.6	1620"	10.2	8.8
17:10"	254	134	3.5				311	164	3.0		1700"	10.2	9.0

↑ AVERAGES ↓ SIEVE ANALYSIS ↓ GEKA→ HOURS RUN 12

TIME	FACE PANS				%	CORE PANS				%	MACHINE SETTINGS	
7:20"	3	17	31	49	40%	9	28	35	28	63%	100	100
												090

MICRO WAX		TOTAL WAX	TOTAL WOOD	RESIN TANK LEVELS	
	FACE	3668	12400	1. 9.5	2. 16.10
	CORE	3121	16100	3. 3.10	4. 16'

32

Line 2 M & D Dryer Report

Shift A Board Size 11/14 Date 5-10-94

	# 5 Dryer (face)						# 6 Dryer (core)						
	Temp.		Moisture		Wet Bins		Temp.		Moisture		Blender		
TIME	IN	OUT	ANL.	CENCO	FACE	CORE	IN	OUT	ANL.	CENCO	TIME	FACE	CORE
6:00	257	161	37	34			339	182	35	40	6:15	9^4	8^8
6:25					12.8	15.8					6:55	9^9	8^8
6:30	244	151	37	42			356	182	37	38	8:25	10^4	8^8
7:05	238	144	36	38			326	184	33	32	8:55	9^6	8^6
7:30	236	144	36	38			358	184	33	34	9:50	9^4	7^6
8:30	252	147	35	34			332	187	32	36	10:50	10^2	9^2
9:20					13.4	15.2					11:45	9^9	8^8
9:30	254	148	34	34			338	186	33	38	12:50	10^2	9^0
10:30	244	143	35	34			337	187	32	34	1:30	9^9	9^0
11:20	252	143	36	38			365	184	35	34	2:30	9^6	9^0
12:10	252	140	35	38			371	188	33	32	3:30	9^9	9^0
1:00	256	141	36	36			370	185	33	32	4:30	9^6	8^8
2:00	243	145	37	36			393	189	36	32	5:20	9^9	8^8
2:50	242	142	36	38			373	187	34	34			
3:50	247	145	36	38			380	188	33	32			
4:50	250	144	36	38			378	186	34	34			
	247	146		3.7			355	186		3.4		9.8	8.8

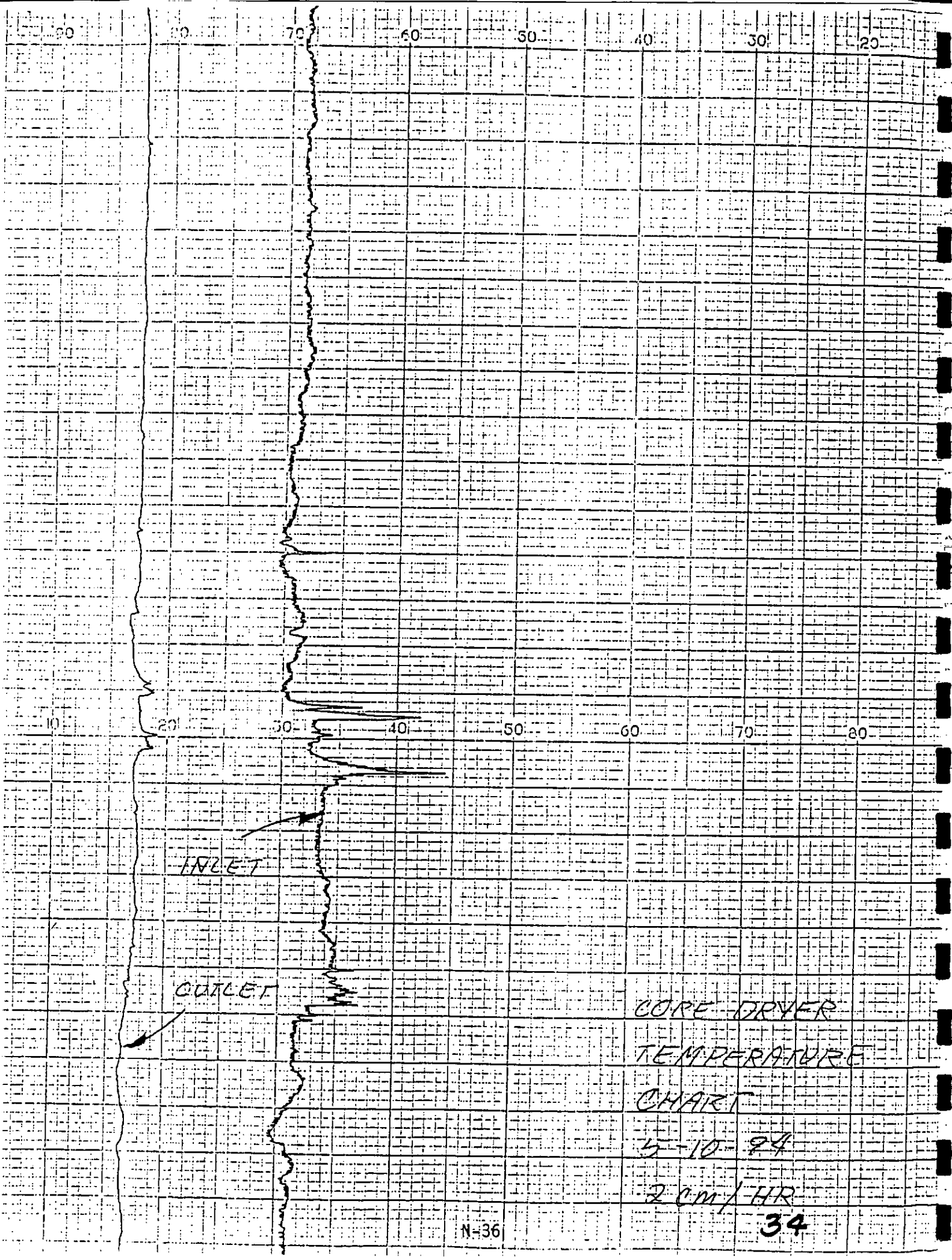
14

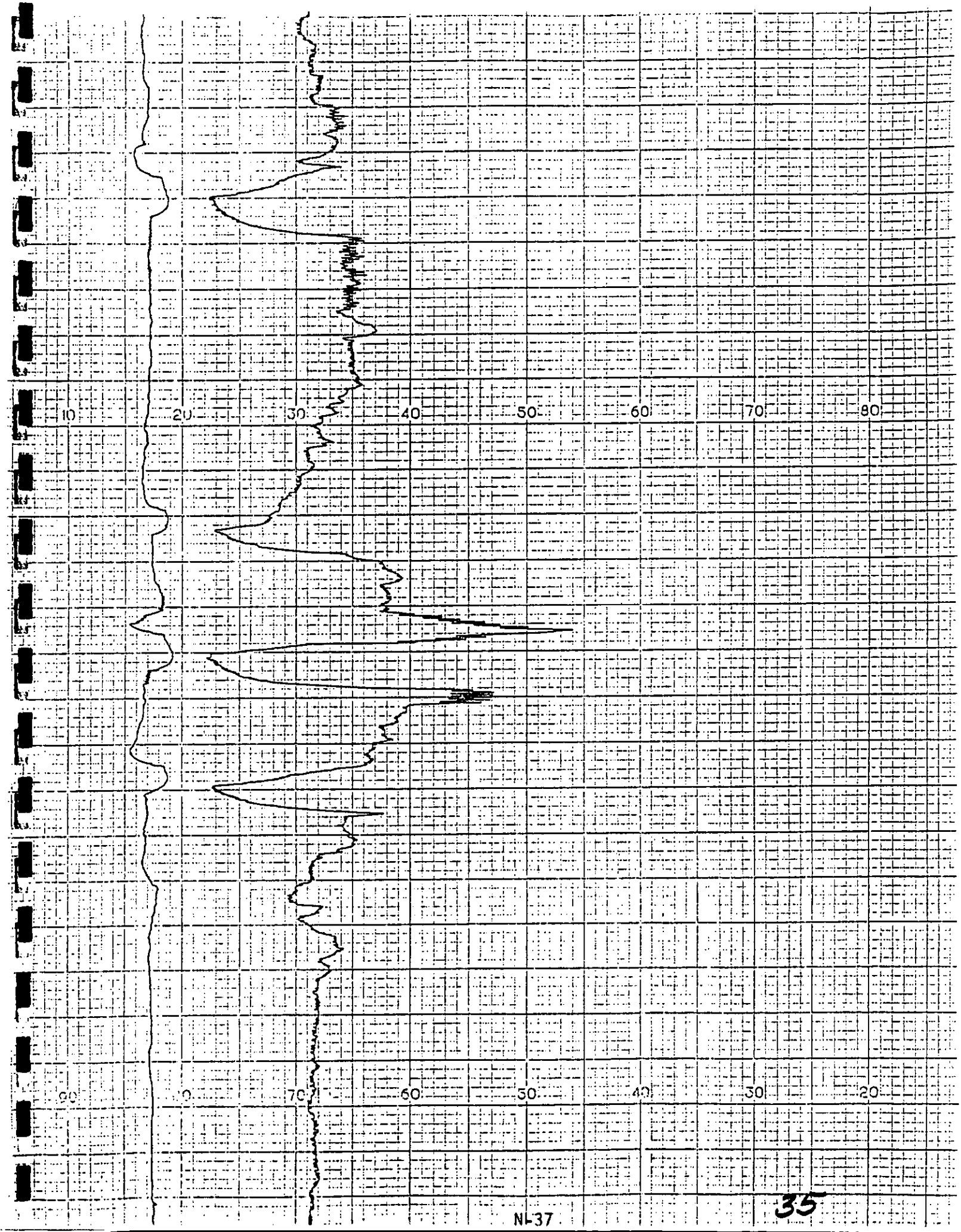
↑ AVERAGES ↓ SIEVE ANALYSIS ↓ GEKA→ HOURS RUN 12

TIME	24/32	FACE PANS			1	74/32	CORE PANS			1	MACHINE SETTINGS
8:05	3	19	36	42	78	12	32	35	21	56	95 110

MICRO WAX		TOTAL WAX	TOTAL WOOD	RESIN TANK LEVELS	
	PACE	1264	187100	1. 4'7	2. 16'10
	CORE	2600	160900	3. 0	4. 15'7

33


90
80
70
60
50
40
30
20
10
20
30
40
50
60
70
80
INLET
OUTLET
CORE DRYER
TEMPERATURE
CHART
5-10-84
2 CM/HR
N-36
34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20
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90
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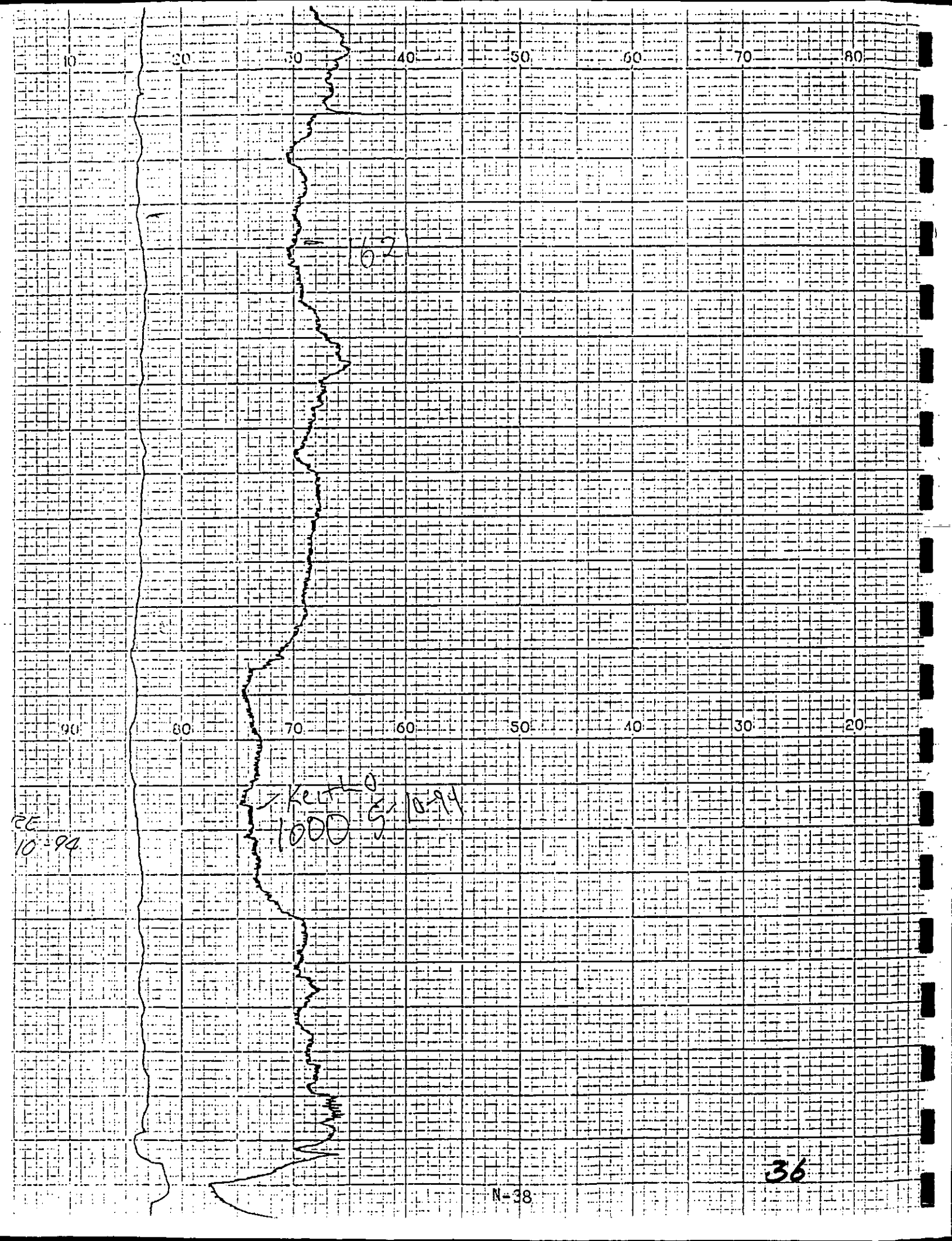
20
NL-37
35


10
20
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70
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62
90
80
70
60
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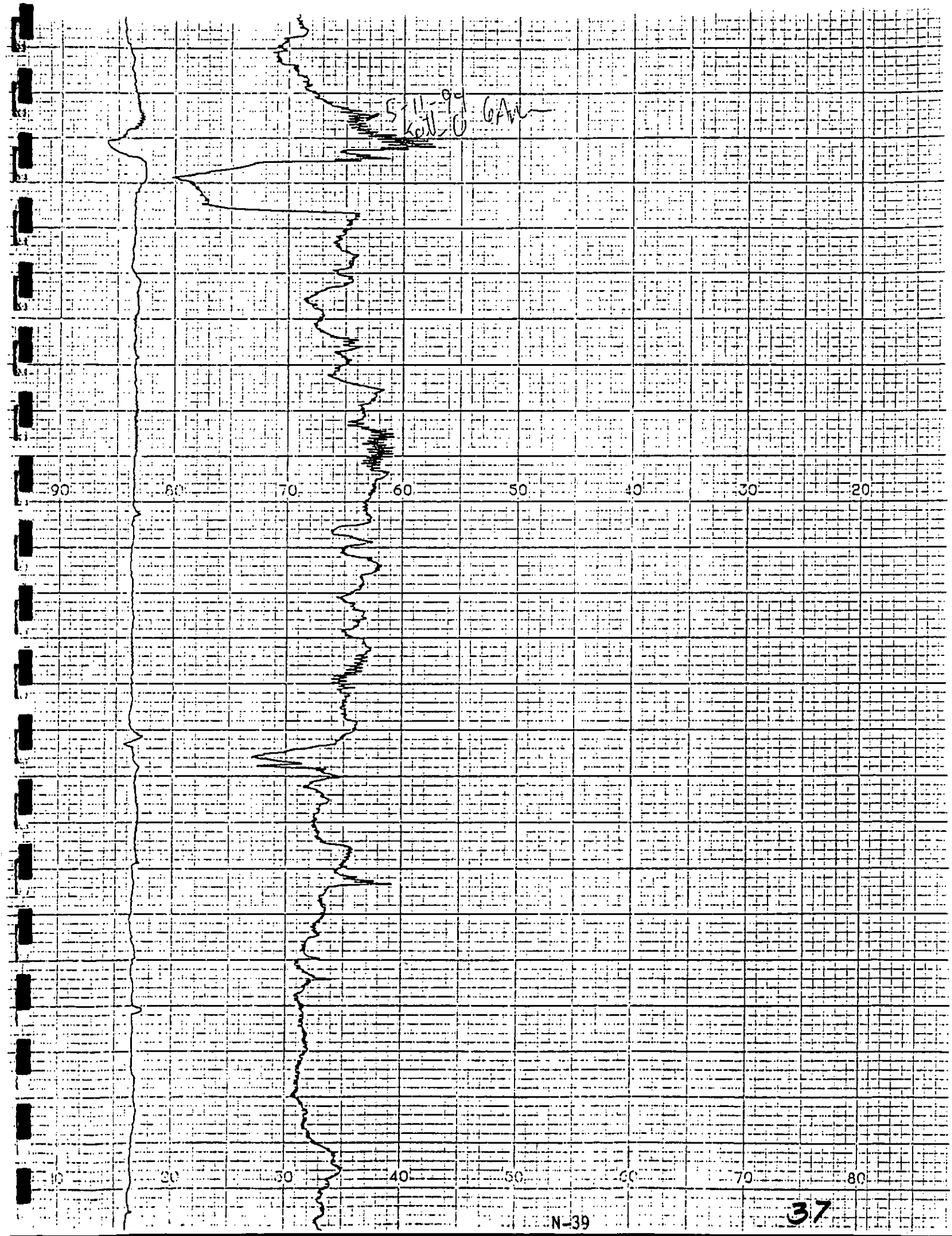
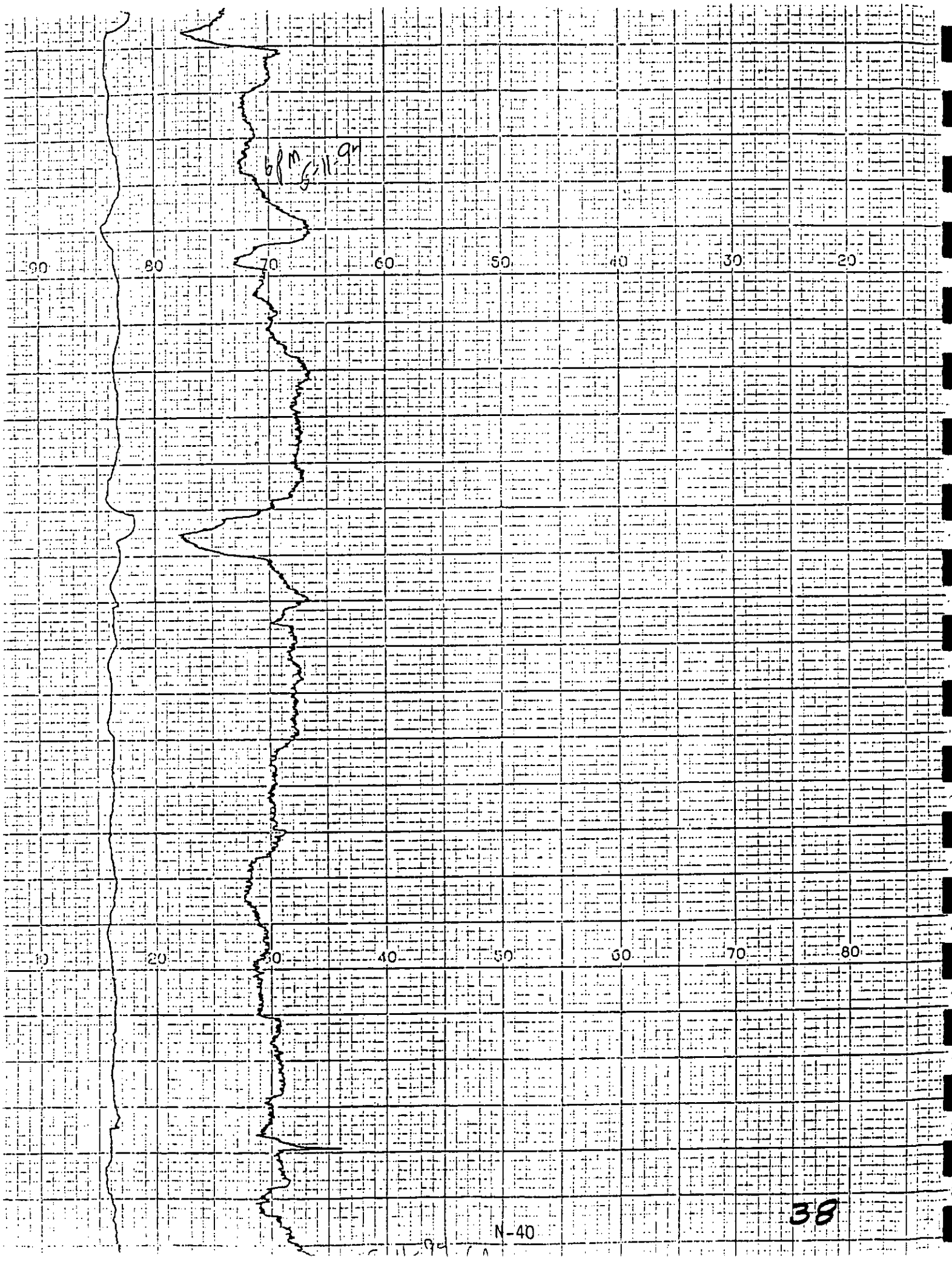
40
30
20
Keith-0
1000 5-10-94
SE
10-94
36
N-38



N-39

37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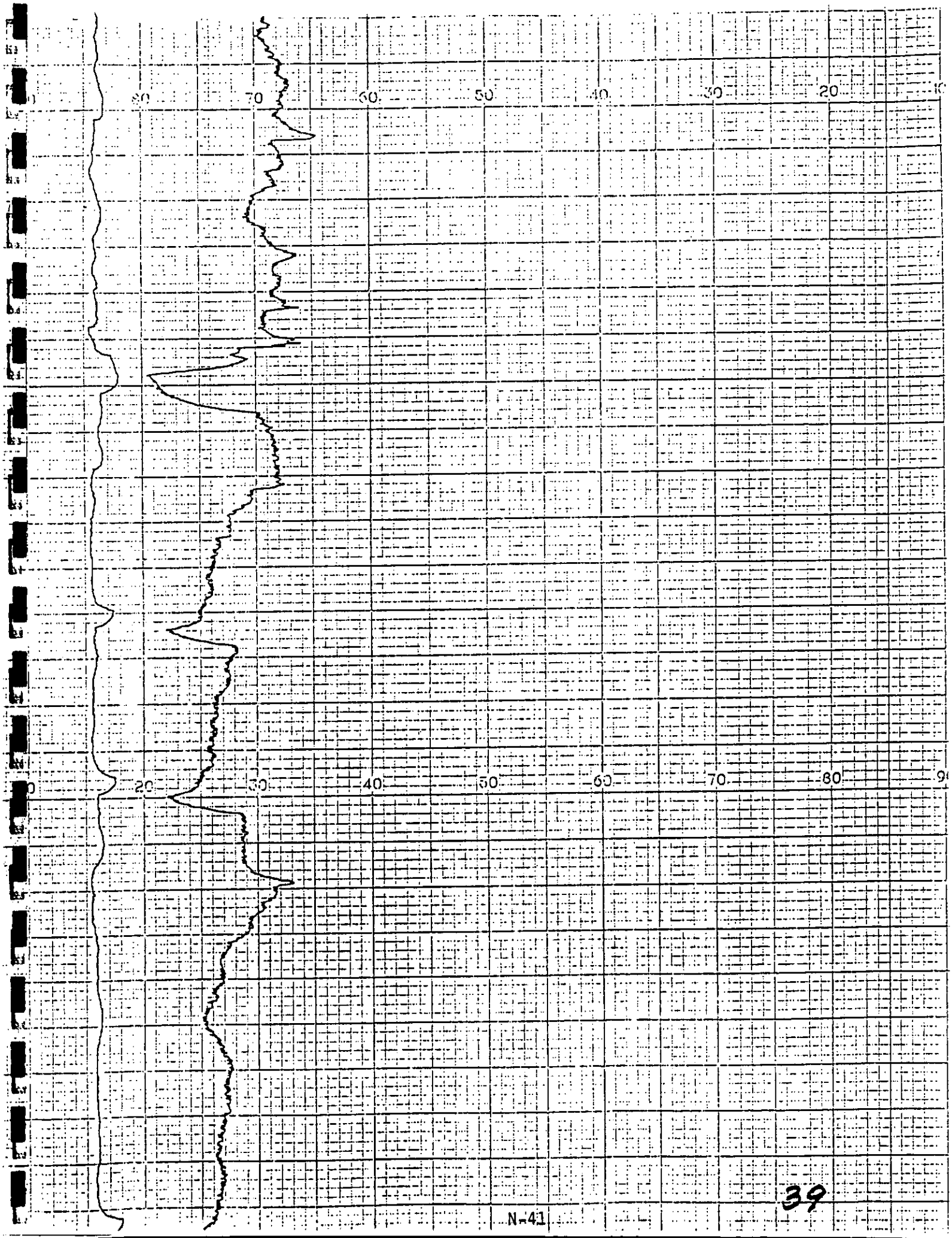
38
N-40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70
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20
30
40
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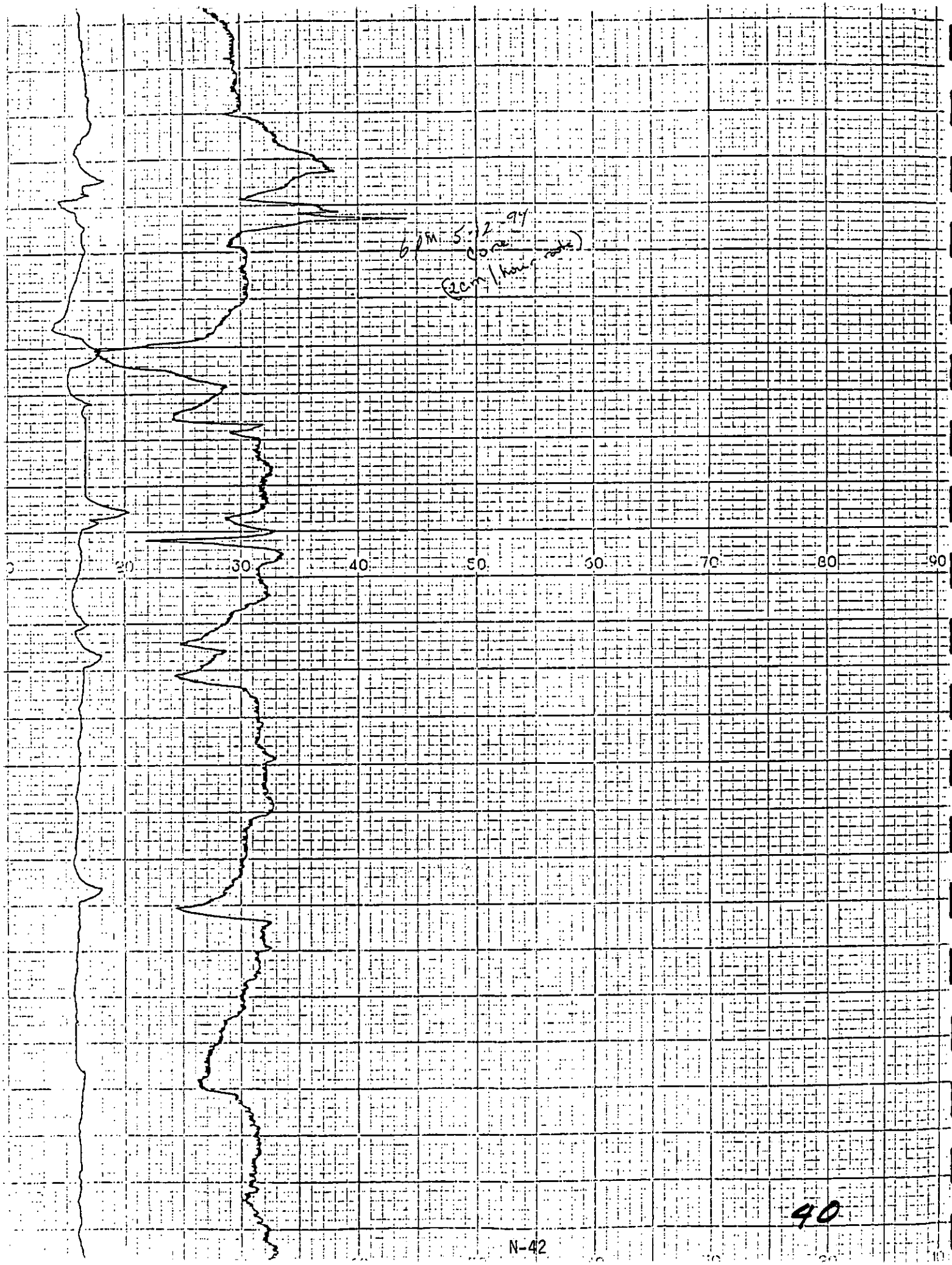
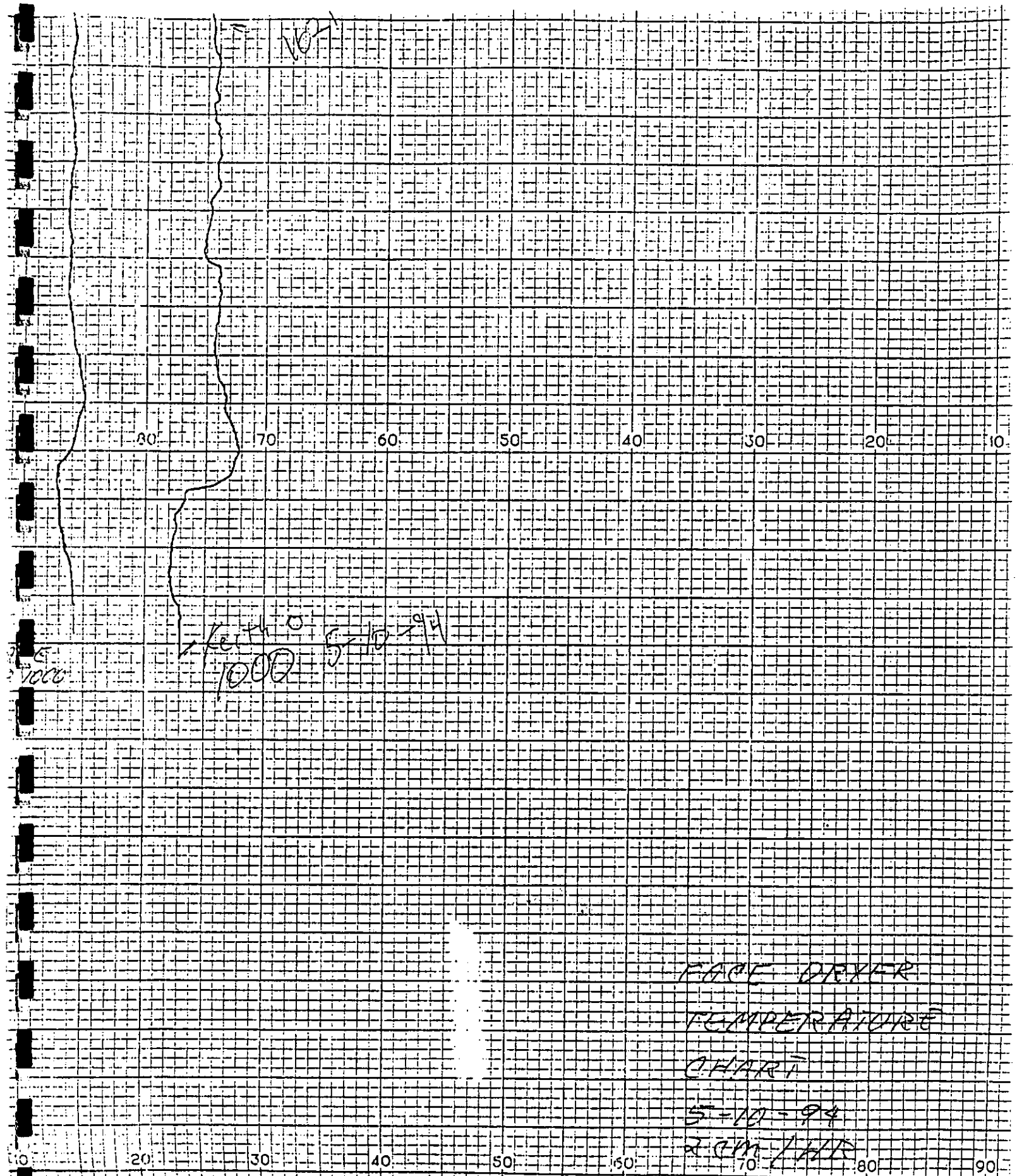
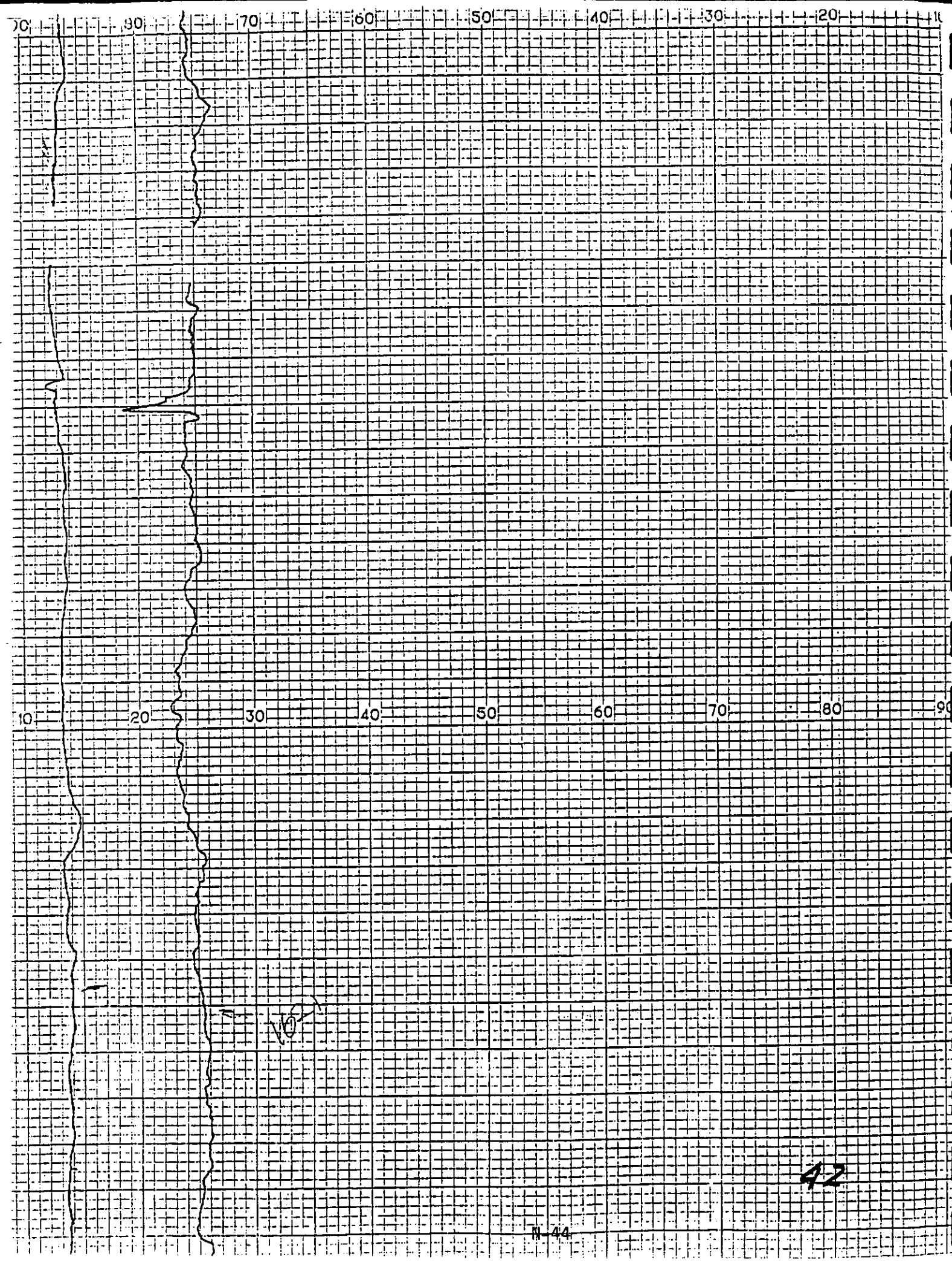
70
80
90


6 fm 5:12 94
core
(2cm/hour)
20
30
40
50
60
70
80
90
40



FACE DRYER
TEMPERATURE
CHART
5-10-94
2 CM / HR


90
80
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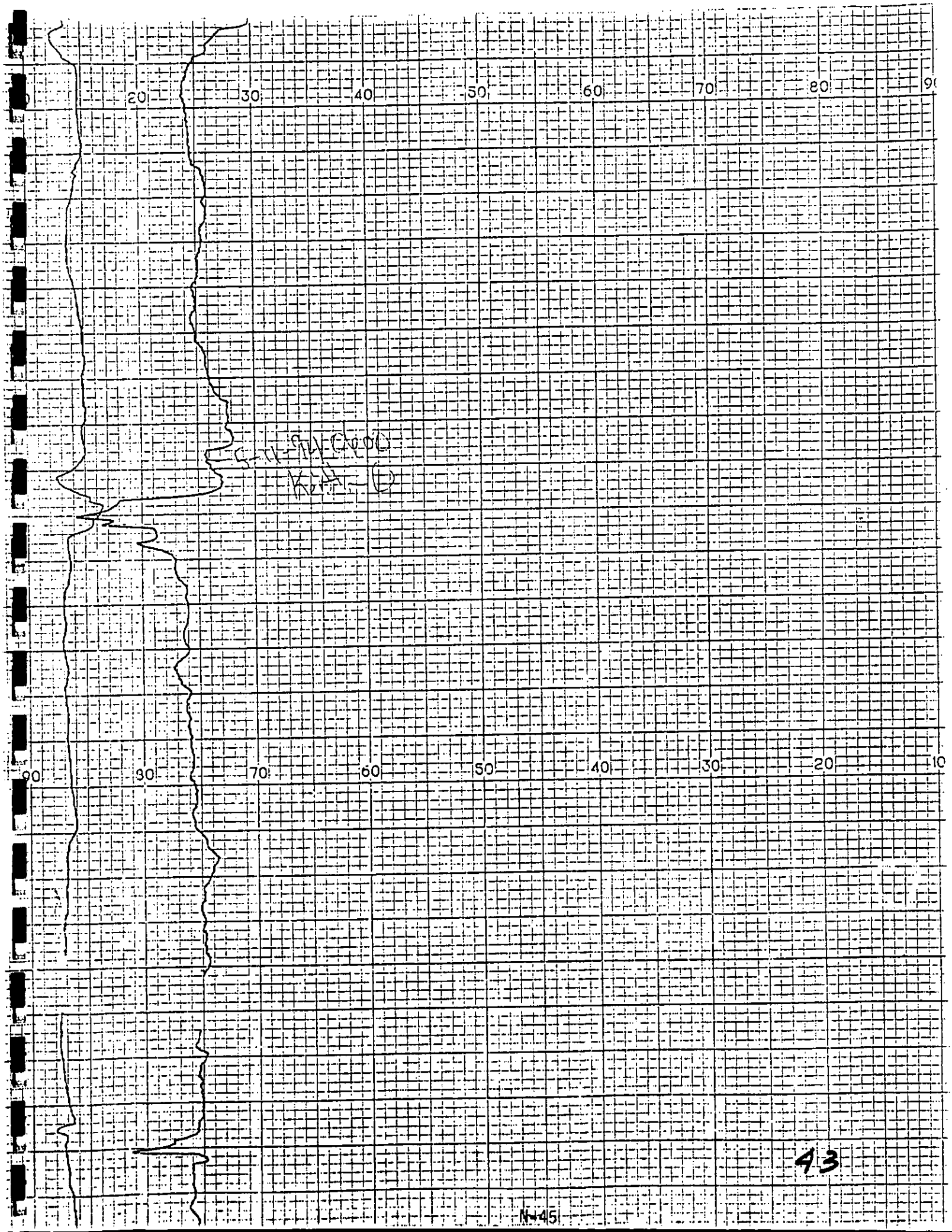
20
30
40
50
60
70
80
90
42
N-44


20
30
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70
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90
5-11-94 (100)
Kent. D
90
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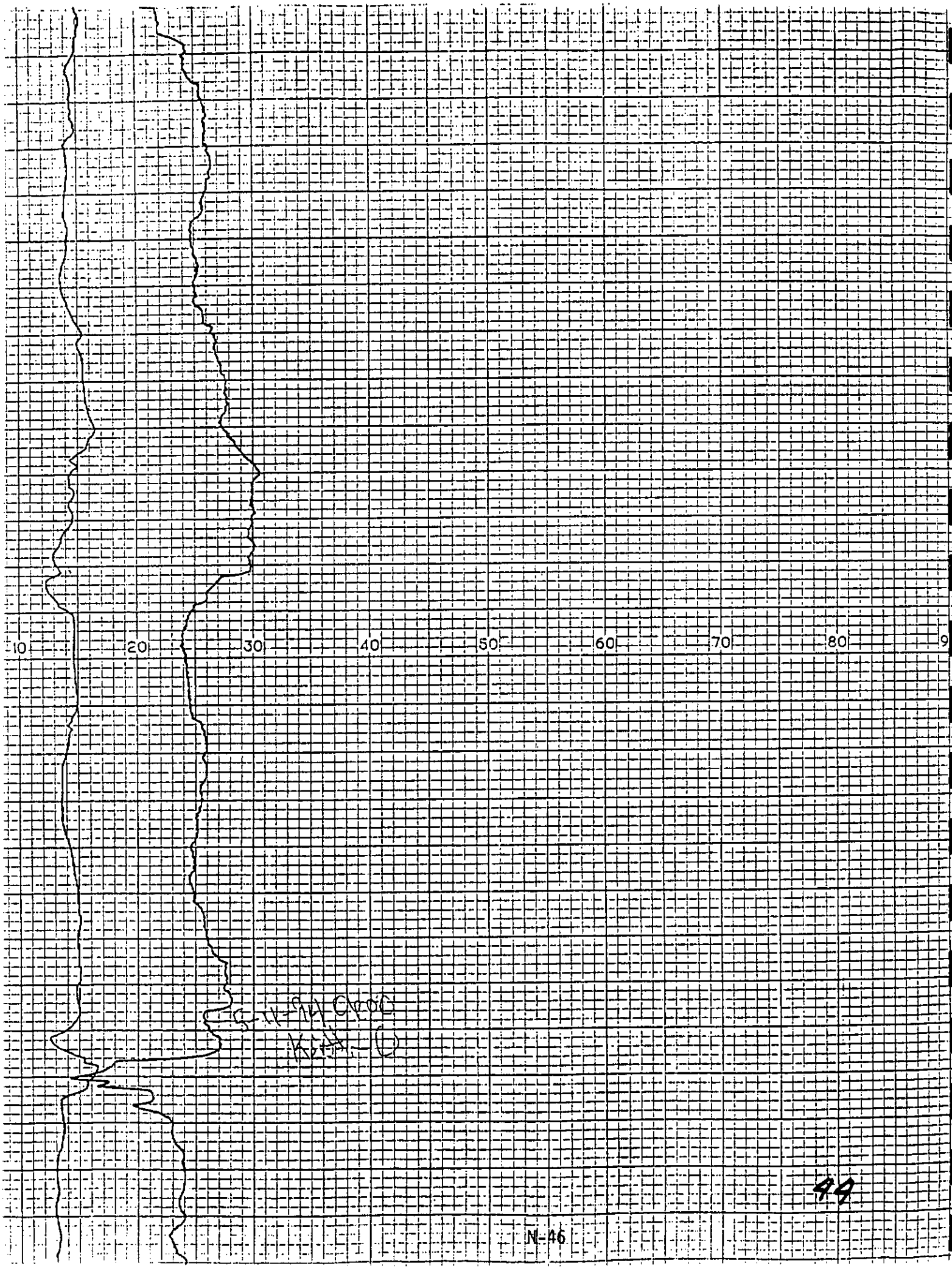
10
43
N-45


10
20
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70
80
9
44

0600 - 1800

LINE II PRODUCTION LOG

SHIFT C

DATE [illegible]

THICKNESS 11/16

WEIGHT 23.1 lbs/ft

DISTANCE WEDGES 1.30 mm

LINE SPEED 21.2 ft/min

PRE PRESS SHIM BLOCKS 12 mm

BULK DENSITY 14.9 lbs/cu ft

PRESS TEMPERATURE CONTROL SETTINGS

Inlet Pump 1 190 Sec.1 (Infeed) 195 Sec.2 (Middle) 200 (210) Sec.3 (Outfeed) 170

Inlet Pump 2 _____ _____ _____ _____

	RESIN USAGE (lbs)	WAX USAGE (lbs)	WOOD USAGE
FACE	[illegible]	36683	191100
CORE	15096	3121	118110

RESIN STORAGE TANK LEVELS

1. 9' 5
2. 16' 10
3. 3' 10
4. 16'

DOWN TIME REPORT

TIME IN	TIME OUT	OPER	MECH	ELEC	CODE	DESCRIPTION	COMMENTS	DOWN TIME
					200	STORAGE		
					210	MILLING & DRY		
					220	BLENDING AREA		
					230	FORMING MACHINE		
					240	PREPRESS		
					250	PRESS		
					260	FLYING SAWS		
					270	COOLING WHEEL		
					280	SAWS		
					290	START		
					300	MISCELLANEOUS		
						3 matches		.06

Total Downtime .06

SAW REPORT

THICKNESS	CUT SIZE	NUMBER OF PIECES		
11/16	41 x 110	336	12	336
11/16	49 x 109	1604	8	1604
11/16	49 x 143 & 74	168 EA.	4	168 EA.
11/16	41 x 121 & 97	452 EA.	4	452 EA

95

1800 - 0600

LINE II PRODUCTION LOG

SHIFT A

DATE 5-10-74

THICKNESS 1 1/16

WEIGHT 23.1 lbs/ft

DISTANCE WEDGES 18.50 mm

LINE SPEED 21.2 ft/min

PRE PRESS SHIM BLOCKS 120 mm

BULK DENSITY 14 lbs/cu ft

PRESS TEMPERATURE CONTROL SETTINGS

Inlet Pump 1 195 Sec.1 (Infeed) 195 Sec.2 (Middle) 210 Sec.3 (Outfeed) 170

Inlet Pump 2 195

	RESIN USAGE (lbs)	WAX USAGE (lbs)	WOOD USAGE
FACE	23595	1264	192500
CORE	14559	2600	115590

RESIN STORAGE TANK LEVELS

1. 4 7
2. 16 10
3. 0 0
4. 15 7

DOWN TIME REPORT

TIME IN	TIME OUT	OPER	MECH	ELEC	CODE	DESCRIPTION	COMMENTS	DOWN TIME
					200	STORAGE		
					210	MILLING & DRY		
					220	BLENDING AREA		
					230	FORMING MACHINE		
					240	PREPRESS		
					250	PRESS		
					260	FLYING SAWS		
					270	COOLING WHEEL		
					280	SAWS		
					290	START		
					300	MISCELLANEOUS		

Total Downtime

SAW REPORT

THICKNESS	CUT SIZE	NUMBER OF PIECES
1 1/16	49 x 121 + 97	74 X Each
1 1/16	49 x 122 + 97	842 Each

½ EA 754 E

0 84

96

ND 6765

5-10-94

by bm
page 1 of 2

Missoula testing
press room readings – dryer testing
board density once per hour – other readings once every 10 minutes
indicate time and duration of any reject material

Bd thickness avg.	time	line speed	target density	actual density oven/hr	face bin level	core bin level	face material in lbs.	core material in lbs.	face resin lbs	core resin lbs	board count
669	0730	21	46.0	46.0	1/2	1/4	27000	16600	3375	2135	12
	0740	21	46.0		3/4	1/4	29900	18220	3727	2335	24
	0750	21	46.0		3/4	1/4	32500	19743	4050	2530	35
668	0800	21	46.0	45.2	3/4	1/4	35300	21440	4397	2746	47
	0810	21	46.0		1/2	1/4	37900	23000	4720	2947	57
	0820	21	46.0		1/2	1/4	40800	24790	5080	3175	71
	0830	21	46.0		1/2	1/4	43500	26475	5415	3390	85
	0840	21	46.0		1/2	1/2	46450	28330	5780	3625	97
	0850	21	46.0		1/2	1/2	48800	29854	6070	3820	107
	0900	21	46.		1/2	1/2	51610	31500	6441	4054	119
667	0910	21.2	46.0	45.4	1/2	1/2	54480	33321	6787	4268	130
	0920	21.2	46.0		1/2	1/4	56900	34750	7078	4446	139
	0930	21.2	46.0		1/2	1/4	59570	36340	7411	4650	145
	0940	21.2	46.0		3/4	1/4	62200	37860	7740	4845	157
	0950	21.2	46.0		1/2	1/4	64700	39275	8050	5025	169
	1000	21.2	46.0		3/4	1/4	67300	40800	8370	5220	180
	1010	21.2	46.0		1/2	1/4	70050	42500	8712	5437	192
665	1020	21.2	46.0	45.5	1/2	1/4	72750	44200	9045	5652	204
	1030	21.2	46.0		1/2	1/4	74600	45700	9275	5845	214
	1040	21.2	46.0		1/2	1/4 *	77450	47555	9630	6080	226
	1050	21.2	46.0		1/2	1/4 *	79700	49060	9910	6273	236
	1100	21.2	46.0	F	1/2	1/4 *	82400	50900	10250	6510	248
	1110	21.2	46.0	O	1/2	1/4 *	85200	52800	10600	6755	261
	1120	21.2	46.0	R	1/2	1/4 *	87500	54300	10880	6943	273
	1130	21.2	46.0	G	1/2	1/4 *	90100	55920	11200	7150	283
	1140	21.2	46.0	O	3/4	1/4 *	92800	57630	11536	7365	295
	1150	21.2	46.0	T	3/4	1/4 *	95300	59205	11847	7570	306
667	1200	21.2	46.0	45.2	3/4	1/4 *	97850	60815	12167	7775	317
	1210	21.2	46.0		3/4	1/4 *	100450	62400	12488	7979	328
	1220	21.2	46.0		3/4	1/4 *	103050	63990	12809	8181	340
	1230	21.2	46.0		3/4	1/4 *	105700	65630	13138	8390	351
	1240	21.2	46.0		3/4	1/4 *	108400	67320	13475	8605	362
	1250	21.2	46.0		3/4	1/4 *	111000	68940	13796	8814	373

* – denotes flashing dry bin level lite or no lite @ all

Metal Rejects

0831 → 0833 = 2 min.
1206 → 1208 = 2 min.
1258 → 1300 = 2 min

10-May-94

97

5-10-94

Missoula testing

press room readings – dryer testing

board density once per hour – other readings once every 10 minutes

Indicate time and duration of any reject material

by Tom

page 2 of 4

	time	line speed	target density	actual density once/hr	face bin level	core bin level	face material in lbs.	core material in lbs.	face resin lbs	core resin lbs	board count
38 thickness AVG.	1300	21.2	46.0		3/4	1/4 *	113650	70630	14125	9030	385
	1310	21.2	46.0		3/4	1/4 *	116300	72300	14451	9244	394
46.8	1320	21.2	46.0	45.8	3/4	1/4 *	119900	73980	14850	9470	3
	1330	21.2	46.0		3/4	1/4	121700	75750	15120	9680	17
	1340	21.5	46.0		3/4	1/4	123950	77260	15405	9875	26
	1350	21.5	46.0		3/4	1/4	126750	79120	15752	10115	39
47.1	1400	21.5	46.0	45.4	3/4	1/4	129300	80800	16065	10329	49
	1410	21.5	46.0		3/4	1/4 *	131950	82600	16397	10558	61
	1420	21.5	46.0		3/4	1/4	135540	84900	16845	10854	76
	1430	21.5	46.0		3/4	1/4	137150	85840	17041	10973	83
	1440	21.5	46.0		3/4	1/4	139850	87350	17375	11165	6
	1450	21.5	46.0		3/4	1/4	142750	89020	17737	11380	18
47.3	1500	21.5	46.0	45.4	3/4	1/4	145850	90780	18122	11605	29
	1510	21.5	46.0		3/4	1/4	148900	92550	18500	11830	42
	1520	21.5	46.0		3/4	1/4	151200	93800	18780	12000	52
	1530	21.5	46.0		3/4	1/4	154450	95840	19970	12250	65
	1540	21.5	46.0		3/4	1/4	156570	97075	19455	12409	74
	1550	21.5	46.0		3/4	1/4	159670	98900	19840	12640	86
47.1	1600	21.5	46.0	45.3	3/4	1/4	162200	100421	20157	12836	97
	1610	21.5	46.0		3/4	1/4	164850	101990	20483	13037	108
	1620	21.5	46.0		3/4	1/4 *	167550	103600	20818	15243	119
	1630	21.5	46.0		3/4	1/4 *	170000	105081	21122	13432	130
	1640	21.5	46.0		3/4	1/4 *	172300	106840	21407	13656	141
	1650	21.5	46.0		3/4	1/4 *	175050	108500	21751	13869	153
47.0	1700	21.5	46.0	45.3	3/4	1/4 *	177800	110160	22092	14080	164
	1710	21.5	46.0		3/4	1/4 *	180450	111800	22435	14230	175
	1720	21.5	46.0		3/4	1/4 *	183130	113380	22762	14490	186
	1730	21.2	46.0		3/4	1/4 *	185750	114900	23080	14687	197
	1740	21.2	46.0		3/4	1/4 *	188750	116740	23452	14921	210
	1750	21.2	46.0		3/4	1/4 *	191100	118110	23740	15096	220
											226 +

Cut

* – Denotes Flashing Dry Bin level lite or no lite @ all

Metal Rejects

10-May-94

48

5-10-94

by Sam - A shift

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Panel Length 220"
width 102"

Missoula testing

press room readings – dryer testing

board density once per hour – other readings once every 10 minutes

Indicate time and duration of any reject material

	time	line speed	target density	actual density once/hr	face bin level	core bin level	face material in lbs.	core material in lbs.	face resin lbs	core resin lbs	board count
	1800	21.2	45.0		3/4	F 1/4	194200	119950	24125	15330	7 Panels
	1810	"	"		"	"	196500	121320	24415	15500	17
	20	"	"		"	"	199150	122880	24740	15700	28
Test	30	"	"	45.6	1/2	F 1/4	201600	124350	25045	15890	39
	40	"	"		"	"	204400	125980	25390	16100	50
	50	"	"		"	"	207100	127560	25725	16300	61
	1900	"	"		"	"	210050	129250	26095	16515	73
	10	"	"		"	"	212360	130590	26380	16685	83
	20	"	"		"	"	215250	132250	26741	16900	93
strip	30	"	"	45.3	"	"	218100	133900	27090	17110	105
	40	"	"		"	"	220700	135400	27410	17295	116
	50	"	"		"	"	223650	137100	27770	17510	128
	2000	21.5	"		"	"	226450	138700	28110	17710	139
	10	"	"		"	"	229200	140730	28450	17970	153
	20	"	"		"	"	231500	142225	28735	18155	164
Test	30	"	"	44.9	"	"	233640	143520	28995	18320	174
	40	"	"		"	"	236000	144950	29282	18500	183
	50	"	"		"	"	238980	146730	29659	18731	197
	2100	21.5	"		"	"	242190	148540	30052	18964	208
	10	"	"		"	"	244400	149870	30323	19125	217
	20	"	"		"	"	247680	151800	30717	19370	230
strip	30	"	"	45.0	"	"	249750	153100	30965	19527	239
	40	"	"	45.0	"	"	252450	154700	31295	19730	250
	50	"	"		"	"	255100	156300	31616	19930	261
	2200	"	"		"	"	257850	158000	31955	20145	273
	10	"	"		"	"	260900	159760	32330	20365	286
	20	"	"		"	"	264270	161790	32744	20626	300
Test	30	"	"	44.6	"	"	266100	162890	32960	20760	308
	40	"	"		"	"	268500	164325	33260	20942	318
	50	"	"		"	"	271350	166000	33605	21155	330
	2300	"	"		"	"	273900	167520	33915	21345	341
	10	"	"		"	"	277300	169600	34330	21608	355
	20	"	"		"	"	279700	171100	34630	21795	370
strip	30	"	"		"	"	282200	172700	34935	22000	3
	40	"	"		"	"	284800	174350	35245	22200	13
	50	"	"		"	"	287900	176100	35649	22433	27

1920 – Dropped face + core resin .2 (gal/1000) each
2003 – Face feed off for 1 minute
2154 – pulled out of press – metal
2155 – back in press – after metal
2300 – Refeeding boards off escape stacker → 2314 Finished
* 2325 – change Flying saw length → 219.50 To 220.50
Total → 49 x 121 + 97 → 754 Each → Now cutting 49 x 122 + 97

10-May-94

49

5-10-94

Missoula testing

press room readings – dryer testing

by _____

page 4 of 4

board density once per hour – other readings once every 10 minutes

indicate time and duration of any reject material

time	line speed	target density	actual density ounce/hr	face bin level	core bin level	face material in lbs.	core material in lbs.	face resin lbs	core resin lbs	board count
0000	21.5	45	44.6	1/2	F 1/4	290400	177400	35954	22599	37
10										
20										
30										
40										
50										

10-May-94

50

5-10-94 C

TEST #	TIME	THICKNESS	DENSITY
1	6:10 AM	.669"	46.0
2	8:00 AM	.668	45.2
3	9:05 AM	.667	45.4
4	10:20 AM	.665	45.5
5	11:55 AM	.667	45.2
6	1:20 PM	.668	45.8
7	2:00 PM	.671	45.4
8	3:00 PM	.673	45.4
9	4:00 PM	.671	45.3
10	5:00 pm	.670	45.3

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LINE II Tests

6:30 pm	668	45.3
7:30 pm	666	45.3
8:30 pm	663	44.9
9:30 pm	667	45.0
10:30 pm	676	44.6
11:30 pm	674	44.6
12:30 Am	676	44.7

Andy, Tim said to Stop at 12:30
they quit testing at MIDNIGHT

Sam

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MISSOULA PRESS VENT/BOARD COOLER TESTING 5-11-94 PM, CO, Nox

DATA TIME: START= 11:00 END= 16:00 HOURS= 5.00

TOTAL HOURS = 5.00

LINE 2 PRESS PRODUCTION RATE - pressed to11/16", finished to 5/8

5.00 =hours during testing
PRODUCTION RATE BY BOARD COUNT
5/8" =marketed thickness of boards produced
214 = no of boards produced (49"x85")
740 = no of boards produced (49"x97")
452 = no of boards produced (49"x122")

trimmed width	trimmed length	trimmed cubic feet	out of press width	out of press length	out of press cubic feet	% of trim
49	85	322	51	85.75	338	4.76%
49	97	1272	51	97.75	1334	4.66%
49	122	977	51	122.75	1023	4.51%

weighted average = 4.63%

45.35 = average actual density of board produced (lb/cubic foot)
0.670 = average actual thickness of board produced
48.58 = average nominal density of board produced
(lb./cubic foot)((.6875/actual thickness) x actual density))
2572 =total nominal cubic feet of board produced
124941 =total pounds of finished board produced during testing
24988 =total pounds of finished board produced per hour during testing
62.5 =total tons of finished board produced during testing
12.49 =total tons of finished board produced per hour during testing

41149 = footage produced during testing (3/4" basis)
8,230 = footage produced per hour during testing (3/4" basis)
197,516 = equivalent daily footage (3/4" basis)

78400 =total pounds of face material through scales during testing
50795 =total pounds of core material through scales during testing
4821 =total pounds of face resin through scales during testing at 100% solids.(solids = 50.2%)
3721 =total pounds of core resin through scales during testing at 100% solids. (solids = 57.4 %)
137737 =total pounds of material into press during testing (sum of material and resin)
27547 =total pounds of material into press per hour during testing (sum of material and resin)
68.9 =total tons of material into press during testing (sum of material and resin)
13.77 =total tons of material into press per hour during testing (sum of material and resin)
9.29% = percentage of loss (trim and water) from material into press and finished product

MISSOULA PRESS VENT/BOARD COOLER TESTING 5-11-94 PM, CO, Nox

DATA TIME: START= 11:00 END= 16:00 HOURS= 5.00

TOTAL HOURS = 5.00

WAX AND RESIN USAGE

1.22% =face wax as a % of finished product as applied
0.60% =face wax as a % of finished product (100% solids)
1524 =face wax usage during testing as applied
305 =face wax usage per hour during testing as applied
747 =face wax usage during testing at 100% solids (solids = 49%)
149 =face wax usage per hour during testing at 100% solids (solids = 49%)

7.69% =face resin as a % of finished product as applied
3.86% =face resin as a % of finished product (100% solids)
9603 =face resin usage during testing as applied
1921 =face resin usage per hour during testing as applied
4821 =face resin usage during testing at 100% solids (solids = 50.2%)
964 =face resin usage per hour during testing at 100% solids (solids = 50.2%)

1.10% =core wax as a % of finished product as applied
0.54% =core wax as a % of finished product (100% solids)
1370 =core wax usage during testing as applied
274 =core wax usage per hour during testing as applied
671 =core wax usage during testing at 100% solids (solids = 49%)
134 =core wax usage per hour during testing at 100% solids (solids = 49%)

5.19% =core resin as a % of finished product as applied
2.98% =core resin as a % of finished product (100% solids)
6483 =core resin usage during testing as applied
1297 =core resin usage per hour during testing as applied
3721 =core resin usage during testing at 100% solids (solids = 57.4%)
744 =core resin usage per hour during testing at 100% solids (solids = 57.4%)

5.60 =gallons of catalyst used during testing at 23% solids
1.12 =gallons of catalyst used per hour during testing at 23% solids
8.92 =lbs per gallon of catalyst mix
9.99 =pounds of catalyst mix used per hour during testing
0.040% =catalyst as % of finished product (as applied, 23% solids)
2.30 =pounds of catalyst used per hour during testing (100% solids)
0.009% =catalyst as % of finished product (100% solids)

210.9 =average press temperature in degrees C (center reading)

MISSOULA PRESS VENT/BOARD COOLER TESTING 5-11-94 formaldehyde and VOC

DATA TIME START= 16:30 END= 21:00 HOURS= 4.50

TOTAL HOURS = 4.50

LINE 2 PRESS PRODUCTION RATE - pressed to11/16", finished to 5/8

4.50 =hours during testing
PRODUCTION RATE BY BOARD COUNT
5/8" =marketed thickness of boards produced
1396 = no of boards produced (49"x85")

trimmed width	trimmed length	trimmed cubic feet	out of press width	out of press length	out of press cubic feet	% of trim	
49	97	2400	51	97.75	2517	4.66%	65.03606

weighted average = 4.66%

45.85 = average actual density of board produced (lb/cubic foot)
0.667 = average actual thickness of board produced
48.89 = average nominal density of board produced
(lb./cubic foot)((.6875/actual thickness) x actual density))
2400 =total nominal cubic feet of board produced
117338 =total pounds of finished board produced during testing
26075 =total pounds of finished board produced per hour during testing
58.7 =total tons of finished board produced during testing
13.04 =total tons of finished board produced per hour during testing

38398 = footage produced during testing (3/4" basis)
8,533 = footage produced per hour during testing (3/4" basis)
204,790 = equivalent daily footage (3/4" basis)

71850 =total pounds of face material through scales during testing
45620 =total pounds of core material through scales during testing
4449 =total pounds of face resin through scales during testing at 100% solids.(solids = 50.2%)
3327 =total pounds of core resin through scales during testing at 100% solids. (solids = 57.4 %)
125246 =total pounds of material into press during testing (sum of material and resin)
27832 =total pounds of material into press per hour during testing (sum of material and resin)
62.6 =total tons of material into press during testing (sum of material and resin)
13.92 =total tons of material into press per hour during testing (sum of material and resin)
6.31% = percentage of loss (trim and water) from material into press and finished product

MISSOULA PRESS VENT/BOARD COOLER TESTING 5-11-94 formaldehyde and VOC

DATA TIM START= 16:30 END= 21:00 HOURS= 4.50

TOTAL HOURS = 4.50

WAX AND RESIN USAGE

1.43% =face wax as a % of finished product as applied
0.70% =face wax as a % of finished product (100% solids)
1679 =face wax usage during testing as applied
336 =face wax usage per hour during testing as applied
822 =face wax usage during testing at 100% solids (solids = 49%)
164 =face wax usage per hour during testing at 100% solids (solids = 49%)

7.55% =face resin as a % of finished product as applied
3.79% =face resin as a % of finished product (100% solids)
8862 =face resin usage during testing as applied
1969 =face resin usage per hour during testing as applied
4449 =face resin usage during testing at 100% solids (solids = 50.2%)
989 =face resin usage per hour during testing at 100% solids (solids = 50.2%)

1.19% =core wax as a % of finished product as applied
0.58% =core wax as a % of finished product (100% solids)
1395 =core wax usage during testing as applied
279 =core wax usage per hour during testing as applied
684 =core wax usage during testing at 100% solids (solids = 49%)
137 =core wax usage per hour during testing at 100% solids (solids = 49%)

4.94% =core resin as a % of finished product as applied
2.84% =core resin as a % of finished product (100% solids)
5796 =core resin usage during testing as applied
1288 =core resin usage per hour during testing as applied
3327 =core resin usage during testing at 100% solids (solids = 57.4%)
739 =core resin usage per hour during testing at 100% solids (solids = 57.4%)

6.00 =gallons of catalyst used during testing at 23% solids
1.33 =gallons of catalyst used per hour during testing at 23% solids
8.92 =lbs per gallon of catalyst mix
11.89 =pounds of catalyst mix used per hour during testing
0.046% =catalyst as % of finished product (as applied, 23% solids)
2.74 =pounds of catalyst used per hour during testing (100% solids)
0.010% =catalyst as % of finished product (100% solids)

212 =average press temperature in degrees C (center reading)

PRODUCTION REPORT LINE #1 11-May-94

	TODAY		MTD	
	STANDARD	ACTUAL	STANDARD	ACTUAL
RAWBOARD 3/4 BASIS	316,000	321,571.62	3,160,000	3,064,081.10
NET SHIFTS OPERATED	2	2	20	20
NET SHIFT AVERAGE	158,000	160,785.81	158,000	153,204.06

	SHIFTS WORKED	TOTAL TODAY	TOTAL MTD
SHIFT A	6	166,234.71	889,511.99
SHIFT B	4	0.00	635,881.58
SHIFT C	6	155,336.91	920,187.32
SHIFT D	4	0.00	618,500.22

	SHIFT AVERAGE
SHIFT A	148,252.00
SHIFT B	158,970.39
SHIFT C	153,364.55
SHIFT D	154,625.05
SHIFT AVERAGE NET	153,803.00 (UNSCHEDULED DT)

	TODAY	MTD
WOOD SHAVINGS USEAGE	463.91	4549.66

PRODUCTION REPORT LINE #2

	TODAY		MTD	
	STANDARD	ACTUAL	STANDARD	ACTUAL
RAWBOARD 3/4 BASIS	134,000	173,445.04	1,340,000	1,525,656.56
NET SHIFTS OPERATED	2	2	20	19.5
NET SHIFT AVERAGE	67,000	86,722.52	67,000	76,282.83

	SHIFTS WORKED	TOTAL TODAY	TOTAL MTD
SHIFT A	5.5	85,530.48	444,980.76
SHIFT B	4	0.00	313,620.77
SHIFT C	6	87,914.55	490,625.46
SHIFT D	4	0.00	276,429.56

	SHIFT AVERAGE	COMBINED LINE 1 & 2 SHIFT AVERAGE
SHIFT A	80,905.59	229,158
SHIFT B	78,405.19	237,376
SHIFT C	81,770.91	235,135
SHIFT D	69,107.39	223,732
SHIFT AVERAGE NET	77,547.27 (UNSCHEDULED DT)	

	TODAY	MTD	TOTAL PRODUCTION LINE 1&2 MTD
WOOD SHAVINGS USEAGE	240.63	2146.22	4,589,738

TODAYS TOTAL PRODUCTION 3/4 BASIS 495,016.65

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LINE II PRODUCTION LOG

SHIFT 3 | DATE 5/11/84

THICKNESS 11/16 | WEIGHT 23.1 lbs/ft

DISTANCE WEDGES 15.7 mm | LINE SPEED 21.5 ft/min

PRE PRESS SHIM BLOCKS 120 mm | BULK DENSITY 14.9 lbs/cu ft

PRESS TEMPERATURE CONTROL SETTINGS

Inlet Pump 1 190 Sec.1 (Infeed) 195 Sec.2 (Middle) 180 Sec.3 (Outfeed) 170

Inlet Pump 2 ____ ____ ____ ____

	RESIN USAGE (lbs)	WAX USAGE (lbs)	WOOD USAGE
FACE	23460	3275	171850
CORE	15470	3177	121210

RESIN STORAGE TANK LEVELS

1. Ø
2. 16'
3. Ø
4. 12'8

DOWN TIME REPORT

TIME IN	TIME OUT	OPER	MECH	ELEC	CODE	DESCRIPTION	COMMENTS	DOWN TIME
					200	STORAGE		
					210	MILLING & DRY		
					220	BLENDING AREA		
					230	FORMING MACHINE		
					240	PREPRESS		
					250	PRESS		
					260	FLYING SAWS		
					270	COOLING WHEEL		
					280	SAWS		
					290	START		
					300	MISCELLANEOUS		

Total Downtime Ø

SAW REPORT

THICKNESS	CUT SIZE	NUMBER OF PIECES	
	49 x 122 & 97	668 EA.	1582
11/16	49 x 122 & 85	214 EA.	Ø
11/16	49 x 97	1552	Ø

702 EA.
214 EA.
1552
58

ND 6765

LINE II PRODUCTION LOG

SHIFT [illegible]
THICKNESS [illegible]
DISTANCE WEDGES [illegible] mm
PRE PRESS SHIM BLOCKS [illegible] mm

DATE 5-11-94
WEIGHT 23.1 25.2 lbs/ft 14.6
LINE SPEED 21.5 19 ft/min 33
BULK DENSITY 14.7 14.7 lbs/cu ft 14.7

PRESS TEMPERATURE CONTROL SETTINGS

Inlet Pump 1 192 Sec.1 (Infeed) 195 Sec.2 (Middle) 210 Sec.3 (Outfeed) 170
Inlet Pump 2 192

	RESIN USAGE (lbs)	WAX USAGE (lbs)	WOOD USAGE
FACE	22150	4169	174650
CORE	14530	3144	1150600

RESIN STORAGE TANK LEVELS

1. 0 0
2. 10 9
3. 0 0
4. 9 10

DOWN TIME REPORT

TIME IN	TIME OUT	OPER	MECH	ELEC	CODE	DESCRIPTION	COMMENTS	DOWN TIME
					200	STORAGE		
					210	MILLING & DRY		
					220	BLENDING AREA		
					230	FORMING MACHINE		
					240	PREPRESS		
					250	PRESS		
					260	FLYING SAWS		
					270	COOLING WHEEL		
					280	SAWS		
					290	START		
					300	MISCELLANEOUS		
0146	0200	✓				Stop Change	11/16 To 12/16	.14
0438	0445	✓				Stop Change	12/16 To 7/16	.17

Total Downtime .31

SAW REPORT

THICKNESS	CUT SIZE	NUMBER OF PIECES
[illegible]	49 X 97	2316
12/16	49 X 85	746
7/16	49 X 97	520

2
2
20

23
7
5

59

ND 6765

5-11-99

Missoula testing

press room readings – press testing

by Tom

page 1 of 3

board density, thickness, wax and catalyst once per hour – other readings once every 10 minutes

indicate time and duration of any reject material

indicate time of size changes

GALLON LEVEL INDICATOR

Actual Dry Thickness Avg.	time	line speed	target density	℄ press temp	face bin level	core bin level	face material in lbs.	core material in lbs.	face resin lbs	core resin lbs	cut size	board count	wax lbs once/hr	catalyst lbs once/hr
661 / 452	0800	21	46.	210	1/2	1/4 *	37380	22870	4574	2880	49 x 122 & 97	139	F = 169	80
	0810	21	46	210	1/2	1/4 *	38873	24100	4756	3038		147	C = 500	
	0820	21	46	210	1/2	1/4 *	41500	26000	5081	3278		157		
	0830	21	46	210	1/2	1/4 *	44000	27315	5385	3446		167		
	0840	21	46	210	1/2	1/4 *	46200	29040	5652	3663		179		
	0850	21	46	210	1/2	1/4 *	48700	30500	5962	3848		187		
664 / 441	0900	21	46	210	1/2	1/4 *	51600	32140	6315	4055		199	F: 234	79
	0910	21	46	210	1/2	1/4 *	53950	33880	6610	4278		211	C: 674	
	0920	21	46.	210	1/2	1/4 *	56300	35300	6899	4455		222	269/772	BY PROPORTION
	0930	21	46.	210	1/2	1/4 *	58900	37030	7206	4671		232		
	0940	21	46	210	1/2	1/4 *	61700	39000	7559	4922		244		
	0950	21	46	210	1/2	1/4 *	64100	40650	7845	5127		255		
	1000	21	46	210	1/2	1/4 *	66500	42260	8140	5330		266	F: 304	78.2
	1010	21	46	210	1/2	1/4 *	68900	43800	8434	5526		277	C: 870	
	1020	21	46	210	1/2	1/4 *	71900	45550	8800	5745		290		
692 / 449	1030	21	46	210	1/2	1/4 *	74360	47140	9105	5946		301		
	1040	21	46	210	1/2	1/4 *	76550	48550	9370	6124		310		
	1050	21	46	210	1/2	1/4 *	79100	50210	9679	6333		320		
	1100	21	46	210	1/2	1/4 *	82100	52275	10047	6593		332	F-387	77.5
	1110	21	46	210	1/2	1/4 *	85300	54200	10400	6840	49 x	343	C-1071	
	1120	21	46	210	1/2	1/4 *	88500	55800	10840	7040	122 & 97 =	702 EA.		
	1130	21	46	210	1/2	1/4 *	90400	56790	11064	7165	49 x	13		
	1140	21.3	46	210	1/2	1/4 *	93700	58817	11467	7420	122 & 85	27		
	1150	21.3	46	210	1/2	1/4 *	95500	60410	11684	7626		37		
	1200	21.3	46	210	1/2	1/4 *	98100	62125	12001	7847		48	F-657	76.8
	1210	21.3	46	210	1/2	1/4 *	101050	64000	12364	8089		60	C-1377	
	1220	21.3	46	212	1/2	1/4 *	103300	65900	12640	8330		73		
	1230	21.5	46	212	1/2	1/4 *	105750	67520	12940	8540	49 x	85		
	1240	21.5	46	212	1/2	1/4 *	108800	69520	13313	8798	122 & 85	214 EA.		
	1250	21.5	46	212	1/2	1/4 *	111500	71270	13645	9023	49 x 97	2		

Metal Rejects → 0834 - 0836 - 2 min.
1330 - 1335 - 5 min.

* = Flashing or no lite - Dry bin levels

5-11-94

Missoula testing

press room readings — press testing

board density, thickness, wax and catalyst once per hour — other readings once every 10 minutes

indicate time and duration of any reject material

indicate time of size changes

by Tom

page 2 of 3

Ave Thick + Dist. 4

672 / 458

time	line speed	target density	press temp	face bin level	core bin level	face material in lbs.	core material in lbs.	face resin lbs	core resin lbs	cut size	board count	wax lbs once/hr	catalyst lbs once/hr
1300	21.5	46	212	1/2	1/4 *	113700	72920	13914	9236	49X97	14	F-1016	75
1310	21.5	46	212	1/2	1/4 *	116400	74550	14241	9447		25	C-1694	
1320	21.5	46.	212	1/2	1/4 *	119400	76400	14617	9688		39		
1330	21.5	46.	212	1/2	1/4 *	121950	77870	14927	9877		52		
1340	21.5	46.	212	1/2	1/4 *	123900	79480	15165	10080		61		
1350	21.5	46	212	1/2	1/4 *	126700	81100	15506	10286		74		
1400	21.5	46	212	1/2	1/4 *	129100	82450	15796	10461		86	F-1557	74.
1410	21.5	46	212	1/2	1/4 *	132840	84860	16259	10773		102	C-1984	
1420	21.5	46	212	1/2	1/4 *	135300	86400	16558	10968		113		
1430	21.5	46	212	1/2	1/4 *	137300	87825	16809	11154		123	1773/2141	BY PROPORTION
1440	21.5	46	212	1/2	1/4 *	140200	89640	17158	11387		137		
1450	21.5	46	212	1/2	1/4 *	142400	91280	17428	11600		149		
1500	21.5	46	212	1/2	1/4 *	145100	92900	17756	11807		157	F-2028	72
1510	21.5	46.	212	1/2	1/4 *	147900	94600	18098	12025		165	C-2299	
1520	21.5	46.	212	1/2	1/4 *	150700	96250	18440	12238		178		
1530	21.5	46.	212	1/2	1/4 *	154300	98380	18888	12515		195		
1540	21.5	46.	21.2	1/2	1/4 *	156350	99550	19140	12660		205		
1550	21.5	46	212	1/2	1/4 *	158750	101270	19418	12876		220		
1600	21.5	46	212	1/2	1/4 *	161700	102970	19873	13103		236	F-2496	70
1610												C-2670	
1620	21.5	46	212	3/4	1/4 *	168000	106090	20552	13508		262		
1630	21.5	46	212	3/4	1/4	170000	107500	20798	13689		274	2842/2889	BY PROPORTION
1640	21.5	46	212	3/4	1/4	173000	109200	21142	13902		291		
1650	21.5	46	212	3/4	1/4	175800	111000	21504	14139		306		
1700	21.5	46	212	3/4	1/4	178400	112600	21826	14344		318	F-3087	68
1710	21.5	46	212	3/4	1/4	180000	114500	22030	14600		330	C-3018	
1720	21.5	46	212	3/4	1/4	183050	116100	22398	14795		344		
1730	21.5	46	212	3/4	1/2	185750	117600	22724	14980		355		
1740	21.5	46	212	3/4	1/2	188900	119400	23114	15214		368		
1750	21.5	46	212	3/4	1/2	191850	121340	23480	15470		378		

49X97 = 1552 | F 3275 C 3177 — Total for wax SHIFT

19

11-May-94

N-63

5-11-94

Missoula testing

by Sam - A shift

press room readings – press testing

page 3 of 3

board density, thickness, wax and catalyst once per hour – other readings once every 10 minutes

indicate time and duration of any reject material

indicate time of size changes

	time	line speed	target density	press temp	face bin level	core bin level	face material in lbs.	core material in lbs.	face resin lbs	core resin lbs	cut size	board count	wax lbs once/hr	catalyst lbs once/hr
	1800	21.5	45.0	196 (reject)	.75	.50	194260	122690	23770	15640	49x97	6	F-200	
Test	13	"	"	"	"	"	197000	124780	24114	15910	"	22	C-154	
	20	"	"	"	"	"	198950	125850	24344	16050	"	30		
	30	"	"	"	"	.75	201950	127500	24710	16255	"	43		
	40	"	"	"	"	"	205000	129200	25085	16470	"	56		
	50	"	"	"	"	"	207950	130925	25440	16685	"	69		
	1906	"	"	"	"	"	211760	133930	25928	17068	"	89	F-721	
	10	"	"	"	"	"	212800	134650	26055	17159	"	95	C-565	
	20	"	"	"	"	Full	215260	136250	26360	17355	"	107		
	30	"	"	"	"	.75	218000	138000	26697	17585	"	121		
	41	"	"	"	"	"	220780	139850	27045	17810	"	135		
	50	"	"	"	"	"	223000	141300	27315	17995	"	146		
	2001	"	"	"	"	"	225850	143150	27670	18230	"	160	F-1072	65 gal left
	12	"	"	"	"	"	228900	145100	28050	18470	"	175	C-794	
	24	"	"	"	"	"	232120	147000	28450	18715	"	190		
	30	"	"	"	"	"	233500	147900	28620	18828	"	196		
	40	"	"	"	"	"	236580	149770	29000	19065		210		
	50	"	"	"	.50	.75	239850	151950	29345	19275		223		
	2100	"	"	"	"	"	241850	153120	29660	19485		235	F-1295	63
													C-1062	

n/a operator recorded wrong readout

92

Line II Info. as of 5-12-94

Resin

Face (F01LM)

59% Solids, 10.4 #/gal, our mix to blender is 85.1% Resin and 14.9% water = 50.2% resin solids

Core (C90LM)

65% Solids, 10.7 #/gal, our mix to blender is 88.3% Resin, and 11.7% water = 57.4% resin solids

Wax

49% Solids, 8.8 #/gal

Catalyst

Sp. gr. 1.07 ; 8.92 #/gal

63

8:00 AM

LOUISIANA-PACIFIC CORPORATION

PRODUCTION Q.C. DATA SHEET (LINE 2)

MISSOULA, MONTANA

Date 5-11-94 Product 7/16 49x1WX 1/2 → 3/16 Sq. Sample C-2 Technician SZ

DENSITY, MOR, IB

Spec. No.	Density #/ft³ Thick	Wt.	Den.	MOR psi Load	MOR	IB psi Load	IB	MOE/1000 psi .050	.100	.150	100 Load	MOE	SA % No.	Face	Core
1	678	396	436	161	2628	351	88m							3	7
2	685	410	447	137	2189	327	82m							18	25
3	693	411	44.4	160	2499	376	94m							37	38
4	685	413	45.1	160	2557	304	76m							42	30
5	700	409	436	143	2189	456	114m								
6	699	410	43.8	160	2456										
7	681	411	45.0	154	2469										
8	685	397	423	137	2189										
9	669	385	430	116	1944										
10	665	393	44.1	150	2544										
Avg	684		44.1		2366		91							79	68

PROCESS VARIABLES

Furnish Ph
Face 5.16
Core 4.92
Press 11
Wt lb/ft
Line Speed 1
Dist. Bars
Middle Temp. °C

Infeed Top: TL ☐ TR ☐ / TL ☐ TR ☐ / TL ☐ TR ☐

Infeed Bottom: BL ☐ BR ☐ / BL ☐ BR ☐ / BL ☐ BR ☐

Up Press Bar: I M O

Lower Press: I M O

WEIGHT PROFILE GRAPH

Spec.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Thk.																														
Wt.	11	3	3	3	4	6	6	5	5	5	3	4	4	6	6	5	1	4	8	8	5	4	4	0	36	36	35	34	34	35

THICKNESS PROFILE GRAPH

PRESSURE PROGRAM

1. 60
2. 46
3. 46
4. 40
5. 40
6. 40
7. 39
8. 35
9. 32
10. 7
11. 13
12. 7
13. 13

F.M.
F.O.

N-66

10:15 AM

LOUISIANA-PACIFIC CORPORATION 11/16 **PRODUCTION Q.C. DATA SHEET** (LINE 2) MISSOULA, MONTANA

Date 5-11-94 Product 49x122x97 Sample C-3 Technician EZ

DENSITY, MOR, IB

Spec. No.	Density #/ft³ Thick	Wt.	Den.	MOR psi Load	MOR	IB psi Load	IB	MOE, 1000 psi .050	.100	.150	100 Load	MOE	SA % No.	Face	Core
1	676	400	441	142	2330	383	96 m							2	18
2	680	409	449	124	2011	327	82 m							21	30
3	669	400	471	148	2480	364	91 m							33	31
4	678	411	453	142	2317	291	73 m							40	21
5	692	410	453	140	2192	390	98 m								
6	689	417	452	154	2493										
7	679	410	451	136	2213										
8	681	415	441	120	1940										
9	666	386	433	100	1798										
10	690	388	438	133	2206										
Avg	677		449		2199		88							77	52

PROCESS VARIABLES

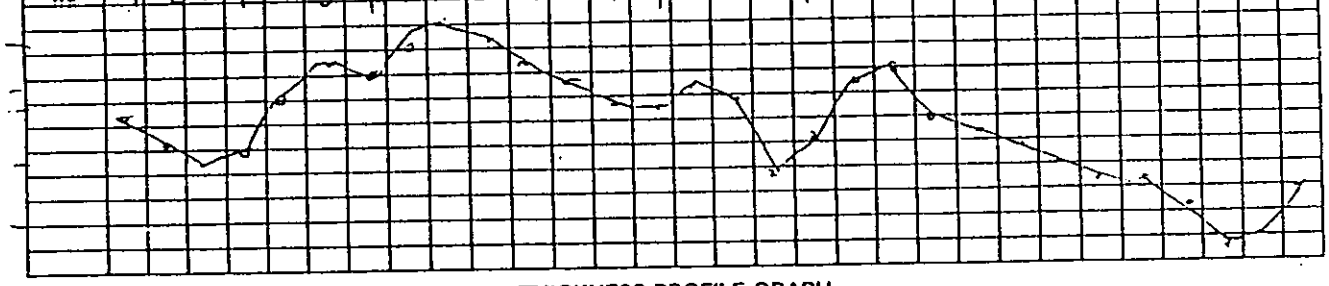
Furnish Ph
Face 5.13
Core 5.02
Press
Wt lb/ft 23.1
Line Speed 21.0
Dist. Bars
Middle Temp. 210

Infeed Top: TL ☐ TR ☐ / TL ☐ TR ☐ / TL ☐ TR ☐
Infeed Bottom: BL ☐ BR ☐ / BL ☐ BR ☐ / BL ☐ BR ☐

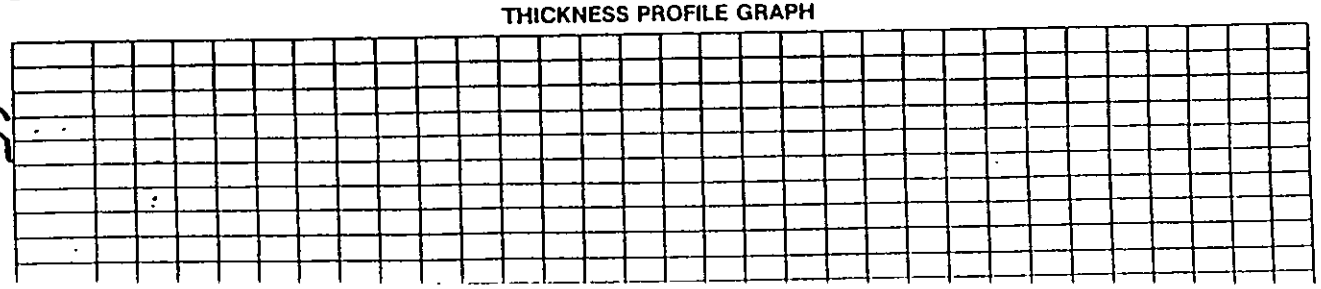
Up Press Bar: I ___ M ___ O ___
Lower Press: I ___ M ___ O ___

WEIGHT PROFILE GRAPH

Spec.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Thi.																														
Wt.	4	2	0	1	5	8	7	9	5	50	8	6	4	4	6	5	38	1	6	7	3	4	1	39	38	38	36	34	33	37



THICKNESS PROFILE GRAPH



PRESSURE PROGRAM

1. 40
2. 40
3. 40
4. 40
5. 40
6. 40
7. 39
8. 35
9. 32
10. 7
11. 13
12. 7
13. 13

F.M. ___
F.O. ___

446

65

N-67

LOUISIANA-PACIFIC CORPORATION

PRODUCTION Q.C. DATA SHEET

(LINE 2) 1:15 pm

MISSOULA, MONTANA

Date 5-11-94 Product 7/16 49x97 Sample C-4 Technician E.T.

DENSITY, MOR, IB

Spec. No.	Density #/ft³ Thick	Wt.	Den.	MOR psi Load	MOR	IB psi Load	IB	MOE, 1000 psi .050	.100	.150	100 Load	MOE	SA % No.	Face	Core
1	670	399	445	122	2039	308	77 m	19			38	357		3	19
2	674	411	456	120	1981	406	106 h	18			36	331		22	30
3	680	411	464	130	2109	316	79 h	11			41	374		34	91
4	671	418	465	130	2166	370	93 m	21			41	391		41	20
5	684	421	460	128	2052	397	99 h	25			50	440			
6	679	417	459	132	2148			24			48	432			
7	670	413	460	112	1872			22			44	414			
8	674	412	456	115	1899			20			40	368			
9	659	391	445	97	1675			17			34	333			
10	658	411	466	140	2435			24			48	475			
Avg	672		458		2036		90					391		28	51

PROCESS VARIABLES

Furnish Ph 5.57
Face 49.4
Core
Press
Wt lb/ft 23.7
Line Speed 215
Dist. Bars
Middle Temp. 212 °F

Infeed Top		Infeed Bottom	
TL ☐	TR ☐	BL ☐	BR ☐
TL ☐	TR ☐	BL ☐	BR ☐
TL ☐	TR ☐	BL ☐	BR ☐

Up Press Bar	Lower Press
I	I
M	M
O	O

WEIGHT PROFILE GRAPH

Spec.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Thk.																														
Wt.	2	3	5	4	3	7	8	10	10	10	9	8	5	5	7	10	1	3	9	9	7	8	8	6	1	38	36	30	37	0

THICKNESS PROFILE GRAPH

99

PRESSURE PROGRAM

1. 40
2. 40
3. 40
4. 40
5. 40
6. 40
7. 39
8. 35
9. 32
10. 7
11. 17
12. 7
13. 13

F.M.
F.O.

N-68

LOUISIANA-PACIFIC CORPORATION 11 / PRODUCTION Q.C. DATA SHEET (LINE 2) 2/:00 pm MISSOULA, MONTANA

Date 5-11-94 Product 1/4 49x97 Sample C-5 Technician EE

DENSITY, MOR, IB

Spec.	Density #/ft³			MOR psi		IB psi		MOE, 1000 psi					SA %		
No.	Thick	Wt.	Den.	Load	MOR	Load	IB	.050	.100	.150	100 Load	MOE	No.	Face	Core
1	671	398	443	172	2199	280	70m							2	10
2	673	411	456	120	1987	384	96m							19	29
3	687	428	465	148	2225	316	79m							32	36
4	685	414	469	136	2239	368	92m							47	25
5	686	420	457	136	2168	400	100m								
6	680	418	459	143	2319										
7	675	416	461	138	2271										
8	674	411	455	123	2031										
9	669	398	451	110	1900										
10	657	414	471	154	2677										
Avg	674		459		2202		87							79	61

PROCESS VARIABLES

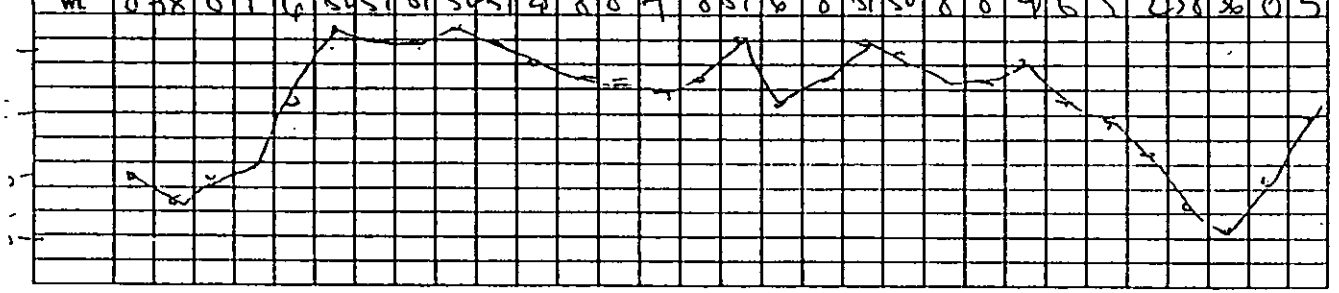
Furnish Ph
Face 5.86
Core 4.87
Press
Wt lb/ft 23.2 #
Line Speed 215 '
Dist. Bars
Middle Temp. 208 °C

Infeed Top		Infeed Bottom	
TL ☐	TR ☐	BL ☐	BR ☐
TL ☐	TR ☐	BL ☐	BR ☐
TL ☐	TR ☐	BL ☐	BR ☐

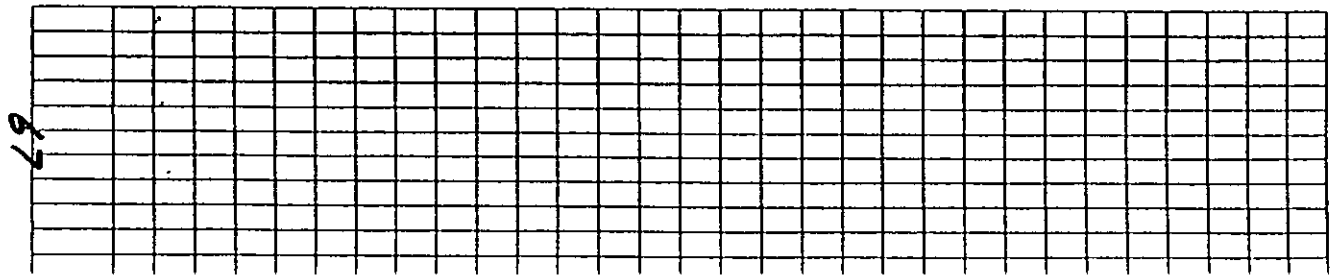
Up Press Bar	Lower Press
I	I
M	M
O	O

WEIGHT PROFILE GRAPH

Spec.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Thk.																														
Wt.	0	38	0	1	6	52	51	51	54	51	9	8	8	7	8	61	6	8	61	50	8	8	9	6	5	2	38	36	0	5



THICKNESS PROFILE GRAPH



PRESSURE PROGRAM

1. 40
2. 40
3. 40
4. 40
5. 40
6. 40
7. 39
8. 35
9. 30
10. 7
11. 13
12. 7
13. 13

F.M.
F.O.

N-69

6:30pm

LOUISIANA-PACIFIC CORPORATION 11/ **PRODUCTION Q.C. DATA SHEET** (LINE 2) MISSOULA, MONTANA

Date 5-11-94 Product 1.L 2 49x97 (4) Sample A-1 Technician SF

DENSITY, MOR, IB

Spec.	Density #/ft³			MOR psi		IB psi		MOE, 1000 psi					SA %		
No.	Thick	Wt.	Den.	Load	MOR	Load	IB	.050	.100	.150	100 Load	MOE	No.	Face	Core
1	667	398	446	110	1855	292	73							3	8
2	669	396	442	88	1475	348	87							19	26
3	675	425	470	119	1959	260	65							32	38
4	667	417	467	114	1922	304	76							46	28
5	679	412	453	116	1887	372	93								
6	674	413	458	118	1948										
7	667	409	458	117	1973										
8	670	403	449	98	1638										
9	655	387	441	84	1468										
10	657	402	457	119	2068										
Avg	668		454		1819		79							75	66

PROCESS VARIABLES

Furnish Ph
Face 508
Core 482
Press
Wt lb/ft 23.1
Line Speed 21.5
Dist. Bars 1530
Middle Temp. 196°

Infeed Top		Infeed Bottom	
TL ☐	TR ☐	BL ☐	BR ☐
TL ☐	TR ☐	BL ☐	BR ☐
TL ☐	TR ☐	BL ☐	BR ☐

Up Press Bar	Lower Press
I	I
M	M
O	O

WEIGHT PROFILE GRAPH

Spec.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Thk.		39		36		6		50		31		8		5		4		2		4		3		2		36		34		4
Wt.	1		35		0		8		31		9		7		4		38		4		3		3		0		33		28	

153, 149, 145, 141, 137, 133

H/51

L-133

THICKNESS PROFILE GRAPH

PRESSURE PROGRAM

1. 2. 3. 4. 5. 6. 7. 8. 9.
10. 11. 12.

F.M. 205
F.O. 205

N-70

89

79

8:30 PM

LOUISIANA-PACIFIC CORPORATION 11/ **PRODUCTION Q.C. DATA SHEET** (LINE 2) MISSOULA, MONTANA

Date 5-11-94 Product 1/4 I 4x8x91 (+) Sample A-2 Technician ST

DENSITY, MOR, IB

Spec. No.	Density #/ft³ Thick	Wt.	Den.	MOR psi Load	MOR	IB psi Load	IB
1	644	393	441	118	1995	272	68
2	670	412	459	122	2039	384	96
3	671	428	476	128	2132	392	98
4	664	423	476	133	2262	416	104
5	674	413	458	128	2113	404	101
6	669	412	460	136	2279		
7	664	417	469	141	2398		
8	666	412	462	124	2097		
9	654	450	457	102	1789		
10	653	415	475	150	2639		
Avg	665		463		2174	93	

MOE, 1000 psi

Spec. No.	.050	.100	.150	100 Load	MOE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
Avg					

SA %

Spec. No.	Face	Core
1	3	7
2	19	25
3	31	38
4	47	30
5		
6		
7		
8		
9		
10		
Avg	28	68

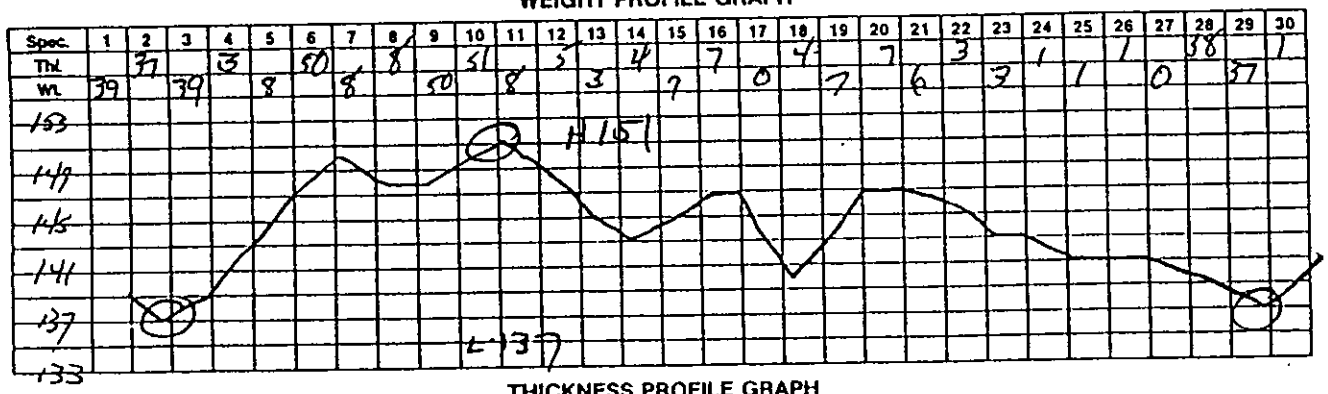
PROCESS VARIABLES

Furnish Ph
Face 507
Core 480
Press
Wt lb/ft 23.1
Line Speed 21.5
Dist. Bars 15.30
Middle Temp. 196 °F

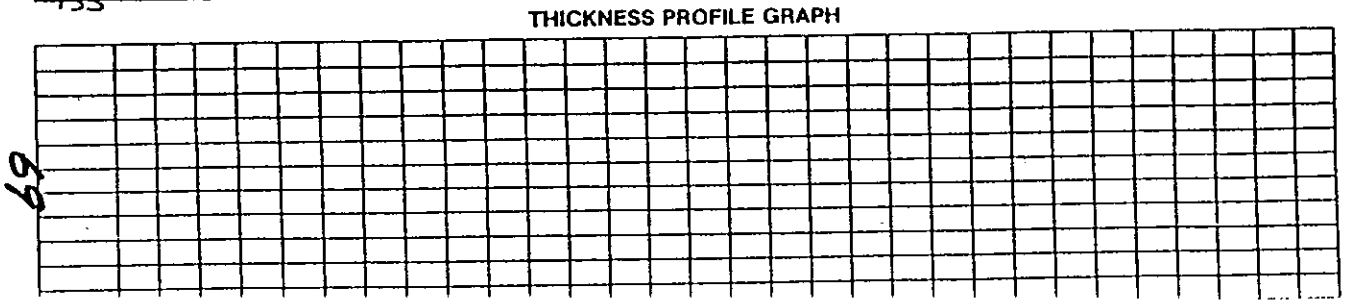
Infeed Top: TL ☐ TR ☐ / TL ☐ TR ☐ / TL ☐ TR ☐
Infeed Bottom: BL ☐ BR ☐ / BL ☐ BR ☐ / BL ☐ BR ☐

Up Press Bar: I ___ M ___ O ___
Lower Press: I ___ M ___ O ___

WEIGHT PROFILE GRAPH



THICKNESS PROFILE GRAPH



PRESSURE PROGRAM

1. ___ 10. ___
2. ___ 11. ___
3. ___ 12. ___
4. ___ 13. ___
5. ___
6. ___ F.M. 205
7. ___ F.O. 205
8. ___
9. ___

NO 6779

69

N-71

10:30 PM

LOUISIANA-PACIFIC CORPORATION 11/16 I 49,121 ⊘/9 ⊘ **PRODUCTION Q.C. DATA SHEET** (LINE 2) MISSOULA, MONTANA

Date 5-11-94 Product _____ Sample A-3 Technician S.T.

DENSITY, MOR, IB

Spec. No.	Density #/ft³ Thick	Wt.	Den.	MOR psi Load	MOR	IB psi Load	IB	MOE, 1000 psi .050	.100	.150	100 Load	MOE	SA % No.	Face	Core
1	675	398	441	138	2271	464	101							3	14
2	679	408	449	120	1952	392	98							21	32
3	681	419	459	146	2361	300	75							32	35
4	678	417	460	150	2448	364	91							44	19
5	689	411	446	144	2275	412	103								
6	684	410	448	138	2212										
7	670	398	444	122	2039										
8	677	401	442	120	1963										
9	664	391	447	107	1854										
10	662	386	435	121	2070										
Avg	676		446		2145		94							26	24

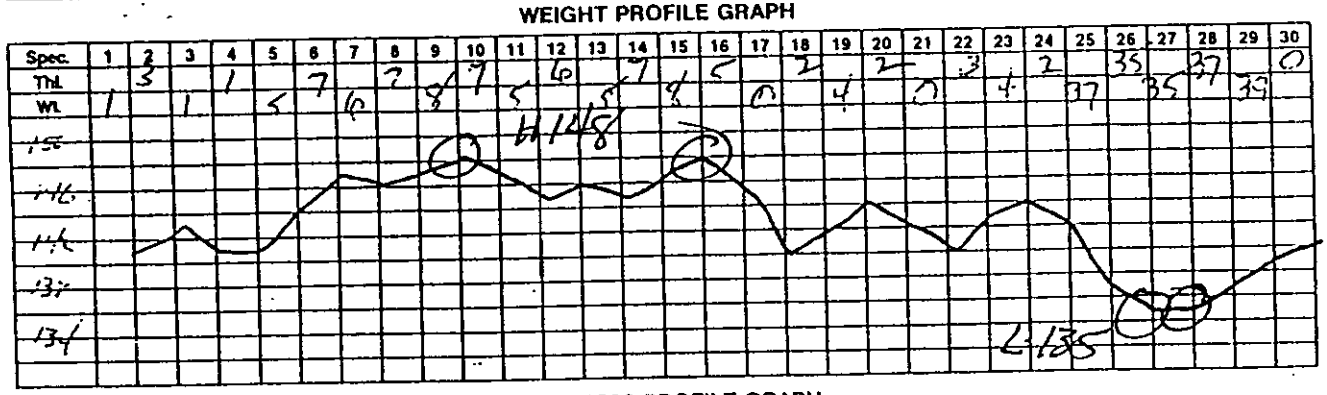
PROCESS VARIABLES

Furnish Ph
Face 503
Core 487
Press
Wt lb/ft 23.1
Line Speed 21.5
Dist. Bars 1530
Middle Temp. 200°

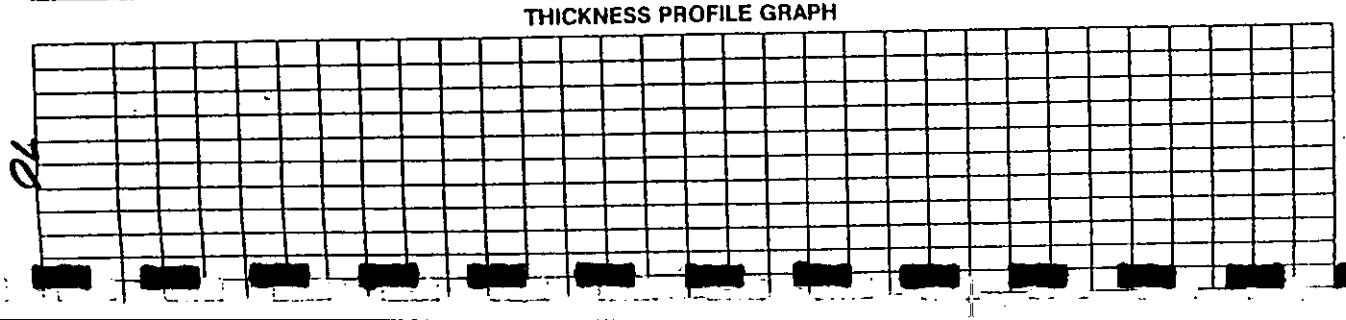
Infeed Top		Infeed Bottom	
TL ☐	TR ☐	BL ☐	BR ☐
TL ☐	TR ☐	BL ☐	BR ☐
TL ☐	TR ☐	BL ☐	BR ☐

Up Press Bar	Lower Press
I	I
M	M
O	O

WEIGHT PROFILE GRAPH



THICKNESS PROFILE GRAPH



PRESSURE PROGRAM

1. _____ 10. _____
2. _____ 11. _____
3. _____ 12. _____
4. _____
5. _____
6. _____ F.M. +205
7. _____ F.O. +205
8. _____
9. _____

N-72

LOUISIANA-PACIFIC CORPORATION 1:30 AM

PRODUCTION Q.C. DATA SHEET (LINE 2)

MISSOULA, MONTANA

Date 5-11-94 Product 1/16 I 4/9 x 12 5/97 Sample A-4 Technician SJ

DENSITY, MOR, IB

Spec. No.	Density #/ft³ Thick	Density #/ft³ Wt.	Density #/ft³ Den.	MOR psi Load	MOR psi MOR	IB psi Load	IB psi IB	MOE, 1000 psi .050	.100	.150	100 Load	MOE	SA % No.	SA % Face	SA % Core
1	671	390	434	140	2332	420	105	22	44		44	409		3	16
2	677	408	450	140	2290	436	109	21	43		43	391		23	33
3	683	420	459	148	2380	428	107	23	46		46	405		34	33
4	676	416	460	155	2544	404	101	23	46		46	419		46	18
5	688	408	443	146	2313	448	112	25	50		50	430			
6	683	417	456	170	2734			25	50		50	440			
7	674	411	455	153	2526			23	46		46	423			
8	675	406	449	135	2227			21	42		42	382			
9	663	399	450	126	2150			20	40		40	355			
10	637	379	432	136	2364			21	43		43	426			
Avg	675		449		2385		107					411		74	51

PROCESS VARIABLES

Furnish Ph
Face 50
Core 453
Press
Wt lb/ft 23.1
Line Speed 215
Dist. Bars 1538
Middle Temp. 200°

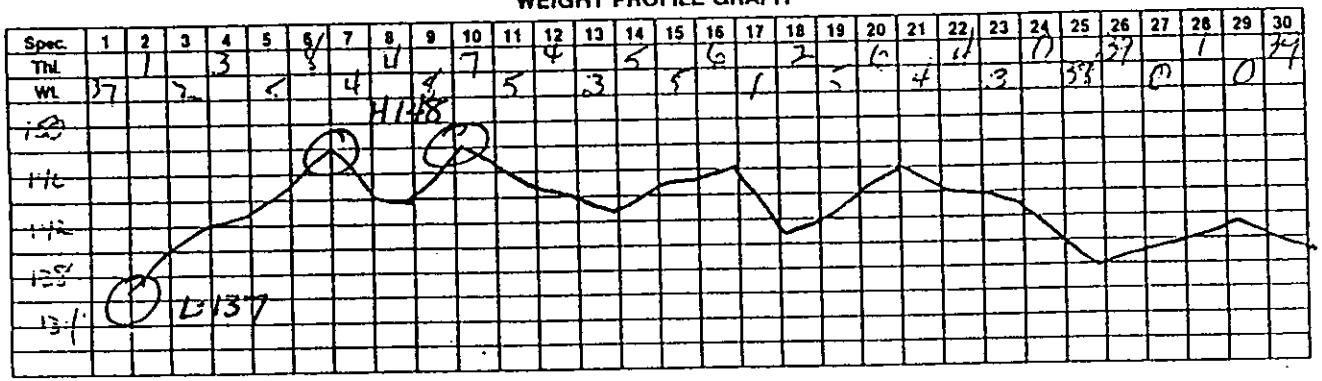
Infeed Top: TL ☐ TR ☐ / TL ☐ TR ☐ / TL ☐ TR ☐

Infeed Bottom: BL ☐ BR ☐ / BL ☐ BR ☐ / BL ☐ BR ☐

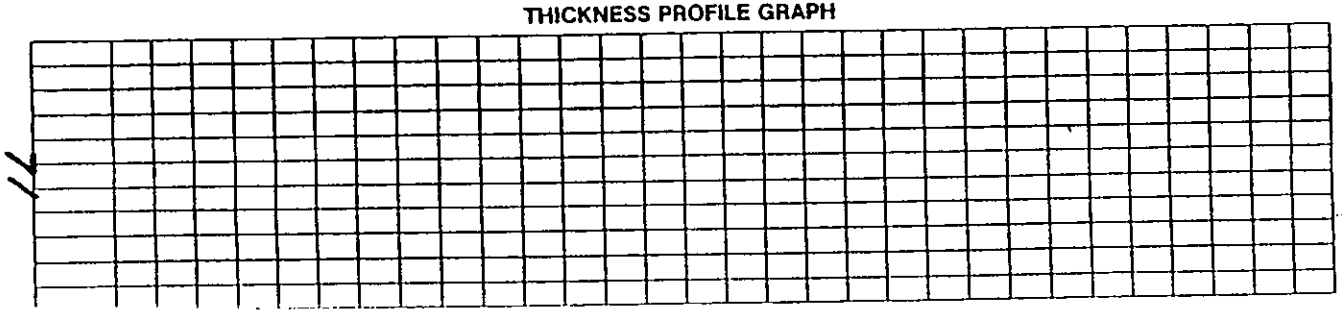
Up Press Bar: I M O

Lower Press: I M O

WEIGHT PROFILE GRAPH



THICKNESS PROFILE GRAPH



PRESSURE PROGRAM

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13.

F.M. 225
F.O. 225

ND 6779

N-73

4:30 AM

LOUISIANA-PACIFIC CORPORATION — PRODUCTION Q.C. DATA SHEET (LINE 2) — MISSOULA, MONTANA

Date 5-11-94 Product 11/16 I 49 x 122 3/97 (2) Sample A-5 Technician SE

DENSITY, MOR, IB

Spec. No.	Density #/ft³ Thick	WL	Den.	MOR psi Load	MOR	IB psi Load	IB	MOE, 1000 psi .050	.100	.150	100 Load	MOE	SA % No.	Face	Core
1	6.73	394	437	141	2335	420	105							3	15
2	6.79	410	451	143	2327	460	115							22	31
3	6.81	418	459	148	2393	400	100							35	34
4	6.76	418	462	152	2527	352	85							40	20
5	6.88	413	449	141	2289	440	110								
6	6.84	414	452	162	2597										
7	6.73	405	451	136	2252										
8	6.76	405	448	134	2199										
9	6.60	387	438	115	1952										
10	6.59	387	439	148	2557										
Avg	6.75		449		2345		104							25	54

PROCESS VARIABLES

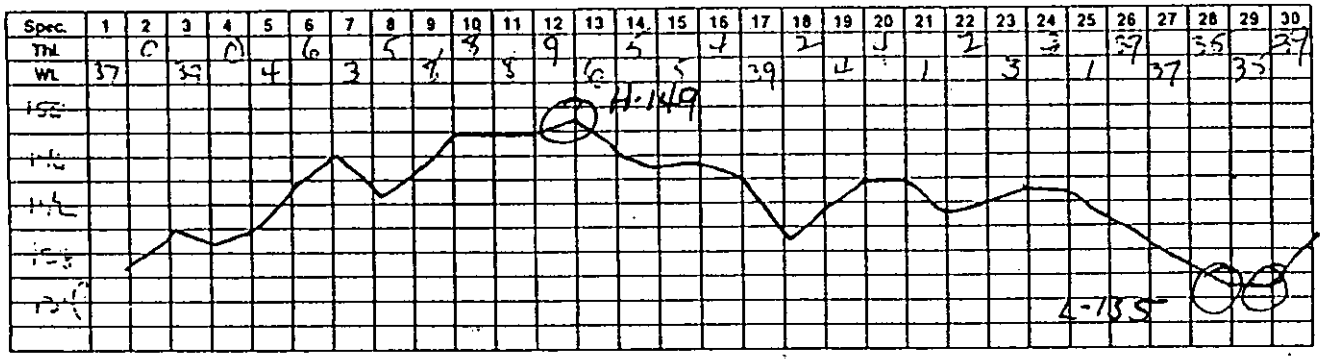
Furnish Ph
Face <11
Core 4.8
Press
Wt lb/ft 231
Line Speed 21.5
Dist. Bars 15.30
Middle Temp. 200°

Infeed Top: TL ☐ TR ☐ / TL ☐ TR ☐ / TL ☐ TR ☐
Infeed Bottom: BL ☐ BR ☐ / BL ☐ BR ☐ / BL ☐ BR ☐

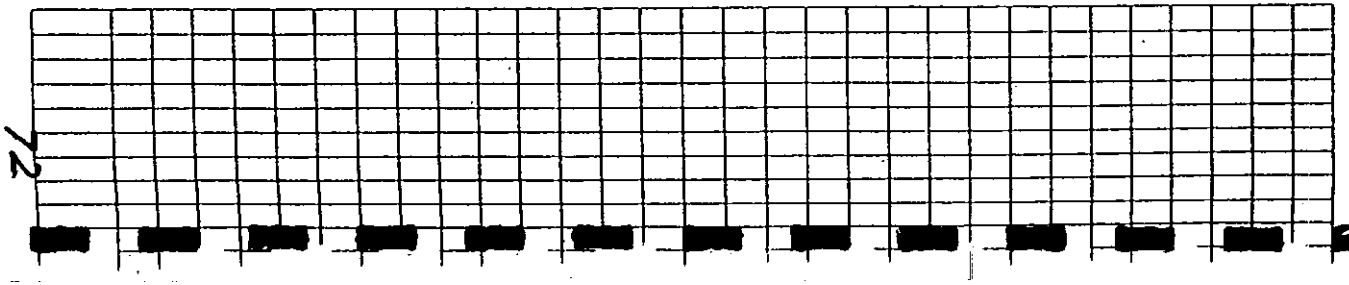
Up Press Bar: I M O
Lower Press: I M O

WEIGHT PROFILE GRAPH

Spec.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Thk		0		0		6		5		3		9		5		4		2		3		2		3		37		35		37
WL	37		39		4		3		4		8		6		5		39		4		1		3		1		37		35	



THICKNESS PROFILE GRAPH



PRESSURE PROGRAM

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13.

F.M. 6205
F.O. 7205

N-74

72

6:15 AM

LOUISIANA-PACIFIC CORPORATION

PRODUCTION Q.C. DATA SHEET (LINE 2)

MISSOULA, MONTANA

Date 5-11-94 Product 11/16 49x122x97 Sample C-1 Technician EK

DENSITY, MOR, IB

Spec. No.	Density #/ft³ Thick	WL	Den.	MOR psi Load	MOR	IB psi Load	IB
1	674	398	44.1	160	2442	330	83m
2	684	400	45.9	151	2421	384	96m
3	693	406	45.9	164	2562	418	105m
4	680	417	45.8	174	2822	376	94m
5	694	412	44.3	162	2522	404	161m
6	692	415	44.8	160	2600		
7	684	424	46.0	170	2725		
8	678	419	45.1	133	2171		
9	666	400	44.9	142	2401		
10	660	400	45.3	140	2411		
Avg	681		45.2		2528		96

Spec. No.	MOE, 1000 psi .050	.100	.150	100 Load	MOE	SA % No.	Face	Core
1							3	13
2							2	32
3							33	36
4							44	19
5								
6								
7								
8								
9								
10								
Avg							77	45

PROCESS VARIABLES

Furnish Ph
Face 5.06
Core 4.72
Press
Wt lb/ft 23.1 #
Line Speed 21.5 1
Dist. Bars 15 36
Middle Temp. 310 °C

Infeed Top: TL ☐ TR ☐ / TL ☐ TR ☐ / TL ☐ TR ☐

Infeed Bottom: BL ☐ BR ☐ / BL ☐ BR ☐ / BL ☐ BR ☐

Up Press Bar: I ___ M ___ O ___

Lower Press: I ___ M ___ O ___

WEIGHT PROFILE GRAPH

Spec.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Thl.																														
Wt.	0	4	5	6	7	5.1	5.1	5.0	5.2	5.0	7	7	6	5	5	7	3	6	6.2	8	7	6	3	0	1	1	1	1	1	1

PRESSURE PROGRAM

1. 40
2. 40
3. 40
4. 40
5. 40
6. 40
7. 39
8. 35
9. 32
10. 7
11. 13
12. 7
13. 13

F.M. ___

F.O. ___

THICKNESS PROFILE GRAPH

10:30 pm

LOUISIANA-PACIFIC CORPORATION 11/16 **PRODUCTION Q.C. DATA SHEET** (LINE 2) MISSOULA, MONTANA

Date 5-12-97 Product 1/16 E 49x97 (1) Sample A-3 Technician ST

DENSITY, MOR, IB

Spec. No.	Density #/ft³ Thick	Wt.	Den.	MOR psi Load	MOR	IB psi Load	IB	MOE, 1000 psi .050	.100	.150	100 Load	MOE	SA % No.	Face	Core
1	670	388	433	130	2172	332	83	22			44	414		3	13
2	678	404	445	126	2056	324	81	20			40	360		20	29
3	680	420	462	138	2238	332	83	23			45	401		34	35
4	677	421	464	152	2487	264	66	23			46	419		43	23
5	689	415	450	148	2338	356	89	25			50	430			
6	683	413	452	152	2444			25			50	440			
7	674	405	449	144	2377			22			44	405			
8	675	409	453	128	2107			21			43	391			
9	658	389	442	109	1888			18			36	356			
10	655	403	459	152	2657			23			47	450			
Avg	674		451		2277		80					409		77	58

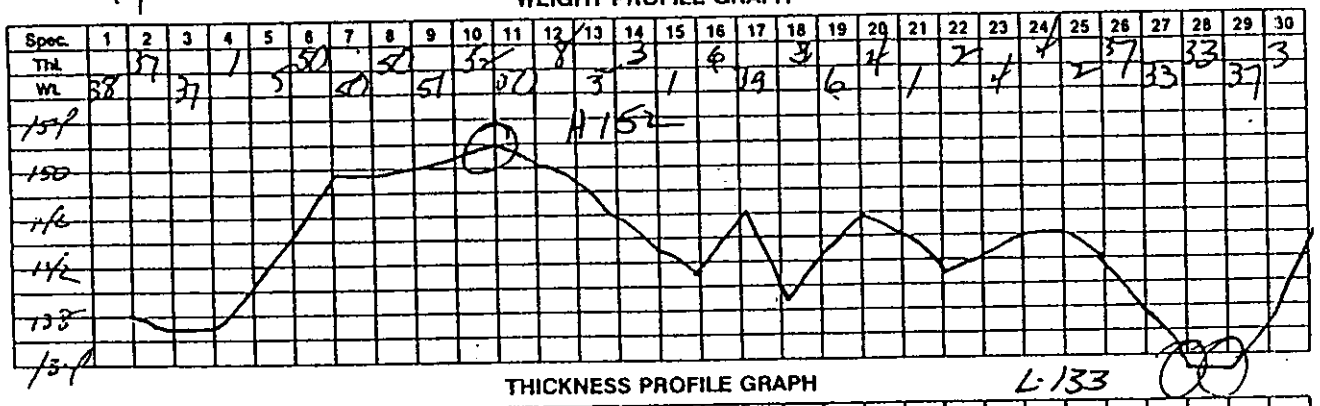
PROCESS VARIABLES

Furnish Ph 5.10
Face
Core 456
Press
Wt lb/ft 23.1
Line Speed 21.5
Dist. Bars 15.30
Middle Temp. 195°C

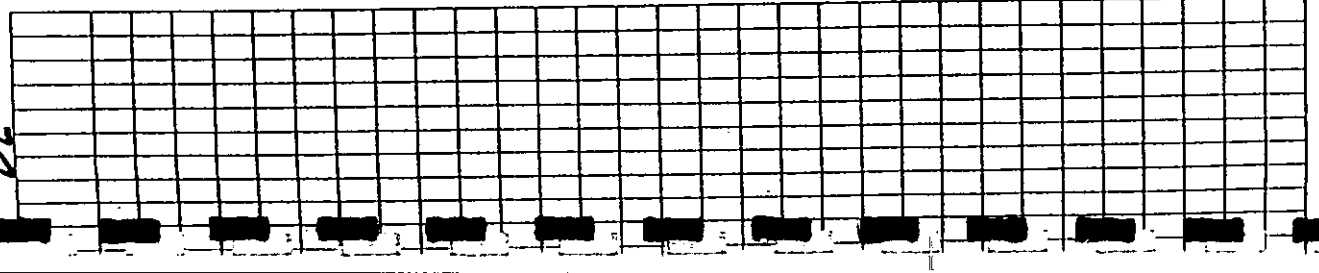
Infeed Top: TL ☐ TR ☐ / TL ☐ TR ☐ / TL ☐ TR ☐
Infeed Bottom: BL ☐ BR ☐ / BL ☐ BR ☐ / BL ☐ BR ☐

Up Press Bar: I M O
Lower Press: I M O

WEIGHT PROFILE GRAPH



THICKNESS PROFILE GRAPH



PRESSURE PROGRAM

1. 2. 3. 4. 5. 6. 8. 9. 10. 11. 12. 13.

F.M. A205
F.O. +205

N-76

94

MISSOULA PRE-DRYER TESTING 5-10-94 Formaldehyde

DATA TIM	START=	07:00	END=	07:30	HOURS=	0.50
		07:40		08:20		0.67
		08:30		11:10		2.67
				TOTAL HOURS =		3.83

DRYER PRODUCTION RATE:

Dryer throughput was measured by weighing 9 truckloads of wet material introduced to the system for the tesing period

Wet weights were as follows:

truck no.	lbs.
1	62,780
2	56,680
3	68,380
4	60,300
5	77,880
6	70,760
7	100,998
8	69,740
9	70,280
	637,798 total pounds

The operating time and stroke rate of the wet bin infeed system was also monitored.

the dryer infeed operated during the following periods:

0631-0727, 0739-0818, 0830-1115, 1330-0120 for a total of 16.33 hours

the infeed stroke speeds were as follows

0631-0830 =23, 0830-1427=20, 1427-1610=18, 1610-0120=20

the average infeed stroke speed throughout the operating period was 20.14 seconds per str

therefore the average wet material infeed rate throughout the operational period is:

637798 pounds / 16.33 hours = 13766 lbs per hour at a feed rate of 20.14

the actual infeed during testing is proportioned by the feed rate during the test times.

3.83 =hours during testing
20.96 =average infeed rate (sroke speed)
14327 = lbs of dryer infeed per hour

North dryer (predryer A)
310 = average inlet temperature
99 = average outlet temperature
38.3% = average inlet moisture content
11.2% = average outlet moisture content

South dryer (predryer B)
310 = average inlet temperature
97 = average outlet temperature
38.3% = average inlet moisture content
11.0% = average outlet moisture content

Coen Burner fuel input (to be verified by f factor)
1344 = total counts during testing
7.52 = fuel calibration in pounds per count
10104 = total pounds burned during testing
2636 = pounds per hour burned during testing
8500 = fuel value in BTU per pound (to be verified by analysis)
22.40 = mmBTU per hour fuel input
1.32 = Tons of dry fuel input per hour during testing

MISSOULA PRE-DRYER TESTING 5-10-94 TSP, CO VOC, Nox

DATA TIME: START= 16:30 END= 21:00 HOURS= 4.50

TOTAL HOURS = 4.50

DRYER PRODUCTION RATE:

Dryer throughput was measured by weighing 9 truckloads of wet material introduced to the system for the tesing period
Wet weights were as follows:

truck no.	lbs.
1	62,780
2	56,680
3	68,380
4	60,300
5	77,880
6	70,760
7	100,998
8	69,740
9	70,280
	637,798 total pounds

The operating time and stroke rate of the wet bin infeed system was also monitored.
the dryer infeed operated during the following periods:
0631-0727, 0739-0818, 0830-1115, 1330-0120 for a total of 16.33 hours

the infeed stroke speeds were as follows
0631-0830 =23, 0830-1427=20, 1427-1610=18, 1610-0120=20
the average infeed stroke speed throughout the operating period was 20.14 seconds per str

therefore the average wet material infeed rate throughout the operational period is:
637798 pounds / 16.33 hours = 13766 lbs per hour at a feed rate of 20.14
the actual infeed during testing is proportioned by the feed rate during the test times.

4.50 =hours during testing
20.00 =average infeed rate (sroke speed)
13671 = lbs of dryer infeed per hour

North dryer (predryer A)
348 = average inlet temperature
94 = average outlet temperature
42.1% = average inlet moisture content
20.6% = average outlet moisture content

South dryer (predryer B)
348 = average inlet temperature
94 = average outlet temperature
42.1% = average inlet moisture content
20.6% = average outlet moisture content

Coen Burner fuel input (to be verified by f factor)
1329 = total counts during testing
7.52 = fuel calibration in pounds per count
9993 = total pounds burned during testing
2221 = pounds per hour burned during testing
8500 = fuel value in BTU per pound (to be verified by analysis)
18.88 = mmBTU per hour fuel input
1.11 = Tons of dry fuel input per hour during testing

06/06/94 MAYPRODB.WK4

76

MISSOULA PRE-DRYER TESTING 5-10-94 Formaldehyde

DATA TIME	START=	07:00	END=	07:30	HOURS=	0.50
		07:40		08:20		0.67
		08:30		11:10		2.67
				TOTAL HOURS =		3.83

DRYER PRODUCTION RATE:

Dryer throughput was measured by weighing 9 truckloads of wet material introduced to the system for the tesing period
Wet weights were as follows:

truck no.	lbs.
1	62,780
2	56,680
3	68,380
4	60,300
5	77,880
6	70,760
7	100,998
8	69,740
9	70,280
	637,798 total pounds

The operating time and stroke rate of the wet bin infeed system was also monitored.
the dryer infeed operated during the following periods:
0631-0727, 0739-0818, 0830-1115, 1330-0120 for a total of 16.33 hours

the infeed stroke speeds were as follows
0631-0830 =23, 0830-1427=20, 1427-1610=18, 1610-0120=20
the average infeed stroke speed throughout the operating period was 20.14 seconds per stroke

therefore the average wet material infeed rate throughout the operational period is:
637798 pounds / 16.33 hours = 13766 lbs per hour at a feed rate of 20.14
the actual infeed during testing is proportioned by the feed rate during the test times.

3.83 =hours during testing
20.96 =average infeed rate (stroke speed)
40647 = lbs of dryer infeed per hour for both dryers
20324 = lbs of dryer infeed per hour per dryer

North dryer (predryer A)
310 = average inlet temperature
99 = average outlet temperature
38.3% = average inlet moisture content
11.2% = average outlet moisture content

South dryer (predryer B)
310 = average inlet temperature
97 = average outlet temperature
38.3% = average inlet moisture content
11.0% = average outlet moisture content

Coen Burner fuel input (to be verified by f factor)
1344 = total counts during testing
7.52 = fuel calibration in pounds per count
10104 = total pounds burned during testing
2636 = pounds per hour burned during testing
8500 = fuel value in BTU per pound (to be verified by analysis)
22.40 = mmBTU per hour fuel input
1.32 = Tons of dry fuel input per hour during testing

MISSOULA PRE-DRYER TESTING 5-10-94 TSP, CO VOC, Nox

DATA TIME: START= 16:30 END= 21:00 HOURS= 4.50

TOTAL HOURS = 4.50

DRYER PRODUCTION RATE:

Dryer throughput was measured by weighing 9 truckloads of wet material introduced to the system for the tesing period
Wet weights were as follows:

truck no.	lbs.
1	62,780
2	56,680
3	68,380
4	60,300
5	77,880
6	70,760
7	100,998
8	69,740
9	70,280
	637,798 total pounds

The operating time and stroke rate of the wet bin infeed system was also monitored.
the dryer infeed operated during the following periods:
0631-0727, 0739-0818, 0830-1115, 1330-0120 for a total of 16.33 hours

the infeed stroke speeds were as follows
0631-0830 =23, 0830-1427=20, 1427-1610=18, 1610-0120=20
the average infeed stroke speed throughout the operating period was 20.14 seconds per stroke

therefore the average wet material infeed rate throughout the operational period is:
637798 pounds / 16.33 hours = 39057 lbs per hour at a feed rate of 20.14
the actual infeed during testing is proportioned by the feed rate during the test times.

4.50 =hours during testing
20.00 =average infeed rate (stroke speed)
38785 = lbs of dryer infeed per hour for both dryers
19392.67 = lbs of dryer infeed per hour per dryer

North dryer (predryer A)
348 = average inlet temperature
94 = average outlet temperature
42.1% = average inlet moisture content
20.6% = average outlet moisture content

South dryer (predryer B)
348 = average inlet temperature
94 = average outlet temperature
42.1% = average inlet moisture content
20.6% = average outlet moisture content

Coen Burner fuel input (to be verified by f factor)
1329 = total counts during testing
7.52 = fuel calibration in pounds per count
9993 = total pounds burned during testing
2221 = pounds per hour burned during testing
8500 = fuel value in BTU per pound (to be verified by analysis)
18.88 = mmBTU per hour fuel input
1.11 = Tons of dry fuel input per hour during testing

Louisiana-Pacific Corporation

EPA Test

DATE:

Load No 1 - Solberg Ticket No 100900 Mill Mt. Medko Net WET WT. 62780 Time 5/11 - 6:47 PM %	1:50 AM Load NO. 2 - Solberg Ticket No 100565 Mill Timber Line Net WET WT. 56680 Time 1:50 AM %	9:23 A Missoula Load NO. 3 - Cartage Ticket No 100973 Mill Pyramid Net WET WT. 68380 Time 9:23 AM %
10:38 A Missoula Load NO. 4 - Cartage Ticket No 100995 Mill Pyramid Net WET WT. 60300 Time 10:38 AM %	11:36 A Load NO. 5 - Solberg Ticket No 100996 Mill Border Line Net WET WT. 77880 Time 11:36 AM %	Missoula Load NO. 6 - Cartage Ticket No 100997 Mill Pyramid Net WET WT. 70760 Time 1:14 PM %
Missoula Load NO. 7 Cartage Ticke No 100998 Mill Pyramid Net WET WT. 66140 Time In 1:16 PM %	Load NO. 8 - TLC Ticket No 95733 Mill JD Line Net WET WT. 69740 Time 1:22 PM %	Missoula Load NO. 9 Cartage Ticket No 100999 Mill Pyramid Net WET WT. 70280 Time 2:21 PM %
Load NO. Ticket No Mill Net WET WT. Time %	Load NO. Ticket No Mill Net WET WT. Time %	Load NO. Ticket No Mill Net WET WT. Time %

IM 6170

77

5-12-94

Missoula testing

PREDRY TESTING FUEL CALIBRATION = 7.52 lb/count

by _____

page 1 of 3

*moisture readings and fuel count once per hour, other readings once every 10 minutes.

time	north temp in deg f.	north temp out deg f.	north setpoint deg f.	south temp in deg f.	south temp out deg f.	south setpoint deg f.	fuel feed temp deg f.	fuel feed %	air control temp deg f.	air control %	once per hour: moisture in %	north moisture out %	south moisture out %	coen fuel count	BIN LEVELS N	BIN LEVELS S
0640	314	119	315	319	100	315	604	40	1092	90	30.8	13.7	9.6	290	1/2	1/2
0650	314	102	315	314	94	315	601	40	1082	90						
0700	315	96	315	314	95	315	558	40	1079	90						
0710	314	93	315	315	96	315	595	40	1056	90						
0720	315	94	314	315	97	315	598	40	1080	90					1/4	1/4
0730	317	95	315	315	99	315	593	40	1072	90						
0740		MISSED		READINGS												
0750			"		"											
0800			"		"											
0810	314	100	315	316	99	315	583	40	1068	90						
0820	314	99	315	315	99	315	581	40	1055	90	40.4	8.5	7.8			
0830	315	124	315	317	115	315	580	40	1061	90						
0840	315	119	315	314	104	315	576	40	1059	90	31.7	4.7	3.6	924	1/4	1/4
0850	315	108	315	315	101	315	574	40	1063	90						
0900	315	104	315	316	105	315	574	40	1056	90						
0910	312	102	312	311	105	312	573	40	1064	90						
0920	315	102	312	312	103	312	573	40	1062	90						
0930	311	102	312	313	101	312	573	40	1057	90						
0940	312	103	312	315	101	312	571	40	1047	90	38.4	8.7	7.0	1212	1/4	1/2
0950	312	102	312	312	101	312	571	40	1060	90						
1000	300	102	300	300	99	300	570	40	1064	90						
1010	300	95	300	300	91	300	570	40	1068	90						
1020	300	91	300	299	86	300	572	40	1067	90						
1030	301	89	300	301	85	300	572	40	1059	90						
1040	300	89	300	300	84	300	571	40	1062	90	42.5	22.8	25.6	1529	1/4	1/4
1050	300	89	298	300	85	299	570	40	1061	90						
1100	300	88	299	300	87	300	572	40	1075	90						
1110	309	89	310	311	87	310	573	40	1066	90				1080*	BY PROPORTION	
1120	319	90	320	321	86	320	573	40	1063	90						
1130	148	106	100	151	104	100	575	40	1083	90						

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5-12-94

by _____

page 2 of 3

Missoula testing

PREDRY TESTING

*moisture readings and fuel count once per hour, other readings once every 10 minutes.

time	north temp in deg f.	north temp out deg f.	north setpoint deg f.	south temp in deg f.	south temp out deg f.	south setpoint deg f.	fuel feed temp deg f.	fuel feed %	air control temp deg f.	air control %	once per hour: moisture in %	north moisture out %	south moisture in %	coen fuel count	Bin Levels N	S
1140	102	98	100	155	101	100	579	40	1080	90	No feed			1530	1/2	1/3
1150	105	91	100	152	97	100	583	40	1103	90						
1200	99	89	100	152	95	100	586	40	1099	90						
1210	100	87	100	154	95	100	587	40	1098	90						
1220	101	86	100	152	95	100	588	40	1097	90						
1230	100	87	100	152	96	100	590	40	1092	90						
1240	99	86	100	152	96	100	596	40	1110	90	No feed			2158	3/4	1/2
1250	98	85	100	146	96	100	597	40	1108	90						
1300	98	85	100	151	95	100	600	40	1122	90						
1310	99	85	100	151	96	100	605	40	1125	90						
1320	100	86	100	152	95	100	607	40	1111	90						
1330	100	86	100	149	95	100	610	40	1117	90						
1340	298	89	320	306	96	320	610	40	1094	90	No feed			2446	3/4	1/3
1350	304	92	300	307	93	300	608	40	1082	90						
1400	301	93	300	300	91	300	608	40	1084	90						
1410	297	93	300	300	92	300	610	40	1085	90						
1420	312	91	310	308	91	310	609	40	1084	90	41.0	23.0	20.0			
1430	309	91	310	309	90	310	607	40	1073	90						
1440	312	91	310	311	89	310	606	40	1097	90				2754	3/4	3/4
1450	309	90	310	308	88	310	605	40	1099	90						
1500	309	89	310	312	87	310	604	40	1101	90						
1510	310	90	310	309	90	310	603	40	1090	90						
1520	307	124	310	314	119	310	604	40	1097	90						
1530	311	118	310	309	111	310	605	40	1096	90						
1540	309	102	310	307	98	310	605	40	1098	90	37.0	22.8	23.6	3076		
1550	307	93	310	310	90	310	605	40	1095	90						
1600	324	91	330	325	90	330	605	40	1089	90						
1610	166	88	150	166	84	150	607	40	1115	90	Changed	Timer	to 20:30		3/1	3/1
1620	243	87	330	238	88	330	609	40	1118	90						
1630	328	91	330	330	91	330	608	40	1103	90				3337	BY RATIO	

N-83

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SN I

Missoula testing

PREDRY TESTING

by _____

page 3 of 3

*moisture readings and fuel count once per hour, other readings once every 10 minutes.

time	north temp in deg f.	north temp out deg f.	north setpoint deg f.	south temp in deg f.	south temp out deg f.	south setpoint deg f.	fuel feed temp deg f.	fuel feed %	air control temp deg f.	air control %	once per hour: moisture in %	north moisture out %	south moisture in %	coen fuel count	
1640	334	91	330	333	92	330	608	40	1106	90				3389	
1650	326	91	330	330	91	330	603	40	1095	90	47	27	24.2		
1700	351	92	350	348	91	350	601	40	1092	90					
1710	349	92	350	351	92	350	601	40	1107	90					
1720	353	93	350	349	93	350	601	40	1097	90					
1730	351	93	350	352	93	350	590	40	1096	90					
1740	349	92	350	353	94	350	598	40	1079	90	40.8	20.0	23.8	3743	3/4 3/4
1750	350	92	350	350	94	350	594	40	1076	90					
1800	349	94	350	348	95	350	594	40	1094	90					
1810	349	95	350	350	96	350	593	40	1089	90					
1820	349	94	350	349	95	350	593	40	1094	90					
1830	351	94	350	350	94	350	591	40	1098	90					
1840	349	94	350	351	96	350	590	40	1095	90	43.0	20.8	18.2	4000	3/4 3/4
1850	351	94	350	351	95	350	591	40	1097	90					
1900	349	94	350	351	95	350	588	40	1083	90					
1910	349	94	350	350	95	350	587	40	1083	90					
1920	351	94	350	353	95	350	586	40	1080	90					
1930	349	95	350	351	96	350	587	40	1083	90					
1940	348	95	350	351	96	350	587	40	1087	90	39	17.2	15.8	4247	3/4 3/4
1950	351	94	350	353	96	350	586	40	1089	90					
2000	349	96	350	350	97	350	585	40	1080	90					
2010	349	94	350	351	96	350	587	40	1070	90					
2020	352	94	350	349	94	350	588	40	1083	90					
2030	351	94	350	349	94	350	590	40	1086	90					
2040	349	95	350	350	94	350	591	40	1083	90	40.6	17.8	18.2	4561	1/2 1/2
2050	349	96	350	350	92	350	590	40	1075	90					
2100	348	94	350	349	92	350	591	40	1070	90				4666*	BY RATIO
2110															
2120															
2130															

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NORTH INLET/ OUTLET TEMP

SOUTH INLET/OUTLET TEMP

Channel Readout
11:28
5-12-94

#5 #4

May. 12.94 06:41 CHART SP1 (A) 10mm/h
CHART SP2 (B) 100mm/h

CH.NO TAG.NO	RANGE	ZERO FULL	SCALE	UNIT
CH1 °F	6V	0.400 2.000	0 2500	°F
CH2 2CH	6V	0.400 2.000	0 2500	°F
CH3 3CH	6V	0.400 2.000	0 2500	°F
CH4 4CH	6V	0.400 2.000	0 2500	°F
CH5	skip			
CH6	skip			

ALARM

CH	ALARM1	ALARM2	ALARM3	ALARM4
1				
2				
3				
4				
5				
6				

CH	HLARM1	HLARM2	HLARM3	HLARM4
1				
2				

RECORDY TEMP CHARTS

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET COLUMBUS, OHIO 43215

Emergency Telephone
(614) 431-6600

IF IT'S BORDEN-IT'S GOT TO BE GOOD

THE OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 REQUIRES THAT THE INFORMATION CONTAINED ON THESE SHEETS BE MADE AVAILABLE TO YOUR WORKERS. INSTRUCT YOUR WORKERS TO HANDLE THIS PRODUCT PROPERLY.

FOR INDUSTRIAL USE ONLY

LOUISIANA-PACIFIC CORPORATION
ATTN: JOHN COSTON
PARTICLE BOARD PLANT
MISSOULA, MT 59801

NON-EMERGENCY TELEPHONE
(503) 746-8461

DESCRIPTION: [redacted]
PRODUCT TYPE: WAX EMULSION
APPLICATION: WAX EMULSION FOR PARTICLEBOARD SIZING

PAGE 1
CUR ISS [redacted]

SIGNAL WORD

This material is not a "health hazard" or a "physical hazard" as determined when reviewed according to the requirements of the Occupational Safety and Health Administration 29 CFR Part 1910.1200 "Hazard Communication" Standard.

CHEMICAL HAZARD RATING

HEALTH=1(slight)
FIRE=0(least)
REACTIVITY=0(least)

29CFR1910.1200 HAZARDOUS INGREDIENTS/REPORTED HEALTH EFFECTS

CAS/REGISTRY NO.	MATERIAL DESCRIPTION
None known to Borden.	

PHYSICAL DATA

STG. LIFE TO HAZE @ 25C	2 MONTHS @ 25C (77F)
PH @ 25C	~7.5 @ 25C
APPEARANCE	OPAQUE LIQUID
COLOR	CREAM/LIGHT BROWN
ODOR	LITTLE OR NONE
FLASH POINT	NOT APPLICABLE
AUTOIGNITION TEMPERATURE	NOT APPLICABLE
LOWER EXPLOSION LIMIT	NOT APPLICABLE
SPECIFIC GRAVITY	~1.06
UPPER EXPLOSION LIMIT	NOT APPLICABLE

IMMEDIATE HEALTH HAZARD DATA

SKIN ABSORPTION: No hazards known to Borden.
INGESTION: Not expected to be harmful under normal conditions of use.
INHALATION: Not expected to be harmful under normal conditions of use. However, if allowed to become airborne, may cause irritation of nose, throat and lungs.
SKIN: May cause irritation on prolonged or repeated contact.

READ NEXT PAGE

DISCLAIMER-SEE REVERSE SIDE

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215
Emergency Telephone
(614) 431-8600

DESCRIPTION: CASCOWAX EW-4054
PRODUCT TYPE: WAX EMULSION
APPLICATION: WAX EMULSION FOR PARTICLEBOARD SIZING
CUR ISS 22-APR-93

IMMEDIATE HEALTH HAZARD DATA

EYES: May cause irritation on prolonged or repeated contact.

HANDLING PRECAUTIONS

INHALATION: Avoid prolonged or repeated breathing of vapor.
SKIN: Avoid prolonged or repeated contact with skin.
EYES: Avoid prolonged or repeated contact with eyes.
Handle in accordance with good industrial hygiene and safety practices.

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: If accidently swallowed, dilute by drinking large quantities of water. Immediately contact poison control center or hospital emergency room for any other additional treatment directions.
INHALATION: Remove to fresh air.
SKIN CONTACT: In case of irritation, flush with water.
EYE CONTACT: Immediately flush eyes with plenty of water. Call a physician if irritation persists.

FIRE AND EXPLOSION HAZARD DATA

Will not burn unless water has evaporated.
In case of fire, water should be used to keep fire-exposed containers cool.

REACTIVITY DATA

Normally stable as defined in NFPA 704-12(4-3.1).
Hazardous polymerization:
Will not occur.
Decomposition products may include:
Oxides of carbon.

CONTROL MEASURES

If airborne contaminants are generated when the material is heated or handled, sufficient ventilation in volume and air flow patterns should be provided to keep air contaminant concentration levels below acceptable criteria.

PERSONAL PROTECTION INFORMATION

Where air contaminants can exceed acceptable criteria, use NIOSH/MSHA approved respiratory protection equipment. Respirators should be selected based on the form and concentration of contaminants in air in

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READ NEXT PAGE

DISCLAIMER-SEE REVERSE SIDE

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215
Emergency Telephone
(614) 431-6600

IF IT'S BORDEN-IT'S GOTTA BE GOOD

DESCRIPTION: CASCOWAX EW-6055
PRODUCT TYPE: WAX EMULSION
APPLICATION: WAX EMULSION FOR PARTICLEBOARD SIZING

PERSONAL PROTECTION INFORMATION

accordance with OSHA 29 CFR 1910.134 or other applicable standards or guidelines.
Use goggles if contact is likely.
Wear impervious gloves as required to prevent skin contact.

SPILL OR LEAK PROCEDURES

Large quantities: Enclose with diking material to prevent seepage into natural bodies of water, then consult Borden, Inc.
Small quantities: Soak up with absorbent material and remove to a chemical disposal area.

WASTE DISPOSAL

Recover free liquid. Absorb residue and dispose of according to local, state/provincial, and federal requirements.

STORAGE PRECAUTIONS

Harmed by freezing. Cannot be made usable after freezing.
Storage life is 2-4 months at 70 F, less at higher temperatures.

TRANSPORT INFORMATION

REFER TO YOUR BILL OF LADING FOR PROPER DOT DESCRIPTION

040 23-.4035-. PREVIOUS ISSUE:21-APR-93 CURRENT ISSUE:22-APR-93
PRINT DATE: 22-Feb-94 01:19 PM

THIS IS THE LAST PAGE

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215

Emergency Telephone
(614) 431-8600

IF IT'S BORDEN-IT'S GOT TO BE GOOD

SARA TITLE III SECTION 313
AND 40 CFR Part 372
TOXIC CHEMICAL NOTIFICATION SHEET

CASCOWAX EW-4039

This product contains the following toxic chemical(s) subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986, and Subpart C-Supplier Notification Requirement of 40 CFR Part 372.

CAS Registry Number	Chemical Name	Pct. By Weight
7783-20-2	AMMONIUM SULFATE (SOLUTION)	2.49

This Toxic Chemical Notification Sheet must not be detached from the Material Safety Data Sheet (MSDS). Any copying and redistribution of the MSDS shall include copying and redistribution of this notification sheet attached to copies of the MSDS subsequently redistributed.

040 23-.4039-. PRINT DATE: 22-Feb-94 01:19 PM

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215

Emergency Telephone
(614) 431-6600

IF IT'S BORDEN-IT'S GOT TO BE GOOD

THE OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 REQUIRES THAT THE INFORMATION CONTAINED ON THESE SHEETS BE MADE AVAILABLE TO YOUR WORKERS. INSTRUCT YOUR WORKERS TO HANDLE THIS PRODUCT PROPERLY.

FOR INDUSTRIAL USE ONLY

LOUISIANA-PACIFIC CORPORATION
ATTN: JOHN COSTON
PARTICLE BOARD PLANT
MISSOULA, MT 59801

NON-EMERGENCY TELEPHONE
(503) 746-8461

DESCRIPTION: [redacted]-RESIN UF C90LM
PRODUCT TYPE: LIQUID UF RESIN
APPLICATION: PARTICLEBOARD CORE RESIN

PAGE 1
CUR ISS 19-JAN-94

SIGNAL WORD

CAUTION!

This material presents possible health hazards as determined when reviewed according to the requirements of the Occupational Safety and Health Administration 29 CFR Part 1910.1200 "Hazard Communication" Standard.

CHEMICAL HAZARD RATING

HEALTH=1(slight)
FIRE=0(least)
REACTIVITY=1(slight)
CHRONIC=*

29CFR1910.1200 HAZARDOUS INGREDIENTS/REPORTED HEALTH EFFECTS

CAS/REGISTRY NO. MATERIAL DESCRIPTION

The ingredients listed below have been associated with one or more of the listed immediate and/or delayed(*) health hazards. Risk of damage and effects depends upon duration and level of exposure. BEFORE USING OR HANDLING, READ AND UNDERSTAND THE MSDS.

50-00-0 *FORMALDEHYDE

POTENTIAL CANCER HAZARD.
Rats chronically exposed to 14 ppm formaldehyde contracted nasal cancers. Based on animal data and limited epidemiological evidence, NTP and IARC have listed formaldehyde as a probable human carcinogen. OSHA regulates formaldehyde as a potential human carcinogen.

May cause allergic skin reaction. Some reports suggest that formaldehyde may cause respiratory sensitization, such as asthma, and that pre-existing respiratory and skin disorders may be aggravated by exposure.

OSHA has identified 0.5 ppm as the "Action Level",

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 4
To: Sue Somers | From: Tim Williams
Co./Dept.: LP Hayward | Co.: LP Missoula
Phone #: (415) 434-5563 | Phone #: | Fax #:

READ NEXT PAGE

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215
IF IT'S BORDEN-IT'S GOOD
Emergency Telephone
(614) 431-8600

DESCRIPTION: CASCO RESIN EF-CYCL
PRODUCT TYPE: LIQUID UF RESIN
APPLICATION: PARTICLEBOARD CORE RESIN

CUR ISS 19-JAN-94

29CFR1910.1200 HAZARDOUS INGREDIENTS/REPORTED HEALTH EFFECTS
CAS/REGISTRY NO. MATERIAL DESCRIPTION

29CFR 1910.1048. Please refer to the OSHA Standard for guidance applicable to your specific operations.

OSHA has stated that a concentration of 100 ppm is immediately dangerous to life and health and that the odor threshold for formaldehyde is 0.8-1 ppm. OSHA Occupational Exposure to Formaldehyde, 52 Fed. Reg. 22290, et seq.
ACGIH TLV: 0.3 ppm (0.37 mg/m3) Ceiling
OSHA PEL: 0.75 ppm(0.9 mg/m3) TWA; 2 ppm(2.5mg/m3)15min STEL
NIOSH DOCUMENT NUMBER: 77-126

PHYSICAL DATA	
STORAGE LIFE @ 70F	2-3 WEEKS @ 70F
PH @ 21C	~7.7 @ 21C
APPEARANCE	CLEAR/HAZY LIQUID
COLOR	COLORLESS/WHITE
ODOR	LITTLE OR NONE
49CFR 173.140 CLASS 9	RQ FORMALDEHYDE
BOILING POINT	~102C
EVAPORATION RATE	~0.3 (N-BUTYL ACETATE=1)
FLASH POINT	NOT APPLICABLE
FREEZING POINT	<-10C
FREE FORMALDEHYDE CONTENT	<0.5%
AUTOIGNITION TEMPERATURE	NOT APPLICABLE
LOWER EXPLOSION LIMIT	NOT APPLICABLE
PERCENT VOLATILE BY WEIGHT	~55% @ 105C
SOLUBILITY IN WATER	SEE STORAGE SECTION
SPECIFIC GRAVITY	~1.3
UPPER EXPLOSION LIMIT	NOT APPLICABLE
VAPOR DENSITY	NOT APPLICABLE
VAPOR PRESSURE	~0.1 MM HG @ 20C

IMMEDIATE HEALTH HAZARD DATA

SKIN ABSORPTION: No hazards known to Borden.
INGESTION: Not expected to be harmful under normal conditions of use.
INHALATION: Not expected to be harmful under normal conditions of use. However, if allowed to become airborne, may cause irritation of nose, throat and lungs.
SKIN: May cause irritation on prolonged or repeated contact.
EYES: May cause irritation on prolonged or repeated contact.

READ NEXT PAGE

DISCLAIMER-SEE REVERSE SIDE

MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215
Emergency Telephone
(614) 431-6600

DESCRIPTION: CASCO RESIN UF CYCLM
PRODUCT TYPE: LIQUID UF RESIN
APPLICATION: PARTICLEBOARD CORE RESIN

CUR ISS 19-JAN-94

HANDLING PRECAUTIONS

INHALATION: Avoid prolonged or repeated breathing of vapor.
SKIN: Avoid prolonged or repeated contact with skin.
EYES: Avoid prolonged or repeated contact with eyes.
Handle in accordance with good industrial hygiene and safety practices. These practices include avoiding unnecessary exposure and removal of the material from eyes, skin and clothing.
Wash thoroughly after handling.

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: If accidently swallowed, dilute by drinking large quantities of water. Immediately contact poison control center or hospital emergency room for any other additional treatment directions.
INHALATION: Remove to fresh air.
SKIN CONTACT: In case of irritation, flush with water.
EYE CONTACT: Immediately flush eyes with plenty of water. Call a physician if irritation persists.

FIRE AND EXPLOSION HAZARD DATA

Will not burn unless water has evaporated.
In case of fire, water should be used to keep fire-exposed containers cool.

REACTIVITY DATA

Normally stable, but may become unstable at high temperatures or may react with water.
Hazardous polymerization:
May occur.
Decomposition products may include:
CO, CO_2, aldehydes (including formaldehyde), hydrogen cyanide, particulate matter and other organic compounds.

CONTROL MEASURES

If airborne contaminants are generated when the material is heated or handled, sufficient ventilation in volume and air flow patterns should be provided to keep air contaminant concentration levels below acceptable criteria.

READ NEXT PAGE

DISCLAIMER-SEE REVERSE SIDE

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215

Emergency Telephone
(614) 431-6600

IF IT'S BORDEN-IT'S GOTTA BE GOOD

DESCRIPTION: CASCO RESIN UF C90LM
PRODUCT TYPE: LIQUID UF RESIN
APPLICATION: PARTICLEBOARD CORE RESIN
CUR ISS 19-JAN-94

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PERSONAL PROTECTION INFORMATION

Where air contaminants can exceed acceptable criteria, use NIOSH/MSHA approved respiratory protection equipment. Respirators should be selected based on the form and concentration of contaminants in air in accordance with OSHA 29 CFR 1910.134 or other applicable standards or guidelines.
Wear impervious gloves as required to prevent skin contact.

==========

SPILL OR LEAK PROCEDURES

Large quantities: Enclose with diking material to prevent seepage into natural bodies of water, then consult Borden, Inc.
Small quantities: Soak up with absorbent material and remove to a chemical disposal area.

==========

WASTE DISPOSAL

Recover free liquid. Absorb residue and dispose of according to local, state/provincial, and federal requirements.

==========

STORAGE PRECAUTIONS

NOTES
Not harmed by freezing, but thaw frozen resin slowly and stir before using.
Store in a cool place. High temperatures shorten storage life. Urea formaldehyde resin thickens with age. Rotate stock in storage to use oldest first.
Limited storage life - Refer to product specifications.
Solubility in water of urea resins can vary from infinite to insoluble depending on manufacturing procedure and age. Warm water helps in washing up resins with limited solubility.

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TRANSPORT INFORMATION

REFER TO YOUR BILL OF LADING FOR PROPER DOT DESCRIPTION

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040 12-C90LM-. PREVIOUS ISSUE: 13-AUG-93 CURRENT ISSUE: 19-JAN-94
PRINT DATE: 22-Feb-94 01:19 PM

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215

Emergency Telephone
(614) 431-6600

IF IT'S BORDEN-IT'S GOT TO BE GOOD

SARA TITLE III SECTION 313
AND 40 CFR Part 372
TOXIC CHEMICAL NOTIFICATION SHEET

CASCO-RESIN UF C90LM

This product contains the following toxic chemical(s) subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986, and Subpart C-Supplier Notification Requirement of 40 CFR Part 372.

CAS Registry Number	Chemical Name	Pct. By Weight
50-00-0	FORMALDEHYDE	0.35

This Toxic Chemical Notification Sheet must not be detached from the Material Safety Data Sheet (MSDS). Any copying and redistribution of the MSDS shall include copying and redistribution of this notification sheet attached to copies of the MSDS subsequently redistributed.

040 12-C90LM-. PRINT DATE: 22-Feb-94 01:19 PM

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215

Emergency Telephone
(614) 431-8600

IF IT'S BORDEN - IT'S GOT TO BE GOOD

THE OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 REQUIRES THAT THE INFORMATION CONTAINED ON THESE SHEETS BE MADE AVAILABLE TO YOUR WORKERS. INSTRUCT YOUR WORKERS TO HANDLE THIS PRODUCT PROPERLY.
FOR INDUSTRIAL USE ONLY

LOUISIANA-PACIFIC CORPORATION
ATTN: JOHN COGTON
PARTICLE BOARD PLANT
MISSOULA, MT 59801

NON-EMERGENCY TELEPHONE
(503) 746-8461

DESCRIPTION: GABCO-RESIN UF FOIUM
PRODUCT TYPE: LIQUID UF RESIN
APPLICATION: PARTICLEBOARD FACE RESIN

PAGE 1
OUR ISS 19-JAN-94

SIGNAL WORD
CAUTION!

This material presents possible health hazards as determined when reviewed according to the requirements of the Occupational Safety and Health Administration 29 CFR Part 1910.1200 "Hazard Communication" Standard.

CHEMICAL HAZARD RATING
HEALTH=1(slight)
FIRE=0(least)
REACTIVITY=1(slight)
CHRONIC=*

29CFR1910.1200 HAZARDOUS INGREDIENTS/REPORTED HEALTH EFFECTS
CAS/REGISTRY NO. MATERIAL DESCRIPTION

The ingredients listed below have been associated with one or more of the listed immediate and/or delayed(*) health hazards. Risk of damage and effects depends upon duration and level of exposure. BEFORE USING OR HANDLING, READ AND UNDERSTAND THE MSDS.

50-00-0 *FORMALDEHYDE
POTENTIAL CANCER HAZARD.
Rats chronically exposed to 14 ppm formaldehyde contracted nasal cancers. Based on animal data and limited epidemiological evidence, NTP and IARC have listed formaldehyde as a probable human carcinogen. OSHA regulates formaldehyde as a potential human carcinogen.

May cause allergic skin reaction. Some reports suggest that formaldehyde may cause respiratory sensitization, such as asthma, and that pre-existing respiratory and skin disorders may be aggravated by exposure.

OSHA has identified 0.5 ppm as the "Action Level",

READ NEXT PAGE

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215

Emergency Telephone
(614) 431-6600

IF ITS BORDEN-ITS GOT TRADEMARK

DESCRIPTION: CASCO RESIN UF POLIM
PRODUCT TYPE: LIQUID UF RESIN
APPLICATION: PARTICLEBOARD FACE RESIN

CUR ISS 19-JAN-94

29CFR1910.1200 HAZARDOUS INGREDIENTS/REPORTED HEALTH EFFECTS
CAS/REGISTRY NO. MATERIAL DESCRIPTION

29CFR 1910.1048. Please refer to the OSHA Standard for guidance applicable to your specific operations.

OSHA has stated that a concentration of 100 ppm is immediately dangerous to life and health and that the odor threshold for formaldehyde is 0.8-1 ppm, OSHA Occupational Exposure to Formaldehyde, 59 Fed. Reg. 22290, et seq.
ACGIH TLV: 0.3 ppm (0.37 mg/m3) Ceiling
OSHA PEL: 0.75 ppm(0.9 mg/m3) TWA; 2 ppm(2.5mg/m3)15min STEL
NIOSH DOCUMENT NUMBER: 77-126

PHYSICAL DATA

FORM FREE UF WAMTA 10.1	<0.3%
STORAGE LIFE @ 70F	3-4 WEEKS @ 21C (70F)
PH @ 21C	~7.6 @ 21C
APPEARANCE	CLEAR/HAZY LIQUID
COLOR	COLORLESS/WHITE
ODOR	LITTLE OR NONE
49CFR 173.140 CLASS 9	RQ FORMALDEHYDE
BOILING POINT	~102C
EVAPORATION RATE	~0.3(N-BUTYL ACETATE=1)
FLASH POINT	NOT APPLICABLE
FREEZING POINT	<-10C
AUTOIGNITION TEMPERATURE	NOT APPLICABLE
LOWER EXPLOSION LIMIT	NOT APPLICABLE
PERCENT VOLATILE BY WEIGHT	~41% @ 105C
SOLUBILITY IN WATER	SEE STORAGE SECTION
SPECIFIC GRAVITY	~1.2
UPPER EXPLOSION LIMIT	NOT APPLICABLE
VAPOR DENSITY	NOT APPLICABLE
VAPOR PRESSURE	~0.1 MM HG @ 20C

IMMEDIATE HEALTH HAZARD DATA

SKIN ABSORPTION: No hazards known to Borden.
INGESTION: No hazards known to Borden.
INHALATION: Not expected to be harmful under normal conditions of use. However, if allowed to become airborne, may cause irritation of nose, throat and lungs.
SKIN: May cause irritation on prolonged or repeated contact.
EYES: May cause irritation on prolonged or repeated contact.

READ NEXT PAGE

DISCLAIMER-SEE REVERSE SIDE

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215

Emergency Telephone
(614) 431-8600

IF IT'S BORDEN-IT'S GOT TO BE GOOD

DESCRIPTION: CASCO RESIN UF PVLH
PRODUCT TYPE: LIQUID UF RESIN
APPLICATION: PARTICLEBOARD FACE RESIN
DOR ISS 19-JAN-94

HANDLING PRECAUTIONS

INHALATION: Avoid prolonged or repeated breathing of vapor.
SKIN: Avoid prolonged or repeated contact with skin.
EYES: Avoid prolonged or repeated contact with eyes.
Handle in accordance with good industrial hygiene and safety practices. These practices include avoiding unnecessary exposure and removal of the material from eyes, skin and clothing.
Wash thoroughly after handling.

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: If accidently swallowed, dilute by drinking large quantities of water. Immediately contact poison control center or hospital emergency room for any other additional treatment directions.
INHALATION: Remove to fresh air.
SKIN CONTACT: In case of irritation, flush with water.
EYE CONTACT: Immediately flush eyes with plenty of water. Call a physician if irritation persists.

FIRE AND EXPLOSION HAZARD DATA

Will not burn unless water has evaporated.
In case of fire, water should be used to keep fire-exposed containers cool.

REACTIVITY DATA

Normally stable, but may become unstable at high temperatures or may react with water.
Hazardous polymerization:
May occur.
Decomposition products may include:
CO, CO2, aldehydes (including formaldehyde), hydrogen cyanide, particulate matter and other organic compounds.

CONTROL MEASURES

If airborne contaminants are generated when the material is heated or handled, sufficient ventilation in volume and air flow patterns should be provided to keep air contaminant concentration levels below acceptable criteria.

READ NEXT PAGE

DISCLAIMER–SEE REVERSE SIDE

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215

Emergency Telephone
(614) 431-8600

IF IT'S BORDEN-IT'S GOT TO BE GOOD

DESCRIPTION: CASCO-RESIN CP-FOICH
PRODUCT TYPE: LIQUID UF RESIN
APPLICATION: PARTICLEBOARD FACE RESIN

PERSONAL PROTECTION INFORMATION

Where air contaminants can exceed acceptable criteria, use NIOSH/MSHA approved respiratory protection equipment. Respirators should be selected based on the form and concentration of contaminants in air in accordance with OSHA 29 CFR 1910.134 or other applicable standards or guidelines.
Use goggles if contact is likely.
Wear impervious gloves as required to prevent skin contact.

SPILL OR LEAK PROCEDURES

Large quantities: Enclose with diking material to prevent seepage into natural bodies of water, then consult Borden, Inc.
Small quantities: Soak up with absorbent material and remove to a chemical disposal area.

WASTE DISPOSAL

Recover free liquid. Absorb residue and dispose of according to local, state/provincial, and federal requirements.

STORAGE PRECAUTIONS

NOTES
Not harmed by freezing, but thaw frozen resin slowly and stir before using.
Store in a cool place. High temperatures shorten storage life. Urea formaldehyde resin thickens with age. Rotate stock in storage to use oldest first.
Limited storage life - Refer to product specifications.
Solubility in water of urea resins can vary from infinite to insoluble depending on manufacturing procedure and age. Warm water helps in washing up resins with limited solubility.

TRANSPORT INFORMATION

REFER TO YOUR BILL OF LADING FOR PROPER DOT DESCRIPTION

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040 12-F01LM-. PREVIOUS ISSUE: 13-AUG-93 CURRENT ISSUE: 19-JAN-94
PRINT DATE: 22-Feb-94 01:19 PM

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MATERIAL SAFETY DATA SHEET

Borden, Inc.
Packaging and Industrial Products Division
180 EAST BROAD STREET, COLUMBUS, OHIO 43215

Emergency Telephone
(614) 431-8600

IF IT'S BORDEN-IT'S GOT TO BE GOOD

SARA TITLE III SECTION 313
AND 40 CFR Part 372
TOXIC CHEMICAL NOTIFICATION SHEET

CABOO-RESIN UF FOILM

This product contains the following toxic chemical(s) subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986, and Subpart C-Supplier Notification Requirement of 40 CFR Part 372.

CAS Registry Number	Chemical Name	Pct. By Weight
50-00-0	FORMALDEHYDE	0.35

This Toxic Chemical Notification Sheet must not be detached from the Material Safety Data Sheet (MSDS). Any copying and redistribution of the MSDS shall include copying and redistribution of this notification sheet attached to copies of the MSDS subsequently redistributed.

040 12-FOILM-. PRINT DATE: 22-Feb-94 01:19 PM

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REPORT NUMBER: 703
MSDS NO: P11334V
EFFECTIVE DATE: 11/14/91

VAN WATERS & ROGERS INC.
MATERIAL SAFETY DATA SHEET

PAGE: 001

VERSION: 001

CATALYST

PRODUCT: AMMONIUM SULFATE

ORDER NO: 127422
PROD NO : 203770

LOUISIANA PACIFIC
PARTICLE BOARD DIVISION
3300 RASER DR./PO BOX4007

MISSOULA ,MT 59806 ,

VAN WATERS & ROGERS INC. , SUBSIDIARY OF UNIVAR (206)889-3400
6100 CARILLON POINT , KIRKLAND , WA 98033

---------- EMERGENCY ASSISTANCE ----------

FOR EMERGENCY ASSISTANCE INVOLVING CHEMICALS CALL - CHEMTREC
(800)424-9300

---------- FOR PRODUCT AND SALES INFORMATION ----------

CONTACT YOUR LOCAL VAN WATERS & ROGERS BRANCH OFFICE AT
VW&R SPOKANE 509-534-0405 SPOKANE , WA

****
SECTION I - PRODUCT IDENTIFICATION
****

PRODUCT NAME: Ammonium Sulfate

MSDS #: P11334V

DATE ISSUED: 07/88

CHEMICAL NAME: Ammonium Sulfate

CHEMICAL FORMULA: (NH4)2SO4

MOLECULAR WEIGHT: 132

SYNONYMS: 21-0-0

MATERIAL USE: Fertilizer, fire retardant, drilling fluids

CAS NUMBER: 7783-20-2

RECEIVED
FEB 22 1993
LOUISIANA PACIFIC CORP.
MISSOULA MONTANA

****
SECTION II - HAZARDOUS INGREDIENTS OF MATERIAL
****

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PRODUCT: AMMONIUM SULFATE

ORDER NO: 127422
PROD NO : 203770

There are no hazardous ingredients.

****
SECTION III - PHYSICAL DATA FOR MATERIAL
****

PHYSICAL STATE: Solid

ODOR AND APPEARANCE: Possible odor of ammonia (white granules or crystals).

ODOR THRESHOLD (ppm): None

SPECIFIC GRAVITY: 1.77

VAPOR PRESSURE (mm Hg): No data

VAPOR DENSITY (Air=1): No data

EVAPORATION RATE: No data

BOILING POINT: Not applicable

FREEZING POINT: Not applicable

SOLUBILITY IN WATER (20 Deg. C): 35 g/100 ml H20

pH: Not applicable

DENSITY (g/ml): Not applicable

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable

****
SECTION IV FIRE AND EXPLOSION HAZARD OF MATERIAL
****

FLAMMABILITY: No

MEANS OF EXTINCTION: Use any means suitable for extinguishing fire.

SPECIAL PROCEDURES: Fire fighters should use self-contained breathing apparatus.

FLASH POINT AND METHOD: Not flammable

UPPER EXPLOSION LIMIT (% BY VOLUME): Not applicable

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LOWER EXPLOSION LIMIT (% BY VOLUME): Not applicable

AUTO IGNITION TEMPERATURE: No data

HAZARDOUS COMBUSTION PRODUCTS: Ammonia and oxides of sulfur.

SENSITIVITY TO MECHANICAL IMPACT: None

SENSITIVITY TO STATIC DISCHARGE: None

****
SECTION V - REACTIVITY DATA
****

CHEMICAL STABILITY: Stable

INCOMPATIBILITY WITH OTHER SUBSTANCES: Yes. Strong oxidizing agents such as potassium chlorate, potassium nitrite and ammonium nitrite.

REACTIVITY AND UNDER WHAT CONDITIONS: Polymerization will not occur.

HAZARDOUS DECOMPOSITION PRODUCTS: When heated to decomposition, can emit toxic fumes of ammonia, sulfur oxide and nitric oxides.

****
SECTION VI - TOXICOLOGICAL PROPERTIES OF PRODUCT
****

ROUTES OF ENTRY: Skin contact, eye contact, inhalation (acute) and ingestion.

EFFECTS OF ACUTE EXPOSURE TO PRODUCT:

SKIN: May cause mild irritation.

EYE: Dust may cause local eye irritation.

INHALATION: May cause mild irritation to mucous membranes.

INGESTION: May cause abdominal pain, nausea and vomiting.

EFFECTS OF CHRONIC EXPOSURE TO PRODUCT: No information found.

LD50 OF PRODUCT (SPECIFY SPECIES AND ROUTE): 3000 mg/kg (rat - oral)

LC50 OF PRODUCT (SPECIFY SPECIES): No data

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PRODUCT: AMMONIUM SULFATE

ORDER NO: 127422
PROD NO : 203770

IRRITANCY OF PRODUCT: Slight

SENSITIZATION OF PRODUCT: No data

EXPOSURE LIMITS OF PRODUCT: 10 mg/m3 (nuisance dust)

SYNERGISTIC MATERIALS: No data

****
SECTION VII - PREVENTIVE MEASURES
****

GLOVES (SPECIFY): None specified

RESPIRATORY (SPECIFY): Approved dust

EYE (SPECIFY): Glasses or goggles

FOOTWEAR (SPECIFY): None specified

CLOTHING (SPECIFY): None specified

ENGINEERING CONTROLS (e.g. ventilation, enclosed process, specify): Local or general ventilation to control process area below the permissible exposure limit.

LEAK AND SPILL PROCEDURE: Contain material. Shovel contents into container for reclamation or return to process.

WASTE DISPOSAL: Material should be saved for reclamation. Dispose of only in accordance with applicable regulations.

HANDLING PROCEDURES AND EQUIPMENT: Clean-up personnel may require respiratory protection from dust.

STORAGE REQUIREMENTS: Store in a dry area. Protect against physical damage.

SPECIAL SHIPPING INFORMATION: None required.

WHMIS: Not a controlled product

****
SECTION VIII - FIRST AID MEASURES
****

SKIN: Remove contaminated clothing. Wash affected area with soap and

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water.

EYE: Flush with water. If irritation persists, get medical attention.

INHALATION: Remove from exposure. If difficulty in breathing, get medical attention.

INGESTION: Give plenty of water if patient is conscious. Get medical attention.

---------- FOR ADDITIONAL INFORMATION ----------

CONTACT: MSDS COORDINATOR VW&R SPOKANE
DURING BUSINESS HOURS, PACIFIC TIME (206)889-3400

02/18/93 07:15 PRODUCT: 203770 CUST NO: 113071 ORDER NO: 127422

---------- NOTICE ----------

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IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE,

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*** E N D O F M S D S ***

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APPENDIX O

PROCEDURES

Particulate Loading and Emission Rates

The particulate emission rates were determined per EPA Methods 1 - 5, CFR Title 40, Part 60, Appendix A (revised July 1, 1992). In this procedure a preliminary velocity profile of the gases in the flue is obtained by means of a temperature and velocity traverse. On the basis of these values, sampling nozzles of appropriate diameter are selected to allow isokinetic sampling, a necessary prerequisite for obtaining a representative sample.

The sampling train consists of a heated glass-lined sampling probe equipped with a Type S pitot and a thermocouple. The probe is attached to a sampling module which houses the all-glass in line filter holder in a temperature controlled oven. The sampling module also houses the impinger case and a Drierite filled column. The sampling module is connected by means of an umbilical cord to the control module. The control module houses the dry test gas meter, the calibrated orifice, a leakless pump, two inclined manometers, and all controls required for operating the sampling train.

Particulate samples are collected as follows: The sample gas is drawn through the sampling probe isokinetically and passed through a 4-inch diameter Gelman Type A/E glass fiber filter where particulates are removed. The sample gas is then passed through an ice-cooled impinger train and a desiccant-packed column which absorbs remaining moisture. The sample gas then passes through a vacuum pump followed by a dry test gas meter. The gas meter integrates the sample gas flow throughout the course of the test. A calibrated orifice attached to the outlet of the gasmeter provides real time flow rate data.

A representative particulate sample was acquired by sampling for equal periods of time at the centroid of a number of equal area regions in the duct. The sampling rate is adjusted at each test point maintaining isokinetic sampling conditions. Nomographs are used for rapid determination of the sampling rate.

Particulate Loading and Emission Rates

After sampling is complete, the filter is removed and placed in a clean container. The nozzle and inlet side of the filter holder are quantitatively washed with acetone and the washings are stored in a second container. A brush is often used in the cleaning step to help dislodge deposits. The samples are returned to the laboratory where they are logged in and analyzed. The volume of the acetone rinse ("probe wash") is noted and then the rinse is quantitatively transferred to a tared 120 cc porcelain evaporating dish and the acetone evaporated off at 97-105 °F. This temperature is used to prevent condensation of atmospheric moisture due to the cooling effect induced by the evaporation of acetone. The acetone-free sample is then transferred to an oven and dried at 105 °C for 30 minutes, cooled in a desiccator over Drierite, and then weighed to the nearest .01 mg. The filter sample is quantitatively transferred to a 6-inch watch glass and dried in an oven at 105 °C for two hours. The filter and watch glass are then cooled in a desiccator and the filter weighed to the nearest .01 mg. All weighings are performed in a balance room where the relative humidity is hydrostatted to less than 50% relative humidity. Microscopic examination of the samples is performed if any unusual characteristics are observed. The weight of the acetone rinse is corrected for the acetone blank. The Drierite column is weighed on-site and the water collected by Drierite is added to the condensate so that the total amount of absorbed water may be ascertained.

Integrated flue gas samples for Orsat analysis were collected simultaneously with each pollutant sample. The samples were collected in 15-liter gas sampling bags at a constant flow rate throughout each particulate run. The bags were at a constant flow rate throughout each particulate run. The bags were then returned to the laboratory and analyzed by Orsat analysis. Standard commercially prepared solutions were used in the Orsat analyzer (sat. KOH for carbon dioxide and reduced methylene blue for oxygen).

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 51

[AD-FRL-3977-4]

Preparation, Adoption, and Submittal of State Implementation Plans, Method for Measurement of Condensible Particulate Emissions From Stationary Sources

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Method 202 for the measurement of condensible particulate matter (CPM) was proposed in the Federal Register on October 12, 1990, at (55 FR 41546). This action promulgates this method. On April 17, 1990 at (55 FR 14246) EPA promulgated two methods for measuring particulate matter (PM) with an aerodynamic diameter of 10 μm or less (PM_{10}). Since CPM emissions form very fine particles in the PM_{10} size range and are considered PM_{10} emissions, the Agency is adding a method for measuring CPM emissions from stationary sources to appendix M in 40 CFR part 51. The purpose of this

rule is to provide the States with a method for measuring CPM.

EFFECTIVE DATE: December 17, 1991.

ADDRESSES: Background Information Document. The Background Information Document for the promulgated test methods may be obtained from Candace Sorrell or Peter Westlin, MD-19, U.S. EPA, Research Triangle Park, North Carolina 27711, telephone number (919) 541-1064. Please refer to "Summary of Comments and Responses for Method 202."

Docket. Docket No. A-90-03, containing materials relevant to this rulemaking, is available for public inspection and copying between 8:30 a.m. to 12 Noon and 1:30 to 3:30 p.m., Monday through Friday, at EPA's Air Docket Section, Waterside Mall, room M1500, 1st Floor, Gallery 1, 401 M Street SW., Washington, DC 20460. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: Candace Sorrell or Peter Westlin, Emission Measurement Branch (MD-19), Technical Support Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-1064.

SUPPLEMENTARY INFORMATION:

I. The Rulemaking

The EPA is proposing to add a method for measuring CPM emissions to appendix M in 40 CFR part 51 to provide a method that States can use in their State implementation plans.

II. Public Participation

The opportunity to hold a public hearing on November 2, 1990 at 10 a.m. was presented in the proposal notice, but no one desired to make an oral presentation. The public comment period was from October 12, 1990 to December 17, 1990.

III. Significant Comments and Changes to the Proposed Rulemaking

Six comment letters were received from the proposal rulemaking. A detailed discussion of these comments is contained in the background document entitled "Summary of Comments and Responses for Method 202" which is referred to in the ADDRESSES section of this preamble. The major comments raised in these letters and the Agency's responses follow.

One commenter suggests that EPA determine the chemical composition of the material collected in the sampling train to verify that it will form ambient condensibles.

The EPA believes that material will collect in the impingers only by condensation or dissolution. Dissolved gases will evaporate during analysis and will not be measured unless the gases react to form a solid or liquid while they are in solution. The EPA has designed Method 202 to prevent the formation of reaction materials from dissolved gases. The EPA believes that any remaining material collected and measured by Method 202 represents the material that would condense in the ambient air. Additional analysis of chemical composition is not necessary.

Another comment raises the concern that the method may collect some portion of the sulfur dioxide (SO_2) as condensible.

The dissolution of SO_2 in water does not lead immediately to the formation of sulfuric acid (H_2SO_4), but tends to lower the solution pH, which further inhibits sulfate or H_2SO_4 formation. The method includes a purging procedure which effectively removes SO_2 before significant oxidation occurs. No additional revisions are necessary.

The commenter feels that if EPA is allowing Method 202 to be used in conjunction with Method 201 or 201A or another dry catch procedure to determine the total PM_{10} measurement, the combined methods should be tested for precision.

The imprecision associated with combining Method 202 with Method 201 or 201A or any other dry catch procedure is not additive because each train provides a separate measurement. Since the total precision associated with the combined methods cannot be larger than the least precise sampling method, a precision evaluation of a combined sampling system is unnecessary.

A commenter suggests that EPA add specific language to the applicability section of the method stating that Method 202 cannot be used on wet sources. He notes that Method 17 is excluded from use on wet sources, and Methods 201 and 201A are not recommended for wet sources.

The EPA agrees that Method 202 with an in-stack filter is not recommended for wet sources, and such a statement has been added to the applicability. However, a heated Method 5 filter could be used in Method 202 instead of the in-stack filter which would allow application to wet sources.

One commenter requests that EPA clearly state that Method 202 should not be used for assessing compliance with emission limits set on the basis of data derived from a different measurement approach.

The EPA agrees that a violation must be shown, in the first instance, by means of measurements made with the applicable test method. Once such a showing is made, however, section 113(e) of the Clean Air Act allows the Agency to rely on any credible evidence including evidence other than the applicable test method, to establish the duration of the period of noncompliance for the purposes of assessing a penalty.

A commenter believes that the sample collection efficiency and method precision may be affected by the sampling conditions such as impinger temperature and sampling flow rate and the method should address this possibility.

The EPA agrees that the nature of the material in the sample gas may affect collection efficiency. For example, a field demonstration of Method 202 at an oil-fired boiler resulted in about 75 percent impinger collection efficiency. This collection efficiency can be improved with the addition of a second filter place between the second and third impinger. This option has been included in the method with a discussion of applicability.

The commenter feels the 1-hour nitrogen (N_2) purge is too long. He believes the majority of the SO_2 is removed in the first few minutes. He suggests the method be revised to reduce the purge time in conjunction with maintaining the sample under cold conditions and analyzing it within 48 hours.

The EPA does not agree with reducing the purge time. Laboratory tests have shown that a 1-hour purge time is necessary to ensure the adequate removal of SO_2 from the impinger solution.

Another commenter suggests that the method should be revised to give credit for ammonium sulfate ($(NH_4)_2SO_4$) dihydrte and other condensible particulate matter formed in the gas stream due to ammonia (NH_3) injection used to enhance the efficiency of a control device.

The EPA does not agree. The condensible particulate matter formed in the gas stream due to NH_3 injection is emitted to the atmosphere. The EPA believes that condensible particulate matter emitted from the source should be counted as such even if it is a product of a pollution-control technique.

The commenter suggests that EPA consider an alternative to $MeCl_2$ consistent with the Montreal Protocol.

The EPA investigated the effectiveness of a chloroform-ether extraction during the method development phase. The chloroform-ether was not as effective as the $MeCl_2$ in removing organic materials; however the chloroform-ether procedure was

found to be acceptable for organic extraction. The method has been revised to allow a chloroform-ether extraction.

The commenter supports the exclusion of ammonium chloride as a condensible; however, he expresses concern about $(NH_4)_2SO_4$ forming in the impingers.

The N_2 purge removes SO_2 before significant oxidation occurs. If NH_3 is present in the flue gas, the $(NH_4)_2SO_4$ formed in the impingers would not be counted as a condensible, although the H_2SO_4, which reacted with NH_3, would be counted as a condensible. Method 202 corrects for the NH_3 by measuring the sulfate using an IC analysis and subtracting out the ammonium ion (NH_4^+) mass.

The commenter agrees that the NH_3 added during the titration should be subtracted from the final weight. However, he does not agree with adding back in the water removed by the acid-base reaction.

Because H_2SO_4 is hygroscopic, the H_2SO_4 mass found in the atmosphere would have the water attached to it. The method has been revised to allow the source to correct for only the NH_4^+ or for both NH_4^+ and water as an option depending on the basis for the regulation.

A. Docket

The docket is an organized and complete file of all the information submitted to or otherwise considered by EPA in the development of this proposed rulemaking. The principle purposes of the docket are to: (1) Allow interested parties to identify and locate documents so that they can effectively participate in the rulemaking process, and (2) serve as the record in case of judicial review except for interagency review materials (Section 307(d)(7)(A)).

B. Office of Management and Budget Review

Under Executive Order 12291, EPA must judge whether a regulation is "major" and, therefore, subject to the requirement of a regulatory impact analysis. This rulemaking would not result in any of the adverse economic effects set forth in Section 1 of the Order as grounds for finding a "major rule." It will neither have an annual effect on the economy of $100 million or more, nor will it result in a major increase in costs or prices. There will be no significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of U.S.-based enterprises to compete with foreign-based enterprises in domestic or export markets. This rulemaking was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291.

C. Regulatory Flexibility Act Compliance

Pursuant to the provisions of 5 U.S.C. 605(b), I hereby certify that this attached rule, if promulgated, will not have any economic impact on small entities because no additional costs will be incurred.

This rule does not contain any information collection requirements subject to OMB review under the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.*

Dated: December 6, 1991.

F. Henry Habicht II,

Acting Administrator.

List of Subjects in 40 CFR Part 51

Administrative practice and procedure.
Air pollution control.
Carbon Monoxide.
Inter-governmental relations.
Lead.
Nitrogen dioxide.
Ozone.
Particulate matter.
Reporting and recordkeeping requirements.
Sulfur Oxides.
Volatile Organic Compounds.

The EPA amends title 40, chapter I, part 51 of the Code of Federal Regulations as follows:

PART 51—[AMENDED]

1. The authority citation for part 51 continues to read as follows:

Authority: Section 110 of the Clean Air Act as amended (42 U.S.C. 7410).

2. Appendix M, to part 51 Table of Contents is amended by adding an entry to read as follows:

Method 202—Determination of Condensible Particulate Emissions From Stationary Sources

3. By adding Method 202 to Appendix M to part 51 to read as follows:

Method 202—Determination of Condensible Particulate Emissions From Stationary Sources

1. Applicability and Principle

1.1 Applicability. 1.1.1 This method applies to the determination of condensible particulate matter (CPM) emissions from stationary sources. It is intended to represent condensible matter as material that condenses after passing through a filter and as measured by this method (Note: The filter catch can be analyzed according to the appropriate method).

1.1.2 This method may be used in conjunction with Method 201 or 201A if the probes are glass-lined. Using Method 202 in conjunction with Method 201 or 201A, only the impinger train configuration and analysis is addressed by this method. The sample train operation and front end recovery and analysis shall be conducted according to Method 201 or 201A.

1.1.3 This method may also be modified to measure material that condenses at other temperatures by specifying the filter and probe temperature. A heated Method 5 out-of-stack filter may be used instead of the in-stack filter to determine condensible emissions at wet sources.

1.2 Principle. 1.2.1 The CPM is collected in the impinger portion of a Method 17 (appendix A, 40 CFR part 60) type sampling train. The impinger contents are immediately purged after the run with nitrogen (N_2) to remove dissolved sulfur dioxide (SO_2) gases from the impinger contents. The impinger solution is than extracted with methylene chloride ($MeCl_2$). The organic and aqueous fractions are then taken to dryness and the residues weighed. The total of both fractions represents the CPM.

1.2.2 The potential for low collection efficiency exist at oil-fired boilers. To improve the collection efficiency at these type of sources, an additional filter placed between the second and third impinger is recommended.

2. Precision and Interference

2.1 Precision. The precision based on method development tests at an oil-fired boiler and a catalytic cracker were 11.7 and 4.8 percent, respectively.

2.2 Interference. Ammonia. In sources that use ammonia injection as a control technique for hydrogen chloride (HCl), the ammonia interferes by reacting with HCl in the gas stream to form ammonium chloride (NH_4Cl) which would be measured as CPM. The sample may be analyzed for chloride and the equivalent amount of NH_4Cl can be subtracted from the CPM weight. However, if NH_4Cl is to be counted as CPM, the inorganic fraction should be taken to near dryness (less than 1 ml liquid) in the oven and then allowed to air dry at ambient temperature to prevent any NH_4Cl from vaporizing.

3. Apparatus

3.1 Sampling Train. Same as in Method 17, section 2.1, with the following exceptions noted below (see Figure 202-1). *Note:* Mention of trade names or specific products does not constitute endorsement by EPA.

3.1.1 The probe extension shall be glass-lined or Teflon.

3.1.2 Both the first and second impingers shall be of the Greenburg-Smith design with the standard tip.

3.1.3 All sampling train glassware shall be cleaned prior to the test with soap and tap water, water, and rinsed using tap water, water, acetone, and finally, $MeCl_2$. It is important to completely remove all silicone grease from areas that will be exposed to the $MeCl_2$ during sample recovery.

3.2 Sample Recovery. Same as in Method 17, section 2.2, with the following additions:

3.2.1 N_2 Purge Line. Inert tubing and fittings capable of delivering 0 to 28 liters/min of N_2 gas to the impinger train from a

standard gas cylinder (see Figure 202-2). Standard 0.95 cm (⅜-inch) plastic tubing and compression fittings in conjunction with an adjustable pressure regulator and needle valve may be used.

3.2.2 Rotameter. Capable of measuring gas flow at 20 liters/min.

3.3 Analysis. The following equipment is necessary in addition to that listed in Method 17, section 2.3:

3.3.1 Separatory Funnel. Glass, 1-liter.

3.3.2 Weighing Tins. 350-ml.

3.3.3 Dry Equipment. Hot plate and oven with temperature control.

3.3.4 Pipets. 5-ml.

3.3.5 Ion Chromatograph. Same as in Method 5F, Section 2.1.6.

4. Reagents

Unless otherwise indicated, all reagents must conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society. Where such specifications are not available, use the best available grade.

4.1 Sampling. Same as in Method 17, section 3.1, with the addition of deionized distilled water to conform to the American Society for Testing and Materials Specification D 1193–74, Type II and the omittance of section 3.1.4.

4.2 Sample Recovery. Same as in Method 17, section 3.2, with the following additions:

4.2.1 N_2 Gas. Zero N_2 gas at delivery pressures high enough to provide a flow of 20 liters/min for 1 hour through the sampling train.

4.2.2 Methylene Chloride. ACS grade. Blanks shall be run prior to use and only methylene chloride with low blank values (0.001 percent) shall be used.

4.2.3 Water. Same as in section 4.1.

4.3 Analysis. Same as in Method 17, section 3.3, with the following additions:

4.3.1 Methylene Chloride. Same as section 4.2.2.

4.3.2 Ammonium Hydroxide. Concentrated (14.8 M) NH_4OH.

4.3.3 Water. Same as in section 4.1.

4.3.4 Phenolphthalein. The pH indicator solution, 0.05 percent in 50 percent alcohol.

5. Procedure

5.1 Sampling. Same as in Method 17, section 4.1, with the following exceptions:

5.1.1 Place 100 ml of water in the first three impingers.

5.1.2 The use of silicone grease in train assembly is not recommended because it is very soluble in $MeCl_2$ which may result in sample contamination. Teflon tape or similar means may be used to provide leak-free connections between glassware.

5.2 Sample Recovery. Same as in Method 17, section 4.2 with the addition of a post-test N_2 purge and specific changes in handling of individual samples as described below.

5.2.1 Post-test N_2 Purge for Sources Emitting SO_2. (Note: This step is recommended, but is optional. With little or no SO_2 is present in the gas stream, i.e., the pH of the impinger solution is greater than 4.5, purging has been found to be unnecessary.) As soon as possible after the post-test leak check, detach the probe and filter from the impinger train. Leave the ice in the impinger box to prevent removal of moisture during the purge. If necessary, add more ice during the purge to maintain the gas temperature below 20 °C. With no flow of gas through the clean purge line and fittings, attach it to the input of the impinger train (see Figure 202-2). To avoid over- or under-pressurizing the impinger array, slowly commence the N_2 gas flow through the line while simultaneously opening the meter box pump valve(s). When using the gas cylinder pressure to push the purge gas through the sample train, adjust the flow rate to 20 liters/min through the rotameter. When pulling the purge gas through the sample train using the meter box vacuum pump, set the orifice pressure differential to $\Delta H_@$ and maintain an overflow rate through the rotameter of less than 2 liters/min. This will guarantee that the N_2 delivery system is operating at greater than ambient pressure and prevents the possibility of passing ambient air (rather than N_2) through the impingers. Continue the purge under these conditions for 1 hour, checking the rotameter and ΔH value(s) periodically. After 1 hour, simultaneously turn off the delivery and pumping systems.

5.2.2 Sample Handling.

5.2.2.1 Container Nos. 1, 2, and 3. If filter catch is to be determined, as detailed in Method 17, section 4.2.

5.2.2.2 Container No. 4 (Impinger Contents). Measure the liquid in the first three impingers to within 1 ml using a clean graduated cylinder or by weighing it to within 0.5 g using a balance. Record the volume or weight of liquid present to be used to calculate the moisture content of the effluent gas. Quantitatively transfer this liquid into a clean sample bottle (glass or plastic); rinse each impinger and the connecting glassware, including probe extension, twice with water, recover the rinse water, and add it to the same sample bottle. Mark the liquid level on the bottle.

5.2.2.3 Container No. 5 ($MeCl_2$ Rinse). Follow the water rinses of each impinger and the connecting glassware, including the probe extension with two rinses of $MeCl_2$; save the rinse products in a clean, glass sample jar. Mark the liquid level on the jar.

5.2.2.4 Container No. 6 (Water Blank). Once during each field test, place 500 ml of water in a separate sample container.

5.2.2.5 Container No. 7 ($MeCl_2$ Blank). Once during each field test, place in a separate glass sample jar a volume of $MeCl_2$ approximately equivalent to the volume used to conduct the $MeCl_2$ rinse of the impingers.

5.3 Analysis. Record the data required on a sheet such as the one shown in Figure 202–3. Handle each sample container as follows:

5.3.1 Container Nos. 1, 2, and 3. If filter catch is analyzed, as detailed in Method 17, section 4.3.

5.3.2 Container Nos. 4 and 5. Note the level of liquid in the containers and confirm on the analytical data sheet whether leakage occurred during transport. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results. Measure the liquid in Container No. 4 either volumetrically to ±1 ml or gravimetrically to ±0.5 g. Remove a 5-ml aliquot and set aside for later ion chromatographic (IC) analysis of sulfates. (Note: Do not use this aliquot to determine chlorides since the HCl will be evaporated during the first drying step: Section 8.2 details a procedure for this analysis.)

5.3.2.1 Extraction. Separate the organic fraction of the sample by adding the contents of Container No. 4 ($MeCl_2$) to the contents of Container No. 4 in a 1000-ml separatory funnel. After mixing, allow the aqueous and organic phases to fully separate, and drain off most of the organic/$MeCl_2$ phase. Then add 75 ml of $MeCl_2$ to the funnel, mix well, and drain off the lower organic phase. Repeat with another 75 ml of $MeCl_2$. This extraction should yield about 250 ml of organic extract. Each time, leave a small amount of the organic/$MeCl_2$ phase in the separatory funnel ensuring that no water is collected in the organic phase. Place the organic extract in a tared 350-ml weighing tin.

5.3.2.2 Organic Fraction Weight Determination (Organic Phase from Container Nos. 4 and 5). Evaporate the organic extract at room temperature and pressure in a laboratory hood. Following evaporation, desiccate the organic fraction for 24 hours in a desiccator containing anhydrous calcium sulfate. Weigh to a constant weight and report the results to the nearest 0.1 mg.

5.3.2.3 Inorganic Fraction Weight Determination. (Note: If NH_4Cl is to be counted as CPM, the inorganic fraction should be taken to near dryness (less than 1 ml liquid) in the oven and then allow to air dry at ambient temperature. If multiple acid emissions are suspected, the ammonia titration procedure in section 8.1 may be preferred.) Using a hot plate, or equivalent, evaporate the aqueous phase to approximately 50 ml; then, evaporate to dryness in a 105 °C oven. Redissovle the residue in 100 ml of water. Add five drops of phenolphthalein to this solution; then, add concentrated (14.8 M) NH_4OH until the sample turns pink. Any excess NH_4OH will be evaporated during the drying step. Evaporate the sample to dryness in a 105 °C oven, desiccate the sample for 24 hours, weigh to a constant weight, and record the results to the nearest 0.1 mg. (Note: The addition of NH_4OH is recommended, but is optional when little or no SO_2 is present in the gas stream, i.e., when the pH of the impinger solution is greater than 4.5, the addition of NH_4OH is not necessary.)

5.3.2.4 Analysis of Sulfate by IC to Determine Ammonium Ion (NH_4^+) Retained in the Sample. (Note: If NH_4OH is not added, omit this step.) Determine the amount of sulfate in the aliquot taken from Container No. 4 earlier as described in Method 5F (appendix A, 40 CFR part 60). Based on the IC SO_4^{-2} analysis of the aliquot, calculate the correction factor to subtract the NH_4^+ retained in the sample and to add the combined water removed by the acid-base reaction (see section 7.2).

5.3.3 Analysis of Water and $MeCl_2$ Blanks (Container Nos. 6 and 7). Analyze these sample blanks as described above in sections 5.3.2.3 and 5.3.2.2, respectively.

5.3.4 Analysis of Acetone Blank (Container No. 8). Same as in Method 17, section 4.3.

6. Calibration

Same as in Method 17, section 5, except for the following:

6.1 IC Calibration. Same as Method 5F, section 5.

6.2 Audit Procedure. Concurrently, analyze the audit sample and a set of compliance samples in the same manner to evaluate the technique of the analyst and the standards preparation. The same analyst, analytical reagents, and analytical system shall be used both for compliance samples and the EPA audit sample. If this condition is met, auditing of subsequent compliance analyses for the same enforcement agency within 30 days is not required. An audit sample set may not be used to validate different sets of compliance samples under the jurisdiction of different enforcement agencies, unless prior arrangements are made with both enforcement agencies.

6.3 Audit Samples. Audit Sample Availability. Audit samples will be supplied only to enforcement agencies for compliance tests. The availability of audit samples may be obtained by writing:

Source Test Audit Coordinator (MD-77B), Quality Assurance Division, Atmospheric Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle, Park, NC 27711

or by calling the Source Test Audit Coordinator (STAC) at (919) 541-7834. The request for the audit sample must be made at least 30 days prior to the scheduled compliance sample analysis.

6.4 Audit Results. Calculate the audit sample concentration according to the calculation procedure described in the audit instructions included with the audit sample. Fill in the audit sample concentration and the analyst's name on the audit response form included with the audit instructions. Send one copy to the EPA Regional Office or the appropriate enforcement agency and a second copy to the STAC. The EPA Regional Office or the appropriate enforcement agency will report the results of the audit to the laboratory being audited. Include this response with the results of the compliance samples in relevant reports to the EPA Regional Office or the appropriate enforcement agency.

7. Calculations

Same as in Method 17, section 6, with the following additions:

7.1 Nomenclature. Same as in Method 17, section 6.1 with the following additions.

C_{cpm} = Concentration of the CPM in the stack gas, dry basis, corrected to standard conditions, g/dscm (g/dscf).

C_{SO_4} = Concentration of SO_4^{-2} in the sample, mg/ml.

m_a = Sum of the mass of the water and $MeCl_2$ blanks, mg.

m_c = Mass of the NH_4^+ added to sample to form ammonium sulfate, mg.

m_i = Mass of inorganic CPM matter, mg.

m_o = Mass of organic CPM, mg.

m_s = Mass of dried sample from inorganic fraction, mg.

V_a = Volume of aliquot taken for IC analysis, ml.

V_{sl} = Volume of impinger contents sample, ml.

7.2 Correction for NH_4^+ and H_2O. Calculate the correction factor to subtract the NH_4^+ retained in the sample based on the IC SO_4^{-2} and if desired, add the combined water removed by the acid-base reaction.

$$m_c = K\, C_{SO_4}\, V_s \qquad \text{Eq. 202-1}$$

where:

K = 0.0205, when correcting for NH_4^+ and H_2O.

= 0.1840, when only correcting for NH_4^+.

7.3 Mass of Inorganic CPM.

$$m_i = m_s \frac{V_{sl}}{V_{sl} - V_a} - m_c \qquad \text{Eq. 202-2}$$

7.4 Concentration of CPM.

$$C_{cpm} = \frac{m_a + m_i - m_o}{V m_{std}} \qquad \text{Eq. 202-3}$$

8. Alternative Procedures

8.1 Determination of NH_4^+ Retained in Sample by Titration.

8.1.1 An alternative procedure to determine the amount of NH_4^+ added to the inorganic fraction by titration may be used. After dissolving the inorganic residue in 100 ml of water, titrate the solution with 0.1 N NH_4OH to a pH of 7.0, as indicated by a pH meter. The 0.1 N NH_4OH is made as follows: Add 7 ml of concentrated (14.8 M) NH_4OH to 1 liter of water. Standardize against standardized 0.1 N H_2SO_4 and calculate the exact normality using a procedure parallel to that described in section 5.5 of Method 6 (appendix A, 40 CFR part 60). Alternatively, purchase 0.1 N NH_4OH that has been standardized against a National Institute of Standards and Technology reference material.

8.1.2 Calculate the concentration of SO_4^{-2} in the sample using the following equation.

$$CSO_4 = \frac{48.03\, V_t\, N}{100} \qquad \text{Eq. 202-4}$$

where

N = Normality of the NH_4OH, mg/ml.

V_t = Volume of NH_4OH titrant, ml.

48.03 = mg/meq.

100 = Volume of solution, ml.

8.3.1 Calculate the CPM as described in section 7.

8.2 Analysis of Chlorides by IC. At the conclusion of the final weighing as described in section 5.3.2.3, redissolve the inorganic fraction in 100 ml of water. Analyze an aliquot of the redissolved sample for chlorides by IC using techniques similar to those described in Method 5F for sulfates. Previous drying of the sample should have removed all HCl. Therefore, the remaining chlorides measured by IC can be assumed to be NH_4Cl, and this weight can be subtracted from the weight determined for CPM.

8.3 Air Purge to Remove SO_2 from Impinger Contents. As an alternative to the post-test N_2 purge described in section 5.2.1, the tester may opt to conduct the post-test purge with air at 20 liter/min. Note: The use of an air purge is not as effective as a N_2 purge.

8.4 Chloroform-ether Extraction. As an alternative to the methylene chloride extraction described in section 5.3.2.1, the tester may opt to conduct a chloroform-ether extraction. Note: The Chloroform-ether was not as effective as the $MeCl_2$ in removing the organics, but it was found to be an acceptable organic extractant. Chloroform and diethylether of ACS grade, with low blank values (0.001 percent), shall be used. Analysis of the chloroform and diethylether blanks shall be conducted according to Section 5.3.3 for $MeCl_2$.

8.4.1 Add the contents of Container No. 4 to a 1000-ml separatory funnel. Then add 75 ml of chloroform to the funnel, mix well, and drain off the lower organic phase. Repeat two more times with 75 ml of chloroform. Then perform three extractions with 75 ml of diethylether. This extraction should yield approximately 450 ml of organic extraction. Each time, leave a small amount of the organic/$MeCl_2$ phase in the separatory funnel ensuring that no water is collected in the organic phase.

8.4.2 Add the contents of Container No. 5 to the organic extraction. Place approximately 300 ml of the organic extract in a tared 350-ml weighing tin while storing the remaining organic extract in a sample container. As the organic extract evaporates, add the remaining extract to the weighing tin.

8.4.3 Determine the weight of the organic phase as described in Section 5.3.2.2.

8.5 Improving Collection Efficiency. If low impinger collection efficiency is suspected, the following procedure may be used.

8.5.1 Place an out-of-stock filter as described in Method 8 between the second and third impingers.

8.5.2 Recover and analyze the filter according to Method 17, Section 4.2. Include the filter holder as part of the connecting glassware and handle as described in sections 5.2.2.2 and 5.2.2.3.

8.5.3 Calculate the Concentration of CPM as follows:

$$C_{cpm} = \frac{m_a + m_i + m_f - m_o}{V m_{std}} \qquad \text{Eq. 202-5}$$

where:

m_f = amount of CPM collected on out-of-stack filter, mg.

8.6 Wet Source Testing. When testing at a wet source, use a heated out-of-stack filter as described in Method 5.

9. Bibliography

1. DeWees, W.D., S.C. Steinsberger, G.M. Plummer, L.T. Lay, C.D. McAlister, and R.T.

Shigehara. "Laboratory and Field Evaluation of the EPA Method 5 Impinger Catch for Measuring Condensible Matter from Stationary Sources." Paper presented at the 1989 EPA/AWMA International Symposium on Measurement of Toxic and Related Air Pollutants. Raleigh, North Carolina. May 1–5, 1989.

2. DeWees, W.D. and K.C. Steinsberger. "Method Development and Evaluation of Draft Protocol for Measurement of Condensible Particulate Emissions." Draft Report. November 17, 1989.

3. Texas Air Control Board, Laboratory Division. "Determination of Particulate in Stack Gases Containing Sulfuric Acid and/or Sulfur Dioxide." *Laboratory Methods for Determination of Air Pollutants*. Modified December 3, 1978.

4. Nothstein, Greg. Masters Thesis. University of Washington. Department of Environmental Health. Seattle, Washington.

5. "Particulate Source Test Procedures Adopted by Puget Sound Air Pollution Control Agency Board of Directors." Puget Sound Air Pollution Control Agency. Engineering Division. Seattle, Washington. August 11, 1983.

6. Commonwealth of Pennsylvania. Department of Environmental Resources. Chapter 139. Sampling and Testing (Title Rules and Regulations. Part I. Department of Environmental Resources. Subpart C. Protection of Natural Resources. Article III Air Resources). January 8, 1960.

7. Wisconsin Department of Natural Resources. *Air Management Operations Handbook, Revision 3*. January 11, 1988.

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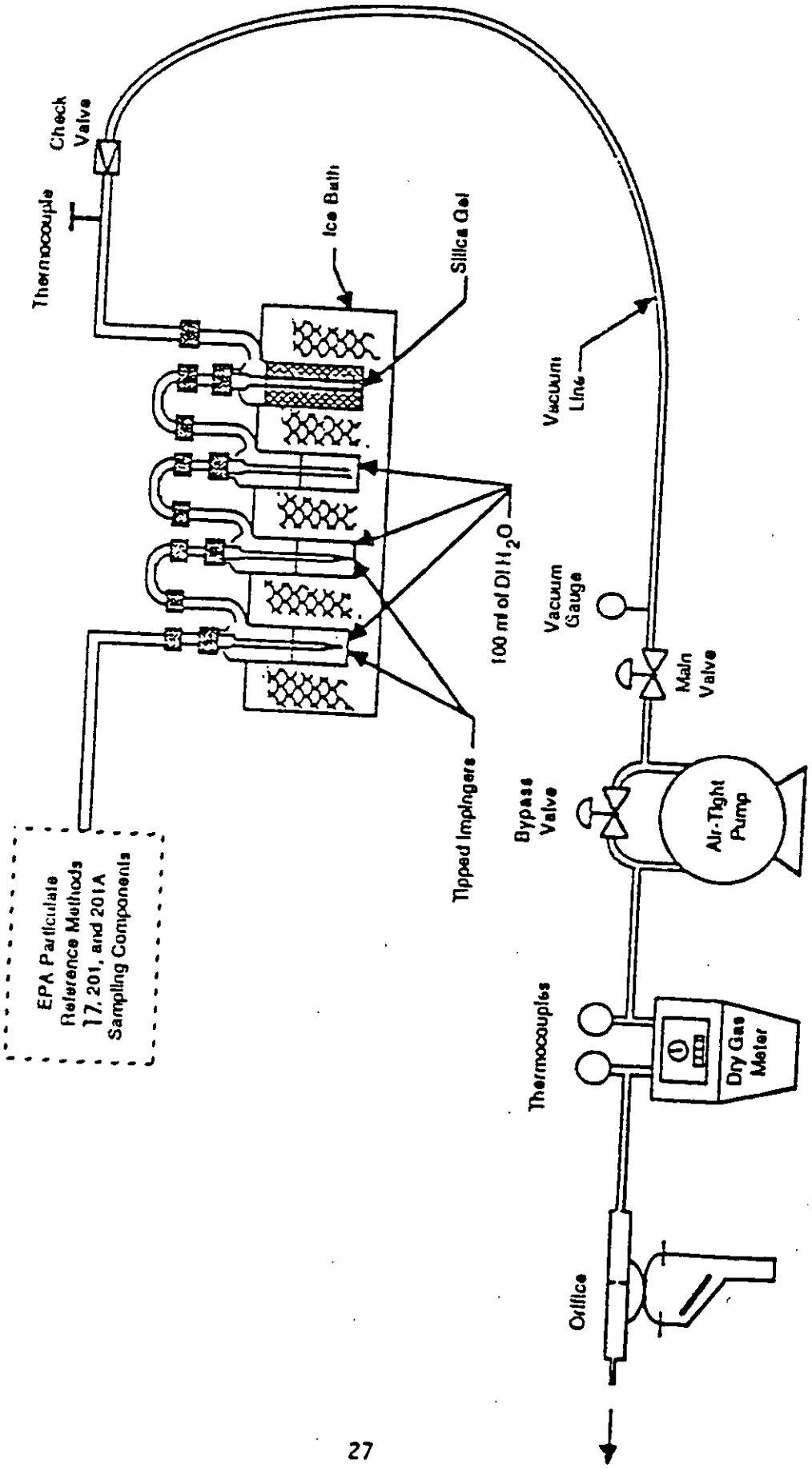

Figure 202-1. Schematic of condensible particulate sampling train.

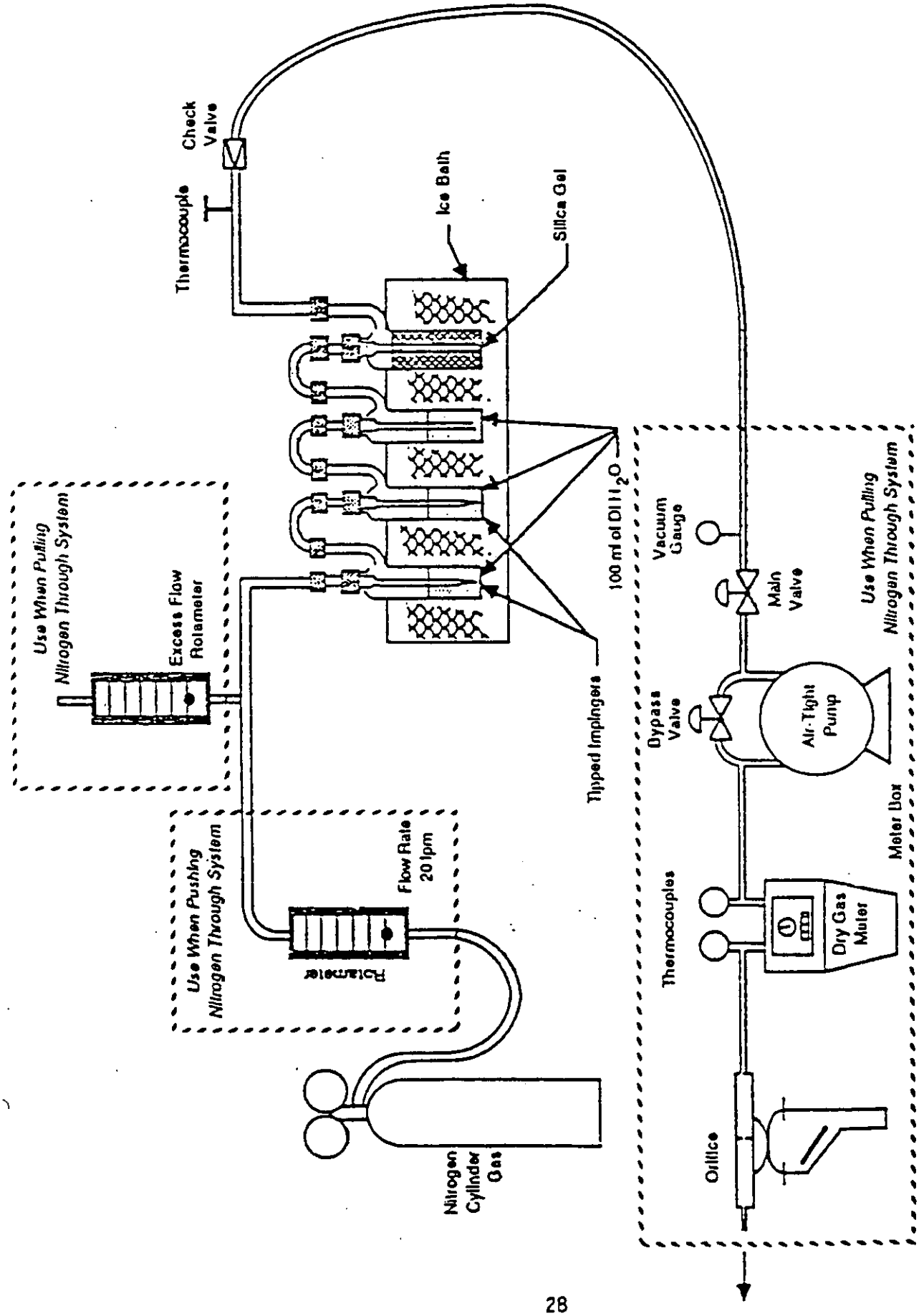

Figure 202-2. Schematic of post-test nitrogen purge system.

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Moisture Determination

Volume or weight of liquid in impingers:
_____ ml or g

Weight of moisture in silica gel: _____ g

Sample Preparation (Container No. 4)

Amount of liquid lost during transport:
_____ ml

Final volume: _____ ml

pH of sample prior to analysis: _____

Addition of NH_4OH required: _____

Sample extracted 2X with 75 ml $MeCl_2$:
_____

For Titration of Sulfate

Normality of NH_4OH: _____ N

Volume of sample titrated: _____ ml

Volume of titrant: _____ ml

Sample Analysis

Container number	Weight of condensible particulate, mg		
	Final weight	Tare weight	Weight gain
4 (Inorganic)			
4 & 5 (Organic)			

Total: _____

Less Blank: _____

Weight of Condensible Particulate:
_____

Figure 202-3. Analytical data sheet.

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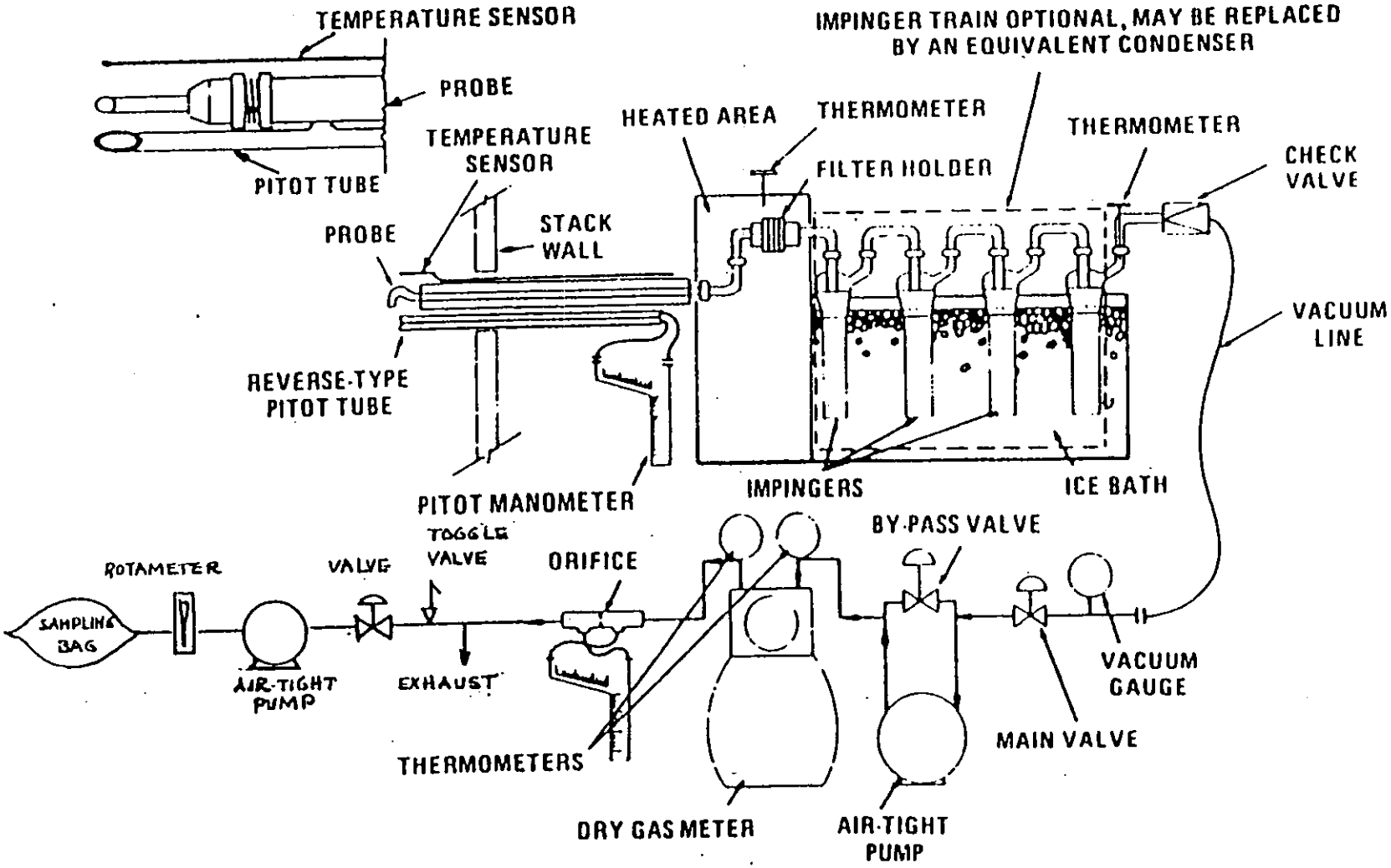


Particulate-sampling train.

Flow

Flow determinations were carried out in accordance with EPA Method 2, CFR Title 40, Part 60, Appendix A (Revised July 1, 1987). A type S pitot was used to sense velocity pressure and an inclined manometer was used to measure velocity pressures. Gas temperatures were measured using a calibrated Type K thermocouple and digital temperature meter. Gas density (i.e. molecular weight) was calculated from the composition of the gas which was determined by Orsat.

Gas Flow Density

Gas compositions were determined as per Method 3 by Orsat analysis of an integrated gas sample collected from the stack during the oxides of nitrogen determinations. Standard commercially prepared solutions were used in the Orsat analyzer (sat. KOH for carbon dioxide and reduced methylene blue for oxygen).

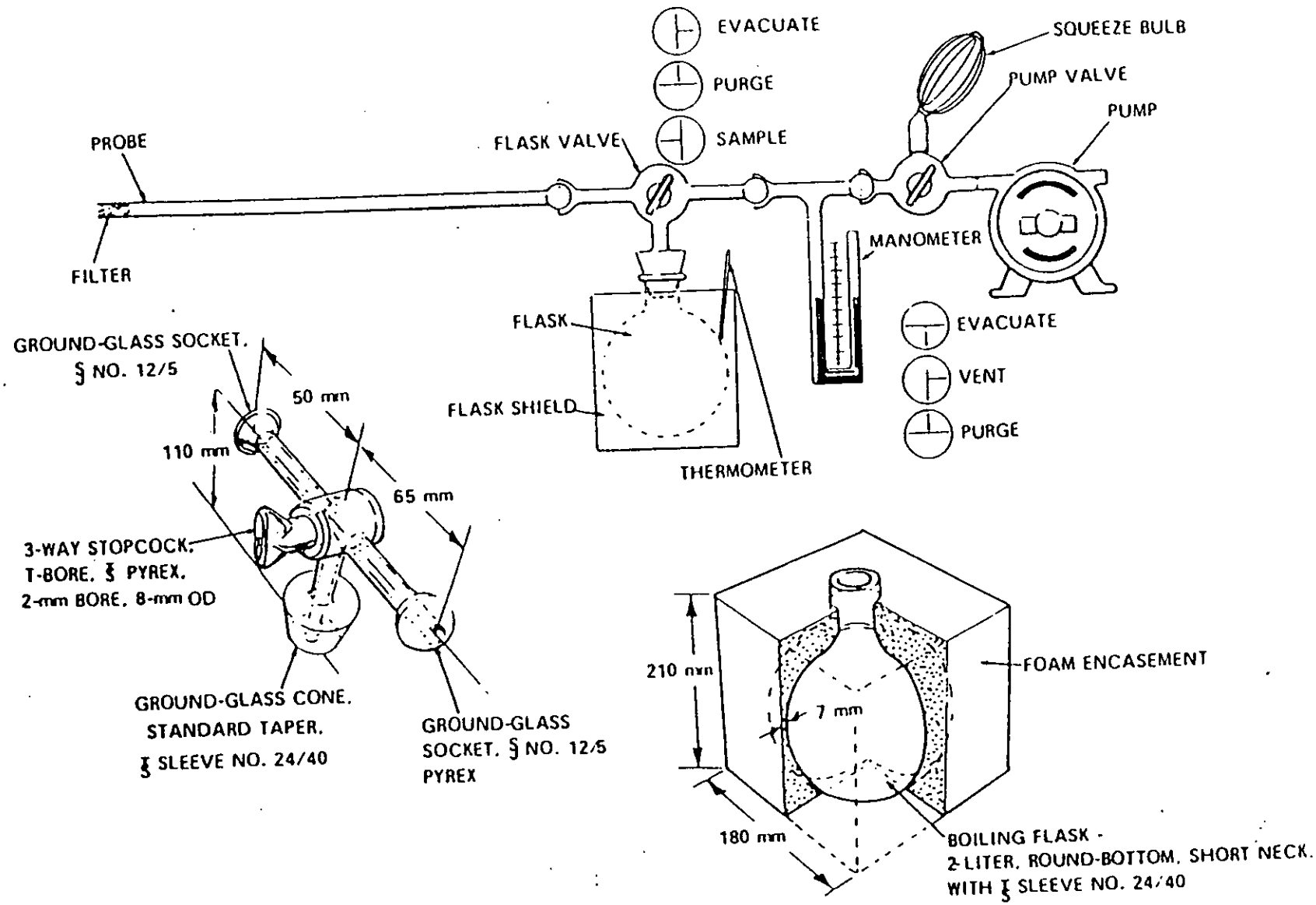
Oxides of Nitrogen

Oxides of nitrogen concentrations were collected in accordance with EPA Method 7 (see above-cited reference) with a specially designed all glass manifold and valving assembly and a heated stainless steel-lined probe. Samples were collected in two-liter evacuated insulated flasks which contained 25 cc of acidified peroxide solution (Method 7 reagent). Nine sets or more of three samples each were collected over a period of 4.5 to 5 hours.

The sampling train was leak checked through the probe at the beginning and end of the test and, in addition, the system leak checked at the time of evacuation of each flask. Before the samples were collected, the probe was purged to eliminate dead volume effects and to raise the temperature of the probe outlet and manifold assembly to minimize condensation of moisture. A plug of microfiber glass wool inserted in the probe inlet was used to prevent particulate material from entering into the flask. The temperature of the flask, vacuum in the

flask and barometric pressure at the time of sampling was recorded for each flask. After sampling was complete, as evidenced by the in-line vacuum gauge, the flask valve was closed, the flask assembly disconnected from the manifold/valve assembly and the flask shook for several minutes to promote oxidation and absorption. The recovered oxides of nitrogen samples were returned to the laboratory and analyzed immediately by ion chromatography as per EPA 7A.

The internal volume of each numbered flask assembly has been measured prior to initial use by filling with water, weighing before and after and then converting the weight of water to volume by means of the density of water at room temperature. Flask volumes are stored in the computer and recalled automatically in the computer calculation.



Sampling train, flask valve, and flask.

4.2 Performance Evaluation Tests. The owner of a lidar system shall subject such a lidar system to the performance verification tests described in Section 3, prior to first use of this method. The annual calibration shall be performed for three separate, complete runs and the results of each should be recorded. The requirements of Section 3.3.1 must be fulfilled for each of the three runs.

Once the conditions of the annual calibration are fulfilled the lidar shall be subjected to the routine verification for three separate complete runs. The requirements of Section 3.3.2 must be fulfilled for each of the three runs and the results should be recorded. The Administrator may request that the results of the performance evaluation be submitted for review.

5. *References*

5.1 The Use of Lidar for Emissions Source Opacity Determination, U.S. Environmental Protection Agency, National Enforcement Investigations Center, Denver, CO. EPA-330/1-79-003-R, Arthur W. Dybdahl, current edition [NTIS No. PB81-246662].

5.2 Field Evaluation of Mobile Lidar for the Measurement of Smoke Plume Opacity, U.S. Environmental Protection Agency, National Enforcement Investigations Center, Denver, CO. EPA/NEIC-TS-128, February 1976.

5.3 Remote Measurement of Smoke Plume Transmittance Using Lidar, C. S. Cook, G. W. Bethke, W. D. Conner (EPA/RTP). Applied Optics 11, pg 1742. August 1972.

5.4 Lidar Studies of Stack Plumes in Rural and Urban Environments, EPA-650/4-73-002, October 1973.

5.5 American National Standard for the Safe Use of Lasers ANSI Z 136.1-176, March 8, 1976.

5.6 U.S. Army Technical Manual TB MED 279, Control of Hazards to Health from Laser Radiation, February 1969.

5.7 Laser Institute of America Laser Safety Manual, 4th Edition.

5.8 U.S. Department of Health, Education and Welfare, Regulations for the Administration and Enforcement of the Radiation Control for Health and Safety Act of 1968, January 1976.

5.9 Laser Safety Handbook, Alex Mallow, Leon Chabot, Van Nostrand Reinhold Co., 1978.

METHOD 10—DETERMINATION OF CARBON MONOXIDE EMISSIONS FROM STATIONARY SOURCES

1. *Principle and Applicability*

1.1 Principle. An integrated or continuous gas sample is extracted from a sampling point and analyzed for carbon monoxide (CO) content using a Luft-type nondispersive infrared analyzer (NDIR) or equivalent.

1.2 Applicability. This method is applicable for the determination of carbon monoxide emissions from stationary sources only when specified by the test procedures for determining compliance with new source performance standards. The test procedure will indicate whether a continuous or an integrated sample is to be used.

2. *Range and Sensitivity*

2.1 Range. 0 to 1,000 ppm.

2.2 Sensitivity. Minimum detectable concentration is 20 ppm for a 0 to 1,000 ppm span.

3. *Interferences*

Any substance having a strong absorption of infrared energy will interfere to some extent. For example, discrimination ratios for water (H_2O) and carbon dioxide (CO_2) are 3.5 percent H_2O per 7 ppm CO and 10 percent CO_2 per 10 ppm CO, respectively, for devices measuring in the 1,500 to 3,000 ppm range. For devices measuring in the 0 to 100 ppm range, interference ratios can be as high as 3.5 percent H_2O per 25 ppm CO and 10 percent CO_2 per 50 ppm CO. The use of silica gel and ascarite traps will alleviate the major interference problems. The measured gas volume must be corrected if these traps are used.

4. *Precision and Accuracy*

4.1 Precision. The precision of most NDIR analyzers is approximately ±2 percent of span.

4.2 Accuracy. The accuracy of most NDIR analyzers is approximately ±5 percent of span after calibration.

5. *Apparatus*

5.1 Continuous Sample (Figure 10-1).

5.1.1 Probe. Stainless steel or sheathed Pyrex[1] glass, equipped with a filter to remove particulate matter.

5.1.2 Air-Cooled Condenser or Equivalent. To remove any excess moisture.

5.2 Integrated Sample (Figure 10-2).

5.2.1 Probe. Stainless steel or sheathed Pyrex glass, equipped with a filter to remove particulate matter.

5.2.2 Air-Cooled Condenser or Equivalent. To remove any excess moisture.

5.2.3 Valve. Needle valve, or equivalent, to to adjust flow rate.

5.2.4 Pump. Leak-free diaphragm type, or equivalent, to transport gas.

5.2.5 Rate Meter. Rotameter, or equivalent, to measure a flow range from 0 to 1.0 liter per min (0.035 cfm).

[1] Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

5.2.6 Flexible Bag. Tedlar, or equivalent, with a capacity of 60 to 90 liters (2 to 3 ft^3). Leak-test the bag in the laboratory before using by evacuating bag with a pump followed by a dry gas meter. When evacuation is complete, there should be no flow through the meter.

5.2.7 Pitot Tube. Type S, or equivalent, attached to the probe so that the sampling rate can be regulated proportional to the stack gas velocity when velocity is varying with the time or a sample traverse is conducted.

5.3 Analysis (Figure 10-3).

5.3.1 Carbon Monoxide Analyzer. Nondispersive infrared spectrometer, or equivalent. This instrument should be demonstrated, preferably by the manufacturer, to meet or exceed manufacturer's specifications and those described in this method.

5.3.2 Drying Tube. To contain approximately 200 g of silica gel.

5.3.3 Calibration Gas. Refer to section 6.1.

5.3.4 Filter. As recommended by NDIR manufacturer.

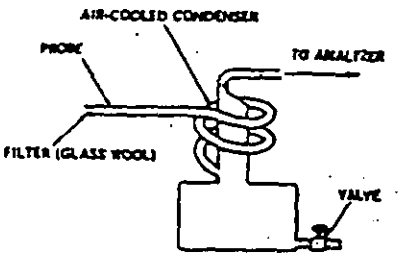


Figure 10-1. Continuous sampling train.

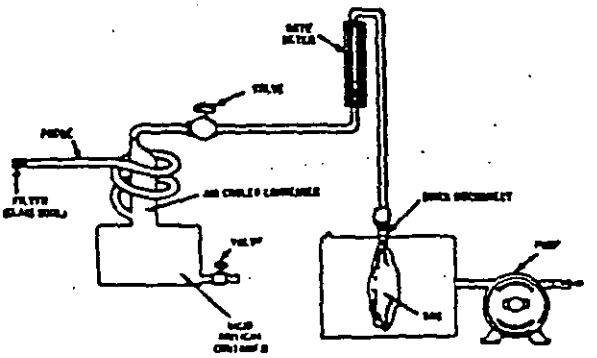


Figure 10-2. Integrated gas sampling train.

5.3.5 CO_2 Removal Tube. To contain approximately 500 g of ascarite.

5.3.6 Ice Water Bath. For ascarite and silica gel tubes.

5.3.7 Valve. Needle valve, or equivalent, to adjust flow rate

5.3.8 Rate Meter. Rotameter or equivalent to measure gas flow rate of 0 to 1.0 liter per min (0.035 cfm) through NDIR.

5.3.9 Recorder (*optional*). To provide permanent record of NDIR readings.

6. *Reagents*

6.1 Calibration Gases. Known concentration of CO in nitrogen (N_2) for instrument span, prepurified grade of N_2 for zero, and two additional concentrations corresponding approximately to 60 percent and 30 percent span. The span concentration shall not exceed 1.5 times the applicable source performance standard. The calibration gases shall be certified by the manufacturer to be within ±2 percent of the specified concentration.

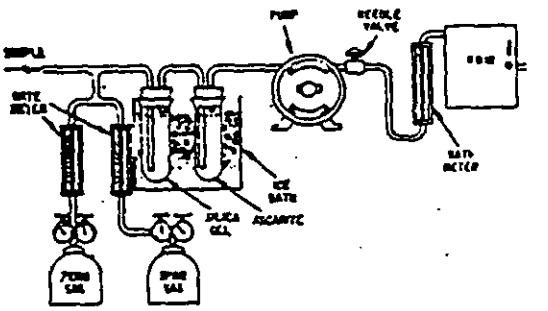


Figure 10-3. Analytical equipment.

6.2 Silica Gel. Indicating type, 6 to 16 mesh, dried at 175° C (347° F) for 2 hours.

6.3 Ascarite. Commercially available.

7. *Procedure*

7.1 Sampling.

7.1.1 Continuous Sampling. Set up the equipment as shown in Figure 10-1 making sure all connections are leak free. Place the probe in the stack at a sampling point and purge the sampling line. Connect the analyzer and begin drawing sample into the analyzer. Allow 5 minutes for the system to stabilize, then record the analyzer reading as required by the test procedure. (See section 7.2 and 8). CO_2 content of the gas may be determined by using the Method 3 integrated sample procedure, or by weighing the ascarite CO_2 removal tube and computing CO_2 concentration from the gas volume sampled and the weight gain of the tube.

7.1.2 Integrated Sampling. Evacuate the flexible bag. Set up the equipment as shown in Figure 10-2 with the bag disconnected. Place the probe in the stack and purge the sampling line. Connect the bag, making sure that all connections are leak free. Sample at a rate proportional to the stack velocity. CO_2 content of the gas may be determined by using the Method 3 integrated sample procedures, or by weighing the ascarite CO_2 removal tube and computing CO_2 concentra-

tion from the gas volume sampled and the weight gain of the tube.

7.2 CO Analysis. Assemble the apparatus as shown in Figure 10-3, calibrate the instrument, and perform other required operations as described in section 8. Purge analyzer with N_2 prior to introduction of each sample. Direct the sample stream through the instrument for the test period, recording the readings. Check the zero and span again after the test to assure that any drift or malfunction is detected. Record the sample data on Table 10-1.

8. *Calibration*

Assemble the apparatus according to Figure 10-3. Generally an instrument requires a warm-up period before stability is obtained. Follow the manufacturer's instructions for specific procedure. Allow a minimum time of 1 hour for warm-up. During this time check the sample conditioning apparatus, i.e., filter, condenser, drying tube, and CO_2 removal tube, to ensure that each component is in good operating condition. Zero and calibrate the instrument according to the manufacturer's procedures using, respectively, nitrogen and the calibration gases.

TABLE 10-1—FIELD DATA

	Comments
Location	
Test	
Date	
Operator	

Clock time	Rotameter setting, liters per minute (cubic feet per minute)

9. *Calculation*

Calculate the concentration of carbon monoxide in the stack using Equation 10-1.

$$C_{CO\ stack} = C_{CO\ NDIR}(1 - F_{CO_2}) \qquad \text{Eq. 10-1}$$

Where:

$C_{CO\ stack}$ = Concentration of CO in stack, ppm by volume (dry basis).

$C_{CO\ NDIR}$ = Concentration of CO measured by NDIR analyzer, ppm by volume (dry basis).

F_{CO_2} = Volume fraction of CO_2 in sample, i.e., percent CO_2 from Orsat analysis divided by 100.

10. Alternative Procedures

10.1 Interference Trap. The sample conditioning system described in Method 10A sections 2.1.2 and 4.2, may be used as an alternative to the silica gel and ascarite traps.

11. *Bibliography*

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ADDENDA

A. PERFORMANCE SPECIFICATIONS FOR NDIR CARBON MONOXIDE ANALYZERS

Range (minimum)	0-1000 ppm.
Output (minimum)	0-10mV.
Minimum detectable sensitivity.	20 ppm.
Rise time, 90 percent (maximum).	30 seconds.
Fall time, 90 percent (maximum).	30 seconds.
Zero drift (maximum)	10% in 8 hours.
Span drift (maximum)	10% in 8 hours.
Precision (minimum)	±2% of full scale.
Noise (maximum)	±1% of full scale.
Linearity (maximum deviation)	2% of full scale.
Interference rejection ratio	CO_2—1000 to 1, H_2O—500 to 1.

B. *Definitions of Performance Specifications.*

Range—The minimum and maximum measurement limits.

Output—Electrical signal which is proportional to the measurement; intended for connection to readout or data processing devices. Usually expressed as millivolts or milliamps full scale at a given impedance.

Full scale—The maximum measuring limit for a given range.

Minimum detectable sensitivity—The smallest amount of input concentration that can be detected as the concentration approaches zero.

Accuracy—The degree of agreement between a measured value and the true value: usually expressed as ± percent of full scale.

Time to 90 percent response—The time interval from a step change in the input concentration at the instrument inlet to a reading of 90 percent of the ultimate recorded concentration.

Rise Time (90 percent)—The interval between initial response time and time to 90 percent response after a step increase in the inlet concentration.

Fall Time (90 percent)—The interval between initial response time and time to 90 percent response after a step decrease in the inlet concentration.

Zero Drift—The change in instrument output over a stated time period, usually 24 hours, of unadjusted continuous operation when the input concentration is zero; usually expressed as percent full scale.

Span Drift—The change in instrument output over a stated time period, usually 24 hours, of unadjusted continuous operation when the input concentration is a stated upscale value; usually expressed as percent full scale.

Precision—The degree of agreement between repeated measurements of the same concentration, expressed as the average deviation of the single results from the mean.

Noise—Spontaneous deviations from a mean output not caused by input concentration changes.

Linearity—The maximum deviation between an actual instrument reading and the reading predicted by a straight line drawn between upper and lower calibration points.

METHOD 10A—DETERMINATION OF CARBON MONOXIDE EMISSIONS IN CERTIFYING CONTINUOUS EMISSION MONITORING SYSTEMS AT PETROLEUM REFINERIES

1. Applicability and Principle

1.1 Applicability. This method applies to the measurement of carbon monoxide (CO) at petroleum refineries. This method serves as the reference method in the relative accuracy test for nondispersive infrared (NDIR) CO continuous emission monitoring systems (CEMS's) that are required to be installed in petroleum refineries on fluid catalytic cracking unit catalyst regenerators [40 CFR Part 60.105(a)(2)].

1.2 Principle. An integrated gas sample is extracted from the stack, passed through an alkaline permanganate solution to remove sulfur and nitrogen oxides, and collected in a Tedlar bag. The CO concentration in the sample is measured spectrophotometrically using the reaction of CO with p-sulfaminobenzoic acid.

1.3 Range and Sensitivity.

1.3.1 Range. Approximately 3 to 1800 ppm CO. Samples having concentrations below 400 ppm are analyzed at 425 nm, and samples having concentrations above 400 ppm are analyzed at 600 nm.

1.3.2 Sensitivity. The detection limit is 3 ppm based on three times the standard deviation of the mean reagent blank values.

1.4 Interferences. Sulfur oxides, nitric oxide, and other acid gases interfere with the colorimetric reaction. They are removed by passing the sampled gas through an alkaline potassium permanganate scrubbing solution. Carbon dioxide (CO_2) does not interfere, but, because it is removed by the scrubbing solution, its concentration must be measured independently and an appropriate volume correction made to the sampled gas.

1.5 Precision, Accuracy, and Stability.

1.5.1 Precision. The estimated intralaboratory standard deviation of the method is 3 percent of the mean for gas samples analyzed in duplicate in the concentration range of 39 to 412 ppm. The interlaboratory precision has not been established.

1.5.2 Accuracy. The method contains no significant biases when compared to an NDIR analyzer calibrated with National Bureau of Standards (NBS) standards.

1.5.3 Stability. The individual components of the colorimetric reagent are stable for at least 1 month. The colorimetric reagent must be used within 2 days after preparation to avoid excessive blank correction. The samples in the Tedlar [1] bag should be stable for at least 1 week if the bags are leak-free.

2. Apparatus

2.1 Sampling. The sampling train is shown in Figure 10A-1, and component parts are discussed below:

[1] Mention of trade names or commercial products in this publication does not constitute the endorsement or recommendation for use by the Environmental Protection Agency.

EPA
METHOD 0011

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INTERPOLL LABORATORIES

SAMPLING FOR FORMALDEHYDE EMISSIONS FROM STATIONARY SOURCES

1.0 SCOPE AND APPLICATION

1.1 This method is applicable to the determination of Destruction and Removal Efficiency (DRE) of formaldehyde, CAS Registry number 50-00-0, and possibly other aldehydes and ketones from stationary sources as specified in the regulations. The methodology has been applied specifically to formaldehyde; however, many laboratories have extended the application to other aldehydes and ketones. Compounds derivatized with 2,4-dinitrophenylhydrazine can be detected as low as 6.4×10^{-8} lbs/cu ft (1.8 ppbv) in stack gas over a 1 h sampling period, sampling approximately 45 cu ft.

2.0 SUMMARY OF METHOD

2.1 Gaseous and particulate pollutants are withdrawn isokinetically from an emission source and are collected in aqueous acidic 2,4-dinitrophenylhydrazine. Formaldehyde present in the emissions reacts with the 2,4-dinitrophenylhydrazine to form the formaldehyde dinitrophenylhydrazone derivative. The dinitrophenylhydrazone derivative is extracted, solvent-exchanged, concentrated, and then analyzed by high performance liquid chromatography.

3.0 INTERFERENCES

3.1 A decomposition product of 2,4-dinitrophenylhydrazine, 2,4-dinitroaniline, can be an analytical interferent if concentrations are high. 2,4-dinitroaniline can coelute with the 2,4-dinitrophenylhydrazone of formaldehyde under high performance liquid chromatography conditions which may be used for the analysis. High concentrations of highly oxygenated compounds, especially acetone, that have the same retention time or nearly the same retention time as the dinitrophenylhydrazone of formaldehyde and that also absorb at 360 nm will interfere with the analysis.

Formaldehyde, acetone, and 2,4-dinitroaniline contamination of the aqueous acidic 2,4-dinitrophenylhydrazine (DNPH) reagent is frequently encountered. The reagent must be prepared within five days of use in the field and must be stored in an uncontaminated environment both before and after sampling in order to minimize blank problems. Some level of acetone contamination is unavoidable, because acetone is ubiquitous in laboratory and field operations. However, the acetone contamination must be minimized.

4.0 APPARATUS AND MATERIALS

4.1 A schematic of the sampling train is shown in Figure 1. This sampling train configuration is adapted from EPA Method 5 procedures. The sampling train consists of the following components: Probe Nozzle, Pitot Tube, Differential Pressure Gauge, Metering System, Barometer, and Gas Density Determination Equipment.

4.1.1 Probe Nozzle: Quartz or glass with sharp, tapered (30° angle) leading edge. The taper shall be on the outside to preserve a constant inner diameter. The nozzle shall be buttonhook or elbow design. A range of nozzle sizes suitable

for isokinetic sampling should be available in increments of 0.16 cm (1/16 in), e.g., 0.32 to 1.27 cm (1/8 to 1/2 in), or larger if higher volume sampling trains are used. Each nozzle shall be calibrated according to the procedures outlined in Section 8.1.

4.1.2 Probe Liner: Borosilicate glass or quartz shall be used for the probe liner. The tester should not allow the temperature in the probe to exceed 120 ± 14°C (248 ± 25°F).

4.1.3 Pitot Tube: The Pitot tube shall be Type S, as described in Section 2.1 of EPA Method 2, or any other appropriate device. The pitot tube shall be attached to the probe to allow constant monitoring of the stack gas velocity. The impact (high pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (see EPA Method 2, Figure 2-6b) during sampling. The Type S pitot tube assembly shall have a known coefficient, determined as outlined in Section 4 of EPA Method 2.

4.1.4 Differential Pressure Gauge: The differential pressure gauge shall be an inclined manometer or equivalent device as described in Section 2.2 of EPA Method 2. One manometer shall be used for velocity-head readings and the other for orifice differential pressure readings.

4.1.5 Impingers: The sampling train requires a minimum of four impingers, connected as shown in Figure 1, with ground glass (or equivalent) vacuum-tight fittings. For the first, third, and fourth impingers, use the Greenburg-Smith design, modified by replacing the tip with a 1.3-cm inside diameter (1/2 in) glass tube extending to 1.3 cm (1/2 in) from the bottom of the flask. For the second impinger, use a Greenburg-Smith impinger with the standard tip. Place a thermometer capable of measuring temperature to within 1°C (2°F) at the outlet of the fourth impinger for monitoring purposes.

4.1.6 Metering System: The necessary components are a vacuum gauge, leak-free pump, thermometers capable of measuring temperature within 3°C (5.4°F), dry-gas meter capable of measuring volume to within 1%, and related equipment as shown in Figure 1. At a minimum, the pump should be capable of 4 cfm free flow, and the dry gas meter should have a recording capacity of 0-999.9 cu ft with a resolution of 0.005 cu ft. Other metering systems may be used which are capable of maintaining sampling rates within 10% of isokinetic collection and of determining sample volumes to within 2%. The metering system may be used in conjunction with a pitot tube to enable checks of isokinetic sampling rates.

4.1.7 Barometer: The barometer may be mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in Hg). In many cases, the barometric reading may be obtained from a nearby National Weather Service Station, in which case the station value (which is the absolute barometric pressure) is requested and an adjustment for elevation differences between the weather station and sampling point is applied at a rate of minus 2.5 mm Hg (0.1 in Hg) per 30 m (100 ft) elevation increase (vice versa for elevation decrease).

4.1.8 Gas Density Determination Equipment: Temperature sensor and pressure gauge (as described in Sections 2.3 and 2.4 of EPA Method 2), and gas analyzer, if necessary (as described in EPA Method 3). The temperature sensor ideally should be permanently attached to the pitot tube or sampling probe in a fixed

configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor may be attached just prior to use in the field. Note, however, that if the temperature sensor is attached in the field, the sensor must be placed in an interference-free arrangement with respect to the Type S pitot tube openings (see EPA Method 2, Figure 2-7). As a second alternative, if a difference of no more than 1% in the average velocity measurement is to be introduced, the temperature gauge need not be attached to the probe or pitot tube.

4.2 Sample Recovery

4.2.1 Probe Liner: Probe nozzle and brushes; Teflon® bristle brushes with stainless steel wire handles are required. The probe brush shall have extensions of stainless steel, Teflon®, or inert material at least as long as the probe. The brushes shall be properly sized and shaped to brush out the probe liner, the probe nozzle, and the impingers.

4.2.2 Wash Bottles: Three wash bottles are required. Teflon® or glass wash bottles are recommended; polyethylene wash bottles should not be used because organic contaminants may be extracted by exposure to organic solvents used for sample recovery.

4.2.3 Graduated Cylinder and/or Balance: A graduated cylinder or balance is required to measure condensed water to the nearest 1 mL or 1 g. Graduated cylinders shall have divisions not >2 mL. Laboratory balances capable of weighing to ±0.5 g are required.

4.2.4 Amber Glass Storage Containers: One-liter wide-mouth amber flint glass bottles with Teflon®-lined caps are required to store impinger water samples. The bottles must be sealed with Teflon® tape.

4.2.5 Rubber Policeman and Funnel: A rubber policeman and funnel are required to aid in the transfer of materials into and out of containers in the field.

5.0 REAGENTS

Reagent grade chemicals or better grades shall be used in all tests. Unless otherwise indicated, all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.

5.1 Water: HPLC-grade water is used in preparation of DNPH reagent and in all other applications in the sampling train.

5.2 Silica Gel: Silica gel shall be indicating type, 6-16 mesh. If the silica gel has been used previously, dry at 175°C (350°F) for 2 h before using. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used.

5.3 Crushed Ice: Quantities ranging from 10-50 lb may be necessary during a sampling run, depending upon ambient temperature. Samples which have been taken must be stored and shipped cold; sufficient ice for this purpose must be allowed.

5.4 2,4-Dinitrophenylhydrazine Reagent: The 2,4-dinitrophenylhydrazine reagent must be prepared in the laboratory within five days of sampling use in the field. Preparation of DNPH can also be done in the field, with consideration of appropriate procedures required for safe handling of solvent in the field. When a container of prepared DNPH reagent is opened in the field, the contents of the opened container should be used within 48 hours. All laboratory glassware must be washed with detergent and water and rinsed with water, methanol, and methylene chloride prior to use.

NOTE: The glassware must not be rinsed with acetone or unacceptable levels of acetone contamination will be introduced. If field preparation of DNPH is performed, caution must be exercised in avoiding acetone contamination.

Reagent bottles for storage of cleaned DNPH derivatizing solution must be rinsed with acetonitrile and dried before use. Baked glassware is not essential for preparation of DNPH reagent.

NOTE: DNPH crystals or DNPH solution should be handled with plastic gloves at all times, with prompt and extensive use of running water in case of skin exposure.

5.4.1 Preparation of Aqueous Acidic DNPH: The following materials and reagents are required for preparation of the reagent.

5.4.1.1 Bottles/Caps: amber 1- or 4 L bottles with Teflon®-lined caps are required for storing cleaned DNPH solution. Additional 4-L bottles are required to collect waste organic solvents.

5.4.1.2 Large Glass Container: at least one large glass container (8 to 16 L) is required for mixing the aqueous acidic DNPH solution.

5.4.1.3 Stir Plate/Large Stir Bars/Stir Bar Retriever: a magnetic stir plate and large stir bar are required for the mixing of the aqueous acidic DNPH solution. A stir bar retriever is needed for removing the stir bar from the large container holding the DNPH solution.

5.4.1.4 Buchner Filter/Filter Flask/Filter Paper: a large filter flask (2-4 L) with a buchner filter, appropriate rubber stopper, filter paper, and connecting tubing are required for filtering the aqueous acidic DNPH solution prior to cleaning.

5.4.1.5 Separatory Funnels: at least one large separatory funnel (2 L) is required for cleaning the DNPH prior to use.

5.4.1.6 Beakers: beakers (150 mL, 250 mL, and 400 mL) are useful for holding/measuring organic liquids when cleaning the aqueous acidic DNPH solution and for weighing DNPH crystals.

5.4.1.7 Funnels: at least one large funnel is needed for pouring the aqueous acidic DNPH into the separatory funnel.

5.4.1.8 Graduated Cylinders: at least one large graduated cylinder (1 to 2 L) is required for measuring HPLC-grade water and acid when preparing the DNPH solution.

5.4.1.9 Top-Loading Balance: a one-place top loading balance is needed for weighing out the DNPH crystals used to prepare the aqueous acidic DNPH solution.

5.4.1.10 Spatulas: spatulas are needed for weighing out DNPH when preparing the aqueous DNPH solution.

5.4.1.11 HPLC-Grade Water: water (HPLC-grade) is required to mix the aqueous DNPH solution.

5.4.1.12 Hydrochloric Acid: reagent grade hydrochloric acid (approximately 12N) is required for acidifying the aqueous DNPH solution.

5.4.1.13 2,4-Dinitrophenylhydrazine: a supply of moist solid 2,4-dinitrophenylhydrazine (DNPH) is required for preparation of aqueous acidic DNPH solution. The quantity of water may vary from 10 to 30%. Reagent grade or equivalent is required.

5.4.1.14 Methylene Chloride: methylene chloride (suitable for residue and pesticide analysis, GC/MS, HPLC, GC, Spectrophotometry or equivalent) is required for cleaning the aqueous acidic DNPH solution, rinsing glassware, and recovery of sample trains.

5.4.1.15 Cyclohexane: cyclohexane (HPLC grade) is required for cleaning the aqueous acidic DNPH solution.

NOTE: Do not use spectroanalyzed grades of cyclohexane if this sampling methodology is extended to aldehydes and ketones with four or more carbon atoms.

5.4.1.16 Methanol: methanol (HPLC grade or equivalent) is required for rinsing glassware.

5.4.1.17 Acetonitrile: acetonitrile (HPLC grade or equivalent) is required for rinsing glassware.

5.4.1.18 Formaldehyde: Analytical grade or equivalent formaldehyde is required for preparation of standards. If other aldehydes or ketones are used, analytical grade or equivalent is required.

5.4.2 Preparation of Aqueous Acidic DNPH Derivatizing Reagent: Each batch of DNPH reagent should be prepared and purified within five days of sampling, according to the procedure described below.

5.4.2.1 Place an 8-L container under a fume hood on a magnetic stirrer. Add a large stir bar and fill the container half full of HPLC-grade water. Save the empty bottle from HPLC-grade water. Start the stirring bar and adjust the stir rate to be as fast as possible. Using a graduated cylinder, measure 1.4 mL of concentrated hydrochloric acid. Slowly pour the acid into the stirring water. Fumes may be generated and the water may become warm. Weigh the DNPH crystals on a one-place balance (see Table 1 for approximate amounts) and add to the stirring acid solution. Fill the 8 L container to the 8 L mark with HPLC water and stir overnight. If all of the DNPH crystals have dissolved overnight, add additional DNPH and stir for two more hours. Continue the process of adding DNPH with additional stirring until a saturated solution has been formed. Filter the DNPH solution using vacuum filtration. Gravity filtration may be used, but a

much longer time is required. Store the filtered solution in an amber bottle at room temperature.

TABLE 1. APPROXIMATE AMOUNT OF CRYSTALLINE DNPH USED TO PREPARE A SATURATED SOLUTION

Amount of Moisture in DNPH	Weight Required per 8 L of Solution
10 weight percent	31 g
15 weight percent	33 g
30 weight percent	40 g

Within five days of proposed use, place about 1.6 L of the DNPH reagent in a 2 L separatory funnel. Add approximately 200 mL of methylene chloride and stopper the funnel. Wrap the stopper of the funnel with paper towels to absorb any leakage. Invert and vent the funnel. Then shake vigorously for 3 minutes. Initially, the funnel should be vented frequently (every 10 - 15 sec). After the layers have separated, discard the lower (organic) layer.

Extract the DNPH a second time with methylene chloride and finally with cyclohexane. When the cyclohexane layer has separated from the DNPH reagent, the cyclohexane layer will be the top layer in the separatory funnel. Drain the lower layer (the cleaned extracted DNPH reagent solution) into an amber bottle that has been rinsed with acetonitrile and allowed to dry.

5.4.3 Quality Control: Take two aliquots of the extracted DNPH reagent. The size of the aliquots is dependent upon the exact sampling procedure used, but 100 mL is reasonably representative. To ensure that the background in the reagent is acceptable for field use, analyze one aliquot of the reagent according to the procedure of EPA Draft Method 8315. Save the other aliquot of aqueous acidic DNPH for use as a method blank when the analysis is performed.

5.4.4 Shipment to the Field: Tightly cap the bottle containing extracted DNPH reagent using a Teflon®-lined cap. Seal the bottle with Teflon® tape. After the bottle is labeled, the bottle may be placed in a friction-top can (paint can or equivalent) containing a 1 -2 inch layer of granulated charcoal and stored at ambient temperature until use.

If the DNPH reagent has passed the Quality Control criteria, the reagent may be packaged to meet necessary shipping requirements and sent to the sampling area. If the Quality Control criteria are not met, the reagent solution may be re-extracted or the solution may be re-prepared and the extraction sequence repeated.

If the DNPH reagent is not used in the field within five days of extraction, an aliquot may be taken and analyzed as described Draft Method 8315. If the reagent meets the Quality Control requirements, the reagent may be used. If the reagent does not meet Quality Control requirements, the reagent must be discarded and new reagent must be prepared and tested.

5.4.5 Calculation of Acceptable Levels of Impurities in DNPH Reagent: The acceptable impurity level (AIL, µg/mL) is calculated from the expected analyte level in the sampled gas (EAL, ppbv), the volume of air that will be sampled at standard conditions (SVOL, L), the formula weight of the analyte (FW, g/mol), and the volume of DNPH reagent that will be used in the impingers (RVOL, mL):

$$AIL = 0.1 \times [EAL \times SVOL \times FW/22.4 \times (FW + 180)/FW]/(RVOL \times 1000).$$

where 0.1 is the acceptable contaminant level, 22.4 is a factor relating ppbv to g/L, 180 is a factor relating the underivatized analyte to the derivatized analyte, and 1000 is a unit conversion factor.

5.4.6 Disposal of Excess DNPH Reagent: Excess DNPH reagent may be returned to the laboratory and recycled or treated as aqueous waste for disposal purposes. 2,4-Dinitrophenylhydrazine is a flammable solid when dry so water should not be evaporated from the solution of the reagent.

5.5 Field Spike Standard Preparation: To prepare a formaldehyde field spiking standard at 4.01 mg/mL, use a 500µL syringe to transfer 0.5 mL of 37% by weight of formaldehyde (401 mg/mL) to a 50 mL volumetric flask containing approximately 40 mL of methanol. Dilute to 50 mL with methanol.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 Because of the complexity of this method, field personnel should be trained in and experienced with the test procedures in order to obtain reliable results.

6.2 Laboratory Preparation:

6.2.1 All the components shall be maintained and calibrated according to the procedure described in APTD-0576, unless otherwise specified.

6.2.2 Weigh several 200- to 300-g portions of silica gel in airtight containers to the nearest 0.5 g. Record on each container the total weight of the silica gel plus containers. As an alternative to preweighing the silica gel, it may instead be weighed directly in the impinger or sampling holder just prior to train assembly.

6.3 Preliminary Field Determinations:

6.3.1 Select the sampling site and the minimum number of sampling points according to EPA Method 1 or other relevant criteria. Determine the stack pressure, temperature, and range of velocity heads using EPA Method 2. A leak-check of the pitot lines according to EPA Method 2, Section 3.1, must be performed. Determine the stack gas moisture content using EPA Approximation Method 4 or its alternatives to establish estimates of isokinetic sampling-rate settings. Determine the stack gas dry molecular weight, as described in EPA Method 2, Section 3.6. If integrated EPA Method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the sample run.

6.3.2 Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates below 28 L/min (1.0 cfm). During the run, do not change the nozzle.

Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see Section 2.2 of EPA Method 2).

6.3.3 Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, to reduce the length of the probe, consider sampling from opposite sides of the stack.

6.3.4 A minimum of 45 ft^3 of sample volume is required for the determination of the Destruction and Removal Efficiency (DRE) of formaldehyde from incineration systems (45ft^3 is equivalent to one hour of sampling at 0.75 dscf). Additional sample volume shall be collected as ecessitated by the capacity of the DNPH reagent and analytical detection limit constraints. To determine the minimum sample volume required, refer to sample calculations in Section 10.

6.3.5 Determine the total length of sampling time needed to obtain the identified minimum volume by comparing the anticipated average sampling rate with the volume requirement. Allocate the same time to all traverse points defined by EPA Method 1. To avoid timekeeping errors, the length of time sampled at each traverse point should be an integer or an integer plus 0.5 min.

6.3.6 In some circumstances (e.g., batch cycles) it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas-volume samples. In these cases, careful documentation must be maintained in order to allow accurate calculation of concentrations.

6.4 Preparation of Collection Train:

6.4.1 During preparation and assembly of the sampling train, keep all openings where contamination can occur covered with Teflon® film or aluminum foil until just prior to assembly or until sampling is about to begin.

6.4.2 Place 100 mL of cleaned DNPH solution in each of the first two impingers, and leave the third impinger empty. If additional capacity is required for high expected concentrations of formaldehyde in the stack gas, 200 mL of DNPH per impinger may be used or additional impingers may be used for sampling. Transfer approximately 200 to 300 g of pre-weighed silica gel from its container to the fourth impinger. Care should be taken to ensure that the silica gel is not entrained and carried out from the impinger during sampling. Place the silica gel container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

6.4.3 With a glass or quartz liner, install the selected nozzle using a Viton-A O-ring when stack temperatures are <260°C (500°F) and a woven glass-fiber gasket when temperatures are higher. See APTD-0576 (Rom, 1972) for details. Other connecting systems utilizing either 316 stainless steel or Teflon® ferrules may be used. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

6.4.4 Assemble the train as shown in Figure 1. During assembly, do not use any silicone grease on ground-glass joints upstream of the impingers. Use Teflon® tape, if required. A very light coating of silicone grease may be used on ground-glass joints downstream of the impingers, but the silicone grease should be limited to the outer portion (see APTD-0576) of the ground-glass joints to

minimize silicone grease contamination. If necessary, Teflon® tape may be used to seal leaks. Connect all temperature sensors to an appropriate potentiometer/display unit. Check all temperature sensors at ambient temperature.

6.4.5 Place crushed ice all around the impingers.

6.4.6 Turn on and set the probe heating system at the desired operating temperature. Allow time for the temperature to stabilize.

6.5 Leak-Check Procedures:

6.5.1 Pre-test Leak Check:

6.5.1.1 After the sampling train has been assembled, turn on and set the probe heating system at the desired operating temperature. Allow time for the temperature to stabilize. If a Viton-A O-ring or other leak-free connection is used in assembling the probe nozzle to the probe liner, leak-check the train at the sampling site by plugging the nozzle and pulling a 381-mm Hg (15 in Hg) vacuum.

NOTE: A lower vacuum may be used, provided that the lower vacuum is not exceeded during the test.

6.5.1.2 If an asbestos string is used, do not connect the probe to the train during the leak check. Instead, leak-check the train by first attaching a carbon-filled leak check impinger to the inlet and then plugging the inlet and pulling a 381-mm Hg (15 in Hg) vacuum. (A lower vacuum may be used if this lower vacuum is not exceeded during the test.) Then connect the probe to the train and leak-check at about 25 mm Hg (1 in Hg) vacuum. Alternatively, leak-check the probe with the rest of the sampling train in one step at 381 mm Hg (15 in Hg) vacuum. Leakage rates in excess of 4% of the average sampling rate or >0.00057 m^3/min (0.02 cfm), whichever is less, are acceptable.

6.5.1.3 The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with the fine-adjust valve fully open and coarse-adjust valve completely closed. Partially open the coarse-adjust valve and slowly close the fine-adjust valve until the desired vacuum is reached. Do not reverse direction of the fine-adjust valve, as liquid will back up into the train. If the desired vacuum is exceeded, either perform the leak check at this higher vacuum or end the leak check, as shown below, and start over.

6.5.1.4 When the leak check is completed, first slowly remove the plug from the inlet to the probe. When the vacuum drops to 127 mm (5 in) Hg or less, immediately close the coarse-adjust valve. Switch off the pumping system and reopen the fine-adjust valve. Do not reopen the fine-adjust valve until the coarse-adjust valve has been closed to prevent the liquid in the impingers from being forced backward into the sampling line and silica gel from being entrained backward into the third impinger.

6.5.2 Leak Checks During Sampling Runs:

6.5.2.1 If, during the sampling run, a component change (i.e., impinger) becomes

necessary, a leak check shall be conducted immediately after the interruption of sampling and before the change is made. The leak check shall be done according to the procedure described in Section 6.5.1, except that it shall be done at a vacuum greater than or equal to the maximum value recorded up to that point in the test. If the leakage rate is found to be no greater than 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable. If a higher leakage rate is obtained, the tester must void the sampling run.

NOTE: Any correction of the sample volume by calculation reduces the integrity of the pollutant concentration data generated and must be avoided.

6.5.2.2 Immediately after a component change and before sampling is re-initiated, a leak check similar to a pre-test leak check must also be conducted.

6.5.3 Post-test Leak Check:

6.5.3.1 A leak check is mandatory at the conclusion of each sampling run. The leak check shall be done with the same procedures as the pre-test leak check, except that the post-test leak check shall be conducted at a vacuum greater than or equal to the maximum value reached during the sampling run. If the leakage rate is found to be no greater than 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable. If, however, a higher leakage rate is obtained, the tester shall record the leakage rate and void the sampling run.

6.6 Sampling Train Operation:

6.6.1 During the sampling run, maintain an isokinetic sampling rate to within 10% of true isokinetic, below 28 L/min (1.0 cfm). Maintain a temperature around the probe of 120° ± 14°C (248° ± 25°F).

6.6.2 For each run, record the data on a data sheet such as the one shown in Figure 2. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak check, and when sampling is halted. Take other readings required by Figure 2 at least once at each sample point during each time increment and additional readings when significant adjustments (20% variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

6.6.3 Clean the stack access ports prior to the test run to eliminate the chance of sampling deposited material. To begin sampling, remove the nozzle cap, verify that the filter and probe heating systems are at the specified temperature, and verify that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point, with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs, which aid in the rapid adjustment of the isokinetic sampling rate without excessive computations, are available. These nomographs are designed for use when the Type S pitot tube coefficient is 0.84 ± 0.02 and the stack gas equivalent density (dry molecular weight) is equal to 29 ± 4. APTD-0576 details the procedure for using the nomographs. If the stack gas molecular weight and

the pitot tube coefficient are outside the above ranges, do not use the nomographs unless appropriate steps are taken to compensate for the deviations.

6.6.4 When the stack is under significant negative pressure (equivalent to the height of the impinger stem), take care to close the coarse-adjust valve before inserting the probe into the stack in order to prevent liquid from backing up through the train. If necessary, the pump may be turned on with the coarse-adjust valve closed.

6.6.5 When the probe is in position, block off the openings around the probe and stack access port to prevent unrepresentative dilution of the gas stream.

6.6.6 Traverse the stack cross section, as required by EPA Method 1, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the access port, in order to minimize the chance of extracting deposited material.

6.6.7 During the test run, make periodic adjustments to keep the temperature around the probe at the proper levels. Add more ice and, if necessary, salt, to maintain a temperature of <20°C (68°F) at the silica gel outlet. Also, periodically check the level and zero of the manometer.

6.6.8 A single train shall be used for the entire sampling run, except in cases where simultaneous sampling is required in two or more separate ducts or at two or more different locations within the same duct, or in cases where equipment failure necessitates a change of trains. An additional train or additional trains may also be used for sampling when the capacity of a single train is exceeded.

6.6.9 When two or more trains are used, separate analyses of components from each train shall be performed. If multiple trains have been used because the capacity of a single train would be exceeded, first impingers from each train may be combined, and second impingers from each train may be combined.

6.6.10 At the end of the sampling run, turn off the coarse-adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry gas meter reading, and conduct a post-test leak check. Also, leak check the pitot lines as described in EPA Method 2. The lines must pass this leak check in order to validate the velocity-head data.

6.6.11 Calculate percent isokineticity (see Method 2) to determine whether the run was valid or another test should be made.

7.0 SAMPLE RECOVERY

7.1 Preparation:

7.1.1 Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool. When the probe can be handled safely, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over the tip to prevent losing or gaining particulate matter. Do not cap the probe tip tightly while the sampling train is cooling because a vacuum will be created, drawing liquid from the impingers back through the sampling train.

7.1.2 Before moving the sampling train to the cleanup site, remove the probe from the sampling train and cap the open outlet, being careful not to lose any condensate that might be present. Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used, let any condensed water or liquid drain into the impingers. Cap off any open impinger inlets and outlets. Ground glass stoppers, Teflon® caps, or caps of other inert materials may be used to seal all openings.

7.1.3 Transfer the probe and impinger assembly to an area that is clean and protected from wind so that the chances of contaminating or losing the sample are minimized.

7.1.4 Inspect the train before and during disassembly, and note any abnormal conditions.

7.1.5 Save a portion of all washing solutions (methylene chloride, water) used for cleanup as a blank. Transfer 200 mL of each solution directly from the wash bottle being used and place each in a separate, pre-labeled sample container.

7.2 Sample Containers:

7.2.1 Container 1: Probe and Impinger Catches. Using a graduated cylinder, measure to the nearest mL, and record the volume of the solution in the first three impingers. Alternatively, the solution may be weighed to the nearest 0.5 g. Include any condensate in the probe in this determination. Transfer the impinger solution from the graduated cylinder into the amber flint glass bottle. Taking care that dust on the outside of the probe or other exterior surfaces does not get into the sample, clean all surfaces to which the sample is exposed (including the probe nozzle, probe fitting, probe liner, first impinger, and impinger connector) with methylene chloride. Use less than 500 mL for the entire wash (250 mL would be better, if possible). Add the washings to the sample container.

7.2.1.1 Carefully remove the probe nozzle and rinse the inside surface with methylene chloride from a wash bottle. Brush with a Teflon® bristle brush, and rinse until the rinse shows no visible particles or yellow color, after which make a final rinse of the inside surface. Brush and rinse the inside parts of the Swagelok® fitting with methylene chloride in a similar way.

7.2.1.2 Rinse the probe liner with methylene chloride. While squirting the methylene chloride into the upper end of the probe, tilt and rotate the probe so that all inside surfaces will be wetted with methylene chloride. Let the methylene chloride drain from the lower end into the sample container. The tester may use a funnel (glass or polyethylene) to aid in transferring the liquid washes to the container. Follow the rinse with a Teflon® brush. Hold the probe in an inclined position, and squirt methylene chloride into the upper end as the probe brush is being pushed with a twisting action through the probe. Hold the sample container underneath the lower end of the probe, and catch any methylene chloride, water, and particulate matter that is brushed from the probe. Run the brush through the probe three times or more. With stainless steel or other metal probes, run the brush through in the above prescribed manner at least six times since there may be small crevices in which particulate matter can be entrapped. Rinse the brush with methylene chloride or water, and quantitatively collect these washings in the sample container. After the brushings, make a final rinse

of the probe as described above.

NOTE: Two people should clean the probe in order to minimize sample losses. Between sampling runs, brushes must be kept clean and free from contamination.

7.2.1.3 Rinse the inside surface of each of the first three impingers (and connecting tubing) three separate times. Use a small portion of methylene chloride for each rinse, and brush each surface to which sample is exposed with a Teflon® bristle brush to ensure recovery of fine particulate matter. Water will be required for the recovery of the impingers in addition to the specified quantity of methylene chloride. There will be at least two phases in the impingers. This two-phase mixture does not pour well, and a significant amount of the impinger catch will be left on the walls. The use of water as a rinse makes the recovery quantitative. Make a final rinse of each surface and of the brush, using both methylene chloride and water.

7.2.1.4 After all methylene chloride and water washings and particulate matter have been collected in the sample container, tighten the lid so that solvent, water, and DNPH reagent will not leak out when the container is shipped to the laboratory. Mark the height of the fluid level to determine whether leakage occurs during transport. Seal the container with Teflon® tape. Label the container clearly to identify its contents.

7.2.1.5 If the first two impingers are to be analyzed separately to check for breakthrough, separate the contents and rinses of the two impingers into individual containers. Care must be taken to avoid physical carryover from the first impinger to the second. The formaldehyde hydrazone is a solid which floats and froths on top of the impinger solution. Any physical carryover of collected moisture into the second impinger will invalidate a breakthrough assessment.

7.2.2 Container 2: Sample Blank. Prepare a blank by using an amber flint glass container and adding a volume of DNPH reagent and methylene chloride equal to the total volume in Container 1. Process the blank in the same manner as Container 1.

7.2.3 Container 3: Silica Gel. Note the color of the indicating silica gel to determine whether it has been completely spent and make a notation of its condition. The impinger containing the silica gel may be used as a sample transport container with both ends sealed with tightly fitting caps or plugs. Ground-glass stoppers or Teflon® caps may be used. The silica gel impinger should then be labeled, covered with aluminum foil, and packaged on ice for transport to the laboratory. If the silica gel is removed from the impinger, the tester may use a funnel to pour the silica gel and a rubber policeman to remove the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that may adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use water or other liquids to transfer the silica gel. If a balance is available in the field, the spent silica gel (or silica gel plus impinger) may be weighed to the nearest 0.5 g.

7.2.4 Sample containers should be placed in a cooler, cooled by although not in contact with ice. Sample containers must be placed vertically and, since they are glass, protected from breakage curing shipment. Samples should be cooled during shipment so they will be received cold at the laboratory.

8.0 CALIBRATION

8.1 Probe Nozzle: Probe nozzles shall be calibrated before their initial use in the field. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in). Make measurements at three separate places across the diameter and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in). When the nozzles become nicked or corroded, they shall be replaced and calibrated before use. Each nozzle must be permanently and uniquely identified.

8.2 Pitot tube: The Type S pitot tube assembly shall be calibrated according to the procedure outlined in Section 4 of EPA Method 2, or assigned a nominal coefficient of 0.84 if it is not visibly nicked or corroded and if it meets design and intercomponent spacing specifications.

8.3 Metering system:

8.3.1 Before its initial use in the field, the metering system shall be calibrated according to the procedure outlined in APTD-0576. Instead of physically adjusting the dry-gas meter dial readings to correspond to the wet-test meter readings, calibration factors may be used to correct the gas meter dial readings mathematically to the proper values. Before calibrating the metering system, it is suggested that a leak check be conducted. For metering systems having diaphragm pumps, the normal leak check procedure will not detect leakages within the pump. For these cases, the following leak check procedure will apply: make a ten-minute calibration run at 0.00057 m^3/min (0.02 cfm). At the end of the run, take the difference of the measured wet-test and dry-gas meter volumes and divide the difference by 10 to get the leak rate. The leak rate should not exceed 0.00057 m^3/min (0.02 cfm).

8.3.2 After each field use, check the calibration of the metering system by performing three calibration runs at a single intermediate orifice setting (based on the previous field test). Set the vacuum at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet-test meter and the inlet of the metering system. Calculate the average value of the calibration factor. If the calibration has changed by more than 5%, recalibrate the meter over the full range of orifice settings, as outlined in APTD-0576.

8.3.3 Leak check of metering system: The portion of the sampling train from the pump to the orifice meter (see Figure 1) should be leak-checked prior to initial use and after each shipment. Leakage after the pump will result in less volume being recorded than is actually sampled. Use the following procedure: Close the main valve on the meter box. Insert a one-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13 - 18 cm (5 - 7 in) water column by blowing into the rubber tubing. Pinch off the tubing and observe the manometer for 1 min. A loss of pressure on the manometer indicates a leak in the meter box. Leaks must be corrected.

NOTE: If the dry-gas-meter coefficient values obtained before and after a test series differ by >5%, either the test series must be voided or calculations for test series must be performed using whichever meter coefficient value (i.e., before or after) gives the lower value of total sample volume.

8.4 Probe heater: The probe heating system must be calibrated before its initial use in the field according to the procedure outlined in APTD-0576. Probes constructed according to APTD-0581 need not be calibrated if the calibration curves in APTD-0576 are used.

8.5 Temperature gauges: Each thermocouple must be permanently and uniquely marked on the casting. All mercury-in-glass reference thermometers must conform to ASTM E-1 63C or 63F specifications. Thermocouples should be calibrated in the laboratory with and without the use of extension leads. If extension leads are used in the field, the thermocouple readings at ambient air temperatures, with and without the extension lead, must be noted and recorded. Correction is necessary if the use of an extension lead produces a change >1.5%.

8.5.1 Impinger and dry-gas meter thermocouples: For the thermocouples used to measure the temperature of the gas leaving the impinger train, three-point calibration at ice water, room air, and boiling water temperatures is necessary. Accept the thermocouples only if the readings at all three temperatures agree to ±2°C (3.6°F) with those of the absolute value of the reference thermometer.

8.5.2 Probe and stack thermocouple: For the thermocouples used to indicate the probe and stack temperatures, a three-point calibration at ice water, boiling water, and hot oil bath temperatures must be performed. Use of a point at room air temperature is recommended. The thermometer and thermocouple must agree to within 1.5% at each of the calibration points. A calibration curve (equation) may be constructed (calculated) and the data extrapolated to cover the entire temperature range suggested by the manufacturer.

8.6 Barometer: Adjust the barometer initially and before each test series to agree to within ±2.5 mm Hg (0.1 in Hg) of the mercury barometer or the corrected barometric pressure value reported by a nearby National Weather Service Station (same altitude above sea level).

8.7 Triple-beam balance: Calibrate the triple-beam balance before each test series, using Class S standard weights. The weights must be within ±0.5% of the standards, or the balance must be adjusted to meet these limits.

9.0 CALCULATIONS

Carry out calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after final calculation.

9.1 Calculation of Total Formaldehyde:

To determine the total formaldehyde in mg, use the following equation:

Total mg formaldehyde = C_d x V x DF x

([g/mole aldehyde]/[g/mole DNPH derivative]) x

10^{-3} mg/μg

where:

C_d = measured concentration of DNPH-formaldehyde derivative, μg/mL

V = organic extract volume, mL

DF = dilution factor

9.2 Formaldehyde concentration in stack gas:

Determine the formaldehyde concentration in the stack gas using the following equation:

C_f = K [total formaldehyde, mg] / $V_{m(std)}$

where:

K = 35.31 ft^3/m^3 if $V_{m(std)}$ is expressed in English units

= 1.00 m^3/m^3 if $V_{m(std)}$ is expressed in metric units

$V_{m(std)}$ = volume of gas sample as measured by dry gas meter, corrected to standard conditions, dscm (dscf)

9.3 Average Dry Gas Meter Temperature and Average Orifice Pressure Drop are obtained from the data sheet.

9.4 Dry Gas Volume: Calculate $V_{m(std)}$ and adjust for leakage, if necessary, using the equation in Section 6.3 of EPA Method 5.

9.5 Volume of Water Vapor and Moisture Content: Calculate the volume of water vapor and moisture content from equations 5-2 and 5-3 of EPA Method 5.

10.0 DETERMINATION OF VOLUME TO BE SAMPLED

To determine the minimum sample volume to be collected, use the following sequence of equations.

10.1 From prior analysis of the waste feed, the concentration of formaldehyde (FORM) introduced into the combustion system can be calculated. The degree of destruction and removal efficiency that is required is used to determine the maximum amount of FORM allowed to be present in the effluent. This amount may be expressed as:

Max $FORM_i$ Mass =

$$[\ (WF)\ (FORM_i\ conc)\ (100 - \%DRE)\ ]\ /\ 100$$

where:

WF = mass flow rate of waste feed per h, g/h (lb/h)

$FORM_i$ = concentration of FORM (wt %) introduced into the combustion process

DRE = percent Destruction and Removal Efficiency required

Max FORM = mass flow rate (g/h [lb/h]) of FORM emitted from the combustion source

10.2 The average discharge concentration of the FORM in the effluent gas is determined by comparing the Max FORM with the volumetric flow rate being exhausted from the source. Volumetric flow rate data are available as a result of preliminary EPA Method 1 - 4 determinations:

$$\text{Max } FORM_i \text{ conc} = [\text{Max } FORM_i \text{ Mass}]\ /\ DV_{eff(std)}$$

where:

$DV_{eff(std)}$ = volumetric flow rate of exhaust gas, dscm (dscf)

$FORM_i$ conc = anticipated concentration of the FORM in the exhaust gas stream, g/dscm (lb/dscf)

10.3 In making this calculation, it is recommended that a safety margin of at least ten be included.

$$[LDL_{FORM} \times 10]\ /[FORM_{i\ conc}] = V_{tbc}$$

where:

LDL_{FORM} = detectable amount of FORM in entire sampling train

V_{tbc} = minimum dry standard volume to be collected at dry-gas meter

10.4 The following analytical detection limits and DNPH Reagent Capacity (based on a total volume of 200 mL in two impingers) must also be considered in determining a volume to be sampled.

Table 2. Instrument Detection Limits and Reagent Capacity for Formaldehyde Analysis[1]

Analyte	Detection Limit, ppbv[2]	Reagent Capacity, ppmv
formaldehyde	1.8	66
acetaldehyde	1.7	70
acrolein	1.5	75
acetone/propionaldehyde	1.5	75
butyraldehyde	1.5	79
methyl ethyl ketone	1.5	79
valeraldehyde	1.5	84
isovaleraldehyde	1.4	84
hexaldehyde	1.3	88
benzaldehyde	1.4	84
o-/m-/p-tolualdehyde	1.3	89
dimethylbenzaldehyde	1.2	93

[1] Oxygenated compounds in addition to formaldehyde are included for comparison with formaldehyde; extension of the methodology to other compounds is possible.

[2] Detection limits are determined in solvent. These values therefore represent the optimum capability of the methodology.

11.0 QUALITY CONTROL

11.1 Sampling: See EPA Manual 600/4-77-027b for Method 5 quality control.

11.2 Analysis: The quality assurance program required for this method includes the analysis of field and method blanks, procedure validations, and analysis of field spikes. The assessment of combustion data and positive identification and quantitation of formaldehyde are dependent on the integrity of the samples received and the precision and accuracy of the analytical methodology. Quality Assurance procedures for this method are designed to monitor the performance of the analytical methodology and to provide the required information to take corrective action if problems are observed in laboratory operations or in field sampling activities.

11.2.1 Field Blanks: Field blanks must be submitted with the samples collected at each sampling site. The field blanks include the sample bottles containing aliquots of sample recovery solvents, methylene chloride and water, and unused DNPH reagent. At a minimum, one complete sampling train will be assembled in the field staging area, taken to the sampling area, and leak-checked at the beginning and end of the testing (or for the same total number of times as the actual sampling train). The probe of the blank train must be heated during the sample test. The train will be recovered as if it were an actual test sample. No gaseous sample will be passed through the Blank sampling train.

11.2.2 Method Blanks: A method blank must be prepared for each set of analytical operations, to evaluate contamination and artifacts that can be derived from glassware, reagents, and sample handling in the laboratory.

11.2.3 Field Spike: A field spike is performed by introducing 200 µL of the Field Spike Standard into an impinger containing 200 mL of DNPH solution. Standard impinger recovery procedures are followed and the field spike sample is returned to the laboratory for analysis. The field spike is used as a check on field handling and recovery procedures. An aliquot of the field spike standard is retained in the laboratory for derivatization and comparative analysis.

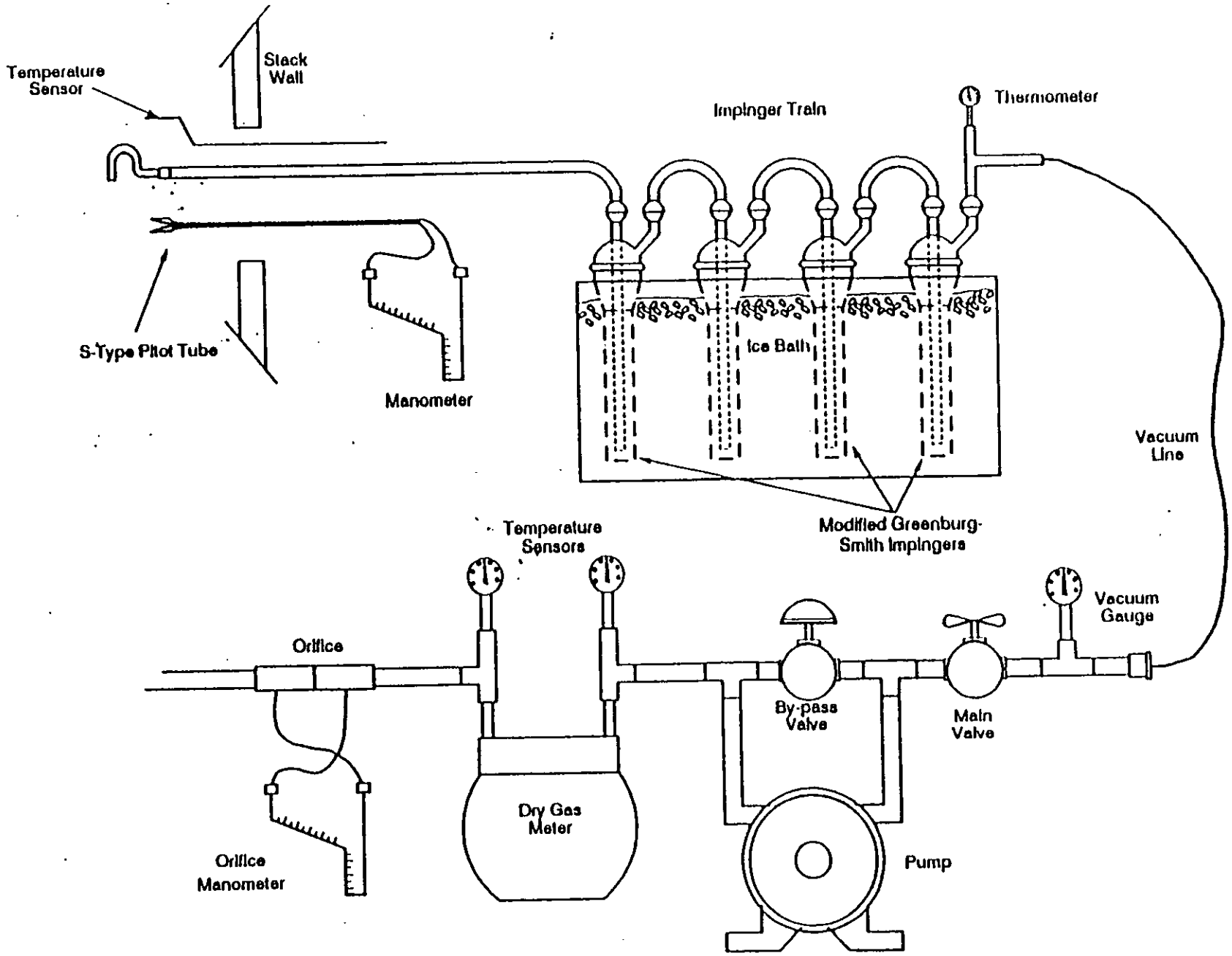
12.0 METHOD PERFORMANCE

12.1 Method performance evaluation: The following expected method performance parameters for precision, accuracy, and detection limits are provided in Table 3.

Table 3. Expected Method Performance for Formaldehyde

Parameter	Precision	[1]Accuracy[2]	Detection Limit[3]
Matrix: Dual trains	±15% RPD	±20%	1.5×10^{-7} lb/ft^3 (1.8 ppbv)

[1] Relative percent difference limit for dual trains.
[2] Limit for field spike recoveries.
[3] The lower reporting limit having less than 1% probability of false positive detection.



Formaldehyde Sampling Train

Plant _____

Location _____

Operator _____

Date _____

Run No. _____

Sample Box No. _____

Meter Box No. _____

Meter H@ _____

C Factor _____

Pitot Tube Coefficient C_p _____

Schematic of Stack Cross Section

Ambient Temperature _____

Barometric Pressure _____

Assumed Moisture % _____

Probe Length, m(ft) _____

Nozzle Identification No. _____

Average Calibrated Nozzle Diameter, cm (in) _____

Probe Heating Setting _____

Leak Rate, m^3/min. (cfm) _____

Probe Liner Material _____

Static Pressure, mm Hg (in. Hg) _____

Filter No. _____

Traverse Point Number	Sampling Time (θ) Min.	Vacuum mm Hg (in. Hg)	Stack Temperature (T_s) °C (°F)	Velocity Head (P_s) mm (in) H_2O	Pressure Differential Across Orifice Meter mm (H_2O) (in H_2O)	Gas Sample Volume m^3 (ft^3)	Gas Sample Temp. at Dry Gas Meter		Filter Holder Temperature °C(°F)	Temperature of Gas Leaving Last Impinger °C(°F)
							Inlet °C(°F)	Outlet °C(°F)		
Total							Avg.	Avg.		
Average										

Figure 2. Field Data Sheet

METHOD 25A—DETERMINATION OF TOTAL GASEOUS ORGANIC CONCENTRATION USING A FLAME IONIZATION ANALYZER

1. *Applicability and Principle*

1.1 Applicability. This method applies to the measurement of total gaseous organic concentration of vapors consisting primarily of alkanes, alkenes, and/or arenes (aromatic hydrocarbons). The concentration is expressed in terms of propane (or other appropriate organic calibration gas) or in terms of carbon.

1.2 Principle. A gas sample is extracted from the source through a heated sample line, if necessary, and glass fiber filter to a flame ionization analyzer (FIA). Results are reported as volume concentration equivalents of the calibration gas or as carbon equivalents.

2. *Definitions*

2.1 Measurement System. The total equipment required for the determination of the gas concentration. The system consists of the following major subsystems:

2.1.1 Sample Interface. That portion of the system that is used for one or more of the following: sample acquisition, sample transportation, sample conditioning, or protection of the analyzer from the effects of the stack effluent.

2.1.2 Organic Analyzer. That portion of the system that senses organic concentration and generates an output proportional to the gas concentration.

2.2 Span Value. The upper limit of a gas concentration measurement range that is specified for affected source categories in the applicable part of the regulations. The span value is established in the applicable regulation and is usually 1.5 to 2.5 times the applicable emission limit. If no span value is provided, use a span value equivalent to 1.5 to 2.5 times the expected concentration. For convenience, the span value should correspond to 100 percent of the recorder scale.

2.3 Calibration Gas. A known concentration of a gas in an appropriate diluent gas.

2.4 Zero Drift. The difference in the measurement system response to a zero level calibration gas before and after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.5 Calibration Drift. The difference in the measurement system response to a mid-level calibration gas before and after a stated period of operation during which no unscheduled maintenance, repair or adjustment took place.

2.6 Response Time. The time interval from a step change in pollutant concentration at the inlet to the emission measurement system to the time at which 95 percent of the corresponding final value is reached as displayed on the recorder.

2.7 Calibration Error. The difference between the gas concentration indicated by the measurement system and the known concentration of the calibration gas.

3. *Apparatus*

A schematic of an acceptable measurement system is shown in Figure 25A-1. The essential components of the measurement system are described below:

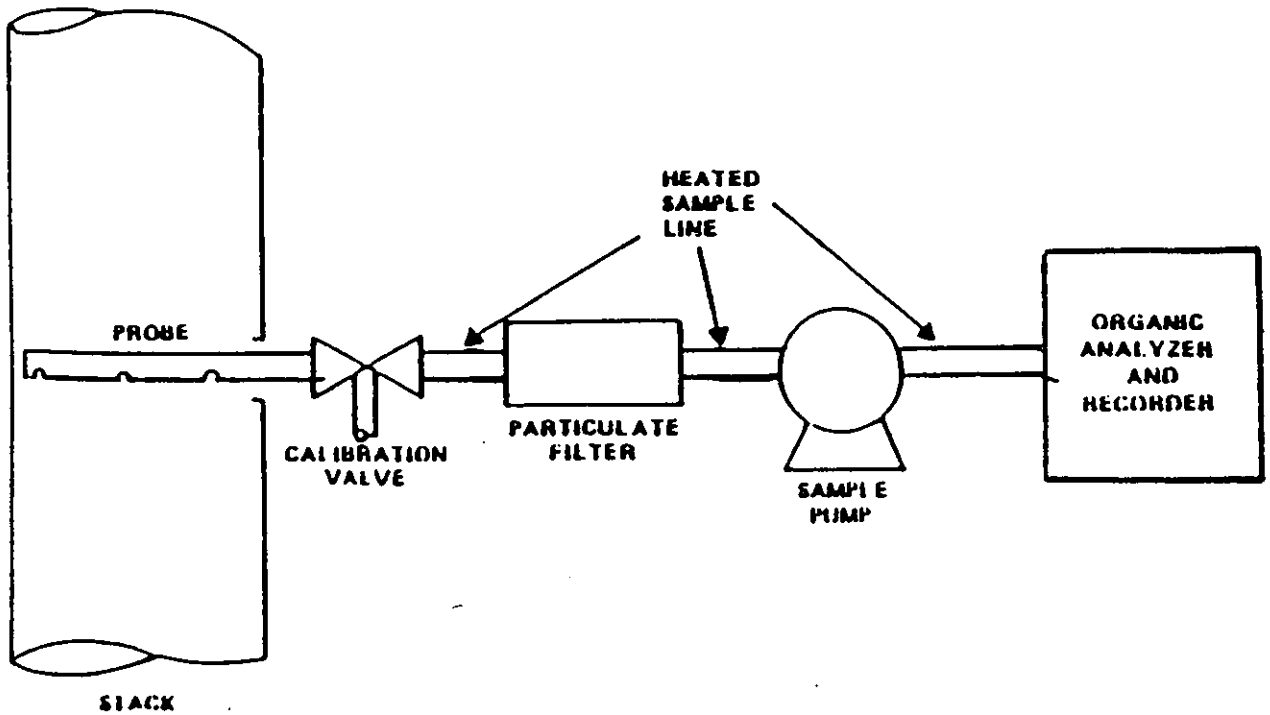


Figure 25A-1. Organic Concentration Measurement System.

3.1 Organic Concentration Analyzer. A flame ionization analyzer (FIA) capable of meeting or exceeding the specifications in this method.

3.2 Sample Probe. Stainless steel, or equivalent, three-hole rake type. Sample holes shall be 4 mm in diameter or smaller and located at 16.7, 50, and 83.3 percent of the equivalent stack diameter. Alternatively, a single opening probe may be used so that a gas sample is collected from the centrally located 10 percent area of the stack cross-section.

3.3 Sample Line. Stainless steel or Teflon* tubing to transport the sample gas to the analyzer. The sample line should be heated, if necessary, to prevent condensation in the line.

3.4 Calibration Valve Assembly. A three-way valve assembly to direct the zero and calibration gases to the analyzers is recommended. Other methods, such as quick-connect lines, to route calibration gas to the analyzers are applicable.

3.5 Particulate Filter. An in-stack or an out-of-stack glass fiber filter is recommended if exhaust gas particulate loading is significant. An out-of-stack filter should be heated to prevent any condensation.

3.6 Recorder. A strip-chart recorder, analog computer, or digital recorder for recording measurement data. The minimum data recording requirement is one measurement value per minute. Note: This method is often applied in highly explosive areas. Caution and care should be exercised in choice of equipment and installation.

4. *Calibration and Other Gases*

Gases used for calibrations, fuel, and combustion air (if required) are contained in compressed gas cylinders. Preparation of calibration gases shall be done according to the procedure in Protocol No. 1, listed in Reference 9.2. Additionally, the manufacturer of the cylinder should provide a recommended shelf life for each calibration gas cylinder over which the concentration does not change more than ±2 percent from the certified value. For calibration gas values not generally available (i.e., organics between 1 and 10 percent by volume), alternative methods for preparing calibration gas mixtures, such as dilution systems, may be used with prior approval of the Administrator.

Calibration gases usually consist of propane in air or nitrogen and are determined in terms of the span value. Organic compounds other than propane can be used following the above guidelines and making the appropriate corrections for response factor.

4.1 Fuel. A 40 percent H_2/60 percent He or 40 percent H_2/60 percent N_2 gas mixture is recommended to avoid an oxygen synergism effect that reportedly occurs when oxygen concentration varies significantly from a mean value.

4.2 Zero Gas. High purity air with less than 0.1 parts per million by volume (ppmv) of organic material (propane or carbon equivalent) or less than 0.1 percent of the span value, whichever is greater.

4.3 Low-level Calibration Gas. An organic calibration gas with a concentration equivalent to 25 to 35 percent of the applicable span value.

4.4 Mid-level Calibration Gas. An organic calibration gas with a concentration equivalent to 45 to 55 percent of the applicable span value.

4.5 High-level Calibration Gas. An organic calibration gas with a concentration equivalent to 80 to 90 percent of the applicable span value.

5. *Measurement System Performance Specifications*

5.1 Zero Drift. Less than ±3 percent of the span value.

5.2 Calibration Drift. Less than ±3 percent of span value.

5.3 Calibration Error. Less than ±5 percent of the calibration gas value.

6. *Pretest Preparations*

6.1 Selection of Sampling Site. The location of the sampling site is generally specified by the applicable regulation or purpose of the test; i.e., exhaust stack, inlet line, etc. The sample port shall be located at least 1.5 meters or 2 equivalent diameters upstream of the gas discharge to the atmosphere.

6.2 Location of Sample Probe. Install the sample probe so that the probe is centrally located in the stack, pipe, or duct and is sealed tightly at the stack port connection.

6.3 Measurement System Preparation. Prior to the emission test, assemble the measurement system following the manufacturer's written instructions in preparing the sample interface and the organic analyzer. Make the system operable.

FIA equipment can be calibrated for almost any range of total organics concentrations. For high concentrations of organics (>1.0 percent by volume as propane) modifications to most commonly available analyzers are necessary. One accepted method of equipment modification is to decrease the size of the sample to the analyzer through the use of a smaller diameter sample capillary. Direct and continuous measurement of organic concentration is a necessary consideration when determining any modification design.

6.4 Calibration Error Test. Immediately prior to the test series, (within 2 hours of the start of the test) introduce zero gas and

*Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

high-level calibration gas at the calibration valve assembly. Adjust the analyzer output to the appropriate levels, if necessary. Calculate the predicted response for the low-level and mid-level gases based on a linear response line between the zero and high-level responses. Then introduce low-level and mid-level calibration gases successively to the measurement system. Record the analyzer responses for low-level and mid-level calibration gases and determine the differences between the measurement system responses and the predicted responses. These differences must be less than 5 percent of the respective calibration gas value. If not, the measurement system is not acceptable and must be replaced or repaired prior to testing. No adjustments to the measurement system shall be conducted after the calibration and before the drift check (Section 7.3). If adjustments are necessary before the completion of the test series, perform the drift checks prior to the required adjustments and repeat the calibration following the adjustments. If multiple electronic ranges are to be used, each additional range must be checked with a mid-level calibration gas to verify the multiplication factor.

6.5 Response Time Test. Introduce zero gas into the measurement system at the calibration valve assembly. When the system output has stabilized, switch quickly to the high-level calibration gas. Record the time from the concentration change to the measurement system response equivalent to 95 percent of the step change. Repeat the test three times and average the results.

7. *Emission Measurement Test Procedure*

7.1 Organic Measurement. Begin sampling at the start of the test period, recording time and any required process information as appropriate. In particular, note on the recording chart periods of process interruption or cyclic operation.

7.2 Drift Determination. Immediately following the completion of the test period and hourly during the test period, reintroduce the zero and mid-level calibration gases, one at a time, to the measurement system at the calibration valve assembly. (Make no adjustments to the measurement system until after both the zero and calibration drift checks are made.) Record the analyzer response. If the drift values exceed the specified limits, invalidate the test results preceding the check and repeat the test following corrections to the measurement system. Alternatively, recalibrate the test measurement system as in Section 6.4 and report the results using both sets of calibration data (i.e., data determined prior to the test period and data determined following the test period).

8. *Organic Concentration Calculations*

Determine the average organic concentration in terms of ppmv as propane or other calibration gas. The average shall be determined by the integration of the output recording over the period specified in the applicable regulation.

If results are required in terms of ppmv as carbon, adjust measured concentrations using Equation 25A-1.

$$C_c = K\ C_{meas} \qquad \text{Eq. 25A-1}$$

Where:

C_c = Organic concentration as carbon, ppmv.

C_{meas} = Organic concentration as measured, ppmv.

K = Carbon equivalent correction factor,

K = 2 for ethane.

K = 3 for propane.

K = 4 for butane.

K = Appropriate response factor for other organic calibration gases.

9. *Bibliography*

9.1 Measurement of Volatile Organic Compounds—Guideline Series. U.S. Environmental Protection Agency. Research Triangle Park, NC. Publication No. EPA-450/2-78-041. June 1978. p. 46-54.

9.2 Traceability Protocol for Establishing True Concentrations of Gases Used for Calibration and Audits of Continuous Source Emission Monitors (Protocol No. 1). U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory. Research Triangle Park, NC. June 1978.

9.3 Gasoline Vapor Emission Laboratory Evaluation—Part 2. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. Research Triangle Park, NC. EMB Report No. 75-GAS-6. August 1975.

APPENDIX P

CALCULATION EQUATIONS

METHOD 2
CALCULATION EQUATIONS

$$\overline{V_s} = 85.49\ C_p\ (\sqrt{\Delta p})_{avg}\ \sqrt{\frac{T_{s(avg)}}{P_s\ M_s}}$$

$$Q_{s,\,d} = 60\ (1 - B_{ws})\ \overline{V_s}\ A\ (\frac{528}{T_{s\ (avg)}})\ (\frac{P_s}{29.92})$$

$$Q_a = 60\ \overline{V_s}\ A$$

$$\dot{m}_g = \frac{4.995\ Q_{s,\,d}\ G_d}{1 - B_{ws}}$$

$$RH^* = 100\ (vp_{twb} - 0.0003641\ P_s\ (T_{db} - T_{wb}))/vp_{tdb}$$

$$B^*_{ws} = RH(vp_{tdb})/P_s$$

$$\rho = \frac{4.585\ x\ 10^{-2}\ P_s M_s}{T_s\ (avg)}$$

*Alternate equations for calculating moisture content from wet bulb and dry bulb data.

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SYMBOLS

A	=	Cross Sectional area of stack, SQ. FT.
A_n	=	Cross sectional area of nozzle, SQ. FT.
B_{ws}	=	Water vapor in gas stream, proportion by volume
C_p	=	Pitot tube coefficient, dimensionless
C_a	=	Concentration of particulate matter in stack gas, wet basis, GR/ACF
C_s	=	Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, GR/DSCF
EA	=	Excess air, percent by volume
γ	=	Dry test meter correction factor, dimensionless
G_d	=	Specific gravity (relative to air), dimensionless
I	=	Isokinetic variation, percent by volume
M_d	=	Molecular weight of stack gas, dry basis, g/g - mole.
$\dot{m}_g$	=	Mass flow of wet flue gas, LB/HR
$\dot{m}_p$	=	Particulate mass flow, LB/HR
M_s	=	Molecular weight of stack gas, wet basis, g/g mole.
M_p	=	Total amount of particulate matter collected, g
P_{bar}	=	Atmospheric pressure, IN. HG. (uncompensated)
P_g	=	Stack static gas pressure, IN. WC.
P_s	=	Absolute pressure of stack gas, IN. HG.
P_{std}	=	Standard absolute pressure, 29.92 IN. HG.
A_a	=	Actual volumetric stack gas flow rate, ACFM
$Q_{s,d}$	=	Dry volumetric stack gas flow rate corrected to standard conditions, DSCFM
RH	=	Relative humidity, %

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T_{db}	=	Dry bulb temperature of stack gas, °F
T_{wb}	=	Wet bulb temperature of stack gas, °F
$T_{m(avg)}$	=	Absolute average dry gas meter temperature, °R
$T_{s(avg)}$	=	Absolute average stack temperature, °R
T_{std}	=	Standard absolute temperature, 528 °R (68 °F)
θ	=	Total sampling time, min.
V_{lc}	=	Total volume of liquid collected in impingers and silica gel, ml
V_m	=	Volume of gas sample as measured by dry gas meter, CF
$V_{m(std)}$	=	Volume of gas sample measured by the dry gas meter corrected to standard conditions, DSCF
$V_{w(std)}$	=	Volume of water vapor in the gas sample corrected to standard conditions, SCF
$\bar{V}_s$	=	Average actual stack gas velocity, FT/SEC
vp_{tdb}	=	Vapor pressure at T_{db}, IN. HG.
vp_{twb}	=	Vapor pressure at T_{wb}, IN. HG.
$\overline{\Delta H}$	=	Average pressure differential across the orifice meter, IN. WC.
ΔP	=	Velocity pressure of stack gas, IN. WC.
γ	=	Dry test meter correction coefficient, dimensionless
ρ	=	Actual gas density, LB/ACF

METHOD 3
CALCULATION EQUATIONS

$$\%EA = \frac{100(\%O_2 - 0.5\%\ CO)}{0.264\%\ N_2 - \%O_2 + 0.5\%\ CO}$$

$$M_d = 0.44(\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%N_2 + \%CO)$$

$$M_s = M_d\ (I - B_{ws}) + 0.18\ B_{ws}$$

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

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METHOD 5
CALCULATION EQUATIONS

$$V_{m(std)} = 17.65\ V_m\ \gamma\ \left(\frac{P_{bar} - \overline{\Delta H}/13.6}{T_{m(avg)}}\right)$$

$$V_{w(std)} = 0.0472\ V_{lc}$$

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

$$I = 0.0944\ \left(\frac{T_{s(avg)}\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (I - B_{ws})}\right)$$

$$C_s = \frac{15.43\ M_p}{V_{m(std)}}$$

$$C_a = \frac{272.3\ M_p\ P_s}{T_{s(avg)}\ (V_{w(std)} + V_{m(std)})}$$

$$(\dot{m}_p)_1 = 8.5714\ x\ 10^{-3}\ C_s\ Q_{s,\,d}$$

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$$(\dot{m}_p)_2 = \frac{1.3228 \ x \ 10^{-1} \ M_p \ A}{\theta \ A_n}$$

$$\dot{m}_p = \frac{(\dot{m}_p)_1 + (\dot{m}_p)_2}{2}$$

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CALCULATION EQUATIONS

METHOD 7

$$V_{m(std)} = 17.64\ (V_f - 25)\ [\frac{p_f}{T_f} - \frac{P_i}{T_i}]$$

$$C_s = 6.243\ x\ 10^{-5}\ \frac{M}{V_{m(std)}}$$

$$E = \frac{2090\ C_s F}{20.9 - \overline{B}'_{O_2}}$$

$$C_s\ (GR/DSCF) = 7000\ C_s$$

$$C_s\ (MG/DSCM) = 1.60186\ x\ 10^7\ C_s$$

$$C_s\ (ppm\text{-}dry) = 8.37552\ x\ 10^6\ C_s$$

$$C_s\ (ppm\text{-}3\%\ O_2) = 8.37552\ x\ 10^6\ C_s\ \{1 + [\frac{\overline{B}'_{O_2} - 3}{20.9 - B'_{O_2}}]\}$$

$$C_s\ (ppm\text{-}wet) = 8.37552\ x\ 10^6\ C_s\ (1 - \frac{MC}{100})$$

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SYMBOLS

$\bar{B}\ O_2$	=	Average oxygen content in flue gas, % v/v
C_s	=	Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, LB/DSCF
C_s (GR/DSCF)	=	Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, GR/DSCF
C_s (MG/DSCM)	=	Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, MG/DSCM
E	=	Emission factor, LB/10^6BTU
F	=	F-Factor for given fuel type, DSCF/10^4BTU
M	=	Mass of nitrogen oxides as nitrogen dioxide in gas sample, ug
MC	=	Moisture content of flue gas, %
P_f	=	Final absolute pressure in flask, IN. HG
P_i	=	Initial absolute pressure in flask, IN. HG
C_s (ppm-dry)	=	Concentration of nitrogen oxides in flue gas, dry basis, (v/v), ppm
C_s (ppm-3% O_2)	=	Concentration of nitrogen oxides in flue gas, dry basis, corrected to 3% O_2, (v/v) ppm
C_s (ppm-wet)	=	Concentration of nitrogen oxides in flue gas, wet basis, (v/v), ppm
T_f	=	Final absolute temperature in flask, °R
T_i	=	Initial absolute temperature in flask, °R
V_f	=	Volume of flask and valve, cc
$V_{m(std)}$	=	Sample volume at standard conditions, dry basis, cc

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CALCULATION EQUATIONS

METHOD 10

$$CO{\cdot}PPM{\cdot}DRY = CO_{CO_2} - free,\ dry,\ avg\ (1 - CO_2,\ d/100)$$

$$CO{\cdot}PPM{\cdot}WET = CO{\cdot}PPM{\cdot}DRY\ (1 - MC/100)$$

$$GR/DSCF = 5.0885\ X\ 10^{-4}\ (CO{\cdot}PPM{\cdot}DRY)$$

$$mg/dscm = 1.165\ (CO{\cdot}PPM{\cdot}DRY)$$

$$\dot{m} = 8.5714\ x\ 10^{-3}\ (GR/DSCF)\ (Q_{s,d})$$

$$E = \frac{2.9857\ x\ 10^{-3}\ F_d\ (GR/DSCF)}{20.9 - O_{2,\,d}}$$

where:

$CO_{CO_2} - free,\ dry,\ avg$

= average of two determinations of carbon monoxide on a dry, CO_2 - free integrated flue gas sample reported in ppm by volume

$CO_{2,\,d}$ = carbon dioxide concentration of flue gas on a dry percent by volume basis

$O_{2,\,d}$ = oxygen concentration of flue gas on a dry percent by volume basis

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MC	=	moisture content of flue gas on a percent by volume basis
CO·PPM·DRY	=	carbon monoxide concentration in ppm by volume on a dry basis
CO·PPM·WET	=	carbon monoxide concentration in ppm by volume on a wet or actual basis
GR/DSCF	=	concentration of carbon monoxide in flue gas on a grains per dry standard cubic foot basis (68 °F, 29.92 IN. HG.)
mg/dscm	=	concentration of carbon monoxide in flue gas on a milligrams per dry standard cubic meter basis (60 °F, 29.92 IN. HG.)
$\dot{m}$	=	emissions or mass rate of carbon monoxide on a LB/HR basis
$Q_{s,d}$	=	volumetric flow rate of flue gas in dry standard cubic feet per minute
E	=	emission factor of carbon monoxide in pounds of carbon monoxide emitted per million BTU heat input (LB/MMBTU)
F_d	=	F-Factor of respective fuel in dry standard cubic feet of exhaust gas at 0% oxygen per million BTU of heat input (DSCF/MMBTU)

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CALCULATION EQUATIONS

Chromotropic Acid Method for Formaldehyde

$$m_t = \frac{m_a \, V_{soln}}{V_{aliq}}$$

where:

m_t	=	mass of formaldehyde in total sample in ug
m_a	=	mass of formaldehyde in aliquot in ug
V_{soln}	=	volume of total sample in cc (500 cc normally)
V_{aliq}	=	volume of aliquot taken for analysis in cc
PPM·DRY	=	$\frac{0.0283 \, m_t}{V_{std}}$
PPM·WET	=	PPM.DRY (1-MC/100)
GR/DSCF	=	5.45×10^{-4} (PPM·DRY)
mg/dscm	=	1.249 (PPM·DRY)
$\dot{m}$	=	8.5714×10^{-3} (GR/DSCF) ($Q_{s,d}$)

where:

PPM·DRY	=	concentration of formaldehyde in parts per million by volume on a dry basis
PPM·WET	=	concentration of formaldehyde in parts per million by volume on an actual or wet basis
MC	=	moisture content of gas on a percent by volume basis
GR/DSCF	=	concentration of formaldehyde in gas on a grains per dry standard cubic foot basis (68 °F, 29.92 IN. HG.)
$\dot{m}$	=	emission or mass rate of formaldehyde in pounds per hour (LB/HR)
V_{std}	=	dry gas volume as measured by the dry gas meter, corrected to standard conditions (at 68 °F and 1 atmosphere) DSCF

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METHOD 25A

Total Gaseous Organics Calculation Equation

GR C/SCF $= 2.180 \times 10^{-4}$ (ppm, w)

GR C/DSCF $= 2.180 \times 10^{-4}$ (ppm, w)/(1-MC/100)

LB C/HR $= 8.5714 \times 10^{-3}$ (GR/DSCF) (DSCFM)

where:

GR C/SCF = grains of total gaseous organics as carbon per actual (wet) standard cubic foot

GR C/DSCF = grains of total gaseous organics as carbon per dry standard cubic foot

LB C/HR = pounds of total gaseous organics as carbon emitted per hour

Note 1: The Ratfisch Model RS 55 Heated FID Analyzer as normally operated with a heated filter, sample line and heated detector oven gives ppm, w.

Note 2: ppm, C = ppm as carbon = 3(ppm propane)

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Report No. 4-2837

LOUISIANA PACIFIC CORPORATION

Missoula, Montana

Total HydroCarbons Calculations

ROEMMC Tube

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
5	1	5.01	4.46	11050	0.10			0.0010236
	2	4.34	2.93	11262	0.06			0.0006677
	3	4.8	14.64	11012	0.32			0.0033524
						7.3433333	0.159277	

C' Dryer Stack

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
6	1	2.65	65.73	23728	2.99			0.0147192
	2	2.98	76.44	24933	3.67			0.0171758
	3	2.99	57.6	25782	2.86			0.0129438
						66.59	3.174898	

D' Dryer Stack

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
7	1	4.1	88.19	18062	3.10			0.0200474
	2	4.99	115.43	18433	4.18			0.0264854
	3	4.7	127.83	18508	4.64			0.0292413
						110.48333	3.975694	

LOUISIANA PACIFIC CORPORATION

Missoula, Montana

Total HydroCarbons Calculations

Board Coolers 1 & 2 Stack

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
11	1	1.01	6.42	31803	0.39			0.0014138
	2	1.09	2.5	32389	0.15			0.000551
	3	0.97	5.75	32927	0.36			0.0012658
						4.89	0.298539	

Press Vents 3 & 4 Stack

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
12	1	1.44	70.37	31118	4.15			0.0155648
	2	0.88	34.18	30771	1.98			0.0075174
	3	0.97	41.62	31027	2.44			0.009162
						48.723333	2.856943	

Press Vents 1 & 2 Stack

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
13	1	1.08	45.51	29953	2.57			0.0100295
	2	0.87	14.05	30159	0.80			0.0030898
	3	1.07	6.85	29997	0.39			0.0015095
						22.136667	1.253931	

LOUISIANA PACIFIC CORPORATION

Missoula, Montana

Total HydroCarbons Calculations

North Pre-Dryer Stack

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
14	1	4.84	77.25	37121	5.63			0.017697
	2	5.04	66.91	37101	4.88			0.0153606
	3	5.86	92.68	37398	6.88			0.0214619
						78.946667	5.798426	

South Pre-Dryer Stack

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
15	1	4.53	69.54	32769	4.46			0.015879
	2	4.84	63.64	32388	4.05			0.0145792
	3	5.94	109.5	32599	7.09			0.0253785
						80.893333	5.199534	

Coen Stack

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
18	1	7.42	< 1	6617	< 0.01			0.0002355
	2	7.09	< 1	6906	< 0.01			0.0002346
	3	8	< 1	6831	< 0.01			0.000237
						< 1	<0.013706	

APPENDIX Q

SAMPLING TRAIN CALIBRATION DATA

INTERPOLL LABORATORIES
EPA Method 5 Gas Metering System
Quality Control Check Data Sheet

Job LP- Missoula Date 5-9-94

Operator SB Module No. 10

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 26.71 in. Hg. Υ = .9954 ^H@ 1.79 in. W.C.

Time (min)	Volume (CF)	Meter Temp. (°F)	
		Inlet	Outlet
[redacted]	292.40	[redacted]	
2.5	294.40	90	84
5.0	296.42	92	84
7.5	298.46	94	85
10	300.35	96	86
[redacted]	V_m= 7.95	Avg(t_m)= 88.9	°F

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{\Upsilon V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(.9954)(7.95)}\left[\frac{(88.9) + 460}{(28.71)}\right]^{0.5}$$

Y_{cn} = 1.0231

If Y_{cn} is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

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INTERPOLL LABORATORIES
EPA Method 5 Gas Metering System
Quality Control Check Data Sheet

Job LP/MISSOULA Date 5-9-94

Operator [illegible] Module No. 4

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 26.74 in. Hg. $_T$ = 1.0041 ^H@ 1.94 in. W.C.

Time (min)	Volume (CF)	Meter Temp. (°F)	
		Inlet	Outlet
[redacted]	(487.500)	[redacted]	
2.5	489.420	89	88
5.0	491.380	90	88
7.5	493.340	90	88
10	495.390	91	88
[redacted]	V_m= 7.890	Avg(t_m)= 89.0	°F

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{{}_T V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(1.0041)(7.89)}\left[\frac{(89) + 460}{(26.74)}\right]^{0.5} \quad 4.5311$$

$$Y_{cn} = 1.0214$$

If Y_{cn} is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

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INTERPOLL LABORATORIES
EPA Method 5 Gas Metering System
Quality Control Check Data Sheet

Job LP / Missoula Date 5-9-94

Operator [illegible] Module No. 9

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 26.74 in. Hg. γ = .9961 ^H@ 1.78 in. W.C.

Time (min)	Volume (CF)	Meter Temp. (°F)	
		Inlet	Outlet
[redacted]	(615.000)	[redacted]	
2.5	617.05	89	89
5.0	618.10	90	89
7.5	620.99	91	89
10	623.175	91	89
[redacted]	V_m= 8.175	Avg(t_m)=	89.6 °F

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{\gamma\ V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(.9961)(8.175)}\left[\frac{(89.6) + 460}{(26.74)}\right]^{0.5}$$ 4.5533

Y_{cn} = .9543

If Y_{cn} is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

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INTERPOLL LABORATORIES
EPA Method 5 Gas Metering System
Quality Control Check Data Sheet

Job LP - Missoula Date 5-11-94

Operator SLB Module No. 16

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 26.95 in. Hg. $_T$ = .9954 ^H@ 1.79 in. W.C.

Time (min)	Volume (CF)	Meter Temp. (°F)	
		Inlet	Outlet
[redacted]	(629.80)	[redacted]	
2.5	631.75	61	52
5.0	633.70	64	52
7.5	635.65	67	53
10	637.60	70	54
[redacted]	V_m= 7.80	Avg(t_m)= 59.13	°F

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{{}_T V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(.9954)(7.80)}\left[\frac{(59.13) + 460}{(26.95)}\right]^{0.5}$$

Y_{cn} = 1.0096

If Y_{cn} is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

S-432

INTERPOLL LABORATORIES
EPA Method 5 Gas Metering System
Quality Control Check Data Sheet

Job _____ Date _____

Operator _____ Module No. ____

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press _____ in. Hg. $_T$ = 1.0041 ^H@ _____ in. W.C.

Time (min)	Volume (CF)	Meter Temp. (°F)	
		Inlet	Outlet
[redacted]	( )	[redacted]	
2.5			
5.0			
7.5			
10			
[redacted]	V_m=	Avg(t_m)=	°F

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{{}_T\ V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(\quad)(\quad)}\left[\frac{(\quad) + 460}{(\quad)}\right]^{0.5}$$

Y_{cn} = _____

If Y_{cn} is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

S-432

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: June 1, 1994

Meter Box No. : 4 (Rockwell Dry Test Meter Serial No. 964552)

Date of Last Calibration: April 22, 1994
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
May 10, 1994	4-2837	495.50	1365.90	870.40	870.40

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: June 1, 1994

Meter Box No. : 9 (Rockwell Dry Test Meter Serial No. 964549)

Date of Last Calibration: March 24, 1994
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
April 06, 1994	4-2597	261.00	391.84	130.84	130.84
April 12, 1994	4-2649	400.30	612.20	211.90	342.74
May 10, 1994	4-2837	624.20	1606.81	982.61	1325.35

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: June 1, 1994

Meter Box No. : 10 (Rockwell Dry Test Meter Serial No. 1334112)

Date of Last Calibration: December 9, 1993
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
January 05, 1994	4-2039	174.15	315.40	141.25	141.25
February 01, 1994	4-2198	316.30	425.63	109.33	250.58
March 25, 1994	4-2556	436.70	537.80	101.10	351.68
April 10, 1994	4-2649	546.10	936.23	390.13	741.81
April 27, 1994	4-2776	948.00	1291.67	343.67	1085.48
May 10, 1994	4-2837	1300.50	2061.09	760.59	1846.07

* Total volume through meter since last calibration.

Date 4-22-94

Bar. Press. 29.31 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 6

Control Module No. 4
Serial No. DTM 964552
Wet Test Meter No. AL-20
Technician [illegible]

ΔH (in. WC) nominal	ΔH (in. WC) actual	Gas Volume Wet Test Meter (ft^3)	* Cal. Index θ (%)	* Diff. Wet Test Meter ΔP_w (in. WC)	Gas Volume Dry test meter (ft^3) V_{di}	Gas Volume Dry test meter (ft^3) V_{df}	Gas temperatures Wet Test t_w (°F)	Gas temperatures Dry Test t_{di} (°F)	Gas temperatures Dry Test t_{do} (°F)	Time θ (min/sec)	Meter Coeff. Y	Orifice Const. ΔH@	C_f
0.6	.5	2	99.85	0.01	459.500	461.510	69.5	77	73	5/07	1.0025	1.86	
1.2	1.2	3	99.91	0.025	456.400	459.015	69.5	74	72	5/02	.9976	1.93	
2.0	2.0	3	99.93	0.055	462.000	465.015	69.5	83	75	3/57	1.0069	1.95	
3.3	3.3	5	100.00	0.09	465.500	470.538	69.5	86	76	5/10	1.0054	1.98	
4.7	4.7	5	100.02	0.12	471.000	476.056	69.5	90	78	4/21	1.0080	1.98	
											1.0041	1.94	

Positive leak check performed by [illegible]

Meter was in tolerance ☒

Meter was not in tolerance ☐; readjusted linkage

Meter was not in tolerance ☐; changed dry test meters

Approved by [illegible] Date 5/2/94

* Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

S0102RR 11/91

Date 3-24-94

Bar. Press. 29.00 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 5

Control Module No. 9
Serial No. DTM 964549
Wet Test Meter No. AL-20
Technician [illegible]

ΔH (in. WC) nominal	ΔH (in. WC) actual	Gas Volume Wet Test Meter (ft^3)	* Cal. Index θ (%)	* Diff. Wet Test Meter ΔP_w (in. WC)	Gas Volume Dry test meter (ft^3) V_{di}	Gas Volume Dry test meter (ft^3) V_{df}	Gas temperatures Wet Test t_w (°F)	Gas temperatures Dry Test t_{di} (°F)	Gas temperatures Dry Test t_{do} (°F)	Time θ (min/sec)	Meter Coeff. Y	Orifice Const. ΔHθ	C_f
0.5	.5	2	99.85	0.01	108.000	110.028	66	77	72	5/00	.9993	1.77	
1.2	1.2	3	99.91	0.025	104.500	107.530	66	74	70	4/49	.9973	1.76	
2.0	2.0	3	99.93	0.055	110.500	113.552	66	80	73	3/46	.9966	1.78	
3.3	3.3	5	100.00	0.09	114.000	119.116	66	84	75	4/55	.9934	1.79	
4.7	4.7	5	100.02	0.12	119.500	124.637	66	88	76	4/07	.9939	1.78	
	2	3	4	5	6	7	8	9	10	11/12	.9961	1.78	

Positive leak check performed by [illegible]
Meter was in tolerance ☒
Meter was not in tolerance ☐; readjusted linkage
Meter was not in tolerance ☐; changed dry test meters

Approved by [illegible] Date 4/4/94

* Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

S0102RR 11/91

Date 12-9-93

Bar. Press. 28.65 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 5

Control Module No. 10
Serial No. DTM 1334112
Wet Test Meter No. AL-20
Technician [illegible]

ΔH (in. WC) nominal	ΔH (in. WC) actual	Gas Volume Wet Test Meter (ft^3)	* Cal. Index Φ (%)	* Diff. Wet Test Meter ΔP_w (in. WC)	Gas Volume Dry test meter (ft^3) V_{di}	Gas Volume Dry test meter (ft^3) V_{df}	Gas temperatures Wet Test t_w (°F)	Gas temperatures Dry Test t_{di} (°F)	Gas temperatures Dry Test t_{do} (°F)	Time θ (min/sec)	Meter Coeff. Y	Orifice Const. ΔHθ	C_f
0.5	.5	2	99.85	0.01	140.500	142.541	67	82	72	4/53	.9957	1.71	
1.2	1.2	3	99.91	0.025	137.000	140.054	67	80	73	4/50	.9959	1.79	
2.0	2.0	3	99.93	0.055	143.000	146.055	67	86	72	3/47	.9983	1.82	
3.3	3.3	5	100.00	0.09	146.500	151.621	67	90	73	4/56	.9945	1.82	
4.7	4.7	5	100.02	0.12	152.500	157.63	67	93	74	4/09	.9928	1.83	
2	3	4	5	6	7		8	9	10	11/12	.9954	1.79	

Positive leak check performed by [illegible]
Meter was in tolerance ☒
Meter was not in tolerance ☐; readjusted linkage
Meter was not in tolerance ☐; changed dry test meters

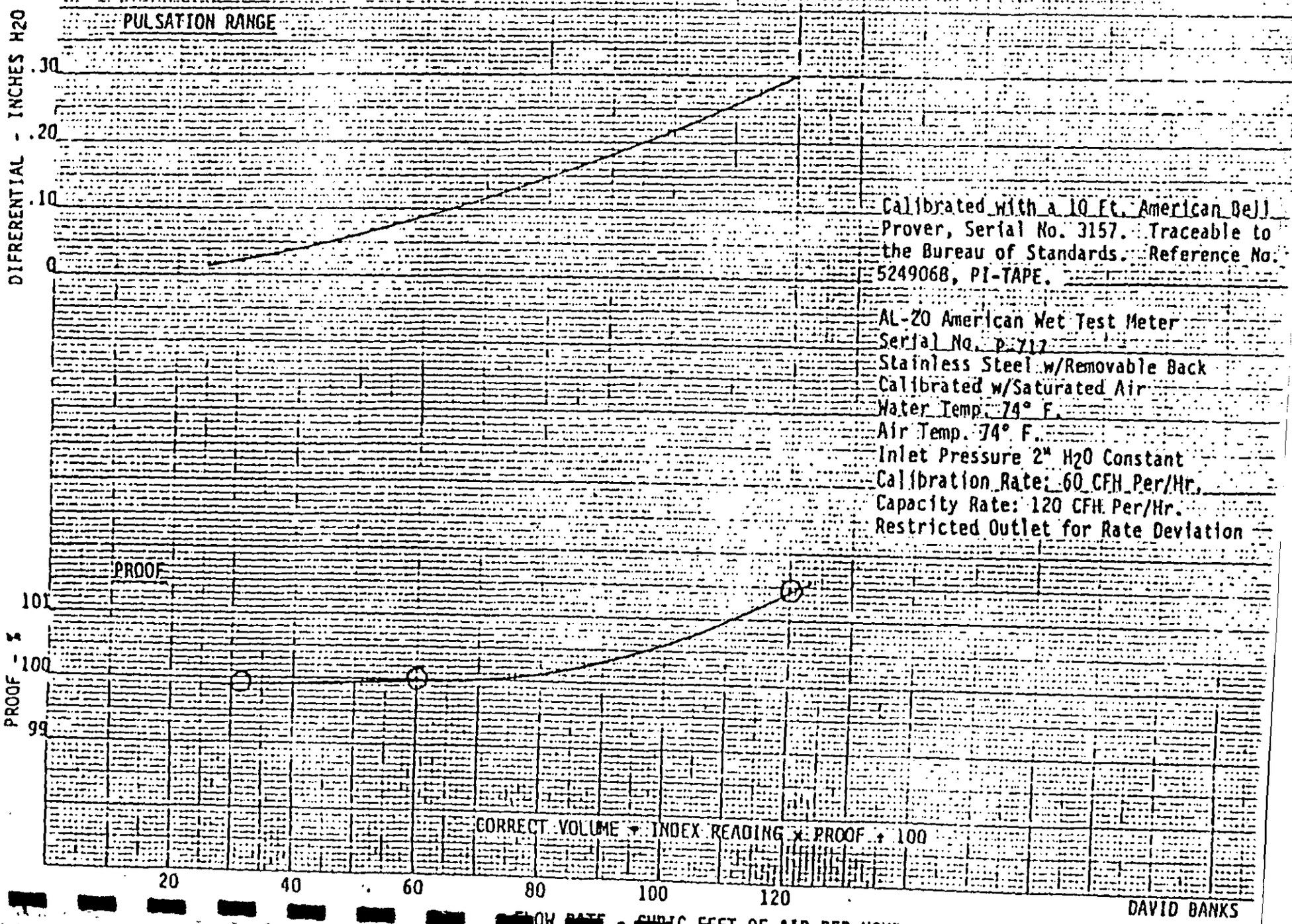
Approved by [illegible] Date 12/10/93

- Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

S0102RR 11/91

DIFFERENTIAL PRESSURE AND PROOF CALIBRATION CURVES

WET TEST METER



Calibrated with a 10 Ft. American Bell Prover, Serial No. 3157. Traceable to the Bureau of Standards. Reference No. 5249068, PI-TAPE.

AL-20 American Wet Test Meter
Serial No. P 717
Stainless Steel w/Removable Back
Calibrated w/Saturated Air
Water Temp. 74° F.
Air Temp. 74° F.
Inlet Pressure 2" H_2O Constant
Calibration Rate: 60 CFH Per/Hr.
Capacity Rate: 120 CFH Per/Hr.
Restricted Outlet for Rate Deviation

DAVID BANKS

November 1991

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 05-10-94 Nozzle Number 3-3
Technician: Ed Trowbridge

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.185
2	.185
3	.184
Average:	.185

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 05-10-94 Nozzle Number 3-4
Technician: Mark Kaehler

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.242
2	.244
3	.243
Average:	.242

Interpoll Laboratories, Inc.

(612) 786-6020

Nozzle Calibration

Data Sheet

Date of Calibration: 05-10-94 Nozzle Number 4-7

Technician: Scott Bainville

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.435
2	.435
3	.435
Average:	.435

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 05-11-94 Nozzle Number 3-3
Technician: Mark Kaehler

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.181
2	.181
3	.180
Average:	.181

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 05-11-94 Nozzle Number 3-3
Technician: Ed Trowbridge

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.185
2	.185
3	.184
Average:	.185

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 05-11-94 Nozzle Number 4-3
Technician: Scott Bainville

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.190
2	.189
3	.190
Average:	.190

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 05-11-94 Nozzle Number Glass
Technician: Ed Trowbridge

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.224
2	.223
3	.224
Average:	.224

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 05-11-94 Nozzle Number Glass
Technician: Mark Kaehler

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.226
2	.227
3	.227
Average:	.227

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 05-12-94 Nozzle Number Glass
Technician: Ed Trowbridge

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.189
2	.190
3	.190
Average:	.190

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 05-12-94 Nozzle Number Glass
Technician: Mark Kaehler

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.191
2	.192
3	.190
Average:	.191

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 05-12-94 Nozzle Number 3-3
Technician: Ed Trowbridge

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.185
2	.185
3	.185
Average:	.185

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 05-12-94 Nozzle Number 4-7
Technician: Scott Bainville

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.434
2	.435
3	.436
Average:	.435

Interpoll Laboratories, Inc.

Temperature Measurement Device
Calibration Sheet

Unit under test:
Vendor OMEGA
Model HH21 Serial Number #2
Range °F Thermocouple Type K
Date of Calibration 1/7/94 Technician D. VAN HOEVER

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± 1 degree (for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation Δt (°F)	Deviation (%)
0	0	2	2	.43
100	100	98.1	2	.36
200	200	200	—	0
300	300	298.0	2	.26
400	400	398	2	.23
500	500	499	1	.10
600	600	601	1	.09
700	700	699	1	.09
800	800	801	1	.08
900	900	899.0	1	.07
1000	1000	1000	—	0
1100	1100	1099	1	.06
1200	1200	1202	2	.12
1300	1300	1299	1	.06
1400	1400	1402	2	.11
1500	1500	1499	1	.05
1600	1600	1601	1	.05
1700	1700	1699	1	.05
1800	1800	1800	—	0
1900	1900	1898	2	.08
2000	2000	2000	0	0
2100	2100	2098	2	.08
		Averages:		.11

OF = off scale response by unit under test (°F)
% dev = 100 Δt / (460 + t)

☒ Unit in tolerance
☐ Unit was not in tolerance: recalibrated - See new calibration sheet.

S-433

Interpoll Laboratories, Inc.

Temperature Measurement Device
Calibration Sheet

Unit under test:
Vendor Omega PDT-29
Model HH21 Serial Number T-97106
Range 0 - 2100 °F Thermocouple Type K
Date of Calibration 10-14-93 Technician SLB

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± 1 degree (for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation Δt (°F)	Deviation (%)
0	0	-0.7	0.7	0.00
100	100	98.6	1.4	0.25
200	200	200.6	0.6	0.09
300	300	298.8	1.2	0.16
400	400	398.1	1.9	0.19
500	500	498.8	1.2	0.13
600	600	600.7	0.7	0.07
700	700	698.9	1.1	0.09
800	800	800.9	0.9	0.07
900	900	898.9	1.1	0.07
1000	1000	999.8	0.1	0.01
1100	1100	1098.6	1.4	0.09
1200	1200	1201.0	1.0	0.06
1300	1300	1298.7	1.3	0.07
1400	1400	1401.1	1.1	0.06
1500	1500	1498.4	1.6	0.08
1600	1600	1599.8	0.2	0.01
1700	1700	1697.8	2.2	0.10
1800	1800	1799.7	0.3	0.01
1900	1900	1897.0	3.0	0.13
2000	2000	1998.6	1.4	0.06
2100	2100	2097.0	3.0	0.12
		Averages:	1.22	0.09

OF = off scale response by unit under test (°F)
% dev = 100 Δt / (460 + t)

☐ Unit in tolerance
☐ Unit was not in tolerance: recalibrated - See new calibration sheet.

S-433

Interpoll Laboratories, Inc.

Temperature Measurement Device
Calibration Sheet

Unit under test:

Vendor Omega

Model HH 81

Range 0 - 2100 °F

Date of Calibration 4-8-94

Serial Number 73JX1495

Thermocouple Type K

Technician Mark Baehler

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☑ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± 1 degree (for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation	
			Δt (°F)	(%)
0	0	-1	1	.22
100	100	100	0	.0
200	200	201	1	.15
300	300	300	0	0
400	400	399	1	.12
500	500	499	1	.10
600	600	601	1	.09
700	700	700	0	0
800	800	802	2	.16
900	900	901	1	.07
1000	1000	1001	1	.07
1100	1100	1100	0	0
1200	1200	1202	2	.12
1300	1300	1300	0	0
1400	1400	1402	2	.11
1500	1500	1500	0	0
1600	1600	1603	3	.15
1700	1700	1701	1	.05
1800	1800	1803	3	.13
1900	1900	1901	1	.04
2000	2000	2001	1	.04
2100	2100	2099	1	.04
		Averages:	1.05	.08

OF = off scale response by unit under test (°F)

% dev = 100 Δt / (460 + t)

☑ Unit in tolerance

☐ Unit was not in tolerance: recalibrated - See new calibration sheet.

S-433

Interpoll Laboratories, Inc.

E.T.'s

Temperature Measurement Device
Calibration Sheet

Unit under test: #34

Vendor: OMEGA
Model: HH81
Range: 0 - 2000 °F
Date of Calibration: 4-21-74

Serial Number: 74TX6343
Thermocouple Type: K
Technician: E TROWBRIDGE

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± 1 degree (for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation Δt (°F)	Deviation (%)
0	0	-1.9	-1.9	.41
100	100	-97.5	-2.5	.45
200	200	199.7	-.3	.05
300	300	297.5	-2.5	.33
400	400	397	-3	.35
500	500	498	-2	.20
600	600	600	—	0
700	700	699	-1	.08
800	800	801	+1	.08
900	900	900	—	0
1000	1000	1001	+1	.07
1100	1100	1098	-2	.13
1200	1200	1201	+1	.06
1300	1300	1299	-1	.05
1400	1400	1402	+2	.11
1500	1500	1500	—	0
1600	1600	1603	+3	.14
1700	1700	1701	+1	.05
1800	1800	1804	+4	.18
1900	1900	1901	+1	.04
2000	2000	2001	+1	.04
2100	2100	2099	-1	—
		Averages:	1.46	.128

OF = off scale response by unit under test (°F)
% dev = 100 Δt / (460 + t)

☒ Unit in tolerance
☐ Unit was not in tolerance; recalibrated - See new calibration sheet.

Interpoll Laboratories, Inc.
(612) 786-6020

S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 22 - 4

Pitot tube dimensions:

1. External tubing diameter (D_t) .316 IN.
2. Base to Side A opening plane (P_A) .460 IN.
3. Base to Side B opening plane (P_B) .460 IN.

Alignment:

4. α_1 < 10° 0
5. α_2 < 10° 0

6. B_1 < 5° 0
7. B_2 < 5° 0

8. Z <.125" .01
9. W <.0625" .02

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .760 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

☒ Meets all EPA design criteria thus C_p = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
C_p = _____

Date of Inspection: 4-8-94

Inspected by: [signature]

CFR Title 40 Part 60 Appenidix A Method 2

S-348

Interpoll Laboratories, Inc.
(612) 786-6020

S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 79-4

Pitot tube dimensions:

1. External tubing diameter (D_t) .316 IN.
2. Base to Side A opening plane (P_A) .460 IN.
3. Base to Side B opening plane (P_B) .460 IN.

Alignment:

4. α_1 < 10° 0
5. α_2 < 10° 0

6. B_1 < 5° 0
7. B_2 < 5° 0

8. Z <.125" .02
9. W <.0625" .02

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .750 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

☒ Meets all EPA design criteria thus C_p = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
C_p = _____

Date of Inspection: 4-7-94

Inspected by: [signature]

CFR Title 40 Part 60 Appenidix A Method 2

S-348

Interpoll Laboratories, Inc.
(612) 786-6020

S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 29-5

Pitot tube dimensions:

1. External tubing diameter (D_t) .316 IN.
2. Base to Side A opening plane (P_A) .460 IN.
3. Base to Side B opening plane (P_B) .460 IN.

Alignment:

4. α_1 < 10° 0
5. α_2 < 10° 0

6. B_1 < 5° 0
7. B_2 < 5° 0

8. Z <.125" .02
9. W <.0625" .01

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .750 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

☒ Meets all EPA design criteria thus C_p = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
C_p = _____

Date of Inspection: 1-7-94

Inspected by: [signature]

CFR Title 40 Part 60 Appenidix A Method 2

S-348

Interpoll Laboratories, Inc.
(612) 786-6020

S-Type Pitot Tube Inspection Sheet

Pitot Tube No. WCP-1

Pitot tube dimensions:

1. External tubing diameter (D_t) .316 IN.
2. Base to Side A opening plane (P_A) .460 IN.
3. Base to Side B opening plane (P_B) .460 IN.

Alignment:

4. α_1 < 10° 0
5. α_2 < 10° 0

6. B_1 < 5° 0
7. B_2 < 5° 0

8. Z <.125" .015
9. W <.0625" .02

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .750 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) _____ IN.
13. Pitot to thermocouple (perpendicular to probe) _____ IN.

☒ Meets all EPA design criteria thus C_p = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
C_p = _____

Date of Inspection: 4-8-94

Inspected by: [signature]

CFR Title 40 Part 60 Appenidix A Method 2

S-348

INTERPOLL LABORATORIES
(612)786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 10-15-93
Technician SCOTT L BAINVICE
Mercury Column Barometer No. 1
Aneroid Barometer No. 560209

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjsted Mercury Barometer Read	Initial Aneriod Barometer Read	Difference (P_{ba}-P_{bm})
29.10	76	.134	28.97	29.16	0.19
29.13	73	.124	29.01	29.19	0.18

Has this barometer shown any consistent problems with calibration? Yes/No. If yes, explain. NO

Has problem been alleviated? Yes/No. How? N/A

*Note

Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20-30 minutes before calibrating. Aneriod barometer will be calibrated to the adjusted mercury barometer readings.

S-312

INTERPOLL LABORATORIES
(612)786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 1-4-93
Technician G HOUE
Mercury Column Barometer No.
Aneroid Barometer No. 636235

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjsted Mercury Barometer Read	Initial Aneriod Barometer Read	Difference (P_{ba}-P_{bm})
29.27	73	-.114	29.155	29.30	.185

Has this barometer shown any consistent problems with calibration? Yes/No. If yes, explain. NO

Has problem been alleviated? Yes/No. How?

I ADJUSTED THE ANEROID TO MATCH THE Hg

*Note

Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20-30 minutes before calibrating. Aneriod barometer will be calibrated to the adjusted mercury barometer readings.

S-312

INTERPOLL LABORATORIES
(612)786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 9-13-93

Technician Mark Bachler

Mercury Column Barometer No. LAB-1

Aneroid Barometer No. 560815

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjsted Mercury Barometer Read	Initial Aneriod Barometer Read	Difference (P_{ba}-P_{bm})
28.770	72	.114	28.656	28.760	.104

Has this barometer shown any consistent problems with calibration? Yes/No. If yes, explain. _____

Has problem been alleviated? Yes/No. How? _____

*Note

Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20-30 minutes before calibrating. Aneriod barometer will be calibrated to the adjusted mercury barometer readings.

S-312

INTERPOLL LABORATORIES
(612)786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 2-11-94

Technician E Trowbridge

Mercury Column Barometer No. ULTIMETER Model 12

Aneroid Barometer No. SN -A1002005

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjsted Mercury Barometer Read	Initial Aneriod Barometer Read	Difference (P_{ba}-P_{bm})
29.33	72	.111	29.22	29.22	—

Has this barometer shown any consistent problems with calibration? Yes/No. If yes, explain. No

Has problem been alleviated? Yes/No. How?

*Note

Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20-30 minutes before calibrating. Aneriod barometer will be calibrated to the adjusted mercury barometer readings.

S-312

REFERENCES FOR SECTION 4

1. *Emission Test Report: HAP Emission Testing on Selected Sources at a Wood Furniture Production Facility--Facility A*, prepared for U. S. Environmental Protection Agency, Research Triangle Park, NC, by Roy F. Weston, Inc., April 1993.

2. *Emission Test Report: HAP Emission Testing at Facility B*, EMB Report 92-PAR-02 prepared for U. S. Environmental Protection Agency, Research Triangle Park, NC, May 1993.

3. *Particleboard Production Facility Emission Test Report: Georgia-Pacific Corporation, Vienna, Georgia*, EMB Report 93-PAR-03 prepared for U. S. Environmental Protection Agency, Research Triangle Park, NC, April 1993.

4. *Stationary Source Sampling Report, Reference No. 6393A, Weyerhaeuser Company, Moncure, North Carolina, Formaldehyde Emissions, Particulate Emissions, and Plume Opacity Testing, Core Line EFB Inlet, Core Line Stack, and Surface Line Stack, August 9 and 11, 1989*, Entropy Environmentalists, Inc., Research Triangle Park, North Carolina, September 21, 1989.

5. *Stationary Source Sampling Report, Reference No. 6041A, Weyerhaeuser Company, Moncure, North Carolina, Particulate Emissions and Plume Opacity Testing, Surface Line Electrified Filter Bed Inlet and Stack, October 20, 1988*, Entropy Environmentalists, Inc., Research Triangle Park, North Carolina, November 8, 1988.

6. *Weyerhaeuser Company, Marshfield, Wisconsin, Stack Testing Report for Total Gaseous Non-Methane Organic Compound Emissions (TGNOC), Test Date: March 19-23, 1990*, Cross/Tessitore & Associates, P.A., Orlando, Florida, 1990.

7. *Report to Weyerhaeuser Company, Marshfield, Wisconsin, for Particulate & NOx Emissions Testing, Door Core Dryer EFB Stack, December 20, 1991*, Environmental Technology & Engineering Corporation, Elm Grove, Wisconsin, 1992.

8. *Particleboard and Medium Density Fiberboard Air Emission Databases, Technical Bulletin No. 693*, the National Council of the Paper Industry for Air and Stream Improvement, New York, New York, April 1995.

9. *Results of the May 9-12, 1994 Air Emission Compliance Tests at the Louisiana-Pacific [Particleboard] Plant in Missoula, Montana*, Report No. 4-2837, Interpoll Laboratories, Inc., Circle Pines, Minnesota, June 8, 1994.

Comments to this report

10.6.2
Sept 98

Louisiana-Pacific Corporation

111 S.W. Fifth Avenue
Portland, Oregon 97204
503/221-0800
FAX: 503/796-0204

(36) AND (38) GO TOGETHER (CLIPPED) WITH TEST REPORT (13)

36)

November 7, 1994

Via Federal Express

Mr. Michael F. Wood, Director
Mr. Laxmi Kesari
Multi Media Enforcement & Strategic
Planning Division
United States Environmental Protection Agency
Aerials Rios Blvd., Room 3119C
1200 Pennsylvania N.W., 7th Floor
Washington, D.C. 20004

Re: Clean Air Act Enforcement Action - United States v. Louisiana-Pacific Corporation, No. CV 93-0869 (W.D. La.)

Subject: Testing and Evaluation of Missoula, MT Particleboard Plant

Dear Gentlemen:

After locating additional records concerning operations at its Missoula, Montana Particleboard Plant in the 1970's and 1980's, Louisiana-Pacific Corporation (L-P) has determined that it is appropriate to revise the emissions evaluation submitted with L-P's August 10, 1994 letter concerning the testing and evaluation of emissions at the Missoula Plant. Enclosed is a revised emissions evaluation from TEAM Environmental Services Inc. for emissions from the Missoula Plant prior to the 1986 expansion, immediately after completion of the expansion, and today. The major changes relate to the Missoula Plant's maximum production capacity at the time of the 1986 permit application, the volatile organic compound (VOC) content of the coatings used in 1986, and the impact of the paint drying ovens on point source VOC emissions.

Despite the revised emission calculations, L-P believes that the conclusions reached in the August 10, 1994 letter are still appropriate. Those conclusions are that the Missoula Plant should not be considered a major source for prevention of significant deterioration (PSD) permitting in 1986 and that although the plant expansion was subject to nonattainment new source review permitting for total suspended particulate matter, because of a regulatory change effective July 31, 1987, it was not subject to nonattainment new source review permitting at the time the

expansion began operating. For the reasons given on page 3 of L-P's August 10, 1994 letter, any new source review permitting issues for the Missoula Plant should be resolved by L-P requesting the Montana Air Quality Bureau to amend the plant's permit based on the emissions shown in the enclosed evaluation of current emissions from the plant. In addition, the permitted VOC emissions would be significantly reduced from the existing VOC emissions because after January 1995, L-P will use mostly water-based coatings at the Missoula Plant.

L-P is discussing this matter with the Montana Air Quality Bureau and plan to discuss it with United States Environmental Protection Agency (EPA) representatives on November 10, 1994 in Washington, D.C.

Sincerely,

Elizabeth T. Smith

Elizabeth T. Smith, Director
Environmental Affairs

Enclosures

c: w/encl: Julie Domike, U.S. EPA, Office of Civil Enforcement, Washington, DC
Air Programs Branch, U.S. EPA, Region VIII, Denver, CO
Jeff Chaffee, Montana Air Quality Bureau, Helena, MT
Jim Evensen - Hayden Lake
Charles Likes - Missoula
Burt Krages - Portland
Norm Radford Jr. - Vinson & Elkins
File

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill

SUMMARY TABLE
PRE–EXPANSION, POST EXPANSION and CURRENT EMISSIONS

Contaminant	Table	Pre–Expansion tons/yr A	Post–Expansion tons/yr B	Current tons/yr C
Particulate [a]	1	240.00	272.36	262.73
Carbon Monoxide	2	170.60	224.76	NC [b]
Nitrogen Oxides	3	201.19	300.06	NC [b]
Volatile Organic Compounds	4	179.56	220.29	163.59 [c]
Sulfur Oxides	5	4.07	5.35	NC [b]

[a] Does not include fugitive particulate emissions.
[b] No Change since plant expansion
[c] As of January 1, 1995 the remanufacturing line will be using mostly waterbase paints.

Lousiana–Pacific Corporation
Missoula, Montana Particleboard Mill
Pre–Expansion Potential Emissions

TABLE 1A (Revised Table 5–1)
PARTICULATE MATTER – PRE–EXPANSION EMISSIONS AT 111.396 MILLION FT^2 (3/4 in) PRODUCTION
STACK EMISSIONS – NOT INCLUDING FUGITIVE PARTICULATES

SOURCE DESIGNATION	SOURCE DESCRIPTION	CONTROL DESIGNATION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
PC 206	Dryer #1	Polutrol	0.54 lb/ton[a]	52,120 tons[b]	14.07	1989 test of #2 dryer
PC 207	Dryer #2	Polutrol	0.54 lb/ton[a]	52,120 tons[b]	14.07	1989 test of #2 dryer
PC 208	Dryer #3	Polutrol	0.54 lb/ton[a]	52,120 tons[b]	14.07	1989 test of #2 dryer
PC 209	Dryer #4	Polutrol	0.54 lb/ton[a]	52,120 tons[b]	14.07	1989 test of #2 dryer
PC 301	Reject Hopper Pneu.	Cyclone	0.03 gr/CF	15,900 CFM	17.91	AP–42 (Table 10.4.1)
PC 302	Blending Area Pneu.	Cyclone	0.03 gr/CF	24,400 CFM	27.48	AP–42 (Table 10.4.1)
PC 401A	Forming Machine to Face Pneu.	Cyclone	0.03 gr/CF	6,530 CFM	7.35	AP–42 (Table 10.4.1)
PC 401B	Forming Machine to Core Pneu.	Cyclone	0.03 gr/CF	6,530 CFM	7.35	AP–42 (Table 10.4.1)
PC 404	Mat Trim Saws Pneu.	Cyclone	0.03 gr/CF	21,380 CFM	24.08	AP–42 (Table 10.4.1)
PC 405	Line Clean Up Pneu.	Cyclone	0.03 gr/CF	4,320 CFM	4.87	AP–42 (Table 10.4.1)
PC 501 A&B	5X25 Saws & blow hog pneu.	Baghouse	included with PC 503 A&B			Industry Data
PC 502 A,B,C	Sander Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 503 A&B	5x16 Saws & Blow Hog Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 504	Saws and Hog to Storage – H.P.	Cyclone	0.03 gr/CF	2,450 CFM	2.76	AP–42 (Table 10.4.1)
PC 506	Fuel Hammer Mill	Baghouse	0.005 gr/CF	9,500 CFM	1.78	Industry Data
PC 601	Reman Pneu.	Baghouse	0.005 gr/CF	16,000 CFM	3.00	Industry Data
PC 602	Reman Relay (H.P. System)	Baghouse	0.005 gr/CF	8,000 CFM	1.50	Industry Data
PC 701 A,B,C	Hot Press Vent Fans	Atmosphere	6 lb/hr[c]	8760 hrs	26.28	Oregon Tests
PC 702	Pre Press Vent Fans	Atmosphere	2 lb/hr[c]	8760 hrs	8.76	Oregon Tests
PC 801	Boiler #1	Atmosphere	Included with ROEMMC Stack			
PC 802	ROEMMC Burner	Atmosphere	9.53 lb/ton[d]	4,936 tons[e]	23.52	1994 Stack Tests
PC 805	Reman Bullnose and Saws	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
	Paint Drying Oven #1	Atmosphere	12 lb/$10^6$$ft^2$	1.752 ft^2	0.01	AP–42 (Table 1.4–1)
	Paint Drying Oven #2	Atmosphere	12 lb/$10^6$$ft^2$	1.752 ft^2	0.01	
	Paint Drying Oven #3	Atmosphere	12 lb/$10^6$$ft^2$	1.752 ft^2	0.01	
	Total				**240.00**	

[a] lb TSP/ton wet material throughput. Test Report shows 3.8 lb/hr emission rate with 14,040 lb/hr throughput:
(3.8 lb TSP/hr) / (14,040 lb/hr)(1 ton/2000 lbs) = 0.541 lb/ton.

[b] Dryer usage rate calculated based on 111.396 $MMft^2$ board pressed with the following conversion assumptions:
board pressed to 850/1000 in, 45 lb/ft^3 density, 8% trim loss, 6.25% resin solids, 0.5% wax solids, 5% final board moisture and 18% moisture content of wood introduced into the dryers.
(111396000 ft^2)(0.850 in)(1 ft/12 in)(45 lb/ft^3)(1/(1–0.08))(1–0.0625–0.005)((1–0.05)/(1–0.18))(1 ton/2000 lbs) = 208478 tons.
Total production was divided evenly into four dryers.

[c] This factor and calculation remains unchanged from the 1986 submittal because no new data was available.

[d] lbs TSP/ton sanderdust fuel combusted. Factor was derived from 1994 testing of ROEMMC tube as follows:
Orsat analysis of ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 1.112 tons/hr.
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lbmol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 1.112 tons/hr.
The TSP flow rate in the ROEMMC tube was 10.6 lbs/hr which corresponds to an emission factor of 9.53 lbs/ton.
(10.6 lbs TSP/hr)/(1.112 tons sanderdust fuel/hr) = 9.53 lbs TSP/ton sanderdust fuel.

[e] Value represents the amount of sanderdust combusted which was not used for heat input into the dryers.
This value was estimated in the following manner:
Line #1 sanderdust generation rate was estimated from a production of 111 $MMft^2$ with the following conversion assumptions:
Board pressed to 850/1000 in. and sanded to 750/1000 in. Board density of 45 lb/ft^3.
(111396000 ft^2)((850–750) in/1000)(1 ft/12 in)(45 lb/ft^3)(1 ton/2000 lbs) = 20887 tons.
The amount of furnish which can be dried per ton of sanderdust fuel consumed in the dryer system was estimated from stack test data:
Production data recorded during stack testing shows 29,060 lbs of wet throughput through dryers #5 and #6 during TSP testing.
This throughput was achieved with the fuel combustion calculated above in footnote d (1.112 tons/hr). This yields a factor of:
(29,060 lbs/hr)(1 ton/2000lbs)/(1.112 tons sanderdust/hr) = 13.07 tons throughput/ton sanderdust.
The amount of sanderdust combustion required to achieve the production rate calculated in footnote b above is calculated as follows:
(208478 tons/yr)/(13.07 tons/ton sanderdust) = 15951 tons sanderdust.
The difference between sanderdust generated and consumed is then:
20887 tons sanderdust generated – 15951 tons sanderdust needed = 4936 tons.

Lousiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 1B (Revised Table 5–2)
PARTICULATE MATTER – POST–EXPANSION EMISSIONS AT 165 MILLION FT^2 (3/4 in) PRODUCTION
STACK EMISSIONS – NOT INCLUDING FUGITIVE PARTICULATES

SOURCE DESIGNATION	SOURCE DESCRIPTION	CONTROL DESIGNATION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISTING AND MODIFIED SOURCES						
PC 206	Dryer #1	Polutrol	0.54 lb/ton[a]	51,466 tons[b]	13.90	1989 test of #2 dryer
PC 207	Dryer #2	Polutrol	0.54 lb/ton[a]	51,466 tons[b]	13.90	1989 test of #2 dryer
PC 208	Dryer #3	Polutrol	0.54 lb/ton[a]	51,466 tons[b]	13.90	1989 test of #2 dryer
PC 209	Dryer #4	Polutrol	0.54 lb/ton[a]	51,466 tons[b]	13.90	1989 test of #2 dryer
PC 301	Reject Hopper Pneu.	Emissions Rerouted to another baghouse				
PC 302	Blending Area Pneu.	Emissions Rerouted to another baghouse				
PC 401A	Forming Machine to Face Pneu.	Baghouse	0.005 gr/CF	26,680 CFM	5.01	Industry Data
PC 401B	Forming Machine to Core Pneu.	Baghouse	0.005 gr/CF	26,680 CFM	5.01	Industry Data
PC 404	Mat Trim Saws Pneu.	Cyclone	0.03 gr/CF	21,380 CFM	24.08	AP–42 (Table 10.4.1)
PC 405	Line Clean Up Pneu.	Cyclone	0.03 gr/CF	4,320 CFM	4.87	AP–42 (Table 10.4.1)
PC 501 A&B	5X25 Saws & blow hog pneu.	Baghouse	included with PC 503 A&B			Industry Data
PC 502A	Sander Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 503 A&B	5x16 Saws & Blow Hog Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 504	Saws and Hog to Storage – H.P. Emissions Rerouted to another baghouse					
PC 506	Fuel Hammer Mill	Baghouse	0.005 gr/CF	9,500 CFM	1.78	Industry Data
PC 601	Reman Pneu.	Baghouse	0.005 gr/CF	16,000 CFM	3.00	Industry Data
PC 602	Reman Relay (H.P. System)	Baghouse	0.005 gr/CF	8,000 CFM	1.50	Industry Data
PC 701 A,B,C	Hot Press Vent Fans	Atmosphere	6 lb/hr[c]	8760 hrs	26.28	Oregon Tests
PC 702	Pre Press Vent Fans	Atmosphere	2 lb/hr[c]	8760 hrs	8.76	Oregon Tests
PC 801	Boiler #1	To Dryer	Included with ROEMMC Burner			
PC 802	ROEMMC Burner	To Dryer	9.53 lb/ton[d]	(2,500)tons[e]	0.00	1994 Stack Testing
PC 805	Reman Bullnose and Saws	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
	Paint Drying Oven #1	Atmosphere	12 lb/$10^6$$ft^2$	1.752 ft^2 [f]	0.01	AP–42 (Table 1.4–1)
	Paint Drying Oven #2	Atmosphere	12 lb/$10^6$$ft^2$	1.752 ft^2 [f]	0.01	AP–42 (Table 1.4–1)
	Paint Drying Oven #3	Atmosphere	12 lb/$10^6$$ft^2$	1.752 ft^2 [f]	0.01	AP–42 (Table 1.4–1)
EXPANSION SOURCES						
PC 201	New Predryer #A	Multiclone	0.366 lb/ton [g]	0 tons [h]	0.00	1994 Stack Testing
PC 211	New Predryer #B	Multiclone	0.366 lb/ton [g]	0 tons [h]	0.00	1994 Stack Testing
PC 212	New Dryer #C	Multiclone	0.477 lb/ton [i]	48,190 tons [j]	11.49	1994 Stack Testing
PC 213	New Dryer #D	Multiclone	0.601 lb/ton [i]	48,190 tons [j]	14.48	1994 Stack Testing
PC 507	New Saws & Hogged Edgings	Baghouse	0.005 gr/CF	60,000 CFM	11.26	Industry Data
PC 508	New Saws & Hogged Edgings Re	Baghouse	0.005 gr/CF	53,360 CFM	10.02	Industry Data
PC 509	New Sanderdust Pneu	Baghouse	0.005 gr/CF	94,000 CFM	17.65	Industry Data
PC 510	New Sanderdust Relay	Baghouse	0.005 gr/CF	1,000 CFM	0.19	Industry Data
PC 703	New Hot Press Vents	Atmosphere	1.009 lb/Mft^2 [k]	55000 Mft^2	27.75	1994 Stack Testing
PC 803	GEKA	Atmosphere	13.7 lb/10^6cf	66.03 10^6cf [l]	0.45	AP–42 Table 1.4–1
PC 804	COEN Burner	Stack	7.68 lb/ton[m]	4,203 tons [n]	16.14	1994 Stack Testing
	Total				272.36	

[a] lb TSP/ton wet material throughput. Test Report shows 3.8 lb/hr emission rate with 14,040 lb/hr throughput:
(3.8 lb TSP/hr) / (14,040 lb/hr)(1 ton/2000 lbs) = 0.541 lb/ton.

[b] Dryer usage rate calculated based on 110 $MMft^2$ board pressed with the following conversion assumptions:
board pressed to 850/1000 in, 45 lb/ft^3 density, 8% trim loss, 6.25% resin solids, 0.5% wax solids, 5% final board moisture and 18% moisture content of wood introduced into the dryers.
(110000000 ft^2)(0.000 in)(1 ft/12 in)(45 lb/ft^3)(1/(1–0.08))(1–0.0625–0.005)((1–0.05)/(1–0.18))(1 ton/2000 lbs) = 205866 tons.
Total production was divided evenly into the four Line #1 dryers.

[c] This factor remains unchanged from the 1986 submittal because no new data was available.

Lousiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 1B continued
PARTICULATE MATTER – POST–EXPANSION EMISSIONS AT 165 MILLION FT² (3/4 in) PRODUCTION
STACK EMISSIONS – NOT INCLUDING FUGITIVE PARTICULATES

[d] lbs TSP/ton sanderdust fuel combusted. Factor was derived from 1994 testing of ROEMMC tube as follows:
Orsat analysis of ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 1.112 tons/hr.
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lbmol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 1.112 tons/hr.
The TSP flow rate in the ROEMMC tube was 10.6 lbs/hr which corresponds to an emission factor of 9.53 lbs/ton.
(10.6 lbs TSP/hr)/(1.112 tons sanderdust fuel/hr) = 9.53 lbs TSP/ton sanderdust fuel.

[e] Value represents the difference between sanderdust generated by line #1 and the amount needed by all 6 dryers.
This value was estimated in the following manner:
i. Line #1 sanderdust generation rate was estimated from a production of 110 MMft² with the following conversion assumptions:
Board pressed to 850/1000 in. and sanded to 750/1000 in. Board density of 45 lb/ft³.
(110000000 ft²)((850–750) in/1000)(1 ft/12 in)(45 lb/ft³)(1 ton/2000 lbs) = 20625 tons.
ii. The amount of furnish which can be dried per ton of sanderdust fuel consumed in the dryer system was estimated from stack test data:
Production data recorded during stack testing shows 29,060 lbs of wet throughput through dryers #5 and #6 during TSP testing.
This throughput was achieved with the fuel combustion calculated above in footnote d (1.112 tons/hr). This yields a factor of:
(29,060 lbs/hr)(1 ton/2000lbs)/(1.112 tons sanderdust/hr) = 13.07 tons throughput/ton sanderdust.
iii. The sanderdust combustion required to achieve 165 MMft² production can be calculated from footnote b and j as follows:
(205,866 tons/yr + 96,379 tons/yr)/(13.07 tons/ton sanderdust) = 23,125 tons sanderdust.
iv. The difference between sanderdust generated and consumed is then:
20,625 tons sanderdust generated – 23,125 tons sanderdust needed = –2,500 tons.
NOTE: the fact that this value is negative indicates that, after the expansion, insufficient heat was available from the sanderdust generated by line #1 to operate the additional two dryers. Supplemental heat is required from the COEN stack. This sanderdust deficit calculated here will be subtracted from the COEN stack waste heat emission calculation as discussed below in footnote m.

[f] Natural gas usage based upon oven burner rateing of 200,000 BTU/hr times 8760 hours.

[g] lb TSP/ton wet throughput. Factor was derived from 1994 stack testing in the following manner:
The sum of emissions from both dryers was 7.1 lb/hr. Throughput through the dryers during TSP testing was 19,393 lb/hr each
(7.1 lb TSP/hr)/(2 x 19393 lbs/2000 lb/ton) = 0.366 lbs TSP/ton.

[h] Predryers were not used until 1994. However, COEN burner was used to combust sanderdust and generate heat for ROEMMC tube.

[i] lb TSP/ton wet throughput. Factor was derived from 1994 stack testing in the following manner:
The emission rate for each dryer was divided by recorded throughput during TSP testing:
Dryer 5 – (3.6 lb TSP/hr)/(15080 lbs/2000 lb/ton) = 0.477 lbs TSP/ton.
Dryer 6 – (4.2 lb TSP/hr)/(13980 lbs/2000 lb/ton) = 0.601 lbs TSP/ton.

[j] #5 & #6 dryer usage rates calculated based on a line 2 production of 55 MMft² board pressed with the following conversion assumptions:
Board pressed to 815/1000 in, 4.6% trim loss, 6.25% resin solids, 0.5% wax solids, 3.8% final board moisture content and 18% moisture content of wood introduced into the dryers. Total production was divided evenly into both dryers.
(55,000,000 ft²)(815"/1000)(1 ft/12")(1/(1–0.046))(45 lb/ft³)(1 ton/2000 lbs)(1–0.0625–0.005)(1–0.038)/(1–0.18) = 96,379 tons.

[k] lbs TSP/Mft² (3/4") finished board. Factor was derived from 1994 stack testing in the following manner:
The sum of the TSP emission rates for the Cooler vents 1 and 2 and Press vents 1–4 is 8.3 lb/hr.
The recorded production rate during TSP testing was 8.230 Mft²/hr.
(8.3 lb TSP/hr)/(8.230 Mft²/hr) = 1.009 lb TSP/Mft²

[l] Natural gas consumption taken from 1993 emission inventory ratioed on production.

[m] lbs TSP/ton sanderdust fuel combusted. Factor was derived from 1994 testing of COEN stack as follows:
Orsat analysis of the COEN stack shows an average CO_2 dry vol% of 3.90% at an average air flow of 6,785 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 0.495 tons/hr.
(0.0390)(6,785 DSCFM)(60 min/hr)(1 lbmol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 0.495 tons/hr.
The TSP flow rate from the COEN stack was 3.8 lbs/hr which corresponds to an emission factor of 7.68 lbs/ton.
(3.8 lbs TSP/hr)/(0.495 tons sanderdust fuel/hr) = 7.68 lbs TSP/ton sanderdust fuel.

[n] Sanderdust generation rate estimated from 55 Mft² production with the following conversion assumptions:
board pressed to 815/1000" and sanded to 750/1000". Board density of 45 lb/ft³.
(55,000,000 ft²)((815–750)"/1000)(1 ft/12")(45 lb/ft³)(1 ton/2000 lb) = 6703 tons.
As discussed above in footnote e, some of the combustion gas from the COEN burner is required for supplemental heat input into the ROEMMC tube. The sanderdust required to provide this supplemental heat is calculated above in footnote e. Therefore:
(6,703 tons) – (2,500 tons) = 4,203 tons remaining sanderdust.

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TABLE 1C
PARTICULATE MATTER – CURRENT EMISSIONS AT 165 MILLION FT² (3/4 in) PRODUCTION
STACK EMISSIONS – NOT INCLUDING FUGITIVE PARTICULATES

SOURCE DESIGNATION	SOURCE DESCRIPTION	CONTROL DESIGNATION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISTING AND MODIFIED SOURCES						
PC 206	Dryer #1	Polutrol	0.54 lb/ton[a]	51,466 tons[b]	13.90	1989 test of #2 dryer
PC 207	Dryer #2	Polutrol	0.54 lb/ton[a]	51,466 tons[b]	13.90	1989 test of #2 dryer
PC 208	Dryer #3	Polutrol	0.54 lb/ton[a]	51,466 tons[b]	13.90	1989 test of #2 dryer
PC 209	Dryer #4	Polutrol	0.54 lb/ton[a]	51,466 tons[b]	13.90	1989 test of #2 dryer
PC 301	Reject Hopper Pneu.	Emissions Rerouted to another baghouse				
PC 302	Blending Area Pneu.	Emissions Rerouted to another baghouse				
PC 401A	Forming Machine to Face Pneu.	Baghouse	0.005 gr/CF	26,680 CFM	5.01	Industry Data
PC 401B	Forming Machine to Core Pneu.	Baghouse	0.005 gr/CF	26,680 CFM	5.01	Industry Data
PC 404	Mat Trim Saws Pneu.	Baghouse	0.005 gr/CF	21,380 CFM	4.01	Industry Data
PC 405	Line Clean Up Pneu.	Baghouse	0.005 gr/CF	4,320 CFM	0.81	Industry Data
PC 501 A&B	5X25 Saws & blow hog pneu.	Baghouse	included with PC 503 A&B			Industry Data
PC 502A	Sander Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 503 A&B	5x16 Saws & Blow Hog Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 504	Saws and Hog to Storage – H.P.	Emissions Rerouted to another baghouse				
PC 506	Fuel Hammer Mill	Removed				
PC 601	Reman Pneu.	Baghouse	0.005 gr/CF	16,000 CFM	3.00	Industry Data
PC 602	Reman Relay (H.P. System)	Baghouse	0.005 gr/CF	8,000 CFM	1.50	Industry Data
PC 701 A,B,C	Hot Press Vent Fans	Atmosphere	6 lb/hr[c]	8760 hrs	26.28	Oregon Tests
PC 702	Pre Press Vent Fans	Atmosphere	2 lb/hr[c]	8760 hrs	8.76	Oregon Tests
PC 801	Boiler #1	To Dryer	Included with ROEMMC Burner			
PC 802	ROEMMC Burner	To Dryer	9.53 lb/ton[d]	0 tons[e]	0.00	1994 Stack Testing
PC 805	Reman Bullnose and Saws	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
	Paint Drying Oven #1	Atmosphere	12 lb/10⁶ft²	1.752 ft²[f]	0.01	AP–42 (Table 1.4–1)
	Paint Drying Oven #2	Atmosphere	12 lb/10⁶ft²	1.752 ft²[f]	0.01	AP–42 (Table 1.4–1)
	Paint Drying Oven #3	Atmosphere	12 lb/10⁶ft²	1.752 ft²[f]	0.01	AP–42 (Table 1.4–1)
EXPANSION SOURCES						
PC 201	New Predryer #A	Multiclone	0.366 lb/ton[g]	74,460 tons[h]	13.63	1994 Stack Testing
PC 211	New Predryer #B	Multiclone	0.366 lb/ton[g]	74,460 tons[h]	13.63	1994 Stack Testing
PC 212	New Dryer #C	Multiclone	0.477 lb/ton[i]	48,190 tons[j]	11.49	1994 Stack Testing
PC 213	New Dryer #D	Multiclone	0.601 lb/ton[i]	48,190 tons[j]	14.48	1994 Stack Testing
PC 507	New Saws & Hogged Edgings	Baghouse	0.005 gr/CF	60,000 CFM	11.26	Industry Data
PC 508	New Saws & Hogged Edgings Re	Baghouse	0.005 gr/CF	53,360 CFM	10.02	Industry Data
PC 509	New Sanderdust Pneu	Baghouse	0.005 gr/CF	94,000 CFM	17.65	Industry Data
PC 510	New Sanderdust Relay	Baghouse	0.005 gr/CF	1,000 CFM	0.19	Industry Data
PC 703	New Hot Press Vents	Atmosphere	1.009 lb/Mft²[k]	55000 Mft²	27.75	1994 Stack Testing
PC 803	GEKA	Atmosphere	13.7 lb/10⁶cf	66.03 10⁶cf[l]	0.45	AP–42 Table 1.4–1
PC 804	COEN Burner	Stack	7.68 lb/ton[m]	0 tons[e]	0.00	1994 Stack Testing
PC 102	Outside Truck Dump	Baghouse	0.005 gr/CF	27,470 CFM	5.16	Industry Data
	Total				262.73	

[a] lb TSP/ton wet material throughput. Test Report shows 3.8 lb/hr emission rate with 14,040 lb/hr throughput:
(3.8 lb TSP/hr) / (14,040 lb/hr)(1 ton/2000 lbs) = 0.541 lb/ton.

[b] Dryer usage rate calculated based on 110 MMft² board pressed with the following conversion assumptions:
board pressed to 850/1000 in, 45 lb/ft³ density, 8% trim loss, 6.25% resin solids, 0.5% wax solids, 5% final board moisture and 18% moisture content of wood introduced into the dryers.
(110000000 ft²)(0.000 in)(1 ft/12 in)(45 lb/ft³)(1/(1 –0.08))(1 –0.0625 –0.005)((1 –0.05)/(1 –0.18))(1 ton/2000 lbs) = 205866 tons.
Total production was divided evenly into the four Line #1 dryers.

[c] This factor remains unchanged from the 1986 submittal because no new data was available.

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TABLE 1C continued
PARTICULATE MATTER – CURRENT EMISSIONS AT 165 MILLION FT² (3/4 in) PRODUCTION
STACK EMISSIONS – NOT INCLUDING FUGITIVE PARTICULATES

[d] lbs TSP/ton sanderdust fuel combusted. Factor was derived from 1994 testing of ROEMMC tube as follows:
Orsat analysis of ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 1.112 tons/hr.
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lbmol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 1.112 tons/hr.
The TSP flow rate in the ROEMMC tube was 10.6 lbs/hr which corresponds to an emission factor of 9.53 lbs/ton.
(10.6 lbs TSP/hr)/(1.112 tons sanderdust fuel/hr) = 9.53 lbs TSP/ton sanderdust fuel.

[e] Since actual predryer usage in unknown, it will be assumed that the predryers are operated at their maximum capacity. In this situation, all sanderdust generated at the facility will need to be used for heating the dryers and/or predryers. No combustion gases will vent through the Boiler, ROEMMC or COEN stacks.

[f] Natural gas usage based upon oven burner rateing of 200,000 BTU/hr times 8760 hours.

[g] lb TSP/ton wet throughput. *Factor was derived from 1994 stack testing in the following manner:*
The sum of emissions from both dryers was 7.1 lb/hr. Throughput through the dryers during TSP testing was 19,393 lb/hr each
(7.1 lb TSP/hr)/(2 x 19393 lbs/2000 lb/ton) = 0.366 lbs TSP/ton.

[h] Since it is not known what capacity the predryers will operate at, usage is based on the rated capacity of 17,000 lb/hr times 8760 hours/year.
(17,000 lbs/hr)(1 ton/2000 lbs)(8760 hrs/yr) = 74,460 tons/yr.

[i] lb TSP/ton wet throughput. Factor was derived from 1994 stack testing in the following manner:
The emission rate for each dryer was divided by recorded throughput during TSP testing:
Dryer 5 – (3.6 lb TSP/hr)/(15080 lbs/2000 lb/ton) = 0.477 lbs TSP/ton.
Dryer 6 – (4.2 lb TSP/hr)/(13980 lbs/2000 lb/ton) = 0.601 lbs TSP/ton.

[j] #5 & #6 dryer usage rates calculated based on a line 2 production of 55 MMft² board pressed with the following conversion assumptions:
Board pressed to 815/1000 in, 4.6% trim loss, 6.25% resin solids, 0.5% wax solids, 3.8% final board moisture content and 18% moisture content of wood introduced into the dryers. Total production was divided evenly into both dryers.
(55,000,000 ft²)(815"/1000)(1 ft/12")(1/(1 – 0.046))(45 lb/ft³)(1 ton/2000 lbs)(1 – 0.0625 – 0.005)(1 – 0.038)/(1 – 0.18) = 96,379 tons.

[k] lbs TSP/Mft² (3/4") finished board. Factor was derived from 1994 stack testing in the following manner:
The sum of the TSP emission rates for the Cooler vents 1 and 2 and Press vents 1 – 4 is 8.3 lb/hr.
The recorded production rate during TSP testing was 8.230 Mft²/hr.
(8.3 lb TSP/hr)/(8.230 Mft²/hr) = 1.009 lb TSP/Mft²

[l] Natural gas consumption taken from 1993 emission inventory ratioed on production.

[m] lbs TSP/ton sanderdust fuel combusted. Factor was derived from 1994 testing of COEN stack as follows:
Orsat analysis of the COEN stack shows an average CO_2 dry vol% of 3.90% at an average air flow of 6,785 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 0.495 tons/hr.
(0.0390)(6,785 DSCFM)(60 min/hr)(1 lbmol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 0.495 tons/hr.
The TSP flow rate from the COEN stack was 3.8 lbs/hr which corresponds to an emission factor of 7.68 lbs/ton.
(3.8 lbs TSP/hr)/(0.495 tons sanderdust fuel/hr) = 7.68 lbs TSP/ton sanderdust fuel.

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Missoula, Montana Particleboard Mill
Pre–Expansion Potential Emissions

TABLE 2A (Revised TABLE 5–3)
CARBON MONOXIDE – PRE EXPANSION EMISSIONS AT 111.396 MMFT²/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 701 A,B,C	Hot Press Vent Fans	0.60 lb/Mft² [b]	111,396 Mft²	33.42	1994 Stack Tests
PC 702	Pre Press Vent Fans	Included with Hot Press Vent Fans			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	13.13 lb/ton [c]	20886.7 tons [d]	137.12	1994 Stack Tests
	Paint Drying Oven #1	21 lb/MMcf	1.752 MMcf [e]	0.02	AP–42 Table 1.4–2
	Paint Drying Oven #2	21 lb/MMcf	1.752 MMcf [e]	0.02	AP–42 Table 1.4–2
	Paint Drying Oven #3	21 lb/MMcf	1.752 MMcf [e]	0.02	AP–42 Table 1.4–2
	TOTAL			170.60	

[a] As discussed in footnote c below, it is assumed that CO is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb CO/ Mft² (3/4") finished board. It was assumed that emissions from line #1 pressing are the same as that tested for line #2 since no better data was available. This factor was derived from 1994 stack testing as follows:
Sum of CO emissions from all line #2 press and cooler vents was 4.9 lbs/hr. Recorded production during testing was 8,230 ft² (3/4")/hr. (4.9 lb/hr)/(8.230 Mft²/hr) = 0.595 lb/Mft².
Emissions represent total CO emissions from pre–pressing, pressing and cooling.

[c] lb CO/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.112 tons/hr:
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(1 –0.5) = 1.112 tons/hr
CO flow rates tested in this air stream were 14.6 lb/hr, therefore an emission factor can be calculated as follows:
(14.6 lb/hr)/(1.112 tons fuel) = 13.13 lb CO/ ton fuel burned.
This flow vents through the new dryers #5 and #6. Stack testing on the exhaust from these two dryers shows 13 lb/hr CO total flow out (i.e. slightly less that what went in). Therefore, within the accuracy of the testing, is would seem appearent that CO coming from the dryer systems is predominately a result of fuel combustion. For this reason it seems reasonable to evaluate emissions from the two combustion sources which feed the system and the dryers as one unit.

[d] Sanderdust generation rate was estimated from a production of 111.396 MMft² with the following conversion assumptions:
Board pressed to 850/1000 in. and sanded to 750/1000 in. Board density of 45 lb/ft³.
(111396000 ft²)((850–750) in/1000)(1 ft/12 in)(45 lb/ft³)(1 ton/2000 lbs) = 20886.8 tons.

[e] Natural gas usage based upon oven burner rating of 200,000 BTU/hr times 8760 hours.

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Missoula, Montana Particleboard Mill

TABLE 2B (Revised TABLE 5–3)
CARBON MONOXIDE – POST EXPANSION EMISSIONS AT 165 MMFT²/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISITING SOURCES					
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 701 A,B,C	Hot Press Vent Fans	0.60 lb/Mft² [b]	110,000 Mft²	33.00	1994 Stack Tests
PC 702	Pre Press Vent Fans	Included with Hot Press Vent Fans			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	13.13 lb/ton [c]	20625 tons [d]	135.40	1994 Stack Tests
	Paint Drying Oven #1	21 lb/MMcf	1.752 MMcf [e]	0.02	AP–42 Table 1.4–2
	Paint Drying Oven #2	21 lb/MMcf	1.752 MMcf [e]	0.02	AP–42 Table 1.4–2
	Paint Drying Oven #3	21 lb/MMcf	1.752 MMcf [e]	0.02	AP–42 Table 1.4–2
NEW SOURCES					
PC 201	Predryer A	Included with COEN Burner			
PC 211	Predryer B	Included with COEN Burner			
PC 212	New Dryer #C	Included with ROEMMC Burner [f]			
PC 213	New Dryer #D	Included with ROEMMC Burner [f]			
PC 703	New Hot Press Vents	0.60 lb/Mft² [b]	55,000 Mft²	16.50	1994 Stack Tests
PC 803	GEKA	35 lb/10⁶cf	66.03 10⁶cf [g]	1.16	AP–42 Table 1.4–2
PC 804	COEN Burner	11.53 lb/ton [h]	6703 tons [i]	38.64	1994 Stack Tests
	TOTAL			224.76	

[a] As discussed in footnote c below, it is assumed that CO is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb CO/ Mft² (3/4") finished board. It was assumed that emissions from line #1 pressing are the same as that tested for line #2 since no better data was available. This factor was derived from 1994 stack testing as follows:
Sum of CO emissions from all line #2 press and cooler vents was 4.9 lbs/hr. Recorded production during testing was 8,230 ft² (3/4")/hr. (4.9 lb/hr)/(8.230 Mft²/hr) = 0.595 lb/Mft².
Emissions represent total CO emissions from pre–pressing, pressing and cooling.

[c] lb CO/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.112 tons/hr:
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(1–0.5) = 1.112 tons/hr
CO flow rates tested in this air stream were 14.6 lb/hr, therefore an emission factor can be calculated as follows:
(14.6 lb/hr)/(1.112 tons fuel) = 13.13 lb CO/ ton fuel burned.
This flow vents through the new dryers #5 and #6. *Stack testing on the exhaust from these two dryers shows* 13 lb/hr CO total flow out (i.e. slightly less that what went in). Therefore, within the accuracy of the testing, is would seem appearent that CO coming from the dryer systems is predominately a result of fuel combustion. For this reason it seems reasonable to evaluate emissions from the two combustion sources which feed the system and the dryers as one unit.

[d] Sanderdust generation rate was estimated from a production of *110.000 MMft² with the following conversion assumptions:*
Board pressed to 850/1000 in. and sanded to 750/1000 in. Board density of 45 lb/ft³.
(110000000 ft²)((850–750) in/1000)(1 ft/12 in)(45 lb/ft³)(1 ton/2000 lbs) = 20625.0 tons.

[e] Natural gas usage based upon oven burner rating of 200,000 BTU/hr times 8760 hours.

[f] The two new dryers were added onto the end of the ROEMMC tube and utilize heat which was already being generated. Therefore, there was no increase in CO emissions from the installation of these dryers. Some additional heat may be input into this system from the COEN burner. These additional emissions, however, are accounted for in the COEN stack emissions.

[g] Natural gas usage was taken from 1993 emissions inventory ratioed on production.

[h] lbs CO/ton sanderdust. This factor was derived from 1994 stack testing in the following manner:
The sum of the CO emission rates from the three predryer system stacks is 12.8 lbs/hr. The recorded sanderdust fuel combustion during the CO testing was 1.11 lb/hr. This corresponds to an emission factor of 11.53 lbs/ton.
(12.8 lbs CO/hr)/(1.11 tons sanderdust fuel combusted/hr) = 11.53 lbs CO/ton sanderdust.

[i] Sanderdust generation rate was estimated from production of 55 MMft² with the following conversion assumptions:
board pressed to 815/1000 in and sanded to 750/1000 in. Board density of 45 lb/ft³.
(55000000 ft²)((815–750) in/1000)(1 ft/ 12 in)(45 lb/ft³)(1 ton/2000 lbs) = 6703 tons.

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill
Pre–Expansion Potential Emissions

TABLE 3A (Revised TABLE 5–3)
NITROGEN OXIDES – PRE EXPANSION EMISSIONS AT 111.396 MMFT^2/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	19.24 lb/ton [b]	20886.7 tons [c]	200.93	1994 Stack Tests
	Paint Drying Oven #1	100 lb/10^{6}ft^3	1.752 MMcf [d]	0.09	AP–42 Table 1.4–2
	Paint Drying Oven #2	100 lb/10^{6}ft^3	1.752 MMcf [d]	0.09	AP–42 Table 1.4–2
	Paint Drying Oven #3	100 lb/10^{6}ft^3	1.752 MMcf [d]	0.09	AP–42 Table 1.4–2
	TOTAL			201.19	

[a] As discussed in footnote b below, it is assumed that NO_X is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb NO_X/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.112 tons/hr:
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(1–0.5) = 1.112 tons/hr
NO_X flow rate tested in this air stream was 21.4 lb/hr, therefore an emission factor can be calculated as follows:
(21.4 lb/hr)/(1.112 tons fuel) = 19.24 lb CO/ ton fuel burned.
This flow vents through the new dryers #5 and #6. Stack testing on the exhaust from these two dryers showed 22.9 lb/hr total flow out (i.e. slightly more than what went in). There is no reason to suspect that the drying of the wood would cause NO_X emissions. The material being dried is not resinated and, therefore, has a very low nitrogen content. Also, temperatures in the dryers do not seem high enough to cause oxidation. For these reasons it was assumed that, within the accuracy of the testing, all NO_X was being generated by fuel combustion and the two combustion sources and four dryers were treated as one unit.

[c] Sanderdust generation rate was estimated from a production of 111.396 MMft^2 with the following conversion assumptions:
Board pressed to 850/1000 in. and sanded to 750/1000 in. Board density of 45 lb/ft^3.
(111396000 ft^2)((850–750) in/1000)(1 ft/12 in)(45 lb/ft^3)(1 ton/2000 lbs) = 20886.750 tons.

[d] Natural gas usage based upon oven burner rating of 200,000 BTU/hr times 8760 hours.

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TABLE 3B (Revised TABLE 5–3)
NITROGEN OXIDES – POST EXPANSION EMISSIONS AT 165 MMFT²/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISITING SOURCES					
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	19.24 lb/ton [b]	20625 tons [c]	198.41	1994 Stack Tests
	Paint Drying Oven #1	100 lb/10⁶ft³	1.752 MMcf [d]	0.09	AP–42 Table 1.4–2
	Paint Drying Oven #2	100 lb/10⁶ft³	1.752 MMcf [d]	0.09	AP–42 Table 1.4–2
	Paint Drying Oven #3	100 lb/10⁶ft³	1.752 MMcf [d]	0.09	AP–42 Table 1.4–2
NEW SOURCES					
PC 201	Predryer A	Included with COEN Burner			
PC 211	Predryer B	Included with COEN Burner			
PC 212	New Dryer #C	Included with ROEMMC Burner [e]			
PC 213	New Dryer #D	Included with ROEMMC Burner [e]			
PC 803	GEKA	199 lb/10⁶cf	66.03 10⁶cf [f]	6.57	1994 Stack Tests
PC 804	COEN Burner	28.29 lb/ton [g]	6,703 tons [h]	94.82	1994 Stack Tests
	TOTAL			300.06	

[a] As discussed in footnote b below, it is assumed that NO_X is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb NO_X/ton sanderdust fuel burned. *Factor was derived from 1994 stack testing in the following manner:*
Orsat analysis of the ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.112 tons/hr:
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(1 – 0.5) = 1.112 tons/hr
NO_X flow rate tested in this air stream was 21.4 lb/hr, therefore an emission factor can be calculated as follows:
(21.4 lb/hr)/(1.112 tons fuel) = 19.24 lb NO_X/ ton fuel burned.
This flow vents through the new dryers #5 and #6. Stack testing on the exhaust from these two dryers showed 22.9 lb/hr total flow out (i.e. slightly more than what went in). There is no reason to suspect that the drying of the wood would cause NO_X emissions. The material being dried is not resinated and, therefore, has a very low nitrogen content. Also, temperatures in the dryers do not seem high enough to cause oxidation. For these reasons it was assumed that, within the accuracy of the testing, all NO_X was being generated by fuel combustion and the two combustion sources and four dryers were treated as one unit.

[c] Sanderdust generation rate was estimated from a production of 110,000 MMft² with the following conversion assumptions:
Board pressed to 850/1000 in. and sanded to 750/1000 in. Board density of 45 lb/ft³.
(110000000 ft²)((850–750) in/1000)(1 ft/12 in)(45 lb/ft³)(1 ton/2000 lbs) = 20625 tons.

[d] Natural gas usage based upon oven burner rating of 200,000 BTU/hr times 8760 hours.

[e] The two new dryers were added onto the end of the ROEMMC tube and utilize heat which was already being generated. Therefore, there was no increase in NO_X emissions from the installation of these dryers. Some additional heat may be input into this system from the COEN burner. These additional emissions, however, are accounted for in the COEN stack emissions.

[f] Natural Gas consumption taken from 1993 emission inventory ratioed on production.

[g] lbs NO_X/ ton sanderdust fuel combusted. Emission factor was derived from the 1994 test data in the following manner:
The sum of the NO_X emission rates from the three predryer system stacks is 31.4 lbs/hr. The recorded sanderdust fuel combustion during the NO_X testing was 1.11 lb/hr. This corresponds to an emission factor of 28.29 lbs/ton.
(31.4 lbs NO_X/hr)/(1.11 tons sanderdust fuel combusted/hr) = 28.29 lbs NO_X/ton sanderdust.

[h] Sanderdust generation rate was estimated from production of 55 MMft² with the following conversion assumptions:
board pressed to 815/1000 in and sanded to 750/1000 in. Board density of 45 lb/ft³.
(55000000 ft²)((815–750) in/1000)(1 ft/ 12 in)(45 lb/ft³)(1 ton/2000 lbs) = 6703 tons.

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill
Pre–Expansion Potential Emissions

TABLE 4A (Revised TABLE 5–3)
VOLATILE ORGANIC COMPOUNDS – PRE EXPANSION EMISSIONS AT 111.396 MMFT²/YEAR

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
PC 206	Dryer #1	0.489 lb/ton[a]	52,120 tons/yr[b]	12.74	1994 Stack Tests
PC 207	Dryer #2	0.489 lb/ton[a]	52,120 tons/yr[b]	12.74	1994 Stack Tests
PC 208	Dryer #3	0.489 lb/ton[a]	52,120 tons/yr[b]	12.74	1994 Stack Tests
PC 209	Dryer #4	0.489 lb/ton[a]	52,120 tons/yr[b]	12.74	1994 Stack Tests
PC 701 A,B,C	Hot Press Vent Fans	0.527 lb/Mft² [c]	111,396 Mft²	29.35	1994 Stack Tests
PC 702	Pre Press Vent Fans	Included with hot press vent fans			
PC 801	Boiler	Included with ROEMMC Burner			
PC 802	*ROEMMC*	*0.15 lb/ton* [d]	*4,936 tons* [e]	0.37	1994 Stack Tests
	Paint Drying Oven #1	1.467 lb/Mft² [f]	24000 Mft²	17.60	Engineering Estimate
	Paint Drying Oven #2	4.872 lb/Mft² [f]	24000 Mft²	58.47	Engineering Estimate
	Paint Drying Oven #3	1.900 lb/Mft² [f]	24000 Mft²	22.80	Engineering Estimate
	TOTAL			**179.56**	

[a] lb VOC/ ton wet furnish. VOC emissions from dryers #1–#4 assumed to be equivelent to that tested for dryers #5 & #6.
Factor was derived from 1994 stack testing of dryers #5 & #6 stacks as follows:
Sum of average VOC emissions from dryers #5 and #6 during testing was 7.2 lb/hr.
Production of dry furnish during the VOC testing was 16,552 lb/hr for the surface dryer and 12,910 lbs/hr for the core dryer (pg N–27). This corresponds to an emission factor of:
(7.2 lbs/hr) / (16,552 lbs/hr + 12,910 lbs/hr)(1 ton/2000 lbs) = 0.489 lbs VOC/ton wet furnish.

[b] Tons wet furnish dried/yr. Dryer usage rate calculated based on 111.396 MMft² production with the following conversion assumptions: board pressed to 850/1000 in, 45 lb/ft³ density, 8% trim loss, 6.25% resin solids, 0.5% wax solids, 5% final board moisture content and 18% moisture content of wood introduced into the driers.
(111396000 ft²)(850 in/1000)(1 ft/12 in)(45 lb/ft³)(1/(1–0.08))(1–0.0625–0.005)((1–0.05)/(1–0.18))(1 ton/2000 lbs) = 208478 tons
Production was assumed to be evenly divided into four dryers.

[c] lb VOC/MMft² (3/4") finished board produced. VOC emissions assumed to be same as for #2 press line.
Factor was derived from 1994 stack testing of line #2 cooler vents 1 & 2 and press vents 1–4 as follows:
Sum of VOC emissions from all sources averaged 4.5 lbs/hr. Production during testing was 8,533 ft²/hr (pg N–57).
Emission factor = (4.5 lb)/(8.533 Mft²/hr) = 0.527 lbs/ Mft²

[d] lb VOC_X/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube (test 5) shows an average CO_2 dry vol% of 5.07% at an average air flow of 11,108 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.053 tons/hr:
(0.0507)(11,108 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(0.5) = 1.053 tons/hr
VOC flow rate tested in this air stream was 0.16 lb/hr, therefore an emission factor can be calculated as follows:
(0.16 lb/hr)/(1.053 tons fuel) = 0.15 lb VOC/ ton fuel burned.

[e] Value represents the amount of sanderdust combusted which was not used for heat input into the dryers.
This value was estimated in the following manner:
i. Sanderdust generation rate was estimated from a production of 111 MMft² with the following conversion assumptions:
Board pressed to 850/1000 in. and sanded to 750/1000 in. Board density of 45 lb/ft³.
(111396000 ft²)((850–750) in/1000)(1 ft/12 in)(45 lb/ft³)(1 ton/2000 lbs) = 20887 tons.
ii. The amount of furnish dried in the dryer system per ton of sanderdust burned was estimated from stack test data:
Production data recorded during TSP testing shows 29,060 lbs of wet throughput through dryers #5 and #6.
This throughput was achieved with a fuel combustion of 1.112 tons/hr. This yields a factor of:
(29,060 lbs/hr)(1 ton/2000lbs)/(1.112 tons sanderdust/hr) = 13.07 tons throughput/ton sanderdust.
iii. The amount of sanderdust combustion required to achieve the production rate calculated in b above is calculated as follows:
(208478 tons/yr)/(13.07 tons/ton sanderdust) = 15951 tons sanderdust.
iv. The difference between sanderdust generated and consumed is then:
20887 tons sanderdust generated – 15951 tons sanderdust needed = 4936 tons.

[f] lbs VOC emitted per Mft² of panel produced on remanufacturing line. *Factor was determined based upon 1989 data as follows:*
Production during 1989 was 16,034 Mft². Oven #1 dries fillers, oven #2 dries basecoats and oven #3 dries top coats.
Solvent shipments offsite are approximately 1/3 of solvents used. It was assumed that 1/5 of the solvent not shipped offsite was vented through dryer #1, 3/5 through drier #2 and 1/5 through drier #3. 176,780 lbs of solvent was used in 1989.
The following fugitive losses were estimated per oven as per SARA 313 calculations: #1 = 2%, %2 = 12%, #3 = 8%.
The ovens, which are direct flame heated, were assumed to have a destruction and removal efficiency of 50%.

Oven	Coating	Gallons	lbs VOC	lbs Solvent	Capture	DRE	Emissions / Production	=	Factor
#1	Fillers	35,266 gal	24,304 lbs	23,689 lbs	98%	50	23517 lbs / 16,034 Mft²		1.467 lbs/Mft²
#2	Basecoats	20,674 gal	106,490 lbs	71,066 lbs	88%	50	78125 lbs / 16,034 Mft²		4.872 lbs/Mft²
#3	Topcoats	8,583 gal	42,538 lbs	23,689 lbs	92%	50	30464 lbs / 16,034 Mft²		1.900 lbs/Mft²

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 4B (Revised TABLE 5–3)
VOLATILE ORGANIC COMPOUNDS – POST EXPANSION EMISSIONS AT 165 MMFT²/YEAR

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISITING SOURCES					
PC 206	Dryer #1	0.489 lb/ton[a]	51,466 tons/yr[b]	12.58	1994 Stack Tests
PC 207	Dryer #2	0.489 lb/ton[a]	51,466 tons/yr[b]	12.58	1994 Stack Tests
PC 208	Dryer #3	0.489 lb/ton[a]	51,466 tons/yr[b]	12.58	1994 Stack Tests
PC 209	Dryer #4	0.489 lb/ton[a]	51,466 tons/yr[b]	12.58	1994 Stack Tests
PC 701 A,B,C	Hot Press Vent Fans	0.527 lb/Mft²[c]	110,000 Mft²	28.99	1994 Stack Tests
PC 702	Pre Press Vent Fans	Included with hot press vent fans			
PC 801	Boiler	Included with ROEMMC Burner			
PC 802	ROEMMC	0.15 lb/ton[d]	(2,500)tons[e]	0.00	1994 Stack Tests
	Paint Drying Oven #1	1.467 lb/Mft²[f]	24,000 Mft²	17.60	Engineering Estimate
	Paint Drying Oven #2	4.872 lb/Mft²[f]	24,000 Mft²	58.47	Engineering Estimate
	Paint Drying Oven #3	1.900 lb/Mft²[f]	24,000 Mft²	22.80	Engineering Estimate
NEW SOURCES					
PC 201	Predryer A	0.567 lb/ton[g]	0 tons[h]	0.00	1994 Stack Tests
PC 211	Predryer B	0.567 lb/ton[g]	0 tons[h]	0.00	1994 Stack Tests
PC 212	New Dryer #C	0.568 lb/ton[a]	48,190 tons/yr[i]	13.69	1994 Stack Tests
PC 213	New Dryer #D	0.568 lb/ton[a]	48,190 tons/yr[i]	13.69	1994 Stack Tests
PC 703	New Hot Press Vents	0.527 lb/Mft²[c]	55,000 Mft²	14.49	1994 Stack Tests
PC 803	GEKA	5.8 lb/10⁶cf	66.03 10⁶cf[j]	0.19	AP–42 Table 1.4–3
PC 804	COEN Burner	0.02 lb/ton[k]	4,203 tons[j]	0.04	1994 Stack Tests
	TOTAL			220.29	

[a] lb VOC/ ton wet furnish. VOC emissions from dryers #1–#4 assumed to be equivelent to that tested for dryers #5 & #6.
Factor was derived from 1994 stack testing of dryers #5 & #6 stacks as follows:
Sum of average VOC emissions from dryers #5 and #6 during testing was 7.2 lb/hr.
Production of dry furnish during the VOC testing was 16,552 lb/hr for the surface dryer and 12,910 lbs/hr for the core dryer (pg N–27). This corresponds to an emission factor of:
(7.2 lbs/hr) / (16,552 lbs/hr + 12,910 lbs/hr)(1 ton/2000 lbs) = 0.489 lbs VOC/ton wet furnish.

[b] Tons wet furnish dried/yr. Dryer usage rate calculated based on 110.000 MMft² production with the following conversion assumptions: board pressed to 850/1000 in, 45 lb/ft³ density, 8% trim loss, 6.25% resin solids, 0.5% wax solids, 5% final board moisture content and 18% moisture content of wood introduced into the driers.
(110000000 ft²)(850 in/1000)(1 ft/12 in)(45 lb/ft³)(1/(1–0.08))(1–0.0625–0.005)((1–0.05)/(1–0.18))(1 ton/2000 lbs) = 205866 tons
Production was assumed to be evenly divided into four dryers.

[c] lb VOC/MMft² (3/4") finished board produced. VOC emissions assumed to be same as for #2 press line.
Factor was derived from 1994 stack testing of line #2 cooler vents 1 & 2 and press vents 1–4 as follows:
Sum of VOC emissions from all sources averaged 4.5 lbs/hr. Production during testing was 8,533 ft²/hr (pg N–57).
Emission factor = (4.5 lb)/(8.533 Mft²/hr) = 0.527 lbs/ Mft²

[d] lb VOC_X/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube (test 5) shows an average CO_2 dry vol% of 5.07% at an average air flow of 11,108 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.053 tons/hr:
(0.0507)(11,108 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(0.5) = 1.053 tons/hr
VOC flow rate tested in this air stream was 0.16 lb/hr, therefore an emission factor can be calculated as follows:
(0.16 lb/hr)/(1.053 tons fuel) = 0.15 lb VOC/ ton fuel burned.

[e] Value represents the amount of sanderdust combusted which was not used for heat input into the dryers.
This value was estimated in the following manner:
i. Sanderdust generation rate was estimated from a production of 110 MMft² with the following conversion assumptions:
Board pressed to 850/1000 in. and sanded to 750/1000 in. Board density of 45 lb/ft³.
(110000000 ft²)((850–750) in/1000)(1 ft/12 in)(45 lb/ft³)(1 ton/2000 lbs) = 20625 tons.
ii. The amount of furnish dried in the dryer system per ton of sanderdust burned was estimated from stack test data:
Production data recorded during TSP testing shows 29,060 lbs of wet throughput through dryers #5 and #6.
This throughput was achieved with a fuel combustion of 1.112 tons/hr. This yields a factor of:
(29,060 lbs/hr)(1 ton/2000lbs)/(1.112 tons sanderdust/hr) = 13.07 tons throughput/ton sanderdust.
iii. The sanderdust combustion required to achieve 165 MMft² production can be calculated from footnote b and i as follows:
(205866 + 96379 tons/yr)/(13.07 tons/ton sanderdust) = 23125 tons sanderdust.
iv. The difference between sanderdust generated and consumed is then:
20625 tons sanderdust generated – 23125 tons sanderdust needed = –2500 tons.
The fact that this value is negative indicates that heat input is required from the COEN burner

TABLE 4B – Continued
VOLATILE ORGANIC COMPOUNDS – POST EXPANSION EMISSIONS AT 165 MMFT²/YEAR

[f] lbs VOC emitted per Mft² of panel produced on remanufacturing line. Factor was determined based upon 1989 data as follows:
Production during 1989 was 16,034 Mft². Oven #1 dries fillers, oven #2 dries basecoats and oven #3 dries top coats.
Solvent shipments offsite are approximately 1/3 of solvents used. It was assumed that 1/5 of the solvent not shipped offsite was vented through dryer #1, 3/5 through drier #2 and 1/5 through drier #3. 176,780 lbs of solvent was used in 1989.
The following fugitive losses were estimated per oven as per SARA 313 calculations: #1 = 2%, %2 = 12%, #3 = 8%.
The ovens, which are direct flame heated, were assumed to have a destruction and removal efficiency of 50%.

Oven	Coating	Gallons	lbs VOC	lbs Solvent	Capture	DRE	Emissions / Production	=	Factor
#1	Fillers	35,266 gal	24,304 lbs	23,689 lbs	98%	50	23517 lbs / 16,034 Mft²		1.467 lbs/Mft²
#2	Basecoats	20,674 gal	106,490 lbs	71,066 lbs	88%	50	78125 lbs / 16,034 Mft²		4.872 lbs/Mft²
#3	Topcoats	8,583 gal	42,538 lbs	23,689 lbs	92%	50	30464 lbs / 16,034 Mft²		1.900 lbs/Mft²

[g] lbs VOC/ton dried material throughput. Emission factor was derived from 1994 stack testing in the following manner:
The sum of VOC emissions from both dryers during testing was 11.0 lb/hr. Wet material throughput into the dryers during VOC testing was 19,393 lbs/hr each:
(11.0 lb/hr)/(2 x 19,393 lbs/2000 lb/ton) = 0.567 lb/ton.

[h] Predryers were not used until 1994. However, COEN burner was used to combust sanderdust and generate heat for ROEMMC tube.

[i] #5 & #6 dryer usage rates based upon 55 MMft² production with the following conversion assumptions:
Board pressed to 815/1000 in, 4.6% trim loss, 6.25% resin solids, 0.5% wax solids, 3.8% final board moisture content and 18% moisture content of wood introduced into the dryers. *Total production was divied evenly into both dryers.*
(55000000 ft²)(815/1000)(1 ft/12 in)(1/(1–0.046))(45 lb/ft3)(1 ton/2000 lbs)(1–0.0625–0.005)(1–0.038)/(1–0.18) = 96379 tons.

[j] Natural Gas usage taken from 1993 emissions inventory ratioed to production.

[k] lbs VOC/Mft² board produced. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the COEN stack shows an average CO_2 dry vol% of 3.90% at an average air flow of 6,785 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 0.495 tons/hr.
(0.0390)(6,785 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 0.495 tons/hr.
The VOC flow rate from the COEN stack was <0.01 lbs/hr which corresponds to an emission factor of:
(0.01 lb/hr)/(0.495 tons/hr) = 0.02 lb VOC/ton sanderdust fuel.

[l] Sanderdust generation rate was estimated from production of 55 MMft² with the following conversion assumptions:
board pressed to 815/1000 in and sanded to 750/1000 in. Board density of 45 lb/ft³.
(55000000 ft²)((815–750) in/1000)(1 ft/ 12 in)(45 lb/ft³)(1 ton/2000 lbs) = 6703 tons.
As discussed above in footnote e, some of the combustion gas from the COEN burner is required for supplemental heat input into the ROEMMC tube. The sanderdust required to provide this heat is shown above in footnote e. Therefore:
(6703 tons generated) – (2500 tons used for supplemental heat) = 4203 tons remaining sanderdust.

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 4C
VOLATILE ORGANIC COMPOUNDS – CURRENT EMISSIONS AT 165 MMFT²/YEAR

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISITING SOURCES					
PC 206	Dryer #1	0.489 lb/ton[a]	51,466 tons/yr[b]	12.58	1994 Stack Tests
PC 207	Dryer #2	0.489 lb/ton[a]	51,466 tons/yr[b]	12.58	1994 Stack Tests
PC 208	Dryer #3	0.489 lb/ton[a]	51,466 tons/yr[b]	12.58	1994 Stack Tests
PC 209	Dryer #4	0.489 lb/ton[a]	51,466 tons/yr[b]	12.58	1994 Stack Tests
PC 701 A,B,C	Hot Press Vent Fans	0.527 lb/Mft²[c]	110,000 Mft²	28.99	1994 Stack Tests
PC 702	Pre Press Vent Fans	Included with hot press vent fans			
PC 801	Boiler	Included with ROEMMC Burner			
PC 802	ROEMMC	0.15 lb/ton[d]	0 tons[e]	0.00	1994 Stack Tests
	Paint Drying Oven #1	low lb/Mft²[f]	24,000 Mft²	0.00	see footnote f
	Paint Drying Oven #2	low lb/Mft²[f]	24,000 Mft²	0.00	see footnote f
	Paint Drying Oven #3	low lb/Mft²[f]	24,000 Mft²	0.00	see footnote f
NEW SOURCES					
PC 201	Predryer A	0.567 lb/ton[g]	74,460 tons[h]	21.11	1994 Stack Tests
PC 211	Predryer B	0.567 lb/ton[g]	74,460 tons[h]	21.11	1994 Stack Tests
PC 212	New Dryer #C	0.568 lb/ton[a]	48,190 tons/yr[i]	13.69	1994 Stack Tests
PC 213	New Dryer #D	0.568 lb/ton[a]	48,190 tons/yr[i]	13.69	1994 Stack Tests
PC 703	New Hot Press Vents	0.527 lb/Mft²[c]	55,000 Mft²	14.49	1994 Stack Tests
PC 803	GEKA	5.8 lb/10⁶cf	66.03 10⁶cf[j]	0.19	AP–42 Table 1.4–3
PC 804	COEN Burner	0.02 lb/ton[k]	0 tons[e]	0.00	1994 Stack Tests
	TOTAL			163.59[l]	

[a] lb VOC/ ton wet furnish. VOC emissions from dryers #1–#4 assumed to be equivalent to that tested for dryers #5 & #6.
Factor was derived from 1994 stack testing of dryers #5 & #6 stacks as follows:
Sum of average VOC emissions from dryers #5 and #6 during testing was 7.2 lb/hr.
Production of dry furnish during the VOC testing was 16,552 lb/hr for the surface dryer and 12,910 lbs/hr for the core dryer (pg N–27). This corresponds to an emission factor of:
(7.2 lbs/hr) / (16,552 lbs/hr + 12,910 lbs/hr)(1 ton/2000 lbs) = 0.489 lbs VOC/ton wet furnish.

[b] Tons wet furnish dried/yr. Dryer usage rate calculated based on 110.000 MMft² production with the following conversion assumptions: board pressed to 850/1000 in, 45 lb/ft³ density, 8% trim loss, 6.25% resin solids, 0.5% wax solids, 5% final board moisture content and 18% moisture content of wood introduced into the driers.
(110000000 ft²)(850 in/1000)(1 ft/12 in)(45 lb/ft³)(1/(1–0.08))(1–0.0625–0.005)((1–0.05)/(1–0.18))(1 ton/2000 lbs) = 205866 tons
Production was assumed to be evenly divided into four dryers.

[c] lb VOC/MMft² (3/4") finished board produced. VOC emissions assumed to be same as for #2 press line.
Factor was derived from 1994 stack testing of line #2 cooler vents 1 & 2 and press vents 1–4 as follows:
Sum of VOC emissions from all sources averaged 4.5 lbs/hr. Production during testing was 8,533 ft²/hr (pg N–57).
Emission factor = (4.5 lb)/(8.533 Mft²/hr) = 0.527 lbs/ Mft²

[d] lb VOC_X/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube (test 5) shows an average CO_2 dry vol% of 5.07% at an average air flow of 11,108 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.053 tons/hr:
(0.0507)(11,108 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(0.5) = 1.053 tons/hr
VOC flow rate tested in this air stream was 0.16 lb/hr, therefore an emission factor can be calculated as follows:
(0.16 lb/hr)/(1.053 tons fuel) = 0.15 lb VOC/ ton fuel burned.

[e] Since actual predryer usage is unknown, it will be assumed that the predryers are operated at their maximum capacity. In this situation, all sanderdust generated at the facility will need to be used for heating the dryers and/or predryers. No combustion gases will vent through the Boiler, ROEMMC or COEN stacks.

[f] As of January 1, 1995 the remanufacturing line will be using mostly waterbased coatings.
VOC emissions from these coatings are, at present, unknown but should be low.

[g] lbs VOC/ton wet material throughput. Emission factor was derived from 1994 stack testing in the following manner:
The sum of VOC emissions from both dryers during testing was 11.0 lb/hr. Wet material throughput into the dryers during VOC testing was 19,393 lbs/hr each:
(11.0 lb/hr)/(2 x 19,393 lbs/2000 lb/ton) = 0.567 lb/ton.

TABLE 4C – Continued
VOLATILE ORGANIC COMPOUNDS – CURRENT EMISSIONS AT 165 MMFT^2/YEAR

[h] Since it is not known what capacity the predryers will operate at, usage is based on the rated capacity of 17,000 lb/hr times 8760 hours/year.
(17,000 lbs/hr)(1 ton/2000 lbs)(8760 hrs/yr) = 74460 tons/yr.

[i] #5 & #6 dryer usage rates based upon 55 MMft^2 production with the following conversion assumptions:
Board pressed to 815/1000 in, 4.6% trim loss, 6.25% resin solids, 0.5% wax solids, 3.8% final board moisture content and 18% moisture content of wood introduced into the dryers. Total production was divied evenly into both dryers.
(55000000 ft^2)(815/1000)(1 ft/12 in)(1/(1 – 0.046))(45 lb/ft3)(1 ton/2000 lbs)(1 – 0.0625 – 0.005)(1 – 0.038)/(1 – 0.18) = 96379 tons.

[j] Natural Gas usage taken from 1993 emissions inventory ratioed to production.

[k] lbs VOC/Mft^2 board produced. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the COEN stack shows an average CO_2 dry vol% of 3.90% at an average air flow of 6,785 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 0.495 tons/hr.
(0.0390)(6,785 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 0.495 tons/hr.
The VOC flow rate from the COEN stack was <0.01 lbs/hr which corresponds to an emission factor of:
(0.01 lb/hr)/(0.495 tons/hr) = 0.02 lb VOC/ton sanderdust fuel.

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill
Pre–Expansion Potential Emissions

TABLE 5A (Revised TABLE 5–3)
SULFUR DIOXIDE – PRE EXPANSION EMISSIONS AT 111.396 MMFT²/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	0.39 lb/ton [b]	20886.7 tons [c]	4.07	AP–42, Table 1.6–2
	Paint Drying Oven #1	0.6 lb/10⁶ft³	1.752 MMcf [d]	0.00	AP–42 Table 1.4–2
	Paint Drying Oven #2	0.6 lb/10⁶ft³	1.752 MMcf [d]	0.00	AP–42 Table 1.4–2
	Paint Drying Oven #3	0.6 lb/10⁶ft³	1.752 MMcf [d]	0.00	AP–42 Table 1.4–2
	TOTAL			**4.07**	

[a] It is assumed that SO_2 is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb SO_2/ton sanderdust fuel burned. Factor was taken from AP–42. AP–42 Table 1.6–2 lists a value of 0.15 lb SO_2/ton wood fuel at 50% moisture. Factor was doubled since the fuel is dry. Although the table footnote d indicates that the lower end of the range shown should be used for wood fuel, the sanderdust combusted in these units contains a minor amount of added sulfur in the form of Ammonium sulfate catalyst. Production data recorded during stack testing indicates about 0.009% ammonium sulfate by weight in the finished product. Ammonimum sulfate is 24.3% Sulfur by weight. This yields a SO_2 generation rate of:

(0.00009 Catalyst)(0.24 S/Catalyst)(2000 lb/tn)(32 lbs SO^2)/(16 lbs S) = 0.09 lb SO_2/ton fuel from catalyst.

This sulfur would be in addition to the sulfur found in the wood. Therefore:

(0.3 lb/ton from wood)+(0.09 lb/ton from Ammonium Sulfate) = 0.39 lb/ton total.

[c] Sanderdust generation rate was estimated from a production of 111 MMft² with the following conversion assumptions:

Board pressed to 850/1000 in. and sanded to 750/1000 in. Board density of 45 lb/ft³.

(111396000 ft²)((850–750) in/1000)(1 ft/12 in)(45 lb/ft³)(1 ton/2000 lbs) = 20887 tons.

[d] Natural gas usage based upon oven burner rating of 200,000 BTU/hr times 8760 hours.

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 5B (Revised TABLE 5–3)
SULFUR DIOXIDE – POST EXPANSION EMISSIONS AT 165 MMFT²/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISITING SOURCES					
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	0.39 lb/ton [b]	20625 tons [c]	4.02	AP–42, Table 1.6–2
	Paint Drying Oven #1	0.6 lb/10⁶ft³	1.752 MMcf [d]	0.00	AP–42 Table 1.4–2
	Paint Drying Oven #2	0.6 lb/10⁶ft³	1.752 MMcf [d]	0.00	AP–42 Table 1.4–2
	Paint Drying Oven #3	0.6 lb/10⁶ft³	1.752 MMcf [d]	0.00	AP–42 Table 1.4–2
NEW SOURCES					
PC 201	Predryer A	Included with COEN Burner			
PC 211	Predryer B	Included with COEN Burner			
PC 212	New Dryer #C	Included with ROEMMC Burner [e]			
PC 213	New Dryer #D	Included with ROEMMC Burner [e]			
PC 803	GEKA	0.6 lb/10⁶cf	66.03 10⁶cf [f]	0.02	AP–42, Table 1.4–2
PC 804	COEN Burner	0.39 lb/ton [b]	6703 tons [g]	1.31	AP–42, Table 1.6–2
	TOTAL			5.35	

[a] It is assumed that SO_2 is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb SO_2/ton sanderdust fuel burned. Factor was taken from AP–42. AP–42 Table 1.6–2 lists a value of 0.15 lb SO_2/ton wood fuel at 50% moisture. Factor was doubled since the fuel is dry. Although the table footnote d indicates that the lower end of the range shown should be used for wood fuel, the sanderdust combusted in these units contains a minor amount of added sulfur in the form of Ammonium sulfate catalyst. Production data recorded during stack testing indicates about 0.009% ammonium sulfate by weight in the finished product. Ammonimum sulfate is 24.3% Sulfur by weight. This yields a SO_2 generation rate of:

(0.00009 Catalyst)(0.24 S/Catalyst)(2000 lb/tn)(32 lbs SO^2)/(16 lbs S) = 0.09 lb SO_2/ton fuel from catalyst.

This sulfur would be in addition to the sulfur found in the wood. Therefore:

(0.3 lb/ton from wood) + (0.09 lb/ton from Ammonium Sulfate) = 0.39 lb/ton total.

[c] Sanderdust generation rate was estimated from a production of 110 MMft² with the following conversion assumptions:
Board pressed to 850/1000 in. and sanded to 750/1000 in. Board density of 45 lb/ft³.
(110000000 ft²)((850–750) in/1000)(1 ft/12 in)(45 lb/ft³)(1 ton/2000 lbs) = 20625 tons.

[d] *Natural gas usage based upon oven burner rating of* 200,000 BTU/hr times 8760 hours.

[e] The two new dryers were added onto the end of the ROEMMC tube and utilize heat which was already being generated. Therefore, there was no increase in SO_2 emissions from the installation of these dryers. Some additional heat may be input into this system from the COEN burner. These additional emissions, however, are accounted for in the COEN stack emissions.

[f] Natural Gas consumption taken from 1993 emission inventory ratioed to production.

[g] Sanderdust generation rate was estimated from production of 55 MMft² with the following conversion assumptions:
board pressed to 815/1000 in and sanded to 750/1000 in. Board density of 45 lb/ft³.
(55000000 ft²)((815–750) in/1000)(1 ft/ 12 in)(45 lb/ft³)(1 ton/2000 lbs) ≐ 6703 tons.

USI MODEL 500C ZERO & CALIBRATION DRIFT

LINE #1 DRYER RTO

PERSON CONDUCTING TEST Bob Schultz
AFFILIATION Louisiana Pacific Corp./Engineering
TEST DATES _ 10-18 thru 10-25 /1994
MONITOR PATHLENGTH - L1 ___ NA

ANALYZER MANUFACTURER USI
SERIAL NUMBER 0394729
LOCATION Hayward, WI Line #1 DRYER RTO
EMISSION OUTLET PATHLENGTH - L2 __ NA

MONITORING SYSTEM OUTPUT PATHLENGTH CORRECTED: YES _____ NO ____ XX
UPSCALE CALIBRATION VALUE: ACTUAL OPTICAL DENSITY (OPACITY) - _____ ('44.51%)
PATH ADJUSTED OPTICAL DENSITY (OPACITY) - _____ (44.51%)

	PERCENT OPACITY																
	DATE	TIME		ZERO READING	1.	ZERO DRIFT	ZERO ADJ	UPSCALE CALIBRATION READING		3. UPSCALE DRIFT	2. CALI-BRATION DRIFT	SPAN ADJ	LENS	ALIGNMENT		ACCUM. DIRT COMP IN % OPACITY
		BEGIN	END	INITIAL A	FINAL B	C = B - A		INITIAL D	FINAL E	F = E - D	G = F - C		CLEANED	CHECK	ADJ	
T0	10-18	0454	0500		(-0.47) +1.64	--	NO	--	44.51	--	--	NO	NO	NO	NO	1.64
T1	10-19	0454	0500	(-0.47) +1.64	(-0.46) +1.66	+0.02	NO	45.25	44.51	+0.74	+0.74	NO	NO	NO	NO	1.66
T2	10-20	0454	0500	(-0.46) +1.66	(-0.24) +1.88	+0.22	NO	44.89	44.51	+0.38	+0.38	NO	NO	NO	NO	1.88
T3	10-21	0454	0500	(-0.24) +1.88	(-0.17) +1.95	+0.07	NO	44.87	44.51	+0.36	+0.36	NO	NO	NO	NO	1.95
T4	10-22	0454	0500	(-0.17) +1.95	(+0.16) +2.29	+0.34	NO	43.88	44.51	-0.64	-0.64	NO	NO	NO	NO	2.29
T5	10-23	0454	0500	(+0.16) +2.29	(+0.35) +2.49	+0.20	NO	44.59	44.51	-0.92	-0.92	NO	NO	NO	NO	2.49
T6	10-24	0454	0500	(+0.35) +2.49	(+0.26) +2.39	-0.10	NO	43.47	44.51	-1.04	-1.04	NO	NO	NO	NO	2.39
T7	10-25	0454	0500	(+0.26) +2.39	(+0.31) +2.44	+0.05	NO	43.54	44.51	-0.98	-0.98	NO	NO	NO	NO	2.44
	ARITHMETIC MEAN					+0.11					-0.30					
	CONFIDENCE INTERVAL					0.14					0.71					
	ZERO DRIFT					0.25	CALIBRATION DRIFT				0.41					

1. Accumulated dirt compensation recorded as final zero reading. Output device indication in parenthesis.
2. Zero was adjusted automatically prior to upscale check, therefore C = 0.
3. Span drift = ADJ RDG - CAL STD per Graseby-STI.

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
RELATIVE ACCURACY TEST AUDIT (RATA)

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #1 DRYER RTO

Monitor Manufacturer USI Model No. 500C

Type of Monitor (SO_2, NO_x, HC, etc.) OPACITY

Unit of Measurement (%, ppm, wet or dry basis) %

Emission Standard (provide units) 20%

Measurement Principle (NDIR, chemiluminescent, etc.) _____

Monitor System Type (extractive, in-situ) _____

Range of Instrument _____ Span Gas Concentration _____

RELATIVE ACCURACY TEST ZERO DRIFT						
Test No.	Date	Time	~~Reference Method~~ INITIAL Value (A)	~~CEMS~~ FINAL Value (B)	C = B-A Difference X_i	Difference X_i^2
1	10-18-94	0500	--	+1.64	--	--
2	10-19		+1.64	+1.66	+0.02	0.0004
3	10-20		+1.66	+1.88	+0.22	0.0484
4	10-21		+1.88	+1.95	+0.07	0.0049
5	10-22		+1.95	+2.29	+0.34	0.1156
6	10-23		+2.29	+2.49	+0.20	0.0400
7	10-24		+2.49	+2.39	-0.10	0.0100
8	10-25		+2.39	+2.44	+0.05	0.0025
9					+0.80	0.2218
10					÷ 7 = +0.11	
11						
12						
Mean			a		b +0.11	
Sum of the Differences						c 0.2218
(Sum of the Differences)^2				$(0.8)^2 =$	d 0.64	

EXAMPLE CALCULATION OF
CONFIDENCE INTERVAL AND RELATIVE ACCURACY
CONTINUOUS EMISSION MONITORING SYSTEM PERFORMANCE EVALUATION

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #1 DRYER RTO

Date 11-22-94 Monitor I.D. S/N 0394729

Confidence Interval = CI ZERO DRIFT

$t_{.975}$ = 2.447

n = 7

Xi = difference

$$\text{Confidence Interval} = \frac{t_{.975}}{n\sqrt{n-1}} * \sqrt{n * (\sum X_i^2)_c - (\sum X_i)_d^2}$$

$$= \frac{2.447}{7\sqrt{7-1}} * \sqrt{[7 * (0.2218)] - (0.64)} = 0.14$$

(0.1427)

$$\text{Accuracy (\% basis)} = \frac{|\text{Mean of the Differences}^b| + CI}{\text{Mean of Reference Method Values}^a} * 100\%$$

$$= \frac{|_____| + ____}{_____} * 100\% = _____\%$$

$$\text{Accuracy (conc. basis)} = |\text{Mean of the Differences}^b| + CI$$

$$= |+0.11| + 0.14 = 0.25$$

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
RELATIVE ACCURACY TEST AUDIT (RATA)

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #1 DRYER RTO

Monitor Manufacturer USI Model No. 500C

Type of Monitor (SO_2, NO_x, HC, etc.) OPACITY

Unit of Measurement (%, ppm, wet or dry basis) %

Emission Standard (provide units) 20%

Measurement Principle (NDIR, chemiluminescent, etc.) _____

Monitor System Type (extractive, in-situ) _____

Range of Instrument _____ Span Gas Concentration _____

RELATIVE ACCURACY TEST SPAN DRIFT						
Test No.	Date	Time	~~Reference Method~~ ADJ Value	CAL STD ~~CEMS~~ Value	Difference X_i	Difference X_i^2
1	10-18-94	0500	--	44.51	--	--
2	10-19		45.25		+0.74	0.5476
3	10-20		44.89		+0.38	0.1444
4	10-21		44.87		+0.36	0.1296
5	10-22		43.88		-0.64	0.4096
6	10-23		43.59		-0.92	0.8464
7	10-24		43.47		-1.04	1.0816
8	10-25		43.53		-0.98	0.9604
9					-2.10	4.1196
10					÷7 = -0.30	
11						
12						
Mean			a		b -0.30	
Sum of the Differences						c 4.1196
(Sum of the Differences)^2				$(2.10)^2$	d 4.41	

EXAMPLE CALCULATION OF
CONFIDENCE INTERVAL AND RELATIVE ACCURACY
CONTINUOUS EMISSION MONITORING SYSTEM PERFORMANCE EVALUATION

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #1 DRYER RTO

Date 11-22-94 Monitor I.D. S/N 0394729

Confidence Interval = CI SPAN DRIFT

$t_{.975}$ = 2.447

n = 7

Xi = difference

$$\text{Confidence Interval} = \frac{t_{.975}}{n\sqrt{n-1}} * \sqrt{n * (\sum X_i^2)_c - (\sum X_i)_d^2}$$

$$= \frac{2.447}{7\sqrt{7-1}} * \sqrt{[7 * (4.1196)] - (4.41)} = 0.71$$

0.1427

$$\text{Accuracy (\% basis)} = \frac{|\text{Mean of the Differences}^b| + CI}{\text{Mean of Reference Method Values}^a} * 100\%$$

$$= \frac{|_____| + ____}{_____} * 100\% = _____\%$$

$$\text{Accuracy (conc. basis)} = |\text{Mean of the Differences}^b| + CI$$

$$= |-0.30| + 0.71 = 0.41$$

Dryer #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:00 10-18-1994

AMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	-0.47	0.00	0.00	100.95
Span	44.51	44.74	45.00	0.48	30.54

irt Drift % 1.64

ack Taper Ratio (Exit/Monitoring) 1.00

-2.13
43.33
New cal standard?

Dryer #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-19-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	-0.46	-0.00	-0.00	100.93
Span	44.51	45.00	45.25	0.74	30.25

Dirt Drift % 1.66

Stack Taper Ratio (Exit/Monitoring) 1.00

Dryer #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-20-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	-0.24	0.00	0.00	100.49
Span	44.51	44.76	44.89	0.38	30.52

Dirt Drift % 1.88

Stack Taper Ratio (Exit/Monitoring) 1.00

Dryer #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:00 10-21-1994

AMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	-0.17	-0.00	-0.00	100.34
Span	44.51	44.78	44.87	0.36	30.49

irt Drift % 1.95

tack Taper Ratio (Exit/Monitoring) 1.00

Dryer #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-22-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.16	0.00	0.00	99.68
Span	44.51	43.97	43.88	-0.64	31.40

Dirt Drift % 2.29

Stack Taper Ratio (Exit/Monitoring) 1.00

Dryer #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-23-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.35	-0.00	-0.00	99.29
Span	44.51	43.79	43.59	-0.92	31.59

Dirt Drift % 2.49

Stack Taper Ratio (Exit/Monitoring) 1.00

Dryer #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-24-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.26	-0.00	-0.00	99.49
Span	44.51	43.62	43.47	-1.04	31.79

Dirt Drift % 2.39

Stack Taper Ratio (Exit/Monitoring) 1.00

Dryer #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-25-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.31	-0.00	-0.00	99.39
Span	44.51	43.71	43.53	-0.98	31.69

Dirt Drift % 2.44

Stack Taper Ratio (Exit/Monitoring) 1.00

USI MODEL 500C ZERO & CALIBRATION DRIFT

LINE #2 DRYER RTO

PERSON CONDUCTING TEST Bob Schultz
AFFILIATION Louisiana Pacific Corp./Engineering
TEST DATES _ 10-18 thru 10-25 /1994
MONITOR PATHLENGTH - L1 ___NA

ANALYZER MANUFACTURER USI
SERIAL NUMBER 0394730
LOCATION Hayward, WI Line #2 DRYER RTO
EMISSION OUTLET PATHLENGTH - L2 __ NA

MONITORING SYSTEM OUTPUT PATHLENGTH CORRECTED: YES _____ NO ____ XX
UPSCALE CALIBRATION VALUE: ACTUAL OPTICAL DENSITY (OPACITY) - _____ (45.77%)
PATH ADJUSTED OPTICAL DENSITY (OPACITY) - _____ (45.77%)

	PERCENT OPACITY																
	DATE	TIME		ZERO READING	1.	ZERO DRIFT	ZERO ADJ	UPSCALE CALIBRATION READING		3. UPSCALE DRIFT	2. CALIBRATION DRIFT	SPAN ADJ	LENS	ALIGNMENT		ACCUM. DIRT COMP IN % OPACITY
		BEGIN	END	INITIAL A	FINAL B	C = B - A		INITIAL D	FINAL E	F = E - D	G = F - C		CLEANED	CHECK	ADJ	
T0	10-18	0454	0500	--	(4.76) +1.93	--	NO	--	45.77	--	--	NO	NO	NO	NO	+1.93
T1	10-19	0454	0500	(4.76) +1.93	(4.79) +1.96	-0.03	NO	45.60	45.77	-0.18	-0.18	NO	NO	NO	NO	+1.96
T2	10-20	0454	0500	(4.79) +1.96	(5.16) +2.36	+0.40	NO	44.99	45.77	-0.79	-0.79	NO	NO	NO	NO	+2.36
T3	10-21	0454	0500	(5.16) +2.36	(5.14) +2.33	-0.03	NO	45.10	45.77	-0.67	-0.67	NO	NO	NO	NO	+2.33
T4	10-22	0454	0500	(5.14) +2.33	(5.06) +2.25	-0.08	NO	45.05	45.77	-0.73	-0.73	NO	NO	NO	NO	+2.25
T5	10-23	0454	0500	(5.06) +2.25	(5.19) +2.38	-0.13	NO	45.09	45.77	-0.68	-0.68	NO	NO	NO	NO	+2.38
T6	10-24	0454	0500	(5.19) +2.38	(5.24) +2.44	+0.06	NO	45.24	45.77	-0.53	-0.53	NO	NO	NO	NO	+2.44
T7	10-25	0454	0500	(5.24) +2.24	(5.15) +2.34	+0.10	NO	45.12	45.77	-0.66	-0.66	NO	NO	NO	NO	+2.34

ARITHMETIC MEAN	+0.04		-0.61
CONFIDENCE INTERVAL	0.16		0.19
ZERO DRIFT	0.20	CALIBRATION DRIFT	-0.42

1. Accumulated dirt compensation recorded as final zero reading. Output device indication in parenthesis.
2. Zero was adjusted automatically prior to upscale check, therefore C = 0.
3. Span drift = ADJ RDG - CAL STD per Graseby-STI.

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
RELATIVE ACCURACY TEST AUDIT (RATA)

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #2 DRYER RTO

Monitor Manufacturer USI Model No. 500C

Type of Monitor (SO_2, NO_x, HC, etc.) OPACITY

Unit of Measurement (%, ppm, wet or dry basis) %

Emission Standard (provide units) 20%

Measurement Principle (NDIR, chemiluminescent, etc.) _____

Monitor System Type (extractive, in-situ) _____

Range of Instrument _____ Span Gas Concentration _____

RELATIVE ACCURACY TEST ZERO DRIFT						
Test No.	Date	Time	~~Reference Method~~ INITIAL Value (A)	~~CEMS~~ FINAL Value (B)	C = B-A Difference X_i	Difference X_i^2
1	10-18-94	0500	— —	+1.93	— —	— —
2	10-19		+1.93	+1.96	-0.03	0.0009
3	10-20		+1.96	+2.36	+0.40	0.1600
4	10-21		+2.36	+2.33	-0.03	0.0009
5	10-22		+2.33	+2.25	-0.08	0.0064
6	10-23		+2.25	+2.38	-0.13	0.0169
7	10-24		+2.38	+2.44	+0.06	0.0036
8	10-25		+2.24	+2.34	+0.10	0.0100
9					+0.29	0.1987
10					÷7 = +0.04	
11						
12						
Mean			a		b +0.04	
Sum of the Differences						c 0.1987
(Sum of the Differences)^2				(.29)^2 =	d 0.0841	

EXAMPLE CALCULATION OF
CONFIDENCE INTERVAL AND RELATIVE ACCURACY
CONTINUOUS EMISSION MONITORING SYSTEM PERFORMANCE EVALUATION

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #2 DRYER RTO

Date 11-22-94 Monitor I.D. S/N 0394730

Confidence Interval = CI ZERO DRIFT

$t_{.975}$ = 2.447

n = 7

Xi = difference

$$\text{Confidence Interval} = \frac{t_{.975}}{n\sqrt{n-1}} * \sqrt{n * (\sum X_i^2)_c - (\sum X_i)_d^2}$$

$$= \frac{2.447}{7\sqrt{7-1}} * \sqrt{[7 * (0.1987)] - (0.0841)} = 0.16$$

0.1427

$$\text{Accuracy (\% basis)} = \frac{|\text{Mean of the Differences}^b| + CI}{\text{Mean of Reference Method Values}^a} * 100\%$$

$$= \frac{|_____| + ____}{_____} * 100\% = _____\%$$

$$\text{Accuracy (conc. basis)} = |\text{Mean of the Differences}^b| + CI$$

$$= |+0.04| + 0.16 = 0.20$$

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
RELATIVE ACCURACY TEST AUDIT (RATA)

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #2 DRYER RTO

Monitor Manufacturer USI Model No. 500C

Type of Monitor (SO_2, NO_x, HC, etc.) OPACITY

Unit of Measurement (%, ppm, wet or dry basis) %

Emission Standard (provide units) 20%

Measurement Principle (NDIR, chemiluminescent, etc.) _____

Monitor System Type (extractive, in-situ) _____

Range of Instrument _____ Span Gas Concentration _____

RELATIVE ACCURACY TEST SPAN DRIFT						
Test No.	Date	Time	~~Reference Method~~ ADJ Value	CAL STD ~~CEMS~~ Value	Difference X_i	Difference X_i^2
1	10-18	0500	--	45.77	--	--
2	10-19		45.60		-0.18	0.0324
3	10-20		44.99		-0.79	0.6241
4	10-21		45.10		-0.67	0.4489
5	10-22		45.05		-0.73	0.5329
6	10-23		45.09		-0.68	0.4624
7	10-24		45.24		-0.53	0.2809
8	10-25		45.12		-0.66	0.4356
9					-4.24	2.8172
10					÷7 = -0.61	
11						
12						
Mean			a		b -0.61	
Sum of the Differences						c 2.8172
(Sum of the Differences)^2				$(4.24)^2$ =	d 17.9776	

EXAMPLE CALCULATION OF
CONFIDENCE INTERVAL AND RELATIVE ACCURACY
CONTINUOUS EMISSION MONITORING SYSTEM PERFORMANCE EVALUATION

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #2 DRYER RTO

Date 11-22-94 Monitor I.D. S/N 0394730

Confidence Interval = CI SPAN DRIFT

$t_{.975}$ = 2.447

n = 7

Xi = difference

$$\text{Confidence Interval} = \frac{t_{.975}}{n\sqrt{n-1}} * \sqrt{n * (\sum X_i^2)_c - (\sum X_i)_d^2}$$

$$= \frac{\overset{0.1427}{2.447}}{7\sqrt{7-1}} * \sqrt{[7 * (2.8172)] - (17.9776)} = 0.19$$

$$\text{Accuracy (\% basis)} = \frac{|\text{Mean of the Differences}^b| + CI}{\text{Mean of Reference Method Values}^a} * 100\%$$

$$= \frac{|_____| + _____}{_____} * 100\% = _____\%$$

$$\text{Accuracy (conc. basis)} = |\text{Mean of the Differences}^b| + CI$$

$$= |-0.61| + 0.19 = -0.42$$

Dryer #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-18-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	4.76	-0.00	-0.00	90.70
Span	45.77	48.18	45.59	-0.19	26.86

Dirt Drift % 1.93

Stack Taper Ratio (Exit/Monitoring) 1.00

2,93

47,36

Dryer #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:00 10-19-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	4.79	0.00	0.00	90.65
Span	45.77	48.20	45.60	-0.18	26.83

Dirt Drift % 1.96

Stack Taper Ratio (Exit/Monitoring) 1.00

Dryer #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-20-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	5.16	-0.00	-0.00	89.94
Span	45.77	47.83	44.99	-0.79	27.22

Dirt Drift % 2.36

Stack Taper Ratio (Exit/Monitoring) 1.00

Dryer #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:00 10-21-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	5.14	-0.00	-0.00	89.99
Span	45.77	47.92	45.10	-0.67	27.12

Dirt Drift % 2.33

Stack Taper Ratio (Exit/Monitoring) 1.00

Dryer #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-22-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	5.06	-0.00	-0.00	90.14
Span	45.77	47.83	45.05	-0.73	27.22

Dirt Drift % 2.25

Stack Taper Ratio (Exit/Monitoring) 1.00

Dryer #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:00 10-23-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	5.19	0.00	0.00	89.89
Span	45.77	47.94	45.09	-0.68	27.10

Dirt Drift % 2.38

Stack Taper Ratio (Exit/Monitoring) 1.00

Dryer #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-24-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	5.24	-0.00	-0.00	89.79
Span	45.77	48.11	45.24	-0.53	26.93

Dirt Drift % 2.44

Stack Taper Ratio (Exit/Monitoring) 1.00

Dryer #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-25-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	5.15	-0.00	-0.00	89.97
Span	45.77	47.94	45.12	-0.66	27.10

irt Drift % 2.34

tack Taper Ratio (Exit/Monitoring) 1.00

USI MODEL 500C ZERO & CALIBRATION DRIFT

LINE #1 PRESS RTO

PERSON CONDUCTING TEST Bob Schultz
AFFILIATION Louisiana Pacific Corp./Engineering
TEST DATES _ 10-18 thru 10-25 /1994
MONITOR PATHLENGTH - L1 ___NA

ANALYZER MANUFACTURER USI
SERIAL NUMBER 0394731
LOCATION Hayward, WI Line 1 Press RTO
EMISSION OUTLET PATHLENGTH - L2 __ NA

MONITORING SYSTEM OUTPUT PATHLENGTH CORRECTED: YES _____ NO ____ XX
UPSCALE CALIBRATION VALUE: ACTUAL OPTICAL DENSITY (OPACITY) - _____ ('45.15%)
PATH ADJUSTED OPTICAL DENSITY (OPACITY) - _____ (45.15%)

	PERCENT OPACITY																
	DATE	TIME		1. ZERO READING		ZERO DRIFT	ZERO ADJ	UPSCALE CALIBRATION READING		3. UPSCALE DRIFT	2. CALIBRATION DRIFT	SPAN ADJ	LENS CLEANED	ALIGNMENT CHECK	ALIGNMENT ADJ	ACCUM. DIRT COMP IN % OPACITY
		BEGIN	END	INITIAL A	FINAL B	C = B - A		INITIAL D	FINAL E	F = E - D	G = F - C					
T0	10-18	0454	0500	--	(-0.79 -1.06	--	NO	--	45.15	--	--	NO	NO	NO	NO	-1.06
T1	10-19	0454	0500	(-0.79) -1.06	(-1.08)	-0.28	NO	43.90	45.15	-1.25	-1.25	NO	NO	NO	NO	-1.34
T2	10-20	0454	0500	(-1.08) -1.34		+0.40	NO	43.97	45.15	-1.18	-1.18	NO	NO	NO	NO	-0.94
T3	10-21	0454	0500	(-0.67) -0.94		-0.31	NO	44.15	45.15	-1.00	-1.00	NO	NO	NO	NO	-1.25
T4	10-22	0454	0500	(-0.98) -1.25		+0.97	NO	45.13	45.15	-0.02	-0.02	NO	NO	NO	NO	-0.28
T5	10-23	0454	0500	(-0.0) -0.28		+0.13	NO	45.00	45.15	-0.15	-0.15	NO	NO	NO	NO	-0.15
T6	10-24	0454	0500	(-0.12) -0.15		-0.30	NO	45.14	45.15	-0.01	-0.01	NO	NO	NO	NO	-0.45
T7	10-25	0454	0500	(-0.17) -0.45		+0.22	NO	45.00	45.15	-0.15	-0.15	NO	NO	NO	NO	-0.23

ARITHMETIC MEAN	+0.12		-0.54
CONFIDENCE INTERVAL	0.44		0.53
ZERO DRIFT	0.56	CALIBRATION DRIFT	0.01

1. Accumulated dirt compensation recorded as final zero reading. Output device indication in parenthesis.
2. Zero was adjusted automatically prior to upscale check, therefore C = 0.
3. Span drift = ADJ RDG - CAL STD per Graseby-STI.

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
RELATIVE ACCURACY TEST AUDIT (RATA)

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #1 PRESS RTO

Monitor Manufacturer USI Model No. 500C

Type of Monitor (SO_2, NO_x, HC, etc.) OPACITY

Unit of Measurement (%, ppm, wet or dry basis) %

Emission Standard (provide units) 20%

Measurement Principle (NDIR, chemiluminescent, etc.) _____

Monitor System Type (extractive, in-situ) _____

Range of Instrument _____ Span Gas Concentration _____

RELATIVE ACCURACY TEST ZERO DRIFT						
Test No.	Date	Time	~~Reference Method~~ INITIAL Value	~~CEMS~~ FINAL Value	Difference X_i	Difference X_i^2
1	10-18-94	0500	–	-1.06	– –	– –
2	10-19		-1.06	-1.34	-0.28	0.0784
3	10-20		-1.34	-0.94	+0.40	0.1600
4	10-21		-0.94	-1.25	-0.31	0.0961
5	10-22		-1.25	-0.28	+0.97	0.9409
6	10-23		-0.28	-0.15	+0.13	0.0169
7	10-24		-0.15	-0.45	-0.30	0.0900
8	10-25		-0.45	-0.23	+0.22	0.0484
9					+0.83	1.4307
10					÷7 = +0.12	
11						
12						
Mean			a		b +0.12	
Sum of the Differences						c 1.4307
(Sum of the Differences)^2				$(0.83)^2$ =	d 0.6889	

EXAMPLE CALCULATION OF
CONFIDENCE INTERVAL AND RELATIVE ACCURACY
CONTINUOUS EMISSION MONITORING SYSTEM PERFORMANCE EVALUATION

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #1 PRESS RTO

Date 11-22-94 Monitor I.D. S/N 0394731

ZERO DRIFT

Confidence Interval = CI

$t_{.975}$ = 2.447

n = 7

Xi = difference

$$\text{Confidence Interval} = \frac{t_{.975}}{n\sqrt{n-1}} * \sqrt{n * (\sum X_i^2)_c - (\sum X_i)_d^2}$$

$$= \frac{\overset{0.1427}{2.447}}{7\sqrt{7-1}} * \sqrt{[7 * (1.4307)] - (0.6889)} = 0.44$$

$$\text{Accuracy (\% basis)} = \frac{|\text{Mean of the Differences}^{b}| + CI}{\text{Mean of Reference Method Values}^{a}} * 100\%$$

$$= \frac{|_____| + ____}{_____} * 100\% = _____\%$$

$$\text{Accuracy (conc. basis)} = |\text{Mean of the Differences}^{b}| + CI$$

$$= |+0.12| + 0.44 = 0.56$$

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
RELATIVE ACCURACY TEST AUDIT (RATA)

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #1 PRESS RTO

Monitor Manufacturer USI Model No. 500C

Type of Monitor (SO_2, NO_x, HC, etc.) OPACITY

Unit of Measurement (%, ppm, wet or dry basis) %

Emission Standard (provide units) 20%

Measurement Principle (NDIR, chemiluminescent, etc.) _____

Monitor System Type (extractive, in-situ) _____

Range of Instrument _____ Span Gas Concentration _____

RELATIVE ACCURACY TEST SPAN DRIFT						
Test No.	Date	Time	~~Reference Method~~ ADJ. Value	CAL STD ~~CEMS~~ Value	Difference X_i	Difference X_i^2
1	10-18-94	0500	—	45.15	—	—
2	10-19		43.90		-1.25	1.5625
3	10-20		43.97		-1.18	1.3924
4	10-21		44.15		-1.00	1.0000
5	10-22		45.13		-0.02	0.0004
6	10-23		45.00		-0.15	0.0225
7	10-24		45.14		-0.01	0.0001
8	10-25		45.00		-0.15	0.0225
9					-3.76	4.0004
10					÷7 = -0.54	
11						
12						
Mean			a 44.61		b -0.54	
Sum of the Differences						c 4.0004
(Sum of the Differences)^2				$(-3.76)^2$	d 14.1376	

EXAMPLE CALCULATION OF
CONFIDENCE INTERVAL AND RELATIVE ACCURACY
CONTINUOUS EMISSION MONITORING SYSTEM PERFORMANCE EVALUATION

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #1 PRESS RTO

Date 11-22-94 Monitor I.D. S/N 0394731

Confidence Interval = CI

SPAN DRIFT

$t_{.975}$ = 2.447

n = 7

Xi = difference

$$\text{Confidence Interval} = \frac{t_{.975}}{n\sqrt{n-1}} * \sqrt{n * (\sum X_i^2)_c - (\sum X_i)_d^2}$$

$$= \frac{2.447}{7\sqrt{7-1}} * \sqrt{[7 * (4.0004)] - (14.1376)} = 0.53$$

0.1427

$$\text{Accuracy (\% basis)} = \frac{|\text{Mean of the Differences}^b| + CI}{\text{Mean of Reference Method Values}^a} * 100\%$$

$$= \frac{|_____| + ____}{_____} * 100\% = _____\%$$

$$\text{Accuracy (conc. basis)} = |\text{Mean of the Differences}^b| + CI$$

$$= |-0.54| + 0.53 = 0.01$$

Press #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-18-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	-0.79	0.00	0.00	101.59
Span	45.15	43.34	43.78	-1.37	32.10

Dirt Drift % -1.06

Stack Taper Ratio (Exit/Monitoring) 1.00

0,28
45.30

Press #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-19-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	-1.08	-0.00	-0.00	102.17
Span	45.15	43.30	43.90	-1.25	32.15

Dirt Drift % -1.34

Stack Taper Ratio (Exit/Monitoring) 1.00

Press #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:00 10-20-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	-0.67	-0.00	-0.00	101.34
Span	45.15	43.60	43.97	-1.18	31.81

Dirt Drift % -0.94

Stack Taper Ratio (Exit/Monitoring) 1.00

Press #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-21-1994

AMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	-0.98	0.00	0.00	101.98
Span	45.15	43.60	44.15	-1.00	31.81

irt Drift % -1.25

tack Taper Ratio (Exit/Monitoring) 1.00

Press #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-22-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.00	0.00	0.00	100.00
Span	45.15	45.13	45.13	-0.02	30.10

Dirt Drift % -0.28

Stack Taper Ratio (Exit/Monitoring) 1.00

Press #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-23-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.12	0.00	0.00	99.76
Span	45.15	45.07	45.00	-0.15	30.18

Dirt Drift % -0.15

Stack Taper Ratio (Exit/Monitoring) 1.00

Press #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-24-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	-0.17	-0.00	-0.00	100.34
Span	45.15	45.05	45.14	-0.01	30.20

Dirt Drift % -0.45

Stack Taper Ratio (Exit/Monitoring) 1.00

Press #1 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-25-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.05	-0.00	-0.00	99.90
Span	45.15	45.02	45.00	-0.15	30.22

irt Drift % -0.23

tack Taper Ratio (Exit/Monitoring) 1.00

USI MODEL 500C ZERO & CALIBRATION DRIFT

LINE #2 PRESS RTO

PERSON CONDUCTING TEST Bob Schultz
AFFILIATION Louisiana Pacific Corp./Engineering
TEST DATES _ 10-18 thru 10-25 /1994
MONITOR PATHLENGTH - L1 ___NA

ANALYZER MANUFACTURER USI
SERIAL NUMBER 0394732
LOCATION Hayward, WI Line #2 Press RTO
EMISSION OUTLET PATHLENGTH - L2 __ NA

MONITORING SYSTEM OUTPUT PATHLENGTH CORRECTED: YES _____ NO ____ XX
UPSCALE CALIBRATION VALUE: ACTUAL OPTICAL DENSITY (OPACITY) - _____ ('44.92%)
PATH ADJUSTED OPTICAL DENSITY (OPACITY) - _____ (44.92%)

	PERCENT OPACITY																
	DATE	TIME		1. ZERO READING		ZERO DRIFT	ZERO ADJ	UPSCALE CALIBRATION READING		3. UPSCALE DRIFT	2. CALI-BRATION DRIFT	SPAN ADJ	LENS CLEANED	ALIGNMENT		ACCUM. DIRT COMP IN % OPACITY
		BEGIN	END	INITIAL A	FINAL B	C = B - A		INITIAL D	FINAL E	F = E - D	G = F - C			CHECK	ADJ	
T0	10-18	0454	0500		(0.91) 0.92	--	NO	--	44.92	--	--	NO	NO	NO	NO	0.92
T1	10-19	0454	0500	(0.91) 0.92	(0.75) 0.75	-0.17	NO	44.88	44.92	-0.04	-0.04	NO	NO	NO	NO	0.75
T2	10-20	0454	0500	(0.75) 0.75	(0.92) 0.93	+0.18	NO	44.85	44.92	-0.07	-0.07	NO	NO	NO	NO	0.93
T3	10-21	0454	0500	(0.92) 0.93	(1.13) 1.14	+0.21	NO	44.62	44.92	-0.30	-0.30	NO	NO	NO	NO	1.14
T4	10-22	0454	0500	(1.13) 1.14	(0.85) 0.85	-0.29	NO	44.78	44.92	-0.14	-0.14	NO	NO	NO	NO	0.85
T5	10-23	0454	0500	(0.85) 0.85	(0.92) 0.93	+0.08	NO	44.85	44.92	-0.07	-0.07	NO	NO	NO	NO	0.93
T6	10-24	0454	0500	(0.92) 0.93	(1.04) 1.05	+0.12	NO	44.87	44.92	-0.05	-0.05	NO	NO	NO	NO	1.05
T7	10-25	0454	0500	(1.04) 1.05	(1.01) 1.02	-0.03	NO	44.71	44.92	-0.21	-0.21	NO	NO	NO	NO	1.02

ARITHMETIC MEAN	+0.014		-0.13
CONFIDENCE INTERVAL	0.55		0.09
ZERO DRIFT	0.56	CALIBRATION DRIFT	0.04

1. Accumulated dirt compensation recorded as final zero reading. Output device indication in parenthesis.
2. Zero was adjusted automatically prior to upscale check, therefore C = 0.
3. Span drift = ADJ RDG - CAL STD per Graseby-STI.

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
RELATIVE ACCURACY TEST AUDIT (RATA)

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #2 PRESS RTO

Monitor Manufacturer USI Model No. 500C

Type of Monitor (SO_2, NO_x, HC, etc.) OPACITY

Unit of Measurement (%, ppm, wet or dry basis) %

Emission Standard (provide units) 20%

Measurement Principle (NDIR, chemiluminescent, etc.) _____

Monitor System Type (extractive, in-situ) _____

Range of Instrument _____ Span Gas Concentration _____

RELATIVE ACCURACY TEST ZERO DRIFT						
Test No.	Date	Time	~~Reference Method~~ INITIAL Value (A)	~~CEMS~~ FINAL Value (B)	C=B-A Difference X_i	Difference X_i^2
1	10-18-94	0500	--	+0.92	--	--
2	10-19		+0.92	+0.75	-0.17	0.0289
3	10-20		+0.75	+0.93	+0.18	0.0324
4	10-21		+0.93	+1.14	+0.21	0.0441
5	10-22		+1.14	+0.85	-0.29	0.0841
6	10-23		+0.85	+0.93	+0.08	0.0064
7	10-24		+0.93	+1.05	+0.12	0.0144
8	10-25		+1.05	+1.02	-0.03	0.0009
9					+0.10	2.112
10					÷7 = +0.014	
11						
12						
Mean			a		b +0.014	
Sum of the Differences						c 2.112
(Sum of the Differences)^2				(+0.10)^2 =	d 0.01	

EXAMPLE CALCULATION OF
CONFIDENCE INTERVAL AND RELATIVE ACCURACY
CONTINUOUS EMISSION MONITORING SYSTEM PERFORMANCE EVALUATION

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE # 2 PRESS RTO

Date 11-22-94 Monitor I.D. S/N # 0394732

Confidence Interval = CI

$t_{.975}$ = 2.447

n = 7

Xi = difference

$$\text{Confidence Interval} = \frac{t_{.975}}{n\sqrt{n-1}} * \sqrt{n * (\sum X_i^2)_c - (\sum X_i)_d^2}$$

$$= \frac{2.447}{7\sqrt{7-1}} * \sqrt{[7 * (2.112)] - (0.01)} = 0.55$$

0.1427

$$\text{Accuracy (\% basis)} = \frac{|\text{Mean of the Differences}^b| + CI}{\text{Mean of Reference Method Values}^a} * 100\%$$

$$= \frac{|_____| + ____}{_____} * 100\% = _____\%$$

$$\text{Accuracy (conc. basis)} = |\text{Mean of the Differences}^b| + CI$$

$$= |0.014| + 0.55 = 0.56$$

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
RELATIVE ACCURACY TEST AUDIT (RATA)

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #2 PRESS RTO

Monitor Manufacturer USI Model No. 500C

Type of Monitor (SO_2, NO_x, HC, etc.) OPACITY

Unit of Measurement (%, ppm, wet or dry basis) %

Emission Standard (provide units) 20%

Measurement Principle (NDIR, chemiluminescent, etc.) _____

Monitor System Type (extractive, in-situ) _____

Range of Instrument _____ Span Gas Concentration _____

RELATIVE ACCURACY TEST SPAN DRIFT						
Test No.	Date	Time	~~Reference Method~~ ADJ Value	CAL STD ~~CEMS~~ Value	Difference X_i	Difference X_i^2
1	10-18-94	0500	--	44.92	--	--
2	10-19		44.88		-0.04	0.0016
3	10-20		44.85		-0.07	0.0049
4	10-21		44.62		-0.30	0.0900
5	10-22		44.78		-0.14	0.0196
6	10-23		44.85		-0.07	0.0049
7	10-24		44.87		-0.05	0.0025
8	10-25		44.71		-0.21	0.0441
9					-0.88	0.1676
10					÷7 = -0.13	
11						
12						
Mean			a		b -0.13	
Sum of the Differences						c 0.1676
(Sum of the Differences)^2				$(-0.88)^2 =$	d 0.7744	

EXAMPLE CALCULATION OF
CONFIDENCE INTERVAL AND RELATIVE ACCURACY
CONTINUOUS EMISSION MONITORING SYSTEM PERFORMANCE EVALUATION

LOUISIANA-PACIFIC CORP. HAYWARD, WI Location LINE #2 PRESS RTO

Date 11-22-94 Monitor I.D. S/N 0394732

Confidence Interval = CI SPAN DRIFT

$t_{.975}$ = 2.447

n = 7

Xi = difference

$$\text{Confidence Interval} = \frac{t_{.975}}{n\sqrt{n-1}} * \sqrt{n * (\sum X_i^2)_c - (\sum X_i)_d^2}$$

$$= \frac{2.447}{7\sqrt{7-1}} * \sqrt{[7 * (0.1676)] - (0.7744)} = 0.09$$

0.1427

$$\text{Accuracy (\% basis)} = \frac{|\text{Mean of the Differences}^b| + CI}{\text{Mean of Reference Method Values}^a} * 100\%$$

$$= \frac{|_____| + ____}{_____} * 100\% = _____\%$$

$$\text{Accuracy (conc. basis)} = |\text{Mean of the Differences}^b| + CI$$

$$= |-0.13| + 0.09 = 0.04$$

Press #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:00 10-18-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.91	0.00	0.00	98.19
Span	44.92	45.09	44.59	-0.33	30.15

Dirt Drift % 0.92

Stack Taper Ratio (Exit/Monitoring) 1.00

0.00
44.92

Press #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-19-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.75	-0.00	-0.00	98.51
Span	44.92	45.29	44.88	-0.04	29.93

Dirt Drift % 0.75

Stack Taper Ratio (Exit/Monitoring) 1.00

Press #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-20-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.92	-0.00	-0.00	98.17
Span	44.92	45.36	44.85	-0.07	29.86

Dirt Drift % 0.93

Stack Taper Ratio (Exit/Monitoring) 1.00

Press #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-21-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	1.13	0.00	0.00	97.75
Span	44.92	45.25	44.62	-0.30	29.98

Dirt Drift % 1.14

Stack Taper Ratio (Exit/Monitoring) 1.00

Press #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-22-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.85	0.00	0.00	98.32
Span	44.92	45.25	44.78	-0.14	29.98

Dirt Drift % 0.85

Stack Taper Ratio (Exit/Monitoring) 1.00

Press #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:00 10-23-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	0.92	-0.00	-0.00	98.17
Span	44.92	45.36	44.85	-0.07	29.86

Dirt Drift % 0.93

Stack Taper Ratio (Exit/Monitoring) 1.00

Press #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:00 10-24-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	1.04	0.00	0.00	97.92
Span	44.92	45.45	44.87	-0.05	29.76

Dirt Drift % 1.05

Stack Taper Ratio (Exit/Monitoring) 1.00

Press #2 Normal Opacity Calibration Report
LOUISIANA PACIFIC
05:00:01 10-25-1994

SAMPLE	CALIBRATION STANDARD	READING	ADJUSTED READING	PERCENT DRIFT	PERCENT TRANSMISSION
Zero	0.00	1.01	-0.00	-0.00	98.00
Span	44.92	45.27	44.71	-0.21	29.96

Dirt Drift % 1.02

Stack Taper Ratio (Exit/Monitoring) 1.00

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Louisiana-Pacific Corporation

P.O. Box 4000-98
Hayden Lake, Idaho 83835
208/772-6011

August 10, 1994

VIA FEDERAL EXPRESS

Mr. Michael F. Wood, Director
Multi Media Enforcement & Strategic
Planning Division
United States Environmental Protection Agency
Aerials Rios Blvd., Room 7120A
12th Pennsylvania, N.W., 7th Floor
Washington, D.C. 20004

Mr. Laxmi Kesari
Multi Media Enforcement & Strategic
Planning Division
United States Environmental Protection Agency
Aerials Rios Blvd., Room 7120A
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RE: CLEAN AIR ENFORCE ACTION - UNITED STATES v. LOUISIANA-PACIFIC CORPORATION, NO: CV 93-0869 (W.D.La.)

Subject: Testing and Evaluation of Missoula, MT Particleboard Plant

Dear Gentlemen:

Enclosed pursuant to the requirements of Paragraphs 121 and 122 of the Consent Decree in the above references lawsuit are the results of emission tests conducted at the Missoula, Montana Particleboard Plant of Louisiana-Pacific Corporation (L-P) in May 1994 pursuant to the test protocol approved by the United States Environmental Protection Agency (EPA). Also enclosed is the evaluation of TEAM Environmental Services, Inc. concerning emissions from the Missoula Plant prior to the 1986 expansion, immediately after completion of the expansion, and today.

/..

Based on the enclosed information L-P has determined that the 1986 expansion of its Missoula Plant did not require a prevention of significant deterioration (PSD) permit application and that for several reasons submittal of a nonattainment new source review permit application should not be required now.

L-P's rationale for those determinations is set forth below:

Area Classifications in 1986

In September 1986 when the expansion of the Missoula Plant was authorized by the Montana Air Quality Bureau, ambient air at the plant site was designated as attainment or unclassified for all criteria pollutants except total suspended particulate matter (PM). Thus, in 1986 the plant site was subject to nonattainment new source review requirements for PM and PSD review requirements for all other regulated pollutants.

PSD Review

The PSD regulations were not applicable to the 1986 permit because the actual point source emissions from the then existing plant did not exceed 250 tpy for any regulated pollutant. PM emissions do not have to be considered because the area was designated nonattainment for PM.

Nonattainment New Source Review

For nonattainment new source review the existing plant was a major source of PM in 1986 because PM emissions from point sources exceeded 100 tons per year (tpy). Because the actual increased PM emissions from the expansion authorized by Montana Permit No. 2303 issued September 15, 1986 totaled 29 tpy, more than the then significant amount of 25 tpy of PM in 1986, the expansion was subject to nonattainment new source review. In fact, Montana Air Quality Bureau did review and issue the permit in 1986 in a manner it believed was consistent with the then applicable nonattainment new source review requirements. The fact is demonstrated by the July 11, 1986 and July 24, 1986 Office Memorandums concerning the Missoula plant expansion which were written by Hal Robbins of the Montana Air Quality Bureau. The EPA has copies of those memorandums. At that time, Montana's nonattainment new source review program was EPA approved.

/...

L-P should not now have to submit a nonattainment new source review permit for PM emissions at its Missoula Particleboard Plant for the following reasons:

1. As stated above the Montana Air Quality Bureau subjected L-P's 1986 permit application to nonattainment new source review.

2. Effective July 31, 1987, PM was removed from the definition of "significant" in the nonattainment new source regulations and it was not replaced with PM_{10}. 52 Fed. Reg. 24672 (July, 1987). L-P should not be required to submit a permit application that it would not be required to submit under current regulations.

3. The plant expansion authorized on September 15, 1986 did not actually emit increased PM emissions from the plant site in excess of 25 tpy prior to the July 31, 1987 end of the applicability of the nonattainment new source review regulation.

4. Current actual PM emissions from point sources at the plant site are less than 25 tpy greater than the pre-expansion PM emissions. Thus, even if the 1986 regulations were still applicable the current operation of the expanded plant with a permit based on actual emissions would not have triggered non attainment new source review.

Conclusion

L-P recommends that any remaining nonattainment new source review issues be resolved by L-P requesting the Montana Air Quality Bureau to amend Permit No. 2303-M based on the emission rates provided in the enclosed TEAM Environmental Services, Inc. evaluation of current emissions at the Missoula Particleboard Plant. L-P will not

/....

take any further action in this matter until it receives the comments of the EPA and the Montana Air Quality Bureau.

Elizabeth Smith has authorized me submit this on her behalf, due to her travel schedule not permitting her to do so herself.

Sincerely,

James A. Evensen, P.E.
Environmental Manager
Northern Division

JAE/eej
Encl

cc w/encls: Julie Domike, U.S. EPA, Office of Civil Enforcement, Washington, DC
Air Programs Branch, U.S. EPA Region VIII, Denver, CO
Jeff Chaffee, Montana Air Quality Bureau, Helena, MT
Elizabeth T. Smith - Portland, OR

w/out encls: Dan Dilworth - Hayward, WI
Mark Becker - Hayward, WI
Bert Krages - Portland, OR
Norm Radford Jr. - Vinson & Elkins, Dallas, TX

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill

SUMMARY TABLE
PRE–EXPANSION, POST EXPANSION and CURRENT EMISSIONS

Contaminant	Table	Pre–Expansion tons/yr A	Post–Expansion tons/yr B	Current tons/yr C
Particulate [a]	1	230.37	259.46	246.13
Carbon Monoxide	2	153.09	204.31	NC [b]
Nitrogen Oxides	3	180.37	272.74	NC [b]
Volatile Organic Compounds	4	237.55	272.62	303.41 [c]
Sulfur Oxides	5	3.66	4.86	NC [b]

[a] Does not include fugitive particulate emissions.
[b] No Change since plant expansion
[c] Calculated using 1993 Remanufacturing line paint usage data. Louisiana–Pacific is currently shifting to lower VOC content paints which should reduce these emissions significantly.

Lousiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 1A (Revised Table 5–1)
PARTICULATE MATTER – PRE–EXPANSION ACTUAL EMISSIONS AT 100 MILLION FT² (3/4") PRODUCTION
STACK EMISSIONS – NOT INCLUDING FUGITIVE PARTICULATES

SOURCE DESIGNATION	SOURCE DESCRIPTION	CONTROL DESIGNATION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
PC 206	Dryer #1	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 207	Dryer #2	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 208	Dryer #3	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 209	Dryer #4	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 301	Reject Hopper Pneu.	Cyclone	0.03 gr/CF	15,900 CFM	17.91	AP–42 (Table 10.4.1)
PC 302	Blending Area Pneu.	Cyclone	0.03 gr/CF	24,400 CFM	27.48	AP–42 (Table 10.4.1)
PC 401A	Forming Machine to Face Pneu.	Cyclone	0.03 gr/CF	6,530 CFM	7.35	AP–42 (Table 10.4.1)
PC 401B	Forming Machine to Core Pneu.	Cyclone	0.03 gr/CF	6,530 CFM	7.35	AP–42 (Table 10.4.1)
PC 404	Mat Trim Saws Pneu.	Cyclone	0.03 gr/CF	21,380 CFM	24.08	AP–42 (Table 10.4.1)
PC 405	Line Clean Up Pneu.	Cyclone	0.03 gr/CF	4,320 CFM	4.87	AP–42 (Table 10.4.1)
PC 501 A&B	5X25 Saws & blow hog pneu.	Baghouse	included with PC 503 A&B			Industry Data
PC 502 A,B,C	Sander Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 503 A&B	5x16 Saws & Blow Hog Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 504	Saws and Hog to Storage – H.P.	Cyclone	0.03 gr/CF	2,450 CFM	2.76	AP–42 (Table 10.4.1)
PC 506	Fuel Hammer Mill	Baghouse	0.005 gr/CF	9,500 CFM	1.78	Industry Data
PC 601	Reman Pneu.	Baghouse	0.005 gr/CF	16,000 CFM	3.00	Industry Data
PC 602	Reman Relay (H.P. System)	Baghouse	0.005 gr/CF	8,000 CFM	1.50	Industry Data
PC 701 A,B,C	Hot Press Vent Fans	Atmosphere	6 lb/hr[c]	8400 hrs	25.20	Oregon Tests
PC 702	Pre Press Vent Fans	Atmosphere	2 lb/hr[c]	8400 hrs	8.40	Oregon Tests
PC 801	Boiler #1	Atmosphere	Included with ROEMMC Stack			
PC 802	ROEMMC Burner	Atmosphere	9.53 lb/ton[d]	4,431 tons[e]	21.11	1994 Stack Tests
PC 805	Reman Bullnose and Saws	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
	Total				**230.37**	

[a] lb TSP/ton wet material throughput. Test Report shows 3.8 lb/hr emission rate with 14,040 lb/hr throughput:
(3.8 lb TSP/hr) / (14,040 lb/hr)(1 ton/2000 lbs) = 0.541 lb/ton.

[b] Dryer usage rate calculated based on 100 MMft² board pressed with the following conversion assumptions:
board pressed to 850/1000", 8% trim loss, 6.25% resin solids, 0.5% wax solids, 5% final board moisture content and 18% moisture content of wood introduced into the dryers.
(100,000,000 ft²)(850"/1000)(1 ft/12")(1/(1 –0.08))(45 lb/ft³)(1 –0.0625–0.005)((1–0.05)/(1–0.18))(1 ton/2000 lbs) = 187,150 tons.
Total production was divided evenly into four dryers.

[c] This factor and calculation remains unchanged from the 1986 submittal because no new data was available.

[d] lbs TSP/ton sanderdust fuel combusted. Factor was derived from 1994 testing of ROEMMC tube as follows:
Orsat analysis of ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 1.112 tons/hr.
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lbmol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 1.112 tons/hr.
The TSP flow rate in the ROEMMC tube was 10.6 lbs/hr which corresponds to an emission factor of 9.53 lbs/ton.
(10.6 lbs TSP/hr)/(1.112 tons sanderdust fuel/hr) = 9.53 lbs TSP/ton sanderdust fuel.

[e] Value represents the amount of sanderdust combusted which was not used for heat input into the dryers.
This value was estimated in the following manner:
Line #1 sanderdust generation rate was estimated from a production of 100 MMft² with the following conversion assumptions:
Board pressed to 850/1000" and sanded to 750/1000". Board density of 45 lb/ft³.
(100,000,000 ft²)((850–750)"/1000)(1 ft/12")(45 lb/ft³)(1 ton/2000 lbs) = 18,750 tons.
The amount of furnish which can be dried per ton of sanderdust fuel consumed in the dryer system was estimated from stack test data:
Production data recorded during stack testing shows 29,060 lbs of wet throughput through dryers #5 and #6 during TSP testing.
This throughput was achieved with the fuel combustion calculated above in footnote d (1.112 tons/hr). This yields a factor of:
(29,060 lbs/hr)(1 ton/2000lbs)/(1.112 tons sanderdust/hr) = 13.07 tons throughput/ton sanderdust.
The amount of sanderdust combustion required to achieve the production rate calculated in footnote b above is calculated as follows:
(187,150 tons/yr)/(13.07 tons/ton sanderdust) = 14,319 tons sanderdust.
The difference between sanderdust generated and consumed is then:
18,750 tons sanderdust generated – 14,319 tons sanderdust needed = 4,431 tons.

Lousiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 1B (Revised Table 5–2)
PARTICULATE MATTER – POST–EXPANSION ACTUAL EMISSIONS AT 150 MILLION FT² (3/4") PRODUCTION
STACK EMISSIONS – NOT INCLUDING FUGITIVE PARTICULATES

SOURCE DESIGNATION	SOURCE DESCRIPTION	CONTROL DESIGNATION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISTING AND MODIFIED SOURCES						
PC 206	Dryer #1	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 207	Dryer #2	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 208	Dryer #3	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 209	Dryer #4	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 301	Reject Hopper Pneu.	Emissions Rerouted to another baghouse				
PC 302	Blending Area Pneu.	Emissions Rerouted to another baghouse				
PC 401A	Forming Machine to Face Pneu.	Baghouse	0.005 gr/CF	26,680 CFM	5.01	Industry Data
PC 401B	Forming Machine to Core Pneu.	Baghouse	0.005 gr/CF	26,680 CFM	5.01	Industry Data
PC 404	Mat Trim Saws Pneu.	Cyclone	0.03 gr/CF	21,380 CFM	24.08	AP–42 (Table 10.4.1)
PC 405	Line Clean Up Pneu.	Cyclone	0.03 gr/CF	4,320 CFM	4.87	AP–42 (Table 10.4.1)
PC 501 A&B	5X25 Saws & blow hog pneu.	Baghouse	included with PC 503 A&B			Industry Data
PC 502A	Sander Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 503 A&B	5x16 Saws & Blow Hog Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 504	Saws and Hog to Storage – H.P.	Emissions Rerouted to another baghouse				
PC 506	Fuel Hammer Mill	Baghouse	0.005 gr/CF	9,500 CFM	1.78	Industry Data
PC 601	Reman Pneu.	Baghouse	0.005 gr/CF	16,000 CFM	3.00	Industry Data
PC 602	Reman Relay (H.P. System)	Baghouse	0.005 gr/CF	8,000 CFM	1.50	Industry Data
PC 701 A,B,C	Hot Press Vent Fans	Atmosphere	6 lb/hr[c]	8400 hrs	25.20	Oregon Tests
PC 702	Pre Press Vent Fans	Atmosphere	2 lb/hr[c]	8400 hrs	8.40	Oregon Tests
PC 801	Boiler #1	To Dryer	Included with ROEMMC Stack			
PC 802	ROEMMC Burner	To Dryer	9.53 lb/ton[d]	(2,273)tons[e]	0.00	1994 Stack Testing
PC 805	Reman Bullnose and Saws	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
EXPANSION SOURCES						
PC 201	New Predryer #A	Multiclone	0.366 lb/ton[f]	0 tons[g]	0.00	1994 Stack Testing
PC 211	New Predryer #B	Multiclone	0.366 lb/ton[f]	0 tons[g]	0.00	1994 Stack Testing
PC 212	New Dryer #C	Multiclone	0.477 lb/ton[h]	43,809 tons[i]	10.45	1994 Stack Testing
PC 213	New Dryer #D	Multiclone	0.601 lb/ton[h]	43,809 tons[i]	13.16	1994 Stack Testing
PC 507	New Saws & Hogged Edgings	Baghouse	0.005 gr/CF	60,000 CFM	11.26	Industry Data
PC 508	New Saws & Hogged Edgings Re	Baghouse	0.005 gr/CF	53,360 CFM	10.02	Industry Data
PC 509	New Sanderdust Pneu	Baghouse	0.005 gr/CF	94,000 CFM	17.65	Industry Data
PC 510	New Sanderdust Relay	Baghouse	0.005 gr/CF	1,000 CFM	0.19	Industry Data
PC 703	New Hot Press Vents	Atmosphere	1.009 lb/Mft²[j]	50000 Mft²	25.22	1994 Stack Testing
PC 803	GEKA	Atmosphere	13.7 lb/10⁶cf	62 10⁶cf[k]	0.42	AP–42 Table 1.4–1
PC 804	COEN Burner	Stack	7.68 lb/ton[l]	3,821 tons[m]	14.67	1994 Stack Testing
	Total				**259.46**	

[a] lb TSP/ton wet material throughput. Test Report shows 3.8 lb/hr emission rate with 14,040 lb/hr throughput:
(3.8 lb TSP/hr) / (14,040 lb/hr)(1 ton/2000 lbs) = 0.541 lb/ton.

[b] #1–#4 dryer usage rates calculated based on a line 1 production rate of 100 MMft² with the following conversion assumptions: board pressed to 850/1000", 8% trim loss, 6.25% resin solids, 0.5% wax solids, 5% final board moisture content and 18% moisture content of wood introduced into the dryers.
(100,000,000 ft²)(850"/1000)(1 ft/12")(1/(1–0.08))(45 lb/ft³)(1–0.0625–0.005)((1–0.05)/(1–0.18))(1 ton/2000 lbs) = 187,150 tons.
Total production was divided evenly into four dryers.

[c] This factor and calculation remains unchanged from the 1986 submittal because no new data was available.

[d] lbs TSP/ton sanderdust fuel combusted. *Factor was derived from 1994 testing of ROEMMC tube as follows:*
Orsat analysis of ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 1.112 tons/hr.
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lbmol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 1.112 tons/hr.
The TSP flow rate in the ROEMMC tube was 10.6 lbs/hr which corresponds to an emission factor of 9.53 lbs/ton.
(10.6 lbs TSP/hr)/(1.112 tons sanderdust fuel/hr) = 9.53 lbs TSP/ton sanderdust fuel.

Lousiana--Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 1B continued
PARTICULATE MATTER – POST–EXPANSION ACTUAL EMISSIONS AT 150 MILLION FT² (3/4") PRODUCTION
STACK EMISSIONS – NOT INCLUDING FUGITIVE PARTICULATES

[e] Value represents the difference between sanderdust generated by line #1 and the amount needed by all 6 dryers.
This value was estimated in the following manner:
Line #1 sanderdust generation rate was estimated from a production of 100 MMft² with the following conversion assumptions:
Board pressed to 850/1000" and sanded to 750/1000". Board density of 45 lb/ft³.
(100,000,000 ft²)((850–750)"/1000)(1 ft/12")(45 lb/ft³)(1 ton/2000 lbs) = 18,750 tons.
The amount of furnish which can be dried per ton of sanderdust fuel consumed in the dryer system was estimated from stack test data:
Production data recorded during stack testing shows 29,060 lbs of wet throughput through dryers #5 and #6 during TSP testing.
This throughput was achieved with the fuel combustion calculated above in footnote d (1.112 tons/hr). This yields a factor of:
(29,060 lbs/hr)(1 ton/2000lbs)/(1.112 tons sanderdust/hr) = 13.07 tons throughput/ton sanderdust.
The amount of sanderdust combustion required to achieve the production rate calculated in footnote b above and footnote i below is calculated as follows:
(187,150 tons/yr + 87,617 tons/yr)/(13.07 tons/ton sanderdust) = 21,023 tons sanderdust.
The difference between sanderdust generated and consumed is then:
18,750 tons sanderdust generated – 21,023 tons sanderdust needed = –2,273 tons.
NOTE: the fact that this value is negative indicates that, after the expansion, insufficient heat was available from the sanderdust generated by line #1 to operate the additional two dryers. *Supplemental heat is required from the COEN stack. This sanderdust deficit calculated here* will be subtracted from the COEN stack waste heat emission calculation as discussed below in footnote m.

[f] lb TSP/ton wet throughput. Factor was derived from 1994 stack testing in the following manner:
The sum of emissions from both dryers was 7.1 lb/hr. Throughput through the dryers during TSP testing was 19,393 lb/hr each
(7.1 lb TSP/hr)/(2 x 19393 lbs/2000 lb/ton) = 0.366 lbs TSP/ton.

[g] Predryers were not used until 1994. However, COEN burner was used to combust sanderdust and generate heat for ROEMMC tube.

[h] lb TSP/ton wet throughput. Factor was derived from 1994 stack testing in the following manner:
The emission rate for each dryer was divided by recorded throughput during TSP testing:
Dryer 5 – (3.6 lb TSP/hr)/(15080 lbs/2000 lb/ton) = 0.477 lbs TSP/ton.
Dryer 6 – (4.2 lb TSP/hr)/(13980 lbs/2000 lb/ton) = 0.601 lbs TSP/ton.

[i] #5 & #6 dryer usage rates calculated based on a line 2 production of 50 MMft² board pressed with the following conversion assumptions:
Board pressed to 815/1000", 4.6% trim loss, 6.25% resin solids, 0.5% wax solids, 3.8% final board moisture content and 18% moisture content of wood introduced into the dryers. Total production was divided evenly into both dryers.
(50,000,000 ft²)(815"/1000)(1 ft/12")(1/(1–0.046))(45 lb/ft³)(1 ton/2000 lbs)(1–0.0625–0.005)(1–0.038)/(1–0.18) = 87,617 tons.

[j] lbs TSP/Mft² (3/4") finished board. Factor was derived from 1994 stack testing in the following manner:
The sum of the TSP emission rates for the Cooler vents 1 and 2 and Press vents 1–4 is 8.3 lb/hr.
The recorded production rate during TSP testing was 8.230 Mft²/hr.
(8.3 lb TSP/hr)/(8.230 Mft²/hr) = 1.009 lb TSP/Mft²

[k] Natural gas consumption taken from 1993 emission inventory.

[l] lbs TSP/ton sanderdust fuel combusted. Factor was derived from 1994 testing of COEN stack as follows:
Orsat analysis of the COEN stack shows an average CO_2 dry vol% of 3.90% at an average air flow of 6,785 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 0.495 tons/hr.
(0.0390)(6,785 DSCFM)(60 min/hr)(1 lbmol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 0.495 tons/hr.
The TSP flow rate from the COEN stack was 3.8 lbs/hr which corrosponds to an emission factor of 7.68 lbs/ton.
(3.8 lbs TSP/hr)/(0.495 tons sanderdust fuel/hr) = 7.68 lbs TSP/ton sanderdust fuel.

[m] Sanderdust generation rate estimated from 50 Mft² production with the following conversion assumptions:
board pressed to 815/1000" and sanded to 750/1000". Board density of 45 lb/ft³.
(50,000,000 ft²)((815–750)"/1000)(1 ft/12")(45 lb/ft³)(1 ton/2000 lb) = 6094 tons.
As discussed above in footnote e, some of the combustion gas from the COEN burner is required for supplemental heat input into the ROEMMC tube. The sanderdust required to provide this supplemental heat is calculated above in footnote e. Therefore:
(6,094 tons) – (2,273 tons) = 3,821 tons remaining sanderdust.
Emissions from this stack, under this configuration, is represented by the combustion of 3,821 tons of sanderdust.

Lousiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 1C
PARTICULATE MATTER – CURRENT ACTUAL EMISSIONS AT 150 MILLION FT² (3/4") PRODUCTION
STACK EMISSIONS – NOT INCLUDING FUGITIVE PARTICULATES

SOURCE DESIGNATION	SOURCE DESCRIPTION	CONTROL DESIGNATION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISTING AND MODIFIED SOURCES						
PC 206	Dryer #1	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 207	Dryer #2	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 208	Dryer #3	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 209	Dryer #4	Polutrol	0.54 lb/ton[a]	46,788 tons[b]	12.63	1989 test of #2 dryer
PC 301	Reject Hopper Pneu.	Emissions Rerouted to another baghouse				
PC 302	Blending Area Pneu.	Emissions Rerouted to another baghouse				
PC 401A	Forming Machine to Face Pneu.	Baghouse	0.005 gr/CF	26,680 CFM	5.01	Industry Data
PC 401B	Forming Machine to Core Pneu.	Baghouse	0.005 gr/CF	26,680 CFM	5.01	Industry Data
PC 404	Mat Trim Saws Pneu.	Baghouse	0.005 gr/CF	21,380 CFM	4.01	Industry Data
PC 405	Line Clean Up Pneu.	Baghouse	0.005 gr/CF	4,320 CFM	0.81	Industry Data
PC 501 A&B	5X25 Saws & blow hog pneu.	Baghouse	included with PC 503 A&B			Industry Data
PC 502A	Sander Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 503 A&B	5x16 Saws & Blow Hog Pneu.	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
PC 504	Saws and Hog to Storage – H.P.	Emissions Rerouted to another baghouse				
PC 506	Fuel Hammer Mill	Removed				
PC 601	Reman Pneu.	Baghouse	0.005 gr/CF	16,000 CFM	3.00	Industry Data
PC 602	Reman Relay (H.P. System)	Baghouse	0.005 gr/CF	8,000 CFM	1.50	Industry Data
PC 701 A,B,C	Hot Press Vent Fans	Atmosphere	6 lb/hr[c]	8400 hrs	25.20	Oregon Tests
PC 702	Pre Press Vent Fans	Atmosphere	2 lb/hr[c]	8400 hrs	8.40	Oregon Tests
PC 801	Boiler #1	To Dryer	Included with ROEMMC Stack			
PC 802	ROEMMC Burner	To Dryer	9.53 lb/ton[d]	0 tons[e]	0.00	1994 Stack Testing
PC 805	Reman Bullnose and Saws	Baghouse	0.005 gr/CF	48,000 CFM	9.01	Industry Data
EXPANSION SOURCES						
PC 201	New Predryer #A	Multiclone	0.366 lb/ton[f]	74,460 tons[g]	13.63	1994 Stack Testing
PC 211	New Predryer #B	Multiclone	0.366 lb/ton[f]	74,460 tons[g]	13.63	1994 Stack Testing
PC 212	New Dryer #C	Multiclone	0.477 lb/ton[h]	43,809 tons[i]	10.45	1994 Stack Testing
PC 213	New Dryer #D	Multiclone	0.601 lb/ton[h]	43,809 tons[i]	13.16	1994 Stack Testing
PC 507	New Saws & Hogged Edgings	Baghouse	0.005 gr/CF	60,000 CFM	11.26	Industry Data
PC 508	New Saws & Hogged Edgings Re	Baghouse	0.005 gr/CF	53,360 CFM	10.02	Industry Data
PC 509	New Sanderdust Pneu	Baghouse	0.005 gr/CF	94,000 CFM	17.65	Industry Data
PC 510	New Sanderdust Relay	Baghouse	0.005 gr/CF	1,000 CFM	0.19	Industry Data
PC 703	New Hot Press Vents	Atmosphere	1.009 lb/Mft²[j]	50000 Mft²	25.22	1994 Stack Testing
PC 803	GEKA	Atmosphere	13.7 lb/10⁶cf	62 10⁶cf[k]	0.42	AP–42 Table 1.4–1
PC 804	COEN Burner	Stack	7.68 lb/ton[l]	0 tons[e]	0.00	1994 Stack Testing
PC 102	Outside Truck Dump	Baghouse	0.005 gr/CF	27470 CFM	5.16	Industry Data
	Total				246.13	

[a] lb TSP/ton wet material throughput. Test Report shows 3.8 lb/hr emission rate with 14,040 lb/hr throughput:
(3.8 lb TSP/hr) / (14,040 lb/hr)(1 ton/2000 lbs) = 0.541 lb/ton.

[b] Dryer usage rate calculated based on 100 MMft² board pressed with the following conversion assumptions:
board pressed to 850/1000", 8% trim loss, 6.25% resin solids, 0.5% wax solids, 5% final board moisture content and 18% moisture content of wood introduced into the dryers.
(100,000,000 ft²)(850"/1000)(1 ft/12")(1/(1–0.08))(45 lb/ft³)(1–0.0625–0.005)((1–0.05)/(1–0.18))(1 ton/2000 lbs) = 187,150 tons.
Total production was divided evenly into four dryers.

[c] This factor and calculation remains unchanged from the 1986 submittal because no new data was available.

[d] lbs TSP/ton sanderdust fuel combusted. Factor was derived from 1994 testing of ROEMMC tube as follows:
Orsat analysis of ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 1.112 tons/hr.
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lbmol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 1.112 tons/hr.
The TSP flow rate in the ROEMMC tube was 10.6 lbs/hr which corresponds to an emission factor of 9.53 lbs/ton.
(10.6 lbs TSP/hr)/(1.112 tons sanderdust fuel/hr) = 9.53 lbs TSP/ton sanderdust fuel.

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TABLE 1C continued
PARTICULATE MATTER – CURRENT ACTUAL EMISSIONS AT 150 MILLION FT² (3/4") PRODUCTION
STACK EMISSIONS – NOT INCLUDING FUGITIVE PARTICULATES

[e] Since actual predryer usage is unknown, it will be assumed that the predryers are operated at their maximum capacity. In this situation, all sanderdust generated at the facility will need to be used for heating the dryers and/or predryers. No combustion gases will vent through the Boiler, ROEMMC or COEN stacks.

[f] lb TSP/ton wet throughput. Factor was derived from 1994 stack testing in the following manner:
The sum of emissions from both dryers was 7.1 lb/hr. Throughput through the dryers during TSP testing was 19,393 lb/hr each
(7.1 lb TSP/hr)/(2 x 19393 lbs/2000 lb/ton) = 0.366 lbs TSP/ton.

[g] Since it is not known what capacity the predryers will operate at, usage is based on the rated capacity of 17,000 lb/hr times 8760 hours/year.
(17,000 lbs/hr)(1 ton/2000 lbs)(8760 hrs/yr) = 74,460 tons/yr.

[h] lb TSP/ton wet throughput. Factor was derived from 1994 stack testing in the following manner:
The emission rate for each dryer was divided by recorded throughput during TSP testing:
Dryer 5 – (3.6 lb TSP/hr)/(15080 lbs/2000 lb/ton) = 0.477 lbs TSP/ton.
Dryer 6 – (4.2 lb TSP/hr)/(13980 lbs/2000 lb/ton) = 0.601 lbs TSP/ton.

[i] Dryer usage rate calculated based on 50 MMft² board pressed with the following conversion assumptions:
board pressed to 815/1000", 4.6% trim loss, 6.25% resin solids, 0.5% wax solids, 3.8% final board moisture content and 18% moisture content of wood introduced into the dryers. Total production was divided evenly into four dryers.
(50,000,000 ft²)(815"/1000)(1 ft/12")(1/(1 – 0.046))(45 lb/ft³)(1 – 0.0625 – 0.005)(1 – 0.038)/(1 – 0.18) = 87,617 tons.

[j] lbs TSP/Mft² (3/4") finished board. Factor was derived from 1994 stack testing in the following manner:
The sum of the TSP emission rates for the Cooler vents 1 and 2 and Press vents 1 – 4 is 8.3 lb/hr.
The recorded production rate during TSP testing was 8.230 Mft²/hr.
(8.3 lb TSP/hr)/(8.230 Mft²/hr) = 1.009 lb TSP/Mft²

[k] Natural gas consumption taken from 1993 emission inventory.

[l] lbs TSP/ton sanderdust fuel combusted. Factor was derived from 1994 testing of COEN stack as follows:
Orsat analysis of the COEN stack shows an average CO_2 dry vol% of 3.90% at an average air flow of 6,785 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 1.112 tons/hr.
(0.0390)(6,785 DSCFM)(60 min/hr)(1 lbmol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 0.495 tons/hr.
The TSP flow rate from the COEN stack was 3.8 lbs/hr which corrosponds to an emission factor of 7.68 lbs/ton.
(3.8 lbs TSP/hr)/(0.495 tons sanderdust fuel/hr) = 7.68 lbs TSP/ton sanderdust fuel.

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TABLE 2A (Revised TABLE 5–3)
CARBON MONOXIDE – PRE EXPANSION ACTUAL EMISSIONS AT 100 MMFT^2/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 701 A,B,C	Hot Press Vent Fans	0.60 lb/Mft^2 [b]	100,000 Mft^2	30.00	1994 Stack Tests
PC 702	Pre Press Vent Fans	Included with Hot Press Vent Fans			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	13.13 lb/ton [c]	18750 tons [d]	123.09	1994 Stack Tests
	TOTAL			153.09	

[a] As discussed in footnote c below, it is assumed that CO is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb CO/ Mft^2 (3/4") finished board. It was assumed that emissions from line #1 pressing are the same as that tested for line #2 since no better data was available. This factor was derived from 1994 stack testing as follows:
Sum of CO emissions from all line #2 press and cooler vents was 4.9 lbs/hr. Recorded production during testing was 8,230 ft^2 (3/4"). (4.9 lb/hr)/(8.230 Mft^2/hr) = 0.595 lb/Mft^2.
Emissions represent total CO emissions from pre–pressing, pressing and cooling.

[c] lb CO/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.112 tons/hr:
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(1–0.5) = 1.112 tons/hr
CO flow rates tested in this air stream were 14.6 lb/hr, therefore an emission factor can be calculated as follows:
(14.6 lb/hr)/(1.112 tons fuel) = 13.13 lb CO/ ton fuel burned.
This flow vents through the new dryers #5 and #6. Stack testing on the exhaust from these two dryers shows 13 lb/hr CO total flow out (i.e. slightly less that what went in). Therefore, within the accuracy of the testing, is would seem appearent that CO coming from the dryer systems is predominately a result of fuel combustion. For this reason it seems reasonable to evaluate emissions from the two combustion sources which feed the system and the dryers as one unit.

[d] Sanderdust generation rate was estimated from production of 100 MMft^2 with the following conversion assumptions: board pressed to 850/1000" and sanded to 750/1000". Board density of 45 lb/ft^3.
(100,000,000 ft^2)((850–750)/1000")(1 ft/ 12")(45 lb/ft^3)(1 ton/2000 lbs) = 18,750 tons.

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TABLE 2B (Revised TABLE 5–3)
CARBON MONOXIDE – POST EXPANSION ACTUAL EMISSIONS AT 150 MMFT^2/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISITING SOURCES					
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 701 A,B,C	Hot Press Vent Fans	0.60 lb/Mft^2 [b]	100,000 Mft^2	30.00	1994 Stack Tests
PC 702	Pre Press Vent Fans	Included with Hot Press Vent Fans			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	13.13 lb/ton [c]	18,750 tons [d]	123.09	1994 Stack Tests
NEW SOURCES					
PC 201	Predryer A	Included with COEN Burner			
PC 211	Predryer B	Included with COEN Burner			
PC 212	New Dryer #C	Included with ROEMMC Burner [e]			
PC 213	New Dryer #D	Included with ROEMMC Burner [e]			
PC 703	New Hot Press Vents	0.60 lb/Mft^2 [b]	50,000 Mft^2	15.00	1994 Stack Tests
PC 803	GEKA	35 lb/10^{6}cf	62 10^{6}cf [f]	1.09	AP–42 Table 1.4–2
PC 804	COEN Burner	11.53 lb/ton [g]	6,094 tons [h]	35.13	1994 Stack Tests
	TOTAL			204.31	

[a] As discussed in footnote c below, it is assumed that CO is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb CO/ Mft^2 finished board. It was assumed that emissions from line #1 pressing are the same as that tested for line #2 since no better data was available. This factor was derived from 1994 stack testing as follows:
Sum of emission from all line #2 press and cooler vents was 4.9 lbs/hr. Recorded production during testing was 8,230 ft^2 (3/4"). (4.9 lb/hr)/(8.230 Mft^2/hr) = 0.595 lb/Mft^2.
Emissions represent total CO emissions from pre–pressing, pressing and cooling.

[c] lb CO/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.112 tons/hr:
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(1–0.5) = 1.112 tons/hr
CO flow rates tested in this air stream were 14.6 lb/hr, therefore an emission factor can be calculated as follows:
(14.6 lb/hr)/(1.112 tons fuel) = 13.13 lb CO/ ton fuel burned.
This flow vents through the new dryers #5 and #6. Stack testing on the exhaust from these two dryers shows 13 lb/hr total flow out (i.e. slightly less that what went in). Therefore, within the accuracy of the testing, is would seem appearent that CO coming from the dryer systems is predominately a result of fuel combustion. For this reason it seems reasonable to evaluate emissions from the two combustion sources which feed the system and the dryers as one unit.

[d] Sanderdust generation rate was estimated from production of 100 MMft^2 with the following conversion assumptions:
board pressed to 850/1000" and sanded to 750/1000". Board density of 45 lb/ft^3.
(100,000,000 ft^2)((850–750)/1000")(1 ft/ 12")(45 lb/ft^3)(1 ton/2000 lbs) = 18,750 tons.

[e] The two new dryers were added onto the end of the ROEMMC tube and utilize heat which was already being generated. Therefore, there was no increase in CO emissions from the installation of these dryers. Some additional heat may be input into this system from the COEN burner. These additional emissions, however, are accounted for in the COEN stack emissions.

[f] Natural gas usage was taken from 1993 emissions inventory.

[g] lbs CO/ton sanderdust. This factor was derived from 1994 stack testing in the following manner:
The sum of the CO emission rates from the three predryer system stacks is 12.8 lbs/hr. The recorded sanderdust fuel combustion during the CO testing was 1.11 lb/hr. This corresponds to an emission factor of 11.53 lbs/ton.
(12.8 lbs CO/hr)/(1.11 tons sanderdust fuel combusted/hr) = 11.53 lbs CO/ton sanderdust.

[h] Sanderdust generation rate was estimated from production of 50 MMft^2 with the following conversion assumptions:
board pressed to 815/1000" and sanded to 750/1000". Board density of 45 lb/ft^3.
(50,000,000 ft^2)((815–750)/1000")(1 ft/ 12")(45 lb/ft^3)(1 ton/2000 lbs) = 6,094 tons.

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TABLE 3A (Revised TABLE 5–3)
NITROGEN OXIDES – PRE EXPANSION ACTUAL EMISSIONS AT 100 MMFT^2/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	19.24 lb/ton [b]	18750 tons [c]	180.37	1994 Stack Tests
	TOTAL			180.37	

[a] As discussed in footnote b below, it is assumed that NO_x is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb NO_x/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.112 tons/hr:
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(1–0.5) = 1.112 tons/hr
NO_x flow rate tested in this air stream was 21.4 lb/hr, therefore an emission factor can be calculated as follows:
(21.4 lb/hr)/(1.112 tons fuel) = 19.24 lb CO/ ton fuel burned.
This flow vents through the new dryers #5 and #6. Stack testing on the exhaust from these two dryers showed 22.9 lb/hr total flow out (i.e. slightly more than what went in). There is no reason to suspect that the drying of the wood would cause NO_x emissions. The material being dried is not resinated and, therefore, has a very low nitrogen content. Also, temperatures in the dryers do not seem high enough to cause oxidation. For these reasons it was assumed that, within the accuracy of the testing, all NO_x was being generated by fuel combustion and the two combustion sources and four dryers were treated as one unit.

[c] Sanderdust generation rate was estimated from production of 100 MMft^2 with the following conversion assumptions: board pressed to 850/1000" and sanded to 750/1000". Board density of 45 lb/ft^3.
(100,000,000 ft^2)((850–750)/1000")(1 ft/ 12")(45 lb/ft^3)(1 ton/2000 lbs) = 18,750 tons.

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TABLE 3B (Revised TABLE 5–3)
NITROGEN OXIDES – POST EXPANSION ACTUAL EMISSIONS AT 150 MMFT^2/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISITING SOURCES					
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	19.24 lb/ton [b]	18750 tons [c]	180.37	1994 Stack Tests
NEW SOURCES					
PC 201	Predryer A	Included with COEN Burner			
PC 211	Predryer B	Included with COEN Burner			
PC 212	New Dryer #C	Included with ROEMMC Burner [d]			
PC 213	New Dryer #D	Included with ROEMMC Burner [d]			
PC 803	GEKA	199 lb/10^{6}cf	62 10^{6}cf [e]	6.17	1994 Stack Tests
PC 804	COEN Burner	28.29 lb/ton [f]	6,094 tons [g]	86.20	1994 Stack Tests
	TOTAL			272.74	

[a] As discussed in footnote b below, it is assumed that NO_x is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb NO_x/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube shows an average CO_2 dry vol% of 5.63% at an average air flow of 10,560 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.112 tons/hr:
(0.0563)(10,560 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(1–0.5) = 1.112 tons/hr
NO_x flow rate tested in this air stream was 21.4 lb/hr, therefore an emission factor can be calculated as follows:
(21.4 lb/hr)/(1.112 tons fuel) = 19.24 lb CO/ ton fuel burned.
This flow vents through the new dryers #5 and #6. Stack testing on the exhaust from these two dryers showed 22.9 lb/hr total flow out (i.e. slightly more than what went in). There is no reason to suspect that the drying of the wood would cause NO_x emissions. The material being dried is not resinated and, therefore, has a very low nitrogen content. Also, temperatures in the dryers do not seem high enough to cause oxidation. For these reasons it was assumed that, within the accuracy of the testing, all NO_x was being generated by fuel combustion and the two combustion sources and four dryers were treated as one unit.

[c] Sanderdust generation rate was estimated from production of 100 MMft^2 with the following conversion assumptions:
board pressed to 850/1000" and sanded to 750/1000". Board density of 45 lb/ft^3.
(100,000,000 ft^2)((850–750)/1000")(1 ft/ 12")(45 lb/ft^3)(1 ton/2000 lbs) = 18,750 tons.

[d] The two new dryers were added onto the end of the ROEMMC tube and utilize heat which was already being generated. Therefore, there was no increase in NO_x emissions from the installation of these dryers. Some additional heat may be input into this system from the COEN burner. These additional emissions, however, are accounted for in the COEN stack emissions.

[e] Natural Gas consumption taken from 1993 emission inventory.

[f] lbs NO_x/ ton sanderdust fuel combusted. Emission factor was derived from the 1994 test data in the following manner:
The sum of the NO_x emission rates from the three predryer system stacks is 31.4 lbs/hr. The recorded sanderdust fuel combustion during the NO_x testing was 1.11 lb/hr. This corresponds to an emission factor of 28.29 lbs/ton.
(31.4 lbs NO_x/hr)/(1.11 tons sanderdust fuel combusted/hr) = 28.29 lbs NO_x/ton sanderdust.

[g] Sanderdust generation rate was estimated from production of 50 MMft^2 with the following conversion assumptions:
board pressed to 815/1000" and sanded to 750/1000". Board density of 45 lb/ft^3.
(50,000,000 ft^2)((815–750)/1000")(1 ft/ 12")(45 lb/ft^3)(1 ton/2000 lbs) = 6,094 tons.

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TABLE 4A (Revised TABLE 5–3)
VOLATILE ORGANIC COMPOUNDS – PRE EXPANSION ACTUAL EMISSIONS AT 100 MMFT²/YEAR

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
PC 206	Dryer #1	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 207	Dryer #2	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 208	Dryer #3	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 209	Dryer #4	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 701 A,B,C	Hot Press Vent Fans	0.527 lb/Mft²[c]	100,000 Mft²	26.35	1994 Stack Tests
PC 702	Pre Press Vent Fans	Included with hot press vent fans			
PC 801	Boiler	Included with ROEMMC Burner			
PC 802	ROEMMC	0.15 lb/ton[d]	4,431 tons[e]	0.33	1994 Stack Tests
	Reman Line – Paints	2.51 lb/gal[f]	86,651 gal/yr[g]	108.75	Material Balance
	Reman Line – Solvents	6.93 lb/gal[h]	16,232 gal/yr[i]	56.24	Material Balance
	TOTAL			**237.55**	

[a] lb VOC/ ton dried furnish. VOC emissions from dryers #1–#4 assumed to be equivelent to that tested for dryers #5 & #6.
Factor was derived from 1994 stack testing of dryers #5 & #6 stacks as follows:
Sum of VOC emissions from both dryers was 7.2 lb/hr.
Production of dry furnish during the VOC testing is shown on Report pg N–27 to be 14,453 lb/hr for the surface dryer and 10,897 lbs/hr for the core dryer. This corresponds to an emission factor of:
(7.2 lbs/hr) / (14,453 lbs/hr + 10,897 lbs/hr)(1 ton/2000 lbs) = 0.568 lbs VOC/ton dry furnish.

[b] Tons dry furnish/yr. Dryer usage rates are based upon 100 MMFt² production using the following conversion assumptions:
100 MMft² board pressed to 850/1000", 8% trim loss, 45 lb/ft³, 6.25% resin, 0.5% wax.
(100,000,000 ft²/ (1–0.08))(850"/1000)(1 ft/12")(45 lb/ft³)(1–0.065–0.005)(1 ton/2000 lb) = 161,540 tons.
Production was assumed to be evenly divided into four dryers.

[c] lb VOC/MMft² (3/4") finished board produced. VOC emissions assumed to be same as for #2 press line.
Factor was derived from 1994 stack testing of line #2 cooler vents 1 & 2 and press vents 1–4 as follows:
Sum of VOC emissions from all sources is 4.5 lbs/hr. Production shown on page N–57 is 8.533 Mft²/hr.
Emission factor = (4.5 lb)/(8.533 Mft²/hr) = 0.527 lbs/ MMft²

[d] lb VOC_X/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube (test 5) shows an average CO_2 dry vol% of 5.07% at an average air flow of 11,108 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.053 tons/hr:
(0.0507)(11,108 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(0.5) = 1.053 tons/hr
VOC flow rate tested in this air stream was 0.16 lb/hr, therefore an emission factor can be calculated as follows:
(0.16 lb/hr)/(1.053 tons fuel) = 0.15 lb VOC/ ton fuel burned.

[e] Value represents the amount of sanderdust combusted which was not used for heat input into the dryers.
This value was estimated as described in Table 1 – Particulate Emissions, footnote e.
18,750 tons sanderdust generated – 14,319 tons sanderdust needed = 4,431 tons.

[f] VOC content based upon average of VOC contents of paints supplied by Forrest Paint Company, Guardsman Products and Akzo Coatings, Inc.

[g] Paint usage rate taken from 1993 purchasing.

[h] Solvent density based upon density of Solvents purchased from Van Waters & Rogers, Inc.

[i] Solvent usage taken from 1993 purchasing minus solvent content of 1993 waste shipments.

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Missoula, Montana Particleboard Mill

TABLE 4B (Revised TABLE 5–3)
VOLATILE ORGANIC COMPOUNDS – POST EXPANSION ACTUAL EMISSIONS AT 150 MMFT²/YEAR

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISITING SOURCES					
PC 206	Dryer #1	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 207	Dryer #2	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 208	Dryer #3	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 209	Dryer #4	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 701 A,B,C	Hot Press Vent Fans	0.527 lb/Mft² [c]	100,000 Mft²	26.35	1994 Stack Tests
PC 702	Pre Press Vent Fans	Included with hot press vent fans			
PC 801	Boiler	Included with ROEMMC Burner			
PC 802	ROEMMC	0.15 lb/ton [d]	(2,273)tons [e]	0.00	1994 Stack Tests
	Reman Line – Paints	2.51 lb/gal [f]	86,651 gal/yr [g]	108.75	Material Balance
	Reman Line – Solvents	6.93 lb/gal [h]	16,232 gal/yr [i]	56.24	Material Balance
NEW SOURCES					
PC 201	Predryer A	0.567 lb/ton [j]	0 tons [k]	0.00	1994 Stack Tests
PC 211	Predryer B	0.567 lb/ton [j]	0 tons [k]	0.00	1994 Stack Tests
PC 212	New Dryer #C	0.568 lb/ton [a]	38,750 tons/yr [l]	11.00	1994 Stack Tests
PC 213	New Dryer #D	0.568 lb/ton [a]	38,750 tons/yr [j]	11.00	1994 Stack Tests
PC 703	New Hot Press Vents	0.527 lb/Mft² [c]	50,000 Mft²	13.18	1994 Stack Tests
PC 803	GEKA	5.8 lb/10⁶cf	62 10⁶cf [m]	0.18	AP–42 Table 1.4–3
PC 804	COEN Burner	0.02 lb/ton [n]	3,821 tons [o]	0.04	1994 Stack Tests
	TOTAL			**272.62**	

[a] lb VOC/ ton dried furnish. VOC emissions from dryers #1–#4 assumed to be equivalent to that tested for dryers #5 & #6. Factor was derived from 1994 stack testing of dryers #5 & #6 stacks as follows:
Sum of VOC emissions from both dryers was 7.2 lb/hr.
Production of dry furnish during the VOC testing is shown on Report pg N–27 to be 14,453 lb/hr for the surface dryer and 10,897 lbs/hr for the core dryer. This corresponds to an emission factor of:
(7.2 lbs/hr) / (14,453 lbs/hr + 10,897 lbs/hr)(1 ton/2000 lbs) = 0.568 lbs VOC/ton dry furnish.

[b] Tons dry furnish/hr. Dryer #1–#4 usage rates are based upon 100 MMFt² production using the following conversion assumptions: 100 MMft² board pressed to 850/1000", 8% trim loss, 45 lb/ft³, 6.25% resin, 0.5% wax.
(100,000,000 ft²/ (1–0.08))(850"/1000)(1 ft/12")(45 lb/ft³)(1–0.065–0.005)(1 ton/2000 lb) = 161,540 tons.
Production was assumed to be evenly divided into all four dryers.

[c] lb VOC/MMft² (3/4") finished board produced. VOC emissions assumed to be same as for #2 press line. Factor was derived from 1994 stack testing of line #2 cooler vents 1 & 2 and press vents 1–4 as follows:
Sum of VOC emissions from all sources is 4.5 lbs/hr. Production shown on page N–57 is 8.533 Mft²/hr.
Emission factor = (4.5 lb)/(8.533 Mft²/hr) = 0.527 lbs/ MMft²

[d] lb VOC_X/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube (test 5) shows an average CO_2 dry vol% of 5.07% at an average air flow of 11,108 DSCFM. Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.053 tons/hr:
(0.0507)(11,108 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(0.5) = 1.053 tons/hr
VOC flow rate tested in this air stream was 0.16 lb/hr, therefore an emission factor can be calculated as follows:
(0.16 lb/hr)/(1.053 tons fuel) = 0.15 lb VOC/ ton fuel burned.

[e] Value represents the difference between sanderdust generated by line #1 and the amount needed by all 6 dryers. This value was estimated as described in Table 1B – Post Expansion Particulate Emissions, footnote e.
18,750 tons sanderdust generated – 21,023 tons sanderdust needed = –2,273 tons.
NOTE: the fact that this value is negative indicates that, after the expansion, insufficient heat was available from the sanderdust generated by line #1 to operate the additional two dryers. Supplemental heat is required from the COEN stack. This sanderdust deficit will be subtracted from the COEN stack waste heat emission calculation as discussed below in footnote m.

[f] VOC content based upon average of VOC contents of paints supplied by Forrest Paint Company, Guardsman Products and Akzo Coatings, Inc.

TABLE 4B continued.
VOLATILE ORGANIC COMPOUNDS – POST EXPANSION ACTUAL EMISSIONS AT 150 MMFT²/YEAR

[g] Paint usage rate taken from 1993 purchasing.

[h] Solvent density based upon density of Solvents purchased from Van Waters & Rogers, Inc.

[i] Solvent usage taken from 1993 purchasing minus solvent content of 1993 waste shipments.

[j] lbs VOC/ton dried material throughput. Emission factor was derived from 1994 stack testing in the following manner:
The sum of VOC emissions from both dryers during testing was 11.0 lb/hr. Wet material throughput into the dryers during VOC testing was 19,393 lbs/hr each:
(11.0 lb/hr)/(2 x 19,393 lbs/2000 lb/ton) = 0.567 lb/ton.

[k] *Predryers were not used until 1994. However, COEN burner was used to combust sanderdust and generate heat for ROEMMC tube.*

[l] Dryer usage rate based upon 50 MMft² production. Production data recorded during testing shows 1.55 tons dried furnish used per Mft² board produced.
(50,000 Mft²/yr)(1.55 tons/Mft²) = 77,500 tons dried furnish/yr.
Production was divided evenly between the two dryers.

[m] Natural Gas usage taken from 1993 emissions inventory.

[n] lbs VOC/Mft² board produced. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the COEN stack shows an average CO_2 dry vol% of 3.90% at an average air flow of 6,785 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 0.495 tons/hr.
(0.0390)(6,785 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 0.495 tons/hr.
The VOC flow rate from the COEN stack was <0.01 lbs/hr which corresponds to an emission factor of:
(0.01 lb/hr)/(0.495 tons/hr) = 0.02 lb VOC/ton sanderdust fuel.

[o] Sanderdust generation rate was estimated from production of 50 MMft² with the following conversion assumptions:
board pressed to 815/1000" and sanded to 750/1000". Board density of 45 lb/ft³.
(50,000,000 ft²)((815–750)/1000")(1 ft/ 12")(45 lb/ft³)(1 ton/2000 lbs) = 6,094 tons.
As discussed above in footnote e, some of the combustion gas from the COEN burner is required for supplemental heat input into the ROEMMC tube. The sanderdust required to provide this heat is shown above in footnote e. Therefore:
(6094 tons generated) – (2,273 tons used for supplemental heat) = 3,821 tons remaining sanderdust.
Emissions from this stack, under this configuration, is represented by the combustion of 3,821 tons of sanderdust.

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 4C
VOLATILE ORGANIC COMPOUNDS – CURRENT ACTUAL EMISSIONS AT 150 MMFT^2/YEAR

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISITING SOURCES					
PC 206	Dryer #1	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 207	Dryer #2	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 208	Dryer #3	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 209	Dryer #4	0.568 lb/ton[a]	40,385 tons/yr[b]	11.47	1994 Stack Tests
PC 701 A,B,C	Hot Press Vent Fans	0.527 lb/Mft^2 [c]	100,000 Mft^2	26.35	1994 Stack Tests
PC 702	Pre Press Vent Fans	Included with hot press vent fans			
PC 801	Boiler	Included with ROEMMC Burner			
PC 802	ROEMMC	0.15 lb/ton [d]	(2,273)tons [e]	0.00	1994 Stack Tests
	Reman Line – Paints	2.51 lb/gal [f]	86,651 gal/yr [g]	108.75 [f]	Material Balance
	Reman Line – Solvents	6.93 lb/gal [h]	16,232 gal/yr [i]	56.24 [f]	Material Balance
NEW SOURCES					
PC 201	Predryer A	0.567 lb/ton [j]	54,298 tons [k]	15.39	1994 Stack Tests
PC 211	Predryer B	0.567 lb/ton [j]	54,298 tons [k]	15.39	1994 Stack Tests
PC 212	New Dryer #C	0.568 lb/ton [a]	38,750 tons/yr [l]	11.00	1994 Stack Tests
PC 213	New Dryer #D	0.568 lb/ton [a]	38,750 tons/yr [l]	11.00	1994 Stack Tests
PC 703	New Hot Press Vents	0.527 lb/Mft^2 [c]	50,000 Mft^2	13.18	1994 Stack Tests
PC 803	GEKA	5.8 lb/10^{6}cf	62 10^{6}cf [m]	0.18	AP–42 Table 1.4–3
PC 804	COEN Burner	0.02 lb/ton [n]	3,821 tons [o]	0.04	1994 Stack Tests
	TOTAL			**303.41** [f]	

[a] lb VOC/ ton dried furnish. VOC emissions from dryers #1–#4 assumed to be equivalent to that tested for dryers #5 & #6.
Factor was derived from 1994 stack testing of dryers #5 & #6 stacks as follows:
Sum of VOC emissions from both dryers was 7.2 lb/hr.
Production of dry furnish during the VOC testing is shown on Report pg N–27 to be 14,453 lb/hr for the surface dryer and 10,897 lbs/hr for the core dryer. This corresponds to an emission factor of:
(7.2 lbs/hr) / (14,453 lbs/hr + 10,897 lbs/hr)(1 ton/2000 lbs) = 0.568 lbs VOC/ton dry furnish.

[b] Tons dry furnish/hr. Dryer #1–#4 usage rates are based upon 100 MMFt^2 production using the following conversion assumptions: 100 MMft^2 board pressed to 850/1000", 8% trim loss, 45 lb/ft^3, 6.25% resin, 0.5% wax.
(100,000,000 ft^2/ (1–0.08))(850"/1000)(1 ft/12")(45 lb/ft^3)(1–0.065–0.005)(1 ton/2000 lb) = 161,540 tons.
Production was assumed to be evenly divided into all four dryers.

[c] lb VOC/MMft^2 (3/4") finished board produced. VOC emissions assumed to be same as for #2 press line.
Factor was derived from 1994 stack testing of line #2 cooler vents 1 & 2 and press vents 1–4 as follows:
Sum of VOC emissions from all sources is 4.5 lbs/hr. Production shown on page N–57 is 8.533 Mft^2/hr.
Emission factor = (4.5 lb)/(8.533 Mft^2/hr) = 0.527 lbs/ MMft^2

[d] lb VOC$_X$/ton sanderdust fuel burned. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the ROEMMC tube (test 5) shows an average CO_2 dry vol% of 5.07% at an average air flow of 11,108 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this corresponds to a wood combustion rate of 1.053 tons/hr:
(0.0507)(11,108 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs carbon/lb mol)(1 ton/2000 lbs)/(0.5) = 1.053 tons/hr
VOC flow rate tested in this air stream was 0.16 lb/hr, therefore an emission factor can be calculated as follows:
(0.16 lb/hr)/(1.053 tons fuel) = 0.15 lb VOC/ ton fuel burned.

[e] Value represents the difference between sanderdust generated by line #1 and the amount needed by all 6 dryers.
This value was estimated as described in Table 1B – Post Expansion Particulate Emissions, footnote e.
18,750 tons sanderdust generated – 21,023 tons sanderdust needed = –2,273 tons.
NOTE: the fact that this value is negative indicates that, after the expansion, insufficient heat was available from the sanderdust generated by line #1 to operate the additional two dryers. Supplemental heat is required from the COEN stack. This sanderdust deficit will be subtracted from the COEN stack waste heat emission calculation as discussed below in footnote m.

[f] VOC content based upon 1993 VOC contents of paints supplied by *Forrest Paint Company, Guardsman Products* and Akzo Coatings, Inc.
NOTE: The plant is presently converting this operation to lower VOC paints and these emissions are expected to decrease significantly.

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 4C continued.
VOLATILE ORGANIC COMPOUNDS – POST EXPANSION ACTUAL EMISSIONS AT 150 MMFT^2/YEAR

[g] Paint usage rate taken from 1993 purchasing.

[h] Solvent density based upon density of 1993 solvents purchased from Van Waters & Rogers, Inc.

[i] Solvent usage taken from 1993 purchasing minus solvent content of 1993 waste shipments.

[j] lbs VOC/ton dried material throughput. Emission factor was derived from 1994 stack testing in the following manner:
The sum of VOC emissions from both dryers during testing was 11.0 lb/hr. Wet material throughput into the dryers during VOC testing was 19,393 lbs/hr each:
(11.0 lb/hr)/(2 x 19,393 lbs/2000 lb/ton) = 0.567 lb/ton.

[k] Since it is not known at what capacity the pre–dryers will operate, usage is based on the rated capacity of 17,000 lb wet material throughput per hour. Dry material throughput was calculated assuming 42.1% inlet and 20.6 % outlet moisture.
(17,000 lbs/hr)((1–.421)/(1–0.206))(1 ton/2000 lbs)(8760 hrs/yr) = 54,298 tons/yr.

[l] Dryer usage rate based upon 50 MMft^2 production. Production data recorded during testing shows 1.55 tons dried furnish used per Mft^2 board produced.
(50,000 Mft^2/yr)(1.55 tons/Mft^2) = 77,500 tons dried furnish/yr.
Production was divided evenly between the two dryers.

[m] Natural Gas usage taken from 1993 emissions inventory.

[n] lbs VOC/Mft^2 board produced. Factor was derived from 1994 stack testing in the following manner:
Orsat analysis of the COEN stack shows an average CO_2 dry vol% of 3.90% at an average air flow of 6,785 DSCFM.
Assuming a sanderdust fuel carbon content of 50% this was converted to a wood combustion rate of 0.495 tons/hr.
(0.0390)(6,785 DSCFM)(60 min/hr)(1 lb mol/385 SCF)(12 lbs C/lb mol)(1 lb fuel/0.5 lbs C)(1 ton/2000 lbs) = 0.495 tons/hr.
The VOC flow rate from the COEN stack was <0.01 lbs/hr which corresponds to an emission factor of:
(0.01 lb/hr)/(0.495 tons/hr) = 0.02 lb VOC/ton sanderdust fuel.

[o] Sanderdust generation rate was estimated from production of 50 MMft^2 with the following conversion assumptions:
board pressed to 815/1000" and sanded to 750/1000". Board density of 45 lb/ft^3.
(50,000,000 ft^2)((815–750)/1000")(1 ft/ 12")(45 lb/ft^3)(1 ton/2000 lbs) = 6,094 tons.
As discussed above in footnote e, some of the combustion gas from the COEN burner is required for supplemental heat input into the ROEMMC tube. The sanderdust required to provide this heat is shown above in footnote e. Therefore:
(6094 tons generated) – (2,273 tons used for supplemental heat) = 3,821 tons remaining sanderdust.
Emissions from this stack, under this configuration, is represented by the combustion of 3,821 tons of sanderdust.

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 5A (Revised TABLE 5–3)
SULFUR DIOXIDE – PRE EXPANSION ACTUAL EMISSIONS AT 100 MMFT^2/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	0.39 lb/ton [b]	18750 tons [c]	3.66	AP–42, Table 1.6–2
	TOTAL			3.66	

[a] It is assumed that SO_2 is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb SO_2/ton sanderdust fuel burned. Factor was taken from AP–42. AP–42 Table 1.6–2 lists a value of 0.15 lb SO_2/ton wood fuel at 50% moisture. Factor was doubled since the fuel is dry. Although the table footnote d indicates that the lower end of the range shown should be used for wood fuel, the sanderdust combusted in these units contains a minor amount of added sulfur in the form of Ammonium sulfate catalyst. Production data recorded during stack testing indicates about 0.009% ammonium sulfate by weight in the finished product. Ammonimum sulfate is 24.3% Sulfur by weight. This yields a SO_2 generation rate of:

(0.00009 Catalyst)(0.24 S/Catalyst)(2000 lb/tn)(32 lbs SO^2)/(16 lbs S) = 0.09 lb SO_2/ton fuel from catalyst.

This sulfur would be in addition to the sulfur found in the wood. Therefore:

(0.3 lb/ton from wood)+(0.09 lb/ton from Ammonium Sulfate) = 0.39 lb/ton total.

[c] Sanderdust generation rate was estimated from production of 100 MMft^2 with the following conversion assumptions: board pressed to 850/1000" and sanded to 750/1000". Board density of 45 lb/ft^3.

(100,000,000 ft^2)((850–750)/1000")(1 ft/ 12")(45 lb/ft^3)(1 ton/2000 lbs) = 18,750 tons.

Louisiana–Pacific Corporation
Missoula, Montana Particleboard Mill

TABLE 5B (Revised TABLE 5–3)
SULFUR DIOXIDE – POST EXPANSION ACTUAL EMISSIONS AT 150 MMFT^2/YEAR PRODUCTION

SOURCE DESIGNATION	SOURCE DESCRIPTION	EMISSION FACTOR	PRODUCTION RATE	EMISSIONS TONS/YR	EMISSION FACTOR REFERENCE
EXISITING SOURCES					
PC 206	Dryer #1	Included with ROEMMC Burner [a]			
PC 207	Dryer #2	Included with ROEMMC Burner [a]			
PC 208	Dryer #3	Included with ROEMMC Burner [a]			
PC 209	Dryer #4	Included with ROEMMC Burner [a]			
PC 801	Boiler	Included with ROEMMC Burner [a]			
PC 802	ROEMMC	0.39 lb/ton [b]	18750 tons [c]	3.66	AP–42, Table 1.6–2
NEW SOURCES					
PC 201	Predryer A	Included with COEN Burner			
PC 211	Predryer B	Included with COEN Burner			
PC 212	New Dryer #C	Included with ROEMMC Burner [d]			
PC 213	New Dryer #D	Included with ROEMMC Burner [d]			
PC 803	GEKA	0.6 lb/10^{6}cf	62 10^{6}cf [e]	0.02	AP–42, Table 1.4–2
PC 804	COEN Burner	0.39 lb/ton [b]	6,094 tons [f]	1.19	AP–42, Table 1.6–2
	TOTAL			4.86	

[a] It is assumed that SO_2 is predominately a result of combustion. Therefore, emissions from all sources connected to the dryer system will be represented as common emissions and will be shown under PC 802.

[b] lb SO_2/ton sanderdust fuel burned. Factor was taken from AP–42. AP–42 Table 1.6–2 lists a value of 0.15 lb SO_2/ton wood fuel at 50% moisture. Factor was doubled since the fuel is dry. Although the table footnote d indicates that the lower end of the range shown should be used for wood fuel, the sanderdust combusted in these units contains a minor amount of added sulfur in the form of Ammonium sulfate catalyst. Production data recorded during stack testing indicates about 0.009% ammonium sulfate by weight in the finished product. Ammonimum sulfate is 24.3% Sulfur by weight. This yields a SO_2 generation rate of:

(0.00009 Catalyst)(0.24 S/Catalyst)(2000 lb/tn)(32 lbs SO^2)/(16 lbs S) = 0.09 lb SO_2/ton fuel from catalyst.

This sulfur would be in addition to the sulfur found in the wood. Therefore:

(0.3 lb/ton from wood) + (0.09 lb/ton from Ammonium Sulfate) = 0.39 lb/ton total.

[c] Sanderdust generation rate was estimated from production of 100 MMft^2 with the following conversion assumptions: board pressed to 850/1000" and sanded to 750/1000". Board density of 45 lb/ft^3.

(100,000,000 ft^2)((850–750)/1000")(1 ft/ 12")(45 lb/ft^3)(1 ton/2000 lbs) = 18,750 tons.

[d] The two new dryers were added onto the end of the ROEMMC tube and utilize heat which was already being generated. Therefore, there was no increase in SO_2 emissions from the installation of these dryers. Some additional heat may be input into this system from the COEN burner. These additional emissions, however, are accounted for in the COEN stack emissions.

[e] Natural Gas consumption taken from 1993 emission inventory.

[f] Sanderdust generation rate was estimated from production of 50 MMft^2 with the following conversion assumptions: board pressed to 815/1000" and sanded to 750/1000". Board density of 45 lb/ft^3.

(50,000,000 ft^2)((815–750)/1000")(1 ft/ 12")(45 lb/ft^3)(1 ton/2000 lbs) = 6,094 tons.

— INSERT ~~B~~ K —

Reference ~~13~~ 9 ~~(OECA)~~

This report presents the results of air emissions tests performed on May 9-12, 1994, at the Louisiana Pacific Waferboard plant located in Missoula, Montana. Pollutants tested for are particulate, VOC, formaldehyde, NO_X, and CO.

The Missoula plant includes a pre-dryer system, six rotary dryers, two press lines, and rotary board coolers. The pre-dry system consists of two 12 foot diameter by 40 foot long triple pass rotary drum dryers manufactured by Guarantee Performance. Emissions are vented to the atmosphere via two 40 inch diameter, 90 foot tall stacks. Heat for the pre-dryers is supplies by a 35 mmBTU/hr Coen sanderdust burner. Emissions from the pre-dryer are controlled by Polutrol multicyclones.

The two dryers which supply Line 2, the surface dryer(C) and core dryer(D) are tripple pass rotary dryers manufactured by Heil. Dryer C is nine foot in diameter and 32 foot long, dryer D is eight foot in diameter and 28 foot long. Emissions from the dryers are controlled by Polutrol multicyclones and emitted to the atmosphere via two 36 inch diameter, 40 foot tall ducts. Heat for the all dryers is supplied via a ROEMMC tube by a 50 mmBTU/hr ROEMMC sanderdust burner and a 55 mmBTU/hr Babcock Wilcox boiler.

The Line 2 continuous particleboard press is ventilated by four roof mounted axial fans. The board cooler is vented by two four foot square ducts. The plant processed 100% softwoods during the test period. Urea formaldehyde resin was used in both the face and core layers throughout the test period.

Particulate matter and condensable PM emissions were tested in accordance with Methods 5 and 202, respectively. Method 5 and 202 results are reported as front half and back half organic and inorganic fractions. Volatile organic compounds were tested in accordance with Method 25A, results are reported on an as carbon basis. Formaldehyde emissions were tested in accordance with Method 0011. Nitrogen oxides emissions were measured in accordance with Method 7. Carbon monoxide emissions were tested in accordance with Method 10.

The dryer and pre-dryer emissions were excluded from this report because they ~~include pollutants produced by the dryer heat sources and are not unique to each dryer or production line.~~

A rating of A was assigned to the report data with the exception of all VOC data and the board cooler formaldehyde data, which were assigned a rating of B. The VOC data was rated B because the Method 25A calibration requirements were not met. The board cooler formaldehyde data was downrated due to super-isokinetic sampling for all three runs.

(129-130 ok)

Can use the dryers the same. Confirm this unless all CFR's and value for [illegible]

REFERENCES

13. Results of the May 9-12, 1994 Air Emission Compliance Tests at the Louisiana Pacific Waferboard Plant in Missoula, Montana

Used press and board cooler only

EMISSION TEST REPORT REVIEW SUMMARY

Source Category:

Filename: pb13.xls
Ref. No.: 13(OECA)
Date: 16-Jul-97
Reviewer: DRL

Facility: Louisiana Pacific Corporation
Location: Missoula, Montana
Source: Line 2 Board Cooler
Test date: 11-May-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
	Stack temperature	Deg F	105	101	104	103.3
	Pressure	in. Hg	26.8	26.8	26.8	26.8
	Moisture	%	1.0	1.1	1.0	1.0
	Oxygen	%	20.9	20.9	20.9	20.9
	Gas volume sampled	dscf	46.01	46.88	47.96	46.95
	Vol. flow, actual	acfm	38,293	38,750	39,556	38,866
	Vol. flow, standard*	dscfm	31,786	32,368	32,906	32,353
	Isokinetic variation	%	129.4	129.4	130.3	129.7
	Process rate[a]	MSF 3/4/h	8.5	8.5	8.5	8.5
Indicate basis for process rate:		thouthand square feet of 3/4 thick board per hour				
	Pollutant concentrations:					AVERAGE
	TOC as propane	ppmdv	2.0	1.0	2.0	1.67E+00
	CO2	% vol.	0.0	0.0	0.0	3.00E-02
	Formaldehyde	ppmdv	0.36	0.34	0.59	4.30E-01
	Pollutant mass flux rates:					AVERAGE
	TOC as propane	lb/hr	4.36E-01	2.22E-01	4.51E-01	3.69E-01
	CO2	lb/hr	6.53E+01	6.65E+01	6.76E+01	6.65E+01
	Formaldehyde	lb/hr	5.35E-02	5.14E-02	9.07E-02	6.52E-02
	Emission factors (ENGLISH UNITS):					AVERAGE
	TOC as propane	lb/unit	5.10E-02	2.60E-02	5.28E-02	4.33E-02
	CO2	lb/unit	7.66E+00	7.80E+00	7.93E+00	7.79E+00
	Formaldehyde	lb/unit	6.26E-03	6.03E-03	1.06E-02	7.64E-03

a ASSUMED THAT ALL OF THE BOARD PRODUCED IN THE PRESS WAS COOLED
*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

VOC as Carbon	0.042	0.021	0.043	0.035

EMISSION TEST REPORT REVIEW SUMMARY

Source Category:

Filename: pb13.xls
Ref. No.: 13(OECA)
Date: 16-Jul-97
Reviewer: DRL

Facility: Louisiana Pacific Corporation
Location: Missoula, Montana
Source: Line 2 Board Cooler
Test date: 11-May-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
	Stack temperature	Deg F	88	104	116	102.7
	Pressure	in. Hg	26.8	26.8	26.8	26.8
	Moisture	%	1.7	1.1	2.0	1.6
	Oxygen	%	20.9	20.9	20.9	20.9
	Gas volume sampled	dscf	36.13	35.45	34.60	35.39
	Vol. flow, actual	acfm	38,196	38,455	38,044	38,232
	Vol. flow, standard*	dscfm	32,471	31,964	30,666	31,700
	Isokinetic variation	%	99.5	99.2	100.9	99.9
	Process rate[a]	MSF 3/4/hr	8.2	8.2	8.2	8.2
Indicate basis for process rate:		thouthand square feet of 3/4 thick board per hour				
	Pollutant mass:					
	Filterable PM	grams	0.0156	0.0163	0.0093	1.37E-02
	Condensable inorg. PM	grams	0.0028	0.0029	0.0033	3.00E-03
	Condensable org. PM	grams	0.0038	0.0024	0.0033	3.17E-03
	Total condensable PM	grams	0.0066	0.0053	0.0066	6.17E-03
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	6.66E-03	7.09E-03	4.15E-03	5.97E-03
	Condensable inorg. PM	gr/dscf	1.20E-03	1.26E-03	1.47E-03	1.31E-03
	Condensable org. PM	gr/dscf	1.62E-03	1.04E-03	1.47E-03	1.38E-03
	Total condensable PM	gr/dscf	2.82E-03	2.31E-03	2.94E-03	2.69E-03
	CO2	% vol.	0.0	0.0	0.0	3.00E-02
	CO	ppmdv	10.0	12.0	10.0	1.07E+01
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	1.85E+00	1.94E+00	1.09E+00	1.63E+00
	Condensable inorg. PM	lb/hr	3.33E-01	3.46E-01	3.87E-01	3.55E-01
	Condensable org. PM	lb/hr	4.52E-01	2.86E-01	3.87E-01	3.75E-01
	Total condensable PM	lb/hr	7.84E-01	6.32E-01	7.74E-01	7.30E-01
	CO2	lb/hr	6.67E+01	6.57E+01	6.30E+01	6.52E+01
	CO	lb/hr	1.42E+00	1.67E+00	1.34E+00	1.48E+00
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	2.25E-01	2.36E-01	1.32E-01	1.98E-01
	Condensable inorg. PM	lb/unit	4.04E-02	4.20E-02	4.70E-02	4.32E-02
	Condensable org. PM	lb/unit	5.49E-02	3.48E-02	4.70E-02	4.56E-02
	Total condensable PM	lb/unit	9.53E-02	7.68E-02	9.40E-02	8.87E-02
	CO2	lb/unit	8.11E+00	7.98E+00	7.66E+00	7.92E+00
	CO	lb/unit	1.72E-01	2.03E-01	1.62E-01	1.79E-01

a ASSUMED THAT ALL OF THE BOARD PRODUCED IN THE PRESS WAS COOLED
*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category:

Filename: pb13.xls
Ref. No.: 13(OECA)
Date: 16-Jul-97
Reviewer: DRL

Facility: Louisiana Pacific Corporation
Location: Missoula, Montana
Source: Line 2 Press
Test date: 11-May-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
Indicate basis for process rate:		thouthand square feet of 3/4 thick board per hour				
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	6.88E-01	3.37E-01	2.80E-01	4.35E-01
	Condensable inorg. PM	lb/unit	1.04E-01	6.66E-02	1.09E-01	9.33E-02
	Condensable org. PM	lb/unit	2.40E-01	2.62E-01	2.55E-01	2.52E-01
	Total condensable PM	lb/unit	3.44E-01	3.28E-01	3.64E-01	3.46E-01
	TOC as propane	lb/unit	9.52E-01	3.93E-01	4.05E-01	5.83E-01
	CO	lb/unit	4.48E-01	3.90E-01	4.11E-01	4.16E-01
	Formaldehyde	lb/unit	6.23E-03	8.10E-03	6.24E-03	6.86E-03
	VOC as Carbon		0.78	0.32	0.33	0.48

EMISSION TEST REPORT REVIEW SUMMARY

Source Category:

Filename: pb13.xls
Ref. No.: 13(OECA)
Date: 16-Jul-97
Reviewer: DRL

Facility: Louisiana Pacific Corporation
Location: Missoula, Montana
Source: Line 2 Press Vents 1&2
Test date: 11-May-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
	Stack temperature	Deg F	102	111	111	108.0
	Pressure	in. Hg	26.9	26.9	26.9	26.9
	Moisture	%	1.1	1.2	1.5	1.3
	Oxygen	%	20.9	20.9	20.9	20.9
	Gas volume sampled	dscf	31.14	30.39	31.59	31.04
	Vol. flow, actual	acfm	36,702	36,426	37,834	36,987
	Vol. flow, standard*	dscfm	30,636	29,872	30,951	30,487
	Isokinetic variation	%	100.1	100.2	100.6	100.3
	Process rate	MSF 3/4/hr	8.2	8.2	8.2	8.2
Indicate basis for process rate:		thouthand square feet of 3/4 thick board per hour				
	Pollutant mass:					
	Filterable PM	grams	0.0171	0.0097	0.0063	1.10E-02
	Condensable inorg. PM	grams	0.0037	0.002	0.0022	2.63E-03
	Condensable org. PM	grams	0.0146	0.0104	0.0117	1.22E-02
	Total condensable PM	grams	0.0183	0.0124	0.0139	1.49E-02
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	8.47E-03	4.93E-03	3.08E-03	5.49E-03
	Condensable inorg. PM	gr/dscf	1.83E-03	1.02E-03	1.07E-03	1.31E-03
	Condensable org. PM	gr/dscf	7.23E-03	5.28E-03	5.71E-03	6.08E-03
	Total condensable PM	gr/dscf	9.07E-03	6.30E-03	6.79E-03	7.38E-03
	CO2	% vol.	0.0	0.0	0.0	3.00E-02
	CO	ppmdv	18.0	10.0	15.0	1.43E+01
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	2.23E+00	1.26E+00	8.16E-01	1.43E+00
	Condensable inorg. PM	lb/hr	4.81E-01	2.60E-01	2.85E-01	3.42E-01
	Condensable org. PM	lb/hr	1.90E+00	1.35E+00	1.52E+00	1.59E+00
	Total condensable PM	lb/hr	2.38E+00	1.61E+00	1.80E+00	1.93E+00
	CO2	lb/hr	6.30E+01	6.14E+01	6.36E+01	6.27E+01
	CO	lb/hr	2.40E+00	1.30E+00	2.02E+00	1.91E+00
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	2.70E-01	1.53E-01	9.92E-02	1.74E-01
	Condensable inorg. PM	lb/unit	5.85E-02	3.16E-02	3.46E-02	4.16E-02
	Condensable org. PM	lb/unit	2.31E-01	1.64E-01	1.84E-01	1.93E-01
	Total condensable PM	lb/unit	2.89E-01	1.96E-01	2.19E-01	2.35E-01
	CO2	lb/unit	7.65E+00	7.46E+00	7.73E+00	7.61E+00
	CO	lb/unit	2.92E-01	1.58E-01	2.46E-01	2.32E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category:

Filename: pb13.xls
Ref. No.: 13(OECA)
Date: 16-Jul-97
Reviewer: DRL

Facility: Louisiana Pacific Corporation
Location: Missoula, Montana
Source: Line 2 Press Vents 1&2
Test date: 11-May-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
	Stack temperature	Deg F	102	112	122	112.0
	Pressure	in. Hg	26.9	26.9	26.9	26.9
	Moisture	%	1.1	0.9	1.1	1.0
	Oxygen	%	20.9	20.9	20.9	20.9
	Gas volume sampled	dscf	47.70	48.17	47.97	47.95
	Vol. flow, actual	acfm	35,863	36,738	37,239	36,613
	Vol. flow, standard*	dscfm	29,927	30,185	30,010	30,041
	Isokinetic variation	%	99.8	100.1	100.2	100.0
	Process rate	MSF 3/4/h	8.5	8.5	8.5	8.5
Indicate basis for process rate:		thouthand square feet of 3/4 thick board per hour				
	Pollutant concentrations:					AVERAGE
	TOC as propane	ppmdv	15.3	4.7	2.3	7.44E+00
	CO2	% vol.	0.0	0.0	0.0	3.00E-02
	Formaldehyde	ppmdv	0.38	0.49	0.38	4.17E-01
	Pollutant mass flux rates:					AVERAGE
	TOC as propane	lb/hr	3.14E+00	9.65E-01	4.80E-01	1.53E+00
	CO2	lb/hr	6.15E+01	6.20E+01	6.17E+01	6.17E+01
	Formaldehyde	lb/hr	5.31E-02	6.91E-02	5.33E-02	5.85E-02
	Emission factors (ENGLISH UNITS):					AVERAGE
	TOC as propane	lb/unit	3.68E-01	1.13E-01	5.62E-02	1.79E-01
	CO2	lb/unit	7.21E+00	7.27E+00	7.23E+00	7.24E+00
	Formaldehyde	lb/unit	6.23E-03	8.10E-03	6.24E-03	6.86E-03

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category:

Filename: pb13.xls
Ref. No.: 13(OECA)
Date: 16-Jul-97
Reviewer: DRL

Facility: Louisiana Pacific Corporation
Location: Missoula, Montana
Source: Line 2 Press Vents 3 & 4
Test date: 11-May-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
	Stack temperature	Deg F	99	102	105	102.0
	Pressure	in. Hg	26.9	26.9	26.9	26.9
	Moisture	%	1.2	1.1	1.1	1.1
	Oxygen	%	20.9	20.9	20.9	20.9
	Gas volume sampled	dscf	30.99	30.84	32.93	31.59
	Vol. flow, actual	acfm	35,079	34,975	37,429	35,828
	Vol. flow, standard*	dscfm	29,405	29,203	31,064	29,891
	Isokinetic variation	%	99.5	99.6	100.0	99.7
	Process rate	MSF 3/4/hr	8.2	8.2	8.2	8.2
Indicate basis for process rate:		thouthand square feet of 3/4 thick board per hour				
	Pollutant mass:					
	Filterable PM	grams	0.0274	0.0121	0.0119	1.71E-02
	Condensable inorg. PM	grams	0.003	0.0023	0.0049	3.40E-03
	Condensable org. PM	grams	0.0006	0.0064	0.0047	3.90E-03
	Total condensable PM	grams	0.0036	0.0087	0.0096	7.30E-03
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	1.36E-02	6.05E-03	5.58E-03	8.42E-03
	Condensable inorg. PM	gr/dscf	1.49E-03	1.15E-03	2.30E-03	1.65E-03
	Condensable org. PM	gr/dscf	2.99E-04	3.20E-03	2.20E-03	1.90E-03
	Total condensable PM	gr/dscf	1.79E-03	4.35E-03	4.50E-03	3.55E-03
	CO2	% vol.	0.0	0.0	0.0	3.00E-02
	CO	ppmdv	10.0	15.0	10.0	1.17E+01
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	3.44E+00	1.52E+00	1.48E+00	2.15E+00
	Condensable inorg. PM	lb/hr	3.76E-01	2.88E-01	6.11E-01	4.25E-01
	Condensable org. PM	lb/hr	7.53E-02	8.02E-01	5.86E-01	4.88E-01
	Total condensable PM	lb/hr	4.52E-01	1.09E+00	1.20E+00	9.13E-01
	CO2	lb/hr	6.04E+01	6.00E+01	6.39E+01	6.14E+01
	CO	lb/hr	1.28E+00	1.91E+00	1.35E+00	1.52E+00
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	4.18E-01	1.84E-01	1.80E-01	2.61E-01
	Condensable inorg. PM	lb/unit	4.57E-02	3.50E-02	7.43E-02	5.17E-02
	Condensable org. PM	lb/unit	9.15E-03	9.74E-02	7.12E-02	5.93E-02
	Total condensable PM	lb/unit	5.49E-02	1.32E-01	1.46E-01	1.11E-01
	CO2	lb/unit	7.34E+00	7.29E+00	7.76E+00	7.47E+00
	CO	lb/unit	1.56E-01	2.32E-01	1.65E-01	1.84E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category:

Filename: pb13.xls
Ref. No.: 13(OECA)
Date: 16-Jul-97
Reviewer: DRL

Facility: Louisiana Pacific Corporation
Location: Missoula, Montana
Source: Line 2 Press Vents 3 & 4
Test date: 11-May-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
	Stack temperature	Deg F	107	112	108	109.0
	Pressure	in. Hg	26.9	26.9	26.9	26.9
	Moisture	%	1.4	0.9	1.0	1.1
	Oxygen	%	20.9	20.9	20.9	20.9
	Gas volume sampled	dscf	48.50	17.58	48.00	38.03
	Vol. flow, actual	acfm	37,757	37,411	37,508	37,559
	Vol. flow, standard*	dscfm	31,129	30,747	31,016	30,964
	Isokinetic variation	%	100.3	99.5	99.5	99.8
	Process rate	MSF 3/4/hr	8.5	8.5	8.5	8.5
Indicate basis for process rate:		thouthand square feet of 3/4 thick board per hour				
	Pollutant concentrations:					AVERAGE
	TOC as propane	ppmdv	23.3	11.3	14.0	1.62E+01
	CO2	% vol.	0.0	0.0	0.0	3.00E-02
	Formaldehyde	ppmdv	4.2	4.1	1.9	3.40E+00
	Pollutant mass flux rates:					AVERAGE
	TOC as propane	lb/hr	4.98E+00	2.39E+00	2.98E+00	3.45E+00
	CO2	lb/hr	6.40E+01	6.32E+01	6.38E+01	6.36E+01
	Formaldehyde	lb/hr	6.11E-01	5.89E-01	2.75E-01	4.92E-01
	Emission factors (ENGLISH UNITS):					AVERAGE
	TOC as propane	lb/unit	5.83E-01	2.80E-01	3.49E-01	4.04E-01
	CO2	lb/unit	7.50E+00	7.41E+00	7.47E+00	7.46E+00
	Formaldehyde	lb/unit	7.16E-02	6.90E-02	3.23E-02	5.76E-02

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