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RESULTS OF THE AUGUST 27 - 29, 1996 AIR EMISSION COMPLIANCE TESTS AT THE LOUISIANA PACIFIC OSB PLANT NEWBERRY, MICHIGAN

Submitted to:

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SL/sll

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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.

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1 INTRODUCTION

During the period of August 27 - 29, 1996 Interpoll Laboratories personnel conducted Air Emission Compliance tests at the Louisiana Pacific Corporation (LP) OSB Plant Located in Newberry, Michigan on the following sources:

Source	Parameters
Dryer Primary Cyclone Exhaust	PM,NO_x,CO,THC's,CH_2O
E-Tube Outlet	PM,NO_x,CO,THC's,CH_2O
Dryer RTO Outlet	PM,SO_2,NO_x,VE,CO,THC's,CH_2O
Press Vents	PM,NO_x,VE,CO,THC's,CH_2O,MDI

On-site testing was performed by Mark Kaehler, Scott Fjelsta, Jamie Bainville, Ed Juers, Bob Aschenbach, Mark Petersen, Jim Lorenz, and Dan Hulleman. Coordination between testing activities and plant operation was provided by Keith Seelig of LP. The tests were not witnessed by a member of the Michigan Department of Natural Resources.

Particulate evaluations were performed in accordance with EPA Methods 2-5, CFR Title 40, Part 60, Appendix A (revised July 1, 1995). 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.

An integrated flue gas sample was extracted 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 in-leakage are discarded. Integrated flue gas samples collected during each particulate sampling were also analyzed for carbon monoxide as per EPA Method 10 (NDIR).

Oxides of nitrogen, carbon monoxide, oxygen, and carbon dioxide concentrations at the **Dryer Primary Cyclone Exhaust, E-Tube Outlet,** and **Press Vents** were determined in accordance with Methods 7E, 10, and 3A (Ibid). A slip stream of sample gas was withdrawn from the exhaust gas stream using a heated stainless steel probe equipped with a filter to remove interfering particulate material. The particulate-free gas was transported to the analyzers by means of a heat-traced probe and filter assembly. After passing through the filter, the gas passed through a chilled condenser-type moisture removal system. The particulate-free dry gas was then transported to the analyzers with the excess exhausted to the atmosphere through a calibrated orifice which was used to ensure that the flow from the stack exceeds the requirements of the analyzers. A three-way valve on the probe was used to introduce standard gas for the "system bias check".

Oxides of nitrogen, carbon monoxide, oxygen, and carbon dioxide evaluations at the **Dryer RTO Outlet** were performed in accordance with EPA Methods 7E, 10, and 3A, CFR Title 40, Part 60, Appendix A (revised July 1, 1995). For oxygen analysis, a slip stream of sample gas was withdrawn from the exhaust gas stream using test ports (provided by the plant) on the stack adjacent to the CEMS using a heat-traced probe and filter assembly. After passing through the filter, the gas passed through two condenser-type moisture removal systems operating in series. The particulate-free dry gas was then transported to the oxygen analyzer with the excess exhausted to the atmosphere through a calibrated orifice which was used to ensure that the flow from the stack exceeds the requirements of the two analyzers. A three-way valve on the probe was used to introduce standard gas for the "system bias check". For NO_x, CO, and CO_2 analysis, a dilution probe based system was used. In this system a slip stream of exhaust gas is drawn from the exhaust gas stream using an EPM dilution probe. The sample stream is filtered and diluted (approximate dilution during these tests was 300:1) before delivery to the NO_x, CO, and CO_2 analyzers. The analog response of the analyzers in both systems was recorded using a computer data logger and backed up with a strip chart recorder. The analyzers were calibrated with National Specialty Gases and Air Products and Chemicals standard gases.

The analog response of each analyzer was recorded with a computer datalogger and backed up with a strip chart recorder. The NO_x, CO, O_2 and CO_2 analyzers were calibrated with National Specialty Gases and Air Products and Chemicals standard gases. The instrument was calibrated before and after each run as per EPA Method 7E, 10, and 3A. The

sample probe was moved through a three-point traverse (1/6, 3/6, 5/6 of the stack diameter) to measure oxides of nitrogen and carbon monoxide concentrations.

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.

MDI concentrations were determined in accordance with the 1,2-PP Method as developed by Radian Corporation under contract to USEPA. This method employs collection of MDI with 1,2-PP in toluene reagent, with analysis by HPLC.

Testing on the Primary Cyclone Outlet Exhaust was conducted from two test ports oriented at 90 degrees. These test ports are located 7.4 diameters downstream and 14.9 diameters upstream of the nearest flow disturbances. A 12-point traverse was used to collect representative particulate and formaldehyde samples. Each traverse point was sampled 5 minutes to give a total sampling time of 60 minutes per run.

Testing on the E-Tube Outlet was conducted from two test ports oriented at 90 degrees. These test ports are located approximately 8 diameters downstream and 2 diameters upstream of the nearest flow disturbances. A 12-point traverse was used to collect representative particulate and formaldehyde samples. Each traverse point was sampled for 5 minutes to give a total sampling time of 60 minutes per run.

Testing on the Dryer RTO Outlet was conducted from two test ports oriented at 90 degrees. These test ports are located approximately 6.6 diameters downstream and 5.6 diameters upstream of the nearest flow disturbances. A 16-point traverse was used to collect

representative particulate and formaldehyde samples. Each traverse point was sampled for 4 minutes to give a total sampling time of 64 minutes per run. Visible emission determinations were performed at this site by Steve Kelker, an EPA-certified observer.

Testing on the Press Vents was conducted as one source by performing one half of the test run in one vent and one half of the test run in the second vent. Sampling was performed from a set of eight test ports (four on each vent) situated horizontally on a vertical section of each duct. A 24-point traverse was used to collect particulate and formaldehyde samples. Each traverse point was sampled three minutes for a total sampling time of 72 minutes per run. A 6-point traverse was used to collect MDI samples. Each traverse point was sampled 10 minutes to give a total sampling time of 60 minutes per run. Visible emission determinations were performed on each vent by Mark Petersen, an EPA-certified observer.

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 - 4. The particulate results have been calculated using the dry plus method 202 condensible wet catch ("a" Tables) and again with the dry catch only ("b" Tables). An overview of all results is presented in the tables on the following pages:

PARAMETER	MEASURED
DRYER PRIMARY CYCLONE EXHAUST	
Particulate	
DRY + WET CATCH . . . . . (GR/DSCF)	0.366
. . . . . (LB/HR)	102
DRY CATCH ONLY . . . . . (GR/DSCF)	0.279
. . . . . (LB/HR)	77.5
Oxides of Nitrogen	
. . . . . (ppm,d)	28
. . . . . (LB/HR)	6.5
Carbon Monoxide	
. . . . . (ppm,d)	568
. . . . . (LB/HR)	80
TGNMO's	
. . . . . (ppmC,w)	292
. . . . . (LBC/HR)	22.7
Formaldehyde	
. . . . . (ppm,d)	4.8
. . . . . (LB/HR)	0.69
E-TUBE OUTLET	
Particulate	
DRY + WET CATCH . . . . . (GR/DSCF)	0.0340
. . . . . (LB/HR)	10.5
DRY CATCH ONLY . . . . . (GR/DSCF)	0.0110
. . . . . (LB/HR)	3.4
Oxides of Nitrogen	
. . . . . (ppm,d)	15
. . . . . (LB/HR)	3.9
Carbon Monoxide	
. . . . . (ppm,d)	513
. . . . . (LB/HR)	80
TGNMO's	
. . . . . (ppmC,w)	175
. . . . . (LBC/HR)	16
Formaldehyde	
. . . . . (ppm,d)	19
. . . . . (LB/HR)	3.3

* ***Note: TGNMO's = Total Gaseous Non-Methane Organics.***

PARAMETER		MEASURED
DRYER RTO OUTLET		
Particulate		
DRY + WET CATCH	(GR/DSCF)	0.00673
	(LB/HR)	2.1
DRY CATCH ONLY	(GR/DSCF)	0.00153
	(LB/HR)	0.47
Sulfur Dioxide		
	(ppm,d)	< 1
	(LB/HR)	< 0.36
Oxides of Nitrogen		
	(ppm,d)	24
	(LB/HR)	6.1
Opacity	(%)	0.31
Carbon Monoxide		
	(ppm,d)	54
	(LB/HR)	8.4
TGNMO's		
	(ppmC,w)	≤2.6
	(LBC/HR)	≤0.23
Formaldehyde		
	(ppm,d)	1.2
	(LB/HR)	0.21
PRESS VENTS		
Particulate		
DRY + WET CATCH	(GR/DSCF)	0.00551
	(LB/HR)	9.0
DRY CATCH ONLY	(GR/DSCF)	0.00462
	(LB/HR)	7.6
Oxides of Nitrogen		
	(ppm,d)	1.3
	(LB/HR)	1.8
Opacity		
West	(%)	2.4
East	(%)	2.4
Carbon Monoxide		
	(ppm,d)	3.9
	(LB/HR)	3.3
TGNMO's		
	(ppmC,w)	5.2
	(LBC/HR)	2.0
Formaldehyde		
	(ppm,d)	2.6
	(LB/HR)	2.2
MDI		
	(ppm,d)	0.0162
	(LB/HR)	0.13

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 these facts and a complete review of the 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 August 27, 1996 Particulate Emission Compliance Test of the Dryer Primary Cyclone Exhaust at the Louisiana Pacific Plant in Newberry, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		08-27-96	08-27-96	08-27-96
Time runs were done	(HRS)	1645/1751	1940/2042	2135/2337
Process rate	(LB/TFP)	12.9	12.9	12.9
Volumetric flow				
actual	(ACFM)	58888	58474	60583
standard	(DSCFM)	31359	31613	34409
Gas temperature	(DEG-F)	253	255	253
Moisture content	(%V/V)	24.22	22.84	19.19
Gas composition	(%V/V,dry)			
carbon dioxide		4.30	4.00	4.10
oxygen		16.10	16.60	16.50
nitrogen		79.60	79.40	79.40
Isokinetic variation	(%)	101.6	98.9	96.7
Particulate concentration				
actual	(GR/ACF)	0.213	0.191	0.195
standard	(GR/DSCF)	0.400	0.353	0.344
Part. emission rate	(LB/HR)	107.4	95.74	101.5

.366

Note: Dry + Method 202 Condensible Particulate Material

Table 1b Summary of the Results of the August 27, 1996 Particulate Emission Compliance Test of the Dryer Primary Cyclone Exhaust at the Louisiana Pacific Plant in Newberry, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		08-27-96	08-27-96	08-27-96
Time runs were done	(HRS)	1645/1751	1940/2042	2135/2337
Process rate	(LB/TFP)	12.9	12.9	12.9
Volumetric flow				
actual	(ACFM)	58888	58474	60583
standard	(DSCFM)	31359	31613	34409
Gas temperature	(DEG-F)	253	255	253
Moisture content	(%V/V)	24.22	22.84	19.19
Gas composition	(%V/V,dry)			
carbon dioxide		4.30	4.00	4.10
oxygen		16.10	16.60	16.50
nitrogen		79.60	79.40	79.40
Isokinetic variation	(%)	101.6	98.9	96.7
Particulate concentration				
actual	(GR/ACF)	0.168	0.144	0.146
standard	(GR/DSCF)	0.315	0.266	0.256
Part. emission rate	(LB/HR)	84.69	72.08	75.59

Note: Dry Catch Only

Table 2a Summary of the Results of the August 27, 1996 Particulate Emission Compliance Test of the E-Tube Outlet at the Louisiana Pacific Plant in Newberry, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		08-27-96	08-27-96	08-27-96
Time runs were done	(HRS)	1645/1750	1940/2045	2135/2347
Process rate	(LB/TFP)	12.9	12.9	12.9
Volumetric flow				
actual	(ACFM)	58959	60166	59448
standard	(DSCFM)	35023	37164	36184
Gas temperature	(DEG-F)	164	161	158
Moisture content	(%V/V)	27.53	25.05	26.47
Gas composition	(%V/V,dry)			
carbon dioxide		3.90	3.60	3.70
oxygen		16.50	16.90	16.80
nitrogen		79.60	79.50	79.50
Isokinetic variation	(%)	105.2	99.0	101.1
Particulate concentration				
actual	(GR/ACF)	.0258	.0133	.0226
standard	(GR/DSCF)	.0434	.0216	.0371
Part. emission rate	(LB/HR)	13.04	6.88	11.52

Note: Dry + Method 202 Condensible Particulate Material

Table 2b Summary of the Results of the August 27, 1996 Particulate Emission Compliance Test of the E-Tube Outlet at the Louisiana Pacific Plant in Newberry, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		08-27-96	08-27-96	08-27-96
Time runs were done	(HRS)	1645/1750	1940/2045	2135/2347
Process rate	(LB/TFP)	12.9	12.9	12.9
Volumetric flow				
actual	(ACFM)	58959	60166	59448
standard	(DSCFM)	35023	37164	36184
Gas temperature	(DEG-F)	164	161	158
Moisture content	(%V/V)	27.53	25.05	26.47
Gas composition	(%V/V,dry)			
carbon dioxide		3.90	3.60	3.70
oxygen		16.50	16.90	16.80
nitrogen		79.60	79.50	79.50
Isokinetic variation	(%)	105.2	99.0	101.1
Particulate concentration				
actual	(GR/ACF)	.007760	.005798	.006305
standard	(GR/DSCF)	.0131	.009390	.0104
Part. emission rate	(LB/HR)	3.92	2.99	3.21

Note: Dry Catch Only

Table 3a Summary of the Results of the August 27, 1996 Particulate Emission Compliance Test of the Dryer RTO Outlet at the Louisiana Pacific Plant in Newberry, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		08-27-96	08-27-96	08-27-96
Time runs were done	(HRS)	1645/1750	1940/2046	2135/2339
Process rate	(LB/TFP)	12.9	12.9	12.9
Volumetric flow				
actual	(ACFM)	68601	66597	67050
standard	(DSCFM)	36861	34827	35163
Gas temperature	(DEG-F)	281	273	273
Moisture content	(%V/V)	22.84	25.67	25.47
Gas composition	(%V/V,dry)			
carbon dioxide		3.00	4.00	4.00
oxygen		17.50	16.30	16.40
nitrogen		79.50	79.70	79.60
Isokinetic variation	(%)	99.7	103.2	101.7
Particulate concentration				
actual	(GR/ACF)	.004056	.003719	.002897
standard	(GR/DSCF)	.007552	.007114	.005526
Part. emission rate	(LB/HR)	2.39	2.12	1.67

Note: Dry + Method 202 Condensible Particulate Material

Table 3b Summary of the Results of the August 27, 1996 Particulate Emission Compliance Test of the Dryer RTO Outlet at the Louisiana Pacific Plant in Newberry, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		08-27-96	08-27-96	08-27-96
Time runs were done	(HRS)	1645/1750	1940/2046	2135/2339
Process rate	(LB/TFP)	12.9	12.9	12.9
Volumetric flow				
actual	(ACFM)	68601	66597	67050
standard	(DSCFM)	36861	34827	35163
Gas temperature	(DEG-F)	281	273	273
Moisture content	(%V/V)	22.84	25.67	25.47
Gas composition	(%V/V,dry)			
carbon dioxide		3.00	4.00	4.00
oxygen		17.50	16.30	16.40
nitrogen		79.50	79.70	79.60
Isokinetic variation	(%)	99.7	103.2	101.7
Particulate concentration				
actual	(GR/ACF)	.000779	.000935	.000713
standard	(GR/DSCF)	.001451	.001790	.001360
Part. emission rate	(LB/HR)	0.458	0.534	0.410

Note: Dry Catch Only

Table 4a Summary of the Results of the August 28, 1996 Particulate Emission Compliance Test of the Press Vents at the Louisiana Pacific Plant in Newberry, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		08-28-96	08-28-96	08-28-96
Time runs were done	(HRS)	1215/1318	1450/1552	1615/1717
Process rate	(LB/TFP)	12.2	12.2	12.2
Volumetric flow				
actual	(ACFM)	214034	211526	218092
standard	(DSCFM)	191539	188269	193848
Gas temperature	(DEG-F)	108	109	112
Moisture content	(%V/V)	1.23	1.57	1.10
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	(%)	99.3	100.3	99.9
Particulate concentration				
actual	(GR/ACF)	.004471	.006435	.003813
standard	(GR/DSCF)	.004999	.007233	.004292
Part. emission rate	(LB/HR)	8.21	11.67	7.13

Note: Dry + Method 202 Condensible Particulate Material

Table 4b Summary of the Results of the August 28, 1996 Particulate Emission Compliance Test of the Press Vents at the Louisiana Pacific Plant in Newberry, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		08-28-96	08-28-96	08-28-96
Time runs were done	(HRS)	1215/1318	1450/1552	1615/1717
Process rate	(LB/TFP)	12.2	12.2	12.2
Volumetric flow				
actual	(ACFM)	214034	211526	218092
standard	(DSCFM)	191539	188269	193848
Gas temperature	(DEG-F)	108	109	112
Moisture content	(%V/V)	1.23	1.57	1.10
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	(%)	99.3	100.3	99.9
Particulate concentration				
actual	(GR/ACF)	.003710	.005672	.002973
standard	(GR/DSCF)	.004147	.006375	.003346
Part. emission rate	(LB/HR)	6.81	10.29	5.56

Note: Dry Catch Only

Table 5. Summary of the Results of the August 27, 1996 **Sulfur Dioxide** Emission Compliance Tests at the Louisiana Pacific Plant in Newberry, Michigan.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
Dryer RTO Outlet			
8-27-96	1646-1756	< 1	< 0.37
8-27-96	1951-2055	< 1	< 0.35
8-27-96	2136-2336	< 1	< 0.35
Avg		< 1	< 0.36

Table 6. Summary of the Results of the August 27 & 29, 1996 **Oxides of Nitrogen** Emission Compliance Tests at the Louisiana Pacific Plant in Newberry, Michigan.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
Dryer Primary Cyclone Exhaust			
8-27-96	1646-1756	39	8.8
8-27-96	1951-2055	20	4.5
8-27-96	2136-2336	25	6.3
Avg		28	6.5
E-Tube Outlet			
8-27-96	1646-1756	13	3.3
8-27-96	1951-2055	14	3.7
8-27-96	2136-2335	18	4.6
Avg		15	3.9
Dryer RTO Outlet			
8-27-96	1646-1756	22	5.9
8-27-96	1951-2055	26	6.5
8-27-96	2136-2336	23	5.9
Avg		24	6.1
Press Vents			
8-29-96	0900-1000	0.8	1.2
8-29-96	1036-1136	1.6	2.2
8-29-96	1211-1311	1.4	2.0
Avg		1.3	1.8

Table 7. Summary of the Results of the August 27 & 29, 1996 **Carbon Monoxide** Emission Compliance Tests at the Louisiana Pacific Plant in Newberry, Michigan.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
Dryer Primary Cyclone Exhaust			
8-27-96	1646-1756	873	119
8-27-96	1951-2055	409	56
8-27-96	2136-2336	422	63
Avg		568	80
E-Tube Outlet			
8-27-96	1645-1750	770	118
8-27-96	1940-2045	356	58
8-27-96	2135-2347	412	65
Avg		513	80
Dryer RTO Outlet			
8-27-96	1646-1756	78	12.5
8-27-96	1951-2055	53	8.1
8-27-96	2136-2336	30	4.6
Avg		54	8.4
Press Vents			
8-29-96	0900-1000	6.2	5.2
8-29-96	1036-1136	3.2	2.6
8-29-96	1211-1311	2.4	2.0
Avg		3.9	3.3

Table 8. Summary of the Results of the August 27 & 29, 1996 **TGNMO's** Emission Compliance Tests at the Louisiana Pacific Plant in Newberry, Michigan.

Date	Time (HRS)	Concentration (ppmC,w)	Emission Rate (LBC/HR)
Dryer Primary Cyclone Exhaust			
8-27-96	1646-1756	321	24.8
8-27-96	1951-2055	276	21.1
8-27-96	2136-2336	280	22.3
Avg		292	22.7
E-Tube Outlet			
8-27-96	1646-1756	245	22.1
8-27-96	1951-2055	148	13.7
8-27-96	2136-2335	131	12.1
Avg		175	16.0
Dryer RTO Outlet			
8-27-96	1646-1756	5.8	0.51
8-27-96	1951-2055	< 1	< 0.09
8-27-96	2136-2336	< 1	< 0.09
Avg		≤ 2.6	≤ 0.23
Press Vents			
8-29-96	0900-1000	1.9	0.7
8-29-96	1036-1136	10.4	4.0
8-29-96	1211-1311	3.4	1.3
Avg		5.2	2.0

Corrected for methane

* TGNMO's = Total Gaseous Non-Methane Organics

Table 9. Summary of the Results of the August 27 & 28, 1996 **Formaldehyde** Emission Compliance Tests at the Louisiana Pacific Plant in Newberry, Michigan.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
Dryer Primary Cyclone Exhaust			
8-28-96	0930-1132	4.0	0.59
8-28-96	1215-1332	3.6	0.53
8-28-96	1500-1618	6.8	0.96
Avg		4.8	0.69
E-Tube Outlet			
8-28-96	0930-1115	19	3.5
8-28-96	1215-1317	19	3.2
8-28-96	1500-1604	19	3.1
Avg		19	3.3
Dryer RTO Outlet			
8-28-96	0930-1120	1.0	0.17
8-28-96	1215-1327	1.3	0.23
8-28-96	1500-1605	1.4	0.23
Avg		1.2	0.21
Press Vents			
8-27-96	1450-1616	4.7	3.7
8-27-96	1645-1809	1.0	0.9
8-27-96	1835-1959	2.2	1.9
Avg		2.6	2.2

Table 10. Summary of the Results of the August 29, 1996 **MDI** Emission Compliance Tests at the Louisiana Pacific Plant in Newberry, Michigan.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
Press Vents			
8-29-96	0900-1002	0.0237	0.19
8-29-96	1035-1136	0.0204	0.16
8-29-96	1210-1311	0.0044	0.03
Avg		0.0162	0.13

3 RESULTS

The results of all field and laboratory evaluations are presented in this section. Orsat (gas composition) and moisture is presented first followed by the computer printout of the particulate, sulfur dioxide, oxides of nitrogen, opacity, carbon monoxide, total hydrocarbons, formaldehyde, and MDI 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. 1
Dryer Primary Cyclone Exhaust

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

	Run 1	Run 2	Run 3
Date of run	08-27-96	08-27-96	08-27-96
Dry basis (orsat)			
carbon dioxide.....	4.30	4.00	4.10
oxygen.....	16.10	16.60	16.50
nitrogen.....	79.60	79.40	79.40
Wet basis (orsat)			
carbon dioxide.....	3.26	3.09	3.31
oxygen.....	12.20	12.81	13.33
nitrogen.....	60.32	61.26	64.16
water vapor.....	24.22	22.84	19.19
Dry molecular weight.....	29.33	29.30	29.32
Wet molecular weight.....	26.59	26.72	27.14
Specific gravity.....	0.918	0.923	0.938
Water mass flow.....(LB/HR)	28119	26256	22920
FO	1.116	1.075	1.073

Test No. 1
E-Tube Outlet

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

	Run 1	Run 2	Run 3
Date of run	08-27-96	08-27-96	08-27-96
Dry basis (orsat)			
carbon dioxide.....	3.90	3.60	3.70
oxygen.....	16.50	16.90	16.80
nitrogen.....	79.60	79.50	79.50
Wet basis (orsat)			
carbon dioxide.....	2.83	2.70	2.72
oxygen.....	11.96	12.67	12.35
nitrogen.....	57.69	59.58	58.45
water vapor.....	27.53	25.05	26.47
Dry molecular weight.....	29.28	29.25	29.26
Wet molecular weight.....	26.18	26.43	26.28
Specific gravity.....	0.904	0.913	0.908
Water mass flow.....(LB/HR)	37317	34847	36547
FO	1.128	1.111	1.108

Test No. 1
Dryer RTO Outlet

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

	Run 1	Run 2	Run 3
Date of run	08-27-96	08-27-96	08-27-96
Dry basis (orsat)			
carbon dioxide.....	3.00	4.00	4.00
oxygen.....	17.50	16.30	16.40
nitrogen.....	79.50	79.70	79.60
Wet basis (orsat)			
carbon dioxide.....	2.31	2.97	2.98
oxygen.....	13.50	12.12	12.22
nitrogen.....	61.34	59.24	59.33
water vapor.....	22.84	25.67	25.47
Dry molecular weight.....	29.18	29.29	29.30
Wet molecular weight.....	26.63	26.39	26.42
Specific gravity.....	0.920	0.912	0.913
Water mass flow.....(LB/HR)	30601	33745	33708
FO	1.133	1.150	1.125

Test No. 3
Dryer Primary Cyclone Exhaust

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

	Run 1	Run 2	Run 3
Date of run	08-28-96	08-28-96	08-28-96
Dry basis (orsat)			
carbon dioxide.....	3.90	3.90	4.20
oxygen.....	16.60	16.60	16.10
nitrogen.....	79.50	79.50	79.70
Wet basis (orsat)			
carbon dioxide.....	2.98	2.92	3.10
oxygen.....	12.69	12.45	11.87
nitrogen.....	60.78	59.61	58.75
water vapor.....	23.55	25.01	26.29
Dry molecular weight.....	29.29	29.29	29.32
Wet molecular weight.....	26.63	26.46	26.34
Specific gravity.....	0.920	0.914	0.910
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.103	1.103	1.143

Test No. 3
E-Tube Outlet

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

	Run 1	Run 2	Run 3
Date of run	08-28-96	08-28-96	08-28-96
Dry basis (orsat)			
carbon dioxide.....	4.00	4.20	4.40
oxygen.....	16.70	16.50	16.30
nitrogen.....	79.30	79.30	79.30
Wet basis (orsat)			
carbon dioxide.....	3.04	3.12	3.20
oxygen.....	12.70	12.28	11.86
nitrogen.....	60.30	58.99	57.71
water vapor.....	23.96	25.61	27.23
Dry molecular weight.....	29.31	29.33	29.36
Wet molecular weight.....	26.60	26.43	26.26
Specific gravity.....	0.919	0.913	0.907
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.050	1.048	1.045

Test No. 3
Dryer RTO Outlet

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

	Run 1	Run 2	Run 3
Date of run	08-28-96	08-28-96	08-28-96
Dry basis (orsat)			
carbon dioxide.....	3.50	3.80	4.00
oxygen.....	16.70	16.50	16.20
nitrogen.....	79.80	79.70	79.80
Wet basis (orsat)			
carbon dioxide.....	2.65	2.84	2.94
oxygen.....	12.63	12.33	11.92
nitrogen.....	60.37	59.55	58.71
water vapor.....	24.35	25.29	26.43
Dry molecular weight.....	29.23	29.27	29.29
Wet molecular weight.....	26.49	26.42	26.30
Specific gravity.....	0.915	0.913	0.909
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.200	1.158	1.175

Test No. 5
Press Vents

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

	Run 1	Run 2	Run 3
Date of run	08-29-96	08-29-96	08-29-96
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.....	20.57	20.64	20.59
nitrogen.....	77.83	78.09	77.91
water vapor.....	1.57	1.24	1.47
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.67	28.71	28.68
Specific gravity.....	0.990	0.992	0.991
Water mass flow.....(LB/HR)	0.00	0.00	0.00

Test No. 7
Press Vents

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

	Run 1	Run 2	Run 3
Date of run	08-27-96	08-27-96	08-27-96
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.....	20.66	20.62	20.63
nitrogen.....	78.15	78.03	78.04
water vapor.....	1.16	1.32	1.30
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.71	28.70	28.70
Specific gravity.....	0.992	0.991	0.991
Water mass flow.....(LB/HR)	0.00	0.00	0.00

Test No. 8
Press Vents

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

	Run 1	Run 2	Run 3
Date of run	08-28-96	08-28-96	08-28-96
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.....	20.64	20.57	20.67
nitrogen.....	78.10	77.83	78.20
water vapor.....	1.23	1.57	1.10
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.71	28.67	28.72
Specific gravity.....	0.992	0.990	0.992
Water mass flow.....(LB/HR)	6687	8423	6043

3.2 Results of Particulate Determinations

Test No. 1
Dryer Primary Cyclone Exhaust

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

	Run 1	Run 2	Run 3
Date of run	08-27-96	08-27-96	08-27-96
Time run start/end.....(HRS)	1645/1751	1940/2042	2135/2337
Static pressure.....(IN.WC)	-11.60	-11.60	-11.60
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)	241.0	215.0	185.0
desiccant.....(GRAMS)	13.0	16.0	12.0
total.....(GRAMS)	254.0	231.0	197.0
Total particulate material..			
.....collected(grams)	0.9703	0.8423	0.8727
Gas meter coefficient.....	1.0007	1.0007	1.0007
Barometric pressure..(IN.HG)	29.26	29.26	29.26
Avg. orif.pres.drop..(IN.WC)	1.37	1.32	1.48
Avg. gas meter temp..(DEF-F)	91.7	100.7	93.1
Volume through gas meter....			
at meter conditions...(CF)	39.88	39.80	41.73
standard conditions.(DSCF)	37.46	36.78	39.11
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.186	.186	.186
Avg.stack gas temp ..(DEG-F)	253	255	253
Volumetric flow rate.....			
actual.....(ACFM)	58888	58474	60583
dry standard.....(DSCFM)	31359	31613	34409
Isokinetic variation.....(%)	101.6	98.9	96.7
Particulate concentration...			
actual.....(GR/ACF)	0.21273	0.19094	0.19545
dry standard.....(GR/DSCF)	0.39962	0.35332	0.34427
Particle mass rate...(LB/HR)	107.417	95.737	101.536

Test No. 1
E-Tube Outlet

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

	Run 1	Run 2	Run 3
Date of run	08-27-96	08-27-96	08-27-96
Time run start/end.....(HRS)	1645/1750	1940/2045	2135/2347
Static pressure.....(IN.WC)	-3.50	-3.50	-3.50
Cross sectional area (SQ.FT)	12.57	12.57	12.57
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	263.0	233.0	241.0
desiccant.....(GRAMS)	10.0	7.0	16.0
total.....(GRAMS)	273.0	240.0	257.0
Total particulate material..			
.....collected(grams)	0.0954	0.0474	0.0810
Gas meter coefficient.....	0.9929	0.9929	0.9929
Barometric pressure..(IN.HG)	29.26	29.26	29.26
Avg. orif.pres.drop..(IN.WC)	1.10	1.08	1.07
Avg. gas meter temp..(DEF-F)	90.5	84.2	78.4
Volume through gas meter....			
at meter conditions...(CF)	36.30	35.85	35.26
standard conditions.(DSCF)	33.89	33.85	33.65
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.188	.188	.188
Avg.stack gas temp ..(DEG-F)	164	161	158
Volumetric flow rate.....			
actual.....(ACFM)	58959	60166	59448
dry standard.....(DSCFM)	35023	37164	36184
Isokinetic variation.....(%)	105.2	99.0	101.1
Particulate concentration...			
actual.....(GR/ACF)	0.02579	0.01334	0.02260
dry standard.....(GR/DSCF)	0.04344	0.02161	0.03714
Particle mass rate...(LB/HR)	13.041	6.882	11.519

Test No. 1
Dryer RTO Outlet

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

	Run 1	Run 2	Run 3
Date of run	08-27-96	08-27-96	08-27-96
Time run start/end.....(HRS)	1645/1750	1940/2046	2135/2339
Static pressure.....(IN.WC)	-0.51	-0.51	-0.51
Cross sectional area (SQ.FT)	22.34	22.34	22.34
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	214.0	247.0	245.0
desiccant.....(GRAMS)	13.0	12.0	10.0
total.....(GRAMS)	227.0	259.0	255.0
Total particulate material..			
.....collected(grams)	0.0177	0.0163	0.0126
Gas meter coefficient.....	0.9976	0.9976	0.9976
Barometric pressure..(IN.HG)	29.26	29.26	29.26
Avg. orif.pres.drop..(IN.WC)	1.19	1.12	1.09
Avg. gas meter temp..(DEF-F)	95.8	87.0	76.4
Volume through gas meter....			
at meter conditions...(CF)	38.92	37.45	36.55
standard conditions.(DSCF)	36.16	35.35	35.18
Total sampling time....(MIN)	64.00	64.00	64.00
Nozzle diameter.....(IN)	.251	.251	.251
Avg.stack gas temp ..(DEG-F)	281	273	273
Volumetric flow rate.....			
actual.....(ACFM)	68601	66597	67050
dry standard.....(DSCFM)	36861	34827	35163
Isokinetic variation.....(%)	99.7	103.2	101.7
Particulate concentration...			
actual.....(GR/ACF)	0.00406	0.00372	0.00290
dry standard.....(GR/DSCF)	0.00755	0.00711	0.00553
Particle mass rate...(LB/HR)	2.386	2.124	1.666

Test No. 8
Press Vents

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

	Run 1	Run 2	Run 3
Date of run	08-28-96	08-28-96	08-28-96
Time run start/end.....(HRS)	1215/1318	1450/1552	1615/1717
Static pressure.....(IN.WC)	-2.30	-2.30	-2.30
Cross sectional area (SQ.FT)	48.35	48.35	48.35
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	3.0	4.0	5.0
desiccant.....(GRAMS)	8.0	10.0	5.0
total.....(GRAMS)	11.0	14.0	10.0
Total particulate material..			
.....collected(grams)	0.0135	0.0194	0.0118
Gas meter coefficient.....	1.0007	1.0007	1.0007
Barometric pressure..(IN.HG)	29.31	29.31	29.31
Avg. orif.pres.drop..(IN.WC)	1.78	1.79	1.89
Avg. gas meter temp..(DEF-F)	84.1	93.4	101.2
Volume through gas meter....			
at meter conditions...(CF)	43.63	44.07	45.80
standard conditions.(DSCF)	41.67	41.39	42.42
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.180	.180	.180
Avg.stack gas temp ..(DEG-F)	108	109	112
Volumetric flow rate.....			
actual.....(ACFM)	214034	211526	218092
dry standard.....(DSCFM)	191539	188269	193848
Isokinetic variation.....(%)	99.3	100.3	99.9
Particulate concentration...			
actual.....(GR/ACF)	0.00447	0.00643	0.00381
dry standard.....(GR/DSCF)	0.00500	0.00723	0.00429
Particle mass rate...(LB/HR)	8.206	11.672	7.131

3.3 Results of Sulfur Dioxide Determinations

Test No. 2
Dryer RTO Outlet

Results of Sulfur Dioxide Determinations——————————————Method6C

	Run 1	Run 2	Run 3
Date of run	8-27-96	8-27-96	8-27-96
Time run start/end (HRS)	1646-1756	1951-2055	2136-2335
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	22.8	25.7	25.5
Oxygen content (%V/V)	17.5	16.3	16.4
Volumetric flow rate (DSCFM)	36861	34827	35163
SO_2 concentration			
ppm,dry	< 1	< 1	< 1
SO_2 emission rate (LB/HR)	< 0.37	< 0.35	< 0.35

3.4 Results of Oxides of Nitrogen Determinations

Test No. 2
Dryer Primary Cyclone Outlet

Results of Oxides of Nitrogen Determinations——————————————Method7E

	Run 1	Run 2	Run 3
Date of run	8-27-96	8-27-96	8-27-96
Time run start/end (HRS)	1646-1756	1951-2055	2136-2335
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	24.2	22.8	19.2
Oxygen content (%V/V)	16.1	16.6	16.5
Volumetric flow rate (DSCFM)	31359	31613	34409
NO_x concentration			
ppm,dry	39.0	19.8	25.5
NO_x emission rate (LB/HR)	8.8	4.5	6.3

Test No. 2
E-Tube Outlet

Results of Oxides of Nitrogen Determinations——————————————Method7E

	Run 1	Run 2	Run 3
Date of run	8-27-96	8-27-96	8-27-96
Time run start/end (HRS)	1646-1756	1951-2055	2136-2335
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	27.5	25.1	26.5
Oxygen content (%V/V)	16.5	16.9	16.8
Volumetric flow rate (DSCFM)	35023	37164	36184
NO_x concentration			
ppm,dry	13.2	14.1	17.7
NO_x emission rate (LB/HR)	3.3	3.7	4.6

Test No. 2
Dryer RTO Outlet

Results of Oxides of Nitrogen Determinations——————————Method7E

	Run 1	Run 2	Run 3
Date of run	8-27-96	8-27-96	8-27-96
Time run start/end (HRS)	1646-1756	1951-2055	2136-2335
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	22.8	25.7	25.5
Oxygen content (%V/V)	20.9	20.9	20.9
Volumetric flow rate (DSCFM)	36861	34824	35163
NO_x concentration			
ppm,dry	22.3	26.1	23.4
NO_x emission rate (LB/HR)	5.9	6.5	5.9

Test No. 9
Press Vents

Results of Oxides of Nitrogen Determinations——————————————Method7E

	Run 1	Run 2	Run 3
Date of run	8-29-96	8-29-96	8-29-96
Time run start/end (HRS)	0900-1000	1036-1136	1211-1311
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	1.6	1.2	1.5
Oxygen content (%V/V)	20.9	20.9	20.9
Volumetric flow rate (DSCFM)	202257	205362	201740
NO_x concentration			
ppm,dry	0.8	1.6	1.4
NO_x emission rate (LB/HR)	1.2	2.2	2.0

3.5 Results of Opacity Observations

Test No. 1
Dryer RTO Outlet

Results of Opacity Observations ---------- EPA Method 9

PERCENT OPACITY	OPTICAL DENSITY	RELATIVE FREQUENCY (%)
0	0.0000	94.16
5	0.0223	5.42
10	0.0458	0.42
15	0.0706	0.00
20	0.0969	0.00
25	0.1249	0.00
30	0.1549	0.00
35	0.1871	0.00
40	0.2219	0.00
45	0.2596	0.00
50	0.3010	0.00
55	0.3468	0.00
60	0.3979	0.00
65	0.4559	0.00
70	0.5229	0.00
75	0.6021	0.00
80	0.6690	0.00
85	0.8239	0.00
90	1.0000	0.00
95	1.3010	0.00
99	2.0000	0.00

Avg Opac 0.31 Avg OD 0.0014 Time average

Observer: Steve Kelker
Cert. Date: 04-03-96
Date of Observation: 08-27-96
Time of Observation: 1640-1740

Test No. 1-1
Press Vent - West Stack

Results of Opacity Observations ---------- EPA Method 9

PERCENT OPACITY	OPTICAL DENSITY	RELATIVE FREQUENCY (%)
0	0.0000	54.58
5	0.0223	42.50
10	0.0458	2.92
15	0.0706	0.00
20	0.0969	0.00
25	0.1249	0.00
30	0.1549	0.00
35	0.1871	0.00
40	0.2219	0.00
45	0.2596	0.00
50	0.3010	0.00
55	0.3468	0.00
60	0.3979	0.00
65	0.4559	0.00
70	0.5229	0.00
75	0.6021	0.00
80	0.6690	0.00
85	0.8239	0.00
90	1.0000	0.00
95	1.3010	0.00
99	2.0000	0.00
Avg Opac 2.42	Avg OD 0.0108	Time average

Observer: Mark Peterson
Cert. Date: 04-03-96
Date of Observation: 08-28-96
Time of Observation: 1450-1550

Test No. 1-2
Press Vent - East Stack

Results of Opacity Observations ---------- EPA Method 9

PERCENT OPACITY	OPTICAL DENSITY	RELATIVE FREQUENCY (%)
0	0.0000	54.58
5	0.0223	42.92
10	0.0458	2.08
15	0.0706	0.42
20	0.0969	0.00
25	0.1249	0.00
30	0.1549	0.00
35	0.1871	0.00
40	0.2219	0.00
45	0.2596	0.00
50	0.3010	0.00
55	0.3468	0.00
60	0.3979	0.00
65	0.4559	0.00
70	0.5229	0.00
75	0.6021	0.00
80	0.6690	0.00
85	0.8239	0.00
90	1.0000	0.00
95	1.3010	0.00
99	2.0000	0.00
Avg Opac 2.42	Avg OD 0.0108	Time average

Observer: Mark Peterson
Cert. Date: 04-03-96
Date of Observation: 08-28-96
Time of Observation: 1450-1550

3.6 Results of Carbon Monoxide Determinations

Test No. 2
Dryer Primary Cyclone Outlet

Results of Carbon Monoxide Determinations——————————Method10

	Run 1	Run 2	Run 3
Date of run	8-27-96	8-27-96	8-27-96
Time run start/end (HRS)	1646-1756	1951-2055	2136-2335
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	24.2	22.8	19.2
Oxygen content (%V/V)	16.1	16.6	16.5
Volumetric flow rate (DSCFM)	31359	31613	34409
CO concentration			
ppm,dry	873	409	422
CO emission rate (LB/HR)	119	56	63

Test No. 2
E-Tube Outlet

Results of Carbon Monoxide Determinations——————————————Method10

	Run 1	Run 2	Run 3
Date of run	8-27-96	8-27-96	8-27-96
Time run start/end (HRS)	1645-1750	1940-2045	2135-2347
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	27.5	25.1	26.5
Oxygen content (%V/V)	16.5	16.9	16.8
Volumetric flow rate (DSCFM)	35023	37164	36184
CO concentration			
ppm,dry	770	356	412
CO emission rate (LB/HR)	118	58	65

Test No. 2
Dryer RTO Outlet

Results of Carbon Monoxide Determinations——————————————Method10

	Run 1	Run 2	Run 3
Date of run	8-27-96	8-27-96	8-27-96
Time run start/end (HRS)	1646-1756	1951-2055	2136-2335
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	22.8	25.7	25.5
Oxygen content (%V/V)	20.9	20.9	20.9
Volumetric flow rate (DSCFM)	36861	34824	35163
CO concentration			
ppm,dry	77.8	53.2	29.9
CO emission rate (LB/HR)	12.5	8.1	4.6

Test No. 9
Press Vents

Results of Carbon Monoxide Determinations——————————————Method10

	Run 1	Run 2	Run 3
Date of run	8-29-96	8-29-96	8-29-96
Time run start/end (HRS)	0900-1000	1036-1136	1211-1311
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	1.6	1.2	1.5
Oxygen content (%V/V)	20.9	20.9	20.9
Volumetric flow rate (DSCFM)	202257	205362	201740
CO concentration			
ppm,dry	6.2	3.2	2.4
CO emission rate (LB/HR)	5.2	2.6	2.0

3.7 Results of Total Hydrocarbons Determinations

Test No. 2
Dryer Primary Cyclone Outlet

Results of TGNMO's Determinations——————————Method25A

	Run 1	Run 2	Run 3
Date of run	8-27-96	8-27-96	8-27-96
Time run start/end (HRS)	1646-1756	1951-2055	2136-2335
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	24.2	22.8	19.2
Oxygen content (%V/V)	16.1	16.6	16.5
Volumetric flow rate (DSCFM)	31359	31613	34409
TGNMO's concentration			
ppmC,wet	321	276	280
TGNMO's emission rate (LBC/HR)	24.8	21.1	22.3

Test No. 2
E-Tube Outlet

Results of TGNMO's Determinations——————————————Method25A

	Run 1	Run 2	Run 3
Date of run	8-27-96	8-27-96	8-27-96
Time run start/end (HRS)	1645-1750	1940-2045	2135-2347
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	27.5	25.1	26.5
Oxygen content (%V/V)	16.5	16.9	16.8
Volumetric flow rate (DSCFM)	35023	37164	36184
TGNMO's concentration			
ppmC,wet	245	148	131
TGNMO's emission rate (LBC/HR)	22.1	13.7	12.1

Test No. 2
Dryer RTO Outlet

Results of TGNMO's Determinations——————————Method 25A

	Run 1	Run 2	Run 3
Date of run	8-27-96	8-27-96	8-27-96
Time run start/end (HRS)	1646-1756	1951-2055	2136-2335
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	22.8	25.7	25.5
Oxygen content (%V/V)	20.9	20.9	20.9
Volumetric flow rate (DSCFM)	36861	34824	35163
TGNMO's concentration			
ppmC,wet	5.75	< 1	< 1
TGNMO's emission rate (LBC/HR)	0.51	< 0.09	< 0.09

Test No. 9
Press Vents

Results of TGNMO's Determinations——————————————Method25A

	Run 1	Run 2	Run 3
Date of run	8-29-96	8-29-96	8-29-96
Time run start/end (HRS)	0900-1000	1036-1136	1211-1311
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	1.6	1.2	1.5
Oxygen content (%V/V)	20.9	20.9	20.9
Volumetric flow rate (DSCFM)	202257	205362	201740
TGNMO's concentration			
ppmC,wet	1.9	10.4	3.4
TGNMO's emission rate (LBC/HR)	0.7	4.0	1.3

3.8 Results of Formaldehyde Determinations

Test No. 3
Dryer Primary Cyclone Exhaust

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

	Run 1	Run 2	Run 3
Date of run	08-28-96	08-28-96	08-28-96
Time run start/end.....(HRS)	930/1132	1215/1332	1500/1618
Static pressure.....(IN.WC)	-11.60	-11.60	-11.60
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)	295.0	315.0	324.0
desiccant.....(GRAMS)	15.0	19.0	24.0
total.....(GRAMS)	310.0	334.0	348.0
Formaldehyde in sample..(uG)	6600	6000	11000
Gas meter coefficient.....	0.9945	0.9945	0.9945
Barometric pressure..(IN.HG)	29.31	29.31	29.31
Avg. orif.pres.drop..(IN.WC)	1.38	1.39	1.40
Avg. gas meter temp..(DEF-F)	70.1	82.0	88.3
Volume through gas meter....			
at meter conditions...(CF)	48.74	49.59	48.89
standard conditions.(DSCF)	47.44	47.21	46.01
Total sampling time....(MIN)	72.00	72.00	72.00
Nozzle diameter.....(IN)	.190	.190	.190
Avg.stack gas temp ..(DEG-F)	256	257	258
Volumetric flow rate.....			
actual.....(ACFM)	59451	59709	58660
dry standard.....(DSCFM)	31880	31381	30239
Isokinetic variation.....(%)	101.1	102.2	103.3
CH2O concentration.....			
(GR/DSCF).....	0.0022	0.0020	0.0037
(MG/DSCM).....	4.93	4.51	8.48
(PPM-DRY).....	3.95	3.61	6.79
(PPM-WET).....	3.02	2.71	5.00
CH2O emission rate...(LB/HR)	0.58839	0.52912	0.95915

CH2O = Formaldehyde

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

Test No. 3
E-Tube Outlet

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

	Run 1	Run 2	Run 3
Date of run	08-28-96	08-28-96	08-28-96
Time run start/end.....(HRS)	930/1115	1215/1317	1500/1604
Static pressure.....(IN.WC)	-3.50	-3.50	-3.50
Cross sectional area (SQ.FT)	12.57	12.57	12.57
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	341.0	345.0	378.0
desiccant.....(GRAMS)	12.0	28.0	21.0
total.....(GRAMS)	353.0	373.0	399.0
Formaldehyde in sample..(uG)	36000	34000	33000
Gas meter coefficient.....	0.9929	0.9929	0.9929
Barometric pressure..(IN.HG)	29.31	29.31	29.31
Avg. orif.pres.drop..(IN.WC)	2.60	2.48	2.34
Avg. gas meter temp..(DEF-F)	77.7	85.2	76.7
Volume through gas meter....			
at meter conditions...(CF)	54.97	53.93	52.25
standard conditions.(DSCF)	52.82	51.10	50.27
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.230	.230	.230
Avg.stack gas temp ..(DEG-F)	158	161	164
Volumetric flow rate.....			
actual.....(ACFM)	61007	59499	59001
dry standard.....(DSCFM)	38475	36529	35275
Isokinetic variation.....(%)	99.7	101.6	103.5
CH2O concentration.....			
(GR/DSCF).....	0.0106	0.0103	0.0102
(MG/DSCM).....	24.23	23.65	23.33
(PPM-DRY).....	19.41	18.94	18.68
(PPM-WET).....	14.76	14.09	13.60
CH2O emission rate...(LB/HR)	3.48917	3.23347	3.07931

CH2O = Formaldehyde

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

Test No. 3
Dryer RTO Outlet

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

	Run 1	Run 2	Run 3
Date of run	08-28-96	08-28-96	08-28-96
Time run start/end.....(HRS)	930/1120	1215/1327	1500/1605
Static pressure.....(IN.WC)	-0.29	-0.29	-0.29
Cross sectional area (SQ.FT)	22.34	22.34	22.34
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	316.0	346.0	356.0
desiccant.....(GRAMS)	22.0	28.0	23.0
total.....(GRAMS)	338.0	374.0	379.0
Formaldehyde in sample..(uG)	1800	2400	2400
Gas meter coefficient.....	0.9976	0.9976	0.9976
Barometric pressure..(IN.HG)	29.31	29.31	29.31
Avg. orif.pres.drop..(IN.WC)	2.15	2.47	2.27
Avg. gas meter temp..(DEF-F)	77.6	95.4	100.0
Volume through gas meter....			
at meter conditions...(CF)	51.32	55.76	53.71
standard conditions.(DSCF)	49.50	52.10	49.75
Total sampling time....(MIN)	64.00	64.00	64.00
Nozzle diameter.....(IN)	.298	.298	.298
Avg.stack gas temp ..(DEG-F)	272	275	271
Volumetric flow rate.....			
actual.....(ACFM)	65988	70631	67822
dry standard.....(DSCFM)	35232	37131	35294
Isokinetic variation.....(%)	101.3	101.2	101.7
CH2O concentration.....			
(GR/DSCF).....	0.0006	0.0007	0.0007
(MG/DSCM).....	1.29	1.64	1.71
(PPM-DRY).....	1.03	1.31	1.37
(PPM-WET).....	0.78	0.98	1.01
CH2O emission rate...(LB/HR)	0.17028	0.22751	0.22637

CH2O = Formaldehyde

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

Test No. 7
Press Vents

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

	Run 1	Run 2	Run 3
Date of run	08-27-96	08-27-96	08-27-96
Time run start/end.....(HRS)	1450/1616	1645/1809	1835/1959
Static pressure.....(IN.WC)	-2.40	-2.40	-2.40
Cross sectional area (SQ.FT)	48.35	48.35	48.35
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	-6.0	-3.0	-2.0
desiccant.....(GRAMS)	18.0	18.0	17.0
total.....(GRAMS)	12.0	15.0	15.0
Formaldehyde in sample..(uG)	8000	1900	4100
Gas meter coefficient.....	0.9945	0.9945	0.9945
Barometric pressure..(IN.HG)	29.26	29.26	29.26
Avg. orif.pres.drop..(IN.WC)	1.63	1.88	1.90
Avg. gas meter temp..(DEF-F)	96.8	97.4	93.0
Volume through gas meter....			
at meter conditions...(CF)	51.95	57.28	57.68
standard conditions.(DSCF)	48.09	53.00	53.80
Total sampling time....(MIN)	72.00	72.00	72.00
Nozzle diameter.....(IN)	.190	.190	.190
Avg.stack gas temp ..(DEG-F)	108	110	105
Volumetric flow rate.....			
actual.....(ACFM)	186515	202956	204472
dry standard.....(DSCFM)	166695	180352	183195
Isokinetic variation.....(%)	98.4	100.3	100.2
CH2O concentration.....			
(GR/DSCF).....	0.0026	0.0006	0.0012
(MG/DSCM).....	5.90	1.27	2.71
(PPM-DRY).....	4.73	1.02	2.17
(PPM-WET).....	4.67	1.01	2.14
CH2O emission rate...(LB/HR)	3.68125	0.85883	1.85467

CH2O = Formaldehyde

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

3.9 Results of MDI Determinations

Test No. 5
Press Vents

Results of MDI Determinations.....Method 1,2 PP

	Run 1	Run 2	Run 3
Date of run	08-29-96	08-29-96	08-29-96
Time run start/end.....(HRS)	900/1002	1035/1136	1210/1311
Static pressure.....(IN.WC)	-2.37	-2.37	-2.37
Cross sectional area (SQ.FT)	48.35	48.35	48.35
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	-46.0	-52.0	-50.0
desiccant.....(GRAMS)	61.0	64.0	64.0
total.....(GRAMS)	15.0	12.0	14.0
MDI in sample.....(ug)	310	270	57
Gas meter coefficient.....	1.0007	1.0007	1.0007
Barometric pressure..(IN.HG)	29.29	29.29	29.29
Avg. orif.pres.drop..(IN.WC)	1.97	2.05	2.01
Avg. gas meter temp..(DEF-F)	83.9	94.0	96.5
Volume through gas meter....			
at meter conditions...(CF)	46.49	47.90	47.40
standard conditions.(DSCF)	44.41	44.93	44.26
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.180	.180	.180
Avg.stack gas temp ..(DEG-F)	100	101	106
Volumetric flow rate.....			
actual.....(ACFM)	223818	227182	225514
dry standard.....(DSCFM)	202257	205362	201740
Isokinetic variation.....(%)	100.2	99.8	100.1
MDI Concentration.....(ppm)	0.0237	0.0204	0.0044
MDI Emission Rate.....(LB/HR)	0.187	0.163	0.034

4 RESULTS OF FUEL ANALYSES

INTERPOLL LABORATORIES, INC.
Fuel Laboratory
(612) 786-6020

Date:	9/27/96
Client:	LOUISIANA-PACIFIC, NEWBERRY, MI
Laboratory Log Number:	8312-01-0516
Sample Collected:	8/27/96
Sample Received:	9/16/96
Sample Identification:	WOOD WASTE

Ultimate Analysis WT %

Parameter	Moisture & Ash Free	Moisture Free	As Received
Moisture, Total			2.02
Ash		1.42	1.40
Carbon	52.92	52.16	51.11
Hydrogen	6.66	6.57	6.43
Nitrogen	0.26	0.26	0.25
Oxygen (calculated)	40.15	39.58	38.78
Sulfur	0.01	0.01	0.01
Heating Value, BTU/LB	8578	8456	8285

Respectfully submitted,

David J. Schneider, Manager
Chemistry Department

10118

APPENDIX A

RESULTS OF VOLUMETRIC FLOW RATE DETERMINATIONS

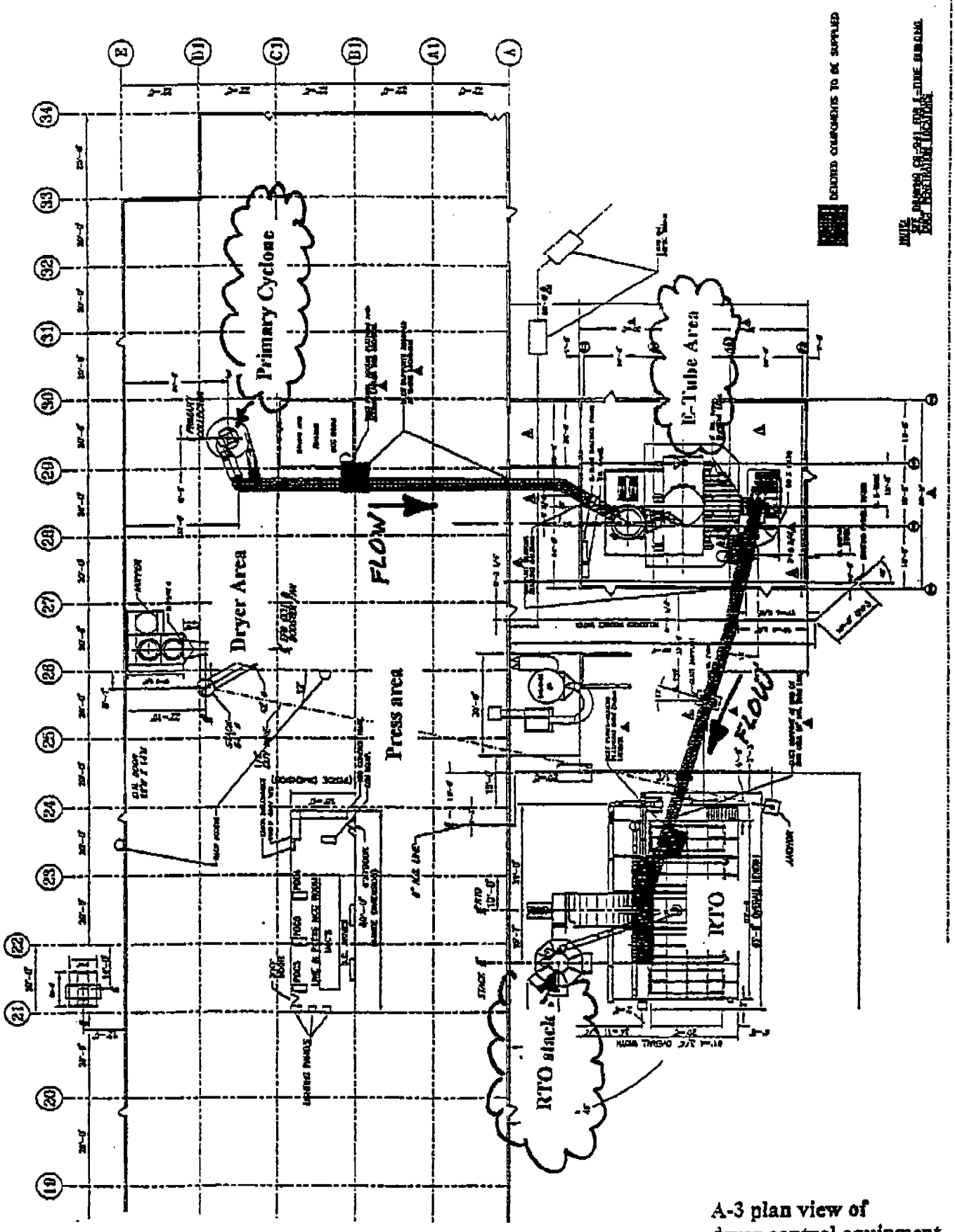
Test No. 1
Dryer Primary Cyclone Exhaust

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

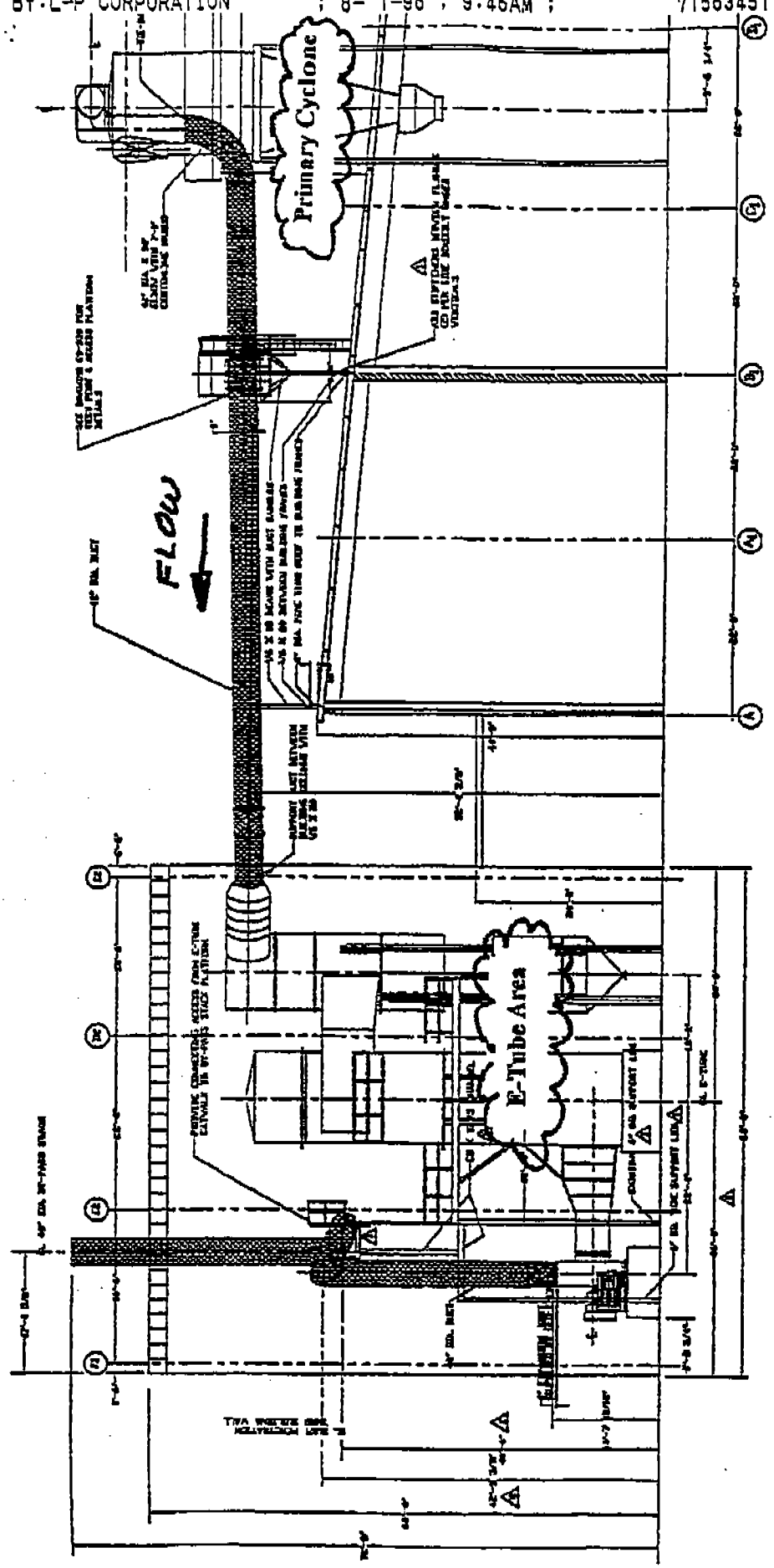
Date of Determination.....	08-27-96
Time of Determination.....(HRS)	810
Barometric pressure.....(IN.HG)	29.26
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	42
Duct area.....(SQ.FT)	9.62
Direction of flow.....	UP
Static pressure.....(IN.WC)	-11.6
Avg. gas temp.....(DEG-F)	254
Moisture content.....(% V/V)	24.22
Avg. linear velocity.....(FT/SEC)	97.6
Gas density.....(LB/ACF)	.04848
Molecular weight.....(LB/LBMOLE)	29.33
Mass flow of gas.....(LB/HR)	163915
Volumetric flow rate.....	
actual.....(ACFM)	56357
dry standard.....(DSCFM)	29983

APPENDIX B

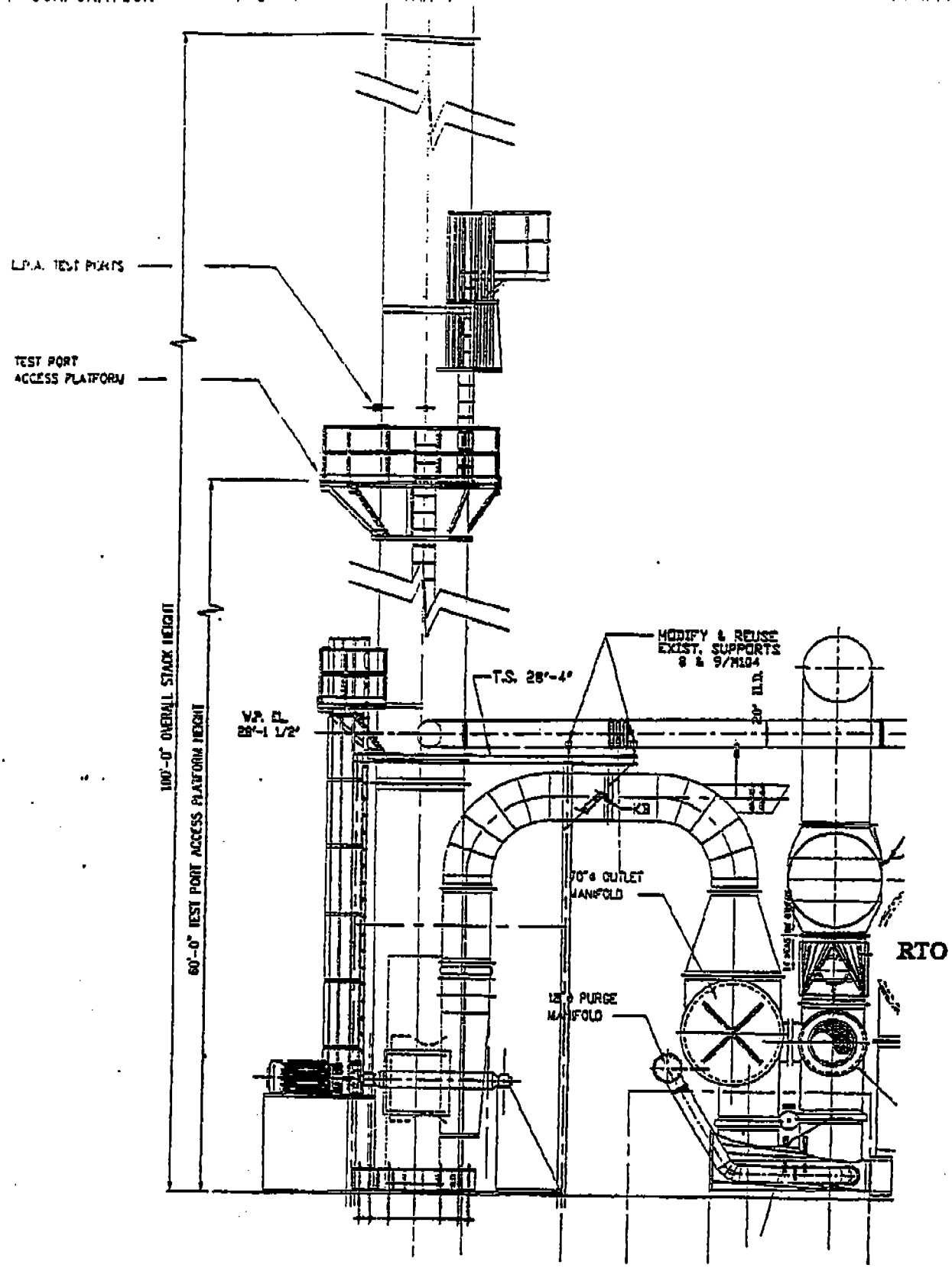
LOCATION OF TEST PORTS



A-3 plan view of
dryer control equipment

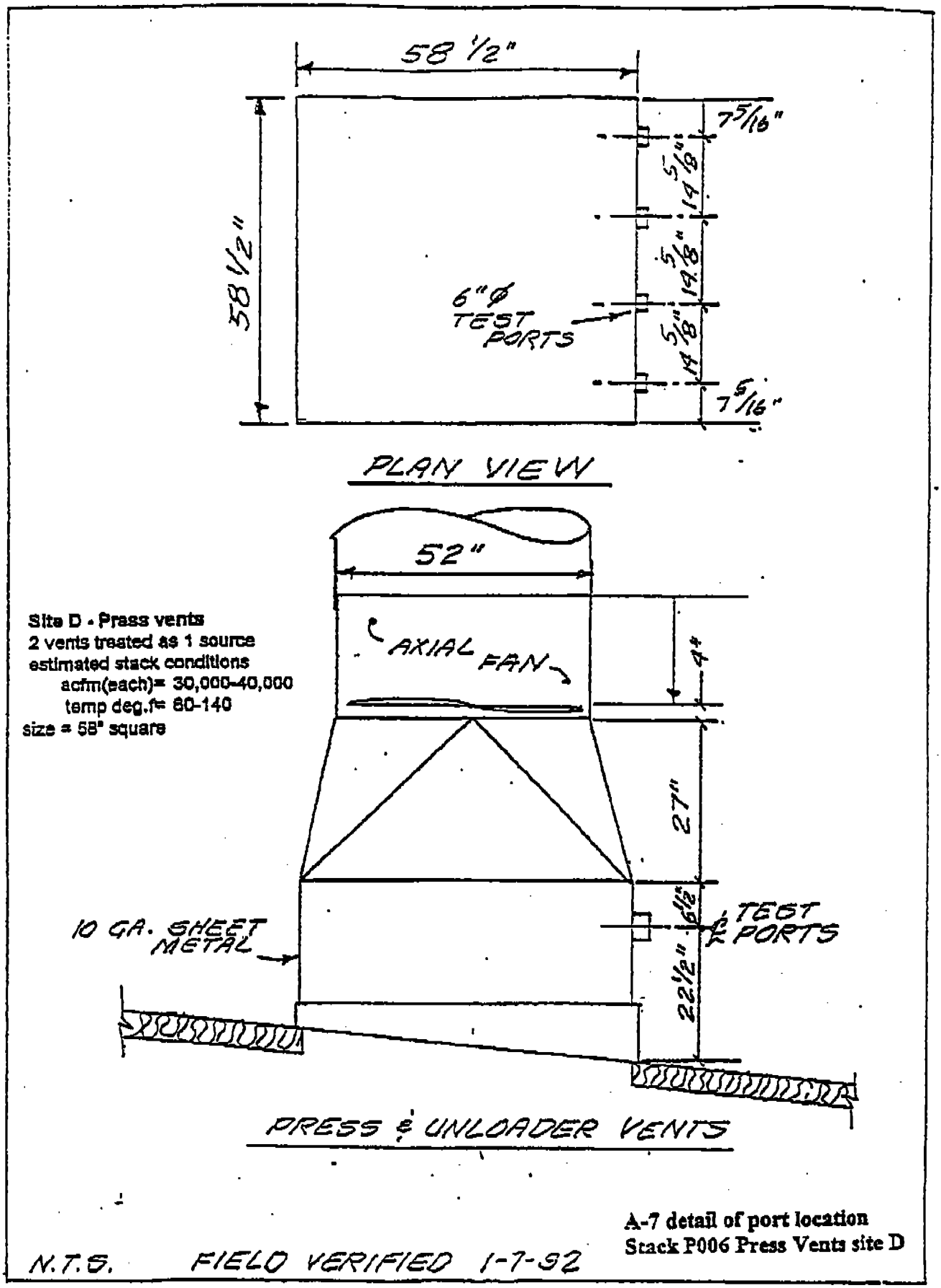


A-4 elevation of dryer control equipment

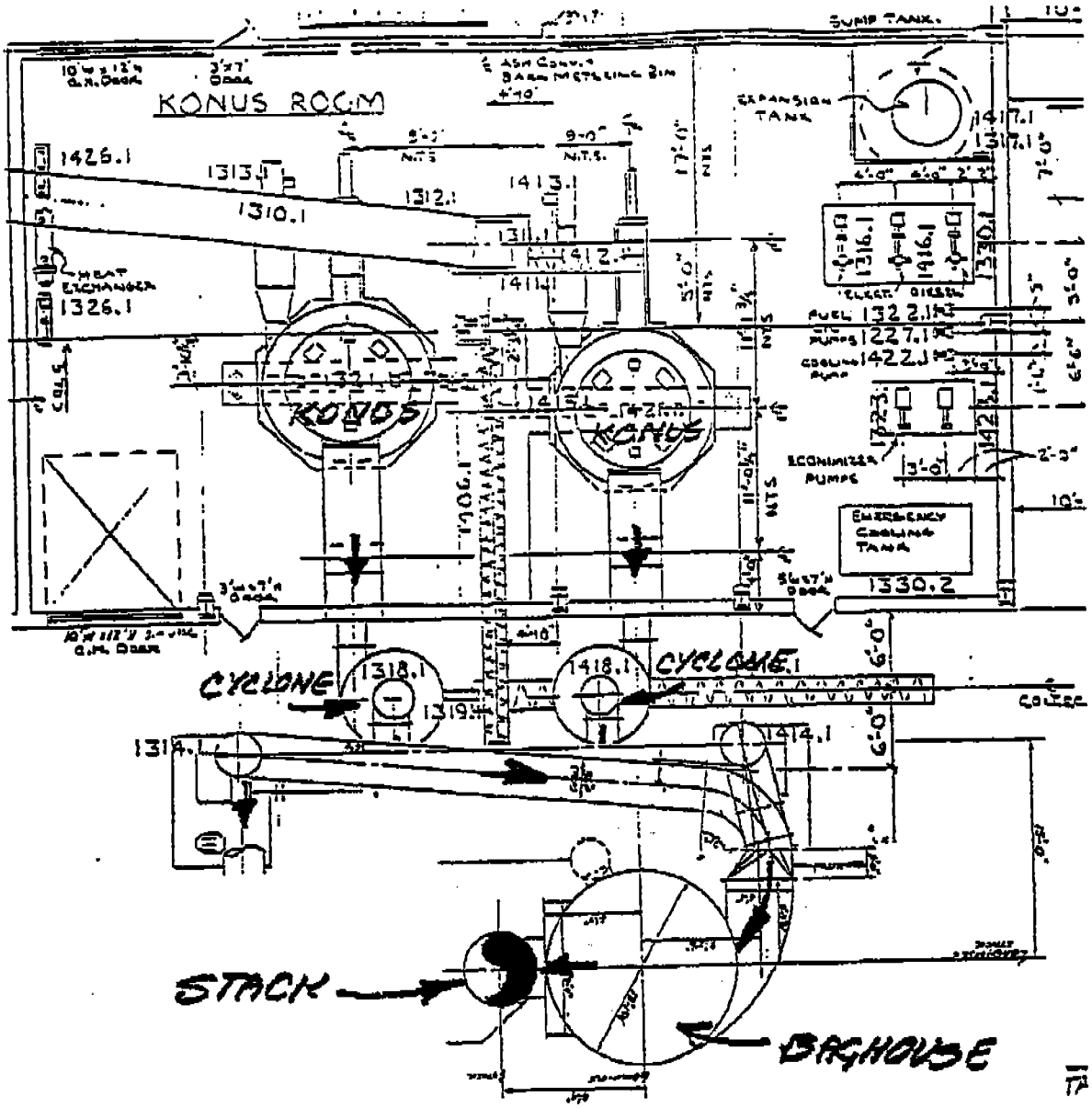


A-5 detail of port location
Stack P002 RTO stack site A

A-6 plan view of press vent and stack



A-7 detail of port location
Stack P006 Press Vents site D



A-8 plan view of Thermal Oil Heater and control equipment

APPENDIX C

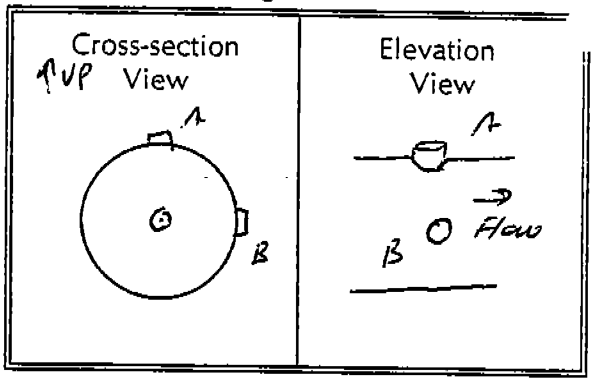
FIELD DATA SHEETS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Newberry, MI
Source: Dryer Primary Cyclone / Exhaust
Test: 1 Run: 2 Date: 8-27-96
Stack Dimen.: 42 IN.
Dry Bulb: 254 °F Wet bulb: 126 °F
Manometer: ☒Reg. ☐Exp ☐Elec.
Barometric Pressure: 29.26 IN.HG
Static Pressure: -11.6 IN.WC
Operators: M. Kochler + M. Petersen
Pitot No.: 27VS 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
		Port Length:	* 9.0 IN.	Time Start: 0810 HRS	
A-1	.044	1.85	10.85	1.53	
2	.146	6.13	15.13	1.65	
3	.296	12.43	21.43	2.10	
4	.704	29.57	38.57	2.18	
5	.854	35.87	44.87	2.20	↑
6	.956	40.15	49.15	2.30	
B-1				2.43	254
2				1.39	
3				2.25	↓
4				2.10	
5				1.85	
6				1.65	

Temp. Meas. Device & S/N: PDT-45 / TC
Time End: 0817 HRS

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

* includes vertical portclamp

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Newberry, MI
Date 8-27-96 Test 1 Run 1
Source Dryer Primary Cyclone / Exhaust
No. of traverse points 12
Method 5 Filter holder: Glass
Filter type: 1"G.F.

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:

8315

Recovery solvent(s)
☒ Acetone
☒ Other(s) MeCl2

VOID RUN

No. of probe wash bottles: 1
Sample recovered by: M. Loehler + M. Petersen

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	636	501	135
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1367	1354	13
Total			149

Integrated Gas Sampling Data:

Bag Pump No. 318
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1115
Sampling rate: 400

Box No. 23 Bag No. 1
Size: 44 L
cc/min at 15 IN.HG
(HRS) Time end: 1143 (HRS)
cc/min Operator: M. Loehler

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job L.P. / Newberry, MI Operators M. Kuehlert & M. Rebecca Nozzle No. 1-3 Pitot No. 27-S
Source Dryer Primary Cyclone / Exhaust Meter Box No. 10 ΔH@ 1.93 in.WC Nozzle Dia. .196 in. C_p .84
Date 8-2-27 Test 1 Run 1 Gasmeter Coeff. 1.0002 Bar. Press. 29.26 in.Hg H_2O 12 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	1115	501.90											
A-6	5	505.35	2.23	1.71	5.57	10	252	247	263	49	77	77	16.3
5	10	509.06	2.25	1.72	9.26	11	255	241	257	46	79	73	16.1
4	15	512.44	2.25	1.73	2.95	11	253	237	261	46	81	72	15.9
3	20	516.10	1.81	1.39	6.27	10	255	245	260	47	84	73	16.3
2	25	519.48	1.90	1.45	9.66	10.5	262	253	252	47	85	73	16.5
1	30	522.60	1.35	1.04	2.53	9	256	247	255	46	87	74	16.2
B-6	35	526.15	2.20	1.70	6.21	13	254	245	251	48	86	78	15.8
5	40	(1143)											
4	45												
3	50												
2	55												
1	60												
	( )												
			RUN ABORTED										
			VOID										
	θ =	V_m =		ΔH =							Avg. =		

C-3

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P./Newberry, MI — Date 8-22-96 Test 1 Run 2
Source Dryer Primary Cyclone/Exhaust — No. of traverse points 12
Method 5 Filter holder: Glass — Filter type: 4"Gl.Fi.

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: 0333

Recovery solvent(s)
☒ Acetone
☒ Other(s) Me.Cl.

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	721	502	219
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1534	1520	14
Total			233

Integrated Gas Sampling Data:

Bag Pump No. 313 — Box No. 23 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar — Size: 44 L
Pretest leak check: 0 — cc/min at 15 IN.HG
Time start: 1415 — (HRS) Time end: 1519 (HRS)
Sampling rate: 400 cc/min Operator: M. Kaehler

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job L.P. / Newberg, MI
Source Dryer Primary Cyclone / Exhaust
Date 8-27-96 Test #1 Run 2

Operators M. Kaehler + M. Petersen
Meter Box No. 10 ΔH@ 1.93 in.WC
Gasmeter Coeff. 1.0007

Nozzle No. 1-3
Nozzle Dia. .186 in.
Bar. Press. 29.26 in.Hg

Pitot No. 27V-5
C_p .84
H_2O 23 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1115 1230)	527.40											
B-6	5	530.77	2.27	1.40	0.73	9	253	233	263	55	91	01	15.6
5	10	533.92	2.20	1.36	4.03	9	257	241	265	50	95	00	16.3
4	15	537.15	2.25	1.40	2.37	10	255	248	260	48	96	99	16.6
3	20	540.67	2.30	1.42	0.74	10	258	245	251	49	93	00	17.1
2	25	543.03	1.09	1.10	3.82	9	256	237	255	47	92	01	17.7
1	30	546.95	1.05	1.16	6.00	9	254	240	254	49	93	01	16.6
A-6	35	550.02	2.48	1.55	0.42	12	255	233	252	47	92	05	17.1
5	40	553.94	2.29	1.44	3.83	12	252	242	260	44	94	03	16.6
4	45	557.51	2.43	1.54	7.36	13	247	245	263	45	97	05	16.4
3	50	560.09	2.22	1.40	0.74	13	253	249	257	45	97	05	16.0
2	55	563.08	1.21	1.10	3.73	12	256	244	261	47	98	07	16.2
1	60	566.89	1.00	1.14	6.78	12	254	243	252	48	99	07	15.9
	(1519)												
	θ - 60	V_m - 39.49		1.34 ΔH -							Avg. - 07.2		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Newberry, MI
Date 8-27-96 Test 1 Run 3
Source Dyer Primary Cyclone / Exhaust
No. of traverse points 12
Method 5 Filter holder: Glass
Filter type: 4" G.F.

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: 0340

Recovery solvent(s)
☒ Acetone
☒ Other(s) MeCl2

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	715	474	241
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1300	1367	13
Total			254

Integrated Gas Sampling Data:

Bag Pump No. 31B
Box No. 23 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0
cc/min at 15 IN.HG
Time start: 1645
(HRS) Time end: 1751 (HRS)
Sampling rate: 400
cc/min Operator: M. Kaehler

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

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INTERPOLL LABORATORIES, INC.
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EPA Method 5 Field Data Sheet

Job L.P. / Newberry, MI
Source Dryer Primary Cyclone / Exhaust
Date 8-27-96 Test R1 Run 3

Operators M. Kaehler + M. Pedersen
Meter Box No. 10 ΔH@ 1.93 in.WC
Gasmeter Coeff. 1.0007

Nozzle No. 1-3
Nozzle Dia. .186 in.
Bar. Press. 29.26 in.Hg

Pitot No. 27V-5
C_p .84
H_2O 22.7 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F)						Oxygen (% v/v)
							Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	
	1645 / 1745 MK	568.40											
A-6	5	571.97	2.45	1.55	1.94	8	250	247	239	55	88	88	15.8
5	10	575.34	2.33	1.47	5.39	10	254	253	246	51	89	87	16.1
4	15	578.80	2.42	1.53	8.90	11	254	245	253	46	91	87	16.1
3	20	582.23	2.10	1.33	2.18	11	255	250	268	43	93	87	16.0
2	25	585.31	1.95	1.24	5.35	11	254	251	260	44	94	87	15.9
1	30	588.27	1.55	.98	8.19	10	253	247	253	44	95	88	15.9
B-6	35	591.65	2.41	1.53	1.71	12	256	240	258	46	95	89	15.7
5	40	595.43	2.43	1.55	5.26	13	253	235	264	47	97	89	15.6
4	45	598.87	2.30	1.47	8.72	13	253	243	260	48	99	89	15.5
3	50	602.45	2.40	1.54	2.26	14	252	249	253	48	99	91	15.5
2	55	605.73	2.08	1.33	5.57	13	254	245	230	49	99	91	15.7
1	60	608.28	1.40	.90	8.28	11	252	240	255	51	100	92	15.6
	(1751)												
	0 - 60	V_m - 39.88		1.37 ΔH -							Avg. - 91.7		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P./Newburgh, IN Date 8-2-96 Test 2 Run 4
Source Dryer Primary Cyclone/Exhaust No. of traverse points 12
Method 5 Filter holder: Glass Filter type: 4" GF

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: 8363

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	709	494	215
Impinger No. 2			
Impinger No. 3			
Condenser			1
Desiccant	1552	1534	16
Total			231

Integrated Gas Sampling Data:

Bag Pump No. 31B Box No. 23 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: ✓ cc/min at 15 IN.HG
Time start: 1940 (HRS) Time end: 2142 (HRS)
Sampling rate: 400 cc/min Operator: M. Kaehler

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

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ENTROPY LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job U.P. / Newberry, MI
Source Dryer Primary Cyclone / Exhaust
Date 8-27-96 Test 1 Run 4

Operators M. Kuehler & M. Petersen
Meter Box No. 10 ΔH@ ____ in.WC
Gasmeter Coeff. 1.0007

Nozzle No. 1-3
Nozzle Dia. .186 in.
Bar. Press. 29.26 in.Hg

Pitot No. 27V-5
C_p .84
H_2O 24.2 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	1940	610.70											
B-6	5	614.11	2.43	1.48	4.16	8	263	233	247	44	97	96	16.7
5	10	617.55	2.35	1.45	7.61	9	260	237	243	46	101	96	16.3
4	15	621.07	2.32	1.44	11.05	10	257	244	251	46	104	96	16.0
3	20	624.60	2.26	1.41	14.47	10	254	240	255	47	104	96	16.2
2	25	627.65	1.97	1.17	17.59	9	252	247	263	49	105	97	16.3
1	30	630.47	1.50	.94	20.38	8	254	239	265	46	105	97	16.3
A-6	35	633.99	2.53	1.58	3.99	13	255	243	257	48	105	97	16.7
5	40	637.67	2.31	1.44	7.45	13	257	239	254	49	106	98	16.2
4	45	640.97	2.35	1.47	10.93	13	257	243	250	51	105	98	16.1
3	50	644.46	2.10	1.31	14.23	12	256	238	245	53	105	99	16.2
2	55	647.58	1.97	1.18	17.36	11	252	247	243	50	106	100	15.8
1	60	650.50	1.60	1.01	20.26	11	249	249	240	50	106	99	16.0
	(2042)												
	0-60	V_m - 39.80		ΔH - 1.32							Avg. - 1007		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Newberry, MI Date 8-27-96 Test 2 Run 5
Source Dryer Burner Cyclone / Exhaust No. of traverse points 12
Method 5 Filter holder: Glass Filter type: 4" Glass

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: 0399

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

No. of probe wash bottles: 1
Sample recovered by: M. Kuehlert - M. Peterson

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	606	501	105
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1342	1300	12
Total			197

Integrated Gas Sampling Data:

Bag Pump No. 31B Box No. 5 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 IN.HG
Time start: 2135 (HRS) Time end: 2237 (HRS)
Sampling rate: 40C cc/min Operator: M. Kuehlert

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

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INTERPOLL LABORATORIES, INC.
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EPA Method 5 Field Data Sheet

Job L.P. / Newberry, MI
Source Dryer Primary Cyclone / Exhaust
Date 8-27-96 Test 1 Run 5

Operators M. Kaehler & M. Peterson
Meter Box No. 10 ΔH@ 1.93 in.WC
Gasmeter Coeff. 1.0007

Nozzle No. 1-3
Nozzle Dia. .186 in.
Bar. Press. 29.26 in.Hg

Pitot No. 27V-5
C_p .84
H_2O 22.8 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	2135	651.40											
A-6	5	655.00	2.45	1.55	5.01	8	255	243	263	49	97	97	15.9
5	10	658.23	2.21	1.42	9.42	8	252	240	266	53	97	94	16.3
4	15	661.77	2.42	1.58	2.02	11	253	251	257	54	98	93	16.4
3	20	665.48	2.53	1.62	5.66	12	253	247	250	50	99	93	16.6
2	25	669.21	2.25	1.45	9.11	12	251	241	245	47	99	93	16.5
1	30	672.47	2.02	1.29	2.36	11	256	239	247	48	100	93	16.3
B-6	35	675.99	2.41	1.54	5.91	13	257	243	253	54	99	94	16.5
5	40	679.66	2.50	1.60	9.53	13	256	247	245	53	91	93	16.0
4	45	683.23	2.48	1.58	3.11	14	253	241	254	47	88	88	16.9
3	50	686.76	2.27	1.43	6.52	14	253	237	260	46	89	88	16.6
2	55	689.99	2.30	1.46	9.96	14	250	240	253	48	88	87	16.4
1	60	693.13	1.87	1.18	3.05	12	250	233	250	49	91	87	16.2
	(2337)												
	0 - 60	V_m - 41.73		ΔH - 1.46							Avg. - 93.1		

Down 2211
Re Start 2245
Down 2255
Restart 2315

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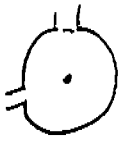
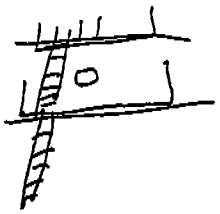
INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job LP / NEWBURY
Source DRYER ETUBE OUTLET
Test 1 Run 0 Date 8-27-96
Stack Dimen. 48 IN.
Dry Bulb 150 °F Wet bulb _____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 29.26 IN.HG
Static Pressure -.5 IN.WC
Operators S.D / D.H.
Pitot No. V27-5 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
1	.044	2.11	8.11	~~69~~ 1.50	
2	.146	7.01	13.01	~~75~~ 1.40	
3	.296	14.21	20.21	~~86~~ 1.55	
4	.704	33.79	39.79	~~73~~ 1.75	
5	.854	40.99	46.99	~~85~~ 1.80	
6	.956	45.89	~~51~~ 51.89	~~80~~ 1.50	
1					
2					
3					
4					
5					
6					

Temp. Meas. Device & S/N: PDT #2 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 CP NEWBERRY Date 8-27-96 Test 1 Run 1
Source DRYER ETUBE OUTLET No. of traverse points 12
Method 5/17 Filter holder: GLASS Filter type: 4" GLASS

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: 8278

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

VOID RUN

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

Condensate Data:

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

Integrated Gas Sampling Data:

NO BAG RUN 1

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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(612) 86-6020

EPA Method 5 Field Data Sheet

Job LP / NEWBURGH
Source DRYER B TUBE OUTLET
Date 6-27-96 Test 1 Run 1

Operators J.D / D.H
Meter Box No. 14 ΔH@ 1.82 in.WC
Gasmeter Coeff. .9929

Nozzle No. S-3
Nozzle Dia. 1.88 in.
Bar. Press. 29.26 in.Hg

Pitot No. U27-5
C_p .84
H_2O 24 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(11 15)	585.75											
A 1	5	588.60	1.40	1.03	6.62	2	150	225	230	35	73	72	16.7
2	10	591.51	1.40	1.01	1.48	2	160	228	237	35	75	72	16.9
3	15	594.74	1.70	1.23	4.64	2	161	231	245	37	78	73	16.7
4	20	598.00	1.80	1.30	7.89	2	164	248	239	36	80	73	16.7
5	25	601.14	1.70	1.23	1.06	2	163	245	242	37	81	74	17.2
6	30	604.26	1.65	1.20	4.19	2	164	242	237	37	82	74	17.0
B 1	3532.9	605.97	1.60	1.17	7.28	2	161	239	240	38	83	74	17.0
2	40												
3	45												
4	50												
5	55												
6	60												
	( )												
	360	20.22											
	θ =	V_m =		ΔH =							Avg. =		

~11:50

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP
Date 8-27-96 Test 1 Run 2
Source DRYER ETUBE OUTLET
No. of traverse points 12
Method 5/~~202~~ Filter holder: GLASS
Filter type: 4" GLASS

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:

7975

Recovery solvent(s)

☑ Acetone
☒ Other(s) METH

VOID RUN

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	711	495	216
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1515	1510	5
Total			221

Integrated Gas Sampling Data:

Bag Pump No. B6
Box No. 17 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0
cc/min at 15 IN.HG
Time start: 1355
(HRS) Time end: 1500 (HRS)
Sampling rate: 400 cc/min
Operator: SB

S/N of O_2 Analyzer used to monitor train outlet: 8

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(612) 86-6020

EPA Method 5 Field Data Sheet

Job LP NEWBERRY
Source DRYER ETUBE OUTLET
Date 8-27-96 Test 1 Run 2

Operators JS / DH
Meter Box No. 14 ΔH@ 1.82 in.WC
Gasmeter Coeff. .9929

Nozzle No. 9-3
Nozzle Dia. .188 in.
Bar. Press. 29.26 in.Hg

Pitot No. U27-5
C_p .84
H_2O 24 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1355)	606.13											
B 1	5	609.18	1.55	1.14	9.17	2-5	158	227	227	40	85	75	17.2
2	10	612.14	1.45	1.06	2-11	2	162	230	229	40	86	78	17.6
3	15	615.40	1.80	1.35	5.44	3	149	235	232	41	87	79	17.8
4	20	618.70	1.75	1.31	8.73	3	151	240	237	40	89	79	17.9
5	25	622.23	1.95	1.46	2.20	3.5	152	243	235	41	90	79	17.9
6	30	625.13	1.35	1.00	5.08	3	154	241	239	42	90	80	17.9
A 1	35	628.07	1.40	1.04	8.02	3	156	245	241	43	90	81	17.7
2	40	631.00	1.50	1.11	1.05	3	161	243	240	43	90	81	17.8
3	45	634.01	1.45	1.07	4.03	3	164	244	244	44	91	82	17.6
4	50	637.08	1.55	1.15	7.11	3	163	251	241	44	92	82	17.7
5	55	640.30	1.70	1.26	0.34	3.5	164	250	242	44	92	82	17.7
6	60	643.61	1.80	1.33	3.66	3.5	163	252	245	45	92	83	17.6
	(1500)												
	θ = 60	V_m = 37.48		ΔH = 1.19							Avg. = 84.5		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP MULBERRY
Date 8-27-96 Test 1 Run 3
Source DRYER TUBE OUTLET
No. of traverse points 12
Method 5/17 Filter holder: GLASS
Filter type: 4" GLASS

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:

8558

Recovery solvent(s)

~~Acetone~~
~~Other(s)~~ METH

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	759	496	263
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1539	1529	10
Total			273

Integrated Gas Sampling Data:

Bag Pump No. B6
Box No. 19 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0
cc/min at 15 IN.HG
Time start: ~~1395~~ 1645
(HRS) Time end: ~~1504~~ (HRS) 1750
Sampling rate: 400
cc/min Operator: JS

S/N of O_2 Analyzer used to monitor train outlet: 8

052394-G:\STACK\WP\FORMS\S-0046RR

(612) 936-6020

EPA Method 5 Field Data Sheet

Job: LP NEWBURGH
Source: DRYER B TUBE OUTLET
Date: 9-27-96 Test: 1 Run: 3

Operators: JB/OH
Meter Box No.: 14 ΔH@ 1.82 in.WC
Gasmeter Coeff.: .9929

Nozzle No.: 9-3
Nozzle Dia.: .188 in.
Bar. Press.: 27.26 in.Hg

Pitot No.: V27-5
C_p: .84
H_2O: 23 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F)						Oxygen (% v/v)
							Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	
	(1648)	(646.75)											
1	5	649.68	1.35	1.03	9.66	2	156	249	235	40	88	84	16.9
2	10	652.65	1.40	1.05	2.62	2	166	249	239	40	91	85	16.8
3	15	655.50	1.35	1.02	5.52	2	168	253	237	41	93	85	16.7
4	20	658.45	1.40	1.06	8.49	2	166	255	241	40	93	85	16.6
5	25	661.55	1.55	1.17	1.61	3	168	257	240	41	94	86	16.6
6	30	664.85	1.70	1.29	4.90	3	163	254	243	41	95	86	16.6
1	35	667.72	1.35	1.02	7.82	3	166	259	245	42	96	86	16.8
2	40	670.90	1.50	1.15	0.92	3	161	256	246	42	97	87	16.6
3	45	674.25	1.80	1.37	4.30	3.5	166	253	249	43	97	87	16.5
4	50	677.17	1.30	.99	7.18	3	166	258	251	43	98	87	16.5
5	55	680.05	1.25	.96	0.02	3	162	262	254	44	98	88	16.5
6	60	683.05	1.40	1.07	3.01	3	165	261	251	44	98	88	16.8
	(1750)												
	θ = 60	V_m = 36.3		ΔH = 1.10							Avg. = 90.5		

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Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP NEW BOILER
Date 8-27-96 Test 1 Run 4
Source DRYER E TUBE OUTLET
No. of traverse points 12
Method 5/20m Filter holder: GLASS
Filter type: 4" GLASS

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:

8429

Recovery solvent(s)

☒ Acetone
☑ Other(s) METH

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	724	491	233
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1463	1456	7
Total			240

Integrated Gas Sampling Data:

Bag Pump No. D6
Box No. 19 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0
cc/min at 15 IN.HG
Time start: 1940
(HRS) Time end: 2055 (HRS)
Sampling rate: 400
cc/min Operator: SB

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

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(612) [illegible]-6020

EPA Method 5 Field Data Sheet

Job: LP New Bunny
Source: Boiler B Tube Outlet
Date: 8-27-96 Test: 1 Run: 4

Operators: S.O / DH
Meter Box No.: 14 ΔH@ 1.82 in.WC
Gasmeter Coeff.: .9929

Nozzle No.: 9-3
Nozzle Dia.: .108 in.
Bar. Press.: 29.26 in.Hg

Pitot No.: V27-5
C_p: .84
H_2O: 26 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1440)	684.64											
1	5	687.60	1.65	1.16	7.77	2	162	245	253	39	83	82	17.6
2	10	690.68	1.55	1.09	0.77	2	160	247	252	39	84	83	17.4
3	15	693.69	1.65	1.16	3.87	2	161	244	254	39	85	83	17.4
4	20	696.88	1.60	1.13	6.92	2	161	243	255	40	86	82	17.5
5	25	699.66	1.35	.95	9.73	2	161	244	251	40	86	82	17.6
6	30	702.28	1.20	.85	2.36	2	161	250	253	41	87	82	17.5
1	35	705.61	1.80	1.27	5.62	3	160	247	255	41	87	82	17.4
2	40	708.60	1.50	1.06	8.58	2.5	162	245	250	40	87	82	17.7
3	45	711.38	1.30	.92	1.34	2	161	249	251	41	88	82	17.9
4	50	714.40	1.60	1.13	4.40	3	161	252	254	42	88	82	17.7
5	55	717.54	1.70	1.20	7.55	3	161	248	257	42	88	82	17.8
6	60	720.49	1.45	1.03	0.47	3	161	249	257	42	88	82	17.7
	(2045)												
	60	V_m - 35.85		1.06							Avg. - 84.2		
	0 -			ΔH -									

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Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP Newberry
Date 8-27-96 Test 1 Run 5
Source DRYER ETUBE OUTLET
No. of traverse points 12
Method 5/202 Filter holder: GLASS
Filter type: 4" GLASS

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: 8421

Recovery solvent(s)
☐ Acetone
☒ Other(s) MEOH

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	720	487	241
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1496	1480	16
Total			257

Integrated Gas Sampling Data:

Bag Pump No. B6
Box No. N/A Bag No. 1
Bag Material: 3-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0
cc/min at 15 IN.HG
Time start: ~~0135~~ ~~400~~
(HRS) Time end: 23:47 (HRS)
Sampling rate: 400 cc/min Operator: SD

S/N of O_2 Analyzer used to monitor train outlet: 0

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EPA Method 5 Field Data Sheet

Job: LP New Bunny
Source: DRYER ETUBE OUTLET
Date: 8-27-96 Test 1 Run 5

Operators: S.B / D.H
Meter Box No. 14 ΔH@ 1.82 in.WC
Gasmeter Coeff. .9989

Nozzle No. 9-3
Nozzle Dia. .188 in.
Bar. Press. 29.26 in.Hg

Pitot No. V27-5
C_p .64
H_2O 25 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(2135)	(721.95)											
1	5	724.60	1.30	.94	4.73	2	161	243	237	41	79	79	17.6
2	10	727.40	1.40	1.01	7.61	2	157	249	246	43	79	78	17.5
3	15	730.40	1.45	1.09	0.63	2	158	252	250	43	80	78	17.6
4	20	733.50	1.70	1.23	3.69	3	157	250	247	43	81	77	17.7
5	25	736.55	1.60	1.15	6.76	3	157	253	249	44	81	77	17.6
6	30	739.29	1.15	.83	9.37	2	157	251	246	44	82	77	17.7
1	35	742.20	1.45	1.04	2.29	3	158	255	247	45	82	77	17.7
2	40	745.27	1.60	1.16	5.37	3	155	250	251	45	80	78	17.3
3	45	748.39	1.75	1.26	8.58	3	157	253	248	46	78	75	17.5
4	50	751.34	1.50	1.07	1.54	3	159	256	250	42	80	74	17.6
5	55	754.45	1.70	1.21	4.68	3	162	252	247	41	82	75	17.3
6	60	757.21	1.30	.93	7.44	3	161	252	249	42	83	75	17.4
	(2317)												
	θ = 60	V_m = 35.26		ΔH = 1.07							Avg. = 78.4		

~2210 DOWN
UP 2845
DOWN 2250
UP 2315

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INTERPOLL LABORATORIES, INC.
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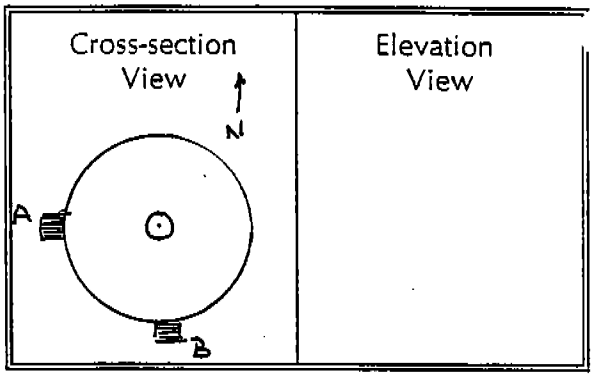
EPA Method 2 Field Data Sheet

Job LP/Newberry
Source Dryer RTO Stack
Test 1 Runs Date 8-27-96
Stack Dimen. 64 IN.
Dry Bulb 265 °F Wet bulb 200 °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 29.26 IN.HG
Static Pressure -.51 IN.WC
Operators Scott Fjelstad & Steve Kalkev
Pitot No. V31-6 C_p 0.84

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
		Port Length: 6.5 IN.		Time Start: HRS	
A - 1	032	2.05	8.55	.39	
2	.105	6.72	13.22	.53	
3	.194	12.42	18.52	.53	265
4	.323	20.67	27.17	.54	
5	.677	43.33	49.83	.62	
6	.806	51.58	58.08	.63	
7	.895	57.28	63.78	.65	
8	.968	61.95	68.45	.55	265
B - 1					
2					
3					
4					
5					
6					
7					
Temp. Meas. Device & S/N: PDT-#32				Time End: HRS	

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

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Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/Newberry Date 8-27-96 Test _____ Run 1

Source Dryer RTO Stack No. of traverse points 16

Method 5 Filter holder: 4" 6/pp Filter type: 4" 6F

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒ Pitots @ 3 in W.C.

Post test: 0.00 cfm at 8 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: Recovery solvent(s)

8615 ☒acetone _____

☒other(s) MeCl2 (Imp R.-sc.)

VOID Run

No. of probe wash bottles: 1

Sample recovered by: SF

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	632	507	125
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant			
	1527	1519	8
Total			133

Integrated Gas Sampling Data:

Bag Pump No. 7R A Box No. ~~12~~ Bag No. ~~1~~

Bag Material: 5-layer Aluminized Tedlar Size: 44 L

Pretest leak check: 0.00 cc/min at 23 IN.HG

Time start: 1116 (HRS) Time end: 1146 (HRS)

Sampling rate: 400 cc/min Operator: SF

S/N of O_2 Analyzer used to monitor train outlet: 5

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INTERPOLL LABORATORIES, INC.

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EPA Method 5 Field Data Sheet

Job LP/Newberry
Source Pyer RTO stack
Date 8-27-96 Test ____ Run 1

Operators SF/SK
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9926

Nozzle No. 9-4
Nozzle Dia. .251 in.
Bar. Press. 28.26 in.Hg

Pitot No. V31-6
C_p 0.84
H_2O 23 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Stack (°F)	Probe (°F)	Oven (°F)	Imp. (°F)	Gas/In (°F)	Gas/Out (°F)	Oxygen (% v/v)
	(1115)	672.91											
A - 8	4	675.33	.56	1.22 (overwritten)	5.33	4	276	241	249	40	66	66	16.7
7	8	677.74	.60	1.26	7.78	4	278	245	250	40	69	67	16.6
6	12	680.40	.70	1.48	0.42	5	278	248	252	42	75	68	16.4
5	16	682.97	.65	1.38	2.99	4.5	278	243	250	42	77	70	16.4
4	20	685.44	.60	1.29	5.47	4	276	244	251	44	80	70	16.8
3	24	687.98	.62	1.33	8.00	4	278	244	247	46	82	71	16.8
2	28	690.39	.55	1.18	0.39	4	278	245	248	45	84	73	16.5
(1147) 1	32	692.58	.45	0.97	2.55	3	278	248	249	47	85	73	16.4
B - 8	36												
7	40												
6	44												
5	48												
4	52												
3	56												
2	60												
1	64												
	(1147)												
	θ = 64	V_m = 19.67		ΔH = 1.26							Avg. = 73.5		

VOID RUN

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP/Newberry
Date 8-27-96 Test 1 Run 2
Source Dryer RTO Stack
No. of traverse points 16
Method 5 Filter holder: Glass
Filter type: 4" GF

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☑
Post test: 0.00 cfm at 8 IN. HG (vac) ☑

VOID Run

Particulate Catch Data:

No. of filters used:

8616

Recovery solvent(s)

☒ acetone
☒ other(s) MeCl2

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	731	507	224
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1456	1443	13
Total			237

Integrated Gas Sampling Data:

Bag Pump No. TR A
Box No. 12 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0.00
cc/min at 23 IN.HG
Time start: 1416
(HRS) Time end: 1520 (HRS)
Sampling rate: 400
cc/min Operator: SF

S/N of O_2 Analyzer used to monitor train outlet: 5

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INTERPOL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LP/Newberg
Source Dryer RTO stack
Date 8-27-96 Test 1 Run 2

Operators SF/SK
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9976

Nozzle No. 9-4
Nozzle Dia. .251 in.
Bar. Press. 29.26 in.Hg

Pitot No. U34-6
C_p 0.84
H_2O 24 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1418 1345)	693.10											
B - 8	4	695.23	.45	.94	5.22	3	276	249	252	43	80	80	17.2
7	8	697.37	.43	.91	7.32	3	279	247	253	44	85	80	16.7
6	12	699.33	.36	.76	9.25	3	279	243	250	46	88	84	16.9
5	16	701.36	.41	.88	1.33	3	278	245	251	47	90	85	17.0
4	20	704.07	.71	1.53	4.07	5	275	246	248	47	93	86	17.2
3	24	706.87	.75	1.62	6.89	5	276	246	249	48	95	86	17.1
2	28	709.67	.73	1.58	9.68	4	276	250	252	49	96	87	17.5
1	32	712.25	.64	1.39	2.31	4	274	251	250	51	97	88	17.1
A - 8	36	714.94	.65	1.42	4.96	4	274	246	249	43	98	90	17.2
7	40	717.63	.68	1.48	7.67	4.5	276	248	247	43	100	91	17.1
6	44	720.38	.68	1.48	0.39	4.5	278	250	248	45	102	92	16.8
5	48	723.20	.72	1.57	3.19	5	278	251	248	45	103	92	16.6
4	52	725.91	.69	1.50	5.93	4.5	281	253	252	46	104	93	16.5
3	56	728.51	.62	1.35	8.53	4	281	254	253	47	104	94	16.8
2	60	731.14	.64	1.40	1.17	4.5	282	255	252	47	104	94	16.8
1	64	733.57	.51	1.11	3.54	4	282	253	250	48	107	96	16.5
	(1521)												
	0 - 64	V_m - 40.47		1.31 ΔH -							Avg. - 92.6		

100 Run

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/Newberry Date 9-27-96 Test 1 Run B1

Source Dryer RTO Stack No. of traverse points 16

Method 5 Filter holder: Glass Filter type: 4" GF

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒

Post test: 0.0 cfm at 7 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: 8619

Recovery solvent(s)

☒acetone

☒other(s) MeCl, (Imp Rinse)

No. of probe wash bottles: 1

Sample recovered by: SF

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	710	496	214
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1540	1527	13
Total			227

Integrated Gas Sampling Data:

Bag Pump No. TR A Box No. 12 Bag No. 3

Bag Material: 5-layer Aluminized Tedlar Size: 44 L

Pretest leak check: 0.00 cc/min at 23 IN.HG

Time start: 1645 (HRS) Time end: 1750 (HRS)

Sampling rate: 400 cc/min Operator: SF

S/N of O_2 Analyzer used to monitor train outlet: 5

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INTERPOLE LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LP/Newberry
Source Dryer RTO Stack
Date 8-24-96 Test 1 Run B1

Operators SF/SK
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9576

Nozzle No. 9-4
Nozzle Dia. .251 in.
Bar. Press. 29.26 in.Hg

Pitot No. U31-6
C_p 0.84
H_2O 23 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1615)	733.75											
A - 8	4	735.08	.39	.86	1.81	3	283	245	247	52	89	87	17.2
7	8	738.50	.65	1.42	8.45	3.5	281	247	251	50	92	88	17.2
6	12	741.29	.69	1.51	1.19	4	281	247	250	49	95	89	16.9
5	16	743.72	.60	1.32	3.74	4	282	251	248	51	97	90	16.8
4	20	746.22	.55	1.21	6.20	4	281	249	252	47	99	91	16.7
3	24	748.63	.54	1.19	8.64	4	282	249	247	45	100	92	17.0
2	28	751.07	.52	1.15	1.04	4	281	245	253	48	101	92	17
1	32	753.47	.47	1.04	3.32	4	281	248	250	47	101	92	17.2
B - 8	36	755.73	.46	1.02	5.58	3.5	281	252	251	47	101	92	17.1
7	40	757.70	.34	.80	7.55	3	279	248	246	45	102	93	17.6
6	44	759.52	.41	1.00	9.83	3	280	250	251	45	102	93	17.9
5	48	761.75	.47	1.05	2.12	4	281	252	252	45	101	93	17.8
4	52	764.60	.65	1.44	4.80	4	281	247	249	47	101	93	17.7
3	56	767.42	.45	1.45	7.49	4.5	275	243	246	46	105	94	17.5
2	60	770.15	.42	1.39	0.13	4.5	279	247	250	48	105	94	17.6
1	64	772.67	.54	1.21	2.66	4	277	251	248	46	106	95	17.5
	(1750)												
	0 - 64	V_m - 38.92		1.19 ΔH -							Avg. - 95.8		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/Newberry
Source Dryer Rto Stack
Method 5 Filter holder: Glass

Date 8-27-96 Test 1 Run A2
No. of traverse points 16
Filter type: 4" GF

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.0 cfm at 7 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: 8621

Recovery solvent(s)

☒acetone
☒other(s) MeCl2 (Imp Rinse)

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	735 SG	486	249
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1468	1456	12
Total			269

Integrated Gas Sampling Data:

Bag Pump No. TR A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0.00
Time start: 1941
Sampling rate: 400

Box No. 12 Bag No. 1
Size: 44 L
cc/min at 23 IN.HG
(HRS) Time end: 2045 (HRS)
cc/min Operator: SF

S/N of O_2 Analyzer used to monitor train outlet: 5

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LP/Newberry
Source Dryer RTO Stack
Date 8-27-96 Test 1 Run #2

Operators SC/SK
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9976

Nozzle No. 9-4
Nozzle Dia. .251 in.
Bar. Press. 29.26 in.Hg

Pitot No. U31-6
C_p 0.84
H_2O 23 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1940)	772.85											
B - 8	4	774.96	.41	.92	4.99	3	271	243	257	40	81	79	16.7
7	8	776.86	.33	.72	6.86	3	270	244	258	41	84	80	16.7
6	12	778.86	.36	.79	8.82	3	273	246	255	43	86	81	16.8
5	16	780.93	.40	.88	0.89	3	274	245	253	45	88	82	16.8
4	20	783.40	.58	1.27	3.39	4	274	248	254	45	90	82	16.7
3	24	785.93	.60	1.32	5.93	4	274	246	255	46	91	83	16.6
2	28	788.53	.63	1.39	8.54	4	274	243	251	46	92	83	16.5
1	32	790.88	.50	1.10	0.87	4	274	245	250	47	93	83	17.0
A - 8	36	793.48	.62	1.37	3.46	4	274	246	250	48	91	83	17.0
7	40	795.99	.58	1.28	5.97	4	271	242	253	48	94	83	17.0
6	44	798.47	.56	1.24	8.45	4	271	238	251	48	94	84	16.9
5	48	800.95	.57	1.26	0.94	4	273	240	248	49	95	84	16.9
4	52	803.34	.52	1.15	3.33	4	273	241	249	48	96	85	16.8
3	56	805.71	.51	1.13	5.68	4	274	243	246	48	96	85	16.8
2	60	808.11	.53	1.18	8.10	4	274	244	244	46	95	84	16.7
1	64	810.30	.43	.95	0.27	4	273	241	244	45	95	84	16.2
	(2046)												
	0 - 64	V_m = 37.45		1.12 ΔH =							Avg. = 87.0		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/Newberry Date 7-27-96 Test 1 Run #3
Source Dryer RTO Stack No. of traverse points 16
Method 5 Filter holder: Glass Filter type: 4" GF

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.0 cfm at 8 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: 8622

Recovery solvent(s)

☒acetone
☒other(s) MeCl2 (Imp Rinse)

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	745	500	245
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1550	1540	10
Total			255

Integrated Gas Sampling Data:

Bag Pump No. TKA Box No. 25 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0.00 cc/min at 23 IN.HG
Time start: 2136 (HRS) Time end: _____ (HRS)
Sampling rate: 400 cc/min Operator: SF

S/N of O_2 Analyzer used to monitor train outlet: 5

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job: CP/Newberry
Source: Dryer RTO Stack
Date: 8-27-96 Test: 1 Run: B-3

Operators: SF/SK
Meter Box No.: 7 ΔH@: 1.95 in.WC
Gasmeter Coeff.: .9976

Nozzle No.: 9-7
Nozzle Dia.: .251 in.
Bar. Press.: 29.26 in.Hg

Pitot No.: U31-L
C_p: 0.84
H_2O: 24 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(2135)	810.40											
A - 8	4	812.74	.50	1.08	2.70	4	274	237	242	41	73	73	16.9
7	8	815.16	.58	1.22	5.11	4	275	239	243	41	76	74	16.8
6	12	817.68	.63	1.33	7.63	4	276	240	245	42	80	74	16.8
5	16	820.14	.60	1.27	0.11	4	274	241	244	42	83	76	16.8
4	20	822.66	.63	1.34	2.65	4	274	243	245	43	84	77	17.1
3	24	825.03	.52	1.11	4.97	4	274	243	248	45	86	76	17.0
2	28	827.27	.48	1.03	7.21	4	271	244	245	46	86	77	17.0
1	32	829.34	.43	.92	9.32	4	274	243	246	47	87	77	17.0
B - 8	36	831.42	.42	.90	1.41	3	274	240	243	48	86	77	17.2
7	40	833.43	.38	.81	3.40	3	273	238	241	47	71	70	16.6
6	44	835.35	.36	.76	5.31	3	264	238	240	45	70	68	16.6
5	48	837.28	.37	.77	7.23	3	273	237	240	44	73	69	16.4
4	52	839.62	.58	1.22	9.64	4	270	239	242	44	75	70	16.2
3	56	842.10	.58	1.22	2.06	4	273	240	245	43	79	71	16.0
2	60	844.43	.58	1.22	4.48	4	274	242	245	45	80	71	16.3
1	64	846.95	.61	1.29	6.97	4	273	241	244	46	82	73	16.2
	(2339)												
	0 - 64	V_m = 36.55		1.09 ΔH =							Avg. = 76.4		

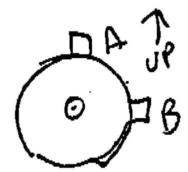
Stop 2240
Start 2244

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

b L.P. Newberry
Source Dryer Primary Cyclone Exhaust
Test 3 Run 0 Date 8-28-96
Stack Dimen. 42 IN.
Dry Bulb ______ °F Wet bulb ______ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 29.31 IN.HG
Static Pressure -11.6 IN.WC
Operators E. Juers & J. Lorenz
Pitot No. 27V-4 C_p .840
Formaldehyde

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
		Port Length:	IN.	Time Start:	HRS
A 1	.094	1.85	10.85		
2	.146	6.13	15.13		
3	.296	12.43	21.43		
4	.704	29.57	38.57		
5	.854	35.87	44.87		
6	.956	40.14	49.15		
Temp. Meas. Device & S/N: PDT 47				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. Newberry Date 6-28-96 Test 3 Run 1
Source Dryer Primary Cyclone/Exhaust No. of traverse points 12
Method 0011 Filter holder: — Filter type: —

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:

Recovery solvent(s)

☐ acetone
☒ other(s) meCl2 (Imp Rinse + P.W) ~~Imp Rinse~~

No. of probe wash bottles: 1
Sample recovered by: EJ SF JL

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	850	555	295
Impinger No. 3			
Condenser			
Desiccant	1485	1470	15
Total			310

Integrated Gas Sampling Data:

Bag Pump No. 298 Box No. 16 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 IN.HG
Time start: 0930 (HRS) Time end: 1137 (HRS)
Sampling rate: 400 cc/min Operator: EJ

S/N of O_2 Analyzer used to monitor train outlet: 298

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(612) 5-6020

EPA Method 5 Field Data Sheet

Job: L.P. Newberry
Source: Paper Primary Cyclone / Exhaust
Date: 8-28-96 Test 3 Run 1

Operators: EJ JL
Meter Box No. 4 ΔH@ 1.75 in.WC
Gasmeter Coeff. .9945

Nozzle No. Glass
Nozzle Dia. .190 in.
Bar. Press. 29.31 in.Hg

Pitot No. 27V-5
C_p .840
H_2O 23 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(0930)	(117.64)											
B 6	3	119.90	2.35	1.51	9.78	9	253	236	-	45	62	62	17.1
	6	122.04	2.65	1.64	1.98	9	253				65	63	17.1
5	9	124.26	2.95	1.83	4.30	10	255	242	-	46	67	63	17.3
	12	126.52	2.95	1.83	6.63	10	255				68	63	17.1
4	15	128.68	2.3	1.42	8.69	10	259	256	-	46	69	64	17.2
	18	130.76	2.25	1.40	0.73	10	258				70	65	17.1
3	21	132.78	2.2	1.38	2.75	10	255	254	-	49	71	65	17.0
	24	134.79	2.2	1.38	4.78	9.5	255				72	66	17.1
2	27	136.77	1.95	1.22	6.69	9	257	260	-	51	72	66	16.5
	30	138.74	2.1	1.32	8.67	9	251				67	66	17.0
1	33	140.55	1.75	1.09	0.47	9	259	257	-	50	68	66	17.5
	36	142.46	1.75	1.09	2.27	9	257				70	67	17.3
A 6	39	144.62	2.5	1.56	4.43	10	256	256	-	45	72	68	17.1
	42	146.71	2.5	1.57	6.60	10	257				72	68	17.2
5	45	148.78	2.40	1.51	8.72	11	256	250	-	44	74	69	17.2
	48	150.88	2.4	1.51	0.85	11	256				75	70	17.4
4	51	152.95	2.25	1.41	2.91	11	258	246	-	46	76	70	17.4
	54	155.03	2.3	1.45	5.00	11	256				77	70	17.3
3	57	157.07	2.25	1.42	7.07	11	256	249	-	47	78	71	17.4
	60	159.13	2.2	1.39	9.12	11	255				78	72	17.3
2	63	161.15	1.9	1.20	1.02	9.5	256	256	-	45	78	72	17.3
	66	163.11	1.9	1.20	2.93	9	256				79	72	17.2
1	69	164.72	1.35	.85	4.54	6.5	256	260	-	49	80	73	17.3
	72	166.38	1.35	.86	6.15	6.5	257				81	73	17.3
	(1132)												
	0 - 72	V_m = 48.74		ΔH = 1.38							Avg. = 70.1		

Restart Plant Down 956 1040

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job C.P. Newberry Date 8-28-96 Test 3 Run 2
Source Dryer Primary Cyclone/Exhaust No. of traverse points 12
Method 0011 Filter holder: — Filter type:

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: <.02 cfm at 13 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) MeCl2 PW + Imp Rinse

No. of probe wash bottles: 1
Sample recovered by: ES SF JL

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	867	552	315
Impinger No. 3			
Condenser			
Desiccant	1439	1420	19
Total			334

Integrated Gas Sampling Data:

Bag Pump No. 298 Box No. 16 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 IN.HG
Time start: 1215 (HRS) Time end: 1332 (HRS)
Sampling rate: 400 cc/min Operator: ES

S/N of O_2 Analyzer used to monitor train outlet: 298

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(612) 5-6020

EPA Method 5 Field Data Sheet

Job: L.P. Newberry
Source: Dryer Primary Cyclone Exhaust
Date: 9-28-96 Test 3 Run 2

Operators: EJ JL
Meter Box No. 4 ΔH@ 1.75 in.WC
Gasmeter Coeff. .9945

Nozzle No. Glass
Nozzle Dia. .190 in.
Bar. Press. 27.31 in.Hg

Pitot No. 27V-5
C_p .840
H_2O 23.5 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1215)	(167.81)											
B 6	3	169.87	2.5	1.57	9.96	8	248	237	–	43	74	74	16.1
	6	172.02	2.5	1.57	2.13	9	253				78	76	16.4
5	9	174.15	2.5	1.56	4.31	9.5	261	242	–	44	81	76	16.4
	12	176.31	2.6	1.63	6.53	10	260				82	76	16.5
4	15	178.50	2.45	1.53	8.69	10.5	264	239	–	44	83	77	17.1
	18	180.66	2.5	1.57	0.88	10.5	261				83	77	16.8
3	21	182.89	2.4	1.51	3.02	10.5	260	252	–	46	84	78	16.7
	24	185.14	2.4	1.51	5.17	10.5	260				84	78	16.8
2	27	187.17	2.2	1.39	7.23	10	259	256	–	45	85	78	16.9
	30	189.26	2.15	1.36	9.27	10	259				85	78	16.8
1	33	191.19	1.75	1.11	1.11	9	257	263	–	46	85	79	17.0
	36	193.07	1.75	1.11	2.95	9	257				85	79	16.9
A 6	39	195.14	2.35	1.49	5.09	10.5	256	256	–	42	84	80	16.2
	42	197.24	2.3	1.45	7.20	10.5	259				85	80	16.6
5	45	199.34	2.3	1.46	9.31	10.5	258	260	–	44	86	80	16.6
	48	201.31	2.25	1.42	1.40	10.5	259				86	81	16.0
4	51	203.53	2.3	1.47	3.52	10.5	253	259	–	44	87	81	16.0
	54	205.56	2.35	1.50	5.67	10.5	254				87	81	16.2
3	57	207.72	2.4	1.53	7.84	10.5	253	253	–	46	87	82	16.0
	60	209.05	2.55	1.50	9.98	10.5	256				88	82	16.1
2	63	212.09	2.0	1.28	1.97	10.0	251	254	–	46	88	82	16.2
	66	214.12	1.95	1.25	3.93	9.5	251				89	83	16.2
1	69	215.81	1.25	.80	5.51	6.5	253	243	–	47	89	83	16.2
	72	217.40	1.15	.80	7.08	6	254				89	83	16.2
	(1732)												
	0 – 72	V_m – 49.59		1.39 ΔH							Avg. – 820		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job G.P. Newberry
Date 8-28-96 Test 3 Run 3
Source Dryer primary cyclone / exhaust
No. of traverse points 12
Method 5017 Filter holder: —
Filter type: —

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.07 cfm at 12 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) MeCl2 (Pw. + Imp. Rinse)

No. of probe wash bottles: 1
Sample recovered by: EJ JL SF

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	871	547	324
Impinger No. 3			
Condenser			
Desiccant	1509	1485	24
Total			348

Integrated Gas Sampling Data:

Bag Pump No. 298
Box No. 16 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0
cc/min at 15 IN.HG
Time start:
(HRS) Time end: (HRS)
Sampling rate: 400 cc/min Operator: EJ

S/N of O_2 Analyzer used to monitor train outlet: 293

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(612) [illegible]-6020

EPA Method 5 Field Data Sheet

Job: C.P. Newberry
Source: Aper Primary Cyclone / Exhaust
Date: 8-28-96 Test 3 Run 3

Operators: EJ JL
Meter Box No. 4 ΔH@ 1.75 in.WC
Gasmeter Coeff. .9945

Nozzle No. Glass
Nozzle Dia. .190 in.
Bar. Press. 29.81 in.Hg

Pitot No. 27V-S
C_p .840
H_2O 24 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
[illegible]	(1500)	(218.40)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B 6	3	220.41	2.55	1.58	0.59	8	269	239	~~251~~	42	82	82	16.0
	6	222.53	2.4	1.49	2.73	8.5	263				82	82	16.4
5	9	224.55	2.45	1.52	4.88	9	263	246	-	44	83	82	16.4
	12	226.73	2.4	1.49	7.02	10	263				84	82	16.4
4	15	228.92	2.5	1.56	9.21	11	261	249	-	44	86	83	16.4
	18	231.11	2.5	1.57	1.40	11.5	260				87	83	16.2
3	21	233.31	2.45	1.54	3.58	12	257	256	-	44	88	83	16.2
	24	235.51	2.4	1.52	5.74	12	256				89	84	16.2
2	27	237.54	1.7	1.08	7.57	9.2	253	249	-	47	89	84	16.3
	30	239.35	1.6	1.02	9.34	8.5	253				89	85	16.2
1	33	241.15	1.6	1.01	1.11	8	259	251	-	46	90	85	16.1
	36	242.94	1.6	1.01	2.88	8	257				91	86	16.2
A 6	39	245.10	2.4	1.52	5.05	11	256	249	-	49	~~88~~	~~86~~	16.0
	42	247.28	2.4	1.52	7.22	11	256				92	87	16.0
5	45	249.43	2.5	1.59	9.44	11	256	257	-	44	93	88	16.1
	48	251.65	2.4	1.53	1.62	11	254				93	88	16.2
4	51	253.83	2.4	1.52	3.79	11.5	259	261	-	49	94	89	16.2
	54	256.10	2.4	1.52	5.97	11	260				95	88	16.1
3	57	258.29	2.15	1.37	8.03	10.5	259	256	-	50	95	89	16.1
	60	260.43	2.2	1.40	0.12	10	259				95	90	16.1
2	63	262.85	1.75	1.12	1.99	8	256	263	-	51	95	90	16.2
	66	264.29	1.8	1.16	3.89	7.5	253				98	90	16.4
1	69	265.70	1.15	.74	5.42	5	255	259	-	50	97	91	16.4
	72	267.29	1.1	.71	6.90	5	255				96	91	16.8
	(1618)												
[illegible]	0 - 72	V_m - 48.89	[illegible]	1.40 ΔH -	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Avg. -	88.3	[illegible]

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job LP Newberry
Source DRYER ETUBE OUTLET
Test 3 Run 0 Date 8-28-96
Stack Dimen. 48 IN.
Dry Bulb ____ °F Wet bulb ____ °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 29.31 IN.HG
Static Pressure -3.5 IN.WC
Operators J.B.
Pitot No. ____ C_p ____

* Formaldehyde *

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
		Port Length:	6 IN.	Time Start:	HRS
1	.16	8.00	14.00		
2	.50	24.00	30.00		
3	.83	40.00	46.00		

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 LP Newberry
Date 8-29-96 Test 3 Run 1
Source DRYER ETUBE OUTLET
No. of traverse points 12
Method 0011 Filter holder: N/A
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) MEK

No. of probe wash bottles: N/A
Sample recovered by: JD/DH

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	770	488	282
Impinger No. 2	231	172	59
Impinger No. 3			
Condenser			
Desiccant	1507	1495	12
Total			353

Integrated Gas Sampling Data:

Bag Pump No. 66
Box No. 9 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0
cc/min at 15 IN.HG
Time start: 930
(HRS) Time end: 1115 (HRS)
Sampling rate: 400
cc/min Operator: SF

S/N of O_2 Analyzer used to monitor train outlet: 8

052394-G:\STACK\WP\FORMS\S-0046RR

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job: C/Newberry
Source: ONTARIO TUBE OUTLET
Date: 8-28-96 Test: 3 Run: 1

Operators: SF/DH/JD
Meter Box No.: 14 ΔH@ 1.82 in.WC
Gasmeter Coeff.: .9929

Nozzle No.: GLASS
Nozzle Dia.: .230 in.
Bar. Press.: 29.31 in.Hg

Pitot No.: 6-TOFLO
C_p: 0.84
H_2O: 24 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(930)	762.75											
1	5	767.38	1.70	2.75	7.43	3	158	242	N/A	41	70	67	17.5
2	10	772.21	1.85	2.98	2.30	4	159	245		43	74	67	18.6
3	15	776.61	1.50	2.43	6.70	4	158	245		45	77	66	18.4
4	20	781.55	1.90	3.08	1.67	5	158	246		46	81	67	18.5
5	25	786.08	1.50	2.44	6.10	5	160	244		47	84	66	18.6
6	30	790.38	1.40	2.33	0.43	4	148	243		48	79	75	18.0
1	35	794.82	1.50	2.48	4.90	4	154	245		46	81	74	17.7
2	40	799.64	1.75	2.88	9.72	5	157	245		45	87	74	17.9
3	45	804.23	1.50	2.46	4.20	4	161	243		45	89	75	17.8
4	50	808.87	1.60	2.64	8.84	5	160	244		46	90	78	17.9
5	55	813.40	1.60	2.64	3.49	5	163	245		47	92	79	18.0
6	60	817.72	1.30	2.15	7.70	5	162	248		47	93	80	17.9
	(1115)												
	θ = 60	V_m = 54.97		2.60 ΔH =							Avg. =	77.7	

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CR/Newberry
Source DRYER RTURE OUTLET
Method 0011 Filter holder: ~~S.S.~~ N/A

Date 8-15-96 Test 3 Run 2
No. of traverse points 12
Filter type: ~~S~~ 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:

—
—

Recovery solvent(s)

☐ acetone
☒ other(s) MeTH

No. of probe wash bottles: N/A
Sample recovered by: BB/DM

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	821	476	345
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1492	1464	28
Total			373

Integrated Gas Sampling Data:

Bag Pump No. 36
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0.00
Time start: ~~930~~ 1215
Sampling rate: 400

Box No. 9 Bag No. 2
Size: 44 L
cc/min at 15 IN.HG
(HRS) Time end: ~~1715~~ 1317 (HRS)
cc/min Operator: SF

S/N of O_2 Analyzer used to monitor train outlet: 8

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job: LP NEWBERRY
Source: DRYER EXHAUST OUTLET
Date: 6-26-96 Test: 3 Run: 2

Operators: S.B./OH/SF
Meter Box No.: 14 ΔH@ 1.82 in.WC
Gasmeter Coeff.: .9929

Nozzle No.: GLASS
Nozzle Dia.: .220 in.
Bar. Press.: 29.31 in.Hg

Pitot No.: 6-Teflon
C_p: .84
H_2O: 24 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1215)	818.50											
B 1	5	822.39	1.30	2.13	2.65	3	160	240	N/A	38	80	80	16.9
2	10	827.85	1.45	2.40	7.07	4	155	241		38	84	80	17.6
3	15	831.71	1.70	2.80	1.05	5	161	245		38	85	78	17.9
4	20	836.50	1.70	2.79	6.62	5	162	247		39	87	79	17.9
C	25	840.61	1.20	1.98	0.65	4	161	250		42	90	79	17.9
6	30	844.87	.97	1.61	4.29	3	159	253		43	90	80	17.9
A 1	35	849.08	1.70	2.82	9.11	5	159	250		44	90	81	18.1
2	40	853.73	1.60	2.66	3.78	5	160	248		44	92	81	17.5
3	45	858.49	1.60	2.65	8.45	5	163	245		45	93	82	17.7
4	50	863.23	1.65	2.73	3.19	5	164	247		46	94	83	17.7
5	55	867.92	1.60	2.65	7.87	5	165	247		47	95	83	17.3
6	60	872.43	1.55	2.57	2.47	5	166	248	▼	48	95	84	17.4
	(1317)												
	0 - 60	V_m = 53.93		2.48 ΔH =							Avg. = 85.2		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP new BOILER
Source DRYER ETUBE OUTLET
Method 0011 Filter holder: N/A

Date 8-24-96 Test 3 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 cfm at 20 IN. HG (vac) ☑

Particulate Catch Data:
No. of filters used:

N/A

Recovery solvent(s)

☐ acetone
☑ other(s) MeOH

No. of probe wash bottles: 1
Sample recovered by: SD/DH

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	783	486	297
Impinger No. 2	253	172	81
Impinger No. 3			
Condenser			
Desiccant	1553	1532	21
Total			399

Integrated Gas Sampling Data:

Bag Pump No. D6
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1500
Sampling rate: 400

Box No. 9 Bag No. 3
Size: 44 L
cc/min at 15 IN.HG
(HRS) Time end: 1604 (HRS)
cc/min Operator: SD

S/N of O_2 Analyzer used to monitor train outlet: 98

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job: LP NEWBERRY | Operators: SP/SD/DM | Nozzle No.: GLASS | Pitot No.: 6 - TC Flow
Source: DRYER ETUBE OUTLET | Meter Box No.: 14 ΔH@ 1.82 in.WC | Nozzle Dia.: .230 in. | C_p: .84
Date: 8-29-96 Test: 3 Run: 3 | Gasmeter Coeff.: .9929 | Bar. Press.: 29.31 in.Hg | H_2O: 25 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1500)	(874.00)											
A 1	5	878.21	1.40	2.27	8.32	3	160	241	~A	40	77	76	16.6
2	10	882.38	1.50	2.43	2.78	3-5	162	245		40	82	77	17.0
3	15	886.73	1.35	2.17	6.48	3	161	246		40	84	77	17.2
4	20	891.33	1.65	2.65	1.63	4	161	243		41	86	77	17.2
5	25	895.90	1.55	2.49	6.13	4	163	248		41	86	77	17.2
6	30	900.30	1.45	2.33	0.44	4	162	250		42	86	78	17.3
B 1	35	904.58	1.40	2.26	4.79	4	161	251		42	88	79	17.3
2	40	909.15	1.55	2.49	9.31	4	164	247		41	91	80	17.5
3	45	913.78	1.60	2.57	3.90	4	168	250		42	93	81	17.5
4	60	918.00	1.35	2.16	8.12	4	170	253		43	93	81	17.5
5	55	922.28	1.40	2.25	2.43	4	168	255		43	92	80	17.7
6	60	926.25	1.25	2.01	6.50	4	167	251	↓	44	93	80	17.5
	(1604)												
	θ = 60	V_m = 52.25		2.34 ΔH =							Avg. = 76.7		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Source: LP/Newberry Dryer RTO Stack
Test: 3 Run ___ Date 8-28-96
Stack Dimen. 64 IN.
Dry Bulb ______ °F Wet bulb ______ °F
Manometer ☐ Reg. ☐Exp ☐Elec.
Barometric Pressure 29.31 IN.HG
Static Pressure -0.29 IN.WC
Operators BA, SK
Pitot No. 40V-6 C_p .84

Formaldehyde

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
		Port Length: IN.		Time Start: HRS	
				Time End: HRS	

Temp. Meas. Device & S/N:

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 CP/ Newberry Date 5-28-96 Test 3 Run 1
Source Dryer RTO STACK No. of traverse points 16
Method 0011 Filter holder: Glass Bypass Filter type: 01

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.0 cfm at 12 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: 4

Recovery solvent(s)
☐ acetone
☒ other(s) H2O CL

No. of probe wash bottles: 4
Sample recovered by: BS

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	782	466	316
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1492	1470	22
Total			338

Integrated Gas Sampling Data:
Done In TRT

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: 5

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(612) 96-6020

EPA Method 5 Field Data Sheet

Job LP / Newberry
Source Dryer RTO Stack
Date 5-28-96 Test 3 Run 1

Operators BA SK
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9976

Nozzle No. Glass
Nozzle Dia. .398 in.
Bar. Press. 29.31 in.Hg

Pitot No. 410-6
C_p .84
H_2O 25 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(0930)	(855.50)											
B-8	4	858.21	.36	1.54	8.19	4	270	245	251	58	63	63	16.5
7	8	861.06	.42	1.77	1.07	4.5	271	250	247	55	69	64	16.7
6	12	863.73	.38	1.61	3.82	4.5	272	247	250	55	73	66	16.7
5	16	866.87	.56	2.12	6.98	5.5	274	253	252	53	76	67	16.8
4	20	870.08	.49	2.08	0.13	5.5	274	249	251	53	80	69	16.7
3	24	873.29	.48	2.05	3.25	5.5	276	253	247	51	82	69	16.5
2	28	876.31	.51	2.19	6.47	6	274	247	251	50	84	71	16.6
1	32	879.12	.35	1.52	9.17	4.5	267	253	249	53	75	72	16.7
A-8	36	882.52	.56	2.41	2.58	6	267	254	257	52	80	74	17.0
7	40	886.01	.60	2.59	6.10	6.5	270	250	248	50	85	75	16.7
6	44	889.61	.62	2.70	9.70	7	269	247	251	52	88	76	16.9
5	48	893.23	.63	2.74	3.34	7	271	249	251	51	90	78	16.8
4	52	896.85	.60	2.61	6.90	7	274	252	253	49	91	79	16.9
3	56	900.24	.54	2.35	0.28	6.5	275	252	247	48	93	80	16.9
2	60	903.53	.49	2.13	3.50	6	278	250	252	48	94	81	16.8
1	64	906.82	.50	2.19	6.77	6	275	252	249	47	95	82	16.8
	(1126)												
	θ - 64	V_m - 51.32		ΔH - 2.16							Avg. - 72.6		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job GP/ Newberry Date 5-28-96 Test 3 Run 2
Source Dryer RTO STACK No. of traverse points 16
Method 0011 Filter holder: Glass Bypass Filter type: N/A

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.0 cfm at 10 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: N/A

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

No. of probe wash bottles: 4
Sample recovered by: SA

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	816	470	346
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1523	1495	28
Total			374

Integrated Gas Sampling Data: Done In TR7

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: 5

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(612) 736-6020

EPA Method 5 Field Data Sheet

Job CPI Newberry
Source Dryer RTO Stack
Date 6/28/96 Test 3 Run 2

Operators BA SK
Meter Box No. 7 ΔH@ 1.53 in.WC
Gasmeter Coeff. .9976

Nozzle No. SS Glass
Nozzle Dia. .298 in.
Bar. Press. 29.31 in.Hg

Pitot No. YoC-6
C_p .84
H_2O 24 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1215)	907.00											
A-5	4	910.42	.58	1.48	0.44	5.5	263	245	251	52	82	83	16.4
7	8	913.77	.55	1.35	3.81	5.5	269	249	247	51	91	85	16.5
6	12	917.45	.65	1.81	7.51	7	269	252	249	51	95	85	16.4
5	16	921.07	.62	1.67	1.13	7	273	247	253	50	98	87	16.6
4	20	924.66	.61	1.63	4.73	7	275	251	248	48	99	88	16.7
3	24	928.22	.56	1.42	8.18	6.5	277	247	249	49	100	89	16.7
2	28	931.82	.55	1.55	1.73	6.5	278	251	251	49	101	90	17.0
1	32	934.99	.45	1.95	4.84	5	276	253	247	48	102	90	16.8
B-8	36	938.65	.68	1.96	8.67	7	274	247	246	51	99	92	16.5
7	40	942.06	.51	1.22	1.98	6	275	251	249	50	103	93	16.1
6	44	945.15	.45	1.96	5.11	5.5	275	249	253	48	104	92	16.2
5	48	948.45	.50	2.18	8.40	6	276	246	247	49	105	94	15.7
4	52	952.11	.64	2.79	2.13	7	278	250	247	49	106	94	15.9
3	56	955.90	.68	2.95	5.97	7.5	280	247	251	47	107	95	15.9
2	60	959.61	.62	2.70	9.64	7	279	253	249	48	108	95	15.9
1	64	962.76	.43	1.89	2.72	5.5	276	249	253	48	108	96	15.8
	(1327)												
	θ = 64	V_m = 55.76		2.47 ΔH =							Avg. = 95.4		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP/ Newberry Date 5-28-96 Test 3 Run 3
Source Dryer RTO STACK No. of traverse points 16
Method 0011 Filter holder: Hot/Wet Glass Filter type: N/A

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☐
Post test: 0 cfm at 11 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: 6A

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

No. of probe wash bottles: NA
Sample recovered by: 6A

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	788	472	316
Impinger No. 2	310	270	40
Impinger No. 3			
Condenser			
Desiccant	1496	1467	23
Total			379

Integrated Gas Sampling Data: None for TR7

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: 5

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(612) 6-6020

EPA Method 5 Field Data Sheet

Job GP Newberry
Source Dryer RTO Stack
Date 6-28-96 Test 3 Run 3

Operators BA SR
Meter Box No. 7 ΔH@ 1.55 in.WC
Gasmeter Coeff. .9976

Nozzle No. Glass
Nozzle Dia. .298 in.
Bar. Press. 29.31 in.Hg

Pitot No. YOU-C
C_p .84
H_2O 35 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1500)	968.00											
B-8	4	966.11	.45	1.96	6.11	5	257	251	247	56	90	90	16.2
7	8	969.08	.41	1.77	7.06	4.5	256	248	250	54	93	90	16.3
6	12	971.85	.35	1.51	1.78	4	261	252	249	52	97	92	16.0
5	16	975.22	.55	2.36	5.20	6	267	250	249	51	99	93	16.0
4	20	978.31	.43	1.84	8.23	5	269	249	253	50	102	94	15.9
3	24	981.82	.63	2.70	1.89	6.5	272	252	251	48	102	94	15.8
2	28	985.36	.57	2.44	5.38	6.5	272	247	246	48	104	95	15.8
1	32	988.73	.52	2.24	8.72	6	271	248	249	49	105	96	15.8
A-8	36	992.31	.60	2.69	2.32	6	270	248	253	51	105	96	16.0
7	40	995.94	.63	2.68	5.98	7	279	251	248	50	107	97	16.1
6	44	999.59	.66	2.57	9.57	7	277	248	253	48	108	98	15.8
5	48	1003.23	.64	2.75	3.28	7	277	249	251	48	110	98	15.9
4	52	1006.73	.54	2.33	6.70	6.5	276	252	248	46	111	99	16.0
3	56	1010.14	.53	2.28	10.09	6	278	249	253	47	112	100	16.2
2	60	1013.50	.50	2.16	3.39	6	276	246	250	46	111	100	16.2
1	64	1016.73	.48	2.08	6.63	5.5	274	250	247	46	112	100	16.0
	(1605)												
	0-64	V_m - 53.7		2.27 ΔH -							Avg. - 100		

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INTERPOLL LABORATORIES, INC.

(612) 786-6020

EPA Method 2 Field Data Sheet

Job L.P. / Newberry, MI
Source Press / Vents
Test 5 Run 0 Date 8-29-96
Stack Dimen. 59 x 55 (2 stacks) IN.
Dry Bulb 110 °F Wet bulb 68 °F
Manometer ☒Reg. ☐Exp ☐Elec.
Barometric Pressure 29.25 IN.HG
Static Pressure -2.37 IN.WC
Operators M. Kaehler + M. Petersen
Pitot No. 31V-6 C_p .84

MOI

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
		Port Length:	5.5 IN.	Time Start: NA HRS	
	1/6	9.83	15.33		
	3/6	29.50	35.00		110
	5/6	49.17	54.67		
Temp. Meas. Device & S/N:	PDT-45 / TC			Time End: NA 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. / Newberry, MI
Date 8-29-96 Test 5 Run 1
Source Press / Vent
No. of traverse points 12
Method MD1 Filter holder: NA
Filter type: NA

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:

NA

Recovery solvent(s)

☐ acetone
☒ other(s) ~~MeCl~~ Toluen + Acetonitrile

No. of probe wash bottles: Added to Impingers
Sample recovered by: M. Koehler + M. Peterson

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	475	526	(51)
Impinger No. 2	444	439	5
Impinger No. 3			
Condenser			
Desiccant	1544	1527	17
Charcoal	1497	1453	44
Total			15

Integrated Gas Sampling Data:

Bag Pump No. JR 13
Box No. 9 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0
cc/min at 15 IN.HG
Time start: 0900
(HRS) Time end: 1002 (HRS)
Sampling rate: 400
cc/min Operator: M. Koehler

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job L.P. / Newberry, MI
Source Press / Vents
Date 9-29-96 Test 5 Run 1

Operators M. Kuehler & M. Petersen
Meter Box No. 10 ΔH@ 1.93 in.WC
Gasmeter Coeff. 1.0007

Nozzle No. 2-3
Nozzle Dia. .180 in.
Bar. Press. 29.29 in.Hg

Pilot No. 310-6
C_p .94
H_2O 1.3 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	~~0830~~ 0900	939.90											
1B-3	5	942.07	1.95	2.19	2.95	5	101	229	242	39	76	76	20.9
3	10	946.91	1.90	2.16	6.97	5	96	233	253	37	79	75	
2	15	950.77	1.70	1.95	0.01	5	90	227	245	37	83	76	
2	20	954.81	1.67	1.92	4.62	5	93	236	249	40	86	76	
1	25	958.95	1.76	2.02	8.03	5	101	241	245	40	89	77	
1	30	962.39	1.65	1.87	2.30	5	105	235	241	42	91	77	
C-3	35	966.29	1.71	1.96	6.17	5	100	243	240	41	91	77	
3	40	970.22	1.70	1.93	0.01	5	103	237	248	44	93	78	
2	45	973.97	1.64	1.90	3.82	5	96	233	255	45	94	80	
2	50	977.93	1.63	1.84	7.62	5	97	240	249	45	96	82	
1	55	981.67	1.75	1.99	1.53	5	109	237	254	46	97	83	
1	60	985.39	1.60	1.83	5.29	5	105	240	253	46	99	84	
	(1002)												
	0 - 60	V_m - 46.49		ΔH - 1.97							Avg. - 83.9		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Newberry, MI
Source Press / Wash
Method MDI Filter holder: NA

Date 8-29-96 Test 5 Run 2
No. of traverse points 12
Filter type: NA

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:

NA

Recovery solvent(s)

☐ acetone
☒ other(s) Toluene + Acetonitrile

No. of probe wash bottles: Added to Impinger
Sample recovered by: M. Kuehlow + M. Peterson

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	474	527	(53)
Impinger No. 2	439	438	1
Impinger No. 3			
Condenser			
Desiccant	1412	1393	19
Charcoal	1485	1440	45
Total			12

Integrated Gas Sampling Data:

Bag Pump No. TR B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1035
Sampling rate: 400

Box No. 9 Bag No. 2
Size: 44 L
cc/min at 15 IN.HG
(HRS) Time end: 1136 (HRS)
cc/min Operator: M. Kuehlow

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job L.P. / Newberry, MI
Source Press / Vents
Date 8-29-96 Test 5 Run 2

Operators M.Maehler & M.Peterson
Meter Box No. 10 ΔH@ 1.93 in.WC
Gasmeter Coeff. 1.0007

Nozzle No. 2-3
Nozzle Dia. .190 in.
Bar. Press. 29.29 in.Hg

Pitot No. 31V-6
C_p .84
H_2O 1.6 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	1035	886.00											
C-3	5	990.07	1.92	2.16	0.05	5	107	233	250	50	96	87	20.9
3	10	894.26	1.86	2.14	4.10	5	104	241	244	45	93	86	
2	15	997.03	1.20	1.95	2.98	5	100	244	240	45	96	87	
2	20	901.97	1.25	2.01	1.93	5	102	240	247	46	99	97	
1	25	905.98	1.68	1.93	5.79	5	105	235	241	47	100	88	
1	30	909.73	1.61	1.85	9.58	5	105	233	246	49	100	99	
C-3	35	913.82	1.93	2.24	3.25	5	100	239	249	50	100	89	
3	40	917.95	1.90	2.19	7.88	5	103	243	257	47	101	90	
2	45	921.99	1.80	2.10	1.92	5	98	240	250	47	103	90	
2	50	925.99	1.75	2.06	5.92	5	95	247	244	46	103	91	
1	55	929.93	1.65	1.93	9.81	5	98	239	253	48	104	91	
1	60	933.90	1.70	1.99	3.25	5	99	235	250	49	104	92	
	(1136)												
	0-60	V_m - 47.90		2.05 ΔH -							Avg. - 94.0		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job U.P. / Newberry, MI
Date 8-29-96 Test 5 Run 3
Source Press / Vents
No. of traverse points 12
Method MDI Filter holder: NA
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.02 cfm at) IN. HG (vac) ☑

Particulate Catch Data:

No. of filters used:

~~NA~~ NA

Recovery solvent(s)

☐ acetone
☒ other(s) Toluene & Acetonitrile

No. of probe wash bottles: Added to Impinger
Sample recovered by: M. Kuehler & M. Hansen

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	474	526	(52)
Impinger No. 2	443	441	2
Impinger No. 3			
Condenser			
Desiccant	1565	1544	21
Charcoal	1494	1451	43
Total			14

Integrated Gas Sampling Data:

Bag Pump No. TR-13
Box No. 9 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0
cc/min at 15 IN.HG
Time start: 1410
(HRS) Time end: 1311 (HRS)
Sampling rate: 400
cc/min Operator: M. Kuehler

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job: L.P. / Newberry, MI
Source: Press / Vents
Date: 8-29-96 Test: 5 Run: 3

Operators: M. Kaehler / M. Petersen
Meter Box No.: 10 ΔH@ 1.93 in.WC
Gasmeter Coeff.: 1.0007

Nozzle No.: 2-3
Nozzle Dia.: .180 in.
Bar. Press.: 29.29 in.Hg

Pitot No.: 310-6
C_p: .84
H_2O: 1.2 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	1210	934.20											
G-3	5	938.21	1.90	2.22	0.34	5	100	230	253	47	91	91	20.9
3	10	942.53	1.87	2.16	2.43	5	102	227	259	46	95	91	
2	15	946.27	1.70	1.99	6.35	5	98	237	249	46	98	91	
2	20	950.48	1.77	2.07	0.37	5	99	240	247	49	100	91	
1	25	954.43	1.70	1.98	4.29	5	102	235	243	50	101	91	
1	30	958.17	1.85	2.15	0.39	5	105	246	249	51	102	91	
B-3	35	962.25	1.80	2.10	2.43	5	103	240	255	50	103	91	
3	40	966.30	1.70	1.99	6.38	5	100	233	261	47	103	92	
2	45	970.10	1.60	1.83	0.16	5	116	239	250	46	104	93	
2	50	973.87	1.63	1.84	3.96	5	123	243	249	56	105	93	
1	55	977.89	1.60	1.85	7.77	5	110	249	253	53	105	94	
1	60	981.60	1.65	1.90	1.63	5	113	240	259	50	106	94	
	(1311)												
	0 - 60	V_m - 47.40		2.01 ΔH -							Avg. - 96.5		

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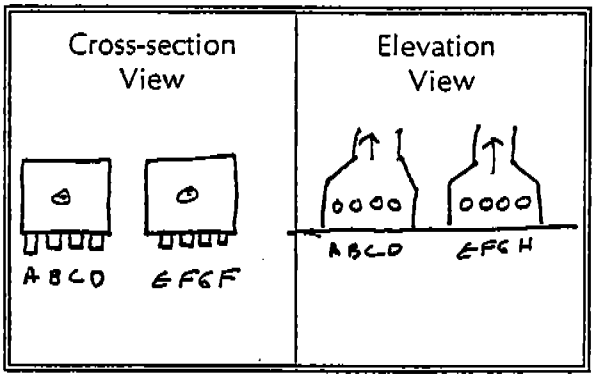
INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. Newberry
Source: Press Vents
Test 1 Run 0 Date 8-27-96
Stack Dimen. 59x59 (2 stacks) IN.
Dry Bulb ____ °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 29.26 IN.HG
Static Pressure -2.4 IN.WC
Operators E. Juers J. Lorenz
Pitot No. 29V-6 C_p .840
CH_2O

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
		Port Length: 5.5 IN.		Time Start:	HRS
A 1	1/6	9.83	15.33		
2	3/6	29.50	35		
3	5/6	49.17	54.67		
B 1					
2					
3					
C 1					
2					
3					
D 1					
2					
3					
E 1					
2					
3					
F 1					
2					
3					
G 1					
2					
3					
H 1					
2					
3					

Temp. Meas. Device & S/N: PDT 47
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 C.P. Newberry Date 8-27-96 Test 7 Run 1
Source Press Vents No. of traverse points 24
Method 0011 Filter holder: — Filter type: —

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 402 cfm at 7 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: —

Recovery solvent(s)

☐ acetone
☒ other(s) $MeCl_2$ Imp. Rinse (Added to Imp. Catch + P.W.)

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	544	550	-6
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1422	1404	18
Total			12

Integrated Gas Sampling Data: Ambient Air

Bag Pump No. 20 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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(612) 36-6020

EPA Method 5 Field Data Sheet

Job L.P. Newberry
Source Press Vents
Date 8-27-96 Test 7 Run 1

Operators EJ JL
Meter Box No. 4 ΔH@ 1.75 in.WC
Gasmeter Coeff. .9945

Nozzle No. 61055
Nozzle Dia. .190 in.
Bar. Press. 29.26 in.Hg

Pitot No. 29V6
C_p .840
H_2O 1.5 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1450)	(930.20											Ambient Air
H 3	3	932.38	1.2	1.54	2.37	4	103	246	266	43	90	89	
2	6	934.90	1.7	2.18	4.97	5	105				92	90	
1	9	937.02	1.1	1.41	7.07	4	109	243	272	46	95	91	
G 3	12	939.46	1.5	1.92	9.51	4.5	110				98	91	
2	15	942.11	1.75	2.28	2.18	5.5	102	246	253	50	98	92	
1	18	943.87	.62	.81	3.78	3	103				99	93	
F 3	21	946.16	1.3	1.69	6.08	4	105	227	243	45	98	92	
2	24	948.02	2.0	2.67	8.94	6	99				99	93	
1	27	951.28	1.25	1.61	1.19	4	112	232	256	49	101	94	
E 3	30	951.98	.11	.14	1.86	2	112				96	96	
2	33	953.42	.65	.83	3.47	2.5	116	249	260	51	97	93	
1	36	954.31	.14	.18	4.23	1	111				99	94	
D 3	39	957.21	2.15	2.76	7.18	6.5	108	225	242	49	100	94	
2	42	959.99	1.85	2.42	9.94	6	102				101	96	
1	45	961.49	.58	.75	1.48	3	108	236	251	52	107	95	
C 3	48	964.31	1.9	2.47	4.27	6	107				103	96	
2	51	966.02	1.8	2.33	6.98	5.5	110	240	256	53	103	96	
1	54	969.13	1.1	1.41	9.10	3.5	117				104	96	
B 3	57	971.90	1.9	2.49	1.90	6	104	230	254	54	102	96	
2	60	974.58	1.8	2.33	4.61	5.5	110				104	96	
1	63	975.79	.34	.44	5.80	2	106	226	257	51	104	96	
A 3	66	978.13	1.4	1.82	8.20	4	108				102	97	
2	69	980.74	1.6	2.08	0.76	5	109	235	260	54	103	97	
1	72	982.14	.48	.62	2.17	2	108				104	97	
	(1616												
	θ - 72	V_m - 51.95		ΔH - 1.63							Avg. - 96.8		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job C.P. Newberry
Source Press vents
Method 0011 Filter holder: —

Date 8-27-96 Test 7 Run 2
No. of traverse points 24
Filter type: —

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: <.02 cfm at 7 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) MeCl2 (Imp. Rinse + PW. combined with imp-catch)

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	548	551	-3
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1479	1461	18
Total			15

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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(612) 96-6020

EPA Method 5 Field Data Sheet

Job: C.P. Newberry
Source: Press Vents
Date: 8-27-96 Test 7 Run 2

Operators: EJ JL
Meter Box No. 4 ΔH@ 1.75 in.WC
Gasmeter Coeff. .9945

Nozzle No. 6/ass
Nozzle Dia. .190 in.
Bar. Press. 29.26 in.Hg

Pitot No. 29v-6
C_p .840
H_2O 1.2 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1645)	(982.40)											Ambient
A 3	3	984.57	1.2	1.58	4.62	4	103	246	230	42	92	91	Air 20.9
2	6	987.15	1.7	2.17	7.22	5.5	114				95	92	
1	9	988.39	.36	.45	8.42	2	119	224	245	43	98	93	
B 3	12	991.11	1.9	2.47	1.20	6	106				98	94	
2	15	993.80	.175	2.20	3.83	5.5	127	237	249	46	100	94	
1	18	995.96	1.10	1.43	5.95	4	108				101	95	
C 3	21	998.78	1.95	2.53	8.77	6	111	245	250	47	98	93	
2	24	1001.49	1.75	2.28	1.44	6	106				102	95	
1	27	1003.73	1.3	1.68	3.74	4	115	239	247	49	102	95	
D 3	30	1006.60	2.0	259	6.59	6	112				101	95	
2	33	1009.49	2.0	2.59	9.45	6	111	256	243	46	103	96	
1	36	1011.97	1.5	1.93	1.92	5.5	116				102	95	
E 3	39	1013.97	.94	1.22	3.88	3	113	265	251	46	99	95	
2	42	1016.78	2.1	2.70	6.79	6.5	116				101	95	
1	45	1018.12	.41	.53	8.08	2	116	259	256	47	103	96	
F 3	48	1020.74	1.7	2.22	0.73	5	108				101	94	
2	51	1023.48	1.8	2.37	3.46	6	102	270	256	47	102	95	
1	54	1026.03	1.6	2.06	6.01	5	116				103	96	
G 3	57	1028.03	.97	1.27	8.01	3.5	109	265	260	46	101	95	
2	60	1030.72	1.85	2.43	0.77	6	103				101	95	
1	63	1032.67	.89	1.16	2.69	3	107	273	259	45	102	95	
H 3	66	1034.23	.57	.75	4.24	2.5	101				100	95	
2	69	1037.07	1.95	2.58	7.08	6.5	100	269	256	46	102	95	
1	72	1039.68	1.5	1.97	9.57	5	106				102	95	
	(1809)												
	0 - 72	V_m - 57.28		1.88 ΔH -							Avg. -	97.4	

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job C.P. New berry Date 8-27-96 Test 7 Run 3
Source Press Vents No. of traverse points 24
Method 0011 Filter holder: — Filter type: —

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: .002 cfm at 7 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) $MeCl_2$ (Imp. Rinse & P.W. Combined with Imp. Catch)

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	550	552	-2
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1500	1483	17
Total			15

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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(612) 6-6020

EPA Method 5 Field Data Sheet

Job: L.P. Newberry
Source: Press Vents
Date: 8-27-96 Test 7 Run 3

Operators: EJ JL
Meter Box No. 4 ΔH@ 1.75 in.WC
Gasmeter Coeff. .9945

Nozzle No. Glass
Nozzle Dia. .190 in.
Bar. Press. 29.26 in.Hg

Pitot No. 295-6
C_p .840
H_2O 1.3 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1835)	(1039.90)											Ambient 20.9
H 3	3	1041.77	.85	1.12	1.77	3	103	228	258	43	90	90	
2	6	1044.64	2.0	2.62	4.62	6.5	96				91	90	
1	9	1047.17	1.6	2.07	7.16	5	104	245	249	46	93	90	
G 3	12	1049.42	1.2	1.56	9.36	4	107				93	90	
2	15	1052.19	1.85	2.42	2.10	6	99	237	256	39	95	90	
1	18	1054.19	.96	1.25	4.08	3.5	102				96	91	
F 3	21	1056.35	1.1	1.44	6.20	4	101	248	253	41	96	91	
2	24	1059.17	2.05	2.68	9.09	6.5	100				96	91	
1	27	1061.79	1.65	2.12	1.60	5	111	228	243	39	97	91	
E 3	30	1063.86	1.05	1.38	3.75	3.5	99				96	90	
2	33	1066.20	1.4	1.82	6.13	4	104	230	237	40	96	91	
1	36	1067.31	.28	.36	7.20	2	109				97	91	
D 3	39	1069.71	1.5	1.95	9.66	5	105	227	241	42	95	90	
2	42	1072.58	2.0	2.56	2.49	6	112				97	91	
1	45	1074.69	1.15	1.48	4.64	4	111	248	244	41	97	91	
C 3	48	1077.46	1.9	2.43	7.39	6	114				96	91	
2	51	1080.13	1.9	2.31	0.08	5.5	111	252	249	44	97	91	
1	54	1082.25	1.1	1.41	2.18	3.5	113				95	90	
B 3	57	1084.83	1.7	2.19	4.79	5	108	256	247	43	94	90	
2	60	1087.57	1.8	2.33	7.48	6	106				97	91	
1	63	1090.08	1.55	2.02	9.99	5	103	264	256	45	98	91	
A 3	66	1092.73	1.75	2.26	2.65	5.5	109				96	90	
2	69	1095.45	1.8	2.36	5.36	5.5	99	230	262	41	96	90	
1	72	1097.58	1.1	1.44	7.48	3.5	104				97	91	
	(1959)												
	0 - 72	V_m = 57.68		ΔH = 1.90							Avg. = 95.0		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job L.P. / Newberry, MI
Source Press / Vents
Test 6 Run 0 Date 6-26-96
Stack Dimen. (59 X 59) 2 Stacks IN.
Dry Bulb 110 °F Wet bulb 67 °F
Manometer ☒Reg. ☐Exp ☐Elec.
Barometric Pressure 29.31 IN.HG
Static Pressure -2.30 IN.WC
Operators Mikaelian & M. Peterson
Pitot No. ~~316-5~~ MK C_p .84
316-6 DM

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
		Port Length: 5.5 IN.		Time Start: NA HRS	
A-1	1/6	9.83	15.33		
2	3/6	29.50	35		110
3	5/6	49.17	54.67		
B-1					
2					
3					
C-1					
2					
3					
D-1					
2					
3					
E-1					
2					
3					
F-1					
2					
3					
G-1					
2					
3					
H-1					
2					
3					

Temp. Meas. Device & S/N: PDT-45 / TC
Time End: NA 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 I.P. / Newberry, MI
Source Press / Vault
Method 5 Filter holder: Glass

Date 8-24-96 Test 9 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: 0.01 cfm at 6 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: 9457

Recovery solvent(s)
☒ acetone
☒ other(s) Me Cl2

No. of probe wash bottles: 1
Sample recovered by: M. Kaehler / M. Peterson

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	507	504	3
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1400	1392	8
Total			11

Integrated Gas Sampling Data: ~~N/A / Ambient~~ N/A / Ambient

Bag Pump No. ~~3 / B~~
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: ~~1215~~
Sampling rate:

Box No. 9 Bag No. 1
Size: 44 L
cc/min at ~~15~~ IN.HG
(HRS) Time end: (HRS)
cc/min Operator:

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

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(612) 786-6020

EPA Method 5 Field Data Sheet

Job L.P. / Newberry, MI
Source Press / Vents
Date 9-20-96 Test B Run 1

Operators M. Kaehler + M. Peterson
Meter Box No. 10 ΔH@ 1.93 in.WC
Gasmeter Coeff. 1.0007

Nozzle No. 2-3
Nozzle Dia. .180 in.
Bar. Press. 29.31 in.Hg

Pitot No. 31U-6
C_p .84
H_2O 1.3 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	1215	704.20											
A-3	2.5	706.17	1.20	1.99	6.07	4	102	230	247	45	74	73	20.9
2	5	708.15	1.03	2.04	9.02	4	105				77	72	
1	7.5	709.18	.53	.59	9.08	2	101	232	241	43	79	73	
B-3	10	711.22	1.25	1.97	1.00	4	102				81	73	
2	12.5	712.98	1.20	1.91	2.09	4	103	231	240	43	84	73	
1	15	714.16	.64	.71	4.06	2	110				86	73	
C-3	17.5	716.23	1.00	2.01	6.00	4	110	225	247	44	86	73	
2	20	717.99	1.00	2.02	7.96	4	106				89	74	
1	22.5	719.94	1.68	1.86	9.84	4	116	229	241	46	90	74	
D-3	25	721.46	.97	1.07	1.26	2	119				89	75	
2	27.5	722.99	1.10	1.35	2.97	3	108	234	240	47	91	76	
1	30	724.36	1.09	1.00	4.25	2	105				92	76	
E-3	32.5	726.51	2.10	2.36	6.37	4	110	239	235	45	92	77	
2	35	728.82	2.27	2.56	8.58	4	109				95	77	
1	37.5	729.73	.45	.51	9.57	2	108	243	230	44	95	78	
F-3	40	731.64	1.25	1.97	1.51	3	113				94	78	
2	42.5	733.85	1.03	2.08	3.50	4	106	235	243	45	97	79	
1	45	735.73	1.61	1.80	5.36	3	116				98	79	
G-3	47.5	737.61	1.40	2.13	7.38	4	117	233	246	47	97	80	
2	50	739.57	1.90	2.13	9.41	4	115				99	83	
1	52.5	741.44	1.00	2.09	1.41	4	100	239	243	48	96	83	
H-3	55	743.55	2.32	2.68	3.68	4	102				99	84	
2	57.5	745.70	1.90	2.20	5.75	4	100	243	240	48	100	85	
1	60	747.03	1.57	1.82	7.63	3	100				101	85	
	1318												
	0 - 60	V_m - 43.63		1.78 ΔH -							Avg. -	84.1	

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job K.P. / Newberry, MI Date 8-20-96 Test 6 Run 2
Source Press / Vents No. of traverse points 24
Method 5 Filter holder: Glass Filter type: 4"6 ft

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☑
Post test: 0.02 cfm at 6 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: 0465

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	480	476	4
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1520	1510	10
Total			14

Integrated Gas Sampling Data: NA / Ambient

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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(612) 786-6020

EPA Method 5 Field Data Sheet

Job L.P. / Newberry, MI
Source Press / Vents
Date 8-28-96 Test B Run 2

Operators Mikaehler & S. Fjelsta
Meter Box No. 10 ΔH@ ____ in.WC
Gasmeter Coeff. 1.0007

Nozzle No. 2-3
Nozzle Dia. .180 in.
Bar. Press. 29.31 in.Hg

Pitot No. 31V-6
C_p .91
H_2O 1.2 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	1450	748.00											
H-3	2.5	750.27	2.35	2.20	0.26	4	98	237	241	47	86	86	20.9
2	5	752.26	1.67	1.90	2.17	3	107				88	86	
1	7.5	754.32	1.80	2.08	4.16	3	98	240	250	49	90	86	
6-3	10	756.34	1.73	2.00	6.12	3	99				91	86	
2	12.5	758.27	1.75	2.03	8.10	3	99	235	253	48	92	86	
1	15	759.94	1.43	1.65	9.88	3	100				95	86	
F-3	17.5	762.15	2.00	2.32	1.99	3.5	100	241	257	46	96	86	
2	20	764.20	1.83	2.10	4.01	3.5	107				97	87	
1	22.5	765.99	1.65	1.88	5.91	3	113	235	253	46	98	87	
E-5	25	769.30	2.15	2.44	9.09	4	113				97	87	
2	27.5	770.23	1.97	2.14	0.12	3.5	110	231	247	45	100	88	
1	30	771.23	.63	.72	1.30	2	113				100	88	
D-3	32.5	772.30	.54	.62	2.40	2	110	227	250	44	98	89	
2	35	773.20	.06	.98	3.28	2	112				99	89	
1	37.5	775.31	.01	.97	5.16	2	112	230	245	46	101	89	
C-3	40	777.19	1.20	1.95	7.11	3	111				101	89	
2	42.5	779.10	1.05	2.12	9.14	3.5	111	237	241	48	102	90	
1	45	781.20	1.71	1.94	1.08	3	119				103	90	
B-3	47.5	783.15	1.25	1.96	3.04	3	125	233	240	49	104	90	
2	50	785.11	1.02	2.11	5.06	3	107				104	90	
1	52.5	786.99	1.63	1.90	6.99	3	105	229	245	51	105	91	
A-3	55	789.03	1.30	1.50	8.70	2.5	112				105	91	
2	57.5	790.65	1.60	1.85	0.60	3	111	237	241	51	105	92	
1	60	792.07	.90	1.03	2.02	2	115				106	92	
	(1552)												
	θ - 60	V_m - 44.07		ΔH - 1.79							Avg. -	93.4	

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Newberry, MI
Source Press / Vent
Method 5 Filter holder: Glass

Date 6-28-96 Test 6 Run 3
No. of traverse points 24
Filter type: 4"Gelman

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☑
Post test: <0.02 cfm at 6 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: 8474

Recovery solvent(s)

☑ Acetone
☑ Other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: M. Koehlert + M. Peterson

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	500	495	5
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1405	1400	5
Total			10

Integrated Gas Sampling Data: NA / 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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(612) '6-6020

EPA Method 5 Field Data Sheet

Job L.P. / Newberry, MI
Source Press / Vents
Date 8-28-96 Test 8 Run 3

Operators M. Kaehlert, M. Peterson
Meter Box No. 12 ΔH@ 1.93 in.WC
Gasmeter Coeff. 1.0007

Nozzle No. 2-3
Nozzle Dia. .180 in.
Bar. Press. 29.31 in.Hg

Pitot No. 31V-6
C_p .84
H_2O 1.6 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	1615	292.40											
A-3	2.5	293.59	.63	.71	3.58	2	111	243	257	44	96	94	20.9
2	5	294.87	.80	.91	4.91	2	110				97	94	
1	7.5	296.10	.67	.75	6.13	2	115	237	250	46	99	94	
B-3	10	298.03	1.64	1.86	8.05	3	115				101	93	
2	12.5	299.96	1.60	1.84	9.93	3	109	240	256	46	103	93	
1	15	001.91	1.65	1.87	1.84	3	118				105	94	
C-3	17.5	003.94	1.73	1.96	3.80	3	118	235	251	48	105	94	
2	20	005.07	1.25	2.02	5.79	3.5	108				106	94	
1	22.5	007.72	1.60	1.81	7.67	3	120	233	250	47	107	95	
D-3	25	009.71	1.72	1.97	9.64	3	114				107	95	
2	27.5	011.63	1.45	1.67	1.46	3	110	230	255	46	107	95	
1	30	013.22	1.20	1.38	3.10	2.5	113				108	96	
E-3	32.5	015.41	2.00	2.27	5.22	3.5	110	227	254	46	107	96	
2	35	017.47	2.25	2.59	7.47	4	112				109	96	
1	37.5	018.99	1.00	1.14	8.98	2	116	223	242	44	109	97	
F-3	40	020.87	1.20	1.95	0.94	3	115				109	97	
2	42.5	022.91	1.78	2.08	2.96	3	107	230	249	45	109	97	
1	45	024.91	1.80	2.07	4.98	3	113				110	97	
G-3	47.5	027.00	1.90	2.16	7.04	3.5	121	237	241	47	109	98	
2	50	029.14	2.01	2.30	9.17	4	118				110	98	
1	52.5	031.20	1.85	2.18	1.24	3.5	102	239	240	49	111	98	
H-3	55	033.61	2.40	2.82	3.60	4.5	103				110	99	
2	57.5	036.22	2.55	2.99	6.03	5	103	240	245	53	111	100	
1	60	038.20	1.80	2.13	9.08	3.6	100				110	100	
	(1717)												
	0 - 60	V_m = 45.80		ΔH = 1.89							Avg. = 101.2		

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EPA

VISIBLE EMISSION OBSERVATION FORM 1

Form Number		Page 1 of 2
Continued on VEO Form Number		

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name: Louisiana Pacific
Facility Name: Newberry OSB Plant
Street Address:
City: Newberry | State: MI | Zip:

Process: Press vent | Unit #: NA | Operating Mode: Auto
Control Equipment: NA | Operating Mode: NA

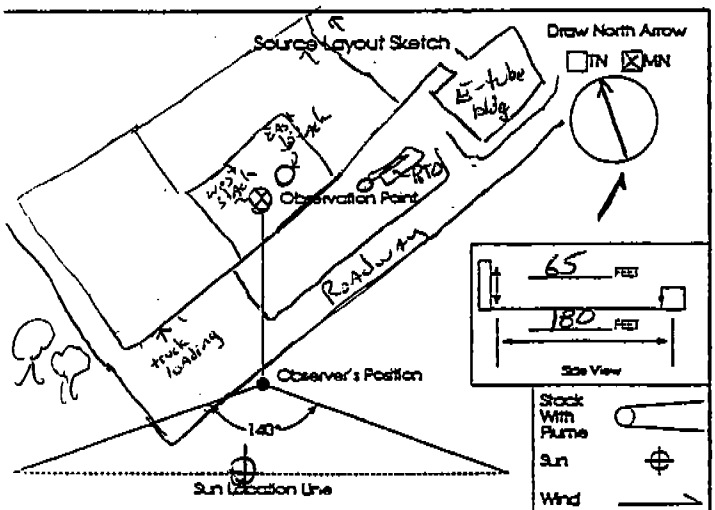
Describe Emission Point: The west stack of two tan stacks on top of the 500' towards the south end

Height of Emiss. Pt.: Start ~65' End same | Height of Emiss. Pt. Rel. to Observer: Start ~65' End same
Distance to Emiss. Pt.: Start ~180' End same | Direction to Emiss. Pt. (Degrees): Start 20° End same

Vertical Angle to Obs. Pt.: Start -20° End same | Direction to Obs. Pt. (Degrees): Start 20° End same
Distance and Direction to Observation Point from Emission Point: Start 3' Above stack End same

Describe Emissions: Start rising up End same
Emission Color: Start white End same | Water Droplet Plume: Attached ☐ Detached ☐ None ☒

Describe Plume Background: Start sky End same
Background Color: Start Blue End same | Sky Conditions: Start clear End same
Wind Speed: Start ~0 to 4mph End same | Wind Direction: Start southwest End same
Ambient Temp.: Start 79° End 83° | Wet Bulb Temp.: 65° | RH Percent: 46%



Longitude | Latitude | Declination

Additional Information: West stack

Observation Date	Time Zone	Start Time	End Time
8-28-96	EDST	14:50	15:20

Min \ Sec	0	15	30	45	Comments
1	0	5	0	0	
2	5	5	5	0	
3	0	0	0	0	
4	0	0	0	0	
5	5	0	5	5	
6	5	5	0	0	
7	0	0	0	0	
8	0	0	0	5	
9	5	5	10	5	
10	10	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	5	5	5	0	
14	5	0	0	0	
15	0	0	0	5	
16	5	5	5	10	
17	5	5	5	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	5	10	
21	5	10	5	0	
22	0	0	0	0	
23	0	5	5	5	
24	5	5	10	5	
25	5	5	0	0	
26	0	0	0	0	
27	0	0	5	5	
28	5	5	5	5	
29	5	0	0	0	
30	0	0	5	5	

Observer's Name (Print): Mark Petersen
Observer's Signature: Mark Peterson | Date: 8/28/96
Organization: Interpoll Laboratories Inc.
Certified By: Eastern Technical Associates | Date: 4-3-96

'EOF1.1'

EPA

SIBLE EMISSION OBSERVATION FORM 1

Form Number		Page 2 of 2
Continued on VEO Form Number		

Method Used (Circle One): Method 9 / 203A / 203B / Other: _____

Company Name: Louisiana Pacific

Facility Name: Newberry OSB Plant

Street Address:

City: Newberry | State: MI | Zip:

Process: Press vent | Unit #: NA | Operating Mode: Auto.

Pollution Equipment: NA | Operating Mode: NA

Describe Emission Point: the west stack of 2 tan stacks on top of the south side of the roof

Height of Emiss. Pt.: ~65' End same | Height of Emiss. Pt. Rel. to Observer: Start ~65' End same

Distance to Emiss. Pt.: ~180' End same | Direction to Emiss. Pt. (Degrees): Start 20° End same

Vertical Angle to Obs. Pt.: ~20° End same | Direction to Obs. Pt. (Degrees): Start 20° End same

Distance and Direction to Observation Point from Emission Point: 3' Above stack End same

Describe Emissions: straight up End same

Plume Color: white End | Water Droplet Plume: Attached ☐ Detached ☐ None ☒

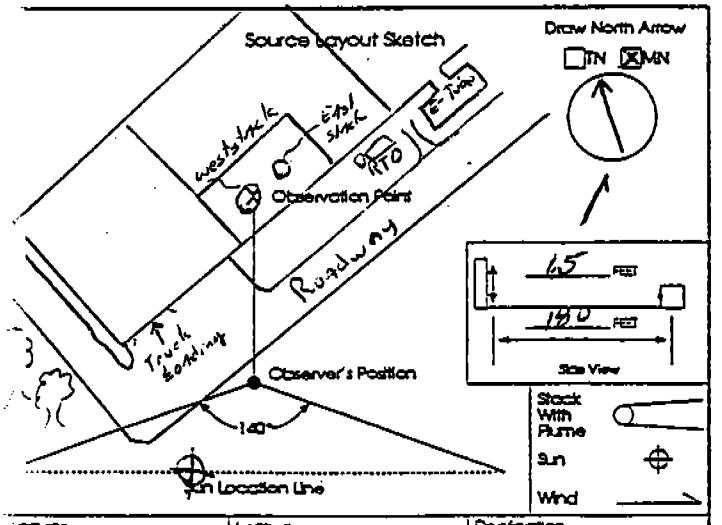
Plume Background: sky End same

Background Color: Blue End same | Sky Conditions: Start clear End same

Wind Speed: ~0 to 4 mph End same | Wind Direction: Start southwest End same

Ambient Temp.: 83° End same | Wet Bulb Temp.: 68° | RH Percent: 46%

Source Layout Sketch



Plume Information: West Stack

Observation Date	Time Zone	Start Time	End Time
8-28-96	EDST	15:20	15:50

Sec / Min	0	15	30	45	Comments
1	0	5	5	5	
2	10	5	5	0	
3	0	0	0	0	
4	0	0	5	5	
5	5	5	5	5	
6	5	5	5	0	
7	0	0	0	0	
8	0	0	0	5	
9	5	5	5	5	
10	5	0	0	0	
11	0	0	0	5	
12	5	5	5	5	
13	5	5	5	5	
14	0	0	0	0	
15	0	0	0	0	
16	0	5	5	5	
17	5	5	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	5	5	5	5	
21	5	5	5	5	
22	0	0	0	0	
23	0	5	0	5	
24	0	5	5	5	
25	5	5	5	0	
26	0	0	0	0	
27	0	0	5	5	
28	5	5	5	5	
29	5	5	0	0	
30	0	0	0	0	

Observer's Name (Print): Mark Petersen

Observer's Signature: Mark Petersen | Date: 8/28/96

Organization: Interpoll Laboratories Inc.

Certified By: Eastern Technical Associates | Date: 4-3-96

EOF1.1

EPA

VISIBLE EMISSION OBSERVATION FORM 1

1651 1-C

Form Number		Page 1 of 2
Continued on VEO Form Number		

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name: Louisiana Pacific
Facility Name: Newberry OSB Plant
Street Address:
City: Newberry | State: MI | Zip:

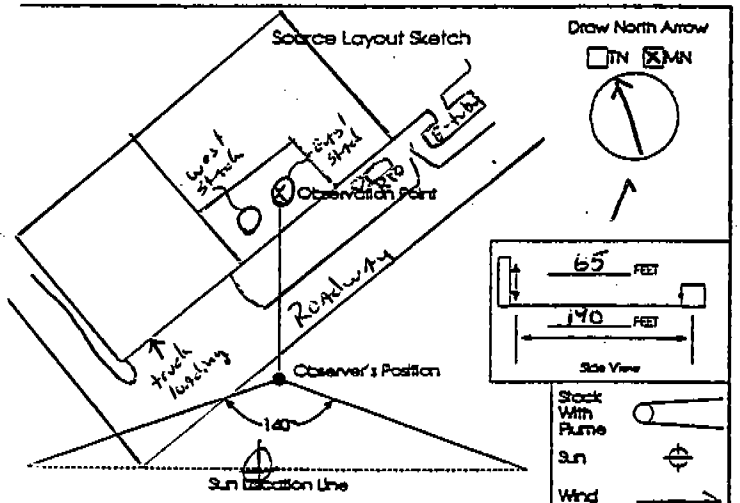
Process: Press vent | Unit #: NA | Operating Mode: Auto.
Control Equipment: NA | Operating Mode: NA

Describe Emission Point: the east stack of 2 stm stacks on top of south side of roof
Height of Emiss. Pt.: Start ~65' End same | Height of Emiss. Pt. Rel. to Observer: Start ~65' End same
Distance to Emiss. Pt.: Start ~190' End same | Direction to Emiss. Pt. (Degrees): Start 22° End same
Vertical Angle to Obs. Pt.: Start ~19° End same | Direction to Obs. Pt. (Degrees): Start 22° End same
Distance and Direction to Observation Point from Emission Point: Start 3' Above End same

Describe Emissions: Start straight up End same
Emission Color: Start white End same | Water Droplet Plume: Attached ☐ Detached ☐ None ☒

Describe Plume Background: Start sky End same
Background Color: Start Blue End same | Sky Conditions: Start clear End same
Wind Speed: Start ~0 to 4 mph End same | Wind Direction: Start Southwest End same
Ambient Temp.: Start 79° End 83° | Wet Bulb Temp.: 65° | RH Percent: 46%

Source Layout Sketch



Plume Angle | Latitude | Declination

Additional Information: East stack

Sec / Min	0	15	30	45	Comments
1	0	5	0	0	
2	5	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	5	0	5	5	
6	5	5	0	0	
7	0	0	0	0	
8	0	0	0	5	
9	5	5	10	5	
10	5	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	5	5	5	0	
14	5	0	0	0	
15	0	0	0	5	
16	5	5	5	10	
17	5	5	5	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	5	15	
21	5	10	5	0	
22	0	0	0	0	
23	0	5	5	5	
24	5	5	10	5	
25	5	5	0	0	
26	0	0	0	0	
27	0	0	5	5	
28	5	5	5	5	
29	5	0	0	0	
30	0	0	5	5	

Observation Date: 8-28-96 | Time Zone: EDST | Start Time: 14:50 | End Time: 15:20

Observer's Name (Print): Mark Peterson
Observer's Signature: Mark Peterson | Date: 8/28/96
Organization: Interpoll Laboratories, Inc.
Certified By: Eastern Technical Associates | Date: 4-3-96

EOF1.1

EPA

ISIBLE EMISSION OBSERVATION FORM 1

Form Number		Page 2 of 2
Continued on VEO Form Number		

od Used (Circle One) Method 9 203A 203B Other: _____

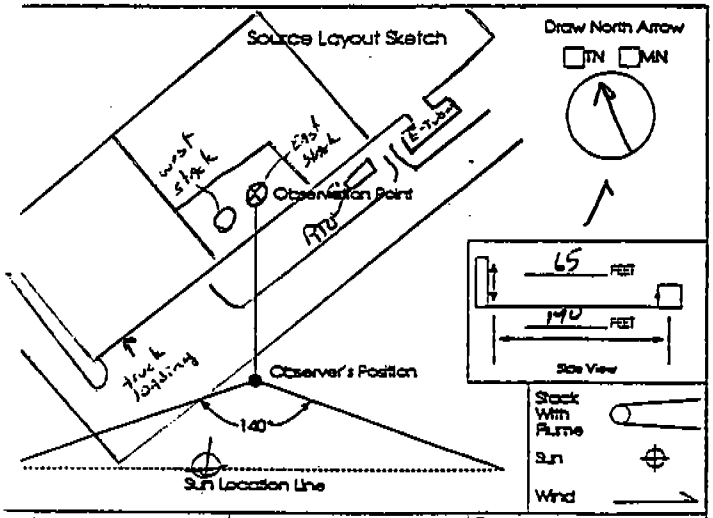
Company Name: Louisiana Pacific
ity Name: Newberry OSB Plant
reet Address:
Newberry | State: MI | Zip:

Process: Press vent | Unit #: NA | Operating Mode: Auto.
ntrol Equipment: NA | Operating Mode: NA

ssible Emission Point: the east stack of 2 tan stacks on top of south side of roof
Height of Emiss. Pt.: ~65' End same | Height of Emiss. Pt. Rel. to Observer: Start ~65' End same
Distance to Emiss. Pt.: ~190' End same | Direction to Emiss. Pt. (Degrees): Start 22° End same
Vertical Angle to Obs. Pt.: ~19° End same | Direction to Obs. Pt. (Degrees): Start 22° End same
Distance and Direction to Observation Point from Emission Point: ~3' above End same

ssible Emissions: straight up End same
sion Color: Start white End same | Water Droplet Plume: Attached ☐ Detached ☐ None ☒

Plume Background: sky End same
Background Color: Start Blue End same | Sky Conditions: Start clear End same
Wind Speed: ~0 to 4 mph End same | Wind Direction: Start southwest End same
bient Temp.: Start 83° End same | Wet Bulb Temp.: 60° | RH Percent: 46%



Longitude | Latitude | Declination

Additional Information: EAST stack

Observation Date	Time Zone	Start Time	End Time
8-28-96	EDST	15:20	15:50

Min \ Sec	0	15	30	45	Comments
1	0	5	5	5	
2	10	5	5	0	
3	0	0	0	0	
4	0	0	5	5	
5	5	5	5	5	
6	5	5	5	0	
7	0	0	0	0	
8	0	0	5	5	
9	5	5	5	5	
10	5	0	0	0	
11	0	0	0	5	
12	5	5	5	5	
13	5	5	5	5	
14	0	0	0	0	
15	0	0	0	0	
16	0	5	5	5	
17	5	5	0	0	
18	0	0	0	0	
19	0	0	0	5	
20	5	5	5	5	
21	5	5	5	5	
22	0	0	0	0	
23	0	5	0	5	
24	0	5	5	5	
25	5	5	5	0	
26	0	0	0	0	
27	0	5	5	5	
28	5	5	5	5	
29	5	0	0	0	
30	0	0	0	0	

Observer's Name (Print): Mark Petersen
Observer's Signature: Mark Peter | Date: 8/28/96
Organization: Interpoll Laboratories, Inc.
Certified By: Eastern Technical Associates | Date: 4-3-96

EOF1.1

EPA

VISIBLE EMISSION OBSERVATION FORM 1

Test

Form Number | Page 1 of 2

Continued on VEO Form Number

Method Used (Circle One): Method 9 | 203A | 203B | Other:

Company Name: LP/Newberry

Facility Name:

Street Address:

City: Newberry | State: SC | Zip:

Process: Dryer | Unit #: | Operating Mode:

Control Equipment: RTO & ESP | Operating Mode:

Describe Emission Point: Large Silver stack on S. Side of Plant behind RTO

Height of Emiss. Pt. Start: ~80ft End: ~80ft | Height of Emiss. Pt. Rel. to Observer Start: ~70ft End: ~70ft

Distance to Emiss. Pt. Start: ~340ft End: ~340 | Direction to Emiss. Pt. (Degrees) Start: ~60° End: ~60°

Vertical Angle to Obs. Pt. Start: End: | Direction to Obs. Pt. (Degrees) Start: ~60° End: ~60°

Distance and Direction to Observation Point from Emission Point Start: ~6ft up End: Same

Describe Emissions Start: Occasional faint Gray wisp End:

Emission Color Start: Gray or colorless End: Same | Water Droplet Plume: Attached ☐ Detached ☐ None ☑

Describe Plume Background Start: Sky End: Sky

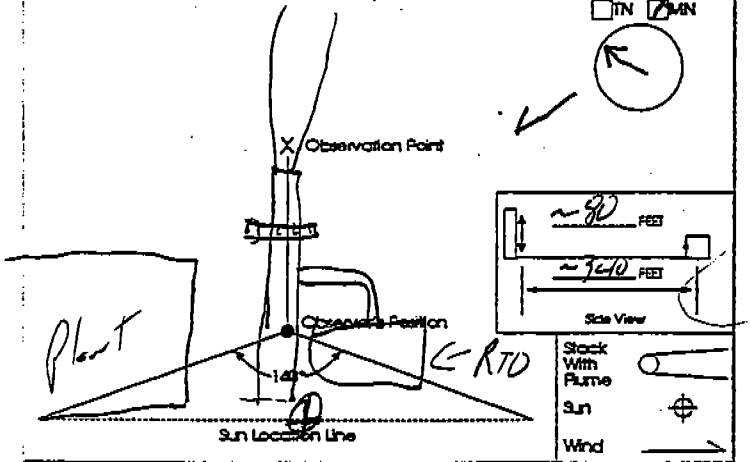
Background Color Start: Blue End: Blue | Sky Conditions Start: Clear End:

Wind Speed Start: 5-10 End: 5-10 | Wind Direction Start: SSE End: Same

Ambient Temp. Start: 70 End: 70 | Wet Bulb Temp: 60 | RH Percent: 54

Source Layout Sketch

Draw North Arrow: ☐TN ☑MN



Longitude | Latitude | Declination

Additional Information

Time	0	15	30	45	Comments
1	0	0	0	0	
2	0	0	0	5	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	5	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	5	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	5	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	5	
24	0	0	0	5	
25	0	0	0	0	
26	0	0	5	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observation Date: 8/27/96 | Time Zone: East | Start Time: 1630 SK | End Time: 1700

Observer's Name (Print): Stephen P Kelker

Observer's Signature: Stephen P Kelker | Date: 8/27/96

Organization: Interpoll Labs

Certified By: ETA | Date: 4/3/96

VEOF1.1

EPA

SIBLE EMISSION OBSERVATION FORM 1

Form Number | Page 2 of 2

Continued on VEO Form Number

Method Used (Circle One): Method 9 | 203A | 203B | Other:

Company Name: CPI/Nicholson

City Name

Plant Address

State | Zip

Process | Unit # | Operating Mode

Control Equipment | Operating Mode

Visible Emission Point

Height of Emiss. Pt. | Height of Emiss. Pt. Rel. to Observer: Start | End

Distance to Emiss. Pt. | Direction to Emiss. Pt. (Degrees): Start | End

Vertical Angle to Obs. Pt. | Direction to Obs. Pt. (Degrees): Start | End

Distance and Direction to Observation Point from Emission Point: End

Visible Emissions: End

Emission Color | Water Droplet Plume: Attached ☐ Detached ☐ None ☐

Plume Background: End

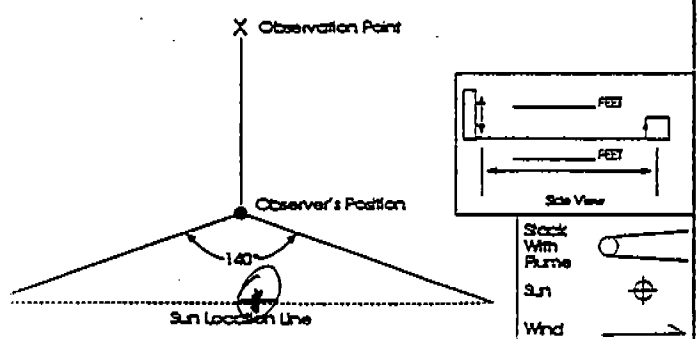
Background Color | Sky Conditions: Start | End

Wind Speed | Wind Direction: Start | End

Ambient Temp.: 70 End 70 | Wet Bulb Temp.: 60 | RH Percent: 54

Source Layout Sketch

Draw North Arrow: ☐TN ☐MN



Longitude | Latitude | Declination

Additional Information: Unchanged from pg 1

Observation Date	Time Zone	Start Time	End Time
8/27/96	East.	1710	1740

Min \ Sec	0	15	30	45	Comments
1	5	10	5	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	5	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	5	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	5	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	5	0	
30	0	0	0	0	

Observer's Name (Print): Stephen P Kellison

Observer's Signature: Stephen P Kellison | Date: 8/27/96

Organization: Interpoll Labs

Certified By: ETA | Date: 4/17/96

EOF1.1

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Stephen Kelker

met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, North Carolina. This certificate is valid for six months from date of issue.

President

252750
Certificate Number

Vice President

Minneapolis Minnesota
Location

David B. Savage, Jr.
Program Manager

April 3, 1996
Date of Issue

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Mark Petersen

met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conduoted by Eastern Technical Associates of Raleigh, North Carolina. This certificate is valid for six months from date of issue.

President

Vice President

David B. Savage, Jr.
Program Manager

252753
Certificate Number

Minneapolis Minnesota
Location

April 3, 1996
Date of Issue

APPENDIX D

INTERPOLL LABORATORIES ANALYTICAL DATA

TABLE OF CONTENTS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: LP/Newberry
Team Leader: MK
Date Submitted: 8-30-96
Test No.: 1
Date of Analysis: 9-6-96

Source: Dryer Primary cyclone Exhaust
Test Site:
Date of Test: 8-27-96
No. of Runs Completed: 3
Technician: SLB

Test/ Run	Sample Log No. 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
1/3	8201-68	1	0.00	4.3	20.4	4.3	16.1	1.12
		2	0.00	4.3	20.4	4.3	16.1	1.12
	☒B☐F	Avg				4.3	16.1	
1/4	-69	1	0.00	4.0	20.6	4.0	16.6	1.08
		2	0.00	4.0	20.6	4.0	16.6	1.08
	☒B☐F	Avg				4.0	16.6	
1/5	-70	1	0.00	4.1	20.6	4.1	16.5	1.07
		2	0.00	4.1	20.6	4.1	16.5	1.07
	☒B☐F	Avg				4.1	16.5	
		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	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, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: LP-New Barry
Team Leader: JB
Date Submitted: 8-30-96
Test No.: 1
Date of Analysis: 9-6-96

Source: Dryer E-TUBE
Test Site: OUTLET
Date of Test: 8-28-96
No. of Runs Completed: 2
Technician: GCB

Test/ Run	Sample Log No. 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_0
1/3	8201-58	1	0.00	3.9	20.4	3.9	16.5	1.13
		2	0.00	3.9	20.4	3.9	16.5	1.13
	☐B☐F	Avg				3.9	16.5	
1/4	-51	1	0.00	3.6	20.5	3.6	16.9	1.11
		2	0.00	3.6	20.5	3.6	16.9	1.11
	☒B☐F	Avg				3.6	16.9	
1/5	-52	1	0.00	3.7	20.5	3.7	16.8	1.11
		2	0.00	3.7	20.5	3.7	16.8	1.11
	☒B☐F	Avg				3.7	16.8	
		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						
		1						
		2						
	☐B☐F	Avg						

☐ Ambient Air QA Check
☒ Orsat Analyzer System Leak Check
☐ F_0 Within EPA M-3 Guidelines for fuel type.

Where $F_0 = \frac{20.9\text{-}O_2}{CO_2}$

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

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job	LP - New Berry	Source	DRYer RTO
Team Leader	SF	Test Site	STACK
Date Submitted	8-30-96	Date of Test	8-27-96
Test No.	1	No. of Runs Completed	3 4
Date of Analysis	9-6-96	Technician	SCO

Test/ Run	Sample Log No. 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
1/2	8201-	1	0.00	3.5	20.3	3.5	16.8	1.17
		2	0.00	3.5	20.3	3.5	16.8	1.17
	☒B☐F	Avg				3.5	16.8	
1/3	8201	1	0.00	3.0	20.5	3.0	17.5	1.17
		2	0.00	3.0	20.5	3.0	17.5	1.17
	☒B☐F	Avg				3.0	17.5	
1/4	8201	1	0.00	4.0	20.3	4.0	16.3	1.15
		2	0.00	4.0	20.3	4.0	16.3	1.15
	☒B☐F	Avg				4.0	16.3	
1/5	8201	1	0.00	4.0	20.4	4.0	16.4	1.13
		2	0.00	4.0	20.4	4.0	16.4	1.13
	☒B☐F	Avg				4.0	16.4	
		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

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job	LP - Newberry	Source	Dryer Primary Cyclone
Team Leader	EJ	Test Site	Exhaust
Date Submitted	8-30-96	Date of Test	8-29-96
Test No.	3	No. of Runs Completed	3
Date of Analysis	9-6-96	Technician	SLH

Test/ Run	Sample Log No. 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_0
3/1	8201	1	0.00	3.9	20.5	3.9	16.6	1.10
		2	0.00	3.9	20.5	3.9	16.6	1.10
	☒B☐F	Avg				3.9	16.6	
3/2	8201	1	0.00	3.9	20.5	3.9	16.6	1.10
		2	0.00	3.9	20.5	3.9	16.6	1.10
	☒B☐F	Avg				3.9	16.6	
3/3	8201	1	0.00	4.2	20.3	4.2	16.1	1.14
		2	0.00	4.2	20.3	4.2	16.1	1.14
	☒B☐F	Avg				4.2	16.1	
		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						
		1						
		2						
	☐B☐F	Avg						

☐ Ambient Air QA Check
☒ Orsat Analyzer System Leak Check
☐ F_0 Within EPA M-3 Guidelines for fuel type.

Where $F_0 = \frac{20.9-O_2}{CO_2}$

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

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: L.P. / Newberry, MI
Team Leader: J. Barnwell
Date Submitted: 8-29-96
Test No.: 3
Date of Analysis: 8-29-96

Source: Dryer 'E' Tube ☒
Test Site: Outlet
Date of Test: 8-29-96
No. of Runs Completed: 3
Technician: Mark Kaehler

Test/ Run	Sample Log No. 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
3/1	8201	1	0.00	4.00	20.20	4.00	16.20	1.050
		2	0.00	4.00	20.20	4.00	16.20	1.050
	☒B☐F	Avg				4.00	16.20	
3/2	8201	1	0.00	4.20	20.20	4.20	16.50	1.048
		2	0.00	4.20	20.20	4.20	16.50	1.048
	☒B☐F	Avg				4.20	16.40	
3/3	8201	1	0.00	4.40	20.20	4.40	16.30	1.045
		2	0.00	4.40	20.20	4.40	16.30	1.045
	☒B☐F	Avg				4.40	16.30	
		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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INTERPOLL LABORATORIES, INC.
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EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: L.P. / Newberry, MI
Team Leader: B. Aschenbach
Date Submitted: 8-29-96
Test No.: 3
Date of Analysis: 8-30-96

Source: Dryer RTO
Test Site: Stack
Date of Test: 8-26-96
No. of Runs Completed: 3
Technician: Mark Kaehler

Test/ Run	Sample Log No. 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_0
3/1	8201	1	0.00	3.50	20.20	3.50	16.70	1.200
		2	0.00	3.50	20.20	3.50	16.70	1.200
	☒B☐F	Avg				3.50	16.70	
3/2	8201	1	0.00	3.50	20.30	3.80	16.50	1.158
		2	0.00	3.50	20.30	3.80	16.50	1.158
	☒B☐F	Avg				3.80	16.50	
3/3	8201	1	0.00	3.50	20.20	4.00	16.20	1.175
		2	0.00	3.50	20.20	4.00	16.20	1.175
	☒B☐F	Avg				4.00	16.20	
		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_0 Within EPA M-3 Guidelines for fuel type.

Where $F_0 = \frac{20.9 - O_2}{CO_2}$

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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REVIEWED
SEP 12 1996

Impinger Catch Data Reporting Sheet

Protocol: ☐Minnesota ☐Wisconsin ☐Iowa ☒EPA Method 202 ☐Other

Job: LP/Newberry
Source/Site: Dryer Primary Cyclone / Exhaust
Date Submitted: 9-3-96
Test No.: 1
Date of Analysis: 9-5-96
Technician: B.J.

	Solvent Phase	Aqueous Phase
Test: 1 Run: 0	Dish No: 530	Dish No: 788
Log No: 820/-62I	Dish + Sample Wt: 48.5288 g	Dish + Sample Wt: 45.4003 g
Color & Appearance:	Dish Tare Wt: 48.5286 g	Dish Tare Wt: 45.4003 g
	Fraction Wt: 0.0002 g	Fraction Wt: 0.0000 g
Comments:	Smpl Vol: 200 ml, Alqt: 150 ml, Factor: 1.333	Smpl Vol: 200 ml, Alqt: 150 ml, Factor: 1.333
	Sample Wt: 0.0003 g	Sample Wt: 0.0000 g
Test: 1 Run: 3	Dish No: 601	Dish No: 814
Log No: -65I	Dish + Sample Wt: 47.7186 g	Dish + Sample Wt: 46.7599 g
Color & Appearance:	Dish Tare Wt: 47.6672 g	Dish Tare Wt: 46.6369 g
	Fraction Wt: 0.0514 g	Fraction Wt: 0.1230 g
Comments:	Smpl Vol: 330 ml, Alqt: 280 ml, Factor 1.179	Smpl Vol: 330 ml, Alqt: 280 ml, Factor 1.179
	Sample Wt: 0.0606 g	Sample Wt: 0.1450 g
Test: 1 Run: 4	Dish No: 606	Dish No: 818
Log No: -66I	Dish + Sample Wt: 48.6550 g	Dish + Sample Wt: 46.0030 g
Color & Appearance:	Dish Tare Wt: 48.5729 g	Dish Tare Wt: 45.9034 g
	Fraction Wt: 0.0821 g	Fraction Wt: 0.0996 g
Comments:	Smpl Vol: 390 ml, Alqt: 340 ml, Factor 1.147	Smpl Vol: 390 ml, Alqt: 340 ml, Factor 1.147
	Sample Wt: 0.0942 g	Sample Wt: 0.1142 g
Test: 1 Run: 5	Dish No: 607	Dish No: 826
Log No: -67I	Dish + Sample Wt: 47.4562 g	Dish + Sample Wt: 48.7081 g
Color & Appearance:	Dish Tare Wt: 47.3970 g	Dish Tare Wt: 48.5741 g
	Fraction Wt: 0.0592 g	Fraction Wt: 0.1340 g
Comments:	Smpl Vol: 370 ml, Alqt: 320 ml, Factor 1.156	Smpl Vol: 370 ml, Alqt: 320 ml, Factor 1.156
	Sample Wt: 0.0685 g	Sample Wt: 0.1549 g

Note: Factor = Sample Volume/Aliquot Volume

Blank Solvent Wt. 0.0003 g

	RUN 0	RUN 3	RUN 4	RUN 5
Results of Solvent Phase g	0.0003	0.0603	0.0939	0.0682
Results of Aqueous Phase g	0.0000	0.1450	0.1142	0.1549

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Solvent Rinse Data Reporting Sheet

☒ EPA Method 5 Probe Wash ☐ EPA Method 29 Probe Wash ☐ EPA Method 202 Cup & Tube Wash

Job: L.P. Newberry
Date Submitted: 8-29-96
Date of Analysis: 9-20-96
Source/Site: Dryer Primary Chlorine Exhaust
Test No.: 1
Technician: SCB

Transport Leakage ☐ None ☒ _____ ml
Solvent: Acetone

Test: 1	Run: 0	Dish No:	57
Log No: 8201-62P		Dish + Sample Wt:	49.2924 g
Volume of Solvent	79 ml	Dish Tare Wt:	49.2120 g
*Solvent Residue	ug/ml	Sample Wt:	.0804 g
Test: 1	Run: 3	Dish No:	51
Vol. of Solvent	130 ml	Dish + Sample Wt:	44.9029 g
Log Number -63P		Dish Tare Wt:	44.7340 g
Comments		Sample Wt:	.0689 g
Test: 1	Run: 4	Dish No:	879
Vol. of Solvent	100 ml	Dish + Sample Wt:	38.7569 g
Log Number -64P		Dish Tare Wt:	38.6576 g
Comments		Sample Wt:	.0993 g
Test: 1	Run: 5	Dish No:	875
Vol. of Solvent	100.1	Dish + Sample Wt:	39.0430 g
Log Number -64P		Dish Tare Wt:	38.9877 g
Comments		Sample Wt:	.0553 g

*Solvent Residue 5.71 ug/ml = [(Sample Wt. .004 g) (10^6)]/Vol. of Sol. 70 ml
EPA-M5 Acetone Residue Blank Spec. ≤ 7.8 ug/ml

VSV

RUN	RUN 3	RUN 4	RUN 5
Results of Solvent Rinse g	0.0682	0.0987	0.0547

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Filter Gravimetrics Reporting Sheet

Fiter Type: ☒ EPA Method 5 ☐ EPA Method 29 ☐ EPA Method 202 ☐ Other _____

Job	LD-New Berry	Source/Site	Dryer Primary Cyclone Exhaust
Date Submitted	8-29-96	Test No.	1
Date of Analysis	9-20-96	Technician	SCB

Test: 1	Run: 0	Filter No:	8355
Field Blank:		Filter Type:	4" G.F.
Log No:	8201-627	Filter + Sample Wt:	.9310 g
Color:		Filter Tare Wt:	.9307 g
		Sample Wt:	.0003 g
Test: 1	Run: 3	Filter No:	8340
Log No:	-631	Filter Type:	4" G.F.
Color:		Filter + Sample Wt:	1.6289 g
		Filter Tare Wt:	.9321 g
		Sample Wt:	.6968 g
Test: 1	Run: 4	Filter No:	8363
Log No:	-647	Filter Type:	4" G.F.
Color:		Filter + Sample Wt:	1.4676 g
		Filter Tare Wt:	.9321 g
		Sample Wt:	.5355 g
Test: 1	Run: 5	Filter No:	8399
Log No:	-655	Filter Type:	4" G.F.
Color:		Filter + Sample Wt:	1.5250 g
		Filter Tare Wt:	.9300 g
		Sample Wt:	.5950 g

VSV

	RUN 0	RUN 3	RUN 4	RUN 5
Results of Filter Analysis g		0.6968	0.5355	0.5950

	RUN	RUN	RUN	RUN
Total Mass g				

	A	B	C	D	E	F	G	H	I	J
1	EPA Method 202 Calculations						Report No. 6-8201			
2	Job: **LOUISIANA PACIFIC - NEWBERRY**									
3	Date: 27-Aug-96									
4	***Dryer Primary Cyclone Exhaust***									**ENTER IN**
5			Vlc	Sulfate	Mc	Mr	Mi	Mo	Mb	CPM	**COMPUTER**
6	RUN		(ml)	(mg/ml)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	**(g)**
7		1	330	6.95E-04	0.04	145	144.96	60.6	0.3	205.26	0.2052578
8		2	390	5.11E-04	0.04	114.2	114.16	94.2	0.3	208.06	0.208063331
9		3	370	1.23E-03	0.08	154.9	154.82	68.5	0.3	223.02	0.223016262
10											
11											
12	**EPA Method 201A/202 Totals**										
13											
14			Probe	Filter	CPM	Total					
15	RUN		(mg)	(mg)	(mg)	(mg)					
16		1	68.2	696.8	205.26	970.2578					
17		2	98.7	535.5	208.06	842.2633					
18		3	54.7	595	223.02	872.7163					

INTERPOLL LABORATORIES, INC.
(6[illegible]) 786-6020

REVIEWED
SEP 12 1996

Impinger Catch Data Reporting Sheet

Protocol: ☐Minnesota ☐Wisconsin ☐Iowa ☒EPA Method 202 ☐Other

Job: LP/Newberry — Source/Site: Dryer E Tube Outlet
Date Submitted: 8-30-96 — Test No.: 1
Date of Analysis: 9-5-96 — Technician: B.D.

	Solvent Phase		Aqueous Phase	
Test: 1 Run: 0	Dish No:	911	Dish No:	311
Log No: 8201-44I	Dish + Sample Wt:	44.8260 g	Dish + Sample Wt:	43.8124 g
Color & Appearance:	Dish Tare Wt:	44.8258 g	Dish Tare Wt:	43.8124 g
	Fraction Wt:	0.0002 g	Fraction Wt:	0.0000 g
Comments:	Smpl Vol: 200 ml, Alqt: 150 ml, Factor:	1.333	Smpl Vol: 200 ml, Alqt: 150 ml, Factor:	1.333
	Sample Wt:	0.0003 g	Sample Wt:	0.0000 g
Test: 1 Run: 3	Dish No:	912	Dish No:	314
Log No: -47I	Dish + Sample Wt:	46.5374 g	Dish + Sample Wt:	44.0673 g
Color & Appearance:	Dish Tare Wt:	46.5097 g	Dish Tare Wt:	44.0353 g
	Fraction Wt:	-0.0277 g	Fraction Wt:	0.0320 g
Comments:	Smpl Vol: 455 ml, Alqt: 405 ml, Factor	1.123	Smpl Vol: 455 ml, Alqt: 405 ml, Factor	1.123
	Sample Wt:	0.0311 g	Sample Wt:	0.0359 g
Test: 1 Run: 4	Dish No:	913	Dish No:	340
Log No: -48I	Dish + Sample Wt:	46.4597 g	Dish + Sample Wt:	47.9271 g
Color & Appearance:	Dish Tare Wt:	46.4464 g	Dish Tare Wt:	47.9165 g
	Fraction Wt:	0.0133 g	Fraction Wt:	0.0106 g
Comments:	Smpl Vol: 430 ml, Alqt: 380 ml, Factor	1.132	Smpl Vol: 430 ml, Alqt: 380 ml, Factor	1.132
	Sample Wt:	0.0151 g	Sample Wt:	0.0120 g
Test: 1 Run: 5	Dish No:	914	Dish No:	716
Log No: -49I	Dish + Sample Wt:	45.0833 g	Dish + Sample Wt:	45.6752 g
Color & Appearance:	Dish Tare Wt:	45.0650 g	Dish Tare Wt:	45.6417 g
	Fraction Wt:	0.0183 g	Fraction Wt:	0.0335 g
Comments:	Smpl Vol: 425 ml, Alqt: 375 ml, Factor	1.133	Smpl Vol: 425 ml, Alqt: 375 ml, Factor	1.133
	Sample Wt:	0.0207 g	Sample Wt:	0.0380 g

Note: Factor = Sample Volume/Aliquot Volume

Blank Solvent Wt: 0.0003 g

√SV	RUN 0	RUN 3	RUN 4	RUN 5
Results of Solvent Phase g	0.0003	0.0308	0.0148	0.0204
Results of Aqueous Phase g	0.0000	0.0359	0.0120	0.0380

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Solvent Rinse Data Reporting Sheet

☒ EPA Method 5 Probe Wash ☐ EPA Method 29 Probe Wash ☐ EPA Method 202 Cup & Tube Wash

Job: LR Nunley
Date Submitted: 8-24-96
Date of Analysis: 8 20 96
Source/Site: Dryer "E" Tube Outlet
Test No.: 1
Technician: SLB
Transport Leakage ☐ None ☒ ml
Solvent: Acetone

Test: 1	Run: 0	Dish No: 1	
Log No: 8201 -442		Dish + Sample Wt: 60.4727	g
Volume of Solvent	115 ml	Dish Tare Wt: 60.4724	g
*Solvent Residue	ug/ml	Sample Wt: .0003	g
Test: 1	Run: 3	Dish No: 22	
Vol. of Solvent	250 ml	Dish + Sample Wt: 64.1200	g
Log Number -450		Dish Tare Wt: 64.1087	g
Comments		Sample Wt: .0113	g
Test: 1	Run: 4	Dish No: 85	
Vol. of Solvent	280 ml	Dish + Sample Wt: 73.9613	g
Log Number -460		Dish Tare Wt: 73.9514	g
Comments		Sample Wt: .0099	g
Test: 1	Run: 5	Dish No: 87	
Vol. of Solvent	160 ml	Dish + Sample Wt: 73.3628	g
Log Number -470		Dish Tare Wt: 73.3532	g
Comments		Sample Wt: .0096	g

*Solvent Residue 2.61 ug/ml = [(Sample Wt. .0003 g) (10^6)]/Vol. of Sol. 115 ml

EPA-M5 Acetone Residue Blank Spec. ≤ 7.8 ug/ml

VSLV

	RUN 0	RUN 3	RUN 4	RUN 5
Results of Solvent Rinse g		0.0106	0.0092	0.0092

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Filter Gravimetrics Reporting Sheet

Fiter Type: ☒ EPA Method 5 ☐ EPA Method 29 ☐ EPA Method 202 ☐ Other_____

Job	LP - NEWBERRY	Source/Site	DRYER STACK OUTLET
Date Submitted	8-29-90	Test No.	1
Date of Analysis	9-20-90	Technician	SLD

Test: 1	Run: 0	Filter No:	8740
Field Blank:		Filter Type:	4" G.F.
Log No: 8201 - 44F		Filter + Sample Wt:	.9425 g
Color:		Filter Tare Wt:	.9424 g
		Sample Wt:	.0001 g
Test: 1	Run: 3	Filter No:	8558
Log No: - 47F		Filter Type:	4" G.F.
Color:		Filter + Sample Wt:	1.0640 g
		Filter Tare Wt:	1.0459 g
		Sample Wt:	.0181 g
Test: 1	Run: 4	Filter No:	8729
Log No: - 48F		Filter Type:	4" G.F.
Color:		Filter + Sample Wt:	.9615 g
		Filter Tare Wt:	.9501 g
		Sample Wt:	.0114 g
Test: 1	Run: 5	Filter No:	9421
Log No: - 48F		Filter Type:	4" G.F.
Color:		Filter + Sample Wt:	.9762 g
		Filter Tare Wt:	.9628 g
		Sample Wt:	.0134 g

✓ SLD

	RUN 0	RUN 3	RUN 4	RUN 5
Results of Filter Analysis g		0.0181	0.0114	0.0134

	RUN	RUN	RUN	RUN
Total Mass g				

112994-G:\STACK\WP\FORMS\S-491

	A	B	C	D	E	F	G	H	I	J
19	EPA Method 202 Calculations						Report No. 6-8201			
20	Job: **LOUISIANA PACIFIC - NEWBERRY**									
21	Date: 27-Aug-96									
22	*E-Tube Outlet*									
23			Vlc	Sulfate	Mc	Mr	Ml	Mo	Mb	CPM	**ENTER IN COMPUTER**
24	RUN		(ml)	(mg/ml)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	**(g)**
25		1	455	3.49E-04	0.03	35.9	35.87	31.1	0.3	66.67	0.066670782
26		2	430	2.81E-04	0.02	12	11.98	15.1	0.3	26.78	0.026777767
27		3	425	2.50E-04	0.02	38	37.98	20.7	0.3	58.38	0.05838045
28											
29											
30	**EPA Method 201A/202 Totals**										
31											
32			Probe	Filter	CPM	Total					
33	RUN		(mg)	(mg)	(mg)	(mg)					
34		1	10.6	18.1	66.67	95.37078					
35		2	9.2	11.4	26.78	47.37777					
36		3	9.2	13.4	58.38	80.98045					

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[illegible]

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SEP 1 3 1996

Impinger Catch Data Reporting Sheet

Protocol: ☐Minnesota ☐Wisconsin ☐Iowa ☒Method 202 ☐Other

Job: LP/Newberry — Source/Site: Dryer RTO Stack

Date Submitted: 8-30-96 — Test No.: 1

Date of Analysis: 9-5-96 — Technician: B.D.

	Solvent Phase	Aqueous Phase
Test: 1 Run: 0	Dish No: 864	Dish No: 4
Log No: 8201-01I	Dish + Sample Wt: 44.9330 g	Dish + Sample Wt: 47.3815 g
Color & Appearance:	Dish Tare Wt: 44.9328 g	Dish Tare Wt: 47.3815 g
	Fraction Wt: 0.0002 g	Fraction Wt: 0.0000 g
Comments:	Smpl Vol: 200 ml, Alqt: 150 ml, Factor: 1.333	Smpl Vol: 200 ml, Alqt: 150 ml, Factor: 1.333
	Sample Wt: 0.0003 g	Sample Wt: 0.0000 g
Test: 1 Run: 3	Dish No: 867	Dish No: 5
Log No: -04I	Dish + Sample Wt: 45.6135 g	Dish + Sample Wt: 39.2430 g
Color & Appearance:	Dish Tare Wt: 45.6061 g	Dish Tare Wt: 39.2375 g
	Fraction Wt: 0.0074 g	Fraction Wt: 0.0055 g
Comments:	Smpl Vol: 415 ml, Alqt: 365 ml, Factor 1.137	Smpl Vol: 415 ml, Alqt: 365 ml, Factor 1.137
	Sample Wt: 0.0084 g	Sample Wt: 0.0062 g
Test: 1 Run: 4	Dish No: 869	Dish No: 6
Log No: -05I	Dish + Sample Wt: 47.4006 g	Dish + Sample Wt: 48.2792 g
Color & Appearance:	Dish Tare Wt: 47.3962 g	Dish Tare Wt: 48.2726 g
	Fraction Wt: 0.0044 g	Fraction Wt: 0.0066 g
Comments:	Smpl Vol: 430 ml, Alqt: 380 ml, Factor 1.132	Smpl Vol: 430 ml, Alqt: 380 ml, Factor 1.132
	Sample Wt: 0.0050 g	Sample Wt: 0.0075 g
Test: 1 Run: 5	Dish No: 871	Dish No: 14
Log No: -06I	Dish + Sample Wt: 48.8032 g	Dish + Sample Wt: 37.7667 g
Color & Appearance:	Dish Tare Wt: 48.7995 g	Dish Tare Wt: 37.7617 g
	Fraction Wt: 0.0037 g	Fraction Wt: 0.0050 g
Comments:	Smpl Vol: 450 ml, Alqt: 400 ml, Factor 1.125	Smpl Vol: 450 ml, Alqt: 400 ml, Factor 1.125
	Sample Wt: 0.0042 g	Sample Wt: 0.0056 g

Note: Factor = Sample Volume/Aliquot Volume

Blank Solvent Wt. 0.0003 g

VSL

		RUN 0	RUN 3	RUN 4	RUN 5
Results of Solvent Phase	g	0.0003	0.0081	0.0047	0.0039
Results of Aqueous Phase	g	0.0000	0.0062	0.0075	0.0056

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Solvent Rinse Data Reporting Sheet

☒ EPA Method 5 Probe Wash ☐ EPA Method 29 Probe Wash ☐ EPA Method 202 Cup & Tube Wash

Job	LP - New Prague	Source/Site	Dryer RTO STACK
Date Submitted	8-29-96	Test No.	1
Date of Analysis	9-20-96	Technician	SCM
Transport Leakage ☐	None ☒ ml	Solvent	Acetone

Test: 1	Run: 0	Dish No:	40
Log No:	8201-01B	Dish + Sample Wt:	41.2746 g
Volume of Solvent	125 ml	Dish Tare Wt:	41.2742 g
*Solvent Residue	ug/ml	Sample Wt:	.0004 g
Test: 1	Run: 3	Dish No:	119
Vol. of Solvent	105 ml	Dish + Sample Wt:	47.7718 g
Log Number	-02B	Dish Tare Wt:	47.7686 g
Comments		Sample Wt:	.0032 g
Test: 1	Run: 4	Dish No:	29
Vol. of Solvent	175 ml	Dish + Sample Wt:	48.8920 g
Log Number	-03B	Dish Tare Wt:	48.8841 g
Comments		Sample Wt:	.0079 g
Test: 1	Run: 5	Dish No:	793
Vol. of Solvent	150 ml	Dish + Sample Wt:	45.9572 g
Log Number	-04B	Dish Tare Wt:	45.9555 g
Comments		Sample Wt:	.0017 g

*Solvent Residue 3.20 ug/ml = [(Sample Wt .0004 g) (10^6)]/Vol. of Sol. 125 ml

EPA-M5 Acetone Residue Blank Spec. ≤ 7.8 ug/ml

VSV

	RUN	RUN 3	RUN 4	RUN 5
Results of Solvent Rinse g		0.0019	0.0025	0.0012

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Filter Gravimetrics Reporting Sheet

Fiter Type: ☒ EPA Method 5 ☐ EPA Method 29 ☐ EPA Method 202 ☐ Other_____

Job	L.P. Newberry	Source/Site	Dryer RTO Stack
Date Submitted	8-29-96	Test No.	1
Date of Analysis	9-20-96	Technician	SUB

Test: 1	Run: 0	Filter No:	8620
Field Blank:		Filter Type:	4" G.F.
Log No:	8201 - 01F	Filter + Sample Wt:	.9486 g
Color:		Filter Tare Wt:	.9482 g
		Sample Wt:	.0004 g
Test: 1	Run: 3	Filter No:	8619
Log No:		Filter Type:	4" G.F.
Color:	-04F	Filter + Sample Wt:	.9593 g
		Filter Tare Wt:	.9578 g
		Sample Wt:	.0015 g
Test: 1	Run: 4	Filter No:	8621
Log No:	-05F	Filter Type:	4" G.F.
Color:	-	Filter + Sample Wt:	9527 g
		Filter Tare Wt:	.9511 g
		Sample Wt:	.0016 g
Test: 1	Run: 5	Filter No:	8622
Log No:	-06F	Filter Type:	4" G.F.
Color:		Filter + Sample Wt:	.9526 g
		Filter Tare Wt:	.9507 g
		Sample Wt:	.0019 g

VGV

		RUN 0	RUN 3	RUN 4	RUN 5
Results of Filter Analysis	g		0.0015	0.0016	0.0019

		RUN	RUN	RUN	RUN
Total Mass	g				

	A	B	C	D	E	F	G	H	I	J
37	EPA Method 202 Calculations						Report No. 6-8201			
38	Job: **LOUISIANA PACIFIC - NEWBERRY**									
39	Date: 27-Aug-96									
40	***Dryer RTO Stack***									
41			Vlc	Sulfate	Mc	Mr	Mi	Mo	Mb	CPM	**ENTER IN COMPUTER**
42	RUN		(ml)	(mg/ml)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	**(g)**
43		1	415	1.34E-04	0.01	6.2	6.19	8.4	0.3	14.29	0.014289768
44		2	430	1.41E-04	0.01	7.5	7.49	5	0.3	12.19	0.012188844
45		3	450	4.13E-04	0.03	5.6	5.57	4.2	0.3	9.47	0.009465804
46											
47											
48	**EPA Method 201A/202 Totals**										
49											
50			Probe	Filter	CPM	Total					
51	RUN		(mg)	(mg)	(mg)	(mg)					
52		1	1.9	1.5	14.29	17.68977					
53		2	2.5	1.6	12.19	16.28884					
54		3	1.2	1.9	9.47	12.5658					

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Impinger Catch Data Reporting Sheet

Protocol: ☐Minnesota ☐Wisconsin ☐Iowa ☒EPA Method 202 ☐Other

Job: LP/Newberry | Source/Site: Press/Vents
Date Submitted: 9-3-96 | Test No.: 8
Date of Analysis: 9-5-96 | Technician: B.D.

	Solvent Phase	Aqueous Phase
Test: Run:	Dish No:	Dish No:
Log No:	Dish + Sample Wt: g	Dish + Sample Wt: g
Color & Appearance:	Dish Tare Wt: g	Dish Tare Wt: g
	Fraction Wt: g	Fraction Wt: g
Comments:	Smpl Vol: ml, Alqt: ml, Factor:	Smpl Vol: ml, Alqt: ml, Factor:
	Sample Wt: g	Sample Wt: g
Test: 8 Run: 1	Dish No: 873	Dish No: 829
Log No: 8201-60I	Dish + Sample Wt: 40.4159 g	Dish + Sample Wt: 45.6938 g
Color & Appearance:	Dish Tare Wt: 40.4149 g	Dish Tare Wt: 45.6928 g
	Fraction Wt: 0.0010 g	Fraction Wt: 0.0010 g
Comments:	Smpl Vol: 205 ml, Alqt: 155 ml, Factor 1.323	Smpl Vol: 205 ml, Alqt: 155 ml, Factor 1.323
	Sample Wt: 0.0013 g	Sample Wt: 0.0013 g
Test: 8 Run: 2	Dish No: 888	Dish No: 833
Log No: -61I	Dish + Sample Wt: 37.9010 g	Dish + Sample Wt: 46.3349 g
Color & Appearance:	Dish Tare Wt: 37.9000 g	Dish Tare Wt: 46.3340 g
	Fraction Wt: 0.0010 g	Fraction Wt: 0.0009 g
Comments:	Smpl Vol: 185 ml, Alqt: 135 ml, Factor 1.370	Smpl Vol: 185 ml, Alqt: 135 ml, Factor 1.370
	Sample Wt: 0.0014 g	Sample Wt: 0.0012 g
Test: 8 Run: 3	Dish No: 890	Dish No: 836
Log No: -62I	Dish + Sample Wt: 36.0849 g	Dish + Sample Wt: 45.0731 g
Color & Appearance:	Dish Tare Wt: 36.0840 g	Dish Tare Wt: 45.0718 g
	Fraction Wt: 0.0009 g	Fraction Wt: 0.0013 g
Comments:	Smpl Vol: 205 ml, Alqt: 155 ml, Factor 1.323	Smpl Vol: 205 ml, Alqt: 155 ml, Factor 1.323
	Sample Wt: 0.0012 g	Sample Wt: 0.0017 g

Note: Factor = Sample Volume/Aliquot Volume

Blank Solvent Wt. 0.0003 g

√SW	RUN	RUN 1	RUN 2	RUN 3
Results of Solvent Phase g		0.0010	0.0011	0.0009
Results of Aqueous Phase g		0.0013	0.0012	0.0017

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Solvent Rinse Data Reporting Sheet

☒ EPA Method 5 Probe Wash ☐ EPA Method 29 Probe Wash ☐ EPA Method 202 Cup & Tube Wash

Job	L.P. New Berry	Source/Site	Press Vents
Date Submitted	8-29-96	Test No.	8
Date of Analysis	9-20-96	Technician	SCB
Transport Leakage ☐	None ☒ ml	Solvent	Acetone

Test: 8	Run: 0	Dish No:	
Log No:		Dish + Sample Wt: V.D	g
Volume of Solvent	ml	Dish Tare Wt:	g
*Solvent Residue	ug/ml	Sample Wt:	g
Test: 8	Run: 1	Dish No: 35	
Vol. of Solvent 110	ml	Dish + Sample Wt: 51.0981	g
Log Number		Dish Tare Wt: 51.0912	g
Comments		Sample Wt: .0069	g
Test: 8	Run: 2	Dish No: 738	
Vol. of Solvent 110	ml	Dish + Sample Wt: 44.9368	g
Log Number		Dish Tare Wt: 44.9207	g
Comments		Sample Wt: .0161	g
Test: 8	Run: 3	Dish No: 765	
Vol. of Solvent 90 ml		Dish + Sample Wt: 44.1959	g
Log Number		Dish Tare Wt: 44.1905	g
Comments		Sample Wt: .0054	g

*Solvent Residue_____ug/ml = [(Sample Wt._____g) (10^6)]/Vol. of Sol. _____ml

EPA-M5 Acetone Residue Blank Spec. ≤ 7.8 ug/ml

VSL

	RUN	RUN 1	RUN 2	RUN 3
Results of Solvent Rinse g		0.0063	0.0155	0.0049

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Filter Gravimetrics Reporting Sheet

Fiter Type: ☒ EPA Method 5 ☐ EPA Method 29 ☐ EPA Method 202 ☐ Other_____

Job: LP-New Berry
Date Submitted: 8-29-96
Date of Analysis: 9-20-96
Source/Site: Press Vents
Test No.: 8
Technician: SLB

Test: 8 Run: 1	Filter No: 8457
Field Blank: 8201 -80F	Filter Type: 4" G.F.
Log No:	Filter + Sample Wt: .9521 g
Color:	Filter Tare Wt: .9472 g
	Sample Wt: .0049 g
Test: 8 Run: 2	Filter No: 8465
Log No: -81F	Filter Type: 4" G.F.
Color:	Filter + Sample Wt: .9585 g
	Filter Tare Wt: .9569 g
	Sample Wt: .0016 g
Test: 8 Run: 3	Filter No: 8471
Log No: -82F	Filter Type: 4" G.F.
Color:	Filter + Sample Wt: .9975 g
	Filter Tare Wt: .9932 g
	Sample Wt: .0043 g
Test: Run:	Filter No:
Log No:	Filter Type:
Color:	Filter + Sample Wt: g
	Filter Tare Wt: g
	Sample Wt: g

VSV

	RUN	RUN 1	RUN 2	RUN 3
Results of Filter Analysis g		0.0049	0.0016	0.0043

	RUN	RUN	RUN	RUN
Total Mass g				

112994-G:\STACK\WP\FORMS\S-491

	A	B	C	D	E	F	G	H	I	J
55	EPA Method 202 Calculations						Report No. 6-8201			
56	Job: **LOUISIANA PACIFIC - NEWBERRY**									
57	Date: 27-Aug-96									
58	***Press Vents***									
59			Vlc	Sulfate	Mc	Mr	Mi	Mo	Mb	CPM	**ENTER IN COMPUTER**
60	RUN		(ml)	(mg/ml)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	**(g)**
61	1		205	2.26E-04	0.01	1.3	1.29	1.3	0.3	2.29	0.002291475
62	2		185	2.00E-04	0.01	1.2	1.19	1.4	0.3	2.29	0.002293192
63	3		205	1.77E-04	0.01	1.7	1.69	1.2	0.3	2.59	0.002593324
64											
65											
66	**EPA Method 201A/202 Totals**										
67											
68			Probe	Filter	CPM	Total					
69	RUN		(mg)	(mg)	(mg)	(mg)					
70	1		6.3	4.9	2.29	13.49148					
71	2		15.5	1.6	2.29	19.39319					
72	3		4.9	4.3	2.59	11.79332					

9/12/96

Interpoll Laboratories, Inc.
(612)786-6020

Ion Chromatography Laboratory

DIONEX MODEL 4000i WITH ANION MICRO MEMBRANE SUPRESSION

Analyst: MJG Date of Analysis: 9/12/96

Job: ID020/LP Newberry Source: Dryer RTO Site: Stack

Chromatography Conditions

Column		Flow Rate	Eluent	Flow Rate	Suppressor Acid
	AS3	ml/min	2.4 mM Na_2CO_3 & 3.0 mM $NaHCO_3$	ml/min	12.5 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)

REVIEWED

SEP 10 1996

Gradient Program	Time (Min.)								
Eluent	0.0								
% A									
% B									

Results of Sulfate Determination

Sample Name	Interpoll Log Number	Tot. Sample Volume (ml)	Dilution	Solution Conc.(ug/ml)	Total ug Sulfate	meq of Sulfate
Imp. Catch T_1R_2	8201-01	200	1.0	0.143	28.6	0.00060
+ Imp. Rinse	T_1R_3 -04	415 ~~0.134~~	1.0	0.134	55.6	0.0012
Dryer Probe	T_1R_4 -05	430	1.0	0.141	60.6	0.0013
Stack	T_1R_5 -06	450	1.0	0.413	186	0.0039
	T_1R_6 8201-44	200	1.0	0.0764	15.3	0.00032
Cyclone Outlet	T_1R_1 -47	455	1.0	0.349	159	0.0033
	T_1R_4 -48	430	1.0	0.281	121	0.0025
	T_1R_5 -49	425	1.0	0.250	106	0.0022

Total ug = (Sample Vol.) x (Dilution) x (Solution Conc.)
meq = Total ug / 48000

LSC-08RR

Interpoll Laboratories, Inc. 9/13/96
(612)786-6020

Ion Chromatography Laboratory

DIONEX MODEL 4000i WITH ANION MICRO MEMBRANE SUPRESSION

Analyst: MTC Date of Analysis: ~~9/16/96~~ 9/13/96

Job: ID030 / Newberry Source: Dryer 1° Site: Exhaust

Chromatography Conditions

Column		Flow Rate	Eluent	Flow Rate	Suppressor Acid
	AS3	ml/min	2.4 mM Na_2CO_3 & 3.0 mM $NaHCO_3$	ml/min	12.5 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										

REVIEWED
SEP 16 1996

Results of Sulfate Determination

Sample Name	Interpoll Log Number	Tot. Sample Volume (ml)	Dilution	Solution Conc.(ug/ml)	Total ug Sulfate	meq of Sulfate
Imp. Catch T_1R_0	8201 - 62	200	1.0	0.120	24	0.0005
+ Imp Rinse T_1R_3	65	~~330~~ 330	1.0	0.695	229	0.0048
Dryer Primary Cyclone catches T_1R_4	66	390	1.0	0.511	199	0.0041
T_1R_5	67	370	1.0	1.23	455	0.0095
T_8R_1	80	205	1.0	0.226	46.3	0.00096
Prep Varies T_8R_2	81	185	1.0	0.200	185	~~0.004~~ 0.0039 9/16/96
T_8R_3	82	205	1.0	0.177	36.3	0.00076

Total ug = (Sample Vol.) x (Dilution) x (Solution Conc.)
meq = Total ug / 48000

LSC-08RR

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 10 NDIR Analysis

Job Name: LP-Newberry
Source: Dryer Primary Cyclone Exhaust
Date of Analysis: 9-6-96
Technician: SLB

NDIR Analyzer: ☒ Fugi ACS Model 3300
☐ Mon. Lab Model 8310
☐ Dasibi Model 3003
Range: 0 - 1000 PPM
Flow rate: 1000 cc/min

Pretest Calibration

	Concentration	Reading	Vendor	Cyl. No.
Zero Gas	0 PPM	0 PPM	TCO	NM235613
Upscale Gas	300.8 PPM	300 PPM	TCO	ALM014239
Upscale Gas	590 PPM	592 PPM	TCO	HA3980
Upscale Gas	PPM	PPM		

Sample Description Test/Run	Sample Log No.	CO Conc. (PPM, Dry)		
		Dilution Factor	Reading	Actual PPM
Y3	8201-68	–	734	734
Y4	-69	–	337	337
Y5	-70	–	406	406

Post-Test Calibration

	Conc.	Reading
Zero Gas	0 PPM	0 PPM
Upscale Gas	300.8 PPM	300 PPM
Upscale Gas	590. PPM	591 PPM
Upscale Gas	PPM	PPM

Note 1: If sample dilution is required, 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.

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 10 NDIR Analysis

Job Name: LP-NewBerry
Source: DRYER E-TUBE OUTLET
Date of Analysis: 9-6-96
Technician: S.B

NDIR Analyzer: ☒ Fugi ACS Model 3300
☐ Mon. Lab Model 8310
☐ Dasibi Model 3003
Range: 0 - 1000 PPM
Flow rate: 1000 cc/min

Pretest Calibration							
	Concentration		Reading		Vendor	Cyl. No.
Zero Gas	0	PPM	0	PPM	TC	MM23 5613
Upscale Gas	300.8	PPM	300	PPM	TC	ALM 014234
Upscale Gas	590	PPM	592	PPM	TC	AA3980
Upscale Gas		PPM		PPM		

Sample Description Test/Run	Sample Log No.	CO Conc. (PPM, Dry)		
		Dilution Factor	Reading	Actual PPM
1/3	8201-50	—	665	665
1/4	-51	—	790	790
1/5	-52	—	754	754

Post-Test Calibration				
	Conc.		Reading	
Zero Gas	0	PPM	0	PPM
Upscale Gas	300.8	PPM	300	PPM
Upscale Gas	590	PPM	591	PPM
Upscale Gas		PPM		PPM

Note 1: If sample dilution is required, 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.

111495-G:\STACK\WP\FORMS\S-570

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 10 NDIR Analysis

Job Name: LP - Newberry
Source: Dryer RTO Stack
Date of Analysis: 9-10-96
Technician: SCR

NDIR Analyzer: ☒
☐ Fugi ACS Model 3300
☐ Mon. Lab Model 8310
☐ Dasibi Model 3003
Range: 0 - 10000 PPM
Flow rate: 1000 cc/min

Pretest Calibration				
	Concentration	Reading	Vendor	Cyl. No.
Zero Gas	0 PPM	0 PPM	TCO	MM235613
Upscale Gas	300.8 PPM	300 PPM	TCO	ALM014279
Upscale Gas	560 PPM	592 PPM	TCO	HA3598
Upscale Gas	PPM	PPM		

Sample Description Test/Run	Sample Log No.	CO Conc. (PPM, Dry)		
		Dilution Factor	Reading	Actual PPM
1/2	8201	—	45	45
1/3	8201	—	33	33
1/4	8201	—	41	41
1/5	8201	—	31	31

Post-Test Calibration		
	Conc.	Reading
Zero Gas	0 PPM	0 PPM
Upscale Gas	300.8 PPM	300 PPM
Upscale Gas	590 PPM	591 PPM
Upscale Gas	PPM	PPM

Note 1: If sample dilution is required, 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.

111495-G:\STACK\WP\FORMS\S-570

Due Date: 9/13/96

Interpoll Laboratories
(612)786-6020

Data Reporting Sheet
(With Regulatory Limits)

CLIENT: IDOLO/ LP Newberry

JOB:
CLIENT NO:
P.O. NO:
PROJECT MGR:

PHONE:

DATE:

CONTACT:

Dryer Primary cyclone Exhaust

LABORATORY REPORT #:
SAMPLES COLLECTED:
SAMPLES RECEIVED:

	Invoicing	Signature	Report Routing
PL			
Lab Mgr			
InO Mgr			
Org Mgr			

SAMPLE I.D:	1/3	1/4	1/5	
SAMPLE TYPE:	I.G.S.	I.G.S.	I.G.S.	
LOG NO:	8201-68	-69	-70	

PARAMETER	UNITS	DET. LIMIT	REG. LIMIT	ANALYSIS DATE & INITIALS	METHOD				
Methane	ppmV	1.0		9/6/96 JWR	M-25	13.7	6.1	6.9	

Footnotes:

SEP 11 1996

In-House Comments:

Bruce W. Holman

LCI-14R

Due Date: 9/12/96

Interpoll Laboratories
(612)786-6020

Data Reporting Sheet
(With Regulatory Limits)

CLIENT: ID020/LP Newberry

PHONE:

CONTACT:

LABORATORY REPORT #:
SAMPLES COLLECTED:
SAMPLES RECEIVED:

JOB:
CLIENT NO:
P.O. NO:
PROJECT MGR:

DATE:

E-Tube outlet

	Invoicing	Signature	Report Routing
PL			
Lab Mgr			
InO Mgr			
Org Mgr			

SAMPLE I.D:	1/3	1/4	1/5	
SAMPLE TYPE:	I.G.S.			
LOG NO:	8102-50	-51	-52	

PARAMETER	UNITS	DET. LIMIT	REG. LIMIT	ANALYSIS DATE & INITIALS	METHOD				
Methane	ppmv	1.0		9/6/96 [illegible]	M-25	10.7	4.9	2.0	

RECEIVED
SEP 11 1996

Footnotes:

In-House Comments:

LCI-14R

Due Date: 9/12/96

Interpoll Laboratories
(612)786-6020

Data Reporting Sheet
(With Regulatory Limits)

CLIENT: 10020/LP Newberry

PHONE:

CONTACT:

JOB:
CLIENT NO:
P.O. NO:
PROJECT MGR:

DATE:

LABORATORY REPORT #:
SAMPLES COLLECTED:
SAMPLES RECEIVED:

	Invoicing	Signature	Report Routing
PL			
Lab Mgr			
InO Mgr			
Org Mgr			

Dryer RTO Stack

SAMPLE I.D:	1/3 AWR	1/4 AWR	1/5 AWR	
SAMPLE TYPE:	I.G.S.	→	→	
LOG NO:	8201-07	-08	-09	

PARAMETER	UNITS	DET. LIMIT	REG. LIMIT	ANALYSIS DATE & INITIALS	METHOD				
Methane	ppmV	1.0		9/9/96 AWR	M25	20.2	29.9	25.1	

Footnotes:

In-House Comments: Runs 1,2 are invalid per samplers (do not analyze) AWR

LCI-14R

Due Date: 9/13/96

Interpoll Laboratories
(612)786-6020

Data Reporting Sheet
(With Regulatory Limits)

CLIENT: ID020/LP Newberry

PHONE:

CONTACT:

JOB:
CLIENT NO:
P.O. NO:
PROJECT MGR:

DATE:

LABORATORY REPORT #:
SAMPLES COLLECTED:
SAMPLES RECEIVED:

	Invoicing	Signature	Report Routing
PL			
Lab Mgr			
InO Mgr			
Org Mgr			

Pressvents

SAMPLE I.D:	5/1	5/2	5/3	
SAMPLE TYPE:	I.G.S.	→	→	
LOG NO:	8201-77	-78	-79	

PARAMETER	UNITS	DET. LIMIT	REG. LIMIT	ANALYSIS DATE & INITIALS	METHOD				
Methane	ppmv	1.0		9/16/96 BMA	M-25	2.3	2.0	3.2	

Footnotes:

In-House Comments:

George W. Robinson

INTERPOLL LABORATORIES INC.

Formaldehyde Results Using EPA Method 0011
For Dept. 20/Louisiana-Pacific, Newberry, MI
Collected 8/27 and 8/28/96

	Field Spike			Test: 3			Source: Dryer RTO Stack
	Actual	Found	% Recovery	Run 0	Run 1	Run 2	Run 3
Log #		(8201-10)		(8201-11)	(8201-12)	(8201-13)	(8201-14)
Mass (ug)*	**750**	**610**	**81.3**	**0.95**	**1800**	**2400**	**2400**

	Field Spike			Test: 3			Source: Primary Cyclone Dryer Exhaust
	Actual	Found	% Recovery	Run 0	Run 1	Run 2	Run 3
Log #		(8201-20)		(8201-19)	(8201-21)	(8201-22)	(8201-23)
Mass (ug)*	**750**	**570**	**76.0**	**2.2**	**6600**	**6000**	**11000**

	Field Spike			Test: 7			Source: Press Vents
	Actual	Found	% Recovery	Run 0	Run 1	Run 2	Run 3
Log #		(8201-28)		(8201-27)	(8201-29)	(8201-30)	(8201-31)
Mass (ug)*	**750**	**670**	**89.3**	**2.4**	**8000**	**1900**	**4100**

	Field Spike			Test: 3			Source: E-Tube Outlet
	Actual	Found	% Recovery	Run 0	Run 1	Run 2	Run 3
Log #		(8201-54)		(8201-53)	(8201-55)	(8201-56)	(8201-57)
Mass (ug)*	**750**	**540**	**72.0**	**12**	**36000**	**34000**	**33000**

* = Total Mass of formaldehyde in the sample in ug.

Reviewed by:

David J. Schneider, Manager
Chemistry Department

INTERPOLL LABORATORIES INC.

4,4-Methylenebis(phenyl isocyanate) Results
For Dept. 20/Louisiana-Pacific, Newberry, MI
Collected 8/29/96

Item	Field Spike			Test: 5				Source: Press Vents
	Actual	Found	% Rec.	Run 0	Run 00	Run 1	Run 2	Run 3
EPA Draft Method 1,2-PP								
Log #		8201-73		8201-72	8201-71	8201-74	8201-75	8201-76
MDI (ug)*	**297**	**280**	**94.3**	**8.0**	**< 6.2**	**310**	**270**	**57**

* = Total mass of MDI in the sample in ug.

Reviewed by:

David J. Schneider, Manager
Chemistry Department

Interpoll Laboratories, Inc.

(612)786-6020

Impinger Catch Preparation Work

Order Form

Project Name: LP/Newberry

Order Date: 8-16-96

Date Required: 8-23-96

Delivery Date: 8-21-96

Nature of Spiking Material	Spike Concentration	Spike Volume	Total Mass of Spike
MDI 95204-83-A	297 µg/mL	1.0 mL	297 µg

SPECIAL REQUIREMENTS

Spiked 8-21-96 B.D.
verified ? YKJ 8/21/96

**Please return this form with the samples.

LOA-34
g:/chem/excel/forms/loa-34.xls

Interpoll Laboratories, Inc.

(612)786-6020

Impinger Catch Preparation Work

Order Form

Project Name: LP/Newberry

Order Date: 8-16-96

Date Required: 8-23-96

Delivery Date: 8-22-96

Nature of Spiking Material	Spike Concentration	Spike Volume	Total Mass of Spike
Formaldehyde in ACN #95082-59-A	3.75 mg/mL	200 µl	750 µg

SPECIAL REQUIREMENTS

Prepared four (4) Field Spikes B.D. 8-22-96
Verified 8/22/96 YKT

**Please return this form with the samples.

LOA-34
g:/chem/excel/forms/loa-34.xls

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job L.P./Newberry, MI Source Dryer Primary Cyclone Site Exhaust Log No. 0201
Field Engineer M. Koehler Date of Test 8-27-96 Test No. 1 No. of Runs 5

No. Items	Sample Type		Analysis		Sequence No.	Comments
5+1	**Probe Wash:** ☒ Acetone ☐ $MeCl_2$	☐ DI Water ☐ _____	☒ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☐ _____		Do Not Analyze Runs 1+2 See R. Rosenthal
5+1	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		Do Not Analyze Runs 1+2 See R. Rosenthal
5+1 5	**Impingers:** ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ (5) ☒ $MeCl_2$ Rinse	☐ MN Protocol ☐ WI Protocol ☒ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☐ _____		Do Not Analyze Runs 1+2 See R. Rosenthal
4	**Integrated Gas:** ☒ Tedlar Bag	☐ _____	☐ EPA M-3 ☒ Methane	☒ EPA M-10		Do Not Analyze Run 2
—	**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	CLI	9/3/96 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job LP Source DRYER TUBE Site OUTLET Log No. 8201
Field Engineer S. BAINVILLE Date of Test 8-27-96 Test No. 1 No. of Runs 5

No. Items	Sample Type		Analysis		Sequence No.	Comments
6	**Probe Wash:** ☒ Acetone ☐ $MeCl_2$	☐ DI Water ☐ _____	☒ EPA M-5 ☒ EPA M-29 (ZINC) ☐ EPA M-201A ☐ _____	☐ EPA M-201A ☐ _____	1/0-5	RUN #1 LOG & NO HOLD RUN #2 " " "
6	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☒ EPA M-29 (ZINC) ☐ EPA M-201A	☐ EPA M-17	1/0-5	"
6	**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 ☐ _____	1/0-5	"
3	**Integrated Gas:** ☒ Tedlar Bag	☐ _____	☐ EPA M-3 ☒ METHANE (3-5)	☒ EPA M-10 CO RUN 3+4 only	1/3-5	
	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 ☐ _____

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job CP/Newberry Source Dryer RTO Stack Site 3 Pts ⊄ Log No. 8201
Field Engineer BA Date of Test 8-27-96 Test No. 2 No. of Runs 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
6	**Probe Wash:** ☒ Acetone ☐ $MeCl_2$	☐DI Water ☐_____	☒EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
6	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☒EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
6 Imp 6 Rinse	**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 (Rinse)	☐MN Protocol ☐WI Protocol ☒EPA M-202 ☐EPA M6,0 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		
4	**Integrated Gas:** ☒Tedlar Bag	☐_____	☐EPA M-3 ☒ methane + zinc	☐EPA M-10		Methane + CO + CO_2
—	**Oxides of Nitrogen:**		☐EPA M-7A ☐_____			
—	**Fuel Lab:** ☐Fuel Sample	☐Aggregate	☐Per S-0163			
—	**Particle Sizing:**		☐X-Ray Sdgraph ☐_____	☐Cascade Imp		
—	**Miscellaneous:**	☒ $MeCl_2$	☒ Imp 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
	Carl / ILL 0900	8/30/96

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INTERPOLL LA RATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L.P. Newberry | Source: Dryer Primary Cyclone | Site: Exhaust | Log No.: 8201
Field Engineer: E. Sivers | Date of Test: 8-28-96 | Test No.: 3 | 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		
	Filter: ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
5	**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		
	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
Interpoll Labs	ILI 0900	8-30-96

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: CF Newberry | Source: EJUCE | Site: OUTLET | Log No.: 6201
Field Engineer: S. Hartwell | Date of Test: 8-28-96 | Test No.: 3 | 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		
7	**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 ☐_____	3/1-3	1 SPIKE 1 BLANK 5 RECOVERY
	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		
3	**Miscellaneous:**	☒ METHANE	☒ DUPL		3/1-3	

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite | Wood: ☐Wood Waste ☐Dust ☐Bark | Oil: ☐Waste Oil ☐No. 2 ☐No. 6 | Misc: ☐Natural Gas ☐RDF ☐_____

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	ILI	8/30/96 1100

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INTERPOLL LA.. JRATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: CP/ Newberry | Source: Dryer RTO | Site: SOMEC | Log No.: 8201
Field Engineer: BOB | Date of Test: 8-28-96 | Test No.: 3 | No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	Probe Wash: Imp Rinse ☐ 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		
6	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 ☐_____		
Dup Imp RIP	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
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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job L.P. / Newberry, MI Source Press Site Vent Log No. 0201
Field Engineer M. Koehler Date of Test 8-29-96 Test No. 1 No. of Runs 3

No. Items	Sample Type	Analysis	Sequence No.	Comments
1	**Probe Wash:** ☐ Acetone ☐DI Water ☐ $MeCl_2$ ☐_____	☐EPA M-5 ☐EPA M-201A ☐EPA M-29 ☐_____		Added to impingers
1	**Filter:** ☐ 4" Glass ☐Pallflex ☐ SS Thimble ☐2.5" Glass	☐EPA M-5 ☐EPA M-17 ☐EPA M-29 ☐EPA M-201A		
1 1 1 1	**Impingers:** ☐DI Water ☐H_2SO_4 ☐3%H_2O_2 ☐HNO_3/H_2O_2 ☐1N NaOH ☐$KMnO_4/H_2SO_4$ ☐2,4-DNPH ☒ 1-2 pp	☐MN Protocol ☐IA Protocol ☐WI Protocol ☐Formaldehyde ☐EPA M-202 ☐EPA M-29 ☐EPA M6,8 ☐EPA M-26 ☐Acid Gases ☒ MOI		
3	**Integrated Gas:** ☒Tedlar Bag ☐_____	☐EPA M-3 ☐EPA M-10 ☒ Methane		
1	**Oxides of Nitrogen:**	☐EPA M-7A ☐_____		
1	**Fuel Lab:** ☐Fuel Sample ☐Aggregate	☐Per S-0163		
1	**Particle Sizing:**	☐X-Ray Sdgraph ☐Cascade Imp ☐_____		
1	**Miscellaneous:** ☐_____	☐_____		

Fuel Type: Coal: NA ☐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] ILI	9/3/96 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L.P. Newberry — Source: Press — Site: Vents — Log No.: 8201
Field Engineer: E. Juers — Date of Test: 8-27-96 — Test No.: 7 — 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		
5	**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 0011 ☐EPA M-29 ☐EPA M-26 ☐_____		
3	**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
Interpoll	ILI 0900	8-30-96

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L.P. / Newberry, MI Source: Press Site: Vents Log No.: 8201
Field Engineer: M. Kaehler Date of Test: 8-29-96 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 ☐ _____		2w
3	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		2w
3 3	**Impingers:** ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☒ Mech Rinse	☐ MN Protocol ☐ WI Protocol ☒ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☐ _____		
	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 Gaalema / Interpoll Labs	[signature] LT. LT.	8/31/96 1000

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APPENDIX E

COMPUTER DATALOGGER PRINTOUTS

L.P.
NEWBERRY, MI
DRYER PRIMARY CYCLONE
EXHAUST
TEST 1 / RUN 3 (/)
16:46:00 - 17:56:00

NOX PPM		O2 %		CO PPM		CO2 %		THC PPM
21.05		15.26		880.98		4.44		107.27
22.54		15.30		771.92		4.45		110.44
25.91		15.47		696.89		4.39		99.86
25.95		15.52		616.98		4.39		95.55
26.48		15.21		767.61		4.72		114.10
27.05		15.29		941.03		4.62		104.66
31.98		15.40		742.63		4.58		100.51
29.58		15.30		865.92		4.68		110.61
28.07		15.35		832.39		4.64		109.87
29.17		15.74		757.52		4.52		99.46
28.21		16.11		769.81		4.50		105.72
30.82		16.16		880.00		4.57		119.88
29.39		16.36		911.17		4.32		115.41
30.76		16.31		855.50		4.24		110.28
31.04		16.22		838.82		4.33		115.41
30.51		16.25		946.47		4.36		116.77
29.94		16.09		896.60		4.78		115.98
20.34		16.09		1000.44		4.89		119.80
33.05		16.01		983.19		4.90		118.34
37.16		15.94		1062.53		4.97		120.37
39.32		16.21		857.13		4.74		107.27
41.07		16.22		662.31		4.75		101.90
41.78		16.05		880.97		4.93		113.86
46.62		16.12		946.65		4.85		114.76
48.98		15.99		914.34		5.02		117.77
49.60		15.96		1108.35		5.04		122.32
49.21		16.15		941.85		4.89		107.51
49.13		16.10		848.99		4.85		112.64
48.42		15.98		977.41		4.80		116.33
72.40		15.89		944.37		4.81		106.78
61.21		15.86		1033.97		4.76		119.15
52.46		15.93		1038.12		4.64		125.74
48.50		15.95		1007.93		4.53		118.99
48.42		16.00		920.52		4.45		117.03
41.01		15.81		1038.93		4.52		129.32
41.25		15.88		1105.01		4.41		122.81
40.77		15.83		1080.19		4.43		123.22
39.79		15.88		1011.26		4.43		122.98
40.30		15.76		1076.86		4.56		127.86
38.22		15.81		1052.20		4.68		115.16
37.43		15.83		984.98		4.67		121.43
37.06		16.00		920.04		4.50		113.54
38.67		16.03		898.68		4.50		114.02
37.10		16.07		691.28		4.48		110.12
37.67		16.05		694.04		4.46		106.70
37.25		16.13		808.27		4.42		100.68
37.98		16.05		633.90		4.51		105.89
38.65		15.89		811.15		4.62		113.54
39.89		15.98		817.09		4.57		108.16
40.97		16.01		715.45		4.52		108.57
50.80		15.96		710.08		4.59		109.22
53.97		15.85		875.52		4.66		116.79
51.91		15.95		792.35		4.59		111.58
46.73		16.10		686.64		4.44		103.93
47.64		15.81		793.65		4.75		122.41
46.33		15.89		1052.37		4.64		120.21
46.32		15.87		975.46		4.54		112.56
39.63		16.39		493.93		4.18		93.92
57.86		16.10		507.76		4.50		110.85
51.90		16.11		830.42		4.37		109.12

AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE
39.70	15.91	861.31	4.60	112.67

LP.
NEWBERRY, MI
DRYER PRIMARY CYCLONE
EXHAUST
TEST 1 / RUN 4 (2)
19:51:00 - 20:55:00

NOX PPM		O2 %		CO PPM		CO2 %		THC PPM
26.40		16.67		322.05		4.40		76.75
27.79		16.77		281.61		4.29		73.33
27.01		16.73		265.82		4.34		75.21
26.99		16.66		298.35		4.29		72.28
28.84		16.63		311.48		4.35		79.19
31.98		16.51		339.31		4.38		85.70
30.41		16.48		359.41		4.22		81.55
26.95		16.50		311.64		4.19		82.12
25.08		16.50		344.35		4.23		84.73
23.86		16.37		376.74		4.28		86.84
24.86		16.41		354.85		4.23		83.10
25.81		16.20		418.00		4.40		114.92
25.28		16.22		440.95		4.34		88.88
25.30		16.29		425.08		4.24		91.32
25.45		16.20		468.05		4.33		149.26
28.44		16.01		693.07		4.47		145.09
28.68		16.28		574.82		4.20		115.00
28.90		16.62		322.62		3.93		89.45
27.56		16.48		255.24		4.05		88.47
26.71		16.41		293.90		4.09		79.93
27.56		16.38		299.92		4.13		85.13
29.29		16.29		332.55		4.22		88.96
30.02		16.49		314.32		4.02		85.62
31.26		16.56		256.14		3.95		84.32
32.61		16.73		207.31		3.79		73.82
32.22		16.56		213.17		3.96		75.45
34.09		16.54		235.79		3.99		79.60
32.95		16.34		311.31		4.16		83.26
33.56		16.30		383.88		4.16		91.56
34.07		16.42		313.51		4.10		87.01
32.67		16.39		307.24		4.11		84.32
32.22		16.40		303.91		4.10		85.21
32.36		16.35		305.21		4.12		85.21
32.00		16.46		304.56		4.08		83.67
37.90		16.39		285.03		4.14		85.46
38.32		16.50		278.27		3.99		79.76
32.51		16.50		258.50		4.00		76.18
34.13		16.41		286.82		4.07		82.69
42.25		16.37		316.28		4.11		79.76
16.37		16.32		337.27		4.24		90.10
9.54		16.37		347.45		4.18		77.65
7.54		16.28		346.22		4.27		87.09
8.11		16.28		379.26		4.28		90.16
6.79		16.32		350.86		4.24		86.27
6.20		16.22		376.82		4.32		93.34
7.09		16.19		380.00		4.38		90.99
6.57		16.09		437.04		4.45		96.53
6.04		16.05		463.90		4.56		113.78
5.75		15.63		802.12		4.90		129.65
5.02		15.72		864.37		4.82		127.45
7.32		15.63		949.09		4.93		139.41
7.68		15.73		898.80		4.84		126.98
2.66		16.10		549.11		4.54		113.45
2.48		16.07		551.30		4.55		114.67
2.15		15.96		619.91		4.66		119.88
1.97		16.07		592.16		4.53		117.60
2.25		16.17		537.88		4.50		112.88
2.19		16.12		523.39		4.50		117.77
2.27		16.27		447.05		4.35		108.00
1.87		16.12		488.71		4.49		115.52
AVERAGE		AVERAGE		AVERAGE		AVERAGE		AVERAGE
21.51		16.32		403.25		4.28		94.65

LP.
NEWBERRY, MI
DRYER PRIMARY CYCLONE
EXHAUST
TEST 1 / RUN 5 (3)
21:36:00 - 23:35:00

NOX PPM		O2 %		CO PPM		CO2 %		THC PPM
18.28		16.31		451.04		3.86		107.19
26.18		16.48		348.10		3.78		101.90
25.00		16.52		342.56		3.85		94.90
23.31		16.59		366.08		3.94		107.76
24.67		16.43		498.49		4.18		119.07
26.46		16.62		517.86		3.93		103.61
27.48		16.66		345.65		3.95		97.99
29.13		16.63		358.52		3.98		98.56
34.11		16.65		358.27		4.01		96.69
33.36		16.58		384.86		4.09		103.28
32.34		16.51		424.51		4.14		111.34
30.69		16.60		426.71		4.05		103.12
28.11		16.57		394.32		4.03		102.22
29.41		16.69		332.15		3.91		94.90
30.06		16.73		285.92		3.85		87.25
30.21		16.79		245.31		3.86		85.05
29.33		16.66		295.85		3.97		87.66
26.77		16.66		289.10		3.96		87.41
23.51		16.63		304.48		4.00		92.13
23.78		16.56		307.41		4.04		87.66
24.92		16.60		307.16		3.99		90.99
25.89		16.69		273.96		3.92		83.75
25.43		16.63		268.59		4.00		85.21
26.48		16.85		239.29		3.87		77.57
24.84		16.73		272.98		3.97		85.13
24.98		16.76		249.22		3.94		84.40
25.28		16.71		253.61		3.98		83.99
24.83		16.64		281.77		4.07		84.24
25.20		16.69		280.31		4.03		83.26
25.40		16.73		266.31		3.98		81.96
25.32		16.76		247.59		3.95		80.33
26.36		16.80		235.30		3.97		80.49
24.77		16.68		266.55		4.07		80.74
25.83		16.78		268.91		4.00		79.93
26.04		16.69		282.32		4.07		84.24
26.10		16.73		300.13		4.03		83.11
32.16		16.41		631.80		4.32		123.94
33.40		16.45		461.84		4.30		122.07
35.09		16.26		586.11		4.44		134.36
36.57		16.32		676.52		4.41		141.68
29.49		16.66		332.04		4.30		84.07
28.23		16.57		297.05		4.43		85.45
27.62		16.53		384.37		4.46		87.08
28.11		16.39		369.31		4.64		91.63
28.58		16.43		418.87		4.55		91.63
28.03		16.37		387.05		4.66		89.60
25.85		16.09		544.69		4.83		101.89
24.65		16.23		517.34		4.72		121.42
24.65		16.11		555.19		4.83		104.82
24.88		16.09		665.78		4.83		109.62
25.93		15.99		656.76		4.96		107.75
26.75		15.98		760.51		4.95		113.69
26.24		16.19		648.53		4.76		105.96
26.22		16.09		611.58		4.85		110.43
27.24		16.16		652.92		4.77		109.78
27.91		16.15		583.99		4.80		109.54
27.87		16.11		600.51		4.86		112.14
27.72		16.05		684.09		4.87		116.78
27.40		16.07		733.98		4.86		117.43
27.23		16.21		700.45		4.73		112.81
AVERAGE		AVERAGE		AVERAGE		AVERAGE		AVERAGE
27.30		16.49		416.87		4.26		98.41

LP / NEWBERRY
TEST 2 RUN 3
8/27/96
E-TUBE OUTLET

TIME	NOX	O2	CO	CO2
443.01	13.022	16.59	838.18	3.8842
444.01	13.26	16.558	812.7	3.8713
445.01	13.312	16.576	709.15	3.9354
446.01	13.665	16.633	791.63	3.8093
447.01	13.395	16.691	677.69	3.7859
448.01	12.752	16.825	650.84	3.6996
449.01	12.617	16.848	544.19	3.6663
450.01	13.178	16.579	604.78	3.9347
451.01	12.949	16.637	840.29	3.8266
452.01	13.022	16.72	678.06	3.7972
453.01	13.022	16.594	729.7	3.8711
454.01	13.354	16.659	764.4	3.8331
455.01	12.835	16.721	686.73	3.7599
456.01	12.368	16.691	657.06	3.8241
457.01	12.877	16.521	746.01	3.973
458.01	13.707	16.651	854.04	3.8354
459.01	13.105	16.646	739.75	3.8127
460.01	12.825	16.567	714.64	3.9372
461.01	13.53	16.641	822.79	3.7997
462.01	13.458	16.669	665.24	3.8201
463.01	12.908	16.624	713.34	3.8451
464.01	12.856	16.579	786.38	3.8972
465.01	13.603	16.528	788.21	3.9273
466.01	13.281	16.582	799.89	3.8801
467.01	12.596	16.552	835.98	3.9282
468.01	13.395	16.636	822.59	3.7916
469.01	14.174	16.649	650.92	3.8501
470.01	12.472	16.751	701.01	3.6914
471.01	12.295	16.866	536.34	3.6588
472.01	12.534	16.738	600.3	3.7525
473.01	12.742	16.525	700.28	3.9631
474.01	13.261	16.466	960.53	3.9656
475.01	14.028	16.538	878.09	3.9241
476.01	13.53	16.455	899.37	3.9599
477.01	13.343	16.697	810.99	3.7671
478.01	12.731	16.733	585.69	3.7695
479.01	12.877	16.564	714.15	3.8939
480.01	12.939	16.556	829.43	3.8834
481.01	12.586	16.564	768.72	3.8989
482.01	12.638	16.499	923.06	3.9273
483.01	14.008	16.57	858.85	3.8672
484.01	13.52	16.588	716.92	3.8729
485.01	13.074	16.565	835.73	3.8858
486.01	13.084	16.524	803.1	3.9307
487.01	14.36	16.452	923.01	3.9582
488.01	13.696	16.504	904.7	3.9347
489.01	12.908	16.546	898.64	3.8777
490.01	13.053	16.593	805.18	3.881
491.01	14.34	16.434	876.75	3.9982
492.01	14.402	16.511	997.31	3.9142
493.01	13.354	16.505	922.36	3.907
494.01	13.686	16.574	875.94	3.8996
495.01	14.713	16.482	929.97	3.9396
496.01	14.495	16.608	949.91	3.8307
497.01	12.804	16.597	823	3.8549
498.01	14.132	16.74	831.22	3.693
499.01	14.516	16.82	623.82	3.6882
500.01	13.997	16.821	599.12	3.6531
501.01	13.416	16.841	593.34	3.6426
502.01	14.194	16.906	538.57	3.6066
503.01	14.827	16.827	527.83	3.6824
504.01	14.049	16.709	662.43	3.7656
505.01	9.2761	16.707	705.4	4.5476
AVERAGES				
	13.285	16.628	762.48	3.8521

LP / NEWBERRY
TEST 2 RUN 4
8/27/96
E-TUBE OUTLET

TIME	NOX	O2	CO	CO2
740	12.43	17.236	257.53	3.4863
741	13.219	17.296	250.69	3.4415
742	13.426	17.322	256.51	3.4132
743	13.281	17.357	224.41	3.3936
744	14.06	17.346	228.84	3.3797
745	13.707	17.3	226.07	3.4383
746	12.575	17.336	255.9	3.3985
747	12.908	17.388	228.07	3.3814
748	13.011	17.218	254.44	3.5334
749	13.178	17.206	328.17	3.5262
750	12.721	17.241	298.05	3.4832
751	12.897	17.232	306.97	3.4986
752	14.983	17.313	290.57	3.4106
753	13.509	17.335	255.17	3.4506
754	12.544	17.287	288.25	3.4488
755	13.354	17.254	296.39	3.5076
756	14.526	17.184	328.04	3.566
757	15.408	17.144	358.44	3.557
758	13.966	17.194	309.53	3.5498
759	14.557	17.14	340.58	3.6011
760	15.72	17.051	375.57	3.654
761	15.305	17.127	370.08	3.5945
762	14.08	16.972	394.45	3.741
763	15.253	16.991	468.91	3.6997
764	15.325	17.081	443.97	3.6027
765	14.184	17.126	436.56	3.6239
766	13.759	16.943	695.68	3.7355
767	16.394	17.134	647.46	3.5334
768	15.118	17.455	383.38	3.2674
769	14.039	17.44	246.99	3.3576
770	13.748	17.356	281.17	3.3936
771	13.966	17.322	285.52	3.422
772	14.568	17.36	309.69	3.4059
773	16.322	17.457	317.14	3.2878
774	16.778	17.498	245.77	3.2639
775	15.44	17.664	215.01	3.1315
776	12.991	17.563	186.52	3.2593
777	13.956	17.494	223.55	3.3145
778	13.427	17.297	273.07	3.4758
779	13.177	17.232	357.99	3.4962
780	12.814	17.344	313.88	3.4245
781	14.018	17.323	306.27	3.4367
782	14.412	17.336	294.27	3.4179
783	13.426	17.324	296.18	3.4536
784	13.344	17.332	298.99	3.404
785	13.79	17.332	276.9	3.4538
786	14.734	17.447	284.95	3.3154
787	13.478	17.429	235.03	3.3593
788	12.783	17.322	258.95	3.4505
789	14.163	17.311	311.65	3.4693
790	13.676	17.202	321.98	3.5709
791	13.499	17.227	358.97	3.4961
792	13.52	17.177	336.26	3.5732
793	14.392	17.171	384.97	3.5506
794	14.101	17.248	362.26	3.5214
795	13.458	17.2	367.35	3.5507
796	14.319	17.18	364.99	3.5748
797	15.014	17.098	409.1	3.6303
798	14.174	17.086	455.61	3.7102
799	14.111	16.676	738.89	4.0014
800	15.356	16.687	909.3	3.9615
801	16.975	16.605	990.19	4.0496
802	16.031	16.621	1027.6	4.0291
AVERAGES	14.117	17.231	359.46	3.51

LP / NEWBERRY
TEST 2 RUN 5
8/27/96
E-TUBE OUTLET

TIME	NOX	O2	CO	CO2
935.01	15.305	17.215	341.27	3.4147
936.01	14.848	17.143	428.96	3.4303
937.01	16.042	17.262	356.57	3.3358
938.01	16.301	17.215	324.42	3.3807
939.01	14.693	17.193	345.87	3.4295
940.01	13.904	17.003	447.92	3.5969
941.01	15.087	17.146	531.37	3.3797
942.01	15.564	17.232	333.58	3.3895
943.01	15.263	17.184	359.9	3.4114
944.01	15.523	17.185	344.24	3.418
945.01	16.446	17.143	337.65	3.4709
946.01	16.736	17.044	407.02	3.5319
947.01	15.201	17.13	432.86	3.4578
948.01	15.149	17.161	380.01	3.4254
949.01	16.674	17.29	321.9	3.2901
950.01	16.705	17.382	253.66	3.2234
951.01	15.004	17.444	206.42	3.2088
952.01	15.699	17.309	241.41	3.3071
953.01	17.473	17.323	258.38	3.2949
954.01	17.131	17.273	279.83	3.3251
955.01	16.218	17.244	280.44	3.3732
956.01	17.037	17.263	294.92	3.3218
957.01	19.413	17.335	262.04	3.265
958.01	17.847	17.297	241.58	3.3243
959.01	16.747	17.391	235.64	3.247
960.01	17.152	17.285	241.29	3.3243
961.01	18.127	17.336	238.32	3.2843
962.01	16.757	17.322	230.31	3.3105
963.01	15.325	17.219	251.59	3.3903
964.01	16.031	17.271	266.56	3.3406
965.01	17.152	17.336	250.77	3.2704
966.01	15.336	17.412	228.64	3.2095
967.01	16.072	17.47	210.77	3.1902
968.01	16.114	17.284	227.91	3.3447
969.01	16.747	17.348	254.48	3.2868
970.01	15.097	17.296	230.1	3.3292
971.01	11.538	16.77	610.15	3.8118
972.01	12.327	16.842	668.38	3.6815
973.01	12.41	16.929	443.2	3.6979
974.01	12.586	16.723	545.9	3.8541
975.01	13.261	16.726	683.59	3.8086
976.01	19.351	17.069	279.83	3.5936
977.01	21.8	17.135	293.99	3.4888
978.01	20.482	17.019	253.95	3.6597
979.01	19.206	16.915	371.18	3.6881
980.01	19.6	16.772	352.58	3.8753
981.01	22.485	16.805	446.74	3.7899
982.01	23.107	16.728	387.78	3.9234
983.01	20.804	16.519	545.74	4.0218
984.01	20.887	16.654	530.52	3.9241
985.01	22.858	16.58	540.57	4.0022
986.01	22.589	16.533	651.81	4.0104
987.01	20.876	16.514	667.85	4.0828
988.01	21.593	16.448	758.67	4.0601
989.01	23.813	16.663	672.97	3.9117
990.01	23.637	16.603	592.41	3.9835
991.01	21.738	16.676	661.46	3.9069
992.01	22.962	16.678	582.56	3.9054
993.01	25.577	16.657	583.98	3.954
994.01	24.01	16.613	667.97	3.9761
995.01	21.26	16.607	719.4	3.9501
996.01	22.08	16.748	708.13	3.8282
997.01	24.892	16.915	530.6	3.7183
AVERAGES				
	17.931	17.035	406.83	3.5658

INTERPOL LABS
DILUTION CEM

LP\NEWBERRY
DRYER RTO STACK
NEWBERRY, MI
TEST1 RUN3

DATE	TIME	SO2 (ppm)	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
8/27/96	4:45:59 PM	0.69	18.43	15.95	54.24	4.31
	4:46:59 PM	0.79	19.89	16.06	51.33	4.45
	4:47:59 PM	0.87	18.33	16.10	58.52	4.31
	4:48:59 PM	0.66	17.60	16.09	58.14	4.10
	4:49:59 PM	0.66	17.62	16.15	52.02	4.03
	4:50:59 PM	0.96	17.33	16.21	55.96	4.01
	4:51:59 PM	1.01	17.17	16.32	64.84	4.07
	4:52:59 PM	1.09	17.73	16.32	58.86	4.06
	4:53:59 PM	2.29	17.73	16.07	51.55	3.96
	4:54:59 PM	1.01	17.40	16.10	59.25	3.92
	4:55:59 PM	0.47	17.14	16.17	66.45	3.92
	4:56:59 PM	0.50	17.38	16.11	58.43	3.89
	4:57:59 PM	0.61	17.28	16.13	54.03	3.82
	4:58:59 PM	0.64	16.93	16.21	64.21	3.74
	4:59:59 PM	0.37	16.83	16.19	69.16	3.72
	5:00:59 PM	0.23	17.67	16.03	57.74	3.92
	5:01:59 PM	0.44	17.74	16.12	50.04	3.90
	5:02:59 PM	0.54	17.40	16.16	59.48	3.82
	5:03:59 PM	0.69	17.31	16.10	62.28	3.87
	5:04:59 PM	0.56	17.68	16.19	52.55	3.87
	5:05:59 PM	0.48	17.47	16.21	50.52	3.81
	5:06:59 PM	0.48	17.02	16.16	59.04	3.83
	5:07:59 PM	0.50	17.49	16.11	57.59	3.96
	5:08:59 PM	0.49	17.95	16.08	47.15	3.93
	5:09:59 PM	0.48	17.80	16.09	47.11	3.87
	5:10:59 PM	0.38	17.30	16.08	55.75	3.91
	5:11:59 PM	0.34	17.40	16.18	53.48	3.86
	5:12:59 PM	0.41	17.64	16.18	46.51	3.84
	5:13:59 PM	0.58	17.48	16.32	50.16	3.86
	5:14:59 PM	0.10	17.28	16.40	56.54	3.92
	5:15:59 PM	0.24	17.77	16.26	51.17	3.97
	5:16:59 PM	0.26	18.08	16.01	45.41	3.95
	5:17:59 PM	0.33	17.70	15.95	49.08	3.97
	5:18:59 PM	0.20	17.31	16.06	52.05	3.89
	5:19:59 PM	0.22	17.73	16.05	64.34	3.86
	5:20:59 PM	0.28	16.90	16.21	169.74	3.78
	5:21:59 PM	0.15	15.95	16.23	323.67	3.66
	5:22:59 PM	0.24	15.90	16.13	341.92	3.75
	5:23:59 PM	0.21	16.70	16.11	218.93	3.91
	5:24:59 PM	0.25	17.63	16.09	104.73	4.05
	5:25:59 PM	0.21	17.71	16.07	63.07	3.98
	5:26:59 PM	0.19	17.88	16.15	58.97	3.98

	5:27:59 PM	0.14	17.33	16.15	53.26	3.88
	5:28:59 PM	0.15	17.09	16.13	46.88	3.82
	5:29:59 PM	0.14	16.70	16.07	53.81	3.89
	5:30:59 PM	0.12	16.97	16.05	56.73	3.93
	5:31:59 PM	0.20	17.19	16.04	49.85	3.93
	5:32:59 PM	0.19	17.25	16.11	48.08	3.97
	5:33:59 PM	0.28	17.22	16.11	51.79	3.93
	5:34:59 PM	0.22	17.52	16.02	48.23	3.88
	5:35:59 PM	0.27	17.40	16.04	44.02	3.91
	5:36:59 PM	0.41	17.20	16.08	41.36	3.93
	5:37:59 PM	0.41	17.72	16.10	27.80	3.98
	5:38:59 PM	0.57	18.15	16.06	24.02	3.98
	5:39:59 PM	0.48	17.83	16.14	32.73	3.95
	5:40:59 PM	0.60	17.38	16.16	32.80	3.91
	5:41:59 PM	0.55	18.01	16.32	31.95	3.99
	5:42:59 PM	0.64	18.50	16.37	22.13	3.97
	5:43:59 PM	0.49	18.22	16.39	26.01	3.95
	5:44:59 PM	0.56	17.80	16.40	39.42	3.91
AVERAGES		**0.47**	**17.50**	**16.14**	**65.95**	**3.93**

INTERPOLL LABS
DILUTION CEM

LP\NEWBERRY
DRYER RTO STACK
NEWBERRY, MI
TEST1 RUN4

DATE	TIME	SO2 (ppm)	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
8/27/96	7:40:03 PM	0.51	24.80	16.75	206.84	2.92
	7:42:03 PM	0.48	22.86	16.87	68.45	3.04
	7:44:03 PM	0.20	20.11	16.65	30.18	3.47
	7:46:03 PM	0.13	17.42	16.67	32.25	3.61
	7:48:03 PM	0.14	19.30	16.67	42.37	3.32
	7:50:03 PM	0.11	18.49	16.65	33.19	3.39
	7:52:03 PM	0.95	18.05	16.57	40.53	3.49
	7:54:03 PM	0.21	18.44	16.56	37.40	3.45
	7:56:03 PM	0.21	18.72	16.64	39.15	3.49
	7:58:03 PM	0.07	18.39	16.59	38.31	3.50
	8:00:03 PM	0.13	18.65	16.51	36.67	3.59
	8:01:59 PM	0.08	18.36	16.49	34.90	3.57
	8:02:59 PM	0.15	18.76	16.45	45.08	3.53
	8:03:59 PM	0.18	19.42	16.40	41.07	3.49
	8:04:59 PM	1.10	18.79	16.41	36.92	3.53
	8:05:59 PM	0.31	18.68	16.34	39.47	3.57
	8:06:59 PM	0.17	19.35	16.30	41.63	3.60
	8:07:59 PM	0.24	20.41	16.38	38.55	3.65
	8:08:59 PM	0.03	20.46	16.42	31.72	3.62
	8:09:59 PM	0.06	19.99	16.29	34.29	3.66
	8:10:59 PM	0.10	20.46	16.41	37.04	3.71
	8:11:59 PM	0.07	21.04	16.70	24.70	3.71
	8:12:59 PM	0.08	20.68	16.82	12.98	3.78
	8:13:59 PM	0.43	20.57	16.76	24.91	3.82
	8:14:59 PM	0.18	21.13	16.73	43.93	3.76
	8:15:59 PM	0.16	21.29	16.67	36.10	3.71
	8:16:59 PM	0.13	20.92	16.70	24.76	3.82
	8:17:59 PM	0.07	20.86	16.77	36.93	3.73
	8:18:59 PM	0.07	20.45	16.87	127.42	3.48
	8:19:59 PM	0.20	19.03	16.87	240.15	3.35
	8:20:59 PM	0.10	18.79	16.78	242.60	3.42
	8:21:59 PM	0.06	18.70	16.65	143.19	3.46
	8:22:59 PM	0.11	19.16	16.55	28.79	3.50
	8:23:59 PM	0.20	20.05	16.61	1.25	3.49
	8:24:59 PM	0.18	21.41	16.62	4.11	3.41
	8:25:59 PM	0.17	21.12	16.63	14.62	3.32
	8:26:59 PM	0.08	19.54	16.63	30.13	3.28
	8:27:59 PM	0.07	19.01	16.65	35.98	3.37
	8:28:59 PM	0.07	19.54	16.64	13.93	3.49
	8:29:59 PM	0.54	19.31	16.70	0.00	3.59
	8:30:59 PM	0.60	18.92	16.74	0.98	3.56
	8:31:59 PM	0.05	19.12	16.66	9.40	3.54

INTERPOLL LABS
DILUTION CEM

8:32:59 PM	0.11	19.85	16.60	18.59	3.53
8:33:59 PM	0.13	19.54	16.55	13.07	3.53
8:34:59 PM	0.06	18.78	16.54	28.62	3.51
8:35:59 PM	0.22	19.14	16.50	27.16	3.51
8:36:59 PM	0.15	19.63	16.46	21.16	3.47
8:37:59 PM	0.48	19.38	16.51	13.23	3.43
8:38:59 PM	0.75	19.08	16.51	5.26	3.49
8:39:59 PM	0.12	19.53	16.48	10.43	3.56
AVERAGES	**0.22**	**19.71**	**16.60**	**44.41**	**3.52**

INTERPOLL LABS
DILUTION CEM

LP\NEWBERRY
DRYER RTO STACK
NEWBERRY, MI
TEST1 RUN5

DATE	TIME	SO2 (ppm)	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
8/27/96	9:36:00 PM	4.10	0.87	16.59	5.48	0.02
	9:37:00 PM	6.12	0.72	16.56	0.40	0.02
	9:38:00 PM	3.77	0.50	16.64	3.42	0.02
	9:39:00 PM	2.31	0.36	16.61	10.23	0.02
	9:40:00 PM	2.07	0.40	16.64	0.00	0.02
	9:41:00 PM	0.61	4.65	16.70	0.00	0.51
	9:42:00 PM	0.32	17.06	16.67	1.52	2.33
	9:43:00 PM	0.13	20.66	16.61	13.44	3.14
	9:44:00 PM	0.01	20.13	16.50	13.56	3.28
	9:45:00 PM	0.00	20.79	16.62	18.96	3.31
	9:46:00 PM	0.26	20.69	16.66	3.55	3.31
	9:47:00 PM	0.04	19.84	16.65	5.54	3.35
	9:48:00 PM	0.00	20.44	16.64	29.29	3.31
	9:49:00 PM	0.00	21.16	16.59	36.61	3.35
	9:50:00 PM	0.00	20.70	16.53	41.26	3.41
	9:51:00 PM	0.00	20.10	16.58	44.83	3.53
	9:52:00 PM	0.00	20.45	16.64	28.22	3.46
	9:53:00 PM	0.00	20.95	16.76	12.36	3.39
	9:54:00 PM	0.00	20.75	16.85	39.87	3.42
	9:55:00 PM	0.36	20.40	16.90	50.76	3.43
	9:56:00 PM	0.00	21.12	16.81	8.89	3.47
	9:57:00 PM	0.00	22.02	16.78	2.01	3.54
	9:58:00 PM	0.00	21.35	16.75	27.71	3.52
	9:59:00 PM	0.00	20.66	16.71	66.58	3.46
	10:00:00 PM	0.00	21.38	16.72	46.01	3.37
	10:01:00 PM	0.00	21.84	16.76	39.62	3.29
	10:02:00 PM	0.00	20.75	16.74	71.24	3.24
	10:03:00 PM	0.09	20.40	16.79	43.50	3.30
	10:04:00 PM	0.00	21.62	16.76	2.96	3.33
	10:05:00 PM	0.00	22.54	16.77	2.45	3.36
	10:06:00 PM	0.00	21.84	16.74	23.87	3.38
	10:07:00 PM	0.11	22.08	16.68	41.95	3.39
	10:08:00 PM	0.00	23.44	16.71	24.63	3.36
	10:09:00 PM	0.00	23.86	16.78	34.10	3.37
	10:10:00 PM	0.16	22.71	16.91	56.30	3.34
	10:11:00 PM	0.00	22.30	16.95	45.14	3.37
	10:12:00 PM	0.00	22.99	16.81	37.90	3.36
	10:13:00 PM	0.00	22.57	16.78	30.40	3.37
	10:14:00 PM	0.21	21.27	16.74	39.30	3.42
	10:15:00 PM	0.00	21.19	16.77	34.88	3.40
	10:16:00 PM	0.00	21.91	16.82	8.63	3.34
	10:17:00 PM	0.00	21.42	17.84	20.46	3.26

	10:18:00 PM	0.04	20.59	19.49	45.99	3.19
	10:19:00 PM	0.00	21.05	20.20	46.74	3.30
	10:20:00 PM	0.00	21.66	20.38	66.08	3.34
	10:21:00 PM	0.00	21.40	20.34	69.34	3.36
	10:22:00 PM	0.18	20.27	20.19	33.47	3.34
	10:23:00 PM	0.00	21.18	20.27	32.36	3.30
	10:24:00 PM	0.00	23.33	20.37	41.69	2.72
	10:25:00 PM	0.00	18.87	20.41	31.84	1.24
	10:26:00 PM	0.10	11.83	20.45	10.98	0.64
	10:27:00 PM	0.03	9.91	20.45	11.48	0.52
	10:28:00 PM	0.00	9.93	20.39	28.94	0.48
	10:29:00 PM	0.00	10.39	20.36	18.08	0.52
	10:30:00 PM	0.00	10.77	20.38	11.72	0.58
	10:31:00 PM	0.18	8.98	20.40	20.92	0.48
	10:32:00 PM	0.00	8.90	20.39	9.69	0.42
AVERAGES		**0.37**	**17.75**	**17.68**	**27.14**	**2.60**

INTERPOLL LABS

LP\NEWBERRY
NEWBERRY, MI
8/27/96 TEST2 RUN3
THC

TIME	E-TUBE OUTLET	DRYER RTO STACK
1646	76.7	5.885
	77.69	7.674
	72.76	9.256
	71.24	7.501
	86.19	6.39
	80.92	8.178
	77.86	9.314
	83.73	8.328
	83.2	6.34
	78.08	7.799
	80.75	9.498
	89.58	7.945
	81.79	6.397
	79.27	8.396
	86.96	10.04
	78.31	6.718
	78.63	6.994
	81.37	10.19
	83.48	8.647
	84.7	6.471
	84.34	7.748
	86.94	10.47
	77.94	8.189
	77.5	6.863
	66.05	20.14
	66.51	24.42
	74.95	11.91
	89.07	8.05
	90.54	8.141
	87.63	9.686
	90.4	8.582
	77.03	6.278
	75.81	7.928
	86.29	9.764
	83.56	7.243
	89.2	6.405
	89.37	9.784
	82.16	8.743
	84.75	6.179
	85.61	6.78
	90.79	10.01
	91.64	7.972
	92.26	6.153

	89.53	8.167
	90.47	9.49
	98.89	7.847
	93.6	7.202
	93.84	8.22
	94	9.775
	97.92	8.8
	89.27	8.5
	92.3	8.245
	81.89	9.983
	80.84	8.232
	79.47	6.476
	77.94	8.685
	75.27	10.26
	81.43	6.576
	86.71	6.766
1745	70.38	10.3
AVERAGE	83.455	8.65

LP\NEWBERRY
NEWBERRY, MI
8/27/96
THC TEST2 RUN4

TIME	E-TUBE OUTLET	DRYER RTO STACK
1921	29.98	8.071
	30.49	7.104
	32.09	4.883
	32	6.753
	34.02	8.158
	39.35	6.94
	27.81	12.97
	24.64	16.18
	28.26	10.15
	31.34	5.527
	30.88	5.318
	32.94	8.637
	57.3	7.398
	60.66	5.147
	49.81	6.014
	45.48	8.802
	40.06	6.747
	38.3	4.934
	45.79	6.945
	48.53	8.13
	48.02	6.357
	46.62	6.088
	46.65	6.67
	46.02	8.143
	48.86	7.198
	47.54	4.861
	46.89	6.713
	53.62	8.171
	53.71	6.754
	52.41	5.084
	52.37	7.422
	50.26	8.584
	51.77	5.39
	52.19	5.389
	54.85	8.786
	57.13	7.115
	55.42	4.784
	55.8	5.966
	58.42	8.752
	61.57	6.401
	57.91	4.669
	66.62	6.855
	67.22	7.939

	66.33	6.058
	89.97	5.66
	90.4	6.713
	72.98	8.642
	49.96	14.61
	50.03	8.595
	55.16	7.905
	58.16	8.161
	60.29	6.655
	54.99	4.94
	52.66	6.863
	47.86	8.795
	51.38	5.255
	53.22	4.9
	59.44	8.288
	60.01	6.888
2020	57.11	4.527
AVERAGE	50.35917	7.2059

LP\NEWBERRY
NEWBERRY, MI
8/27/96
THC TEST2 RUN5

TIME	E-TUBE OUTLET	DRYER RTO STACK
2136	74.67	9.55
	69.93	6.377
	70.85	6.559
	74.89	9.725
	85.05	8.354
	71.21	5.998
	71.07	6.813
	70.06	9.825
	69.06	7.745
	73.88	5.83
	77.06	7.408
	72.39	9.515
	69.6	7.679
	64.4	5.892
	59.65	8.121
	58.6	9.166
	62.19	7.205
	62.57	6.608
	63.05	7.719
	65.3	8.915
	63.26	7.202
	59.68	6.419
	61.66	7.383
	58.15	8.814
	60.6	7.545
	58.43	5.597
	59.53	7.623
	62.85	8.968
	60.7	7.212
	58.7	5.77
	55.35	7.776
	55.73	9.5
	61.35	6.375
	60.38	5.906
	62.54	9
	59.94	8.205
	58.2	5.953
	42.27	6.322
	18.74	9.418
	14.21	8.162
	10.43	6.236
	10.42	7.12
	10.08	10.37

	9.973	8.557
	5.792	6.492
	4.471	8.129
	3.653	9.776
	3.609	8.431
	7.103	7.029
	6.945	8.753
	6.628	9.994
	6.346	8.158
	5.985	7.544
	4.78	8.202
	5.633	10.15
	4.41	8.835
	3.82	6.675
	2.896	8.083
	2.746	10.22
2235	9.18	8.79
AVERAGE	43.3775	7.861633

L.P.
NEWBERRY, MI
PRESS / VENTS
TEST 9 / RUN 1
8/23/96

TIME		NOX PPM		CO PPM		THC PPM
900.09		0.828		5.673		1.372
901.09		0.665		5.673		2.023
902.09		0.624		5.673		2.47
903.09		1.072		5.266		2.351
904.09		0.746		5.266		2.104
905.09		0.705		5.266		2.267
906.09		0.909		5.469		1.819
907.09		0.99		5.469		1.494
908.09		0.828		5.266		1.697
909.09		0.624		5.673		1.819
910.09		0.99		5.469		1.738
911.09		1.072		6.69		2.796
912.09		0.787		5.876		2.877
913.09		0.624		5.876		1.372
914.09		0.99		6.079		1.697
915.09		0.828		6.079		1.25
916.09		0.787		5.876		1.819
917.09		0.746		6.079		1.657
918.09		0.99		5.876		2.145
919.09		0.746		6.486		0.802
920.09		0.828		6.283		2.552
921.09		0.787		6.69		1.901
922.09		1.072		6.486		1.738
923.09		0.828		6.283		1.575
924.09		0.868		6.486		2.104
925.09		0.95		6.486		2.348
926.09		0.868		6.69		1.616
927.09		0.909		6.486		1.901
928.09		0.868		6.69		1.25
929.09		1.072		6.486		1.209
932.09		1.031		7.504		1.25
933.09		1.316		7.097		1.941
934.09		0.99		5.876		0.558
935.09		0.909		7.504		0.151
936.09		0.909		7.707		0.395
937.09		1.031		7.3		0.843
938.09		0.99		6.69		0.924
939.09		0.868		6.69		0.232
940.09		0.909		6.486		1.046
941.09		0.99		6.486		1.006
942.09		0.99		6.486		0.721
943.09		0.909		6.486		0.883
944.09		1.031		6.486		0.354
945.09		1.112		6.079		0.883
946.09		0.99		6.283		1.372
947.09		1.072		6.486		0.436
948.09		1.112		6.486		0.517
949.09		1.194		6.486		1.209
950.09		1.153		8.317		0.639
951.09		1.153		8.928		1.046
952.09		1.153		8.521		0.436
953.09		1.194		9.131		1.982
954.09		1.153		8.928		0.273
955.09		1.316		8.724		1.166
956.09		1.357		8.521		0.843
957.09		1.357		8.317		0.924
958.09		1.397		8.114		0.395
959.09		1.397		9.724		1.046
1000.09		1.479		8.521		0.721
1001.09		1.438		7.91		0.924
		AVERAGE		AVERAGE		AVERAGE
		0.9917		6.72		1.35

L.P.
NEWBERRY, MI
PRESS / VENTS
TEST 9 / RUN 2
8/29/96

TIME		NOX PPM		CO PPM		THC PPM
1035.19		0.99		3.638		1.616
1036.19		1.641		3.638		2.145
1037.19		2.089		4.452		3.121
1038.19		1.275		4.045		2.308
1039.19		1.194		4.045		2.389
1040.19		1.763		4.859		2.796
1041.19		1.601		5.062		3.65
1042.19		1.112		4.452		1.982
1043.19		1.438		4.248		2.348
1044.19		1.682		4.452		3.203
1045.19		1.601		4.248		4.139
1046.19		1.072		4.248		1.982
1047.19		1.641		3.841		2.389
1048.19		1.886		4.248		2.918
1049.19		1.519		3.841		3.976
1050.19		1.194		3.841		1.209
1051.19		1.723		3.841		1.739
1052.19		1.723		4.452		4.098
1053.19		1.316		4.655		3.61
1054.19		1.601		4.045		2.267
1055.19		1.845		4.452		2.959
1056.19		1.886		4.452		3.935
1057.19		1.357		3.841		1.819
1058.19		1.723		4.045		2.877
1059.19		2.008		4.045		2.348
1100.19		1.682		4.452		4.627
1101.19		1.357		4.045		1.901
1102.19		2.048		4.045		3.813
1103.19		2.13		4.452		4.464
1104.19		1.397		4.248		3.366
1107.19		1.601		3.638		2.755
1108.19		1.56		4.859		4.179
1109.19		1.967		4.655		3.854
1110.19		2.415		4.859		5.359
1111.19		2.008		4.859		6.377
1112.19		1.519		4.859		4.139
1113.19		2.292		4.859		4.952
1114.19		2.537		5.266		6.214
1115.19		1.926		5.062		7.841
1116.19		1.641		4.655		3.895
1117.19		2.618		4.859		5.278
1118.19		2.496		5.266		6.539
1119.19		1.845		5.062		6.295
1120.19		1.886		4.248		4.424
1121.19		2.537		5.266		6.214
1122.19		2.252		5.469		7.882
1123.19		1.763		4.452		4.79
1124.19		2.415		4.859		4.098
1125.19		2.659		5.469		7.597
1126.19		2.089		5.469		8.086
1127.19		1.845		5.673		5.4
1128.19		2.537		5.266		4.668
1129.19		2.659		5.673		7.841
1130.19		2.252		5.876		8.452
1131.19		2.008		5.062		3.406
1132.19		2.821		5.062		6.499
1133.19		2.618		6.283		9.144
1134.19		2.008		6.486		6.214
1135.19		2.13		5.062		4.871
1136.19		2.781		5.876		7.679
		AVERAGE		AVERAGE		AVERAGE
		1.89		4.68		4.35

L.P.
NEWBERRY, MI
PRESS / VENTS
TEST 9 / RUN 3
8/29/96

TIME		NOX PPM		CO PPM		THC PPM
1210.39		1.153		6.69		3.772
1211.39		1.235		6.079		4.993
1212.39		1.275		6.079		3.568
1213.39		1.357		6.486		3.772
1214.39		1.235		6.283		3.65
1215.39		1.316		6.486		3.772
1216.39		1.357		6.486		2.959
1217.39		1.438		6.486		1.738
1218.39		1.438		6.079		2.308
1219.39		1.438		6.079		3.081
1220.39		1.682		6.486		2.837
1221.39		1.438		6.283		1.616
1222.39		1.479		6.69		4.261
1223.39		1.479		6.486		1.535
1224.39		1.601		6.69		1.901
1225.39		1.479		6.69		2.47
1226.39		1.641		7.3		4.179
1227.39		1.641		7.504		1.86
1228.39		1.723		7.91		1.657
1229.39		1.763		7.504		5.278
1230.39		1.682		8.114		5.766
1231.39		1.641		6.69		0.721
1232.39		1.519		6.486		0.883
1233.39		1.926		6.283		3.04
1234.39		2.089		6.893		2.308
1235.39		1.926		6.486		4.22
1236.39		1.886		6.486		2.918
1237.39		2.17		6.486		3.61
1238.39		1.967		6.893		3.895
1239.39		2.008		7.91		5.156
1242.39		1.967		8.317		1.616
1243.39		1.886		5.266		-0.012
1244.39		1.926		5.469		0.558
1245.39		2.17		5.876		1.657
1246.39		2.048		5.876		3.081
1247.39		1.967		5.876		1.087
1248.39		2.17		5.673		1.29
1249.39		2.455		6.486		3.976
1250.39		2.17		6.486		3.447
1251.39		2.089		6.283		1.982
1252.39		2.048		6.283		0.477
1253.39		2.089		5.876		0.558
1254.39		2.13		5.673		1.697
1255.39		2.374		5.876		1.412
1256.39		2.496		5.876		2.511
1257.39		2.252		5.876		1.412
1258.39		2.496		5.673		1.25
1259.39		2.537		5.876		1.697
100.39		2.415		6.283		2.755
101.39		2.333		5.673		0.965
102.39		2.496		5.876		0.883
103.39		2.74		5.876		2.348
104.39		2.415		6.283		1.453
105.39		2.455		5.266		0.924
106.39		2.781		5.876		2.592
107.39		2.74		5.673		3.772
108.39		2.537		6.079		2.348
109.39		2.74		5.266		1.657
110.39		2.984		5.876		2.592
111.39		2.781		5.876		3.203
		AVERAGE		AVERAGE		AVERAGE
		1.98		6.33		2.48

APPENDIX F

ANALYZER SPECIFICATIONS

C. SPECIFICATIONS (* denotes EPA designed parameters)

Ranges	0-50*, 100*, 200*, 500*, 1000*, 2000, 5000, 10000 20000 PPB
Noise	0.25 PPB RMS (60 sec. time setting)
Minimum Detectable Limit	0.50 PPB (60 sec. time constant)
Zero Drift (24 hour)	0.50 PPB
Span Drift (24 hour)	+/- 1% Full Scale
Rise, Fall Times (0-95%):	
10 sec. average*	40 seconds
60 sec. average*	80 seconds
300 sec. average*	300 seconds
Precision	+/- 0.5 PPB
Linearity	+/- 1% Full Scale
Sample Flow Rate	0.7 Liters per minute
Interference Equivalent (PPB)	Each < 10 PPB Total < 20 PPB
Operating Temperature	15^{o}-35^{o} C* (may be safely operated over the range 5-40^{o} C)
Power Requirements	105-125 VAC, 60 Hz* 220-240 VAC, 50 Hz 300 Watts
Physical Dimensions	17" W x 8-3/4" H x 23"D
Weight	53 lbs.
Outputs	NO, NO_2, NO_x Selectable Voltage 4-20 mA, RS-232(Optional)

II. SPECIFICATIONS

MODEL 43B PULSED FLUORESCENCE SO2 ANALYZER

Ranges	
Standard Mode	0-0.1, 0.2, 0.5, 1, 2, 5, and 10 ppm
High Range Mode	0-1, 2, 5, 10, 20, 50, and 100 ppm

Signal Averaging Time For:	10 SEC	60 SEC	300 SEC
Noise (RMS value when sampling zero air)	1.0 ppb	0.5 ppb	0.25 ppb
Lower Detectable Limit (LDL)	2.0 ppb	1.0 ppb	0.5 ppb
Analyzer Response Time	80 sec	110 sec	320 sec

Linearity	±1 % of fullscale
Precision	1% of Reading or 1 ppb
Zero Drift	Less than 1 ppb per day
Span Drift	± 1% per day
Interferences per EPA levels	Less than LDL except for the following
NO	Less than 3 ppb
M-Xylene	Less than 2 ppb
H_2O	Less than 2% of reading
Temperature Dependence	
Zero	± 0.1 ppb/°C
Span	± 0.1% / °C
Flow	0.5 LPM (Standard), 1 LPM (optional)
Standard Output	Dual: Selectable Voltage
Optional: Two additional analog outputs	Selectable Voltage, 4-20 mA isolated, 4-20 mA non-isolated
Optional: Digital Output	RS-232
Line Power	115 V/60 Hz and 220 V/50 Hz versions
Average Power Consumption	100 Watts
Maximum Steady A.C. Line Current	1.3 Amp (115 V)
Size and Weight	17"W x 8 3/4"H x 23"D 44 lbs.

C. SPECIFICATIONS

Ranges	0-1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 PPM
Noise	0.05 PPM RMS - with time constant of 30 seconds
Minimum Detectable Limit	0.10 PPM
Zero Drift, 24 hours	+/- 0.2 PPM
Span Drift, 24 hours	+/- 1% Full Scale
Rise, Fall Times (0-95%) (at 1 lpm flow, 30 second response time)	1 Minutes
Precision	+/- 0.1 PPM
Linearity	+/- 1%
Flow Rate	0.5 - 2 lpm
Rejection Ration	Negligible interference from water and CO2.
Operating Temperature	Performance specifications maintained over the range 15-35^{o}C (may be operated safely over the range 5-45^{o}C)
Power Requirements	105 - 125 VAC, 60 Hz 220 - 240 VAC, 50 Hz 100 Watts
Physical Dimensions	17"W x 8 3/4"H x 23"D
Weight	45 lbs.
Dual Outputs (Standard)	Individually selectable to 0-10mv, 0-100mv, 0-1V, 0-5V, 0-10V, digital display, 1 hour integrated value. Other outputs available upon request (4-20ma)

C. SPECIFICATIONS

Ranges	Model 41	0-0.2, 0.5, 1.0, 2, 5, 10, 20, 100, 200 PPM
	Model 41H	0-5, 10, 20, 50, 100, 200, 500, 2000, 5000 PPM
Noise	Model 41	3 PPB RMS - with time constant of 5 minutes
	Model 41H	50 PPB RMS - with time constant of 5 minutes
Minimum Detectable Limit	Model 41	5 PPB
	Model 41H	100 PPB
Zero Drift, 24 hours	Model 41	+/- 0.02 PPM
	Model 41H	+/- 0.05 PPM
Span Drift, 24 hours		+/- 2% Full Scale
Rise, Fall Times (0-95%) (at 1 lpm flow, 30 second response time)		1.5 Minutes
Precision		±1%
Linearity		+/- 1.5%
Flow Rate		0.5 - 2 lpm
Rejection Ratio		Negligible interference from water and CO
Operating Temperature		Performance specifications maintained over the range 15-35°C (may be operated safely over the range 5-45°C)
Power Requirements		100 Watt at 105 to 125 VAC, 60 Hz or 200 to 240 VAC, 50 Hz 100 Watts
Physical Dimensions		17"W x 8 3/4"H x 23"D
Weight		45 lbs.
Dual Outputs (Standard)		Individually selectable to 0-10mv, 0-100mv, 0-1V, 0-5V, 0-10V, digital display, 1 hour integrated value. Other outputs available upon request (4-20ma)

SPECIFICATIONS FOR SO_2 ANALYZER
WESTERN RESEARCH MODEL 721ATZ

Measuring principle	NDUV double beam method which uses 285 nm UV light for SO_2 measurement and 585 nm visible light to compensate for contamination of all windows, detector drift or changes in the intensity of the radiation source
Range	SO_2: 0 - 500 ppm and 0 - 1000 ppm; but low range may be reduced to 0 - 100 ppm with full scale analog output; total dynamic range of 0 - 5000 ppm with 1 ppm readability
Accuracy	±2% f.s., worst case. Typically better than ±1% f.s.
Temperature drift	≤0.5% f.s./^{0}C
Noise	0.5% of full scale, worst case
Ambient temperature	0 to 40 ^{0}C
Ambient humidity	Less than 100% RH
Response time (90% of final reading)	<5 seconds
Optical cell length	35 cm
Output signal	Panel display is digital - direct reading in ppm,w; output signal: 7 field-selectable potentiometric outputs of 1V, 2V, 5V, 10V DC and 100, 200, 500 mV DC. Two outputs per range are provided at the rear of the

	instrument, standard. Unit equipped also with 4 - 20 mA
Interferences	No known interferences from O_2, CO_2, CO or hydrocarbons; internally compensated for NO interference
Linearity	±1.5% of full scale
Power supply	AC 115 V ± 10%, 60 Hz
Power consumption	Less than 575 watts
Electronic span value	Nominal 766 @ 77 ^{0}F and 29.92 in Hg
Sample gas flow	1.0 - 5.0 LPM to give desired response time
Sample gas temperature	0 to 40 ^{0}C
Warmup time	Approximately 30 minutes
External dimensions	7 x 19 x 22 (H x W x D) inch
Weight	40 LB

SPECIFICATIONS FOR MODEL 10A
ROCK MOUNTED CHEMILUMINESCENT
NO-NO_x GAS ANALYZER

Sensitivity	Each instrument is equipped with the following ranges: 0 - 2.5 ppm 0 - 10 ppm 0 - 25 ppm 0 - 100 ppm 0 - 250 ppm 0 - 1000 ppm 0 - 2500 ppm 0 - 10000 ppm
Accuracy	Derived from the NO or NO_2 calibration gas, ±1% of fullscale
Response time (0-90%) Typical	1.5 seconds - NO Mode 1.7 seconds - NO_x Mode
Output	0 - 10mV and 0 - 10V
Zero Drift	Negligible after 1/2-hour warm-up
Linearity	±1% of full scale
Input Power Requirements	115v/50Hz; 115v/60Hz

Servomex

1420
Oxygen Analyser
Instruction Manual

Ref : 01420/001A/0

Order as part No. 01420001A

was (7982-2842)

INTERPOLL LABORATORIES
4500 BALL ROAD N.E.
CIRCLE PINES, MN 55014-1819
(612) 786-6020

1.3 Sampling System

The sampling system of the analyser includes a combination filter/automatic flow control device, designed to keep a constant flow of sample gas through the measuring cell for varying input pressures and to prevent the entrance of particulate matter into the measuring cell. Excess flow is vented to the by-pass.

1.4 Specification

Performance Specification (typical)

Repeatability:	Better than +/-0.2% O2 under constant conditions.
Drift:	Less than 0.2% O2 per week under constant conditions. (Excluding variation due to barometric pressure changes; reading is proportional to barometric pressure.)

Outputs

Display:	3 1/2 digit LCD reading 0.0 to 100.0% oxygen with overrange capability.
Output:	0 to 1V (non-isolated) for 0 to 100% oxygen available on 'D' type connector located on the back panel of the instrument. Output impedance is less than 10 ohms.
Option:	4 - 20mA isolated, Max impedance 500 ohms.
Flow alarm output:	Change over relay contact rated at 3A/115V ac, 1A/240V ac or 1A/28V dc. 4 sets of single pole changeover contacts. Alarm becomes active when sample gas flow through the analyser fails.

Sample requirements

Condition:	Clean, dry gas with dew point 5 deg C below ambient temperature.
Inlet pressure:	0.5 to 3psig (3.5 to 21kPa). Inlet pressure changes within this range will change the reading by less than 0.1% O2. May be operated up to 10psig (70kPa) with degraded stability.
Flowrate:	1.5 to 6 litres/minute approximately depending on sample pressure.
Filtering:	0.6 micron replaceable filter integral to the automatic flow control device.

Response time:	Less than 15 secs. to 90% at an inlet pressure of 3psig (21kPa).
Inlet/vent connections:	1/4 inch OD tube (stainless steel) suitable for 6mm ID flexible tubing or 1/4 inch OD compression fittings.
Materials exposed to the sample:	Stainless steel, Pyrex glass, brass, platinum, epoxy resin, Viton, polypropylene and glass fibre filter.

Physical Characteristics

Case:	Steel and aluminium finished in epoxy powder paint.
Case classification:	IP 20 (IEC 529) when fitted into the Servomex 1400 series 19 inch case.
Dimensions:	See Figure 2.1.
Weight:	10Kg (22lb) approximately.

Electrical

AC Supply:	110 to 120V AC or 220 to 240V AC, +/-10%, 48 to 62Hz. Voltage selected by a voltage selector integral to the IEC supply plug.
Power required:	15VA maximum.

Environmental Limits

Operating ambient temperature:	0 to +40 deg C (32 to 104 deg F)
Storage temp. range:	-20 to +70 deg C (-4 to 158 deg F)
Relative humidity:	0-85%, non-condensing.

SPECIFICATIONS FOR ACS MODEL 3300 CO_2 NDIR

Measuring principle	NDIR single beam method
Measurable gas components and measuring range	0 - 20%
Reproducibility	±0.5% of full scale
Stability	Zero drift; ±% of full scale/24H Span drift; ±% of full scale/24H
Noise	0.5% of full scale
Ambient temperature	-5 to 45°C
Ambient humidity	Less than 90% RH
Response time (90% of final reading)	Electrical system; 2 sec, 3 sec, 5 sec (selectable with connector) Response of actual gas; Within 15 sec (depending on cell length)
Indicator	100 linear division
Output signal	OUTPUT 1; DC 0 - 1 V OUTPUT 2; DC 0 - 10 mV or DC 0 - 100 mV or DC 0 - 1 V or DC 4 - 20 mA (Allowable load resistance 500Ω max.)
Linearity	Better than ±2% of full scale (when linearizer is used)
Power supply	AC 115 V ± 10%, 60 Hz

Power consumption	Approx. 30 VA
Materials of gas-contacting parts	Measuring cell; SUS304 Window; CaF2 Piping; Polyethylene
Sample gas flow rate	1ℓ/min ± 0.5ℓ/min
Sample gas temperature	0 to 55°C
Purging gas flow rate	1ℓ/min (to be flowed as occasion demands)
Warmup time	Approx. 2 hours
External dimensions	200 x 250 x 541 (H x W x D) mm
Weight	Approx. 11 kg
Finish Color	MUNSELL N1.5

Remarks: For combinations of measuring ranges for the dualcomponent analyzer, inquiry should be made to the manufacturer.

Rathsch 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:

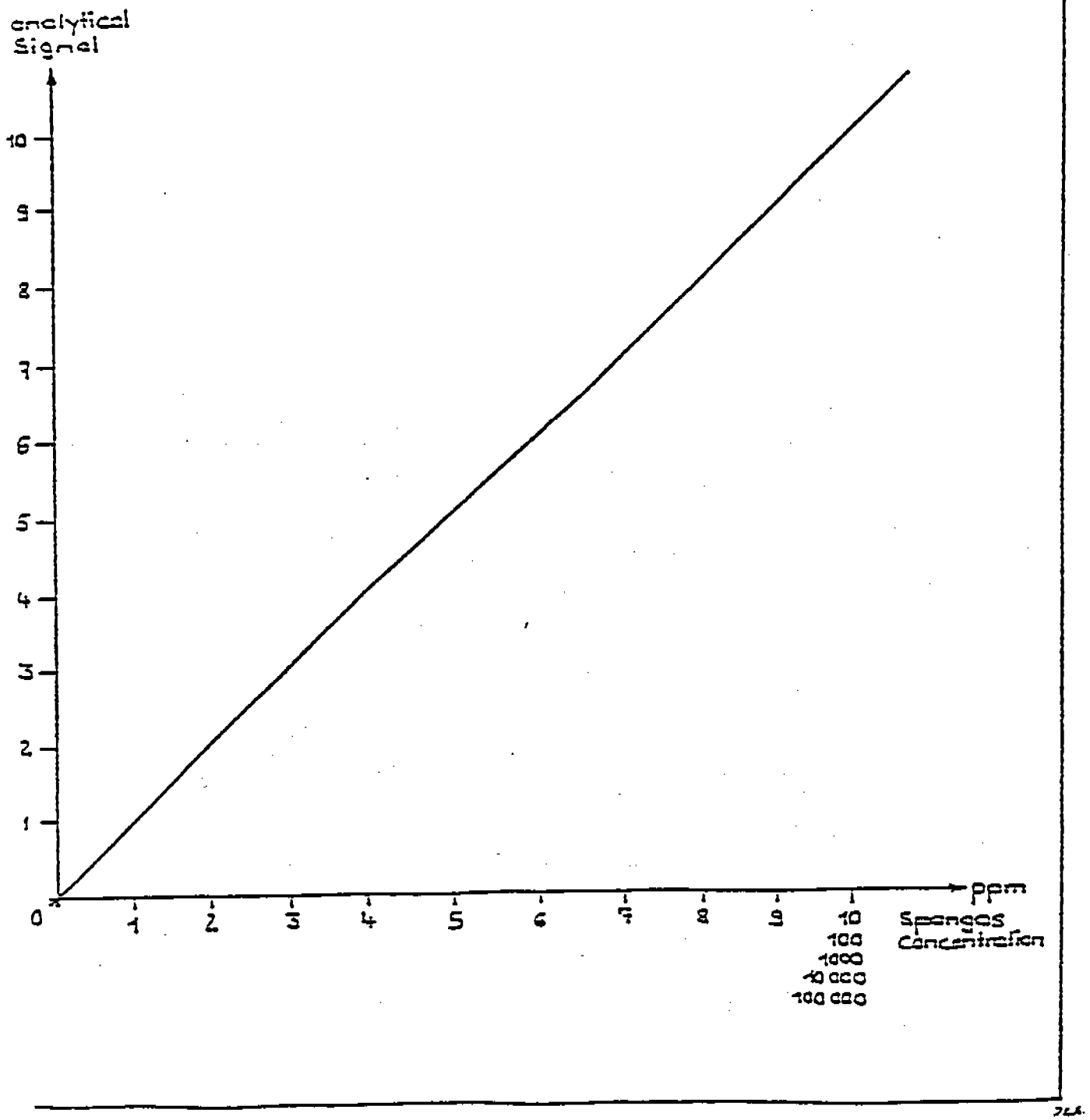
Temperature : 160 °C

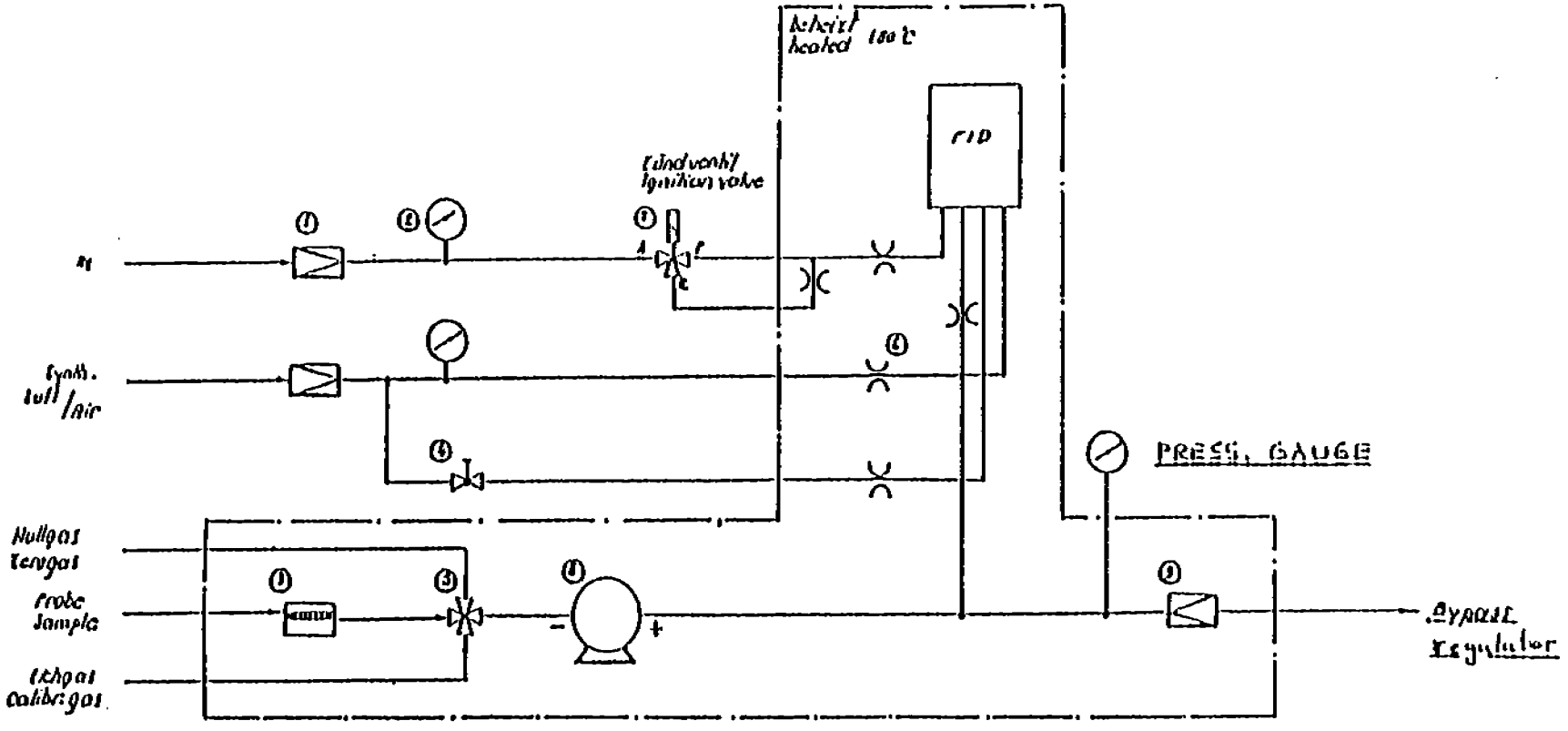
Zero Point : 3,90
Gain : 7,70

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 Magnet Ventil
solenoid valve
8 Pumpe
pump
9 Boot druckregler
Boot pressure regulator

Zündventil
Ignition valve

F-A angezogen
energised
R-A abgefallen
at rest

Handumschaltung
Manual switching

Ratfisch

FLAMMEN IONISATIONS DETEKTOR
Flame Ionisation Detector

Fließplan
Flowdiagram

AS 55

D 04.88 de

F-15

APPENDIX G

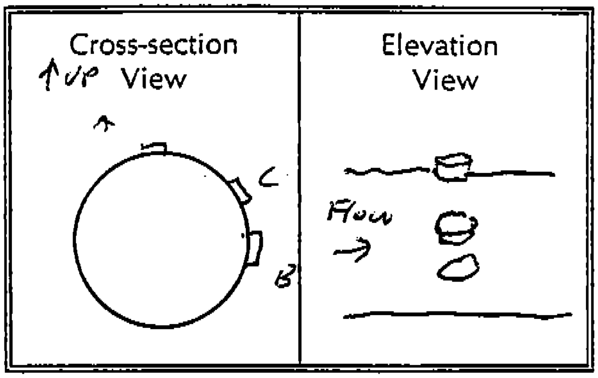
MEASUREMENT SYSTEMS PERFORMANCE SPECIFICATIONS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Newberry, MI
Source: Dryer Primary Cyclone / Exhaust
Test: 2 Run: 0 Date: 9-27-96
Stack Dimen.: 42 IN.
Dry Bulb: 255 °F Wet bulb: 155 °F
Manometer ☐ Reg. ☐Exp ☐Elec.
Barometric Pressure: 29.26 IN.HG
Static Pressure: -11.6 IN.WC
Operators: M. Kaehler + M. Petersen
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
		Port Length: 9.0*	6.0 IN.	Time Start:	NA HRS
C - 1		7.00	16.00		
2		21.00	30.00		255
3		35.00	44.00		

Temp. Meas. Device & S/N: PPT-45 / TC   Time End: NA HRS

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

* includes vertical port clamp

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

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Calibration Error Check

Job L.P. / Newberry, MI

Test 2 Run 0 Date 8-26-96

Operator M. Kaechler

SO_2 Calibration: Time (HRS) _____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0				
Mid Level					
High Level					

NO_x Calibration: Time (HRS) 2012

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0.1	0.1	500	.02
Mid Level	139.7	140.4	0.7	500	.14
High Level	239	239.3	0.3	500	.06

O_2 Calibration: Time (HRS) 2012

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0.0	0.0	25%	0
Mid Level	13.5				
High Level	20.8	20.8	0.0	25%	0

CO_2 Calibration Time (HRS) 2012

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0.0	0.0	25%	0
Mid Level	10.8				
High Level	16.6	16.6	0.0	25%	0

CO Calibration Time (HRS) 2012

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	1	1	1,000	.1
Mid Level	289	296	7	1,000	.7
High Level	620	617	3	1,000	.3

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INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job U.P. / Newberry, MI

Test 2 Run 0 Date 9-26-96

Operator M. Kaechler

THC Calibration (Low Range): Time (HRS) 1946

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0	0	100	0
Low Level	30.5	30	.5	100	.5
Mid Level	286	284	2	1,000	.2
High Level	2960	3000	40	10,000	.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.

INTERPOLL LABORATORIES, INC
(612) 786-6020

_____ System Bias Check

Job L.P. / Newberry, MI Source Dryer Primary Cyclone
Test 2 Run 0 Date 9-26-96 Site Exhaust
Operator M. Kaewler

Instrument	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
			Cal. Err.	Sys. Bias			
NOx	Zero Gas	0	0.1 ~~0.2~~	1-3	1.2	250	.48
	Upscale	139.7	140.4	139.5	0.9	250	.36
O2	Zero Gas	0	0.0	0.0	0	25%	0
	Upscale	20.8	20.8	20.6	0.2	25%	.80
CO	Zero Gas	0	~~0~~ 0	~~2~~ 3	3	1,000	.3
	Upscale	289	296	300	4	1,000	.4
CO2	Zero Gas	0	0.0	0.1	0.1	20%	.5
	Upscale	16.6	16.6	16.6	0	20%	0
THC	Zero Gas	0	0.0	0	0	1000	0
	Upscale	~~286~~ ~~305~~	294	290	6	1,000	.6
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

070595-G:\STACK\WP\FORMS\S-562

INTERPOLL LABORATORIES, INC
(612) 786-6020

NOx Cal Drift Check

Job L.P. / Newberry, MI — Source Roger Primary Cyclone
Test 2 Run 1, 2, 3, 4, 5 Date 8-27-96 — Site Exhaust
Operator M. LaChelier

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1		Zero Gas	0	0.1				
		Upscale	139.7	139.9				
2		Zero Gas	0	0.5				
		Upscale	139.7	140.4				
3 (1120, 1151, ~~220~~) 2/1	VOID	Zero Gas	0	0.3	0.5	0.4		
		Upscale	139.7	141.0	140.4		140.7	
4		Zero Gas	0	0.5				
		Upscale	139.7	~~170~~ 140.4				
5 (1415, 1515) 2/2	VOID	Zero Gas	0	0.2	5.7	2.95		
		Upscale	139.7	140.3	141.0		140.65	
~~1130~~ 45 ~~1110~~ 2/3	39.70 (1646, ~~1445~~ 1558)	Zero Gas	0	1.0	0.3	0.65		
		Upscale	139.7	141.0	140.4		140.7	38.95
~~1110~~ ~~2070~~ 2/4	21.51 (1451, ~~1455~~ 1553)	Zero Gas	0	0.3	3.0	1.65		
		Upscale	139.7	140.4	143.1		141.75	19.80
~~2135~~ ~~2335~~ 2/5	27.30 (2136, 2335)	Zero Gas	0	3.0	1.1	2.05		
		Upscale	139.7	140.4	140.5		140.45	25.49
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.

091595-G:\STACK\WP\FORMS\S-559a

INTERPOLL LABORATORIES, INC
(612) 786-6020

O_2 Cal Drift Check

Job L.P. / Newberry, MI
Test L Run 1, 2, 3, 4, 5 Date 8-27-96
Operator M. Kaehler
Source Dryer Primary Cyclone
Site Exhaust

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0.0				
		Upscale	20.8	20.8				
2		Zero Gas	0	0.0				
		Upscale	20.8	20.5				
3		Zero Gas	0	0.0	0.0	0.0		
2/1	VOID	Upscale	20.8	20.8	20.8		20.8	
4		Zero Gas	0	0.0				
		Upscale	20.8	20.8				
5		Zero Gas	0	0.0	0.0	0.0		
2/2	VOID	Upscale	20.5	20.8	20.8		20.8	
6		Zero Gas	0	0.0	0.0	0.0		
2/3	15.91	Upscale	20.5	20.6	20.9		20.85	15.87
7		Zero Gas	0	0.0	0.3	0.15		
2/4	16.32	Upscale	20.8	20.9	20.9		20.9	16.21
8		Zero Gas	0	0.3	0.1	0.2		
2/5	16.49	Upscale	20.8	20.9	20.9		20.9	16.37
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.

091595-G:\STACK\WP\FORMS\S-539a

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO_2 Cal Drift Check

Job: L.P. / Newberry MI
Test: 2 Run 1,2,3,4,5 Date 8-22-96
Operator: M. Kuehler
Source: Dryer Primary Cyclone
Site: Exhaust

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1		Zero Gas	0	0.0				
		Upscale	16.6	16.6				
2		Zero Gas	0	0.0				
		Upscale	16.6	16.6				
3 2/1	VOID	Zero Gas	0	0.0	0.2	0.1		
		Upscale	16.6	16.6	16.6		16.6	
4		Zero Gas	0	0.1				
		Upscale	16.6	16.6				
5 2/2	VOID & ML	Zero Gas	0	0.0	0.2	0.1		
		Upscale	16.6	16.6	16.5		16.55	
6 2/3	~~0615~~ ML 4.60	Zero Gas	0	0.1	0.0	0.05		4.56
		Upscale	16.6	16.6	16.6		16.6	
7 2/4	~~405.2~~ ML 4.28	Zero Gas	0	0.0	0.1	0.05		4.26
		Upscale	16.6	16.6	16.5		16.55	
8 2/5	~~416.8~~ ML 4.26	Zero Gas	0	0.1	0.1	0.1		4.17
		Upscale	16.6	16.5	16.8		16.65	
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.

091595-G:\STACK\WP\FORMS\S-559a

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO Cal Drift Check

Job: L.P./Newberry, MI — Source: Dryer Primary Cyclone Exhaust
Test: 2 — Run: 1, 3, 4, 5 — Date: 6-27-96 — Site:
Operator: M. Kaehler

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	1				
		Upscale	289	290				
2		Zero Gas	0	1				
		Upscale	289	290				
3 2/1	VOID	Zero Gas	0	1	7	4		
		Upscale	289	290	289		289.5	
4		Zero Gas	0	7				
		Upscale	289	289				
5 2/2	VOID	Zero Gas	0	7	15	11		
		Upscale	289	289	291		290	
6 2/3	861.31	Zero Gas	0	3	10	6.5		872.93
		Upscale	289	291	288		289.5	
7 2/4	403.25	Zero Gas	0	10	6	8		409.42
		Upscale	289	293	286		297	
8 2/5	416.07	Zero Gas	0	6	3	4.5		421.86
		Upscale	289	286	283		297	
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.

091595-G:\STACK\WP\FORMS\S-559a

INTERPOLL LABORATORIES, INC
(612) 786-6020

THC Cal Drift Check

Job: I.P. / Newberry, MI
Test: 2 Run 1, 2, 3, 4, 5 Date 8-27-96
Operator: M. Kaehler

Source: Dryer Primary Cyclone
Site: Exhaust

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0				
		Upscale	286	288				
2		Zero Gas	0	0				
		Upscale	286	289				
3		Zero Gas	0	0	4	2		
2/1	VOID	Upscale	286	288	299		293.5	
4		Zero Gas	0	3				
		Upscale	286	287				
5		Zero Gas	0	1	3	2		
2/2	VOID	Upscale	286	287	283		285	
6		Zero Gas	0	3	5	4		
2/3	112.67	Upscale	286	283	281		282	111.80
7		Zero Gas	0	5	3	4		
2/4	94.65	Upscale	286	291	276		279.5 ~~299.5~~ PM	94.10
8		Zero Gas	0	3	5	4		
2/5	98.41	Upscale	296	278	295		286.5	95.58
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

EPA Method 2 Field Data Sheet

Job: CP Newberry
Source: Dryer E Tube Outlet
Test: 2 Run: 0 Date: 8-27-96
Stack Dimen.: 48 IN.
Dry Bulb: ___ °F Wet bulb: ___ °F
Manometer: ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 29.26 IN.HG
Static Pressure: ___ IN.WC
Operators: JB-/D.H
Pitot No.: ___ C_p ___

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
		Port Length: 6 IN.		Time Start: HRS	
1	.16	8.00	14.00		
2	.50	24.00	30.00		
3	.83	40.00	46.00		
Temp. Meas. Device & S/N: PDT #2				Time End: HRS	

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Calibration Error Check

Job LP Newberry

Test 2 Run 0 Date 8-27-96

Operator S. BAIRD/CLE

THC Calibration: Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0	0	100	0
~~Low Level~~ Mid Level	29.9 / 294.4	29.94 / 292.6	.04 / 1.8	1000 / 10000	.004% / .002%
High Level	2990	2990	0	10000	0

NO_x Calibration: Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0	0	250	0
Mid Level	90.6	91	.4	250	.2%
High Level	143	143	0	250	0

O_2 Calibration: Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0	0	25%	0
Mid Level	13.5	13.5	0	25%	0
High Level	21.1	21.1	0	25%	0

CO_2 Calibration Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0	0	20%	0
Mid Level	10.7	10.7	0	20%	0
High Level	16.6	16.6	0	20%	0

CO Calibration Time (HRS)

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0	0	1000	0
Mid Level	147	146	1	1000	.1%
High Level	279	299	0	1000	0

052394-G:\STACK\WP\FORMS\S-120-10

INTERPOLL LABORATORIES, INC
(612) 786-6020

_____ System Bias Check

Job LP NEW BERRY Source PROBE TUBE
Test 2 Run 0 Date 8-27-96 Site OUTLET
Operator S. BATHURST

Instrument	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
			Cal. Err.	Sys. Bias			
CO	Zero Gas	0	0	0	0	1000	0
	Upscale	147	148	147	1	1000	.18
NOx	Zero Gas	0	0	0	0	250	0
	Upscale	90.6	91	91	0	250	0
O2	Zero Gas	0	0	0	0	25%	0
	Upscale	13.5	13.5	13.5	0	25%	0
CO2	Zero Gas	0	0	0	0	20%	0
	Upscale	10.7	10.7	10.7	0	20%	0
THC	Zero Gas	0	0	0	0	1000.00	0%
	Upscale	29.9	29.94	29.81	.14	1000.00	.01%
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

070595-G:\STACK\WP\FORMS\S-362

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO Cal Drift Check

Job CP NEWBERRY Source DRYER ETUBE ~~OUTLET~~
Test 2 Run 0 Date 8-27-96 Site OUTLET
Operator JD-1 DH-

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1	VOID	Zero Gas	0	0	0	0		
		Upscale	147	147	147		147	
2	VOID	Zero Gas	0	0	0	0		
		Upscale	147	147	144		145.5	
3	762.46	Zero Gas	0	0	0	0		770.34
		Upscale	147	147	144		145.5	
4	359.46	Zero Gas	0	0	-4	-2		356.11
		Upscale	147	147	150		148.5	
5	406.53	Zero Gas	0	0	3	1.5		412.34
		Upscale	147	147	145		146	
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.

091595-C:\STACK\WP\FORMS\S-339a

INTERPOLL LABORATORIES, INC
(612) 786-6020

NOx Cal Drift Check

Job: CP NWBOILER
Test: 2 Run: 0 Date: 8-27-96
Operator: S.D. / DH

Source: DRYER TUBE OUT
Site: OUTLET

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1	VOID	Zero Gas	0	0	0	0		
		Upscale	90.6	91	91		91	
2	VOID	Zero Gas	0	0	0	0		
		Upscale	90.6	91	91		91	
3	13.29	Zero Gas	0	0	0	0		13.23
		Upscale	90.6	91	91		91	
4	14.12	Zero Gas	0	0	0	0		14.05
		Upscale	90.6	91	91		91	
5	17.93	Zero Gas	0	0	0	0		17.66
		Upscale	90.6	91	93		92	
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.

091595-G:\STACK\WP\FORMS\S-559a

INTERPOLL LABORATORIES, INC
(612) 786-6020

O2 Cal Drift Check

Job: LP NEWBERRY — Source: DRYER TUBE OUTLET
Test: 2 — Run: 0 — Date: 8-27-96 — Site:
Operator: SD / DH

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1	VOID	Zero Gas	0	0	0	0		
		Upscale	13.5	13.5	13.5		13.5	
2	VOID	Zero Gas	0	0	0	0		
		Upscale	13.5	13.5	13.4		13.45	
3	16.63	Zero Gas	0	0	0	0		16.89
		Upscale	13.5	13.5	13.4		13.45	
4	17.23	Zero Gas	0	0	-.1	.05		17.12
		Upscale	13.5	13.5	13.7		13.6	
5	17.04	Zero Gas	0	0	.2	.1		17.06
		Upscale	13.5	13.5	13.5		13.5	
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.

091595-G:\STACK\WP\FORMS\S-559a

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO Cal Drift Check

Job: LP New Penny — Source: Orifice Tube
Test: CO Run: 2 Date: 6-27-96 — Site: Outlet
Operator: SD / DH

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1	VOID	Zero Gas	0	0	0	0		
		Upscale	10.7	10.7	10.7		10.7	
2	VOID	Zero Gas	0	0	0	0		
		Upscale	10.7	10.7	10.6		10.65	
3	3.85	Zero Gas	0	0	0	0		3.85
		Upscale	10.7	10.7	10.7		10.7	
4	3.51	Zero Gas	0	0	0	0		3.51
		Upscale	10.7	10.7	10.7		10.7	
5	3.57	Zero Gas	0	0	0	0		3.57
		Upscale	10.7	10.7	10.7		10.7	
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.

091595-G:\STACK\WP\FORMS\S-559a

INTERPOLL LABORATORIES, INC
(612) 786-6020

THC Cal Drift Check

Job: LP New Bonny
Test: 2 Run: 0 Date: 8-27-96
Operator: SB - 10.4-
Source: DRYER E TUBE OUTLET
Site:

Run	C̄	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1	VOID	Zero Gas	0	1	.13	.57		
		Upscale	29.9	30.5	29.13		29.82	
2		Zero Gas	0	0	.52	.26		
		Upscale	29.9	29.13	29.87		29.50	
3	83.46	Zero Gas	0	.52	.68	.60		85.23
1546-1750 ~~1545~~		Upscale	29.9	29.87	29.47		29.67	
4	50.36	Zero Gas	0	.68	0	.34		50.87
1451 -.055		Upscale	29.9	29.47	30.0		29.74	
5	43.38	Zero Gas	0	0	1	.5		44.21
2136 2135		Upscale	29.9	30.0	29.00		29.50	
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.

091595-G:\STACK\WP\FORMS\S-559a

INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job CPI Newberry

Test 2 Run _____ Date 2-27-96

Operator Bob

THC Calibration (Low Range): **Time (HRS)**_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0	0	100	
Low Level	29.9	30	.1	100	
Mid Level	294.4	300	5.6	1000	
High Level	2990	2980	10	1000	

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.

052394-G:\STACK\WP\FORMS\S-420-14

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Calibration Error Check

Job LP/ Newberry

Test 2 Run _____ Date 5-20-96

Operator DAB

SO_2 Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0	0	200	
Mid Level	82.1	82.51	.40	200	
High Level	116.4	116.79	1.61	200	

NO_x Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0	0	200	
Mid Level	73.7	73.63	.07	200	
High Level	148.	149.52	1.52	200	

O_2 Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0	0	25	
Mid Level	13.4	13.35	.05	25	
High Level	20.8	20.83	.03	25	

CO_2 Calibration Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	.01	-.01	20	
Mid Level	10.8	11.0	.2	20	
High Level	16.8	16.7	.1	20	

CO Calibration Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	4	4	500	
Mid Level	140	140.12	-.12	500	
High Level	296	290	6	500	

INTERPOLL LABORATORIES, INC
(612) 786-6020

SO_2 Cal Drift Check

Job CPI New Brady Source Dryer RTO
Test ____ Run ____ Date 6-27-96 Site STACK
Operator BG

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1	VOID	Zero Gas	0	.07	.34			
		Upscale	82.1	83.73	83.30			
2	VOID	Zero Gas	0	.34	1			
		Upscale	82.1	83.3	85			
3	0.47	Zero Gas	0	1	0.5	0.75		< 1
		Upscale	82.1	85	82.79			
4	0.22	Zero Gas	0	.5	0.56	0.53		< 1
		Upscale	82.1	82.79	85.85			
5	0.37	Zero Gas	0	.56	.63	0.60		< 1
		Upscale	82.1	85.85	83.72			
6		Zero Gas	0	.63	0			
		Upscale	82.1	83.72	80.41			
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						

111.

Must be within 5% of the span for the zero or upscale cal. gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

VOx Cal Drift Check

Job: CPI Newberry — Source: Dryer RTO
Test: 2 — Run: — Date: 5-25-95 — Site: Stack
Operator: Bob

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1	VOID	Zero Gas	0	0	0			
		Upscale	73.7	74.14	73.45			
2	VOID	Zero Gas	0	0	0			
		Upscale	73.7	73.43	74.68			
3	17.50	Zero Gas	0	0	0	0		17.24
		Upscale	73.7	74.68	74.98		74.63	
4	19.71	Zero Gas	0	0	0	0		19.44
		Upscale	73.7	74.58	74.49		74.74	
5	17.75	Zero Gas	0	0	0	0		17.39
		Upscale	73.7	74.45	76		75.25	
6		Zero Gas	0	0	0			
		Upscale	73.7	76	75.39			
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

CO Cal Drift Check

Job CPI Newbury — Source Dryer RTO
Test 2 Run ____ Date 8-[illegible]96 — Site STACK
Operator Dan

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1	VOID	Zero Gas	0	8	1			
		Upscale	140	136	144			
2	VOID	Zero Gas	0	1	6	[illegible]		
		Upscale	140	144	145			
3	65.95	Zero Gas	0	6	6	6.0		
		Upscale	140	145	146.36		145.68	60.09
4	44.41	Zero Gas	0	6	3	4.5		
		Upscale	140	146.32	145.53		145.95	39.50
5	27.14	Zero Gas	0	3	6	4.5		22.28
		Upscale	140	145.53	148		146.77	
6		Zero Gas	0	6	3			
		Upscale	140	148	138			
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

O2 Cal Drift Check

Job (P) Newberry — Source Dryer RTO
Test 2 — Run — Date 4-27-96 — Site STACK
Operator Bas

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0	0			
		Upscale	13.4	13.36	13.37			
2		Zero Gas	0	0	0			
		Upscale	13.4	13.37	13.37			
3		Zero Gas	0	0	0			
		Upscale	13.4	13.37	13.37			
4		Zero Gas	0	0	0			
		Upscale	13.4	13.37	13.34			
5		Zero Gas	0	0	0			
		Upscale	13.4	13.36	13.4			
6		Zero Gas	0	0	0			
		Upscale	13.4	13.4	13.34			
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

CO2 Cal Drift Check

Job LPI Newberry
Test 2 Run Date 5-27-96
Operator Sm

Source Dryer RTO
Site Sidell

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0	.01			
		Upscale	10.8	10.88	10.72			
2		Zero Gas	0	.01	.01			
		Upscale	10.8	10.72	10.75			
3		Zero Gas	0	.01	0			
		Upscale	10.8	10.75	10.72			
4		Zero Gas	0	0	0			
		Upscale	10.8	10.72	10.74			
5		Zero Gas	0	0	.02			
		Upscale	10.8	10.74	10.78			
6		Zero Gas	0	.02	0			
		Upscale	10.8	10.74	.06			
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 Cal Drift Check

Job 191 Newberry Source Dryer RTO
Test 2 Run ____ Date 2-22-96 Site STACK
Operator ____

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1	VOID	Zero Gas	0	.87	.5			
		Upscale	29.94	29.77	27.69			
2	VOID	Zero Gas	0	.5	.5			
		Upscale	29.94	29	29.5			
3	15.26	Zero Gas	0	.5	.5	0.50		
		Upscale	29.94	29.5	29.81		29.66	15.16
4	7.21	Zero Gas	0	.5	.4	0.45		6.90
		Upscale	29.94	29.51	29.76		29.79	
5	7.86	Zero Gas	0	.4	.5	0.45		7.67
		Upscale	29.94	29.76	29.0		29.38	
6		Zero Gas	0	.5	.63			
		Upscale	29.94	29	28.27			
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

O2 Cal Drift Check

Job LPI Newberg
Test 3+4 Run _____ Date 8-28-96
Operator _____

Source Dryer RTO
Site STACK

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0	0			
		Upscale	13.4	13.37	13.38			
2		Zero Gas	0	0	0			
		Upscale	13.4	13.38	13.37			
3		Zero Gas	0	0	0			
		Upscale	13.4	13.37	13.4			
4		Zero Gas	0					
		Upscale						
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.

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO_2 Cal Drift Check

Job CP/ New Berry
Test 3-4 Run _____ Date 6-28-94
Operator SRB

Source Dryer RTO
Site STACK

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0	.02			
		Upscale	10.8	10.74	10.6			
2		Zero Gas	0	.02	.04			
		Upscale	10.8	10.6	10.60			
3		Zero Gas	0	.04	.02			
		Upscale	10.8	10.6	10.6			
4		Zero Gas	0					
		Upscale						
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.

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LP / Newberry, MI
Source: Press / Vents
Test: 9 Run 0 Date 8-29-96
Stack Dimen.: (59 X 59) 2 Stacks IN.
Dry Bulb: 110 °F Wet bulb: 64 °F
Manometer: ☑Reg. ☐Exp ☐Elec.
Barometric Pressure: 29.29 IN.HG
Static Pressure: -2.37 IN.WC
Operators: M. Kaehlert M. Petersen
Pitot No.: INST C_p NA

NOx/CO/THC's

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
		Port Length: 5.5 IN.		Time Start: NA HRS	
	1/6	9.83	15.33		
	3/6	29.50	35.00		
	5/6	49.17	54.67		
Temp. Meas. Device & S/N: PDT-31 / TC				Time End: NA HRS	

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

NOx Cal Drift Check

Job A.P. / Newberry, MI Source Process
Test 9 Run 1, 2, 3 Date 6-29-94 Site Vents
Operator M. Kaehler

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1 0400 a/l	.9917	Zero Gas	0	0.2	0.1	0.15		
		Upscale	91.9	92.6	91.5		92.05	0.84
2 1002 a/l	1.89	Zero Gas	0	0.1	0.5	0.3		
		Upscale	91.9	91.5	91.0		91.25	1.61
3 1035 a/l	1.98	Zero Gas	0	0.5	0.7	0.6		
		Upscale	91.9	91.0	90.0		90.5	1.41
4 1136		Zero Gas	0					
		Upscale						
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

CO Cal Drift Check

Job L.P. / Newberry, MI
Test 9 Run 1, 2, 3 Date 6-24-96
Operator M. Kuehler

Source Press
Site Vents

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1	6.72	Zero Gas	0	1	0	0.5		6.19
9/1		Upscale	143.3	145	144		144.5	
2	4.60	Zero Gas	0	0	3	1.5		3.18
9/2		Upscale	143.3	144	146		145	
3	6.33	Zero Gas	0	3	5	4		2.4
9/3		Upscale	143.3	146	146		146	
4		Zero Gas	0					
		Upscale						
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 Cal Drift Check

Job L.P. / Newberry #1 Source Press
Test 9 Run 1, 2, 3 Date 9-29-96 Site Vents
Operator M. Knudsen

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1	1.35	Zero Gas	0	0.3	-0.4	-0.05		1.40
9/1		Upscale	30.5	30.7	30.4		30.55	
2	4.35	Zero Gas	0	0.2	0.4	0.3		4.12
9/2		Upscale	30.5	30.4	30.1		30.25	
3	2.48	Zero Gas	0	0.4	0.3	0.35		2.20
9/3		Upscale	30.5	30.1	29.7		29.9	
4		Zero Gas	0					
		Upscale						
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 H

CALIBRATION GAS CERTIFICATION SHEETS

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC
27713
(919)544-3772

CERTIFICATE OF ANALYSIS * EPA PROTOCOL MIXTURES

REFERENCE #:	88-46472	CYLINDER #:	CC 104398	CYL. PRESSURE:	2000 PSIG	P.O. #:	22209
EXP. DATE:	3/14/99	LAST ANALYSIS DATE:	3/14/96	CUSTOMER:	TWIN CITY OXYGEN		

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993.G-1 THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

COMPONENT:	CARBON DIOXIDE	COMPONENT:	OXYGEN	COMPONENT:	
STANDARD		STANDARD		STANDARD	
SRM #:	1675B	SRM #:	2659A	SRM #:	
CYL. #:	CLM 6481	CYL. #	CLM 6737	CYL. #	
CONC:	14.01 %	CONC:	20.72 %	CONC:	
INSTRUMENT:	ROSEMOUNT NDIR	INSTRUMENT:	BECKMAN PARAMAGNETIC	INSTRUMENT:	
MODEL #:	880	MODEL #.	755	MODEL #:	
SERIAL #:	2000418	SERIAL #:	1001419	SERIAL #:	
LAST CAL:	2/20/96	LAST CAL..	3/1/96	LAST CAL.:	
MEAN CONC.:	16.6% +/- 0.13 %	MEAN CONC.:	21.1% +/- 0.17 %	MEAN CONC.:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC	
DATE: 3/14/96	DATE:	DATE: 3/14/96	DATE:	DATE:	DATE:
16.6 %		21.1 %			
16.7 %		21.0 %			
16.6 %		21.1 %			

BALANCE GAS: NITROGEN

REPLICATE DATA						REPLICATE DATA						REPLICATE DATA			
DATE: 3/14/96						DATE: 3/14/96						DATE:			
Z	0	R	14.1	C	16.7	Z	0	R	400.2	C	407.5	Z	R	C	
R	14.1	Z	0	C	16.8	R	400.3	Z	0	C	405.7	R	Z	C	
Z	0	C	16.6	R	14.0	Z	0	C	407.7	R	400.4	Z	C	R	
DATE						DATE:						DATE:			
Z		R		C		Z		R		C		Z	R	C	
R		Z		C		R		Z		C		R	Z	C	
Z		C		R		Z		C		R		Z	C	R	

Z= ZERO C-CANDIDATE R=REFERENCE

ANALYST: Robert McKay APPROVED BY: Laura Thurston

THIS REPORT STATES 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 THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF THE ESTABLISHED CHARGE FOR THE SERVICE.
ASSAYED AT: NATIONAL SPECIALTY GASES, 630 UNITED DRIVE, DURHAM, NC 27713 (919)544-3772

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC
27713
(919)544-3772

CERTIFICATE OF ANALYSIS * EPA PROTOCOL MIXTURES

REFERENCE #:	88-48212	CYLINDER #:	CC 52399	CYL. PRESSURE:	2000 PSIG	P.O. #	23662
EXP. DATE:	6/21/99	LAST ANALYSIS DATE:	6/21/96	CUSTOMER:	TWIN CITY OXYGEN		

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1 THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

COMPONENT:	CARBON DIOXIDE	COMPONENT:	OXYGEN
STANDARD		STANDARD	
SRM #:	1675D	SRM #:	2659A
CYL. #:	CLM 6481	CYL. #	CLM 6737
CONC:	14.01 %	CONC:	20.72 %
INSTRUMENT:	ROSEMOUNT NDIR	INSTRUMENT:	BECKMAN PARAMAGNETIC
MODEL #:	880	MODEL #:	755
SERIAL #:	2000418	SERIAL #:	1001419
LAST CAL.:	6/20/96	LAST CAL.:	6/1/96

MEAN CONC.:	10.7 %	+/-	0.09 %	MEAN CONC.:	13.5 %	+/-	0.11 %
REPLICATE CONC.				REPLICATE CONC.			
DATE:	6/21/96	DATE:		DATE:	6/21/96	DATE:	
	10.7 %				13.5 %		
	10.8 %				13.5 %		
	10.7 %				13.4 %		

BALANCE GAS: NITROGEN

REPLICATE DATA						REPLICATE DATA						REPLICATE DATA					
DATE:	6/21/96					DATE:	6/21/96										
Z	0	R	209	C	160	Z	0	R	312	C	203						
R	209	Z	0	C	161	R	312	Z	0	C	203						
Z	0	C	159	R	208	Z	0	C	202	R	313						

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: James Rago APPROVED BY: Richard Sykes

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 CORRECTLY THE INFORMATION PRESENTED, HOWEVER, IN CONNECTION WITH THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE. ASSAYED AT: NATIONAL SPECIALTY GASES, 630 UNITED DRIVE, DURHAM, NC 27713 (919)544-3772

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC
27713
(919)544-3772

CERTIFICATE OF ANALYSIS * EPA PROTOCOL MIXTURES

REFERENCE #:	88-46473	CYLINDER #:	CC 61410	CYL. PRESSURE:	2000 PSIG	P.O. #:	22249
EXP. DATE:	3/14/99	LAST ANALYSIS DATE:	3/14/96	CUSTOMER:	TWIN CITY OXYGEN		

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1 THIS STANDARD SHOULD NOT BE USED WHEN IT'S GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

COMPONENT:	CARBON DIOXIDE	COMPONENT:	OXYGEN	COMPONENT:	
STANDARD		STANDARD		STANDARD	
SRM #:	1675B	SRM #:	2659A	SRM #:	
CYL. #:	CLM 6481	CYL. #	CLM 6737	CYL. #	
CONC:	14.01 %	CONC:	20.72 %	CONC:	
INSTRUMENT:	ROSEMOUNT NDIR	INSTRUMENT:	BECKMAN PARAMAGNETIC	INSTRUMENT:	
MODEL #:	880	MODEL #:	755	MODEL #:	
SERIAL #:	2000418	SERIAL #:	1001419	SERIAL #:	
LAST CAL.:	2/20/96	LAST CAL.:	3/1/96	LAST CAL.:	
MEAN CONC.:	10.89% +/- 0.09 %	MEAN CONC.:	13.4% +/- 0.11 %	MEAN CONC.:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC	
DATE: 3/14/96	DATE:	DATE: 3/14/96	DATE:	DATE:	DATE:
10.8 %		13.4 %			
10.9 %		13.5 %			
10.8 %		13.4 %			

BALANCE GAS: NITROGEN

REPLICATE DATA						REPLICATE DATA						REPLICATE DATA			
DATE: 3/14/96						DATE: 3/14/96						DATE:			
Z	0	R	14.0	C	10.8	Z	0	R	400.3	C	258.9	Z	R	C	
R	14.1	Z	0	C	11.0	R	400.2	Z	0	C	260.7	R	Z	C	
Z	0	C	10.9	R	14.1	Z	0	C	258.9	R	400.4	Z	C	R	
DATE						DATE:						DATE:			
Z		R		C		Z		R		C		Z	R	C	
R		Z		C		R		Z		C		R	Z	C	
Z		C		R		Z		C		R		Z	C	R	

Z- ZERO C-CANDIDATE R-REFERENCE

ANALYST: Robert Mc... APPROVED BY: Louise Thornton

THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATIVE EFFORT UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY THE QUALITY GUARANTEED. HOWEVER, IN CONNECTION WITH THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE.
ASSAYED AT NATIONAL SPECIALTY GASES, 630 UNITED DRIVE, DURHAM, NC 27713 (919)544-3772

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-40607 CYLINDER #:CC46348 CYL. PRESSURE:2000PSIG
EXPIRATION DATE: 6/2/98 LAST ANALYSIS DATE:6/2/95
CUSTOMER: TWIN CITY OXYGEN P.O.# 17405

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1.
THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

STANDARD:		INSTRUMENT:BECKMAN NDIR	BECKMAN PARAMAGNETIC
SRM #:	1675B 2659A	MODEL #:880	755
CYL #:	CLM6413 CLM6737	SERIAL #:2000418	1001419
CONC.:	14.01% 20.72%	LAST CAL.:5/22/95	6/1/95

COMPONENT:CO2		COMPONENT: O2		COMPONENT:	
MEAN CONC:16.8%		MEAN CONC: 21.0%		MEAN CONC:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC.	
DATE:6/2/95	DATE:	DATE:6/2/95	DATE:	DATE:	DATE:
16.8%		21.0%			
16.8%		21.0%			
16.9%		21.1%			

BALANCE GAS:N2

REPLICATE DATA — COMPONENT:CO2

DATE: 6/2/95						DATE:		
Z	0	R	168.0	C	201.5	Z	R	C
R	168.5	Z	0	C	202.1	R	Z	C
Z	0	C	203.9	R	169.0	Z	C	R

REPLICATE DATA — COMPONENT:O2

DATE: 6/2/95						DATE:		
Z	0	R	210.0	C	212.8	Z	R	C
R	210.5	Z	0	C	213.0	R	Z	C
Z	0	C	214.9	R	211.0	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: Mary A. Savage APPROVED BY: Tina Rowe

"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 #:	88-45052	CYLINDER #:	CC50725	CYL. PRESSURE:	2000PSIG	P.O. #:	
EXP. DATE:	1/5/99	LAST ANALYSIS DATE:	1/5/96	CUSTOMER:	TWIN CITY OXYGEN		

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1 THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

COMPONENT:	CARBON MONOXIDE	COMPONENT:	COMPONENT:
STANDARD		STANDARD	STANDARD
SRM #:	1680B	SRM #:	SRM #:
CYL. #:	FF 34077	CYL. #	CYL. #
CONC:	477 PPM	CONC:	CONC:
INSTRUMENT:	ROSEMOUNT NDIR	INSTRUMENT:	INSTRUMENT:
MODEL #:	880A	MODEL #:	MODEL #:
SERIAL #:	2000172	SERIAL #:	SERIAL #:
LAST CAL.:	12/13/95	LAST CAL.:	LAST CAL.:
MEAN CONC.:	289 PPM +/- 2.31 PPM	MEAN CONC.:	MEAN CONC.:
REPLICATE CONC.		REPLICATE CONC.	REPLICATE CONC
DATE: 12/28/95	DATE: 1/5/96	DATE:	DATE:
289 PPM	289 PPM		
289 PPM	289 PPM		
290 PPM	289 PPM		

BALANCE GAS: NITROGEN

REPLICATE DATA						REPLICATE DATA			REPLICATE DATA		
DATE: 12/28/95						DATE:			DATE:		
Z 0	R 478	C 289.6				Z	R	C	Z	R	C
R 477	Z 0	C 289.0				R	Z	C	R	Z	C
Z 0	C 290.0	R 477				Z	C	R	Z	C	R
DATE: 1/5/96						DATE:			DATE:		
Z 0	R 478	C 289.6				Z	R	C	Z	R	C
R 477	Z 0	C 289				R	Z	C	R	Z	C
Z 0	C 289.6	R 478				Z	C	R	Z	C	R

Z= ZERO C=CANDIDATE R=REFERENCE

ANALYST: Jon Kore APPROVED BY: Laura Hawkins

ASSAYED AT: NATIONAL SPECIALTY GASES, 630 UNITED DRIVE, DURHAM, NC 27713. (919)544-3772

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919) 544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-25249 CYLINDER #:CC44391 CYL. PRESSURE: 2000PSIG

EXPIRATION DATE: 7-7-96 LAST ANALYSIS DATE:7-7-93

CUSTOMER:TWIN CITY OXYGEN P.O.# 5337
METHOD: EPA PROTOCOL # 13.0.4.G-1

STANDARD:

SRM #:1681B

CYL #:CLM4470

CONC.:975PPM

INSTRUMENT:
BECKMAN
COMPONENT: NDIR

MODEL #: 865

SERIAL #: 0103409

LAST CAL.: 4-2-93

COMPONENT: CO REPLICATE CONC.
MEAN CONC: 620PPM DATE: 6-30-93 DATE: 7-7-93
623PPM 618PPM
620PPM 616PPM
621PPM 619PPM

COMPONENT: REPLICATE CONC.
MEAN CONC: DATE: DATE:

COMPONENT: REPLICATE CONC.
MEAN CONC: DATE: DATE:

BALANCE GAS:N2

Air Produ ; and Chemicals, Inc.
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
AIR PRODUCTS & CHEMICALS, INC.
373 CANTERBURY ROAD
SHAKOPEE MN 55379

Notes:

Order No: CSS-174989-01
Batch No: 861-25785

Cylinder No: SG9151275BAL
Cylinder Pressure*: 2000 psig
Certification Date: 05/27/95
Expiration Date: 05/27/98

PO: Rel:

*** Certified Concentration ***			********* Reference Standards *********			************ Analytical Instrumentation ************			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
CARBON MONOXIDE	140 ±0.4 PPM	SG9113611BAL	GMIS	151.5000 PPM	Horiba VIA-510	405079	05/20/95	INFRARED HORIBA

Balance Gas: Nitrogen

* Standard should not be used below 150 psig

H-7

Analyst: James Laas

Approved By: Robert McNear
Robert McNear

Air Products and Chemicals, Inc.
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
AIR PRODUCTS & CHEMICALS, INC.
373 CANTERBURY ROAD Notes:
SHAKOPEE MN 55379

PO: Rel:

Order No: CSS-188055-01
Batch No: 861-26103
Cylinder No: SG9150306BAL
Cylinder Pressure*: 2000 psig
Certification Date: 06/13/95
Expiration Date: 06/13/98

*** Certified Concentration ***		********* Reference Standards *********			********** Analytical Instrumentation **********			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
CARBON MONOXIDE	147 ±0.4 PPM	SG9113611BAL	GMIS	151.5000 PPM	Horiba VIA-510	405079	05/20/95	INFRARED HORIBA

Balance Gas: Nitrogen

* Standard should not be used below 150 psig

H-8

Analyst: Heather Aboor
Heather Aboor

Approved By: Robert McNear
Robert McNear

Air Products and Chemicals, Inc.
SPECIALTY GASES DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
AIR PRODUCTS & CHEMICALS, INC.
373 CANTERBURY ROAD
SHAKOPEE MN 55379

Notes:

PO: Rel:

Order No: CSS-411663-01
Batch No: 861-31683
Cylinder No: SG9136041BAL
Cylinder Pressure*: 2000 psig
Certification Date: 04/29/96
Expiration Date: 04/29/98

*** Certified Concentration ***			********* Reference Standards *********			********** Analytical Instrumentation **********			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration		Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
NITRIC OXIDE	90.6 ±.27 PPM	SG9148169BAL	GMIS	96.0200 PPM		Rosemount 951a	0101877	04/19/96	CHEMILUMINESCENCE

Balance Gas: NITROGEN

Contaminent
Nitrogen Dioxide .400 PPM

H-9

* Standard should not be used below 150 psig

Analyst: James Laas

Approved By: Richard Fry

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Certificate of Analysis for Standard Gas

Vendor: Air Products

Cylinder No.: SG 916 2775

Date of Preparation: 11-9-95

Label: Nitric Oxide

Blend Specification: 145 ppm Balance N_2

Results of Analysis of Standard Gas			
Date of Analysis	Run	NO	
4-5-96	1	143.3031	
4-5-96	2	142.8554	
4-5-96	3	142.9570	
	4		
	5		
	6		
	Avg	143.0385	-1.35%

Analyst: BOB A

☒ Results are within 2% of the vendor tag value; use tag value.

☐ Results are not within 2% of the vendor tag value; conduct another set of triplicate analyses.

☐ All results within ± 2% of the average; relabel as above.

☐ All results not within ± 2% of the average; perform another set of triplicate analyses.

Date: April 5, 1996

Approved by:

012696-G:\STACK\WP\FORMS\S-425

INTERPOLL LABS

TANK CERT
TANK NUMBER SG9162775
4/5/96

4/5/96	12:29:00 PM			
0	144.809	0	0	0
4/5/96	12:29:06 PM			
0	144.809	0	0	0
4/5/96	12:29:12 PM			
0	144.809	0	0	0
4/5/96	12:29:18 PM			
0	143.995	0	0	0
4/5/96	12:29:24 PM			
0	143.588	0	0	0
4/5/96	12:29:30 PM			
0	143.181	0	0	0
4/5/96	12:29:36 PM			
0	143.995	0	0	0
4/5/96	12:29:42 PM			
0	143.181	0	0	0
4/5/96	12:29:48 PM			
0	143.588	0	0	0
4/5/96	12:29:54 PM			
0	142.774	0	0	0
4/5/96	12:30:00 PM			
0	143.588	0	0	0
4/5/96	12:30:06 PM			
0	142.774	0	0	0
4/5/96	12:30:12 PM			
0	142.367	0	0	0
4/5/96	12:30:18 PM			
0	142.774	0	0	0
4/5/96	12:30:24 PM			
0	142.774	0	0	0
4/5/96	12:30:30 PM			
0	142.774	0	0	0
4/5/96	12:30:36 PM			
0	142.367	0	0	0
4/5/96	12:30:42 PM			
0	143.181	0	0	0
4/5/96	12:30:48 PM			
0	142.367	0	0	0
4/5/96	12:30:54 PM			
0	142.367	0	0	0

143.3031

INTERPOLL LABS

TANK CERT
TANK NUMBER SG9162775
4/5/96

4/5/96	12:36:00 PM			
0	144.402	0	0	0
4/5/96	12:36:06 PM			
0	144.809	0	0	0
4/5/96	12:36:12 PM			
0	143.181	0	0	0
4/5/96	12:36:18 PM			
0	143.588	0	0	0
4/5/96	12:36:24 PM			
0	143.181	0	0	0
4/5/96	12:36:30 PM			
0	142.367	0	0	0
4/5/96	12:36:36 PM			
0	142.367	0	0	0
4/5/96	12:36:42 PM			
0	142.774	0	0	0
4/5/96	12:36:48 PM			
0	143.181	0	0	0
4/5/96	12:36:54 PM			
0	142.367	0	0	0
4/5/96	12:37:00 PM			
0	143.181	0	0	0
4/5/96	12:37:06 PM			
0	142.367	0	0	0
4/5/96	12:37:12 PM			
0	142.367	0	0	0
4/5/96	12:37:18 PM			
0	142.367	0	0	0
4/5/96	12:37:24 PM			
0	142.367	0	0	0
4/5/96	12:37:30 PM			
0	142.367	0	0	0
4/5/96	12:37:36 PM			
0	142.367	0	0	0
4/5/96	12:37:42 PM			
0	141.96	0	0	0
4/5/96	12:37:48 PM			
0	142.774	0	0	0
4/5/96	12:37:54 PM			
0	142.774	0	0	0

142.8554

INTERPOL LABS

TANK CERT
TANK NUMBER SG9162775
4/5/96

4/5/96	12:42:00 PM			
0	144.809	0	0	0
4/5/96	12:42:06 PM			
0	144.402	0	0	0
4/5/96	12:42:12 PM			
0	143.995	0	0	0
4/5/96	12:42:18 PM			
0	143.181	0	0	0
4/5/96	12:42:24 PM			
0	143.588	0	0	0
4/5/96	12:42:30 PM			
0	143.995	0	0	0
4/5/96	12:42:36 PM			
0	142.774	0	0	0
4/5/96	12:42:42 PM			
0	143.181	0	0	0
4/5/96	12:42:48 PM			
0	142.367	0	0	0
4/5/96	12:42:54 PM			
0	142.774	0	0	0
4/5/96	12:43:00 PM			
0	142.367	0	0	0
4/5/96	12:43:06 PM			
0	141.96	0	0	0
4/5/96	12:43:12 PM			
0	143.181	0	0	0
4/5/96	12:43:18 PM			
0	142.774	0	0	0
4/5/96	12:43:24 PM			
0	142.367	0	0	0
4/5/96	12:43:30 PM			
0	142.367	0	0	0
4/5/96	12:43:36 PM			
0	142.367	0	0	0
4/5/96	12:43:42 PM			
0	142.367	0	0	0
4/5/96	12:43:48 PM			
0	141.96	0	0	0
4/5/96	12:43:54 PM			
0	142.367	0	0	0

142.95715

Air Products and Chemicals, Inc.
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
TWIN CITY OXYGEN (MAIN ACCT.)
305 2ND STREET NW
NEW BRIGHTON MN 55112-

Notes:

PO: 20013 Rel:

Order No: CSS-296700-01
Batch No: 861-28757
Cylinder No: SG9162775BAL
Cylinder Pressure*: 2000 psig
Certification Date: 11/09/95
Expiration Date: 11/09/97

*** Certified Concentration ***		********** Reference Standards **********			************ Analytical Instrumentation ************			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
NITRIC OXIDE	145 ±1.0 PPM	SG9151688BAL	GMIS	145.5000 PPM	Rosemount 951a	0101877	10/19/95	CHEMILUMINESCENCE

Balance Gas: NITROGEN

Contaminent	
Nitrogen Dioxide	1.80 PPM

H-14

* Standard should not be used below 150 psig

Analyst: Stephen Aboor
Stephen Aboor

Approved By: Richard Fry
Richard Fry

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Certificate of Analysis for Standard Gas

Vendor: Air Products

Cylinder No.: SG 9168059

Date of Preparation: ~~4-4-96~~ 12-12-95

Label: Nitric Oxide

Blend Specification: 141 ppm Balance N_2

Results of Analysis of Standard Gas			
Date of Analysis	Run	NO_x	
4-5-96	1	140.0888	
4-5-96	2	139.9667	
4-5-96	3	139.9463	
	4		
	5		
	6		
	Avg	140.0006	.71%

Analyst: [signature]

☒ Results are within 2% of the vendor tag value; use tag value.

☐ Results are not within 2% of the vendor tag value; conduct another set of triplicate analyses.

☐ All results within ± 2% of the average; relabel as above.

☐ All results not within ± 2% of the average; perform another set of triplicate analyses.

Date: April 5, 1996

Approved by: [signature]

012696-C:\STACK\WP\FORMS\S-425

INTERPOLL LABS

TANK CERT
TANK NUMBER SG9168059
4/5/96

4/5/96	9:31:00 AM			
0	139.926	0	0	0
4/5/96	9:31:06 AM			
0	139.926	0	0	0
4/5/96	9:31:12 AM			
0	140.74	0	0	0
4/5/96	9:31:18 AM			
0	140.333	0	0	0
4/5/96	9:31:24 AM			
0	140.333	0	0	0
4/5/96	9:31:30 AM			
0	140.333	0	0	0
4/5/96	9:31:36 AM			
0	140.74	0	0	0
4/5/96	9:31:42 AM			
0	139.519	0	0	0
4/5/96	9:31:48 AM			
0	139.926	0	0	0
4/5/96	9:31:54 AM			
0	140.74	0	0	0
4/5/96	9:32:00 AM			
0	139.926	0	0	0
4/5/96	9:32:06 AM			
0	140.333	0	0	0
4/5/96	9:32:12 AM			
0	139.926	0	0	0
4/5/96	9:32:18 AM			
0	139.926	0	0	0
4/5/96	9:32:24 AM			
0	139.926	0	0	0
4/5/96	9:32:30 AM			
0	140.333	0	0	0
4/5/96	9:32:36 AM			
0	140.333	0	0	0
4/5/96	9:32:42 AM			
0	139.519	0	0	0
4/5/96	9:32:48 AM			
0	139.519	0	0	0
4/5/96	9:32:54 AM			
0	139.519	0	0	0

140.0666

INTERPOLL LABS

TANK CERT
TANK NUMBER GG9168058
4/5/96

4/5/96	9:46:00 AM			
0	140.333	0	0	0
4/5/96	9:46:06 AM			
0	139.926	0	0	0
4/5/96	9:46:12 AM			
0	140.333	0	0	0
4/5/96	9:46:18 AM			
0	139.926	0	0	0
4/5/96	9:46:24 AM			
0	139.926	0	0	0
4/5/96	9:46:30 AM			
0	139.519	0	0	0
4/5/96	9:46:36 AM			
0	140.333	0	0	0
4/5/96	9:46:42 AM			
0	139.112	0	0	0
4/5/96	9:46:48 AM			
0	139.926	0	0	0
4/5/96	9:46:54 AM			
0	139.926	0	0	0
4/5/96	9:47:00 AM			
0	139.926	0	0	0
4/5/96	9:47:06 AM			
0	140.333	0	0	0
4/5/96	9:47:12 AM			
0	139.519	0	0	0
4/5/96	9:47:18 AM			
0	139.926	0	0	0
4/5/96	9:47:24 AM			
0	140.333	0	0	0
4/5/96	9:47:30 AM			
0	139.926	0	0	0
4/5/96	9:47:36 AM			
0	139.926	0	0	0
4/5/96	9:47:42 AM			
0	139.519	0	0	0
4/5/96	9:47:48 AM			
0	140.333	0	0	0
4/5/96	9:47:54 AM			
0	139.926	0	0	0

139.94635

Air Products and Chemicals, Inc.
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
AIR PRODUCTS & CHEMICALS, INC.
373 CANTERBURY ROAD
SHAKOPEE MN 55379

Notes:

PO: Rel:

Order No: CSS-320131-01
Batch No: 861-29293

Cylinder No: SG9168059BAL
Cylinder Pressure*: 2000 psig
Certification Date: 12/12/95
Expiration Date: 12/12/97

*** Certified Concentration ***		********* Reference Standards *********			********** Analytical Instrumentation **********			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
NITRIC OXIDE	141 ±0.9 PPM	SG9151688BAL	GMIS	145.5000 PPM	Rosemount 951a	0101877	11/20/95	CHEMILUMINESCENCE

Balance Gas: NITROGEN

Contaminent
Nitrogen Dioxide .400 PPM

H-18

* Standard should not be used below 150 psig

Analyst: James Laas

Approved By: Richard Fry

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Certificate of Analysis for Standard Gas

Vendor: SCOTT SPECIALTY GASES
Cylinder No.: ALM 030977
Date of Preparation: 11-2-92
Label: NITRIC OXIDE
Blend Specification: 144.1 PPM BALANCE N2

Results of Analysis of Standard Gas			
Date of Analysis	Run		
4-24-96	1	140.12	
4-24-96	2	138.04	
4-24-96	3	139.48	
4-24-96	4	140.30	
4-24-96	5	140.58	
4-24-96	6	139.47	
	Avg	139.738	

Analyst: JAMES BANVILLE

☐ Results are within 2% of the vendor tag value; use tag value.

☐ Results are not within 2% of the vendor tag value; conduct another set of triplicate analyses.

☒ All results within ± 2% of the average; relabel as above.

☐ All results not within ± 2% of the average; perform another set of triplicate analyses.

Date: APRIL 24, 1996
Approved by:

012696-G:\STACK\WP\FORMS\S-425

Shipped From : Scott Michigan
Our Project # : 542740
Your P.O. # : 40643
Expiration Date : 4-19-94
Cylinder Number : ALM030977
Cylinder Pressure : 1900 psig
Certification Date : 10-19-92

Customer :
GENEX
2455 CLEVELAND AVENUE
ROSEVILLE MN 55113

**** CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES ****

PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

LAB # 5299

Certified Accuracy 1 % NIST Traceable

1 of 1 Component(s)

ANALYZED CYLINDER		REFERENCE STANDARDS			INSTRUMENTATION		
COMPONENT	CERTIFIED CONCENTRATION	SRM # (CRM #)	CYLINDER NUMBER	CONCENTRATION	INSTRUMENT/ MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
NITRIC OXIDE	144.1 PPM	1685 1684	ALM-008716 ALM-010464	250.3 PPM 95.26 PPM	BECKMAN 951A 270-0828998	10-1-92	CHEMILUMINESCENCE

BALANCE GAS : NITROGEN

NITROGEN DIOXIDE 1.00 PPM (FROM SECOND ANALYSIS)

FIRST ANALYSIS DATE : 10-13-92

ZERO GAS (mV)	TEST GAS (mV)	CURVE RESULTS PPM	REFERENCE GAS CONCENTR.	(mV)	CURVE RESULTS PPM
0.00	57.60	144.2	250.3 PPM	100.0	250.3
0.00	57.50	143.9		100.0	250.3
0.00	57.50	143.9		100.0	250.3

CALCULATED RESULTS 144.2, 143.9, 143.9

AVERAGE : 144.0 PPM

SECOND ANALYSIS DATE : 10-19-92

ZERO GAS (mV)	TEST GAS (mV)	CURVE RESULTS PPM	REFERENCE GAS CONCENTR.	(mV)	CURVE RESULTS PPM
0.00	57.60	144.2	250.3 PPM	100.0	250.3
0.00	57.60	144.2		100.0	250.3
0.00	57.60	144.2		100.0	250.3
0.00	58.00 NOX	145.2			

CALCULATED RESULTS 144.2, 144.2, 144.2

145.2 PPM NOX

AVERAGE : 144.2 PPM

CALIBRATION CURVE 1 st DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1685	250.3	100	100.0	250.3	0.00
1684	95.26	38	38.05	95.24	-0.02
	0.0000	0	0.0000	0.0000	0.00
		0		0.00	0.00
		0		0.00	0.00
		0		0.00	0.00
		0		0.00	0.00
1684	95.26	LOW	38.05	95.24	-0.02
1685	250.3	HIGH	100.0	250.3	0.00

* GNIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : DON EICHLER, JR

Approved By : J Shapiro

Revised : 3/31/92 RML

H-20

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Certificate of Analysis for Standard Gas

Vendor: Air Products

Cylinder No.: SG 9151692

Date of Preparation: ~~4-4-96~~ 6-2-95

Label: Nitric Oxide

Blend Specification: 73.7 ppm, Balance N2

Results of Analysis of Standard Gas			
Date of Analysis	Run	NOx	
4-4-96	1	72.4614	
4-4-96	2	72.3393	
4-4-96	3	72.6038	
	4		
	5		
	6		
	Avg	72.4682	1.67%

Analyst: [illegible]

☒ Results are within 2% of the vendor tag value; use tag value.

☐ Results are not within 2% of the vendor tag value; conduct another set of triplicate analyses.

☐ All results within ± 2% of the average; relabel as above.

☐ All results not within ± 2% of the average; perform another set of triplicate analyses.

Date: April 4, 1996

Approved by: [signature]

012696-G:\STACK\WP\FORMS\S-425

INTERPOLL LABS

TANK CEWRT
TANK NUMBER SG9151692
4/4/96

4/4/96	1:20:00 PM			
0	71.973	0	0	0
4/4/96	1:20:06 PM			
0	74.008	0	0	0
4/4/96	1:20:12 PM			
0	73.601	0	0	0
4/4/96	1:20:18 PM			
0	73.194	0	0	0
4/4/96	1:20:24 PM			
0	72.787	0	0	0
4/4/96	1:20:30 PM			
0	72.38	0	0	0
4/4/96	1:20:36 PM			
0	71.973	0	0	0
4/4/96	1:20:42 PM			
0	72.787	0	0	0
4/4/96	1:20:48 PM			
0	72.38	0	0	0
4/4/96	1:20:54 PM			
0	71.566	0	0	0
4/4/96	1:21:00 PM			
0	72.38	0	0	0
4/4/96	1:21:06 PM			
0	72.38	0	0	0
4/4/96	1:21:12 PM			
0	72.787	0	0	0
4/4/96	1:21:18 PM			
0	73.194	0	0	0
4/4/96	1:21:24 PM			
0	71.16	0	0	0
4/4/96	1:21:30 PM			
0	72.38	0	0	0
4/4/96	1:21:36 PM			
0	72.38	0	0	0
4/4/96	1:21:42 PM			
0	71.973	0	0	0
4/4/96	1:21:48 PM			
0	72.38	0	0	0
4/4/96	1:21:54 PM			
0	71.566	0	0	0

72.46145

INTERPOL LABS

TANK CERT
TANK NUMBER SG9151692
4/4/96

4/4/96	1:41:05 PM			
0	72.38	0	0	0
4/4/96	1:41:11 PM			
0	72.787	0	0	0
4/4/96	1:41:17 PM			
0	73.194	0	0	0
4/4/96	1:41:23 PM			
0	72.38	0	0	0
4/4/96	1:41:29 PM			
0	72.787	0	0	0
4/4/96	1:41:35 PM			
0	73.194	0	0	0
4/4/96	1:41:41 PM			
0	71.973	0	0	0
4/4/96	1:41:47 PM			
0	71.973	0	0	0
4/4/96	1:41:53 PM			
0	71.973	0	0	0
4/4/96	1:41:59 PM			
0	73.194	0	0	0
4/4/96	1:42:05 PM			
0	71.973	0	0	0
4/4/96	1:42:11 PM			
0	72.787	0	0	0
4/4/96	1:42:17 PM			
0	71.973	0	0	0
4/4/96	1:42:23 PM			
0	72.787	0	0	0
4/4/96	1:42:29 PM			
0	72.787	0	0	0
4/4/96	1:42:35 PM			
0	73.194	0	0	0
4/4/96	1:42:41 PM			
0	73.601	0	0	0
4/4/96	1:42:47 PM			
0	72.787	0	0	0
4/4/96	1:42:53 PM			
0	71.973	0	0	0
4/4/96	1:42:59 PM			
0	72.38	0	0	0

72.60385

Air Products and Chemicals, Inc.
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
AIR PRODUCTS & CHEMICALS, INC.
373 CANTERBURY ROAD Notes:
SHAKOPEE MN 55379

PO: Rel:

Order No: CSS-174990-01
Batch No: 861-25878
Cylinder No: SG9151692BAL
Cylinder Pressure*: 2000 psig
Certification Date: 06/02/95
Expiration Date: 06/02/97

*** Certified Concentration ***		********* Reference Standards *********			********** Analytical Instrumentation **********			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
NITRIC OXIDE	73.7 ±0.64 PPM	SG9119927BAL	GMIS	93.7200 PPM	Rosemount 951a	0101877	05/18/95	CHEMILUMINESCENCE

Balance Gas: Nitrogen

Contaminent	
Nitrogen Dioxide	.300 PPM

H-24

* Standard should not be used below 150 psig

Analyst: Richard VanDyke

Approved By: Robert McNear

Air Products and Chemicals, Inc.
SPECIALTY G. . DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
AIR PRODUCTS & CHEMICALS, INC.
373 CANTERBURY ROAD Notes:
SHAKOPEE MN 55379

PO: Rel:

Order No: CSS-411663-01
Batch No: 861-31683

Cylinder No: SG9169061BAL
Cylinder Pressure*: 2000 psig
Certification Date: 04/29/96
Expiration Date: 04/29/98

*** Certified Concentration ***		********* Reference Standards *********			********** Analytical Instrumentation **********			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
NITRIC OXIDE	91.9 ±.39 PPM	SG9148169BAL	GMIS	96.0200 PPM	Rosemount 951a	0101877	04/19/96	CHEMILUMINESCENCE

Balance Gas: NITROGEN

Contaminent	
Nitrogen Dioxide	1.40 PPM

H-25

* Standard should not be used below 150 psig

Analyst: James Laas

Approved By: Richard Fry

Air Products and Chemicals, Inc.
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
AIR PRODUCTS & CHEMICALS, INC.
373 CANTERBURY ROAD Notes:
SHAKOPEE MN 55379

PO: Rel:

Order No: CSS-195906-01
Batch No: 861-26235
Cylinder No: SG9152374BAL
Cylinder Pressure*: 2000 psig
Certification Date: 06/13/95
Expiration Date: 06/13/98

*** Certified Concentration ***		********* Reference Standards *********			********** Analytical Instrumentation **********			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
PROPANE	30.4 ±.22 PPM	SG9128572BAL	GMIS	30.4000 PPM	Gow-Mac 750	59405U	05/30/95	GC-FID

Balance Gas: AIR
Oxygen Concentration 20.1 %

H-26

* Standard should not be used below 150 psig

Analyst: James Laas

Approved By: Robert McNear
Robert McNear

NATIONAL SPECIALTY GASES•630 UNITED DRIVE•DURHAM, N.C. 27713•(919) 544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-41643 CYLINDER #: CC46326 CYL. PRESSURE:2000PSIG CUSTOMER:TWIN CITY
EXPIRATION DATE: 7/25/98 LAST ANALYSIS DATE: 7/25/95 P.O.#:SHELIA
METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1.
THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150PSIG).

STANDARD:
SRM #: 1667B
CYL. #: CLM5293
CONC.: 47.3PPM
INSTRUMENT:ROSEMOUNT THC
MODEL#:400A
SERIAL #:2000335
LAST CAL.:7/14/95

COMPONENT:PROPANE
MEAN CONC:30.5 ± 0.31PPM
REPLICATE CONC.
DATE:7/25/95 DATE:
30.5PPM
30.5PPM
30.6PPM

BALANCE GAS:AIR

COMPONENT:PROPANE
REPLICATE DATA
DATE: 7/25/95

Z	0	R	47.3	C	30.5
R	47.3	Z	0	C	30.5
Z	0	C	30.6	R	47.3

DATE:

Z	R	C
R	Z	C
Z	C	R

STANDARD:
SRM #:
CYL. #:
CONC.:
INSTRUMENT:
MODEL #:
SERIAL #:
LAST CAL.:

COMPONENT:
MEAN CONC:
REPLICATE CONC.
DATE: DATE:

COMPONENT:
REPLICATE DATA
DATE:

Z	R	C
R	Z	C
Z	C	R

DATE:

Z	R	C
R	Z	C
Z	C	R

STANDARD:
SRM #:
CYL. #:
CONC.:
INSTRUMENT:
MODEL #:
SERIAL #:
LAST CAL.:

COMPONENT:
MEAN CONC:
REPLICATE CONC.
DATE: DATE:

COMPONENT:
REPLICATE DATA
DATE:

Z	R	C
R	Z	C
Z	C	R

DATE:

Z	R	C
R	Z	C
Z	C	R

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Richard Sykes APPROVED BY: Jane Rowe

"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."

Air Products and Chemicals, Inc.
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
AIR PRODUCTS & CHEMICALS, INC.
373 CANTERBURY ROAD Notes:
SHAKOPEE MN 55379

PO: Rel:

Order No: CSS-320133-01
Batch No: 861-29310
Cylinder No: SG9170128BAL
Cylinder Pressure*: 2000 psig
Certification Date: 12/04/95
Expiration Date: 12/04/98

*** Certified Concentration ***		********* Reference Standards *********			********** Analytical Instrumentation **********			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
PROPANE	286 ±3.2 PPM	SG9128611BAL	GMIS	351.5000 PPM	Gow-Mac 750	59405U	11/14/95	GC-FID

Balance Gas: AIR
Oxygen Concentration 20.1 %

H-28

* Standard should not be used below 150 psig

Analyst: Richard VanDyke

Approved By: Richard Fry

APPENDIX I

PROCESS RATE INFORMATION

Louisiana-Pacific Corporation
Northern Division
Rt. 8, Box 8263
Hayward, Wisconsin 54843
(715) 634-3454

LETTER OF TRANSMITTAL

Date: 9/24/96	
TO:	Kathy Eickstadt
RE:	

TO Interpoll Laboratories
4500 Ball Road NE
Circle Pines, MN

WE ARE SENDING YOU

[X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop Drwgs. [X] Prints [ ] Plans [ ] Samples [ ] Specifications

[ ] Copy of Letter [ ] Change Order [ ] 3.5" disk [X] 11" x 17" sketches

COPIES	REV.	NO.	DESCRIPTION
1			Process Data for Newberry's Compliance

THESE ARE TRANSMITTED as checked below:

[ ] For approval
[ ] For your use
[ ] As requested
[ ] For review & comment
[ ] For bids due _____

[ ] Approved as submitted
[ ] Approved as noted
[ ] Return for corrections
[ ] Resubmit___ copies for approval

[ ] Submit _____ copies for distribution
[ ] Return____
[ ] For your information
[ ] Construction Issue

REMARKS:

Copy To: File, **Signed:** Sue Somers /Sue Somers/ D.R.

NEWBERRY DRYER & PRESS TESTS

GENERAL DESCRIPTION

NEWBERRY DRYER & PRESS TESTING
AUGUST 27-29, 1996

All testing was conducted using 100% hardwoods with the RTO btu enhancement on. The finished product was 7/16" 4' x 9' panel siding.

a

NEWBERRY TEST SCHEDULE AUGUST 27-29, 1996

Dryer

	POLLUTANT	RUN #1	RUN #2	RUN #3
8-27	PM,CO,NOX,VOC	*1640-1749*	*1940-2055*	*2135-2210* *2315-2350*
8-28	HCHO,PHENOL METHANOL	*0930-0955* *1040-1133*	*1215-1332*	*1500-1618*

Press

8-27	MDI	*1005-1108*	*1117-1219*	*1230-1250* *1320-1405*
8-27	HCHO	*1450-1609*	*1645-1809*	*1835-1958*
8-28	PHENOL,METHANE	*1215-1317*	*1450-1552*	*1615-1717*
8-29	PM,CO,NOX,VOC	*0900-1000*	*1035-1135*	*1210-1310*

NEWBERRY TESTING AUGUST 27-29, 1996
Process data summary

DRYER AUGUST 27, 1996 - PM,CO,NOX,VOC

12.85	=PressProduction rate in Tons per hour
29,265	=Production rate of both dryers in pounds per hour
2.40	=Total fuel burned in tons per hour
47.85%	=average incoming moisture percent
3.49%	=average dry moisture percent
1,013	=average inlet temperature
1,543	=average RTO burner temperature #1
1,543	=average RTO burner temperature #2

PRESS AUGUST 27, 1996 - MDI

12.81	=Plant Production rate in Tons per hour
875	=MDI resin usage in pounds per hour
3.41%	=MDI resin usage as % of finished product
220	=Wax usage in pounds per hour
0.86%	=Wax usage as % of finished product
395	=Zinc Borate usage in pounds per hour
1.54%	=Zinc Borate as % of finished product
981	=Face paper usage in pounds per hour
247	=Backer paper usage in pounds per hour

PRESS AUGUST 27, 1996 - HCHO

12.37	=Plant Production rate in Tons per hour
897	=MDI resin usage in pounds per hour
3.63%	=MDI resin usage as % of finished product
229	=Wax usage in pounds per hour
0.92%	=Wax usage as % of finished product
378	=Zinc Borate usage in pounds per hour
1.53%	=Zinc Borate as % of finished product
947	=Face paper usage in pounds per hour
238	=Backer paper usage in pounds per hour

DRYER AUGUST 28, 1996 - HCHO,PHENOL,METHANOL

12.21	=PressProduction rate in Tons per hour
28,472	=Production rate of both dryers in pounds per hour
2.61	=Total fuel burned in tons per hour
48.73%	=average incoming moisture percent
3.55%	=average dry moisture percent
1,020	=average inlet temperature
1,541	=average RTO burner temperature #1
1,537	=average RTO burner temperature #2

2

PRESS AUGUST 28, 1996 - PHENOL,METHANE

12.26 =Plant Production rate in Tons per hour
957 =MDI resin usage in pounds per hour
3.90% =MDI resin usage as % of finished product
239 =Wax usage in pounds per hour
0.97% =Wax usage as % of finished product
343 =Zinc Borate usage in pounds per hour
1.40% =Zinc Borate as % of finished product
944 =Face paper usage in pounds per hour
237 =Backer paper usage in pounds per hour

PRESS AUGUST 29, 1996 - PM,CO,NOX,VOC

11.99 =Plant Production rate in Tons per hour
902 =MDI resin usage in pounds per hour
3.76% =MDI resin usage as % of finished product
223.00 =Wax usage in pounds per hour
0.93% =Wax usage as % of finished product
335 =Zinc Borate usage in pounds per hour
1.40% =Zinc Borate as % of finished product
936 =Face paper usage in pounds per hour
235 =Backer paper usage in pounds per hour

3

DRYER AUGUST 27, 1996
PM,CO,NOX,VOC

DATA TIME:	START=	16:40	END=	17:49	HOURS=	1.15
	START=	19:40	END=	20:55	HOURS=	1.25
	START=	21:35	END=	22:10	HOURS=	0.58
	START=	23:15	END=	23:50	HOURS=	0.58
					TOTAL=	3.57

BOARD WEIGHTS - LBS

average weights determined by taking every 25th untrimmed board (from press tapes)

7/16"
lb per/ 4' x 9' 55.49
lb per/ 4' x 18' 110.98

119.3 lb= average untrimmed mat weight

lb weight of paper overlay (per msf) 74.15

6.97% =trim %

PLANT PRODUCTION RATE

3.57 =hours during testing
59 =pressloads (see press chart)
826 =no. of 4'x18' boards produced (pressloads x 14 boards per load)
59,472 =volume produced in surface footage (pressloads x 4'x18'x14 openings)
69,386 =volume produced 3/8" basis (pressloads x 4'x18'x 14 openings x 1.1667)
91,666 =lbs of finished product (boards produced x weight of finished board)
25,701 =lbs of finished product per hour (lbs of finshed product / hours)
12.85 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

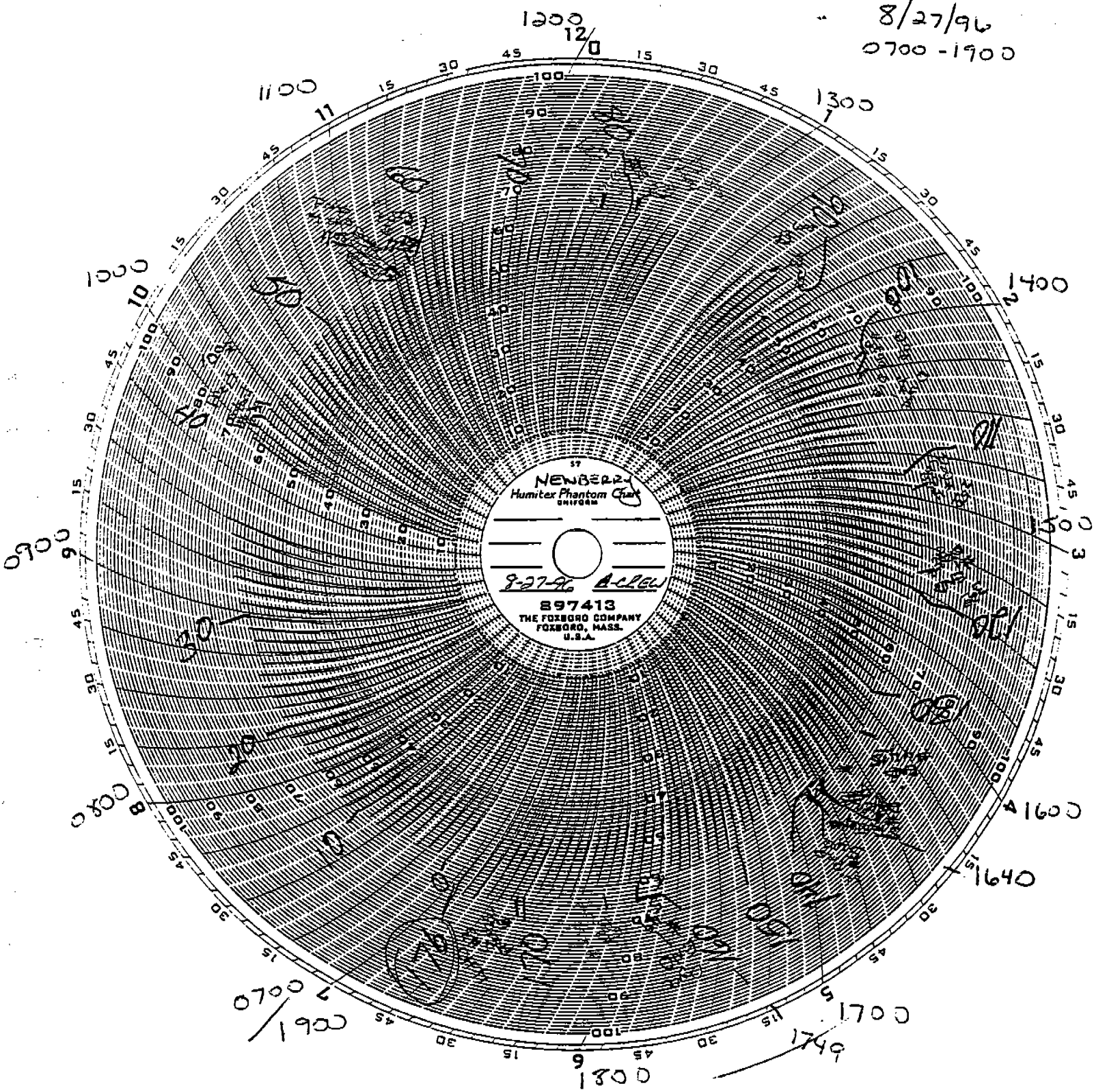
FUEL BURNING RATE ESTIMATED BY DRY FUEL INPUT

4.5 =fuel calibration in pounds per count
3,805 =counts during testing hours
17,123 = lbs of fuel burned during testing
3.57 =hours during testing
4,801 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.40 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,500 =estimated BTU content per pound of dry fuel,
40.8 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,013 =average inlet temperature
47.85 =average incoming moisture percent
3.49 =average dry moisture percent

DRYER THROUGHPUT RATE

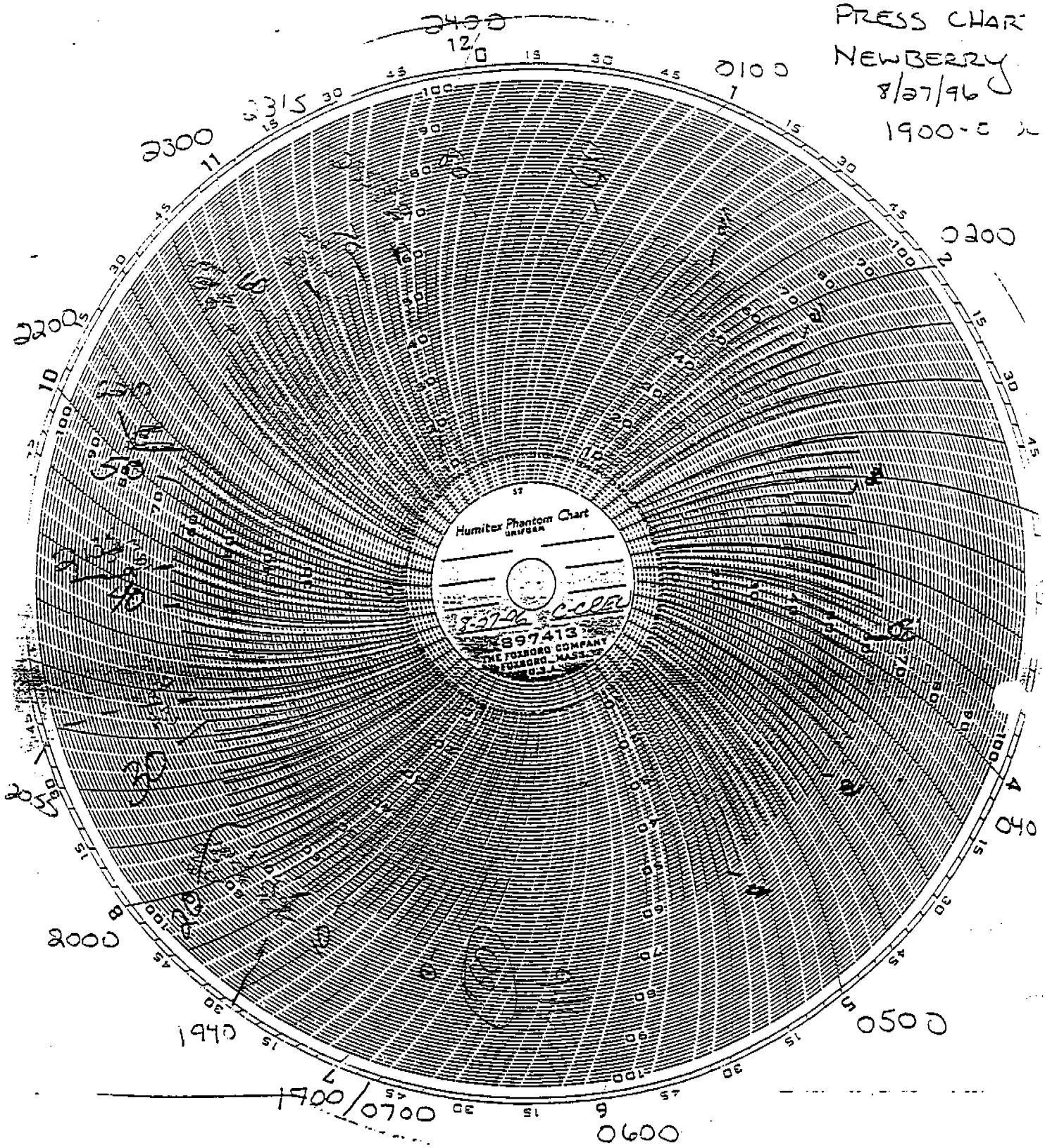
4,801 =Total pounds of fuel burned per hour in Dryer
25,701 =lbs of finished product per hour (lbs of finshed product / hours)
1,236 =lbs of face & backer paper per hour (surf. ftge.prod. per hour x lbs of paper per M/1000)
24,464 =lbs of finished product per hour less paper (lbs of finshed product / hours- paper)
29,265 =Pounds of material produced by the dryer per hour (dry basis, assuming fuel balances)
4,801 =weight of screened fines per hour (total fuel)
16.40% =resulting loss to fines as percentage of dryer throughput

PRESS CHART
8/27/96
0700 - 1900



TEST TIMES	PRESSLOADS
1640 - 1749	21
1940 - 2055	20
2135 - 2210	9
2315 - 2350	9

5


PRESS CHART
NEWBERRY
8/27/96
1900-0
Humitex Phantom Chart
THE FOXBORO COMPANY
FOXBORO, MASS.
U.S.A.
2400
0100
0200
0300
0400
0500
0600
0700
0800
0900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300

LOUISIANA-PACIFIC CORPORATION
NEWBERRY, MICHIGAN

DATE: 8/27/96

SHIFT	TYPE	# OF PRESS LOADS	A-GRADE	FOOTAGE	SCHED. RUN TIME	DOWNTIME MINUTES	% RUN TIME	% "A" GRADE	WOOD USAGE
A.M. TO P.M. A CREW	7/16 P.S. 4x18	176		206,976	720	47	93.4	96.7	KONUS #1 #2 10.4 DRYER 1ST 49,176
P.M. TO A.M. CREW	7/16 P.S 4X18 BAB	160		188,160	720	78	89.1	98.2	KONUS #1 #2 10.6 DRYER 2ND 32,783
TOTAL DAILY				395,136					

PRODUCTION M.T.D.		W.T.D.	M.T.D.	Y.T.D.
1ST SHIFT	637,728	1,573,656	1,573,656	81,114,966
2ND SHIFT	935,928			
TOTAL	1,573,656			

	HOURS DOWN	HOURS RUN
1ST		
2ND		

DAILY PRESS VENT CHECK
TIME CHECKED 9:30 AM

FOREMAN	% R/T
CHRIS VOGEL	93.4
BILL MAGNUSON	
KIRK BOWLER	89.1
BOBBY CRANDELL	

LOG COUNT	DAILY	W.T.D.	M.T.D.
CREW A	5120	5120	5120
CREW B			
CREW C	7280	7280	7280
CREW D			

CREW A:	206,976
CREW B:	430,752
CREW C:	188,160
CREW D:	747,768
TOTAL	1,573,656

MAJOR DOWNTIME: A-CREW 46 MIN FILLING WET BIN (STACK TESTING - PURPOSES)
C-CREW 69 MIN " " " (" " ")

NEWBERRY SHIFT PRODUCTION SUMMARY 8/27/96

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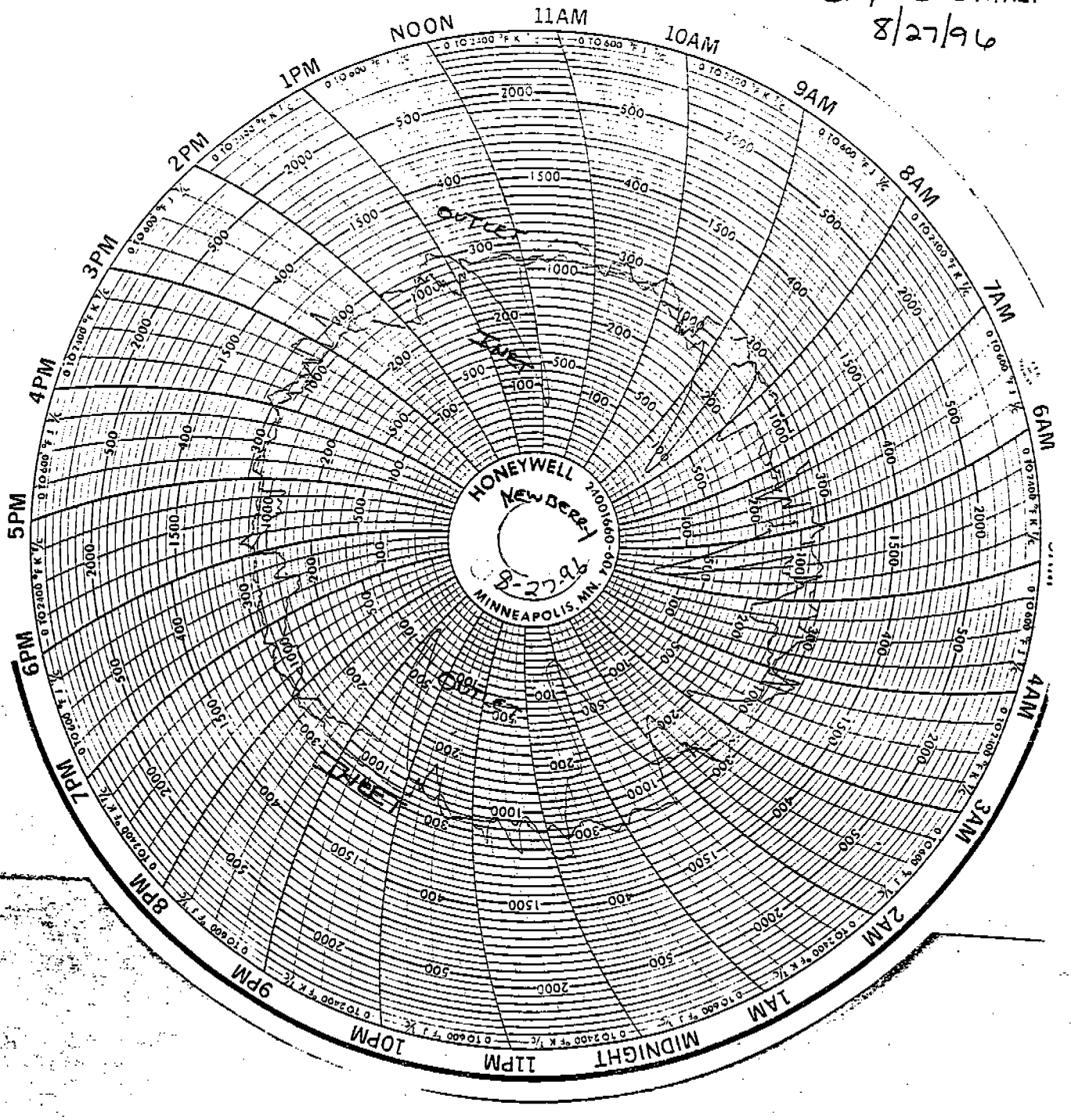
DRYER CHART
8/27/96



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LOUISIANA-PACIFIC CORPORATION
NEWBERRY, MI

DRYER REPORT

OPERATOR: James Depew SHIFT: 7am-7pm CREW: A DATE: 8-27-96

TIME	WET BIN LEVEL	FEED SPEED %	INLET TEMP %F	OUTLET TEMP %F	OUTLET MOIST. %	DRY FUEL USED LB.	SET POINT
7:15	19.0	430	894	276	3.2-3.4	313	256-256
11:22	32.4	410	1090	278	3.4-3.4	3992	259-257
						10,928	
						x 4.5	
			AVE:	AVE:	AVE:	TOT: 49,176	AVE:

ONCE PER SHIFT:

WET WAFER MOIST. % 52.8
DRYER FUEL MOIST. % 2.2
#1 BAGHOUSE MAGNEHELIC 3.0
MCCONNEL GAS METER 4679

HAMMERMILL MAGNET CLEANED: X
WOOD FUEL FILTER CLEANED: X
CROSS TRANSFER GAS METER 5322
PANEL OVEN GAS METER 3652

TIMES AND REASONS FOR DOWNTIME: _____

OTHER PROBLEMS: "

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LOUISIANA-PACIFIC CORPORATION
NEWBERRY, MI

DRYER REPORT

OPERATOR: Robert Marsh SHIFT: 7-7AM. CREW: C DATE: 8-27-96

TIME	WET BIN LEVEL	FEED SPEED %	INLET TEMP %F	OUTLET TEMP %F	OUTLET MOIST. %	DRY FUEL USED LB.	SET POINT
7:10	18.4	400	981	282	3.7-3.4	4556	260-261
9:03	27.1	440	995	281	3.3-3.0	2310	261-261
						7285	
						x 4.5	
						32,783	
					3.5-3.2		261-261
			AVE: 988	AVE: 282	AVE:	TOT:	AVE:

ONCE PER SHIFT:

WET WAFER MOIST. % 46.8 – 45.2
DRYER FUEL MOIST. % 24
#1 BAGHOUSE MAGNEHELIC 3.6
MCCONNEL GAS METER 4681

HAMMERMILL MAGNET CLEANED: ✓
WOOD FUEL FILTER CLEANED: ✓
CROSS TRANSFER GAS METER 5333
PANEL OVEN GAS METER 3679

TIMES AND REASONS FOR DOWNTIME: _____

OTHER PROBLEMS: 7:30 soil test

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NEWBERRY DRYER DATA
(FUEL CALIB. LB/COUNT)

8/27/96

Wet Bin Wood ✓ 2×3

TIME	OUT. SET POINT	FEED RATE	INLET TEMP.	OUTLET TEMP.	FUEL COUNT	WET BIN LEVEL	DRY BIN LEVEL	MOIST. IN	MOIST. OUT
10:05	256	440	878	293	2699	29.3	27.1		3.1
10:15	256	440	919	277	2853	32.7	27.2		3.5
10:25	256	440	958	273	3006	31.2	27.2		3.3
10:35	257	445	979	272	3174	32.2	27.2		3.7
10:45	257	445	1004	275	3341	32.1	23.1		3.6
10:55	257	445	1068	272	3511	31.8	22.2		3.5
11:05	257	430	1021	275	3681	32.7	28.1		3.6
11:15	257	430	1102	270	3850	32.4	28.5		3.9
11:25	257	410	1094	278	4040	32.0	28.0		3.6
11:35	257	410	1014	283	4215	30.5	28.1		3.3
11:45	257	420	1083	273	4397	31.5	27.2	51.7	4.1
11:55	257	420	1157	280	4589	33.0	27.4		3.6
12:05	258	410	1155	276	4775	31.1	28.2		3.7
12:15	258	410	1157	281	4965	29.9	28.2		3.4
12:25	258	410	1080	284	5149	23.3	28.1		3.5
12:35	258	420	1034	283	5336	16.1	27.3		3.4
12:45	258	440	1017	281	5499	8.0	26.6		3.5
12:55	258	440	909	290	5657	5.0	27.9		3.2
1:05	258	360	316	253	5763	17.2	25.5		3.5
1:15	258	360	349	257	5917	22.2	30.5		4.9
1:25	258	390	888	281	5902	32.8	28.9		5.0
1:35	258	410	1070	286	6085	34.3	27.9		3.6
1:45	258	410	1155	276	6278	30.0	26.4		4.0
1:55	258	410	1165	283	6470	25.3	24.9		3.6
2:05	258	405	1120	286	6662	27.1	25.3		3.4
2:15	258	405	1042	278	6859	31.4	24.3		3.6
2:25	258	405	997	282	7042	31.4	24.7		3.5

DRYER DATA NEWBERRY

NEWBERRY DRYER DATA
(FUEL CALIB. LB/COUNT)

8/27/96

	TIME	OUT. SET POINT	FEED RATE	INLET TEMP.	OUTLET TEMP.	FUEL COUNT	WET BIN LEVEL	DRY BIN LEVEL	MOIST. IN	MOIST. OUT
	2:35	256	405	907	285	7207	30.8	24.5	[illegible]	3.4
	2:45	255	405	915	277	7365	30.6	24.5		3.7
	2:55	255	405	922	276	7524	32.1	24.4		4.0
	3:05	255	406	1025	274	7698	32.0	24.8		3.8
	3:15	255	405	1013	276	7870	32.5	24.8	[illegible]	3.8
GAS	3:25	285	400	1196	294	7977	33.3	24.6	51.8	3.1
	3:35	285	400	1108	269	7977	30.3	25.7		4.6
	3:45	285	400	1210	274	7977	30.5	25.8		4.2
WOOD	3:55	257	400	1165	289	7995	32.5	25.8		4.0
	4:05	257	420	1078	296	8176	34.0	26.0		3.5
	4:15	257	430	1092	283	8349	31.2	26.3		3.9
	4:25	259	430	1126	281	8528	29.3	25.9		4.0
	4:35	259	430	1180	282	8710	32.2	25.10		4.0
	4:45	259	430	1130	285	8884	30.9	26.9		3.7
	4:55	261	440	1094	283	9058	28.1	27.4		4.2
	5:05	261	440	1104	281	9238	29.0	27.9	49.9	3.9
	5:15	261	440	1108	280	9425	29.3	28.5		3.9
	5:25	262	440	1113	282	9602	30.3	28.6		3.6
	5:35	262	440	1127	280	9778	31.5	28.8		3.6
	5:45	262	440	1068	283	9944	32.8	28.5		3.7
	[illegible]:55	262	405	1043	298	10143	28.4	28.9		2.9
	6:05	260	405	965	281	10291	22.1	24.3		3.7
	6:15	260	405	939	293	10451	21.2	28.6		3.8
	6:25	260	440	1012	296	10634	24.4	27.9		3.8
	6:35	260	410	1066	279	10802	26.1	27.9		3.6
	6:45	260	410	1095	282	10929+49	23.7	28.0		3.4
	6:53	260	410	927	2[illegible]	219	26.0	28.0		3.5

DRYER DATA NEWBERRY

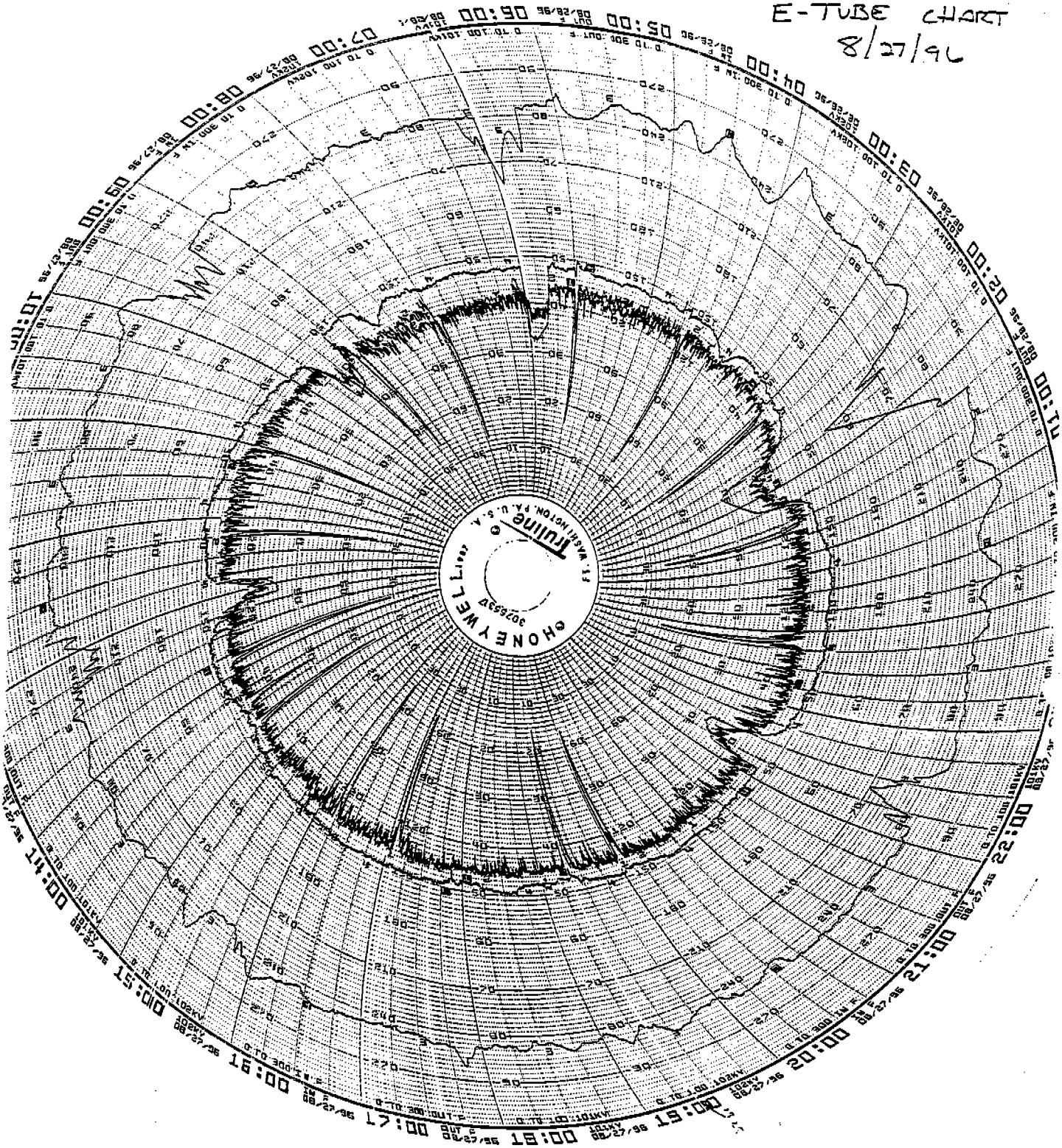
NEWBERRY DRYER DATA
(FUEL CALIB. LB/COUNT)

8/27/96

TIME	OUT. SET POINT	FEED RATE	INLET TEMP.	OUTLET TEMP	FUEL COUNT	WET BIN LEVEL	DRY BIN LEVEL	MOIST. IN	MOIST. OUT
7:05	259	430	960	282	430	17.7	24/29		3.8
7:15	269	380	930	290	535	17.8	24/28		3.4
7:25	257	380	863	280	688	21.4	26/26		3.9
7:35	268	420	945	290	840	23.7	26/24		3.6
7:45	267	440	952	288	969	27.4	26/23		3.1
7:55	260	440	975	280	1134	29.6	25/24		3.5
8:05	265	440	995	281	1382	31.1	24/25	45.8	3.2
8:15	266	440	948	286	1503	33.1	26/25		3.2
8:25	263	440	962	282	1669	29.4	24/27		3.2
8:35	257	440	997	276	1819	31.2	23/28		3.5
8:45	265	440	1075	282	2093	28.4	24/24		3.1
8:55	264	940	1016	280	2219	27.2	23/29	45.8	3.2
9:05	261	440	995	280	2332	27.8	28/27		3.4
9:15	261	440	1007	279	2524	30.3	28/27		3.3
9:25	263	440	984	281	2661	29.2	26/24		3.1
9:35	262	440	954	279	2872	30.2	29/26		3.3
9:45	261	440	936	279	2989	26.8	28/28		3.3
9:55	261	440	927	281	3147	18.7	28/29		3.2
10:05	262	440	919	283	3320	12.4	28/30		3.2
10:15	258	360	512	259	3432	12.8	29/31		4.1
10:25	241	360	267	268	3433	22.2	29/31	45.2	3.5
10:35	260	360	237	253	3455	28.0	29/30		3.7
10:45	267	420	844	288	3598	28.9	28/27		3.9
10:55	265	440	1005	285	3826	31.5	28/25		3.3
11:05	263	440	1036	284	3998	32.5	27/26		3.5
11:15	262	440	1001	282	4229	25.2	26/27		3.4
11:25	259	440	1081	279	4364	27.1	24/28		3.4
11:35	261	440	1026	278	4576	29.8	26/28		3.4

DRYER DATA NEWBERRY

E-TUBE CHART
8/27/96



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every 10 min.

8/27/96

NEWBERRY E-TUBE DATA SHEET

TIME	SOUTH TR SET KV	SOUTH TR SET MA	SOUTH TR SET SPARK RATE	NORTH TR SET KV	NORTH TR SET MA	NORTH TR SET SPARK RATE	QUENCH outlet ~~INLET~~	QUENCH inlet ~~OUTLET~~	
~~1st test~~ 10:00	44	200	29.8	46	130	30.0	135	246	119lbs.
10:10	43	150	29.8	44	180	29.7	138	239	tons of
10:20	46	180	29.8	46	~~200~~ 200	29.8	140	234	
10:30	46	180	29.9	46	160	29.8	140	234	
10:40	45	200	30.0	45	180	29.9	235	140	
10:50	46	180	29.8	46	220	29.9	235	142	17 pres loads
11:00	46	185	29.8	46	135	29.9	236	141	
Start dryer test 11:10	45	100	29.9	46	100	29.7	234	142	18 pres loads
11:20	46	210	29.9	48	130	29.7	236	143	
11:30	46	198	29.9	46	125	29.8	240	142	
11:40	45	110	29.8	47	110	29.8	236	143	
11:50	46	138	29.8	45	122	29.8	235	145	
12:00	46	140	29.9	47	130	29.8	235	144	
12:10	47	140	29.9	46	145	29.9	235	146	
12:26	48	130	29.6	47	138	29.7	242	144	
12:35	47	170	29.8	46	120	29.9	240	142	
12:46	46	210	29.9	46	145	29.8	240	142	238
12:56	48	440	29.8	43	350	29.9	228	108	
1:05	41	210	29.8	41	145	29.9	223	99	27289
1:16	47	140	29.8	48	168	29.8	236	128	
1:26							235	139	
1:36	~~46~~ ~~152~~	~~46~~	~~46~~	~~46~~	~~46~~		237	144	
1:46	46	170	29.8	47	160	29.8	233	146	
start ~~1st~~ 1:56	45	180	29.8	47	100	30.1	239	145	
~~2:06~~	48	230	29.8	45	100	29.6	240	143	
2:16	48	220	29.9	47	100	29.9	236	142	
2:26	47	120	29.9	47	110	29.8	239	139	
2:36	47	190	29.6	46	150	29.6	241	136	
2:46	38	40	30.2	46	165	30.0	234	137	
2:56	46	205	29.4	47	110	29.6	233	139	
3:06	46	195	29.7	46	100	29.8	233	140	

12:30 started #3 test

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8/27/96 8/27/96

NEWBERRY E-TUBE DATA SHEET								
	SOUTH TR SET #2			NORTH TR SET #1				
			SPARK			SPARK	QUENCH	
TIME	KV	MA	RATE	KV	MA	RATE	INLET	OUTLET
3:15	48	160	29.9	46	110	29.9	233	142
3:25	47	270	29.9	46	215	29.9	246	143
3:35	46	300	29.8	46	210	29.8	228	143
3:45	46	340	29.8	45	280	29.8	225	144
3:55	48	140	30.0	48	165	29.9	232	143
4:05	47	250	29.8	47	60	29.8	247	143
4:15	46	280	30.0	18	20	30.1	239	144
4:25	47	245	30.0	47	100	29.6	237	146
4:35	47	162	29.7	47	110	29.8	240	147
4:45	46	220	29.7	47	105	29.9	242	144
4:55	48	150	29.9	46	180	29.9	239	145
5:05	46	73	29.9	43	70	29.8	239	144
5:15	48	108	29.8	51	82	29.9	238	144
5:25	52	91	29.8	44	44	29.9	239	146
5:35	54	117	30.0	50	123	29.8	238	144
5:45	43	58	29.8	52	88	29.9	241	144
5:55	50	70	29.9	53	97	29.9	248	136
6:05	55	141	29.7	53	108	29.8	241	140
6:15	50	82	29.9	49	70	29.8	239	141
6:25	53	114	29.9	46	47	29.9	241	143
6:35	55	138	29.9	50	67	29.9	238	144
6:45	51	100	29.8	50	76	29.8	243	141
6:55	51	161	29.8	51	135	29.9	240	139
7:05	48	105	29.9	56	126	29.8	238	142
7:15	53	176	29.8	50	138	29.9	246	138
7:25	51	132	29.9	51	155	29.9	240	136
7:35	54	114	29.9	54	144	29.9	245	139
7:45	53	102	29.9	56	137	29.9	244	142
7:55	53	100	29.8	54	144	29.9	239	142
8:05	53	91	29.9	54	132	29.8	240	141
8:15	55	114	29.9	54	123	29.9	242	141

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8/27/96

NEWBERRY E-TUBE DATA SHEET								
	SOUTH TR SET #2			NORTH TR SET #2				
TIME	KV	MA	SPARK RATE	KV	MA	SPARK RATE	QUENCH INLET	QUENCH OUTLET
8:25	55	123	29.8	54	120	29.9	241	141
8:35	56	144	29.9	55	126	29.8	235	143
8:45	53	105	29.8	57	164	29.8	241	144
8:55	55	126	29.8	55	144	29.9	241	142
9:05	53	117	29.8	54	123	29.9	240	142
9:15	56	152	29.8	57	193	29.8	239	143
9:25	52	141	29.8	57	194	30.0	241	142
9:35	55	164	29.8	54	158	29.8	238	140
9:45	52	111	29.8	57	205	29.8	238	141
9:55	52	117	29.8	57	217	29.8	239	140
10:05	55	158	29.9	57	211	29.8	238	139
10:15	49	217	29.9	54	391	29.9	230	103
10:25	45	155	29.8	51	282	29.8	208	97
10:35	50	91	29.9	45	100	29.9	215	110
10:45	53	135	29.9	56	185	29.8	238	136
10:55	52	117	29.8	55	179	29.8	243	140
11:05	56	167	29.8	55	167	29.8	240	143
11:15	56	161	29.8	54	152	29.9	238	144
11:25	53	123	29.8	54	150	29.7	237	145
11:35	56	179	29.9	56	182	29.9	234	143
11:45	55	150	29.9	55	155	29.8	237	145
11:55								

5:40:8

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Louisiana-Pacific Corporation
Newberry, Michigan

E-TUBE OPERATING REPORT

Operator	Crew	Date
Days DARTT	A	8-27-96
Nights WARREN	C	

Time	T/R CONTROL PANEL DIGITAL TRANSFORMER/RECTIFIERS No. 1 KV	No. 1 mA	No. 2 KV	No. 2 mA	Mesh Pad Δ P	ZYCOM QUENCH INLET deg. F	QUENCH OUTLET deg. F	INLET in H2O	OUTLET in H2O	Beginning & End of Shift on the Vessel: Flush Water total gal.	Make-up Water total gal.	Vessel PSI
7:00 AM	42	193	44	334	.4	236	138	11	25	1127933	535684	
8:00 AM	41	223	40	222	.4	239	135	11	25	1136516	541077	
9:00 AM	40	129	43	155	.4	241	142	11	25			
10:00 AM	40	163	44	110	.4	245	136	11	26			
11:00 AM	46	168	45	103	.4	235	143	11	25			
12:00 PM	45	111	47	171	.4	238	145	11	25			
1:00 PM			DRYERS DOWN									
2:00 PM	44	95	48	125	.4	240	144	10	25			
3:00 PM	43	95	46	104	.4	235	140	11	25			
4:00 PM	47	149	47	129	.4	242	144	11	26			
5:00 PM	41	86	45	57	.4	238	145	11	25			
6:00 PM	45	104	46	146	.4	248	140	12	27			
7:00 PM	45	135	43	111	.4	243	139	11	26			
8:00 PM	47	169	45	82	.4	237	143	10	26			
9:00 PM	46	155	45	120	.4	238	140	11	27			
10:00 PM												
11:00 PM	46	165	45	192	.4	243	141	11	26			
12:00 AM	43	181	44	142	.4	245	144	10	25			
1:00 AM	43	186	45	181	.4	259	142	11	25			
2:00 AM			Dryer	Down								
3:00 AM	46	160	44	103	.4	240	138	11	27			
4:00 AM	44	130	45	131	.4	233	138	11	27			
5:00 AM	46	160	43	173	.4	246	139	10	26			
6:00 AM	48	137	44	113	.4	224	131	11	26	1136562	541077	
Total Hours Dryer Operating on Natural Gas									Total:	8629	5393	

Recyle Water Solids %	6%	7.5%
Time		7:30pm

Spark Rate Transformer/Rectifier

NO. 1	NO. 2

* Change Chart : 7:00 a.m.

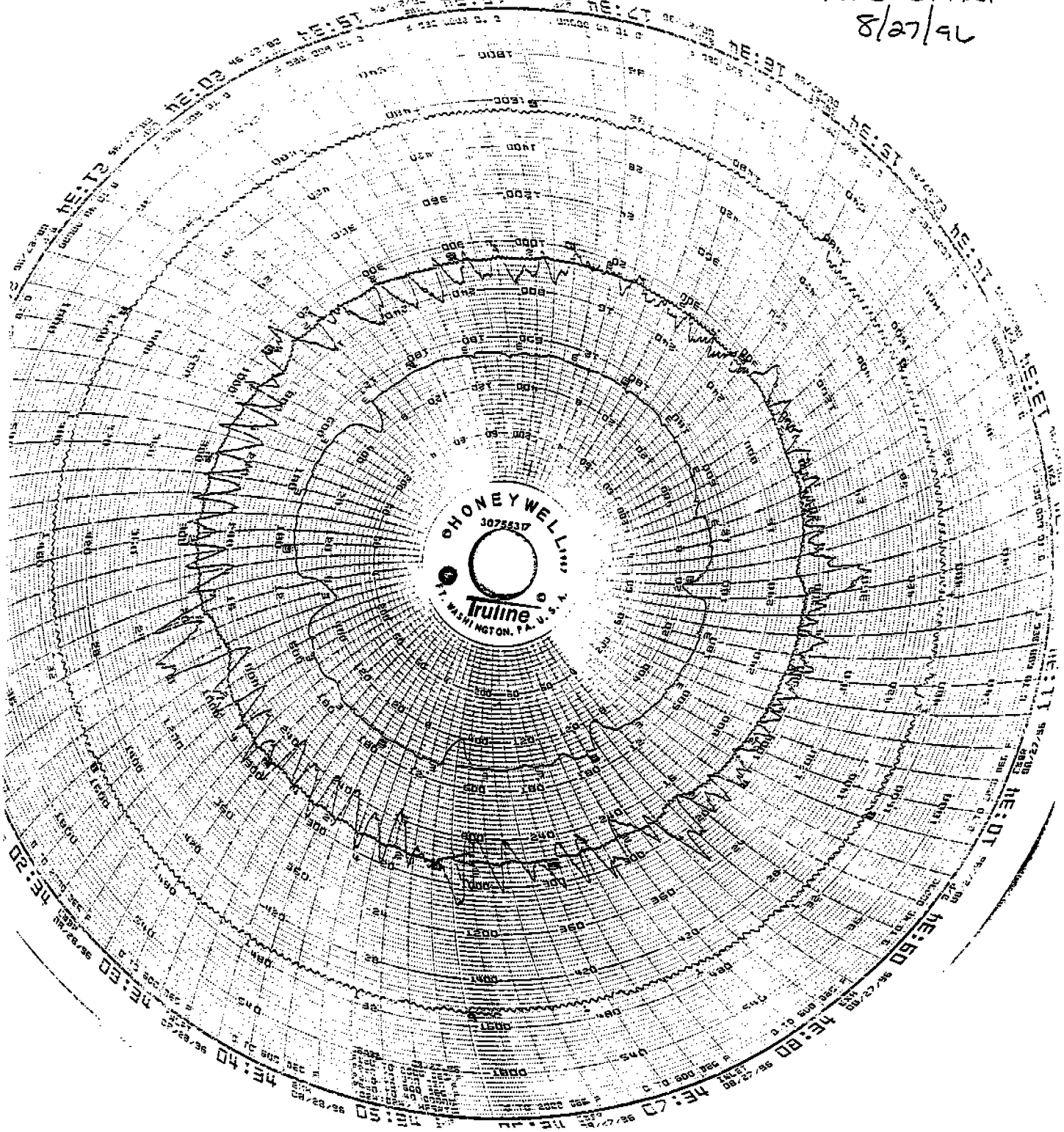
RECYCLE BLOWDOWN Estimated Gallons

Gallons Used	Caustic	Defoamer
Start:	2785	1079
End:	30	1128
Total:	3	49

	Day	Night
Check caustic level	/	
Check Defoamer level	/	
Clean recycle line strainer	/	
Solids Test	/	
Record time started new tote		

I-22

RTO CHART
8/27/96



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NEWBERRY DRYER RTO

every 10 minutes

8/27/96

TIME	CHAMBER TEMPS.					INLET	BURNERS		COMB.	EXHAUST	PRESS.	GAS	OPACITY
5 MINUTES	#1	#2	#3	#4	#5	TEMP.	#1	#2	TEMP.	TEMP.	DROP	USAGE	
8:30	492												
8:40													
8:50													
9:00													
9:10													
9:20													
9:30	496	471	448	466	480	131	1521	1517	1531	270	22.5		
9:40													
9:50													
10:00	481	476	440	460	473	148	1516	1509	1513	267	21.4	42139	0
10:10	487	470	444	454	480	151	1517	1528	1527	271	20.1		1
10:20	493	470	446	459	477	~~1530~~ 153	~~1530~~ ~~1522~~	1522	1532	272	18.9		1
10:30	491	471	449	456	482	153	1514	1523	1527	276	21.5		0
10:40	492	477	446	466	473	154	1524	1516	1523	277	21.0		1
10:50	491	476	451	457	483	157	1513	1527	1521	278	19.5		0
10+6 11:00	497	473	451	466	474	156	1526	1518	1524	278	21.5		0
11:10	492	478	452	459	483	156	1510	1524	1517	280	21.2		0
11:20	496	479	451	468	476	157	1522	1515	1522	278	19.9		0
11:30	497	479	452	468	476	157	1522	1517	1524	279	19.3		0
11:40	501	473	456	461	482	158	1522	1523	1530	280	20.9		0
11:60	496	483	453	467	480	159	1524	1513	1518	280	19.9		0
12:00	501	477	458	462	487	160	1519	1547	1533	283	21.5		0
12:10	503	482	467	475	480	159	1526	1516	1523	284	20.5		0
12:20	504	486	459	477	484	158	1531	1516	1528	286	21.1		0
12:30 S	508	482	464	473	489	158	1528	1530	1531	284	21.2		0
12:40 S	508	483	464	475	487	157	1533	1518	1529	284	20.5		0
12:50 S	501	491	465	470	496	152	1507	1506	1507	288	22.0		0
1:00 S	498	490	463	469	491	126	1501	1513	1506	283	26		0
1:10 S	501	476	462	468	478	158	1531	1530	1533	283	21		0
1:20 S													0
1:30 S													0
1:40 S	496	483	463	462	489	159	1505	1527	1512	284	20.5		0
1:50 S	502	478	464	468	482	156	1532	1529	1530	283	20.5		0

DRYER RTO DATA

NEWBERRY DRYER RTO

8/27/96

TIME	CHAMBER TEMPS.					INLET	BURNERS		COMB.	EXHAUST	PRESS.	GAS	OPACITY
5 MINUTES	#1	#2	#3	#4	#5	TEMP.	#1	#2	TEMP.	TEMP.	DROP	USAGE	
2:05	498	487	461	473	482	158	1522	1505	1513	285	20.5		0
2:15	501	481	465	466	489	157	1516	1535	1533	288	22.0		0
2:25	499	488	461	474	483	156	1518	1504	1515	286	20.4		0
2:35	497	488	460	473	482	147	1522	1509	1510	282	22.0		1
2:45	500	479	463	465	486	148	1518	1529	1532	282	21		0
2:55	495	486	460	468	484	183	1808	1512	1506	285	21.5		0
3:05	494	487	459	467	484	156	1507	1509	1507	286	21.0		0
3:15	499	480	463	463	487	156	1527	1532	1531	285	21.5		0
3:25	498	481	463	462	488	158	1510	1529	1531	286	20.4		0
3:35	503	479	464	466	484	157	1528	1531	1537	287	22.3		0
3:45	502	481	463	469	481	160	1539	1531	1544	287	20.5		0
3:55	499	483	464	462	489	157	1563	1594	1596	286	20.5		0
4:05	503	482	461	470	480	160	1549	1540	1551	285	20.0		0
4:15	496	488	459	466	484	161	1552	1556	1558	287	18.8		0
4:25	502	478	460	464	480	163	1561	1552	1562	285	20.5		0
4:35	498	484	457	469	477	163	1552	1548	1552	285	18.9		0
4:45	498	485	457	470	478	162	1549	1543	1544	284	19.5		0
4:55	501	479	461	463	485	162	1562	1554	1563	286	19.0		0
5:05	500	486	458	471	479	162	1551	1546	1549	285	19.5		0
5:15	502	481	463	469	487	162	1550	1555	1562	286	19.5		0
5:25	505	486	463	467	486	162	1555	1549	1557	284	19.3		0
5:35	499	487	462	468	490	162	1544	1554	1553	287	20.5		0
5:45	506	481	463	474	484	161	1565	1549	1553	285	19.5		0
5:55	503	485	466	468	494	157	1541	1548	1554	285	20.5		0
6:05	500	490	463	472	492	159	1538	1548	1541	285	19.8		0
6:15	507	483	465	472	491	159	1552	1544	1552	283	20.2		0
6:25	508	483	466	472	491	160	1553	1542	1550	284	21		0
6:35	508	483	467	472	492	161	1552	1547	1554	282	18.9		0
6:45	508	486	465	480	487	161	1549	1541	1546	283	18.5		0
6:55	508	487	465	480	487	158	1555	1549	1547	281	18.5		0
7:05	510	486	465	480	487	159	1552	1546	1548	280	18.5		0
7:15	510	487	465	480	488	157	1548	1542	1546	280	18.5		0
7:25	511	485	465	479	488	156	1552	1547	1558	280	18.5		0

DRYER RTO DATA

NEWBERRY DRYER RTO

8/27/96

TIME 5 MINUTES	CHAMBER TEMPS. #1	#2	#3	#4	#5	INLET TEMP.	BURNERS #1	#2	COMB. TEMP.	EXHAUST TEMP.	PRESS. DROP	GAS USAGE	OPACITY
7:35	506	487	467	471	497	156	1548	1552	1554	279	19.5	[illegible]	0
7:45	504	490	465	473	495	159	1536	1544	1544	282	18.5	42575	0
7:55	508	490	463	480	490	160	1546	1541	1546	280	18.0		1
8:05	512	484	466	476	492	161	1552	1547	1554	279	18.5	42589	2
8:15	511	487	464	480	488	159	1551	1546	1546	279	17.0		0
8:25	511	484	466	474	494	160	1549	1545	1552	280	18.0	42607	0
8:35	506	494	463	478	493	160	1542	1540	1541	283	19.0		0
8:45	512	485	465	477	493	163	1540	1543	1544	280	17.0	42617	0
8:55	505	494	464	476	497	161	1531	1535	1532	285	19.5		0
9:05	506	491	466	472	500	161	1534	1546	1545	283	18.0	42631	0
9:15	513	486	467	474	496	161	1545	1541	1546	280	17.5		0
9:26	510	490	464	481	492	161	1542	1535	1526	280	18.0		0
9:36	510	487	468	471	500	158	1539	1543	1547	281	19.5	42650	1
9:46	509	492	464	480	492	159	1541	1536	1539	281	19.0	[illegible]	0
9:55	509	489	466	472	500	159	1532	1542	1542	280	17.0	42665	0
10:05	508	488	467	472	500	158	1531	1541	1544	280	18.5		0
10:15	512	488	463	481	490	137	1539	1534	1535	280	20.5	42679	1
10:25	511	481	464	473	492	125	1547	1542	1543	280	21.0		1
10:35	502	480	460	464	493	122	1544	1540	1540	265	21.0	42692	1
10:45	501	476	465	461	488	157	1540	1534	1539	271	19.0		1
10:55	494	484	458	464	493	157	1528	1535	1536	276	20.0	42705	1
11:05	503	477	460	467	490	160	1545	1542	1545	282	17.5		0
11:15	499	487	458	474	490	160	1537	1530	1530	275	16.5	42718	0
11:25	505	480	462	470	493	162	1546	1542	1546	275	18.0	[illegible]	0
11:35	501	486	463	468	499	161	1531	1539	1538	280	17.5	42731	0
11:45	503	484	464	468	500	163	1542	1547	1548	278	17.0	42736	0
11:55													

DRYER RTO DATA

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Louisiana-Pacific Corporation
Newberry, Mi

Wheelabrator Cl. Air Systems
RTO

Date: 8-27-96 8PM A-Days C-Nights

Time	8:00 AM	10:00 AM	12:00 PM	2:00 PM	4:00 PM	6:00 PM	8:00 PM	10:00 PM	12:00 AM	2:00 AM	4:00 AM	6:00 AM
Burner S.P.	1520	1520	1520	1530	1550	1540						
Bnr #1 temp	1537	1510	1527	1533	1550	1539						
Bnr #1 out	24.0	24.2	17.1	35.1	16.2	8.1						
Bnr #2 temp	1528	1511	1514	1529	1542	1547						
Bnr #2 out	19.5	19.6	11.4	32.3	0	.2						
Inlet temp	150	149	158	158	162	157						
Chamber temp	1543	1521	1530	1541	1558	1543						
Exhaust temp	270	271	280	285	284	286						
RTO Dif Press	20wc	23wc	21wc	23wc	24wc	22						
VFD Amps	477	525	509	530	500	495						
VFD RPM	1270	1350	1339	1380	1327	1331						
P/V setpoint	1.2	1.3	[illegible]	1.0	1.1	1.1						
P/V out	61.8	64.7	106.6	69.9	64.4	67.3						
Cbr #1 B.O. temp	491	487	502	500	500	502						
Cbr #2 B.O. temp	471	473	475	482	483	491						
Cbr #3 B.O. temp	451	440	457	465	455	463						
Cbr #4 B.O. temp	460	464	462	465	470	475						
Cbr #5 B.O. temp	489	471	483	490	477	489						
Fan brg #1 temp	82	89	96	105	105	104						
Fan brg #2 temp	73	82	88	101	100	76						
Motor brg #1 temp	84	73	101	113	112	108						
Motor brg #2 temp	74	83	91	102	102	98						
Dryer to RTO	yes	yes	yes	yes	yes	yes						
Panel Line to RTO												
Lap Line to RTO												
Chamber Prg Fan	ON	ON	ON	ON	ON	ON						
BTUE Pressure	16	16	16	0	21	21						
BTUE Flow DP	42049	42138	42221	42328	42447	42500						
Comments:												
Bulk Gas Usage:												

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Louisiana-Pacific Corporation

Interdepartmental Communication

date: 9/13/96

to: Joel Anderson location: Hayward

from: Stephanie Browne location: Newberry

subject: Paper Weights and Trim Percentage

The paper weight of backer paper per 1000 sq. ft. is 14.9. The paper weight of the top surface face paper per 1000 sq. ft. is 59.25. These numbers were given to me by Quality Control. During compliance testing from 8/27/96 to 8/29/96, Quality Control compared mat and finished product weights which resulted in a 6.97% weight reduction due to trimming. If you have any questions, please contact me.

Sincerely,

Stephanie Browne

Stephanie Browne
Asst. Env. Manager

08/27/96

NEWBERRY BOARD WEIGHTS
(lbs./4x18 panel every 25th mat)
APPROXIMATE TIMES

PRESS MDI		***PRESS HCHO***		***DRYER PM***	
1005-1108	120	1450-1609	114	1640-1749	116
	120		116		117
	119		118		118
	118		118		120
	118		119		121
	120		117		118
	117		117		120
	118		119		120
1117-1219	120		117		118
	123		117		122
	120		116		121
	119		117	1940-2055	118
	121	1645-1809	115		116
	118		116		119
1230-1250	121		119		116
	120		118		117
1320-1405	118		120		119
	120		120		115
	123		123		119
	121		124		117
	119		123		117
	123		122	2135-2210	123
AVE	**119.82**		119	2315-2350	122
			122		119
		1835-1958	125		119
			124		120
			126		122
			126		122
			124		124
			121		121
			121		122
			120	AVE	**119.29**
			121		
			119		
			120		
			120		
		AVE	**119.81**		

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PRESS AUGUST 27, 1996
MDI

DATA TIME:	START=	10:05	END=	11:08	HOURS=	1.05
	START=	11:17	END=	12:19	HOURS=	1.03
	START=	12:30	END=	12:50	HOURS=	0.33
	START=	13:20	END=	14:05	HOURS=	0.75
					TOTAL=	3.17

BOARD WEIGHTS - LBS

average weights determined by taking every 25th untrimmed board (from press tapes)

7/16"

lb per/ 4' x 9' 55.73

lb per/ 4' x 18' 111.47

119.8 lb= average untrimmed mat weight

lb weight of paper overlay (per msf) 74.15

6.97% =trim %

PLANT PRODUCTION RATE

3.17 =hours during testing
52 =pressloads (see press chart)
728 =no. of 4'x18' boards produced (pressloads x 14 boards per load)
52,416 =volume produced in surface footage (pressloads x 4'x18'x14 openings)
61,154 =volume produced 3/8" basis (pressloads x 4'x18'x 14 openings x 1.1667)
81,148 =lbs of finished product (boards produced x weight of finished board)
25,626 =lbs of finished product per hour (lbs of finshed product / hours)
12.81 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE TAKEN FROM TOTALIZERS

TIME	MDI	WAX	ZINC BOR.
10:05-11:08	948	234	390
11:17-12:19	953	242	437
12:30-12:50	236	59	137
13:20-14:05	634	162	288
ave. lbs/hr. 100% solids	875	220	395

25,626 =average lbs. per hour finished product produced during testing
875 =average lbs. per hour of MDI resin used during testing
3.41% = MDI resin used as % of finished product

220 =average lbs. per hour of wax (100% solids) used during testing
0.86% =wax used as % of finished product

395 =Zinc Borate usage in pounds per hour
1.54% =Zinc Borate as % of finished product

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PRESS AUGUST 27, 1996
HCHO

DATA TIME:	START=	14:50	END=	16:09	HOURS=	1.32
	START=	16:45	END=	18:09	HOURS=	1.40
	START=	18:35	END=	19:58	HOURS=	1.38
					TOTAL=	4.10

BOARD WEIGHTS - LBS

average weights determined by taking every 25th untrimmed board (from press tapes)

7/16"
lb per/ 4' x 9' 55.73
lb per/ 4' x 18' 111.46

119.8 lb= average untrimmed mat weight

lb weight of paper overlay (per msf) 74.15

6.97% =trim %

PLANT PRODUCTION RATE

4.10 =hours during testing
65 =pressloads (see press chart)
910 =no. of 4'x18' boards produced (pressloads x 14 boards per load)
65,520 =volume produced in surface footage (pressloads x 4'x18'x14 openings)
76,442 =volume produced 3/8" basis (pressloads x 4'x18'x 14 openings x 1.1667)
101,424 =lbs of finished product (boards produced x weight of finished board)
24,738 =lbs of finished product per hour (lbs of finshed product / hours)
12.37 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE TAKEN FROM TOTALIZERS

TIME	MDI	WAX	ZINC BOR.
14:50-16:09	1,173	300	503
16:45-18:09	1,230	313	513
18:35-19:58	1,275	324	532
ave. lbs/hr. 100% solids	897	229	378

24,738 =average lbs. per hour finished product produced during testing
897 =average lbs. per hour of MDI resin used during testing
3.63% = MDI resin used as % of finished product

229 =average lbs. per hour of wax (100% solids) used during testing
0.92% =wax used as % of finished product

378 =Zinc Borate usage in pounds per hour
1.53% =Zinc Borate as % of finished product

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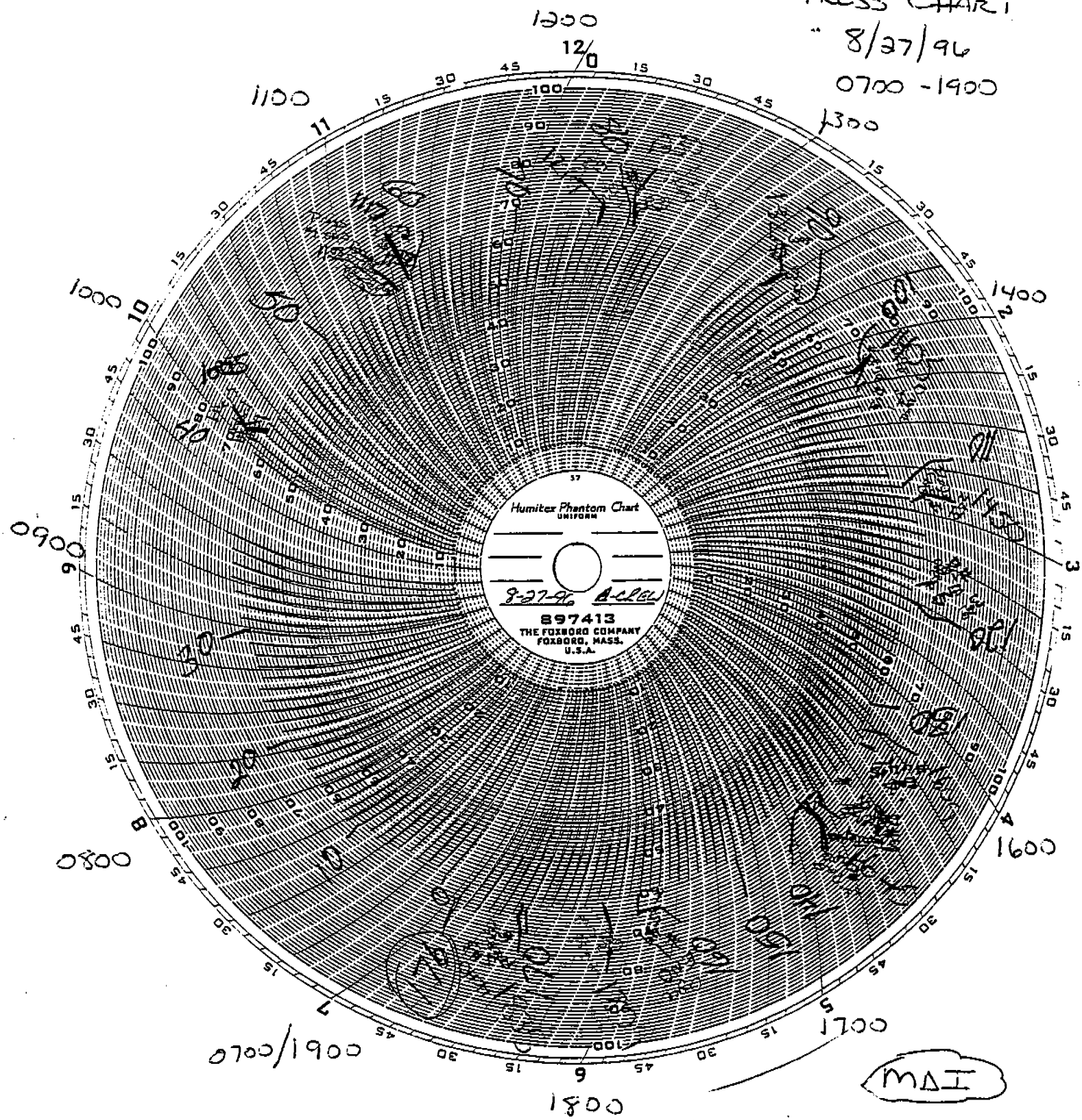
PRESS CHART
" 8/27/96
0700 - 1900

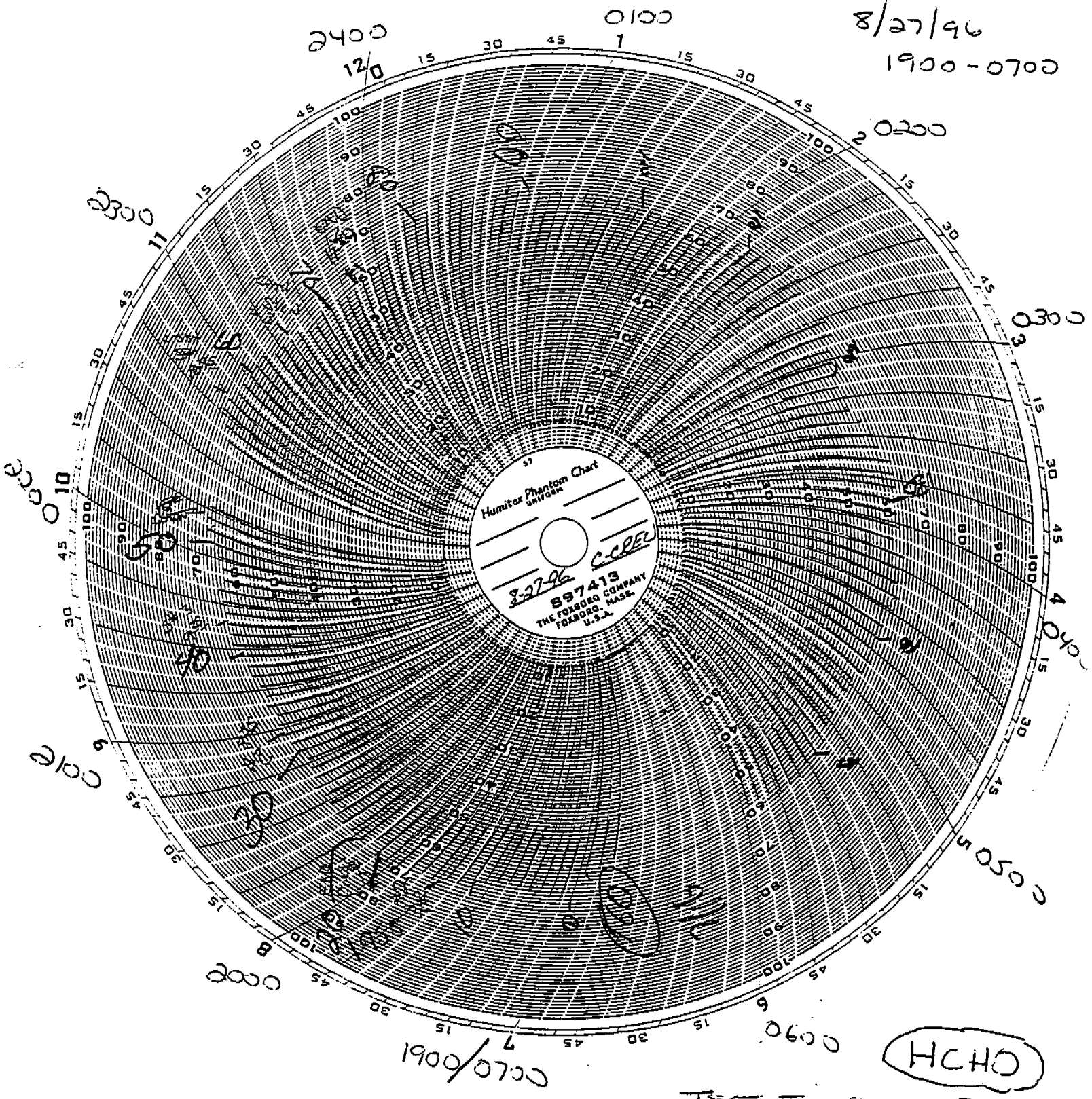


MAI

TEST TIMES	PRESSLOADS
1005 - 1105	18
1117 - 1219	18
1230 - 1250	5
1320 - 1405	11

(28)

PRESS CHART
8/27/96
1900-0700



HCHO

TEST TIMES	PRESS LOAD
1450 - 1609	21
1645 - 1809	21
1835 - 1958	23

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LOUISIANA-PACIFIC CORPORATION
NEWBERRY, MICHIGAN

DATE: 8/27/96

SHIFT	TYPE	# OF PRESS LOADS	A-GRADE	FOOTAGE	SCHED. RUN TIME	DOWNTIME MINUTES	% RUN TIME	% "A" GRADE	WOOD USAGE
A.M. TO P.M. A CREW	7/16 P.S. 4x18	176		206,976	720	47	93.4	96.7	KONUS #1 #2 10.4 DRYER 1ST 49,176
P.M. TO A.M. ___ CREW	7/16 P.S 4x18 BAB	160		188,160	720	78	89.1	98.2	KONUS #1 #2 10.60 DRYER 2ND 32,783
TOTAL DAILY				395,136					

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PRODUCTION M.T.D.		W.T.D.	1,573,656
1ST SHIFT	637,728	M.T.D.	1,573,656
2ND SHIFT	935,928	Y.T.D.	81,114,966
TOTAL	1,573,656		

	HOURS DOWN	HOURS RUN
1ST		
2ND		

DAILY PRESS VENT CHECK
TIME CHECKED 9:30 AM

FOREMAN	% R/T
CHRIS VOGEL	93.4
BILL MAGNUSON	
KIRK BOWLER	89.1
BOBBY CRANDELL	

LOG COUNT	DAILY	W.T.D.	M.T.D.
CREW A	5120	5120	5120
CREW B			
CREW C	7280	7280	7280
CREW D			

CREW A: 206,976
CREW B: 430,752
CREW C: 188,160
CREW D: 747,268
TOTAL 1,573,656

MAJOR DOWNTIME: A-CREW 46 MIN FILLING WET BIN (STACK TESTING - PURPOSES)
C-CREW 69 MIN " " " " (" " ")

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NEWBERRY SHIFT PRODUCTION SUMMARY 8/27/96

Louisiana-Pacific Corporation

Newberry OSB Plant

Date 8-27-96

TIME	PRESS TEMP.	MDI USAGE SURFACE	MDI USAGE CORE	WAX USAGE SURFACE	WAX USAGE CORE
10:05	403	1331	1157	5783	494
10:15		1420	1240	615	529
10:25		1490	1299	645	553
10:35		1578	1379	683	587
10:43		16662	1453	720	617
10:55		1749	1529	757	650
11:05	405	1835	1601	793	680
11:15		1920	1673	830	711
11:25		2001	1745	865	743
11:35		2086	1817	904	774
11:45		2177	1898	945	810
11:55		2261	1972	981	841
12:05	407	2343	2045	1018	872
12:15		2428	2118	1056	903
12:25		2515	2192	1096	935
12:35		21007	2268	1138	968
12:45		2688	2337	1174	998
12:55		2734	2377	1193	1015
1:05	409	2734	2377	1193	1015
1:15		2742	2385	1197	1019
1:25		2821	2449	1232	1047
1:35		2907	2523	1270	1079
1:45		2993	2598	1308	1112
1:55		3078	2669	1347	1143
2:05	406	3162	2742	1383	1175
2:15		3257	2823	1423	1210
2:25		3335	2903	1456	1244
2:35		3426	2976	1497	1275
2:45		3542	3050	1536	1309
2:53		3605	3126	1574	1339
3:05	408	3684	3193	1608	1367
3:15		37104	3265	11641	1397
3:25		3861	3346	11684	1432
3:35		3923	3397	1710	1453
3:45		4002	3461	1745	1481

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Louisiana-Pacific Corporation

Newberry OSB Plant

Date 8/27/96

TIME	PRESS TEMP.	MDI USAGE SURFACE	MDI USAGE CORE	WAX USAGE SURFACE	WAX USAGE CORE
3:55	411	4086	3531	1782	1512
4:05		4166	3599	1818	1542
4:15		4257	3672	1857	1574
4:25		4337	3752	1893	1609
4:35		4421	3825	1929	1637
4:45		4497	3897	1962	1669
4:55	410	4582	3969	2000	1699
5:05		4666	4041	2039	1730
5:15		4752	4111	2076	1759
5:25		4836	4178	2115	1788
5:35		4915	4242	2150	1815
5:45		4994	4305	2183	1843
5:55	410	5090	4384	2227	1878
6:05		5171	4453	2263	1908
6:15		5257	4528	2302	1941
6:25		5355	4615	2345	1978
6:35		5427	4678	2378	2005
6:45		5510	4747	2414	2035
6:55		3895	3392	1855	1490
7:05		148	127	67	53
7:15		203	175	92	73
7:25		298	262	134	111
7:35		371	334	171	140
7:45		449	392	200	167
7:55		540	478	244	201
8:05					
8:15					
8:25					
8:35					
8:45					
8:55					
9:05					

ZERO-OUT
5516 | 4796 | 2440

END PRESS .736 HCHO

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Louisiana-Pacific Corporation

Newberry OSB Plant

Date 8-27-96

	TIME		SCALE READING SURFACE		SCALE READING CORE		SCALE READING ZINC BORATE	
Start 10:05 P1	10:00		24725.6		19685.3		2640	
	10:10		24726.7		19686.2		2578	
	10:20		24727.8		19687.2		2505	
	10:30		24728.7		19688.0		2449	
	10:40		24729.9		19689.0		2375	
FINISH 11:06 P1	10:50		24730.9		19689.9		2311	
~~start P1 10:5~~ START 11:17 P2	11:00		24731.8		19690.7		2250	
	11:10		24732.8		19691.5		2188	
	11:20		—		—		—	
	11:30		24734.9		19693.4		2055	
	11:40		24736.0		19694.3		1974	
	11:50		24737.0		19695.2		1904	
FINISH P2 12:17	12:00		24738.1		19696.2		1838	
	12:10		24739.2		19697.1		1763	
	12:20		24740.4		19698.1		1695	
Start P3 12:30 START 12:50 S1	12:30		24741.4		19698.9		1623	
	12:40		24742.6		19699.9		1545	
	12:50		24743.5		19700.7		1496	
	1:00		24743.5		19700.7		1475	DOWN
Stop 12:50 P3	1:10		24743.5		19700.7		1475	DOWN
	1:20		—		—		—	
Start P3 1:20	1:30		—		—		—	
	1:40		24746.3		19703.0		1366	
Finish P3 2:05	1:50		24747.2		19703.8		1246	
	2:00		24748.3		19704.8		1176	
	2:10		24749.4		19705.7		1102	✓
Start 2:15 Stack 1	2:20		24750.4		19706.7		1031	
	2:30		24751.4		19707.6		968	
	2:40		24752.6		19708.5		893	
Start P4 14:50	2:50		24753.5		19709.4		822	
	3:00		24754.6		19710.4		754	
Finish S1 14:20	3:10		24755.6		19711.2		691	
	3:20		24757.0		19712.4		667	
	3:30		24757.6		19712.9		573	
	3:40		24758.8		19713.8		507	

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Louisiana-Pacific Corporation

Newberry OSB Plant

Date 8-27-96

start P4 14:50 HCOM

TIME		SCALE READING SURFACE		SCALE READING CORE		SCALE READING ZINC BORATE
3:50		24759.9		19714.8		423
4:00		—		—		—
4:10		24761.5		19716.1		319
4:20		24762.8		19717.2		309
4:30		24763.8		19718.2		2725
4:40		24764.9		19719.2		2610
4:50		24765.7		19719.9		2576
5:00		24767.0		19720.9		2498
5:10		24767.9		19721.6		2448
5:20		—		—		—
5:30		24769.9		19723.3		2338
5:40		24771.0		19724.2		2283
5:50		24772.1		19725.0		2223
6:00		24773.0		19725.8		2168
6:10		24774.4		19727.0		2097
6:20		24775.4		19727.8		2042
6:30		24776.2		19728.6		2004
6:40		—		—		—
6:50		24778.6		19730.6		1869
7:00		24779.4		19731.2		1928
7:10		24780.6		19732.3		1761
7:20		24781.8		19733.0		1683
7:30		24782.7		19734.1		1646
7:40		24783.7		19734.9		1588
7:50		24784.8		19735.9		1526
8:00		24785.8		19736.8		1473
8:10						
8:20						
8:30						
8:40						
8:50						
9:00						
9:10						
9:15						
9:20						

Finish P4 16:16

Start 1645 P5

Finish Dryer 2 5:50

Finish P5 1809

Start Start P6 ~~16:35~~ 18:35

Start Dryer 3 7:40

FINISH P6 19:59

End Dryer 3 8:55

Start Dryer 4 9:35 hold 10:10 Restart

stack #2

BTUE on COMB CHAMB TEMP ↑ to 1550°

END OF TEST

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Louisiana-Pacific Corporation

Northern Division

KONUS CHECKLIST

OPERATOR D Edgar SHIFT DAYS CREW A DATE 8-27-96

THERMAL OIL LEVEL – FT. 2'

FUEL OIL INCHES #1 Full #2 Full		
MILLTRONICS CLARK BINS (QUARTERS)	BARK BIN	
EMERGENCY DIESEL FUEL LEVEL	CHECKED ✓	FILLED
EMERGENCY DIESEL OIL LEVEL	CHECKED ✓	FILLED
EMERGENCY COOLING TANK	CHECKED ✓	FILLED
EMERGENCY DIESEL RUN EACH SHIFT	YES ✓	NO
T.O. PUMP PRESSURE	SUCTION ✓	DISCHARGE ✓
PRIMARY PUMP I	OK	
PRIMARY PUMP II	~~OFF~~ OK	
PRIMARY PUMP III	Off	
ECONOMIZER PUMP I	ok	
ECONOMIZER PUMP II	✓	✓

KONUS BAGHOUSE (TWICE A SHIFT) ✓

SAWTRIM BAGHOUSES (TWICE A SHIFT) ✓

LEVEL E-TUBE BLOW DOWN TANK

7:00 54" 1:00 48"

POND SET POINT off

POND TEMP #1 — #2 —

	SET POINT	RETURN	OUTLET
KONUS I	OFF		
KONUS II	500	490	510
SPACE HEAT	OFF		
ECONOMIZER	500		
FLUE GAS	#1 —		#2 700
BLEND AIR	#1 —		#2 334

KONUS ROOM BLOWN DOWN	YES	NO
KONUS ROOM SWEPT	YES	NO

KONUS FUEL	I	II
WOOD HRS.		12
OIL HRS.		0
WOOD FUEL IN TONS		10.4

	COUNTER	SCALE
BEGINNING	8723.5	8856320
END	8733.9	8867616
TOTAL		

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Louisiana-Pacific Corporation
Northern Division

KONUS CHECKLIST

OPERATOR J Leafer SHIFT DITES CREW C DATE 8-27-96

THERMAL OIL LEVEL – FT. 1.5

7:15 pm

FUEL OIL INCHES #1 46" #2 46 1/2"		
MILLTRONICS CLARK BINS (QUARTERS)	BARK BIN	
EMERGENCY DIESEL FUEL LEVEL	~~CHECKED~~ 3/4	FILLED
EMERGENCY DIESEL OIL LEVEL	~~CHECKED~~	FILLED
EMERGENCY COOLING TANK	~~CHECKED~~	FILLED
EMERGENCY DIESEL RUN EACH SHIFT	YES	NO
T.O. PUMP PRESSURE	SUCTION	DISCHARGE
PRIMARY PUMP I	8	120
PRIMARY PUMP II	2	122
PRIMARY PUMP III	off	
ECONOMIZER PUMP I	27	64
ECONOMIZER PUMP II	off	

KONUS BAGHOUSE (TWICE A SHIFT) ✓

SAWTRIM BAGHOUSES (TWICE A SHIFT) ✓

LEVEL E-TUBE BLOW DOWN TANK

7:00 41" 1:00 AI"

POND SET POINT —

POND TEMP #1 — #2 —

	SET POINT	RETURN	OUTLET
KONUS I	off		
KONUS II	520	493	520
SPACE HEAT	off		
ECONOMIZER	550		
FLUE GAS		#1 —	#2 715
BLEND AIR		#1 —	#2 345
KONUS ROOM BLOWN DOWN		YES	NO
KONUS ROOM SWEPT		YES	NO

KONUS FUEL	I	II
WOOD HRS.		12
OIL HRS.		0
WOOD FUEL IN TONS		10.6

COUNTER	SCALE	
BEGINNING	87339	8857616
END	8744.5	8858963
TOTAL	10.6	

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DRYER AUGUST 28, 1996
HCHO,PHENOL,METHANOL

DATA TIME:	START=	09:30	END=	09:55	HOURS=	0.42
	START=	10:40	END=	11:33	HOURS=	0.88
	START=	12:15	END=	13:32	HOURS=	1.28
	START=	15:00	END=	16:18	HOURS=	1.30
					TOTAL=	3.88

BOARD WEIGHTS - LBS
average weights determined by taking every 25th untrimmed board (from press tapes)

7/16"
lb per/ 4' x 9' 55.54
lb per/ 4' x 18' 111.09

119.4 lb= average untrimmed mat weight

lb weight of paper overlay (per msf) 74.15

6.97% =trim %

PLANT PRODUCTION RATE

3.88 =hours during testing
61 =pressloads (see press chart)
854 =no. of 4'x18' boards produced (pressloads x 14 boards per load)
61,488 =volume produced in surface footage (pressloads x 4'x18'x14 openings)
71,738 =volume produced 3/8" basis (pressloads x 4'x18'x 14 openings x 1.1667)
94,870 =lbs of finished product (boards produced x weight of finished board)
24,430 =lbs of finished product per hour (lbs of finshed product / hours)
12.21 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY DRY FUEL INPUT

4.5 =fuel calibration in pounds per count
4,501 =counts during testing hours
20,255 = lbs of fuel burned during testing
3.88 =hours during testing
5,216 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.61 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,500 =estimated BTU content per pound of dry fuel,
44.3 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,020 =average inlet temperature
48.73 =average incoming moisture percent
3.55 =average dry moisture percent

24,430 / 2000 = 12.215

DRYER THROUGHPUT RATE

5,216 =Total pounds of fuel burned per hour in Dryer
24,430 =lbs of finished product per hour (lbs of finshed product / hours)
1,174 =lbs of face & backer paper per hour (surf. ftge.prod. per hour x lbs of paper per M/1000)
23,256 =lbs of finished product per hour less paper (lbs of finshed product / hours- paper)
28,472 =Pounds of material produced by the dryer per hour (dry basis, assuming fuel balances)
5,216 =weight of screened fines per hour (total fuel)
18.32% =resulting loss to fines as percentage of dryer throughput

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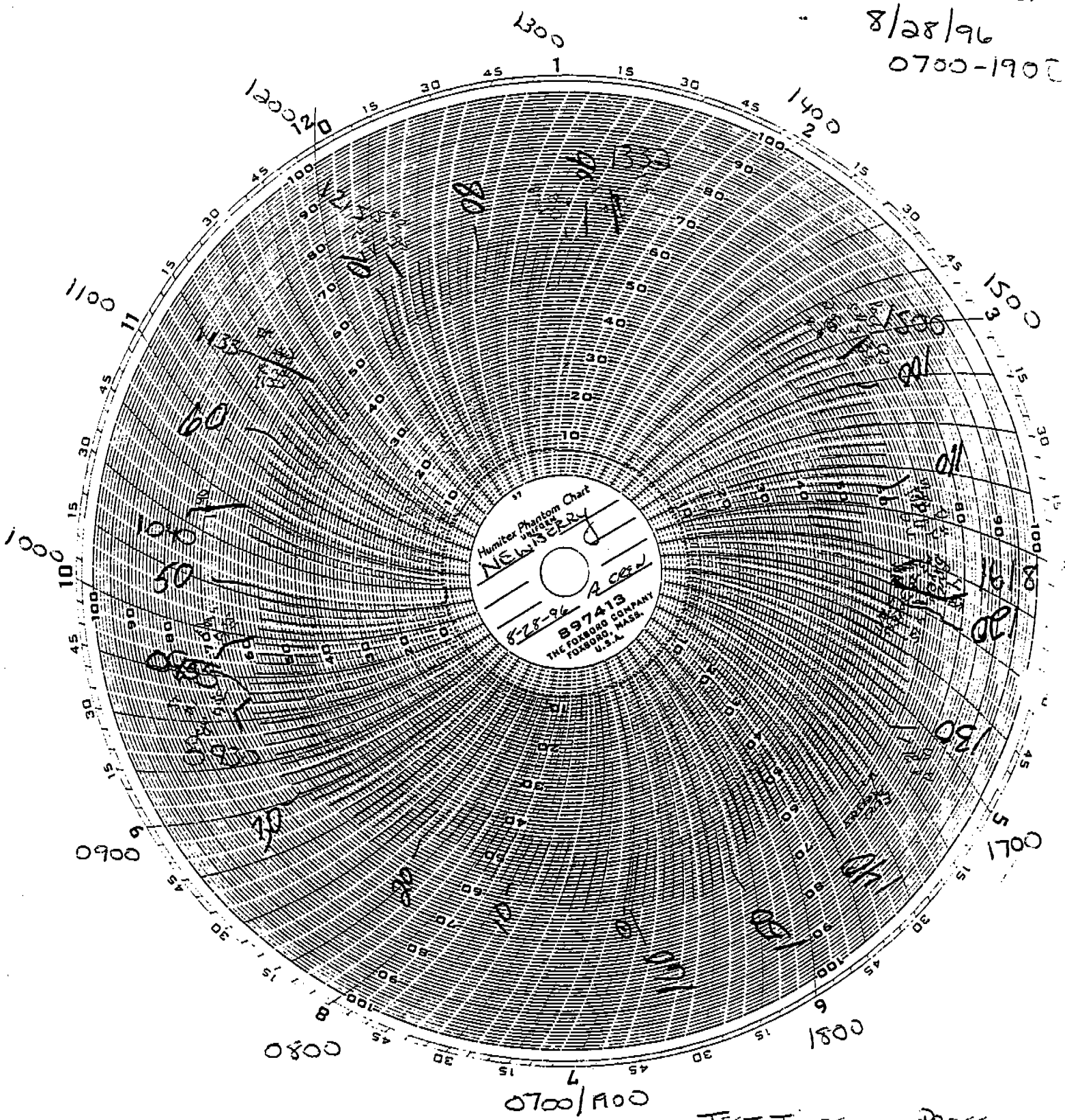
PRESS CHART
8/28/96
0700-1900



TEST TIMES	PRESSLOAD
0930 - 0955	6
1040 - 1133	14
1215 - 1332	20
1500 - 1618	21

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LOUISIANA-PACIFIC CORPORATION
NEWBERRY, MICHIGAN

DATE: 8/28/96

SHIFT	TYPE	# OF PRESS LOADS	A-GRADE	FOOTAGE	SCHED. RUN TIME	DOWNTIME MINUTES	% RUN TIME	% "A" GRADE	WOOD USAGE
A.M. TO P.M. A CREW	7/16 P.S. 4x18	160		188,160	720	104	85.5	98.2	KONUS #1 #2 11.8 DRYER 1ST 44,977
P.M. TO A.M. C CREW	7/16 P.S. 4x18	179		210,504	720	14	98.0	96.7	KONUS #1 #2 13.8 DRYER 2ND 39,951
TOTAL DAILY				398,664					

PRODUCTION M.T.D.		
	W.T.D.	1,972,320
	M.T.D.	1,972,320
	Y.T.D.	81,513,630

	HOURS DOWN	HOURS RUN
1ST		
2ND		

DAILY PRESS VERT CHECK
TIME CHECKED 2:50PM

1ST SHIFT 825,888
2ND SHIFT 1,146,432
TOTAL 1,972,320

CREW A: 325,136
CREW B: 430,252
CREW C: 398,664
CREW D: 247,268
TOTAL 1,972,320

FOREMAN	% D/T
CHRIS VOGEL	89.5
BILL MAGNUSON	
KIRK BOWLER	93.6
BOBBY CHANDELL	

LOG COUNT	DAILY	W.T.D.	M.T.D.
CREW A	9117	14,237	14,237
CREW B			
CREW C	11,100	18,380	18,380
CREW D			

MAJOR DOWNTIME: A-CREW 103 MIN FILLING WET BIN (STACK TESTING PURPOSES), #2 B.H. BAGS CHANGED

SHIFT PRODUCTION SUMMARY 8/28/96

I-43

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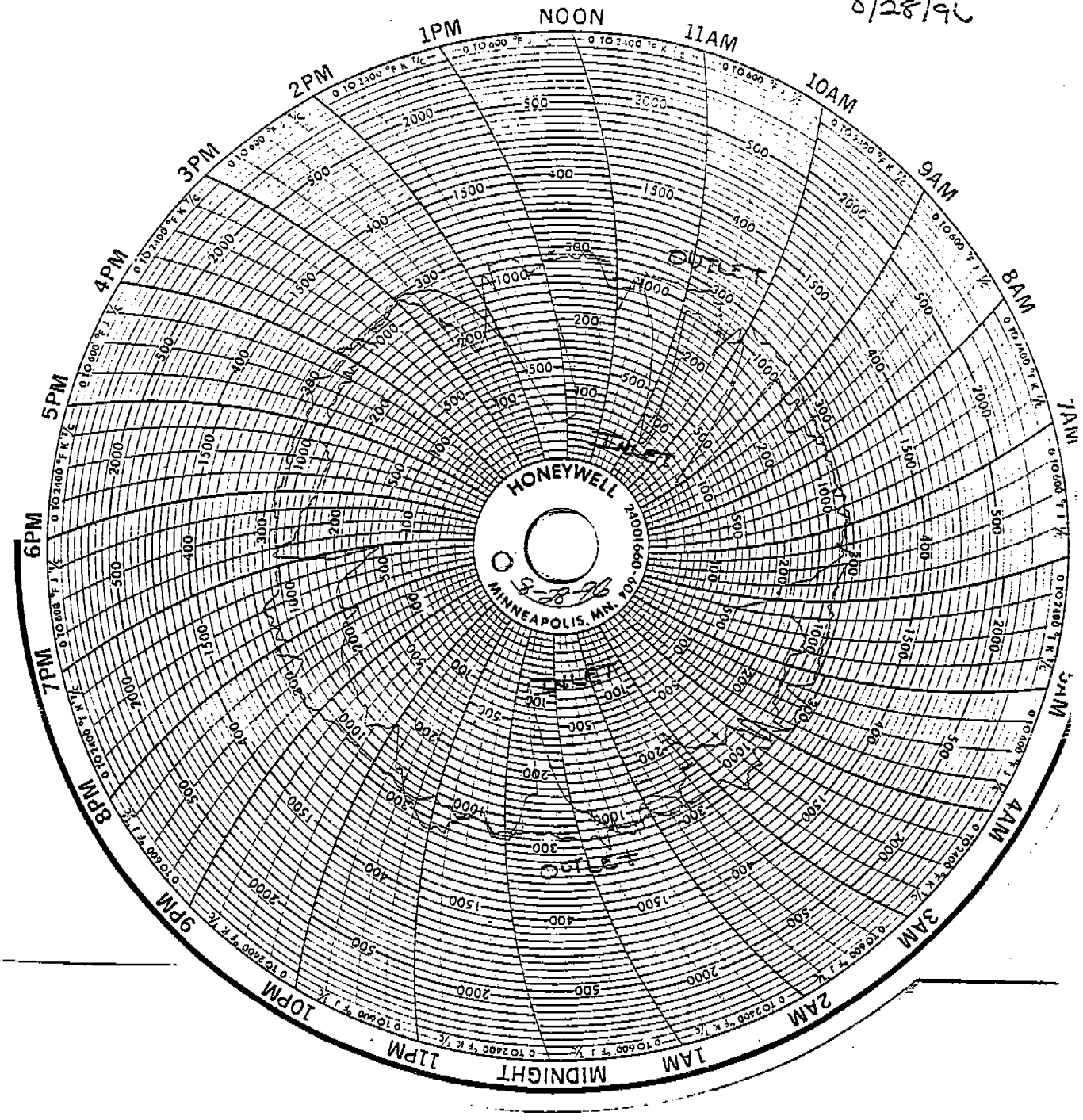
DRYER CHART
8/28/96



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LOUISIANA-PACIFIC CORPORATION
NEWBERRY, MI

DRYER REPORT

OPERATOR: JAMES DEDEW SHIFT: 7am-7pm CREW: A DATE: 8-28-96

TIME	WET BIN LEVEL	FEED SPEED %	INLET TEMP %F	OUTLET TEMP %F	OUTLET MOIST. %	DRY FUEL USED LB.	SET POINT
7:45	27.7	440	1132	284	3.2-3.2	1072	265-262
1:21	25.5	430	1136	286	4.0-3.8	6360	267-261
6:21	17.7	420	869	283	3.8-3.8	9741	259-261
						9995	
						X 4.5	263-261
	23.6	430	AVE:1045	AVE:284	AVE:3.6-3.6	TOT: 44,977	AVE:

ONCE PER SHIFT:

WET WAFER MOIST. % 49.7 - 49.1 - 47.9 HAMMERMILL MAGNET CLEANED: X
DRYER FUEL MOIST. % 2.0 WOOD FUEL FILTER CLEANED: X
1 BAGHOUSE MAGNEHELIC 3.0 CROSS TRANSFER GAS METER 5343
MCCONNEL GAS METER 4694 PANEL OVEN GAS METER 3707

TIMES AND REASONS FOR DOWNTIME: _____

OTHER PROBLEMS: Fuel bin baghouse is plugging every so often. Have to keep checking it.

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NEWBERRY DRYER DATA
(FUEL CALIB. LB/COUNT)

8/28/96

TIME	OUT. SET POINT	FEED RATE	INLET TEMP.	OUTLET TEMP.	FUEL COUNT	WET BIN LEVEL	DRY BIN LEVEL	MOIST. IN	MOIST. OUT
9:30	262	440	1043	290	2921	20.8	26.1/30.5		3.3
9:40	262	445	983	289	3060	21.4	25.6/30.1		3.5
9:50	262	445	1024	282	3232	18.9	25.5/31.8		3.9
10:00	262	405	965	291	3399	12.4	30.6/27.5	49.7	3.3
10:10	262	405	318	266	3412	16.1	29.0/25.5		3.2
10:20	262	360	235	245	3421	23.9	25.4/22.7		3.3
10:30	262	400	835	284	3555	27.9	25.2/24.4		5.0
10:40	262	445	1030	294	3735	29.6	23.3/25.0		3.6
10:50	262	445	957	288	3898	29.7	24.4/25.3		3.5
11:00	262	445	976	284	4053	29.9	25.2/24.3		3.3
11:10	262	445	946	284	4238	27.2	25.2/24.6		3.5
11:20	262	445	962	282	4386	28.0	24.4/26.4		3.5
11:30	262	445	971	280	4550	28.1	23.6/27.7		3.6
11:40	261	445	753	261	4702	25.9	27.2/26.4		3.7
11:50	261	360	270	252	4702	25.8	27.1/29.0		2.5
12:00	261	340	227	240	4713	25.8	22.2/28.9		2.5
12:10	261	390	828	284	4867	25.2	23.9/28.1		4.2
12:20	261	430	994	289	5031	24.2	26.4/26.4		3.8
12:30	261	440	961	286	5245	21.8	25.8/23.4		3.6
12:40	261	440	943	286	5396	19.0	27.5/22.2		3.5
12:50	261	450	1008	281	5590	20.8	25.4/22.2	49.1	3.8
1:00	261	450	1093	282	5770	24.0	25.0/22.2		3.4
1:10	261	450	1151	268	5949	25.3	24.7/22.1		4.0
1:20	261	430	1143	278	6130	25.0	22.5/24.3		3.8
1:30	261	440	1115	287	6304	25.5	23.1/25.3		3.5
1:40	261	440	1065	286	6487	20.2	26.1/27.8		3.7
1:50	261	440	1106	282	6567	12.4	32.1/32.7		4.2

DRYER DATA

NEWBERRY DRYER DATA
(FUEL CALIB. LB/COUNT)

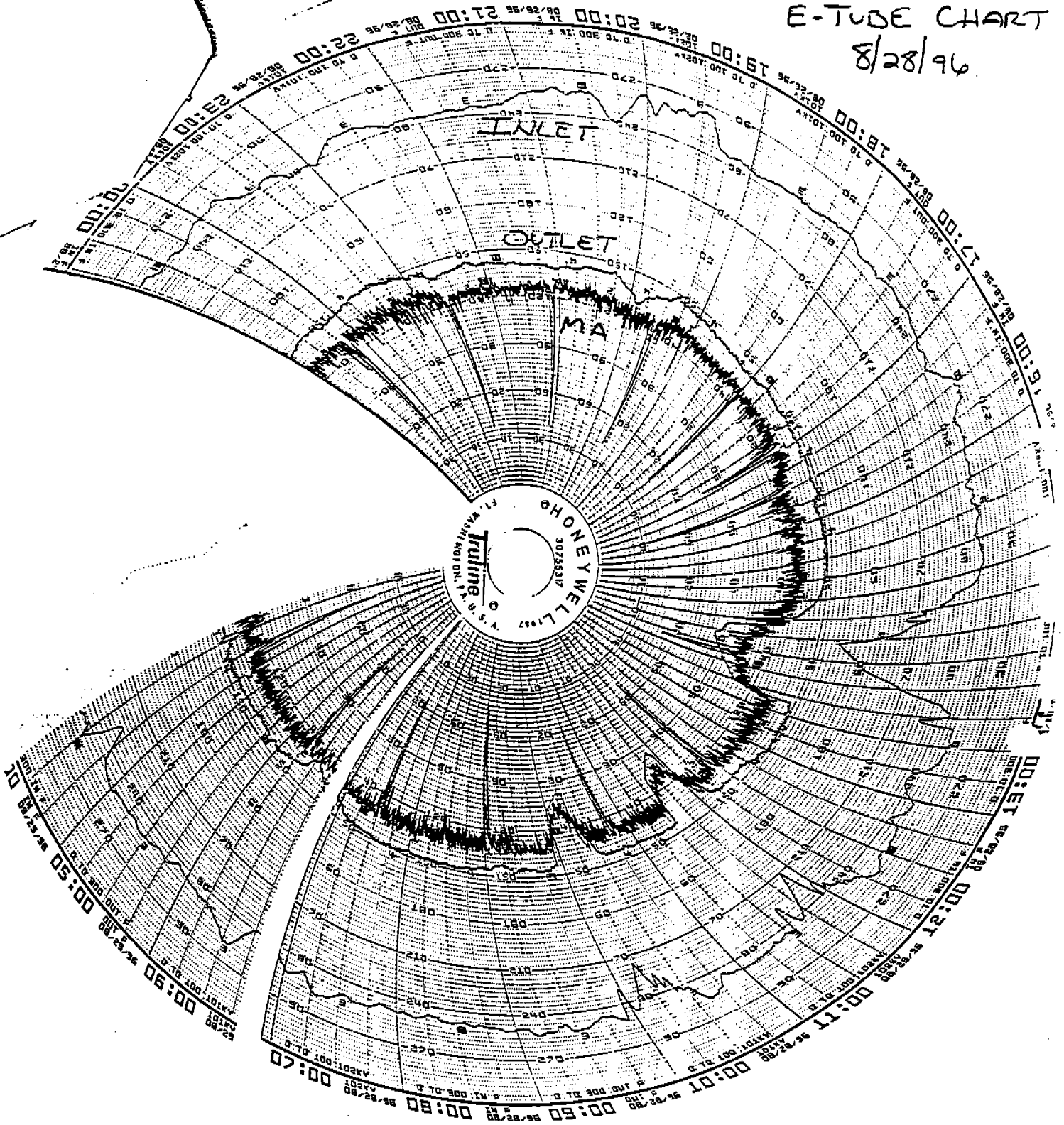
8/28/96

TIME	OUT. SET POINT	FEED RATE	INLET TEMP.	OUTLET TEMP.	FUEL COUNT	WET BIN LEVEL	DRY BIN LEVEL	MOIST. IN	MOIST. OUT
2:00	261	440	263	243	6567	~~33.8~~	32.0/32.5		3.5
2:10	261	440	228	207	6567	30.3	32.4/32.1		3.5
2:20	261	440	213	185	6567	25.3	32.4/32.5		2.5
2:30	261	440	206	175	6567	25.3	32.4/32.5		2.5
2:40	261	440	206	228	6599	25.3	32.2/32.4		2.5
2:50	261	350	729	272	6724	32.0	29.3/27.8		4.9
3:00	261	~~405~~ 551	959	293	6904	30.0	28.7/27.2		3.9
3:10	261	430	1072	287	7102	33.0	26.8/27.1		3.3
3:20	261	440	1109	281	7282	33.3	27.1/26.4		3.5
3:30	261	440	1142	283	7459	31.1	28.3/27.1		3.4
3:40	261	440	1114	284	7670	33.4	27.2/27.4		3.3
3:50	261	440	1117	282	7857	30.4	27.2/28.0	47.4	3.4
4:00	261	440	1091	282	7996	31.8	29.0/27.5		3.4
4:10	261	440	1059	284	8168	30.9	28.9/29.1		3.2
4:20	261	440	1029	283	8340	29.6	28.1/29.5		3.2
4:30	~~289~~ 261	400	1091	300	8345	30.5	28.1/29.0		3.2
4:40	261	400	1047	289	8345	29.9	27.5/31.1		4.2
4:50	261	400	987	279	8345	26.7	26.1/31.2		4.5
5:00	261	405	970	282	8436	26.2	27.2/29.2		3.9
5:10	261	410	990	282	8672	26.4	26.7/30.3		3.6
5:20	261	410	981	284	8806	29.5	26.5/29.7		3.7
5:30	261	410	968	284	8993	30.2	26.2/29.9		3.5
5:40	261	410	950	279	9108	33.0	26.9/28.0		3.7
5:50	261	410	965	281	9266	32.8	25.9/29.5		3.6
6:00	261	410	923	286	9418	28.4	25.5/30.0		3.5
6:10	261	410	879	287	9555	22.1	24.4/30.3		3.7
6:20									

6 hrs
6 hrs
6.9 hrs

DRYER DATA

E-TUBE CHART
8/28/96



NEWBERRY E-TUBE DATA SHEET								
8/28/96	#1			#2				
							QUENCH	
TIME	KV	MA	SPARK RATE	KV	MA	SPARK RATE	INLET	OUTLET
9:30	46	170	25.8	47	140	25.8	244	140
9:35	45	160	29.9	46	120	29.9	244	141
9:45	45	180	29.9	46	140	29.8	239	141
9:55	46	300	29.8	44	200	29.9	244	139
10:05	43	280	29.9	46	240	29.9	232	100
10:15	42	130	25.7	42	120	25.6	223	96
10:25	44	120	25.6	46	110	25.6	236	125
10:35	46	130	25.5	44	100	25.6	246	139
10:45	24	80	25.8	40	100	25.6	244	139
10:55	46	180	25.6	46	160	25.6	240	140
11:05	46	180	25.5	46	100	25.6	241	139
11:15	47	170	25.6	45	120	25.6	240	140
11:25	46	180	25.6	46	180	25.6	238	139
11:35	46	220	25.6	44	120	25.6	220	110
11:45	40	200	25.6	42	280	25.6	225	97
11:55	40	200	25.6	40	220	25.6	228	95
12:05	43	44	25.6	48	73	25.6	233	137
12:15	45	140	25.5	47	130	25.5	244	138
12:25	47	190	25.6	44	40	25.9	243	139
12:35	47	180	25.6	47	160	25.5	242	140
12:45	46	160	25.5	47	170	25.6	235	142
12:55	47	170	25.6	48	160	25.5	241	144
1:05	48	200	25.6	48	180	25.7	231	145
1:15	47	200	25.7	48	160	25.5	240	145
1:25	47	180	25.5	47	160	25.4	240	145
1:35	46	190	25.6	47	140	25.6	240	145
1:45	44	240	25.6	42	220	25.6	238	104
1:55	40	260	25.5	42	260	25.7	219	97
2:05	38	220	25.7	38	180	25.5	188	90
2:15	38	160	25.6	38	140	25.6	169	84
2:25	40	120	25.6	42	140	25.6	160	87

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NEWBERRY E-TUBE DATA SHEET

7/28/96

TIME	#1 KV	#1 MA	#1 SPARK RATE	#2 KV	#2 MA	#2 SPARK RATE	QUENCH INLET	QUENCH OUTLET
~~1:35~~	42	120	25.7	42	100	25.6	198	86
2:45	46	140	25.6	46	140	25.5	219	115
2:55	45	120	25.5	45	130	25.5	241	138
3:05	46	180	25.6	46	180	25.5	245	142
3:15	47	190	25.5	47	160	25.6	241	144
3:25	46	140	25.6	47	180	25.5	243	144
3:35	48	210	25.5	48	190	25.6	242	144
3:45	48	220	25.5	47	180	25.5	241	143
~~4:05~~ 3:55	47	200	25.6	48	190	25.6	241	144
~~4:15~~ 4:05	47	200	25.6	47	140	25.5	243	141
~~4:25~~ 4:15	48	200	25.5	46	160	25.7	241	142
4:25	45	220	25.5	45	210	25.6	249	142
4:35	46	220	25.5	47	180	25.7	244	142
4:45	48	240	25.5	47	240	25.6	235	143
4:55	47	240	25.5	48	140	25.6	238	141
5:05	36	80	27.7	38	60	27.6	240	142
5:15	46	200	27.3	47	140	27.5	241	141
5:25	46	180	27.5	48	170	27.5	242	140
5:35	47	210	27.5	47	150	27.5	240	140
5:45	46	200	27.5	47	160	27.5	240	141
5:55	47	180	27.5	48	190	27.5	243	138
6:05	47	160	27.5	46	140	27.6	243	137
6:15								

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Louisiana-Pacific Corporation
Newberry, Michigan

E-TUBE OPERATING REPORT

Operator		Crew	Date
Days	DART	A	8-28-96
Nights	WARREN	C	

Time	T/R CONTROL PANEL DIGITAL TRANSFORMER/RECTIFIERS No. 1 KV	No. 1 mA	No. 2 KV	No. 2 mA	Mesh Pad Δ P	ZYCOM QUENCH INLET deg. F	QUENCH OUTLET deg. F	INLET in H2O	OUTLET in H2O	Beginning & End of Shift on the Vessel Flush Water total gal.	Make-up Water total gal.	Vessel PSI
7:00 AM	45	153	45	129	.3.5	239	143	11	26	1136562	541077	
8:00 AM	45	121	45	108	.3.5	240	145	11	26			
9:00 AM	45	121	45	147	.3.5	243	141	11	26			
10:00 AM	45	137	45	152	.3.5	241	142	11	26			
11:00 AM	46	167	45	120	.3.5	241	139	11	27			
12:00 PM				DRYERS DOWN								
1:00 PM	45	136	47	162	.35	242	144	12	26			
2:00 PM				DRYERS DOWN								
3:00 PM	45	154	45	145	.3.5	243	141	11	27			
4:00 PM	45	200	44	119	.35	241	144	11	25			
5:00 PM	46	206	46	119	.3.5	239	141	11	26			
6:00 PM	44	203	45	141	.3.5	243	138	11	26			
7:00 PM	45	144	45	140	.35	239	141	11	26			
8:00 PM	43	204	44	180	3.5	249	131	11	27			
9:00 PM	43	214	44	182	3.5	244	136	11	25			
10:00 PM	43	117	45	240	3.5	238	134	11	26			
11:00 PM	43	134	45	120	3.5	234	142	11	26			
12:00 AM	36	158	44	85	3.5	248	144	11	25			
1:00 AM	41	114	46	145	25	244	144	11	26			
2:00 AM	47	213	47	135	3.5	237	145	11	26			
3:00 AM	47	259	42	134	3.5	250	142	11	26			
4:00 AM	44	196	41	150	3.5	232	142	11	26			
5:00 AM	41	184	42	158	3.5	242	141	12	27			
6:00 AM	44	147	47	184	3.3	235	140	12	27	1144343	547420	
Total:										7801	6343	

Total Hours Dryer Operating on Natural Gas

Recycle Water Solids %	6.5%	8.0	
Time	11:45	7:50	

RECYCLE BLOWDOWN Estimated Gallons

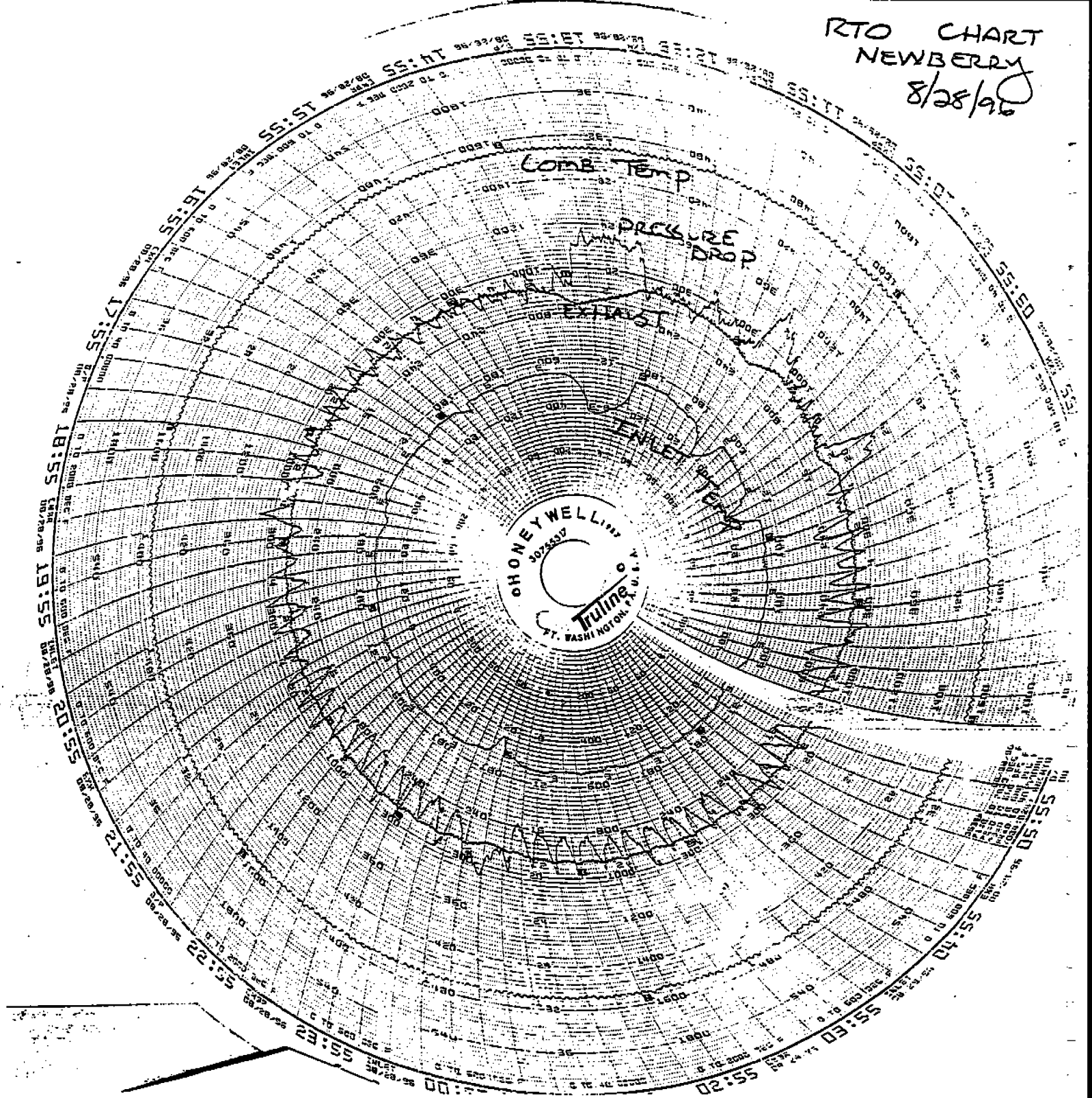
Spark Rate Transformer/Rectifier: 25.6 (NO. 1) | 25.6 (NO. 2)

Chart: 7:00 a.m.

Gallons Used	Caustic	Defoamer
Start:	3053	1128
End:	3049	1172
Total:	210	44

Check caustic level
Check Defoamer level
Clean recycle line strainer
Solids Test
Record time started new tote

	Day	Night
	/	
	/	
	/	
	/	


RTO CHART
NEWBERRY
8/28/96
COMB. TEMP
PRESSURE DROP
EXHAUST
INLET
HONEYWELL
Truline
FT. WASHINGTON, PA. U.S.A.

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NEWBERRY DRYER RTO 8/28/96

TIME / 10 MINUTES	CHAMBER TEMPS. #1	#2	#3	#4	#5	INLET TEMP	BURNERS #1	#2	COMB. TEMP.	EXHAUST TEMP.	PRESS. DROP	GAS USAGE	OPACITY
9:25	507	481	465	472	498	158	1532	1542	1534	275	1.0	43151	0
9:35	508	481	464	475	494	158	1538	1535	1545	280	1.0	43160	0
9:45	501	489	461	478	495	159	1538	1533	1540	280	1.0	43167	0
9:55	507	481	465	474	497	158	1541	1538	1539	281	1.0	43174	0
10:05	505	483	465	[illegible]	502	137	1524	1537	1530	283	1.1	43180	0
10:15	581	483	457	[illegible]	486	121	1544	1536	1540	269	1.2	43182	0
10:25	502	475	457	[illegible]	486	127	1547	1539	1547	265	1.2	43196	0
10:35	494	479	453	[illegible]	483	151	1540	1533	1542	267	1.2	43204	0
10:45	499	476	454	[illegible]	482	155	1539	1531	1540	273	1.0	43211	0
10:65	500	476	456	475	484	155	1547	1542	1550	275	1.3	43218	0
11:05	503	475	460	473	489	156	1545	1539	1551	276	.9	43229	0
11:15	504	475	460	472	490	156	1547	1540	1553	276	1.1	43231	0
11:25	503	477	461	471	493	158	1540	1540	1549	280	1.4	43240	0
11:35	505	477	459	477	487	157	1547	1537	1549	281	.7	43245	0
11:45	504	480	457	480	486	133	1540	1534	1539	277	1.1	43254	0
11:55	497	479	458	467	493	122	1532	1542	1536	275	M	43262	0
12:05	496	470	451	470	477	141	1552	1542	1543	263	20	43271	0
12:15	487	475	461	464	486	152	1529	1542	1537	271	19	43280	0
12:25	495	475	461	477	479	154	1543	1537	1547	275	20	43289	1
12:35	499	476	454	473	483	155	1546	1541	1554	275	21	43294	—
12:45	500	474	453	477	483	156	1547	1537	1551	279	21	43300	—
12:55	495	481	453	480	484	158	1541	1537	1544	279	21	43307	—
1:05	495	482	456	475	491	161	1530	1543	1537	280	19	43312	—
1:15	500	478	460	473	495	161	1533	1541	1540	283	20	43321	—
1:25	505	477	460	481	487	161	1546	1538	1548	282	20	43328	—
1:36	501	484	459	483	489	160	1535	1529	1535	282	20	43334	—
1145	507	476	463	478	494	143	1536	1532	1542	283	21	43341	—
1155	502	481	459	482	487	124	1541	1536	1543	277	22	43347	—
2:05	500	471	456	474	482	117	1544	1538	1543	268	25	43358	—
2:15	494	464	453	465	479	110	1545	1541	1547	260	23	43368	—
2:25	483	470	446	465	474	107	1536	1529	1537	258	22	43379	—
2:35	481	461	447	454	475	109	1534	1544	1543	256	22	43386	—
2:45	481	458	446	452	473	142	1540	1543	1547	257	19	43396	—

476
476
470
470
474

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NEWBERRY DRYER RTO

8/28/96

TIME	CHAMBER TEMPS.					INLET	BURNERS		COMB.	EXHAUST	PRESS.	GAS	OPACITY
@ MINUTES	#1	#2	#3	#4	#5	TEMP.	#1	#2	TEMP.	TEMP.	DROP	USAGE	
2:55	480	476	444	462	468	148	1538	1534	1542	263	19	43402	—
3:05	482	469	448	466	475	157	1540	1536	1543	270	18	43407	—
3:15	487	467	452	462	482	159	1535	1542	1542	273	18	43412	—
3:25	490	469	456	469	484	161	1544	1538	1549	276	18	43420	—
3:35	495	475	464	477	481	160	1542	1530	1539	279	19	43425	—
3:46	496	481	456	478	486	161	1537	1535	1541	280	19	43432	—
3:55	498	479	457	480	485	161	1540	1536	1543	280	18	43437	—
4:05	503	476	461	474	492	160	1538	1539	1548	281	18	43442	—
4:15	505	477	460	479	487	157	1546	1535	1547	280	19	43450	—
4:25	506	478	461	480	488	161	1549	1546	1552	281	18	43457	—
4:36	500	485	460	480	492	159	1532	1529	1531	281	19	43464	—
4:45	500	486	461	479	494	160	1533	1530	1536	283	19	43472	—
4:55	499	487	462	478	497	159	1529	1534	1532	281	18	43479	—
5:05	501	488	460	483	493	159	1538	1533	1539	280	18	43486	—
5:15	501	486	462	477	497	152	1532	1539	1535	278	18	43494	77 *
5:25	503	484	461	481	491	157	1539	1534	1541	276	18	43500	—
5:35	504	483	461	482	490	157	1540	1533	1543	278	19	43508	—
5:45	508	477	464	476	493	158	1544	1539	1550	276	18	43515	—
5:55	508	477	464	475	494	156	1542	1538	1549	277	18	43522	—
6:05	504	480	465	472	499	152	1533	1542	1539	278	18	43529	—
6:15													

* TEST PROBE IN PATH OF MONITOR

DRYER RTO DATA

I-54

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Louisiana-Pacific Corporation
Newberry, Mi

A Crew days
C crew Nights

Whoelabrator Clean Air Systems
RTO

Date: 8-28-96												
Time	8:00 AM	10:00 AM	12:00 PM	2:00 PM	4:00 PM	6:00 PM	8:00 PM	10:00 PM	12:00 AM	2:00 AM	4:00 AM	6:00 AM
Burner S.P.	1538	1538	1538	1538	1538	1538	1538	1538	1538	1538	1538	1538
Bnr #1 temp	1532	1528	1534	1538	1540	1537	1531	1541	1547	1541	1533	1530
Bnr #1 out	17.5	28.3	24.0	24.5	17.2	16.0	19.6	18.8	7.7	17.7	200	18.2
Bnr #2 temp	1542	1544	1543	1545	1546	1542	1541	1535	1547	1542	1538	1541
Bnr #2 out	6.0	14.6	15.6	15.2	5.1	9.1	10.1	12.8	1.6	3.2	6.9	4.6
Inlet temp	161	130	122	116	160	154	150	153	153	159	158	157
Chamber temp	1538	1534	1537	1543	1546	1544	1549	1542	1556	1548	1540	1538
Exhaust temp	280	279	274	262	280	277	303	304	306	302	304	304
RTO Dif Press	17wc	26wc	27wc	27wc	20wc	21wc	21w.c.	23w.c.	18w.c.	21w.c.	19w.c.	18w.c.
VFD Amps	458	570	604	614	480	482	487	522	462	485	460	454
VFD RPM	1232	1409	1429	1417	1303	1298	1312	1345	1245	1315	1261	1250
P/V setpoint	1.4	1.0	1.1	1.0	1.1	1.0	1.0	1.0	1.1	1.0	1.1	1.0
P/V out	58.1	72.1	75.0	72.5	1.1	1.1	66.5	67.6	57.3	60.4	61.2	60.4
Cbr #1 B.O. temp	501	500	495	486	501	501	505	504	508	502	493	501
Cbr #2 B.O. temp	489	491	484	473	480	486	478	478	481	482	492	491
Cbr #3 B.O. temp	459	461	456	451	459	461	464	462	467	463	461	459
Cbr #4 B.O. temp	477	475	473	464	481	479	467	472	469	468	473	475
Cbr #5 B.O. temp	491	498	490	483	486	493	485	489	499	488	500	497
Fan brg #1 temp	84	96	106	113	110	107	102	96	92	91	87	86
Fan brg #2 temp	75	86	94	105	103	97	89	84	81	80	76	75
Motor brg #1 temp	86	97	110	120	118	112	107	101	93	94	89	87
Motor brg #2 temp	77	88	100	108	108	102	96	90	83	84	79	77
Dryer to RTO	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Panel Line to RTO												
Lap Line to RTO												
Chamber Prg Fan	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
BTUE Pressure	19	18	18	18	18	18	18	18	18	18	18	19
BTUE Flow DP	43096	43181	43261	43369	43442	43515	43614	43690	43766	43867	43951	44035
Comments:												
Daily Gas Usage:												

5/

08/28/96 NEWBERRY BOARD WEIGHTS
(lbs./4x18 panel every 25th mat)
APPROXIMATE TIMES

DRYER HCHO		***PRESS PHENOL***	
0930-0955	115	1215-1317	122
1040-1133	118		121
	120	1450-1552	118
	119		119
1215-1332	118		117
	121		119
1500-1618	117		118
	118		120
	116		123
	119		123
	120		120
	121	1615-1717	121
	122		120
	121		119
	120		116
	122		116
	123		114
AVE	**119.41**		118
			118
			120
		AVE	**119.10**

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PRESS AUGUST 28, 1996
PHENOL,METHANE

DATA TIME:	START=	12:15	END=	13:17	HOURS=	1.03
	START=	14:50	END=	15:52	HOURS=	1.03
	START=	16:15	END=	17:17.	HOURS=	1.03
					TOTAL=	3.10

BOARD WEIGHTS - LBS

average weights determined by taking every 25th untrimmed board (from press tapes)

7/16"
lb per/ 4' x 9' 55.40
lb per/ 4' x 18' 110.80

119.1 lb= average untrimmed mat weight

lb weight of paper overlay (per msf) 74.15

6.97% =trim %

PLANT PRODUCTION RATE

3.10 =hours during testing
49 =pressloads (see press chart)
686 =no. of 4'x18' boards produced (pressloads x 14 boards per load)
49,392 =volume produced in surface footage (pressloads x 4'x18'x14 openings)
57,626 =volume produced 3/8" basis (pressloads x 4'x18'x 14 openings x 1.1667)
76,008 =lbs of finished product (boards produced x weight of finished board)
24,519 =lbs of finished product per hour (lbs of finshed product / hours)
12.26 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE TAKEN FROM TOTALIZERS

TIME	MDI	WAX	ZINC BOR.
12:15-13:17	1,022	255	341
14:50-15:52	999	247	354
16:15-17:17	945	238	369
ave. lbs/hr. 100% solids	957	239	343

24,519 =average lbs. per hour finished product produced during testing
957 =average lbs. per hour of MDI resin used during testing
3.90% = MDI resin used as % of finished product

239 =average lbs. per hour of wax (100% solids) used during testing
0.97% =wax used as % of finished product

343 =Zinc Borate usage in pounds per hour
1.40% =Zinc Borate as % of finished product

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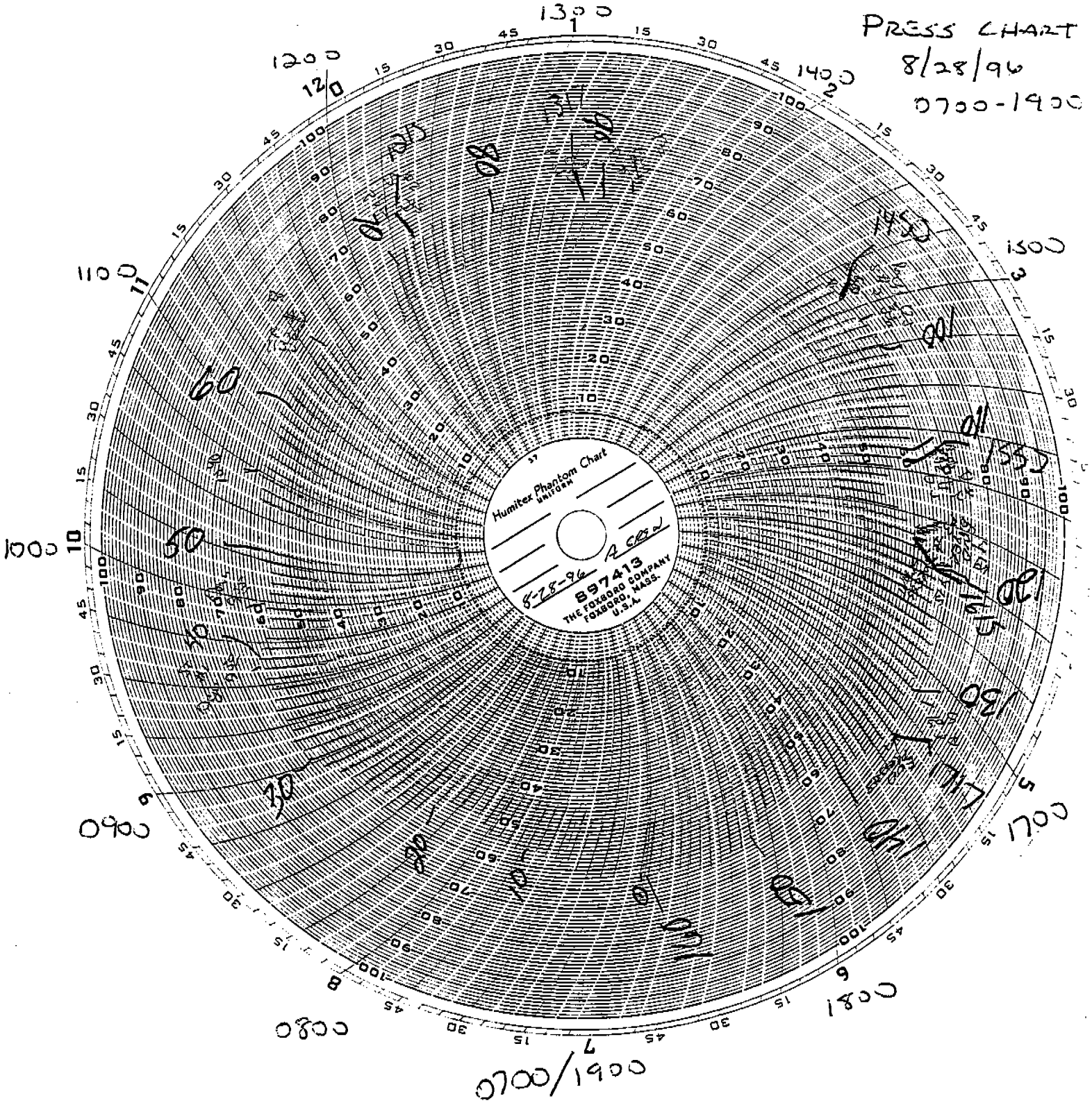
PRESS CHART
8/28/96
0700-1900



TEST TIMES	PRESSLOADS
1215 - 1317	16
1450 - 1552	17
1615 - 1717	16

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Louisiana-Pacific Corporation

Newberry OSB Plant

Date 8/28/94

TIME	PRESS TEMP.	MDI USAGE SURFACE	MDI USAGE CORE	WAX USAGE SURFACE	WAX USAGE CORE
9:30	408	1304	1128	548	484
9:40		1373	1187	599	509
9:50		1453	1256	~~587~~ 634	539
10:00		1523	1316	664	564
10:10		1606	1387	701	596
10:20		1643	1419	717	609
10:30	411	1661	1433	725	615
10:40		1742	1503	760	645
10:50		1820	1570	794	673
11:00		1895	1636	827	701
11:10		1997	1721	873	739
11:20		2072	1785	905	767
11:30	410	2154	1852	942	796
11:40		2218	1907	969	819
11:50		2218	1907	969	819
12:00		2218	1907	969	819
12:10		2283	1964	999	844
12:20		2362	2031	1035	874
12:30	411	2466	2119	1080	911
12:40		2537	2183	1111	938
12:50		2638	2269	1157	974
1:00		2724	2344	1194	1005
1:10		2808	2417	1231	1036
1:20		2908	2507	1275	1073
1:30	408	2971	2560	1300	1094
1:40		3003	2589	1315	1105
1:50		3003	2589	1315	1105
2:00		3003	2589	1315	1105
2:10		3003	2589	1315	1105
2:20		3003	2589	1315	1105
2:30	401	3003	2589	1315	1105
2:40		3003	2589	1315	1105
2:50		3090	21064	1353	1135
3:00		3178	2737	1391	1164
3:10		3274	2819	1435	1200

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Louisiana-Pacific Corporation

Newberry OSB Plant

Date 8/28/96

TIME	PRESS TEMP.	MDI USAGE SURFACE	MDI USAGE CORE	WAX USAGE SURFACE	WAX USAGE CORE
3:20	408	3351	2892	1470	1230
3:30		3438	2962	1506	1259
3:40		3540	3052	1548	1296
3:50		3626	3127	1586	1327
4:00		3697	3191	1620	1356
4:10		3783	3267	1663	1387
4:20	409	3876	3337	1698	1417
4:30		3980	3428	1742	1456
4:40		4038	3479	1767	1477
4:50		4131	3556	1806	1508
5:00		4195	3610	1835	1532
5:10		4298	3692	1879	1570
5:20	409	4386	3772	1922	1604
5:30					
5:40					
5:50					
6:00					
6:10					
6:20					

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Louisiana-Pacific Corporation

Newberry OSB Plant

Date 8-28-96

TIME		SCALE READING SURFACE		SCALE READING CORE		SCALE READING ZINC BORATE
9:25		24858.2		19798.5		989
9:35		24859.2		19799.4		934
9:45		24860.4		19800.3		889
9:55	INTERVAL WAITING ON			SCALES	VIA FED EX	
10:05						
10:15						
10:25						
10:35						
10:45						
10:55						
11:05						
11:15						
11:25						
11:35						
11:45						
11:55	Switched Analyzers PM			VOC (condensates)		
12:05		24870.5		19808.9		2883
12:15	x	24871.5		19809.7		2832
12:25		24872.6		19810.6		2784
12:35		24873.9		19811.8		2709
12:45		24874.7		19812.5		2664
12:55		24875.9		19813.4		2601
1:05		24877.1		19814.4		2543
1:15	x	24878.1		19815.3		2491
1:25		24879.0		19816.1		2434
1:35		24879.9		19816.9		2378
1:45		24879.9		19816.9		2379
1:55						
2:05						
2:15						
2:25						
2:35						
2:45	x	24881.0		19,817.8		2344
2:55		24,881.5		19,818.2		2312
3:05		24,882.6		19,819.1		2244

Dryer 1 start 9:30a

Stop 9:55a Knife Change

Start 10:40

Finish 11:33 Dryer 1

START Dryer 2 12:15

START Press 1 12:15

Finish Press 1 @ 1:47

Finish Dryer 2 1:32

START Press 1 2:50

START #3 Dryer 3:00

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Louisiana-Pacific Corporation

Newberry OSB Plant

Date 8-28-96

TIME		SCALE READING SURFACE		SCALE READING CORE		SCALE READING ZINC BORATE
3:15		24,883.9		19,820.1		2172
3:25		24,884.5		19,820.7		2136
3:35		24,885.6		19,821.7		2076
3:45		24,886.6		19,822.5		2012
3:55		24,887.7		19,823.4		1958
4:05		24,888.9		19,824.4		1887
4:15		24,890.0		19,825.3		1819
4:25		24,890.9		19,826.1		1766
4:35		24,892.2		19,827.2		1700
4:45		24,893.6		19,828.9		1617
5:05		24,895.4		19,830.0		1508
5:15		24,896.4		19,830.8		1450
5:25						
5:35						
5:45						
5:55						
6:05						
6:15						
6:25						
6:35						
6:45						
6:55						
7:05						
7:15						
7:25						
7:35						
7:45						
7:55						
8:05						
8:15						
8:25						
8:35						
8:45						
8:55						

3 SZ Press #2 END

4 SZ Steel Press #3

END #4 Press

1 PM 5 SZ Press #3 END

Louisiana-Pacific Corporation
Northern Division

KONUS CHECKLIST

OPERATOR D. EDGAR SHIFT DAYS CREW A DATE 8-28-96

THERMAL OIL LEVEL – FT. 2'

FUEL OIL INCHES #1 FULL #2 FULL		
MILLTRONICS CLARK BINS (QUARTERS)	BARK BIN	
EMERGENCY DIESEL FUEL LEVEL	CHECKED	FILLED
EMERGENCY DIESEL OIL LEVEL	CHECKED	FILLED
EMERGENCY COOLING TANK	CHECKED	FILLED
EMERGENCY DIESEL RUN EACH SHIFT	YES	NO
T.O. PUMP PRESSURE	SUCTION	DISCHARGE
PRIMARY PUMP I	—	—
PRIMARY PUMP II	—	—
PRIMARY PUMP III	OFF	
ECONOMIZER PUMP I	—	—
ECONOMIZER PUMP II	OFF	

KONUS BAGHOUSE (TWICE A SHIFT) —

SAWTRIM BAGHOUSES (TWICE A SHIFT) —

LEVEL E-TUBE BLOW DOWN TANK

7:00 43" 1:00 45"

POND SET POINT OFF

POND TEMP #1 — #2 —

	SET POINT	RETURN	OUTLET
KONUS I	OFF		
KONUS II	500	464	520
SPACE HEAT	OFF		
ECONOMIZER	500		
FLUE GAS	#1 —		#2 582
BLEND AIR	#1 —		#2 356

KONUS ROOM BLOWN DOWN	YES	NO
KONUS ROOM SWEPT	YES	NO

KONUS FUEL	I	II
WOOD HRS.		12
OIL HRS.		0
WOOD FUEL IN TONS		11.8

	SCALE	
COUNTER		
BEGINNING	8744.5	8858763
END	8756.3	8860385
TOTAL		

59

PRESS AUGUST 29, 1996
PM,CO,NOX,VOC

DATA TIME:	START=	09:00	END=	10:00	HOURS=	1.00
	START=	10:35	END=	11:35	HOURS=	1.00
	START=	12:10	END=	13:10	HOURS=	1.00
					TOTAL=	3.00

BOARD WEIGHTS - LBS

average weights determined by taking every 25th untrimmed board (from press tapes)

7/16"
lb per/ 4' x 9' 54.69
lb per/ 4' x 18' 109.38

117.6 lb= average untrimmed mat weight

lb weight of paper overlay (per msf) 74.15

6.97% =trim %

PLANT PRODUCTION RATE

3.00 =hours during testing
47 =pressloads (see press chart)
658 =no. of 4'x18' boards produced (pressloads x 14 boards per load)
47,376 =volume produced in surface footage (pressloads x 4'x18'x14 openings)
55,274 =volume produced 3/8" basis (pressloads x 4'x18'x 14 openings x 1.1667)
71,970 =lbs of finished product (boards produced x weight of finished board)
23,990 =lbs of finished product per hour (lbs of finshed product / hours)
11.99 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE TAKEN FROM TOTALIZERS

TIME	MDI	WAX	ZINC BOR.
09:00-10:00	929	222	287
10:35-11:35	934	231	394
12:10-13:10	843	216	325
ave. lbs/hr.	902	223	335
100% solids			

23,990 =average lbs. per hour finished product produced during testing
902 =average lbs. per hour of MDI resin used during testing
3.76% = MDI resin used as % of finished product

223 =average lbs. per hour of wax (100% solids) used during testing
0.93% =wax used as % of finished product

335 =Zinc Borate usage in pounds per hour
1.40% =Zinc Borate as % of finished product

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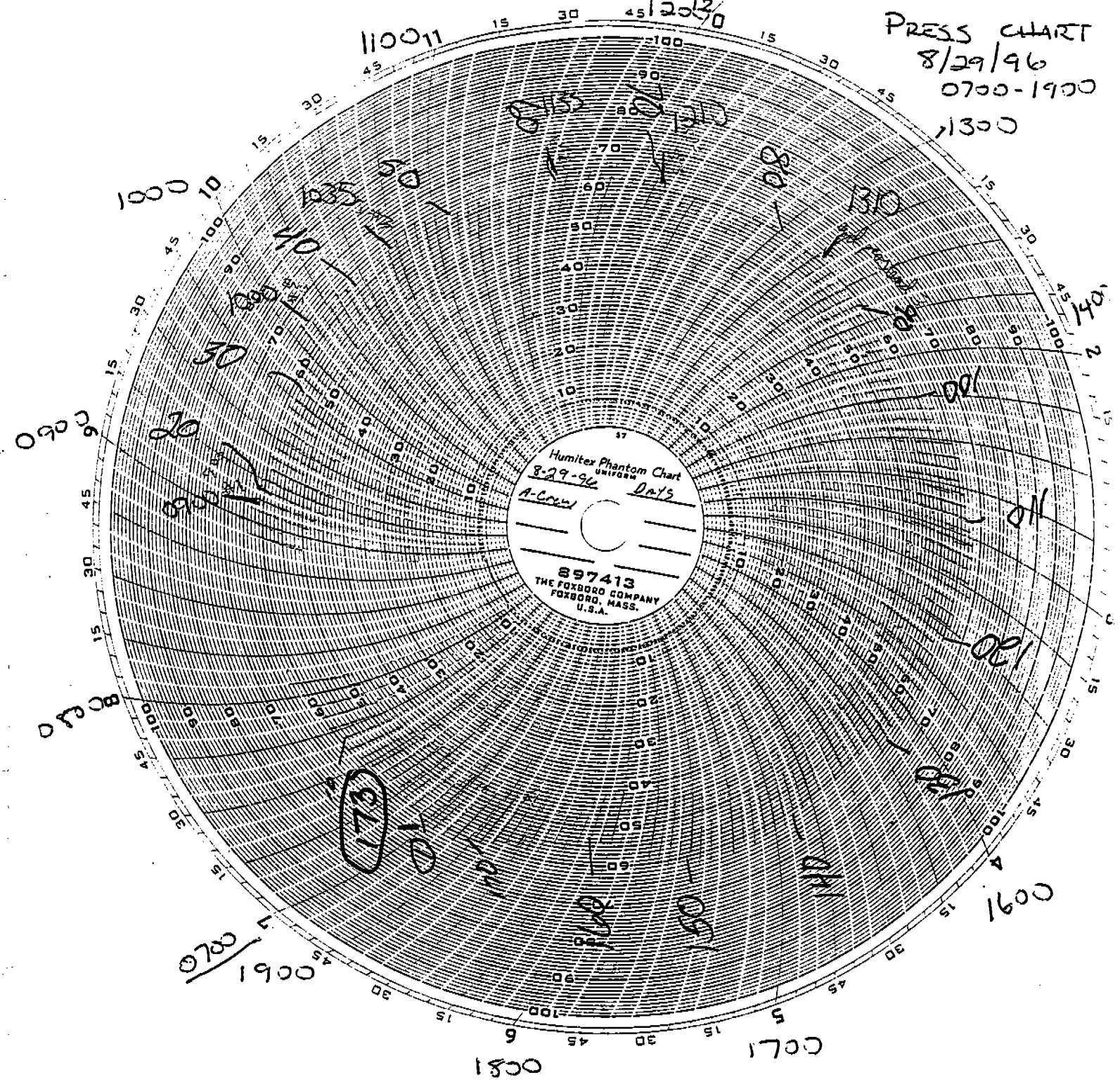
PRESS CHART
8/29/96
0700-1900



TEST TIMES	PRESSLOADS
0900-1000	16
1035 - 1135	16
1210 - 1310	15

(61)

LOUISIANA-PACIFIC CORPORATION
NEWBERRY, MICHIGAN

DATE: 8/29/96

SHIFT	TYPE	# OF PRESS LOADS	A-GRADE	FOOTAGE	SCHED. RUN TIME	DOWNTIME MINUTES	% RUN TIME	% "A" GRADE	WOOD USAGE
A.M. TO P.M. A CREW	7/16 P.S. 4x18	174		204,624	718	2 sc 49 misc 51	93.1	98.3	KONUS #1 #2 12.7 DRYER 1ST 36,661
P.M. TO A.M. C CREW	7/16 P.S. 4x18	187		219,912	720	2	99.0	100%	KONUS #1 #2 12.5 SMS DRYER 2ND 51,111
TOTAL DAILY				424,536					

PRODUCTION M.T.D.		W.T.D.	2,398,856
1ST SHIFT	1,030,512	M.T.D.	2,396,856
2ND SHIFT	1,366,344	Y.T.D.	81,938,166
TOTAL	2,396,856		
CREW A:	599,760		
CREW B:	430,252		
CREW C:	618,576		
CREW D:	247,268		
TOTAL	2,396,856		

	HOURS DOWN	HOURS RUN
1ST		
2ND		

DAILY PRESS VENT CHECK
TIME CHECKED 10:00 AM

FOREMAN	% R/T
CHRIS VOGEL	90.7
BILL MAGNUSON	
KIRK BOWLER	95.4
BOBBY CHANDELL	

LOG COUNT	DAILY	W.T.D.	M.T.D.
CREW A	9353	23,590	23,590
CREW B			
CREW C	3900	22,280	22,280
CREW D			

MAJOR DOWNTIME: A-CREW 46 MIN - FILLING BINS (STACK TESTING PURPOSES)

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Louisiana-Pacific Corporation

Newberry OSB Plant

Date 8/29/96

TIME	PRESS TEMP.	MDI USAGE SURFACE	MDI USAGE CORE	WAX USAGE SURFACE	WAX USAGE CORE	
9:00		632	541	267	227	ST #1 9:00
9:10		705	609	294	254	
9:20		790	678	333	283	
9:30		878	753	369	312	
9:40		964	828	406	342	
9:50		1043	898	441	368	
10:00	405	1125	977	476	401	E #1 10:00
10:10		1220	1052	520	434	
10:20		1314	1137	560	470	S #2 10:20
10:30		1405	1225	599	509	
10:40		1477	1296	633	538	
10:50		1570	1381	673	572	
11:00	407	1671	1466	720	606	
11:10		1778	1560	768	646	
11:20		1816	1599	783	663	
11:30		1892	1672	815	692	E #2 11:35
11:40		2020	1786	875	740	
11:50		2068	1829	898	757	
12:00	410	2156	1906	935	790	S #3 12:10
12:10		2236	1973	974	818	
12:20		2318	2049	1010	849	
12:30		2379	2101	1038	869	
12:40		2475	2180	1083	903	
12:50		2543	2238	1113	928	
1:00	410	2624	2306	1152	959	
1:10		2690	2362	1182	983	
1:20						
1:30						
1:40						
1:50						
2:00						

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Louisiana-Pacific Corporation

Newberry OSB Plant

Date 8/29/96

TIME		SCALE READING SURFACE		SCALE READING CORE		SCALE READING ZINC BORATE
9:00		24987.4		19904.7		617
9:10		24988.2		19905.5		578
9:20		24989.3		19906.5		498
9:30		24990.0		19906.9		463
9:40		24991.2		19908.1		2918
9:50		24992.1		19908.7		2876
10:00		24993.3		19909.9		2830
10:10		24994.5		19910.9		2760
10:20		24995.6		19911.8		2708
10:30		—		—		—
10:40		24997.4		19913.3		2600
10:50		24998.5		19914.4		2528
11:00		24999.5		19915.2		2480
11:10		25000.6		19916.3		2421
20		25001.5		19917.0		2367
30		25002.7		19918.1		2300
40		25003.9		19919.1		2234
50		—		—		—
1200		—		—		—
10		25007.0		19921.8		2050
20		25008.1		19922.8		1989
30		25008.9		19923.3		1940
40		25009.8		19924.1		1886
50		25010.7		19924.9		1828
1300		25011.7		19925.5		1785
10		25012.7		19926.5		1725
20						
30						
40						
50						
1400						

ST. #1 9:00

ADD #2500 BAG #1 END 10:00

ST #2 10:35

E#2 11:55

E#2 12:00

ST. #3 12:10

E#3 1:10

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Louisiana-Pacific Corporation
Northern Division

KONUS CHECKLIST

OPERATOR D. EDGAR SHIFT DAYS CREW A DATE 2-29-96

THERMAL OIL LEVEL – FT. 2'

FUEL OIL INCHES #1 FULL #2 FULL		
MILLTRONICS CLARK BINS (QUARTERS)	BARK BIN	
EMERGENCY DIESEL FUEL LEVEL	CHECKED	FILLED
EMERGENCY DIESEL OIL LEVEL	CHECKED	FILLED
EMERGENCY COOLING TANK	CHECKED	FILLED
EMERGENCY DIESEL RUN EACH SHIFT	YES	NO
T.O. PUMP PRESSURE	SUCTION	DISCHARGE
PRIMARY PUMP I	—	—
PRIMARY PUMP II	—	—
PRIMARY PUMP III	off	
ECONOMIZER PUMP I	—	—
ECONOMIZER PUMP II	OFF	

KONUS BAGHOUSE (TWICE A SHIFT) —

SAWTRIM BAGHOUSES (TWICE A SHIFT) —

LEVEL E-TUBE BLOW DOWN TANK

T:00 49" 1:00 52"

POND SET POINT OFF

POND TEMP #1 — #2 —

	SET POINT	RETURN	OUTLET
KONUS I	OFF		
KONUS II	500	486	510
SPACE HEAT	OFF		
ECONOMIZER	500		
FLUE GAS	#1 —	#2 773	
BLEND AIR	#1 —	#2 345	

KONUS ROOM BLOWN DOWN	YES	NO
KONUS ROOM SWEPT	YES	NO

KONUS FUEL	I	II
WOOD HRS.		12
OIL HRS.		0
WOOD FUEL IN TONS		12.7

	COUNTER	SCALE
BEGINNING	8770.1	8862100
END	8782.8	8863670
TOTAL		

65

08/29/96 NEWBERRY BOARD WEIGHTS
(lbs./4x18 panel every 25th mat)
APPROXIMATE TIMES

PRESS PM

0900-1000	110
	115
	117
	116
	115
	118
	121
	121
	122
1035-1135	118
	118
	120
	120
	116
	118
	117
	116
	115
	118
1210-1310	114
	117
	117
	116
	115
	125
	118
	119
	120
AVE	**117.57**

Issue Date: 03/18/91
Revised Date: 04/20/94

SECTION I - PRODUCT IDENTIFICATION

Product Code: 42-500 - 42-509
Trade Name: DYNOPREG Paint Base Overlay
Product Class: Paper impregnated with phenol-formaldehyde resin
C.A.S. Number: Not Applicable

SECTION II - HAZARDOUS INGREDIENTS

Ingredients	CAS #	Weight Max. %	Exposure Limits
Phenol	108-95-2	<0.25	5.0 ppm ACGIH TLV
Formaldehyde	50-00-0	<0.1	.75 ppm ACGIH TLV

SECTION III - PHYSICAL DATA

Boiling Point: N/A
Volatile %: N/A
[illegible]: [illegible]

Vapor Density: Non-volatile
Specific Grav: N/A
Appearance: Paper

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flammability Class: N/A

Flash Point: N/A

LEL : N/A

EXTINGUISHING MEDIA: Water spray, carbon dioxide or foam.

SPECIAL FIRE FIGHTING PROCEDURES: None known.

UNUSUAL FIRE & EXPLOSION HAZARDS: Fire fighters should wear self-contained breathing apparatus to avoid inhalation of smoke or vapors.

SECTION V - HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL:

Phenol: The OSHA PEL and the ACGIH TLV for phenol is currently set at 5 ppm for an 8-hour TWA.

SECTION V - HEALTH HAZARD DATA (cont.)

PERMISSIBLE EXPOSURE LEVEL (cont.)

Formaldehyde: OSHA has established a .75 ppm PEL for formaldehyde as an 8-hour time weighted average (TWA) and a 2 ppm 15-minute short term exposure limit (STEL). OSHA has also set 0.5 ppm as an action level for formaldehyde. See OSHA regulation at 21 CFR 1910.1048 for information on workplace requirements if these levels are exceeded. ACGIH TLV for formaldehyde is .75 ppm for an 8-hour TWA.

EFFECTS OF OVEREXPOSURE: Contact with skin may cause irritation or rash. Eye contact may cause slight irritation or redness. Heated vapors may cause irritation of the respiratory tract.

Repeated or prolonged skin contact with this formaldehyde-containing material may cause an allergic skin reaction (i.e. sensitization) in some individuals.

FIRST AID: If skin contact, wash with soap and water at once. If eye contact, flush with water for 15 minutes and call a physician. If fumes or heated vapors are inhaled, remove victim to fresh air

PRIMARY ROUTE(S) OF ENTRY: Inhalation of dust or heated fumes. Phenol may be absorbed through the skin.

CARCINOGENICITY: Formaldehyde is listed as a potential carcinogen by the National Toxicolgy Program (NTP) and the International Agency for Research on Cancer (IARC).

SECTION VI - REACTIVITY DATA

STABILITY:	[ ] Unstable	[x] Stable
HAZARDOUS POLYMERIZATION:	[ ] May occur	[x] Will not occur
INCOMPATIBILITY:	None Known.	
CONDITIONS TO AVOID:	Warm storage and ignition sources.	
HAZARDOUS DECOMPOSITION PRODUCTS:	Under severe thermal degradation toxic fumes, carbon dioxide, carbon monoxide, and formaldehyde may be formed.	

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Issue Date: 03/18/91
Revised Date: 04-20-94

Product Code: 42-500 - 42-509

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:	Sweep up and place in a closed container. Wear a dust mask if dust is created.
WASTE DISPOSAL METHOD:	At this time, this material or its containers would not be considered hazardous wastes as defined under the federal RCRA regulations (40 CFR 261) if discarded. Care should be taken to ensure that the material or its containers are disposed of in an approved facility in accordance with current federal, state, and local regulations. For further information, contact your state or local solid waste agency or the United States Environmental Protection Agency's RCRA hotline (1-800-424-9346 or 202-382-3000).

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:	Should be worn to avoid breathing dust or heated fumes.
VENTILATION:	Local exhaust and general ventilation recommended.
PROTECTIVE GLOVES:	Suitable protective gloves must be worn to prevent skin contact.
EYE PROTECTION:	Safety glasses or goggles are recommended.
OTHER PROTECTIVE EQUIPMENT:	As required to prevent prolonged or repeated skin contact.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:	Avoid prolonged or repeated skin contact. Store in a cool, dry location.
OTHER PRECAUTIONS:	Consult Product Bulletin prior to using this material.

SECTION X - SUPPLEMENTAL INFORMATION

SARA STATUS: One or more of the chemical substances listed in Section II of this MSDS is subject to the reporting requirements of Section 313 of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR 372.

This material has been categorized as having the following hazard(s) as defined by SARA Title III Regulations (40 CFR 370): acute, chronic.

DOT PROPER SHIPPING NAME: Not regulated by DOT

UN NUMBER: None

DOT HAZARD CLASS: None

DYNO

MATERIAL SAFETY DATA SHEET

Dyno Overlays, Inc.

SECTION I - PRODUCT IDENTIFICATION

Product Code: 42-270 - 4227I
Trade Name: DYNOPREG - Phenolic Backer Overlay [OSB Siding Application]
Product Class: HDO
C.A.S. Number: Article
MSDS Preparation: 13 June, 1995

SECTION II - HAZARDOUS INGREDIENTS

Ingredients	*CAS #*	*Weight % Max.*	*Exposure Limits*
Phenol	108-95-2	<0.10 %	5.0 PPM ACGIH
Formaldehyde	50-00-0	<2.00 %	0.75 PPM ACGIH
Methanol	67-56-1	NA	200 PPM ACGIH

SECTION III - PHYSICAL DATA

Boiling Point: N/A

Volatile % N/A

Evaporation Rate: Non-Volatile

Vapor Density: Non-Volatile

Appearance: Brown Paper Coated Gray Top Side

Specific Gravity: N/A

Micro Chamber Analysis:
* Methanol NA
* Formaldehyde: NA
* Phenol: NA

SECTION IV - FIRE AND EXPLOSION DATA

Flammability Class: N/A

Flash Point: N/A

LFL: N/A

CORPORATE HQTRS. & PLANT — Route 8 Box 8206 ▪ 121 Vermont Ave. S. ▪ Hayward, WI 54843 ▪ Call: (715) 634-5057 ▪ Fax: (715) 634-2361
TACOMA OFFICE & PLANT — ▪ 2144 Milwaukee Way ▪ Tacoma, WA 98421-2706 ▪ Call: (206) 572-5600 ▪ Fax: (206) 627-2896

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Extinguishing Media:	Water Spray, Carbon Dioxide, or Foam
Special Fire Fighting Procedures:	None known
Unusual Fire and Explosion Hazards:	Fire fighters should wear self contained breathing apparatus to avoid inhalation of smoke and vapors.

SECTION V – HEALTH HAZARD DATA

When heated the paper will give off small amounts of volatile chemicals, primarily formaldehyde, phenol and methanol.

Permissible Exposure Levels:

Phenol: The OSHA PEL (Permissible Exposure Limit) and the ACGIH TLV (Threshold Limit Value) for phenol is currently set at 5 PPM for an 8-hour TWA.

Formaldehyde: OSHA has established a 0.75 PPM PEL for formaldehyde as an 8-hour TWA and a 2 PPM 15 minute STEL (Short Term Exposure Limit). OSHA has also set a 0.5 PPM action level for formaldehyde(see OSHA regulation 21 CFR 1910.1048 for specific information regarding work place requirements). ACGIH TLV for formaldehyde is 0.75 PPM for an 8-hour TWA.

Methanol: The OSHA PEL and the ACGIH TLV for methanol is currently set at 200 PPM for an 8-hour TWA.

Effects of Over Exposure:

Contact with skin may cause irritation or rash. Eye contact may cause slight irritation or redness. Heated vapors may cause irritation of the respiratory tract.

First Aid:

Skin contact:	Wash with soap and water at once.
Eye Contact:	Flush with water for 15 minutes and call a physician if irritation persists.
Inhalation:	If fumes or heated vapors are inhaled, remove victim to fresh air.

Primary Route(s) of Entry:

Inhalation of dust or fumes. Phenol may be absorbed through the skin.

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Carcinogenicity:

Formaldehyde, a component of this product, is listed by the NTP (National Toxicology Program) in their third annual report as a substance that may be reasonably be anticipated to be a carcinogen. Formaldehyde is classified as a "probable carcinogen to humans" by the IARC (International Agency for Research on Cancer). TLV's have been established by the ACGIH. OSHA standard 1910.1048 also requires exposure

monitoring in the work place. For the purpose of this standard, formaldehyde concentrations greater than .1% require initial monitoring to determine if the action level has been exceeded. If the Monitoring levels are in excess of the action level, periodic monitoring will be required as stated in the OSHA standard. The free formaldehyde content in this product is listed in the physical data section of this MSDS..

SECTION VI – REACTIVITY DATA

Stability:	[ ] Unstable	[x] Stable
Hazardous Polymerization:	[ ] May Occur	[x] Will Not Occur
Incompatibility:	None known	
Conditions to Avoid:	Warm storage and ignition sources.	
Hazardous Decomposition Products:	Under severe thermal degradation , toxic fumes carbon dioxide, carbon monoxide and formaldehyde may be formed.	

SECTION VII – SPILL OR LEAK PROCEDURES

Material Release:

Sweep up and place in a closed container. Proper PPE (Personal Protective Equipment) should be worn per Section VIII of this MSDS.

Waste Disposal Method:

At this time, this material is not would not be considered a hazardous waste as defined under the federal RCRA regulations (40 CFR 261) if discarded. However caution should be taken as these regulations can change and state and local regulations may vary to reclassify this waste as hazardous. Material should always be disposed of in accordance with federal, state and local regulations.

For further information, contact your state or local solid waste disposal agency of the United States Environmental Protection Agency's RCRA hot-line (800-424-9346 or 202-382-3000).

SECTION VIII - SPECIAL PROTECTION INFORMATION

Respiratory Protection:	Should be worn to prevent breathing dust or heated fumes.
Ventilation:	Local exhaust and general ventilation recommended.
Protective Gloves:	Suitable protective gloves should be worn to protect against skin contact and to prevent paper cuts.
Eye Protection:	Safety glasses or goggles are recommended.
Other Protective Equipment:	As required to prevent prolonged or repeated skin contact.

SECTION IX - SPECIAL PRECAUTIONS

Handling and Storage: -

Avoid prolonged or repeated skin contact. Store in a cool, dry location.

Other Precautions:

Consult Product Bulletin prior to using this product.

SECTION X - SECTION 313 SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of "Section 313 of the Emergency Planning and Community Right to Know Act" of 1986 (40 CFR 372). This page must remain attached to this MSDS.

CAS #	*Chemical Name*	*Percent by Weight*
50-00-0	Formaldehyde	<2.00 %
108-95-2	Phenol	<0.10 %

We can not anticipate all conditions under which this information and our products, the products of other manufactures in combination with our products, may be used. We accept no responsibility for results obtained by the application of this product or the safety and suitability of our products, either alone or in conjunction with other products. Users are advised to make their own determinations, through testing as to the safety and suitability of each product or product combination for their own purposes. Unless otherwise agreed to in writing, we sell the products without warranty. Buyers and users assume all responsibility and liability for loss or damage arising from the handling and use of our products, whether used alone or in conjunction with other products.

This information is provided in accordance with OSHA Hazard Communication Standard 29 CFR 1910.1200.

MSDS Number: 228
Revision Date: 3-JAN-96

Material Safety Data Sheet

EMERGENCY CONTACTS:

Spills, Leaks, Fire or Exposure Call Chemtrec: (800) 424-9300
Medical Emergency Information: (800) 561-3636

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: RUBINATE* 1840
Product Use: Component of a polyurethane.
Company:
ICI Polyurethanes Group (a business unit of ICI Americas Inc.)
286 Mantua Grove Road
West Deptford, NJ 08066-1723
For Polyurethanes product information/assistance:
West Deptford: (800) 257-5547 Sterling Heights: (800) 553-8624 Canadian Office: (905) 678-9150

*RUBINATE is a registered trademark of ICI Americas Inc.

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENT(S)	% (w/w)	ACGIH TLV	CAS NO.
Polymeric Diphenylmethane Diisocyanate (polymeric MDI)	100	Not Listed.	9016-87-9
CONTAINS: 4,4'-Diphenylmethane Diisocyanate (4,4' MDI) (approx. 45%)		0.005 ppm	101-68-8
MDI isomers/oligomers		Not Listed.	9016-87-9

SECTION 3 - HAZARDS IDENTIFICATION

****

EMERGENCY OVERVIEW

Health Hazards: Irritating to eyes, respiratory system and skin. Risk of serious damage to respiratory system. May cause sensitization by inhalation and skin contact. Repeated inhalation of aerosol at levels above the occupational exposure limit could cause respiratory sensitization. The onset of the respiratory symptoms may be delayed for several hours after exposure. A hyper-reactive response to even minimal concentrations of MDI may develop in sensitized persons.

Physical Hazards: Reacts slowly with water to produce carbon dioxide which may rupture closed containers. This reaction accelerates at higher temperatures.

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Appearance: Dark brown viscous liquid.
Odor: Slightly aromatic.

Read the entire MSDS for a more thorough evaluation of the hazards.

****

SECTION 4 - FIRST AID MEASURES

General: In case of accident or if you feel unwell, seek medical advice IMMEDIATELY (show the label where possible).

Inhalation: Remove patient from exposure, keep warm and at rest. Obtain medical attention. Treatment is symptomatic for primary irritation or bronchospasm. If breathing is labored, oxygen should be administered by qualified personnel. Apply artificial respiration if breathing has ceased or shows signs of failing.

Skin Contact: Remove contaminated clothing. Wash affected areas thoroughly with soap and water. If irritation, redness, or a burning sensation develops and persists, obtain medical advice. Contaminated clothing should be thoroughly cleaned before reuse.

Eye Contact: Immediately flush eyes with running water for a minimum of 15 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY.

Ingestion: Do NOT induce vomiting. Provided the patient is conscious, wash out mouth with water then give 1 or 2 glasses of water to drink. Refer person to medical personnel for immediate attention.

*** **Note to Physicians:** Symptomatic and supportive therapy as needed. Following severe exposure medical follow-up should be monitored for at least 48 hours.

SECTION 5 - FIRE-FIGHTING MEASURES

Fire and Explosion Hazards: Containers may burst under intense heat. Due to reaction with water, a hazardous build-up of pressure could result if contaminated containers are re-sealed.

Extinguishing Media: Carbon dioxide, dry chemical, or appropriate foam. If water is used, very large quantities are required. Reaction between water and hot isocyanate may be vigorous. Contain run-off water with temporary barriers.

Fire Fighting Procedures: As appropriate for surrounding materials/equipment.

Fire Fighting Protective Equipment: Use self-contained breathing apparatus and full protective clothing (Bunker gear).

Flash Point: 425°F (218°C) (COC)
Flammable Limits (Lower): Not available.
Flammable Limits (Upper): Not available.
Auto Ignition Temperature: 240°C (464°F) (4,4'- Diphenylmethane Diisocyanate)
Decomposition Temperature: Not available.
Rate of Burning: Not available.
Explosive Power: None.

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Sensitivity to Mechanical Impact: None.
Sensitivity to Static Discharge: None.
Combustion Products: Carbon monoxide, carbon dioxide, nitrogen oxides and some HCN.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

For major spills call Chemtrec (800-424-9300).

Spills, Leaks, or Releases: Clean-up should only be performed by trained personnel. People dealing with major spillages should wear full protective clothing including respiratory protection. Evacuate the area. Prevent further leakage, spillage or entry into drains.
Contain and absorb large spillages onto an inert, non-flammable adsorbent carrier (such as earth or sand). Shovel into open-top drums or plastic bags for further decontamination, if necessary. Wash the spillage area clean with liquid decontaminant. Test atmosphere for MDI vapor. Neutralize small spillages with decontaminant. Remove and dispose of residues. Notify applicable government authorities if release is reportable.

Preparation of Decontamination Solution: Prepare a decontamination solution of 0.2-0.5% liquid detergent and 3-8% concentrated ammonium hydroxide in water (5-10% sodium carbonate may be substituted for the ammonium hydroxide). Follow the precautions on the supplier's material safety data sheets when preparing and using solution.

Use of Decontamination Solution: Allow deactivated material to stand for at least 30 minutes before shoveling into drums. Do not tighten the bungs. Mixing with wet earth is also effective, but slower.

SECTION 7 - HANDLING AND STORAGE

Handling: Avoid personal contact with the product or reaction mixture. Use only with adequate ventilation to ensure that the defined occupational exposure limit is not exceeded. The efficiency of the ventilation must be monitored regularly because of the possibility of blockage. Avoid breathing aerosols, mists and vapors. When the product is sprayed or heated, an approved MSHA/NIOSH positive-pressure, supplied-air respirator may be required.

Storage Requirements: Keep containers properly sealed and when stored indoors, in a well ventilated area. Keep contents away from moisture. Due to reaction with water, producing CO2-gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Do not store in containers made of copper, copper alloys or galvanized surfaces. If a container is contaminated, do not reseal it. Reseal containers only after placing under a nitrogen blanket.

Storage Temperature: Ideal storage temperature is 16-38^{o}C (60-100^{o}F).

Keep stocks of decontaminant (See Section 6) readily available.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

PREVENTIVE MEASURES:

Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

Engineering Controls: Use local exhaust ventilation to maintain airborne concentrations below the TLV. Suitable respiratory equipment should be used in cases of insufficient ventilation or where operational procedures demand it. Follow guidelines in the ACGIH publication "Industrial Ventilation".

Personal Protective Equipment:

Eye Protection: Chemical safety goggles. If there is a potential for splashing, use a full face shield.

Skin Protection: The following protective materials are recommended:
Gloves - neoprene, nitrile-butadiene rubber, butyl rubber. Thin disposable gloves should be avoided for repeated or long term use.
Protective clothing should be selected and used in accordance with "Guidelines for the Selection of Chemical Protective Clothing" published by ACGIH.

Respiratory Protection: Use a NIOSH/MSHA-approved positive pressure air-supplied respirator equipped with a full facepiece, or an air-supplied hood, if airborne concentrations exceed or are expected to exceed the TLV. Air purifying (cartridge type) respirators are not approved for protection against diisocyanates.

EXPOSURE GUIDELINES:

*** Medical supervision of all employees who handle or come in contact with respiratory sensitizers is recommended. Persons with asthmatic-type conditions, chronic bronchitis, other chronic respiratory diseases or recurrent skin eczema or sensitization should be excluded from working with this product. Once a person is diagnosed as sensitized, no further exposure to the material that caused the sensitization should be permitted.

HAZARDOUS INGREDIENT(S):

4,4'-Diphenylmethane Diisocyanate:

ACGIH TLV	0.005 ppm (8-hour, 40 hours/week)
OSHA PEL CEILING	0.02 ppm
NIOSH TLV	0.005 ppm (10-hour, 40 hours/week)
NIOSH STEL	0.02 ppm (15-minute)

NOTE: The Occupational Exposure Limits listed for isocyanates do not apply to previously sensitized individuals.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Alternate Name(s): Polymeric MDI
Chemical Name: Not applicable (mixture).
Chemical Family: Diisocyanate.
Molecular Formula: Not applicable (mixture).
Appearance: Dark brown viscous liquid.
Odor: Slightly aromatic.
Odor Threshold (ppm): 0.4 (4,4'-Diphenylmethane Diisocyanate)
pH: Not applicable.
Flash Point: 425°F (218°C) (COC)
Vapor Pressure (mm Hg at 25°C): < 0.0003
Vapor Density (Air=1): 8.5 approx.
Boiling Point: Not applicable.
Melting Point: Not available.
Solubility (Water): (Reacts with water)

Solubility (Other): Soluble in most organic solvents.
Specific Gravity: 1.2
Evaporation Rate: Not available.

SECTION 10 - STABILITY AND REACTIVITY

Hazardous Decomposition Products: Highly unlikely under normal industrial use. See Section 5.
Chemical Stability: Stable at room temperature.
Conditions to Avoid: Avoid high temperatures. Avoid freezing.
Incompatibility with other Substances: This product will react with any materials containing active hydrogens such as water, alcohol, amines, bases and acids. The reaction with water is very slow under 50°C (122°F) but is accelerated at higher temperatures.
Hazardous Polymerization: Polymerization may occur at elevated temperatures in the presence of alkalies, tertiary amines and metal compounds.

SECTION 11 - TOXICOLOGICAL INFORMATION

TOXICOLOGICAL DATA:

Polymeric MDI:

Oral LD50 (rat) > 5,000 mg/kg
Dermal LD50 (rabbit) > 5,000 mg/kg
Inhalation LC50 (rat) = 490 mg/m3/4H (respirable aerosol)

POTENTIAL HEALTH EFFECTS:

Inhalation: This product is a respiratory irritant and potential respiratory sensitizer. Repeated inhalation of vapor or aerosol at levels above the occupational exposure limit could cause respiratory sensitization. Symptoms may include irritation to the eyes, nose, throat and lungs, possibly combined with dryness of the throat, tightness of chest and difficulty in breathing. The onset of the respiratory symptoms may be delayed for several hours after exposure. A hyper-reactive response to even minimal concentrations of MDI may develop in sensitized persons.

Skin Contact: Moderate irritant. Repeated and/or prolonged contact may cause skin sensitization. Animal studies have shown that respiratory sensitization can be induced by skin contact with known respiratory sensitizers including diisocyanates. These results emphasize the need for protective clothing including gloves to be worn at all times when handling these chemicals or in maintenance work.

Eye Contact: The aerosol, vapor or liquid will irritate human eyes following contact.

Ingestion: Ingestion may cause irritation of the gastrointestinal tract. Based on the oral LD50, this product is considered practically non-toxic by ingestion.

Chronic Effects: A study where groups of rats were exposed for 6 hours/day, 5 days/week for a lifetime to atmospheres of respirable polymeric MDI aerosol. Overall, the tumor incidence, both benign and malignant, and the number of animals with tumors were not different from controls. Only at the top level (6 mg/m3), there was a significant incidence of a benign tumor of the lung (adenoma) and one malignant tumor (adenocarcinoma). There were no lung tumors at 1 mg/m3 and no effects at 0.2 mg/m3. The increased incidence of lung tumors is associated with prolonged respiratory irritation and the concurrent accumulation of yellow material in the lung, which occurred throughout the study. In the absence of prolonged exposure to high concentrations leading to chronic irritation and lung damage, it is highly unlikely that tumor formation will occur.

There are reports that chronic exposure may result in permanent decrease in lung function.

Carcinogenicity: The ingredients of this product are not classified as carcinogenic by ACGIH or IARC, nc regulated as carcinogens by OSHA, and not listed as carcinogens by NTP.

Mutagenicity: There is no substantial evidence of mutagenic potential.

Reproductive Effects: No adverse reproductive effects are anticipated.

*** **Teratogenicity and Fetotoxicity:** No birth defects were seen in two independent animal (rat) studies. Fetotoxicity was observed at doses that were extremely toxic (including lethal) to the mother. Fetotoxicity was not observed at doses that were not maternally toxic. The doses used in these studies were maximal, respirable concentrations well in excess of the defined occupational limits.

SECTION 12 - ECOLOGICAL INFORMATION

Environmental Fate and Distribution: It is unlikely that significant environmental exposure in the air or water will arise, based on consideration of the production and use of the substance.

Persistence and Degradation: Immiscible with water, but will react with water to produce inert and non-biodegradable solids.

Toxicity: Polymeric MDI.
LC0 (Zebra Fish) > 1000 mg/l
EC50 (Daphnia magna) (24 hour) > 1000 mg/l
EC50 (E. Coli) > 100 mg/l

SECTION 13 - DISPOSAL CONSIDERATIONS

The generation of waste should be avoided or minimized wherever possible.

Disposal should be in accordance with local, state, provincial or national regulations. This material is not a hazardous waste under RCRA 40 CFR 261. Small quantities should be treated with a decontaminant solution (See Section 6). The treated waste is not a hazardous material under RCRA 40 CFR 261. Chemical waste, even small quantities, should never be poured down drains, sewers or waterways.

Empty containers should be decontaminated and either passed to an approved drum recycler or destroyed.

SECTION 14 - TRANSPORT INFORMATION

DOT: Not regulated.

Transportation Emergency Telephone Number: 1-800-424-9300 (CHEMTREC)

TDG: Not regulated.

IMO: Not regulated.
IATA/ICAO Class: Not regulated.

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SECTION 15 - REGULATORY INFORMATION

USA CLASSIFICATION:

OSHA Classification:

- Physical: Not regulated.
- Health: Highly toxic. Respiratory sensitizer. Skin sensitizer. Irritant.
- Target Organ: Respiratory tract. Skin.

TSCA (Toxic Substances Control Act) Regulations: All ingredients are on the TSCA Chemical Substance Inventory.

*** **EPCRA Section 313 (40 CFR 372):** This product contains the following chemical(s) subject to reporting requirements: ~100% Diisocyanate compounds (No CAS number assigned).

This product does not contain nor is it manufactured with ozone depleting substances.

Other Regulations/Legislation which apply to this product: Massachusetts Right-to-Know, Pennsylvania Right-to-Know, New Jersey Right-to-Know, CERCLA.

CANADIAN CLASSIFICATION:

This product has been classified in accordance with the hazard criteria of the CPR (Controlled Products Regulations) and this MSDS (Material Safety Data Sheet) contains all the information required by the CPR.

Controlled Products Regulations (WHMIS) Classification: D- 1A: Very Toxic (acute effects). D-2A: Very Toxic. D-2B: Toxic.

CEPA / Canadian Domestic Substances List (DSL): The substance(s) in this product is/are on the Canadian Domestic Substances List (CEPA DSL).

SECTION 16 - OTHER INFORMATION

Glossary:		
	ACGIH -	American Conference of Governmental Industrial Hygienists
	IARC -	International Agency for Research on Cancer
	NTP -	National Toxicology Program
	OSHA -	Occupational Safety and Health Administration

*** FOR YOUR PROTECTION: The information and recommendations in this publication are, to the best of our knowledge, reliable.

The toxicity and risk characteristics of products made by ICI Polyurethanes Group will necessarily differ from the toxicity and risk characteristics that occur when such products are used with other materials during a manufacturing process. The resulting risk characteristics should be determined and made known to ultimate end-users and processors. ICI Polyurethanes Group MAKES NO WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Prepared By: "Polyurethanes Applied Toxicology/Regulatory Services" (609) 423-8518

***This line or section contains revisions or new statements since the last issue date.

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BORDEN®
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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

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 CORP
ATTN: KURT CHAMBERLAIN
461 MILLER STREET
NEWBERRY, MI 49868

NON-EMERGENCY TELEPHONE
(503) 746-8461

DESCRIPTION: CASCOPHEN OS57H
PRODUCT TYPE: LIQUID PF RESIN
APPLICATION: ORIENTED STRANDBOARD FACE RESIN

CUR ISS 18-OCT-93

SIGNAL WORD
WARNING!

This material is a "health hazard" and/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=3(high)
FIRE=0(least)
REACTIVITY=1(slight)
CHRONIC=*

29CFR1910.1200 HAZARDOUS INGREDIENTS/REPORTED HEALTH EFFECTS

CAS/REGISTRY NO.	MATERIAL DESCRIPTION	% RANGE
50-00-0	*FORMALDEHYDE NOTE REVISED OSHA PEL	< 0.1

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.

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

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DISCLAIMER SEE REVERSE SIDE
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29CFR1910.1200 HAZARDOUS INGREDIENTS/REPORTED HEALTH EFFECTS

CAS/REGISTRY NO.	MATERIAL DESCRIPTION	% RANGE

aggravated by exposure.

OSHA has identified 0.5 ppm as the "Action Level", 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 PF WAMTA11.1	<0.1%
PHENOL FREE, GC (OCF)	<0.5%
STG. LIFE	2 WEEKS @ 21C (70F)
PH @ 25C	~11.07
APPEARANCE	CLEAR LIQUID
COLOR	REDDISH BROWN
ODOR	SLIGHT AROMATIC
BOILING POINT	~102C
EVAPORATION RATE	~0.4 (N-BUTYL ACETATE=1)
FLASH POINT	NOT APPLICABLE
FREEZING POINT	<0C
AUTOIGNITION TEMPERATURE	NOT APPLICABLE
LOWER EXPLOSION LIMIT	NOT APPLICABLE
PERCENT VOLATILE BY WEIGHT	~43% @ 105C
SOLUBILITY IN WATER	INFINITE
SPECIFIC GRAVITY	~1.2
UPPER EXPLOSION LIMIT	NOT APPLICABLE
VAPOR DENSITY	NOT APPLICABLE
VAPOR PRESSURE	~50MM HG @ 21C

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. A similar product was found to be non-toxic by inhalation when tested as described in 16 CFR Part 1500.3 (c) (1) and (2).

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IMMEDIATE HEALTH HAZARD DATA

SKIN: May cause irritation on prolonged or repeated contact. A similar product was not a primary irritant (primary skin irritation index less than 5.0/8.0) when tested as described in 16 CFR Part 1500.41.
EYES: Causes chemical burns. A similar product was severely irritating when tested as described in 16 CFR Part 1500.42.

HANDLING PRECAUTIONS

INHALATION: Avoid prolonged or repeated breathing of vapor.
SKIN: Avoid prolonged or repeated contact with skin.
EYES: Do not get in 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 for at least 15 minutes. Eyelids should be held apart during irrigation to insure water contact with entire surface of eyes and lids. Call a physician.

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.
Incompatibilities:
Oxidizers, acids.
Decomposition products may include:
CO, CO2, aldehydes (including formaldehyde), particulate matter and other organic compounds.

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READ NEXT PAGE

DESCRIPTION: CASCOPHEN OS57H
PRODUCT TYPE: LIQUID PF RESIN
APPLICATION: ORIENTED STRANDBOARD FACE RESIN

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.

ENGINEERING CONTROLS: The following exposure control techniques may be used to effectively minimize employee exposure: local exhaust ventilation, enclosed system design, process isolation and remote control in combination with appropriate use of personal protective equipment and prudent work practices. These techniques may not necessarily address all issues pertaining to your operations. We, therefore, recommend that you consult with experts of your choice to determine whether or not your programs are adequate.

PERSONAL PROTECTION INFORMATION

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

Store at 70 F or lower. Keep tightly closed.

TRANSPORT INFORMATION

REFER TO YOUR BILL OF LADING FOR PROPER DOT DESCRIPTION

040 45-OS57H-. PREVIOUS ISSUE: CURRENT ISSUE:18-OCT-93
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BORDEN
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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

SARA TITLE III SECTION 313
AND 40 CFR Part 372
TOXIC CHEMICAL NOTIFICATION SHEET

CASCOPHEN 0557H

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

None required per SARA TITLE III SECTION 313

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 45-0557H-. PRINT DATE: 16-Dec-93 10:58 AM

MATERIAL SAFETY DATA SHEET

BOROGARD® ZB

USBORAX

EFFECTIVE DATE: May 1, 1993
Supersedes October 1991 Version

1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name:	BOROGARD ZB
Grades:	Regular, Fine
Chemical Formula:	$2ZnO \cdot 3B_2O_3 \cdot 3.5H_2O$
Chemical Name/Synonyms:	Zinc Borate 2335
Chemical Family:	Inorganic Borates
CAS Registry Number:	138265-88-0 (or 12447-61-9)
TSCA Inventory Number:	1332-07-6 (anhydrous form)

MANUFACTURER: U.S. Borax Inc.*
26877 Tourney Rd.
Valencia, CA 91355

*Formerly United States Borax & Chemical Corporation

EMERGENCY PHONE NUMBERS:

24 Hour Info. Service:	**(800) 228-5635 EXT. 144**
CHEMTREC:	**(800) 424-9300**

BOROGARD is a registered trademark of U.S. Borax Inc.

2 COMPOSITION/INFORMATION ON INGREDIENTS; OSHA HAZARDS

This product contains greater than 99 percent (%) Zinc Borate ($2ZnO \cdot 3B_2O_3 \cdot 3.5H_2O$) CAS No. 138265-88-0. There are no studies of Zinc Borate indicating that this compound is hazardous under the OSHA Hazard Communication Standard. However, animal chronic toxicity studies of Boric Acid and Zinc trigger requirements of the OSHA Hazard Communication Standard.

3 HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:
Zinc Borate is a white odorless, powdered substance that is not flammable, combustible, or explosive, and it presents no unusual hazard if involved in a fire. Zinc Borate presents little or no hazard (to humans) and has low acute oral and dermal toxicities. Care should be taken to minimize the amount of Zinc Borate released to the environment to avoid ecological effects.

POTENTIAL ECOLOGICAL EFFECTS:
Large amounts of Zinc Borate can be harmful to boron-sensitive plants and other ecological systems.

POTENTIAL HEALTH EFFECTS:
Routes of Exposure: Inhalation is the most significant route of exposure in occupational and other settings. Dermal exposure is not usually a concern because Zinc Borate is not absorbed through intact skin.
Inhalation: Irritation effects may occur from inhalation of Zinc Borate dusts at levels greater than 10 mg/m^3.
Eye Contact: Zinc Borate is non-irritating to eyes in normal industrial use.
Skin Contact: Zinc Borate does not cause irritation to intact skin.
Ingestion: Products containing Zinc Borate are not intended for ingestion. Zinc Borate has a relatively low acute toxicity. Small amounts (e.g. a teaspoonful) swallowed accidentally are not likely to cause effects; swallowing amounts larger than that may cause gastrointestinal symptoms.
Cancer: Zinc Borate has not been tested for carcinogenicity.
Reproductive: Zinc Borate has not been tested for reproductive toxicity. Animal studies of Boric Acid have demonstrated reproductive effects in male animals; a human study of occupational exposure to borate dust showed no adverse effect to reproduction.
Developmental: Zinc Borate has not been tested for developmental toxicity. Animal feeding studies with Boric Acid, and similar studies with Zinc compounds, have both demonstrated effects.
Target Organs: No target organ has been identified in humans.
Signs and Symptoms of Exposure: Symptoms of accidental over-exposure to Zinc Borate may be similar to those observed from borate or zinc products. These may include nausea, vomiting, and diarrhea, with delayed effects of skin redness and peeling.
Refer to Section 11 for details on Toxicological Data.

4 FIRST AID MEASURES

Inhalation: No specific treatment is necessary since Zinc Borate is not likely to be hazardous by inhalation. Prolonged exposure to dust levels in excess of regulatory limits should always be avoided.
Eye Contact: Use eye wash fountain or fresh water to cleanse eye. If irritation persists for more than 30 minutes, seek medical attention.
Skin Contact: No treatment necessary because non-irritating.
Ingestion: Swallowing less than one teaspoon will cause no harm to healthy adults. If larger amounts are swallowed, give two glasses of water to drink and seek medical attention.

NOTE TO PHYSICIANS: Observation only is required for adult ingestion of a few grams of Zinc Borate. For ingestion in excess of a few grams, maintain adequate kidney function and force fluids. Gastric lavage is recommended for symptomatic patients only. Hemodialysis should be reserved for massive acute ingestion or patients with renal failure. Boron analyses of urine or blood are only useful for documenting exposure and should not be used to evaluate severity of poisoning or to guide treatment. (Further Information: Litovitz T.L., Norman, S.A., Veltri, J. C., Annual Report of the American Association of Poison Control Centers Data Collection System. Am. J. Emerg. Med. 1986; 4:427-458). 24 hour Medical consultation is available at (800) 228-5635 EXT. 144.

5 FIRE-FIGHTING MEASURES

General Hazard: None, because Zinc Borate is not flammable, combustible or explosive. The product is itself a flame retardant.

Extinguishing Media: Any fire extinguishing media may be used on nearby fires.
Flammability Classification (29 CFR 1910.1200): Non-flammable solid.

6 ACCIDENTAL RELEASE MEASURES

General: Zinc Borate is a slightly soluble white powder that may cause damage to trees or vegetation by root absorption. (Refer to Ecological Information Section 12 for specific information).
Land Spill: Vacuum, shovel or sweep up Zinc Borate and place in containers for disposal in accordance with applicable local regulations. Avoid contamination of water bodies during clean up and disposal. No personal protective equipment is needed to clean up land spills.
Water Spill: Zinc Borate will cause localized contamination of surrounding waters depending on the quantity dissolved in these waters. At high concentrations some damage to local vegetation, fish and other aquatic life may be expected. (Refer to Sections 12, 13 and 15 for additional information).

Zinc Borate is a non-hazardous waste when spilled or disposed of, as defined in the Resource Conservation and Recovery Act (RCRA) regulations (40 CFR 261). (Refer to Regulatory Information Section 15 for additional references and information regarding EPA and California regulations.)

7 HANDLING AND STORAGE

Storage Temperature: Ambient

Storage Pressure: Atmospheric

Special Sensitivity: Moisture (Caking)

General: No special handling precautions are required, but dry, indoor storage is recommended. To maintain package integrity and to minimize caking of the product, bags should be handled on a "first-in first-out" basis. Good housekeeping procedures should be followed to minimize dust generation and accumulation.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: Use local exhaust ventilation to keep airborne concentrations of Zinc Borate dust below permissible exposure levels.
Personal Protection: Where airborne concentrations are expected to exceed exposure limits, NIOSH/MSHA certified respirators must be used. Eye goggles and gloves are not required for normal industrial exposures, but may be warranted if environment is excessively dusty.

Occupational Exposure Limits:
Zinc Borate is listed/regulated by OSHA, Cal OSHA and ACGIH as "Particulate Not Otherwise Classified" or "Nuisance Dust."

OSHA: PEL*	- 15 mg/m³ total dust and - 5 mg/m³ respirable dust
ACGIH: TLV**	- 10 mg/m³
Cal OSHA: PEL*	- 10 mg/m³

*PEL = "Permissible Exposure Limit"
** TLV = "Threshold Limit Value"

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	White, odorless powder
Specific Gravity:	2.7
Vapor Pressure:	Negligible @ 20°C
Solubility in Water:	0.3% @ 24°C
Melting Point:	Phase change @ 650°C (1202°F)
Viscosity:	Not applicable
Boiling Point:	Not applicable
Flash Point:	None
Formula Weight:	434.66

10 STABILITY AND REACTIVITY

General: Zinc Borate is a stable product.
Incompatible Materials and Conditions to Avoid: Reaction with strong reducing agents such as metal hydrides or alkali metals will generate hydrogen gas which could create an explosive hazard.
Hazardous Decomposition: None

11 TOXICOLOGICAL INFORMATION

INGESTION (ACUTE ORAL TOXICITY): Low acute oral toxicity; LD_{50} of Zinc Borate in rats is greater than 10000 mg/kg of body weight.
SKIN (ACUTE DERMAL TOXICITY): Low acute dermal toxicity; LD_{50} of Zinc Borate in rabbits is greater than 10000 mg/kg of body weight. Zinc Borate is not absorbed through intact skin.
PRIMARY SKIN IRRITATION INDEX: 0 (zero). Zinc Borate is non-corrosive.
EYE: Draize test in rabbits produces mild eye irritation effects. Many years of occupational exposure history reflect no indication of human eye injury from exposure to Zinc Borate.
DERMAL SENSITIZATION: Zinc Borate is not a sensitizer, based on a delayed contact hypersensitivity study in guinea pigs.

NOTE: Zinc Borate can decompose, under biological conditions, to form Zinc Hydroxide and Boric Acid. While there are no chronic toxicity studies of Zinc Borate, the following information is derived from chronic studies of Zinc compounds or Boric Acid.

INHALATION: No data is available on inhalation effects of Zinc Borate dust. Human occupational studies show no increase in pulmonary disease with chronic exposure to Sodium Borate dust. Inhalation studies of Zinc Oxide dust show some pulmonary damage in both humans and animals.
CARCINOGENICITY: Zinc Borate has not been tested for carcinogenic activity. Carcinogenicity and mutagenicity tests were negative for Boric Acid. Limited epidemiology studies have shown no relationship between cancer in humans and occupational exposure to Zinc compounds.
REPRODUCTIVE TOXICITY (FERTILITY): No data is available on the potential reproductive toxicity of Zinc Borates. Animal studies indicate that Boric Acid reduces sperm production and causes testicular atrophy. These animal feeding studies were conducted under chronic exposure conditions at doses well above those that occur through inhalation of dust in occupational settings.
DEVELOPMENTAL TOXICITY: No studies are reported on the potential developmental toxicity of Zinc Borates. Animal feedings studies of Boric Acid in mice, rats, and rabbits have shown reductions in fetal weight and increased skeletal malformations, with the lowest observed adverse effect level at 78 mg/kg/day of Boric Acid in the rat study. Animal studies have also demonstrated developmental toxicity due to excess zinc levels, including increased fetal resorption and reduced fetal weights.

12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
Phytotoxicity: Zinc Borate can decompose, under certain environmental conditions, to form Zinc hydroxide and Boric Acid. Boric Acid is known to be harmful to plants at high exposure levels. Care should be taken to minimize the amount of Zinc Borate product released to the environment.

Fish Toxicity: Zinc Borate toxicity to fish varies considerably among fish species. In a laboratory study the acute toxicity (96-hr LC_{50}) for Rainbow Trout (Salmo gairdneri) was determined to be 2.4 mg/L. In a similar study, the same 96-hr LC_{50} acute toxicity value for Bluegill (Lepomis macrochirus) was determined to be greater than 335 mg/L.

Invertebrate Toxicity: The acute toxicity (48-hour LC_{50}) of Zinc Borate to Daphnids (Daphnia magna Straus) is 76 mg/L.

ENVIRONMENTAL FATE DATA:
Persistence/Degradation: Under certain environmental conditions, Zinc Borate will slowly hydrolyze to form other inorganic chemicals such as Zinc Hydroxide and Boric Acid.

Soil Mobility: The product is partially soluble in water and may be leachable through certain soils depending on pH conditions.

13 DISPOSAL CONSIDERATIONS

Disposal Guidance: Small quantities of Zinc Borate can usually be disposed of at Municipal Landfill sites. No special disposal treatment is required, but refer to state and local regulations for applicable site-specific requirements. Tonnage quantities of product are not recommended to be sent to landfills. Such product should, if possible, be re-used for an appropriate application.

RCRA (40 CFR 261): Zinc Borate is not listed under any sections of the Federal Resource Conservation and Recovery Act (RCRA).
California Hazardous Waste Designation: Zinc Borate waste material is considered a "hazardous waste" in the State of California because it is a zinc compound with a zinc concentration exceeding the total threshold limit concentration (TTLC) of 5000 mg/kg. (CCR Title 22 § 66261.24) Refer to Section 15 for additional regulatory information.

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14 TRANSPORT INFORMATION

DOT Hazardous Material Classification: Zinc Borate is not a U.S. Department of Transportation (DOT) Hazardous Material.

DOT Hazardous Substances Classification: Zinc Borate is classified by DOT as a Hazardous Substance with a reportable quantity (RQ) of 1000 lbs (454kg), 49 CFR 172.1011 (c) (9), Table 1.

International Transportation: Zinc Borate has no U.N. Number, and is not regulated under international rail, highway, water or air transport regulations. However, Zinc Borate does have a reportable quantity (RQ) of 1,000 pounds (454 kg), which should always be included in the bill of lading.

15 REGULATORY INFORMATION

TSCA No.: Zinc Borate appears on the EPA TSCA inventory list under the CAS No. 1332-07-6, which represents the anhydrous form of this inorganic salt.

RCRA: Zinc Borate is not listed as a hazardous waste under any sections of the Resource Conservation and Recovery Act or regulations (40 CFR 261 et seq.).

Superfund: CERCLA/SARA. Zinc Borate 2335 is not listed under CERCLA (the Comprehensive Environmental Response Compensation and Liability Act). Zinc Borate appears on the SARA (the Superfund Amendments and Reauthorization Act) Section 313 Toxic Chemical Release Inventory under Zinc compounds, 42 USC 11023, 40 CFR 372.65. Zinc Borate is not listed under Section 302 of SARA, Extremely Hazardous Substances, 42 USC 11002, 40 CFR 355; or the CERCLA Hazardous Substances list, 42 USC 9604, 40 CFR 302.

Safe Drinking Water Act: Zinc Borate is not regulated under the SDWA, 42 USC 300g-1, 40 CFR 141 et seq. Consult state and local regulations for possible water quality advisories regarding boron.

Clean Water Act (Federal Water Pollution Control Act): 33 USC 1251 et seq.

(a) Zinc Borate is not itself a discharge covered by any water quality criteria of Section 304 of the CWA, 33 USC 1314.

(b) It is not on the Section 307 List of Priority Pollutants, 33 USC 1317, 40 CFR 129.

(c) It is on the Section 311 List of Hazardous Substances, 33 USC 1321, 40 CFR 116.

OSHA/Cal OSHA: This MSDS document meets the requirements of both OSHA (29 CFR 1910.1200) and Cal OSHA (Title 8 CCR 5194(g)) hazard communication standards. Refer to Section 8 for regulatory exposure limits.

IARC: The International Agency for Research on Cancer (of the World Health Organization) does not list or categorize Zinc Borate as a carcinogen.

NTP Annual Report on Carcinogens: Zinc Borate is not listed.

OSHA Carcinogen: Zinc Borate is not listed.

California Proposition 65: Zinc Borate is not listed on any Proposition 65 lists of carcinogens or reproductive toxicants.

CONEG Model Legislation: Zinc Borate meets all the CONEG requirements relating to heavy metal limitations on components of packaging materials.

Clean Air Act: Zinc Borate was not manufactured with and does not contain any Class I or Class II ozone depleting substances, as defined by EPA.

16 OTHER INFORMATION

Product Label Text Hazard Information:

- May be harmful if swallowed.
- May cause reproductive harm or birth defects based on animal data.
- Avoid contamination of food or feed.
- Not for food, drug or pesticidal use.
- Refer to MSDS.
- KEEP OUT OF REACH OF CHILDREN.

National Fire Protection Association (NFPA) Classification:

Health	0
Flammability	0
Reactivity	0

Hazardous Materials Information Systems (HMIS):

Red: (Flammability)	0
Yellow: (Reactivity)	0
Blue: (Acute Health)	0*

* Chronic Effects

Contact U.S. Borax Inc. Occupational Health & Product Safety Department for further information:

(805) 287-6050

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APPENDIX J

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, 1995). 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 41548). 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 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 prod 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 M in removing organic materials; how 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 then 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 2.1.8.

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 sec 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.

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_w = Sum of the mass of the water and $MeCl_2$ blanks, mg.

m_a = 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_s = Volume of aliquot taken for IC analysis, ml.

V_{ic} = 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.

$$m_c = K\, C_{so_4}\, V_{ic} \qquad \text{Eq. 202–1}$$

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.

$$m_i = m_s \frac{V_{ic}}{V_{ic} - V_s} - m_c \qquad \text{Eq. 202–2}$$

7.4 Concentration of CPM.

$$C_{cpm} = \frac{m_o + m_i - m_w}{V m_{std}} \qquad \text{Eq. 202–3}$$

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.

8.1.1 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-stack 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:

$$C_{cpm} = \frac{m_o + m_i + m_f - m_w}{V m_{std}} \qquad \text{Eq. 202–5}$$

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

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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 25, Rules and Regulations, Part I, Departme 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.

BILLING CODE 6560-50-M

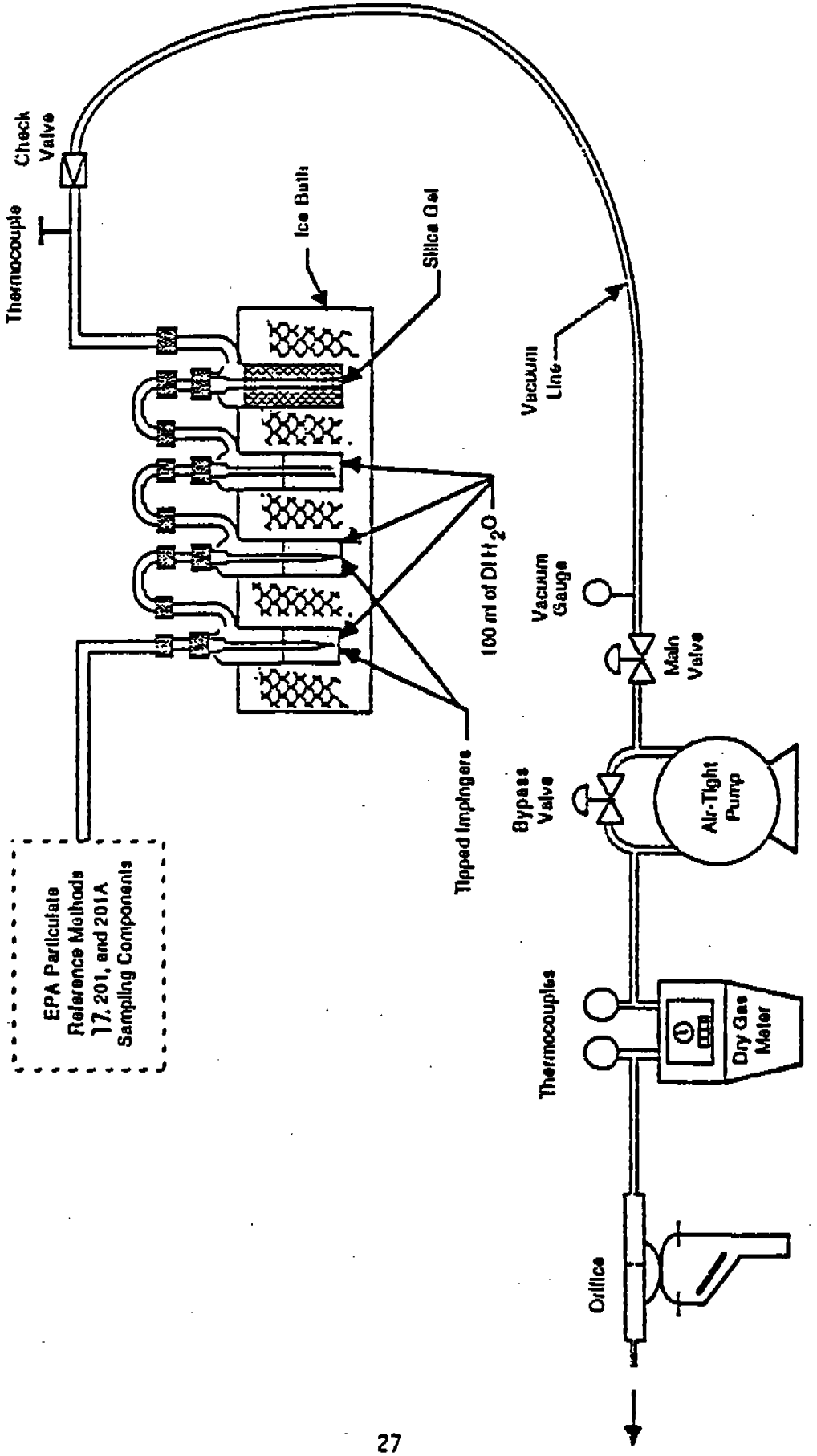

Figure 202-1. , Schematic of condensible particulate sampling train.

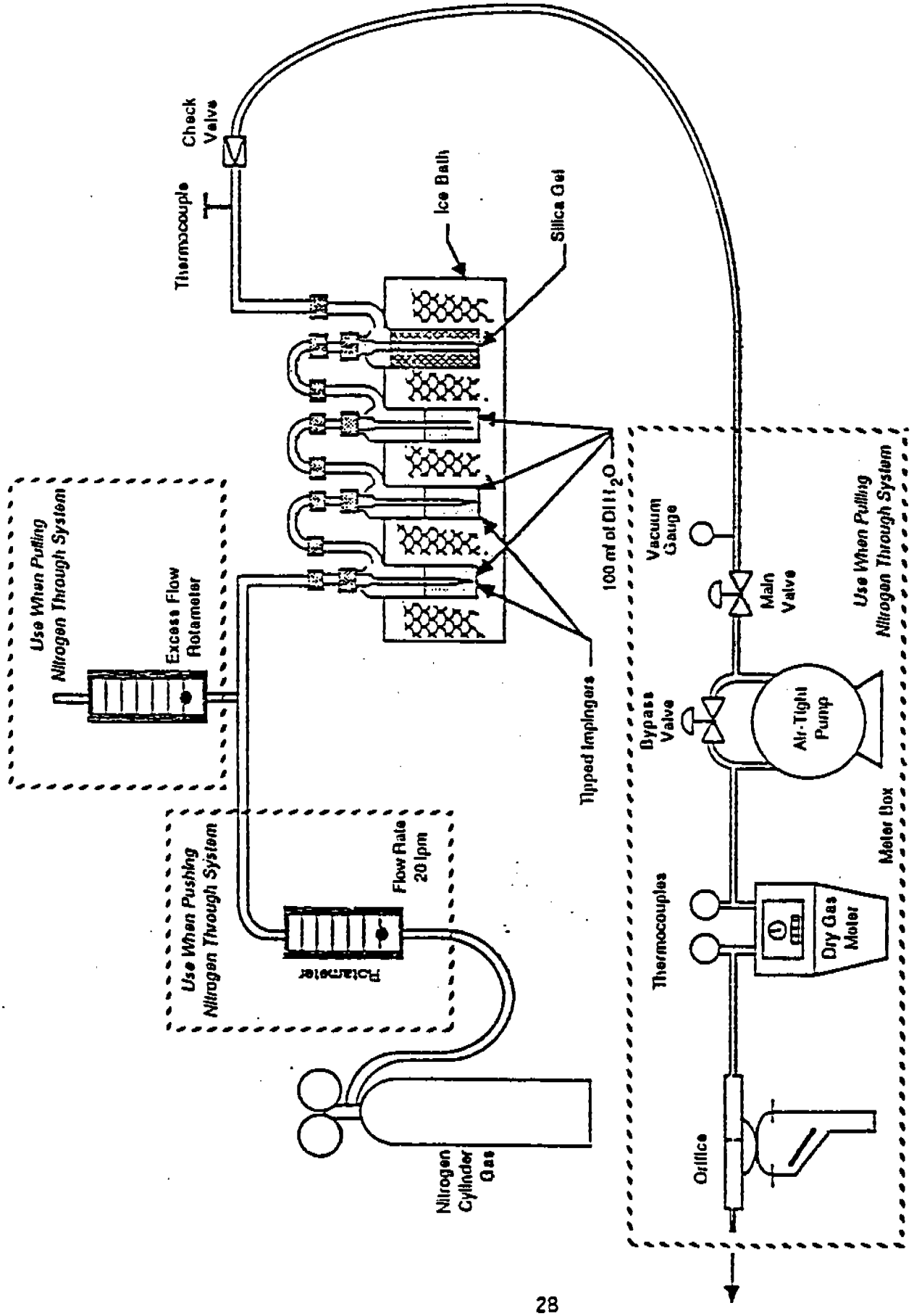

Figure 202-2. Schematic of post-test nitrogen purge system.

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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.

[FR Doc. 91-29957 Filed 12-16-91; 8:45 am]

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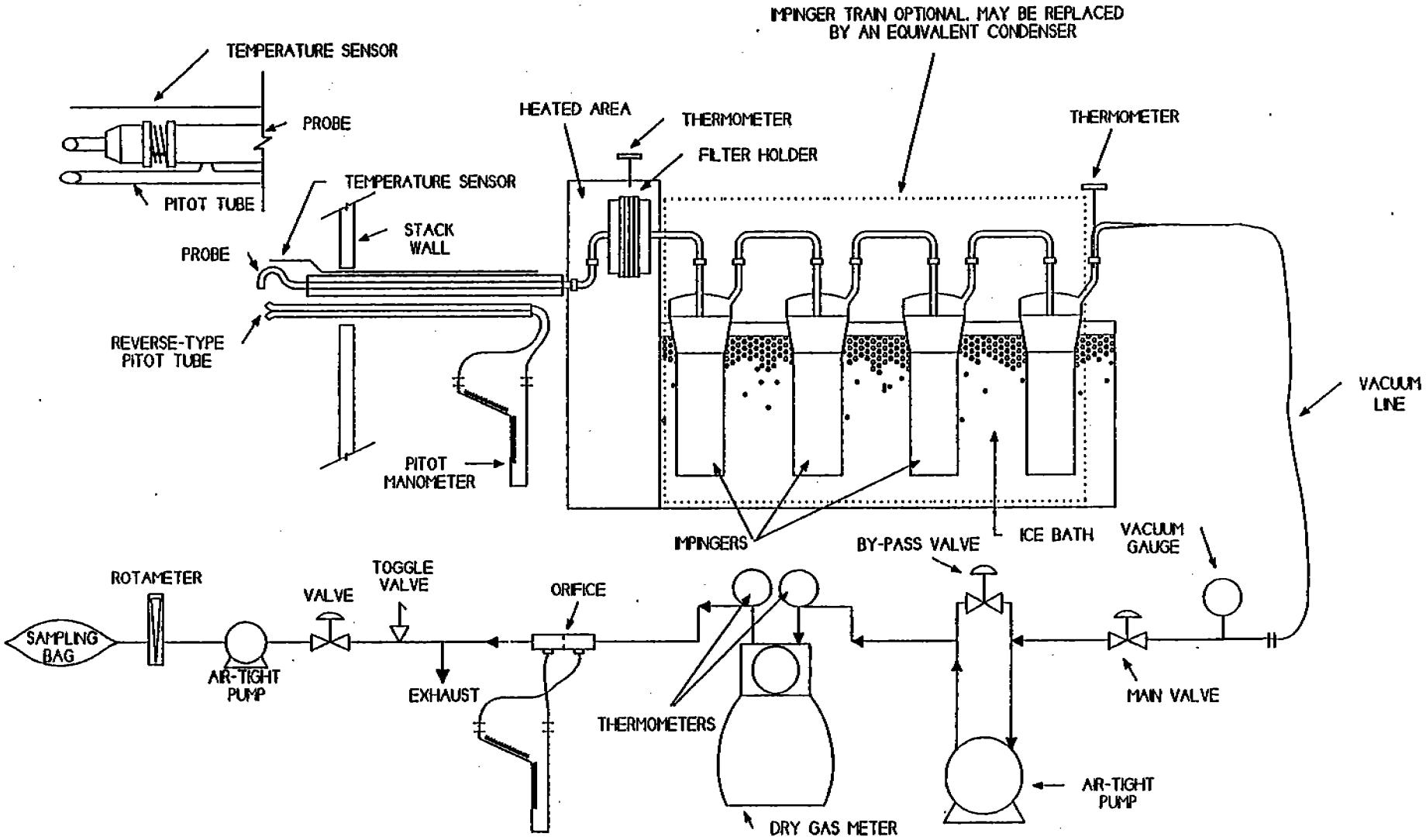
(612) 786-6020

PARTICULATE SAMPLING TRAIN



PmTRAN2

Method 6C—Determination of Sulfur Dioxide Emissions From Stationary Sources (Instrumental Analyzer Procedure)

1. Applicability and Principle

1.1 **Applicability.** This method is applicable to the determination of sulfur dioxide (SO_2) concentrations in controlled and uncontrolled emissions from stationary sources only when specified within the regulations.

1.2 **Principle.** A gas sample is continuously extracted from a stack, and a portion of the sample is conveyed to an instrumental analyzer for determination of SO_2 gas concentration using an ultraviolet (UV), nondispersive infrared (NDIR), or fluorescence analyzer. Performance specifications and test procedures are provided to ensure reliable data.

2. Range and Sensitivity

2.1 **Analytical Range.** The analytical range is determined by the instrumental design. For this method, a portion of the analytical range is selected by choosing the span of the monitoring system. The span of the monitoring system shall be selected such that the pollutant gas concentration equivalent to the emission standard is not less than 30 percent of the span. If at any time during a run the measured gas concentration exceeds the span, the run shall be considered invalid.

2.2 **Sensitivity.** The minimum detectable limit depends on the analytical range, span, and signal—to—noise ratio of the measurement system. For a well designed system, the minimum detectable limit should be less than 2 percent of the span.

3. Definitions

3.1 **Measurement System.** The total equipment required for the determination of gas concentration. The measurement system consists of the following major subsystems:

3.1.1 **Sample Interface.** That portion of a system used for one or more of the following: sample acquisition, sample transport, sample conditioning, or protection of the analyzers from the effects of the stack effluent.

3.1.2 **Gas Analyzer.** That portion of the system that senses the gas to be measured and generates an output proportional to its concentration.

3.1.3 **Data Recorder.** A strip chart recorder, analog computer, or digital recorder for recording measurement data from the analyzer output.

3.2 **Span.** The upper limit of the gas concentration measurement range displayed on the data recorder.

3.3 **Calibration Gas.** A known concentration of a gas in an appropriate diluent gas.

3.4 **Analyzer Calibration Error.** The difference between the gas concentration exhibited by the gas analyzer and the known concentration of the calibration gas when the calibration gas is introduced directly to the analyzer.

3.5 **Sampling System Bias.** The difference between the gas concentrations exhibited by the measurement system when a known concentration gas is introduced at the outlet of the sampling probe and when the same gas is introduced directly to the analyzer.

3.6 **Zero Drift.** The difference in the measurement system output reading from the initial calibration response at the zero concentration level after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

3.7 **Calibration Drift.** The difference in the measurement system output reading from the initial calibration response at a mid-range calibration value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

3.8 **Response Time.** The amount of time required for the measurement system to display 95 percent of a step change in gas concentration on the data recorder.

3.9 **Interference Check.** A method for detecting analytical interferences and excessive biases through direct comparison of gas concentrations provided by the measurement system and by a modified Method 6 procedure. For this check, the modified Method 6 samples are acquired at the sample by-pass discharge vent.

3.10 **Calibration Curve.** A graph or other systematic method of establishing the relationship between the analyzer response and the actual gas concentration introduced to the analyzer.

4. Measurement System Performance Specifications

4.1 **Analyzer Calibration Error.** Less than $\pm$ 2 percent of the span for the zero, mid-range, and high-range calibration gases.

4.2 **Sampling System Bias.** Less than $\pm$ 5 percent of the span for the zero, and mid— or high-range calibration gases.

4.3 **Zero Drift.** Less than $\pm$ 3 percent of the span over the period of each run.

4.4 **Calibration Drift.** Less than $\pm$ 3 percent of the span over the period of each run.

4.5 **Interference Check.** Less than $\pm$ 7 percent of the modified Method 6 result for each run.

5. Apparatus and Reagents

5.1 **Measurement System.** Any measurement system for SO_2 that meets the specifications of this method. A schematic of an acceptable measurement system is shown in Figure 6C-1. The essential components of the measurement system are described below:

5.1.1 **Sample Probe.** Glass, stainless steel, or equivalent, of sufficient length to traverse the sample points. The sampling probe shall be heated to prevent condensation.

5.1.2 **Sample Line.** Heated (sufficient to prevent condensation) stainless steel or Teflon tubing, to transport the sample gas to the moisture removal system.

5.1.3 **Sample Transport Lines.** Stainless steel or Teflon tubing, to transport the sample from the moisture removal system to the sample pump, sample flow rate control, and sample gas manifold.

5.1.4 **Calibration Valve Assembly.** A three—way valve assembly, or equivalent, for blocking the sample gas flow and introducing calibration gases to the measurement system at the outlet of the sampling probe when in the calibration mode.

5.1.5 **Moisture Removal System.** A refrigerator-type condenser or similar device (e.g., permeation dryer), to remove condensate continuously from the sample gas while maintaining minimal contact between the condensate and the sample gas. The moisture removal system is not necessary for analyzers that can measure gas concentrations on a wet basis; for these analyzers, (1) heat the sample line and all interface components up to the inlet of the analyzer sufficiently to prevent condensation, and (2) determine the moisture content and correct the measured gas concentrations to a dry basis using appropriate methods, subject to the approval of the Administrator. The determination of sample moisture content is not necessary for pollutant analyzers that measure concentrations on a wet basis when (1) a wet basis CO_2 analyzer operated according to Method 3A is used to obtain simultaneous measurements, and (2) the pollutant/CO_2 measurements are used to determine emissions in units of the standard.

5.1.6 **Particulate Filter.** An in-stack or heated (sufficient to prevent water condensation) out—of—stack filter. The filter shall be borosilicate or quartz glass wool, or glass fiber mat. Additional filters at the inlet or outlet of the moisture removal system and inlet of the analyzer may be used to prevent accumulation of particulate material in the measurement system and extend the useful life of the components. All filters shall be fabricated of materials that are nonreactive to the gas being sampled.

5.1.7 **Sample Pump.** A leak-free pump, to pull the sample gas through the system at a flow rate sufficient to minimize the response time of the measurement system. The pump may be constructed of any material that is nonreactive to the gas being sampled.

5.1.8 **Sample Flow Rate Control.** A sample flow rate control valve and rotameter, or equivalent, to maintain a constant sampling rate within 10 percent.

(Note: The tester may elect to install a back-pressure regulator to maintain the sample gas manifold at a constant pressure in order to protect the analyzer(s) from over pressurization, and to minimize the need for flow rate adjustments.)

5.1.9 **Sample Gas Manifold.** A sample gas manifold, to divert a portion of the sample gas stream to the analyzer, and the remainder to the by-pass discharge vent. The sample gas manifold should also include provisions for introducing calibration gases directly to the analyzer. The manifold may be constructed of any material that is nonreactive to the gas being sampled.

5.1.10 **Gas Analyzer.** A UV or NDIR absorption or fluorescence analyzer, to determine continuously the SO_2 concentration in the sample gas stream. The analyzer shall meet the applicable performance specifications of Section 4. A means of controlling the analyzer flow rate and a device for determining proper sample flow rate (e.g., precision rotameter, pressure gauge downstream of all flow controls, etc.) shall be provided at the analyzer.

(Note: Housing the analyzer(s) in a clean, thermally-stable, vibration-free environment will minimize drift in the analyzer calibration.)

5.1.11 **Data Recorder.** A strip chart recorder, analog computer, or digital recorder, for recording measurement data. The data recorder resolution (i.e., readability) shall be 0.5 percent of span. Alternatively, a digital or analog meter having a resolution of 0.5 percent of span may be used to obtain the analyzer responses and the readings may be recorded manually. If this alternative is used, the readings shall be obtained at equally spaced intervals over the duration of the sampling run. For sampling run durations of less than 1 hour, measurements at 1—minute intervals or a minimum of 30 measurements, whichever is less restrictive, shall be obtained. For sampling run durations greater than 1 hour, measurements at 2—minute intervals or a minimum of 96 measurements, whichever is less restrictive, shall be obtained.

5.2 **Method 6 Apparatus and Reagents.** The apparatus and reagents described in Method 6, and shown by the schematic of the sampling train in Figure 6C-2, to conduct the interference check.

5.3 **SO2 Calibration Gases.** The calibration gases for the gas analyzer shall be SO_2 in N_2 or SO_2 in air. Alternatively, SO_2/CO_2, SO_2/O_2, or $SO_2/CO_2/O_2$ gas mixtures in N_2 may be used. For fluorescence-based analyzers, the O_2 and CO_2 concentrations of the calibration gases as introduced to the analyzer shall be within 1 percent (absolute) O_2 and 1 percent (absolute) CO_2 of the O_2 and Co_2 concentrations of the effluent samples as introduced to the analyzer. Alternatively, for fluorescence-based analyzers, use calibration blends of SO_2 in air and the nomographs provided by the vendor to determine the quenching correction factor (the effluent O_2 and CO_2 concentrations must be known). Use three calibration gases as specified below:

5.3.1 **High-Range Gas.** Concentration equivalent to 80 to 100 percent of the span.

5.3.2 **Mid-Range Gas.** Concentration equivalent to 40 to 60 percent of the span.

5.3.3 **Zero Gas.** Concentration of less than 0.25 percent of the span. Purified ambient air may be used for the zero gas by passing air through a charcoal filter, or through one or more impingers containing a solution of 3 percent H_2O_2.

6. Measurement System Performance Test Procedures

Perform the following procedures before measurement of emissions (Section 7).

6.1 **Calibration Gas Concentration Verification.** There are two alternatives for establishing the concentrations of calibration gases. Alternative Number 1 is preferred.

6.1.1 **Alternative Number 1**—Use of calibration gases that are analyzed following the Environmental Protection Agency Traceability Protocol Number 1 (see Citation 1 in the Bibliography). Obtain a certification from the gas manufacturer that Protocol Number 1 was followed.

6.1.2 **Alternative Number 2**—Use of calibration gases not prepared according to Protocol Number 1. If this alternative is chosen, obtain gas mixtures with a manufacturer's tolerance not to exceed ± 2 percent of the tag value. Within 6 months before the emission test, analyze each of the calibration gases in triplicate using Method 6. Citation 2 in the Bibliography describes procedures and techniques that may be used for this analysis. Record the results on a data sheet (example is shown in Figure 6C-3). Each of the individual SO_2 analytical results for each calibration gas shall be within 5 percent (or 5 PPM, whichever is greater) of the triplicate set average; otherwise, discard the entire set, and repeat the triplicate analyses. If the average of the triplicate analyses is within 5 percent of the calibration gas manufacturer's cylinder tag value, use the tag value; otherwise, conduct at least three additional analyses until the results of six consecutive runs agree with 5 percent (or 5 PPM, whichever is greater) of their average. Then use this average for the cylinder value.

6.2 **Measurement System Preparation.** Assemble the measurement system by following the manufacturer's written instructions for preparing and preconditioning the gas analyzer and, as applicable, the other system components. Introduce the calibration gases in any sequence, and make all necessary adjustments to calibrate the analyzer and the data recorder. Adjust system components to achieve correct sampling rates.

6.3 **Analyzer Calibration Error.** Conduct the analyzer calibration error check by introducing calibration gases to the measurement system at any point upstream of the gas analyzer as follows:

6.3.1 After the measurement system has been prepared for use, introduce the zero, mid-range, and high-range gases to the analyzer. During this check, make no adjustments to the system except those necessary to achieve the correct calibration gas flow rate at the analyzer. Record the analyzer responses to each calibration gas on a form similar to Figure 6C-4.

Note: A calibration curve established prior to the analyzer calibration error check may be used to convert the analyzer response to the equivalent gas concentration introduced to the analyzer. However, the same correction procedure shall be used for all effluent and calibration measurements obtained during the test.

6.3.2 The analyzer calibration error check shall be considered invalid if the gas concentration displayed by the analyzer exceeds ± 2 percent of the span for any of the calibration gases. If an invalid calibration is exhibited, take corrective action, and repeat the analyzer calibration error check until acceptable performance is achieved.

6.4 **Sampling System Bias Check.** Perform the sampling system bias check by introducing calibration gases at the calibration valve installed at the outlet of the sampling probe. A zero gas and either the mid-range or high-range gas, whichever most closely approximates the effluent concentrations, shall be used for this check as follows:

6.4.1 Introduce the upscale calibration gas, and record the gas concentration displayed by the analyzer on a form similar to Figure 6C-5. Then introduce zero gas, and record the gas concentration displayed by the analyzer. During the sampling system bias check, operate the system at the normal sampling rate, and make no adjustments to the measurement system other than those necessary to achieve proper calibration gas flow rates at the analyzer. Alternately introduce the zero and upscale gases until a stable response is achieved. The tester shall determine the measurement system response time by observing the times required to achieve a stable response for both the zero and upscale gases. Note the longer of the two times as the response time.

6.4.2 The sampling system bias check shall be considered invalid if the difference between the gas concentrations displayed by the measurement system for the analyzer calibration error check and for the sampling system bias check exceeds ± 5 percent of the span for either the zero or upscale calibration gas. If an invalid calibration is exhibited, take corrective action, and repeat the sampling system bias check until acceptable performance is achieved. If adjustment to the analyzer is required, first repeat the analyzer calibration error check, then repeat the sampling system bias check.

7. Emission Test Procedure

7.1 **Selection of Sampling Site and Sampling Points.** Select a measurement site and sampling points using the same criteria that are applicable to Method 6.

7.2 **Interference Check Preparation.** For each individual analyzer, conduct an interference check for at least three runs during the initial field test on a particular source category. Retain the results, and report them with each test performed on that source category. If an interference check is being performed, assemble the modified Method 6 train (flow control valve, two midget impingers containing 3 percent H_2O_2, and dry gas meter) as shown in Figure 6C-2. Install the sampling train to obtain a sample at the measurement system sample by-pass discharge vent. Record the initial dry gas meter reading.

7.3 **Sample Collection.** Position the sampling probe at the first measurement point, and begin sampling at the same rate as used during the sampling system bias check. Maintain constant rate sampling (i.e., ± 10 percent) during the entire run. The sampling time per run shall be the same as for Method 6 plus twice the system response time. For each run, use only those measurements obtained after twice response time of the measurement system has elapsed, to determine the average effluent concentration. If an interference check is being performed, open the flow control valve on the modified Method 6 train concurrent with the initiation of the sampling period, and adjust the flow to 1 liter per minute (± 10 percent).

(Note: If a pump is not used in the modified Method 6 train, caution should be exercised in adjusting the flow rate since overpressurization of the impingers may cause leakage in the impinger train, resulting in positively biased results).

7.4 **Zero and Calibration Drift Tests.** Immediately preceding and following each run, or if adjustments are necessary for the measurement system during the run, repeat the sampling system bias check procedure described in Section 6.4 (Make no adjustments to the measurement system until after the drift checks are completed.) Record and analyzer's responses on a form similar to Figure 6C-5.

7.4.1 If either the zero or upscale calibration value exceeds the sampling system bias specification, then the run is considered invalid. Repeat both the analyzer calibration error check procedure (Section 6.3) and the sampling system bias check procedure (Section 6.4) before repeating the run.

7.4.2 If both the zero and upscale calibration values are within the sampling system bias specification, then use the average of the initial and final bias check values to calculate the gas concentration for the run. If the zero or upscale calibration drift value exceeds the drift limits, based on the difference between the sampling system bias check responses immediately before and after the run, repeat both the analyzer calibration error check procedure (Section 6.3) and the sampling system bias check procedure (Section 6.4) before conducting additional runs.

7.5 **Interference Check (if performed).** After completing the run, record the final dry gas meter reading, meter temperature, and barometric pressure. Recover and analyze the contents of the midget impingers, and determine the SO_2 gas concentration using the procedures of Method 6. (It is not necessary to analyze EPA performance audit samples for Method 6.) Determine the average gas concentration exhibited by the analyzer for the run. If the gas concentrations provided by the analyzer and the modified Method 6 differ by more than 7 percent of the modified Method 6 result, the run is invalidated.

8. Emission Calculation

The average gas effluent concentration is determined from the average gas concentration displayed by the gas analyzer, and is adjusted for the zero and upscale sampling system bias checks, as determined in accordance with Section 7.4. The average gas concentration displayed by the analyzer may be determined by integration of the area under the curve for chart recorders, or by averaging all of the effluent measurements. Alternatively, the average may be calculated from measurements recorded at equally spaced intervals over the entire duration of the run. For sampling run durations of less than 1 hour, measurements at 1—minute intervals or a minimum of 30 measurements, whichever is less restrictive, shall be used. For sampling run durations greater than 1 hour, measurements at 2—minute intervals or a minimum of 96 measurements, whichever is less restrictive, shall be used. Calculate the effluent gas concentration using Equation 6C-1.

$$\overline{C}_{gas} = (C - Co)\ \frac{C_{ma}}{C_m - Co}\quad Eq.\ 6C - 1$$

Where:

C_{gas} = Effluent gas concentration, dry basis, PPM.

$\overline{C}$ = Average gas concentration indicated by gas analyzer, dry basis, PPM.

Co = Average of initial and final system calibration bias check responses for the zero gas, PPM.

C_m = Average of initial and final system calibration bias check responses for the upscale calibration gas, PPM.

C_{ma} = Actual concentration of the upscale calibration gas, PPM.

9. Bibliography

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2. Westlin, Peter R. and J. W. Brown. Methods for Collecting and Analyzing Gas Cylinder Samples. Source Evaluation Society Newsletter. 3(3):5-15. September 1978.

|_See_CFR_paper_publication_for_illustration_0809

|_See_CFR_paper_publication_for_illustration_0810

Method 7E—Determination of Nitrogen Oxides Emissions From Stationary Sources (Instrumental Analyzer Procedure)

1. Applicability and Principle

1.1 **Applicability.** This method is applicable to the determination of nitrogen oxides (NO_x) concentrations in emissions from stationary sources only when specified within the regulations.

1.2 **Principle.** A gas simple is continuously extracted from a stack, and a portion of the sample is conveyed to an instrumental chemiluminescent analyzer for determination of NO_x concentration. Performance specifications and test procedures are provided to ensure reliable data.

2. Range and Sensitivity

Same as Method 6C, Sections 2.1 and 2.2.

3. Definitions

3.1 **Measurement System.** The total equipment required for the determination of NO_x concentration. The measurement system consists of the following major subsystems:

3.1.1 **Sample Interface, Gas Analyzer, and Data Recorder.** Same as Method 6C, Sections 3.1.1, 3.1.2, and 3.1.3.

3.1.2 **NO_2 to NO Converter.** A device that converts the nitrogen dioxide (NO_2) in the sample gas to nitrogen oxide (NO).

3.2 Span, Calibration Gas, Analyzer Calibration Error, Sampling System Bias, Zero Drift, Calibration Drift, and Response Time. Same as Method 6C, Sections 3.2 through 3.8.

3.3 **Interference Response.** The output response of the measurement system to a component in the sample gas, other than the gas component being measured.

4. Measurement System Performance Specifications

Same as Method 6C, Sections 4.1 through 4.4.

5. Apparatus and Reagents

5.1 **Measurement System.** Any measurement system for NO_x that meets the specifications of this method. A schematic of an acceptable measurement system is shown in Figure 6C-1 of Method 6C. The essential components of the measurement system are described below:

5.1.1 Sample Probe, Sample Line, Calibration Valve Assembly, Moisture Removal System, Particulate Filter, Sample Pump, Sample Flow Rate Control, Sample Gas Manifold, and Data Recorder. Same as Method 6C, Sections 5.1.1 through 5.1.9, and 5.1.11.

5.1.2 **NO_2 to NO Converter.** That portion of the system that converts the nitrogen dioxide (NO_2) in the sample gas to nitrogen oxide (NO). An NO_2 to NO converter is not necessary if data are presented to demonstrate that the NO_2 portion of the exhaust gas is less than 5 percent of the total NO_x concentration.

5.1.3 **NO_x Analyzer.** An analyzer based on the principles of chemiluminescence, to determine continuously the NO_x concentration in the sample gas stream. The analyzer shall meet the applicable performance specifications of Section 4. A means of controlling the analyzer flow rate and a device for determining proper sample flow rate (e.g., precision rotameter, pressure gauge downstream of all flow controls, etc.) shall be provided at the analyzer.

5.2 **NO_x Calibration Gases.** The calibration gases for the NO_x analyzer shall be NO in N_2. Three calibration gases, as specified in Sections 5.3.1 through 5.3.3. of Method 6C, shall be used. Ambient air may be used for the zero gas.

6. Measurement System Performance Test Procedures

Perform the following procedures before measurement of emissions (Section 7).

6.1 **Calibration Gas Concentration Verification.** Follow Section 6.1 of Method 6C, except if calibration gas analysis is required, use Method 7, and change all 5 percent performance values to 10 percent (or 10 PPM, whichever is greater).

6.2 **Interference Response.** Conduct an interference response test of the analyzer prior to its initial use in the field. Thereafter, recheck the measurement system if changes are made in the instrumentation that could alter the interference response (e.g., changes in the gas detector). Conduct the interference response in accordance with Section 5.4 of Method 20.

6.3 **Measurement System Preparation, Analyzer Calibration Error, and Sample System Bias Check.** Follow Sections 6.2 through 6.4 of Method 6C.

6.4 **NO_2 to NO Conversion Efficiency.** Unless data are presented to demonstrate that the NO_2 concentration within the sample stream is not greater than 5 percent of the NO_x concentration, conduct an NO_2 to NO conversion efficiency test in accordance with Section 5.6 of Method 20.

7. Emission Test Procedure

7.1 **Selection of Sampling Site and Sampling Points.** Select a measurement site and sampling points using the same criteria that are applicable to tests performed using Method 7.

7.2 **Sample Collection.** Position the sampling probe at the first measurement point, and begin sampling at the same rate as used during the system calibration drift test. Maintain constant rate sampling (i.e., ± 10 percent) during the entire run. The sampling time per run shall be the same as the total time required to perform a run using Method 7, plus twice the system response time. For each run, use only those measurements obtained after twice the response time of the measurement system has elapsed, to determine the average effluent concentration.

7.3 **Zero and Calibration Drift Test.** Follow Section 7.4 of Method 6C.

8. Emission Calculation

Follow Section 8 of Method 6C.

9. Bibliography

Same as bibliography of Method 6C.

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 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).

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.

|_See_CFR_paper_publication_for_illustration_18A

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.

|_See_CFR_paper_publication_for_illustration_19A

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 concentration 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.

CCO stack = CCO NDIR(1-Fco2) Eq. 10-1

Where:

CCO stack = Concentration of CO in stack, PPM by volume (dry basis).
CCO NDIR = Concentration of CO measured by NDIR analyzer, PPM by volume (dry basis).
FCO 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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4. Models 215A, 315A, and 415A Infrared Analyzers, Beckman Instruments, Inc., Beckman Instructions 1635-B, Fullerton, CA. October 1967.

5. Continuous CO Monitoring System, Model A5611, Intertech Corp., Princeton, NJ.

6. UNOR Infrared Gas Analyzers, Bendix Corp., Ronceverte, WV

Agenda

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.

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 Systems.** 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 midlevel 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:

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.

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* Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

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 Citation 2 of Bibliography. 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 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 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.

$C_c = K C_{meas}$ 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.

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This document is a preliminary draft. It has not been formally released by EPA and should not at this stage be construed to represent Agency policy. It is being circulated for comment on its technical accuracy and for policy implications.

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FIELD TEST OF A GENERIC METHOD FOR SAMPLING AND ANALYSIS OF ISOCYANATES

Interim Report
(Work Assignment 55)

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EXECUTIVE SUMMARY

Isocyanates are used extensively in the production of polyurethane materials such as flexible foam, enamel wire coatings, paint formulations and in binders for the pressed board industry. Because of their widespread use and known adverse physiological effects, several isocyanates have been listed in Title III of the Clean Air Act Amendments of 1990. The isocyanates of interest are: 2,4-toluene diisocyanate (TDI), methylene diphenyl diisocyanate (MDI), 1,6-hexamethylene diisocyanate (HDI) and methyl isocyanate (MI). Previously, no validated sampling and analytical methodology for these compounds relative to stationary sources existed.

The field validation study presented in this report is a culmination of laboratory investigations, performed under previous work assignments, which were designed to develop and evaluate a viable approach for the determination of isocyanate emissions from stationary sources. After the successful completion of the laboratory studies, the sampling and analysis approach was formulated and a field validation test was initiated. At the direction of the EPA, TDI was selected as the primary analyte.

The test site selected was a flexible foam manufacturing facility in High Point, North Carolina, which used TDI in the manufacturing process. The approximate level of TDI in the emission stream was determined by the analysis of samples collected during a presurvey. A sampling scheme was then designed to ensure the collection of sufficient samples to yield statistically valid data. Following the EPA Method 301 protocol, quadruplicate trains (QUAD) were operated simultaneously with four co-located probes. Two of the trains were spiked with TDI and two were unspiked. Samples from eight QUAD runs (minimum of six valid runs required by Method 301) were returned to the laboratory and analyzed according to the analytical procedure developed in laboratory studies. These data were statistically evaluated following Method 301 protocol to determine the performance of the method relative to bias and precision. These results are summarized in the following table. The precision for both the spiked and unspiked trains was less than 5% RSD, which is well within the precision criteria (% RSD <50)

Method Validation Statistical Summary

Precision[a]	
% RSD for Spiked Samples	3.55[b]
% RSD for Unspiked Samples	4.72[b]
Accuracy[a]	
Bias:	-295 μg
Significant?	No
Correction Factor	1.0[c]
Recovery[a]	
Amount Spiked (as TDI)	7828 μg
Average Percent Recovered	95

[a]Results are based on the average of seven QUAD runs (14 spiked trains and 14 unspiked trains). TDI was present in the stack emissions and was therefore collected as background in the unspiked trains as well as in the spiked trains.

[b]EPA Method 301 requires the precision to be <50% RSD for the method to be acceptable.

[c]EPA Method 301 requires the calculated Correction Factor to be between 0.7 and 1.3 for the method to be acceptable.

for an acceptable method as tested. Using the data from all eight runs, the bias was found to be significant at the 95% level of confidence thus requiring the use of a correction factor of 1.053. Using the data from only seven runs (eliminating run number eight due to a questionable leak check for one of the trains) the bias was not significant and therefore did not require the calculation of a correction factor. In either case, the method was well within the bias acceptance criteria (correction factor between 0.7 and 1.3) for an acceptable method as tested.

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1.0 INTRODUCTION

Sampling and analytical methods for a particular analyte or group of analytes can be evaluated and validated by demonstrating their performance in field tests, thereby establishing the precision and bias of the methods experimentally. Few methods have been fully validated for sampling and analyzing the organic compounds listed in Title III of the Clean Air Act Amendments of 1990. For some analytes, methods have been validated for sample analysis, but not for sample collection. Full validation for both sampling and analytical methods, for both field and laboratory operations, is available for fewer than 10 percent of the analytes listed in Title III of the Clean Air Act Amendments at any source category. Field validation may be performed by side-by-side comparison of a candidate method to a validated method to establish comparable performance for the same analytes in the same matrix (same source category). Another procedure for validation of a method is to spike known quantities of analytes into the collection apparatus in the field so that the precision and bias of the method can be demonstrated from sample collection through analysis.

EPA, under the authority of Title III of the Clean Air Act Amendments (CAAA) of 1990, requires the identification and validation of sampling and analytical methods for the isocyanate compounds which are listed among the 189 hazardous air pollutants identified in Title III. These isocyanate compounds are listed in Table 1-1. Development of sampling and analytical methods for these four compounds was accomplished under Work Assignments 11, 21, and 40 on EPA Contract No. 68-D1-0010. At the direction of EPA, initial efforts were directed to the measurement of 2,4-toluene diisocyanate (TDI) emissions.

The objective of this work assignment was to validate the isocyanate sampling and analytical test method through field testing at an operating stationary source. The method was validated by collecting flue gas samples for the analysis of 2,4-TDI, and evaluating the data for bias and precision. EPA Method 301, "Field Validation of Pollutant Measurement Methods from Various Waste Media," was used as

Table 1-1

Isocyanates Listed in the Clean Air Act Amendments of 1990

Hexamethylene-1,6-diisocyanate (HDI)
2,4-Toluene diisocyanate (TDI)[a]
Methylene diphenyl diiocyanate (MDI)
Methyl isocyanate (MI)

[a]The 2,6 TDI isomer may also be present but is not listed in the CAAA.

a model for the validation protocol. Analyte spiking was used with quadruplicate sampling trains to generate the required data. The field validation was performed at an industrial facility which manufactures flexible foam products. Only two of the quadruplicate trains were spiked for each run. The two unspiked trains were used to establish the background level of target compound in the stack gas.

The sampling method utilizes a Method 5-type sampling train, which operates with a solution of 1-(2-pyridyl) piperazine and toluene in the impingers. Stack gas is extracted from the source through a heated probe and drawn through the impingers. TDI present in the stack gas reacts with the piperazine to form an isocyanate derivative. The quantity of isocyanate is determined by solvent exchange of the toluene solution with acetonitrile followed by high pressure liquid chromatographic (HPLC) analysis.

This report discusses the details of the field validation study. Section 2.0, Conclusions and Recommendations, summarizes the results and provides recommendations for future work. Sections 3.0 and 4.0 provide details of the sampling and analysis procedures respectively. Section 5.0 is a detailed discussion of the procedures, calculations and quality control.

2.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results presented in Section 6.0 of this report, the following conclusions can be made concerning the validity of the method as tested under the conditions described in this report:

- The calculated values for precision (%RSD) for both the spiked and unspiked trains, 3.55 and 4.72 respectively, are both well within the acceptance criteria of less than 50% RSD found in Section 6.3 of the EPA Method 301. Therefore, the method as tested at the source category described meets the precision requirements;

- The method bias, at the concentration levels tested, was found to be significantly different from zero at the 95% level of confidence when the data from all eight runs (minimum of six runs required) were used in the calculations. A correction factor of 1.053 would be required if all eight runs are included in the bias calculation. Good technical reasons exist for excluding one of eight QUAD runs. If this run is eliminated, no bias correction is required. In either case the correction factor is well within the acceptance criteria of 0.7 to 1.3 found in Section 1.2 of the EPA Method 301. Therefore, the method as tested at the source category described meets the bias and correction factor requirements; and

- The method as tested is sufficiently robust to allow testing at sources similar to the source tested in this study where the stack gas moisture is less than 1% by volume, the stack temperature is less than 30 degrees C and the presence of other compounds that may interfere with the analysis are minimal.

Recommendations for future testing and validation of the method for the sampling and analysis of isocyanates include the following:

- Identify a source for testing that has more than one isocyanate present in the stack gas;

- Spike as many of the four CAAA target isocyanates as possible into the train before sampling in order to gain as much information as possible from the field test; and

- Design the condenser between the first and second impinger of the train to more efficiently reduce the loss of toluene from the first impinger and minimize compound breakthrough due entrained aerosols.

3.0 FIELD TEST

The objective of this program was to perform a field test to establish the bias and precision of a sampling and analytical method for isocyanate compounds listed in Title III of the Clean Air Act Amendments of 1990. The method evaluation in this test series resulted from extensive literature reviews, industry consultation and laboratory development. To achieve the test objective, an industrial source with known emissions of TDI was selected as a field test site. Factors in the site selection were easy access, ample space for the quadruple sampling trains and proximity to Radian's office and laboratory in Research Triangle Park, North Carolina.

3.1 Site Description

The field validation test was performed at a flexible foam production plant located in High Point, North Carolina. In the manufacturing process starting materials (TDI, water, a polyether resin, methylene chloride, an amine catalyst, and coloring additives) are blended and continuously fed onto a conveyer belt. The TDI reacts with water and releases CO_2, which causes foaming in the resin material. Dichloromethane (DCM) can be added as a supplemental "blowing" or foaming agent. The heat from the reaction of TDI and water causes the DCM to vaporize, resulting in increased foaming. The density of the foam is controlled by the amount of TDI, water and DCM added. The foaming action continues as the material proceeds down the conveyer belt. Finished product is then allowed to cure and degas for 24 to 48 hours.

3.2 Sampling Location

Figure 3-1 presents a schematic view of the sampling location. Three induced draft (ID) fans are used to exhaust TDI and DCM vapors from the production process through three separate uninsulated sheet metal ducts that extend through the roof. Two of the ducts are connected by a 30-foot horizontal duct, 34 inches in diameter, which then extends vertically to a height of 25 feet above the roof top. A 6 inch

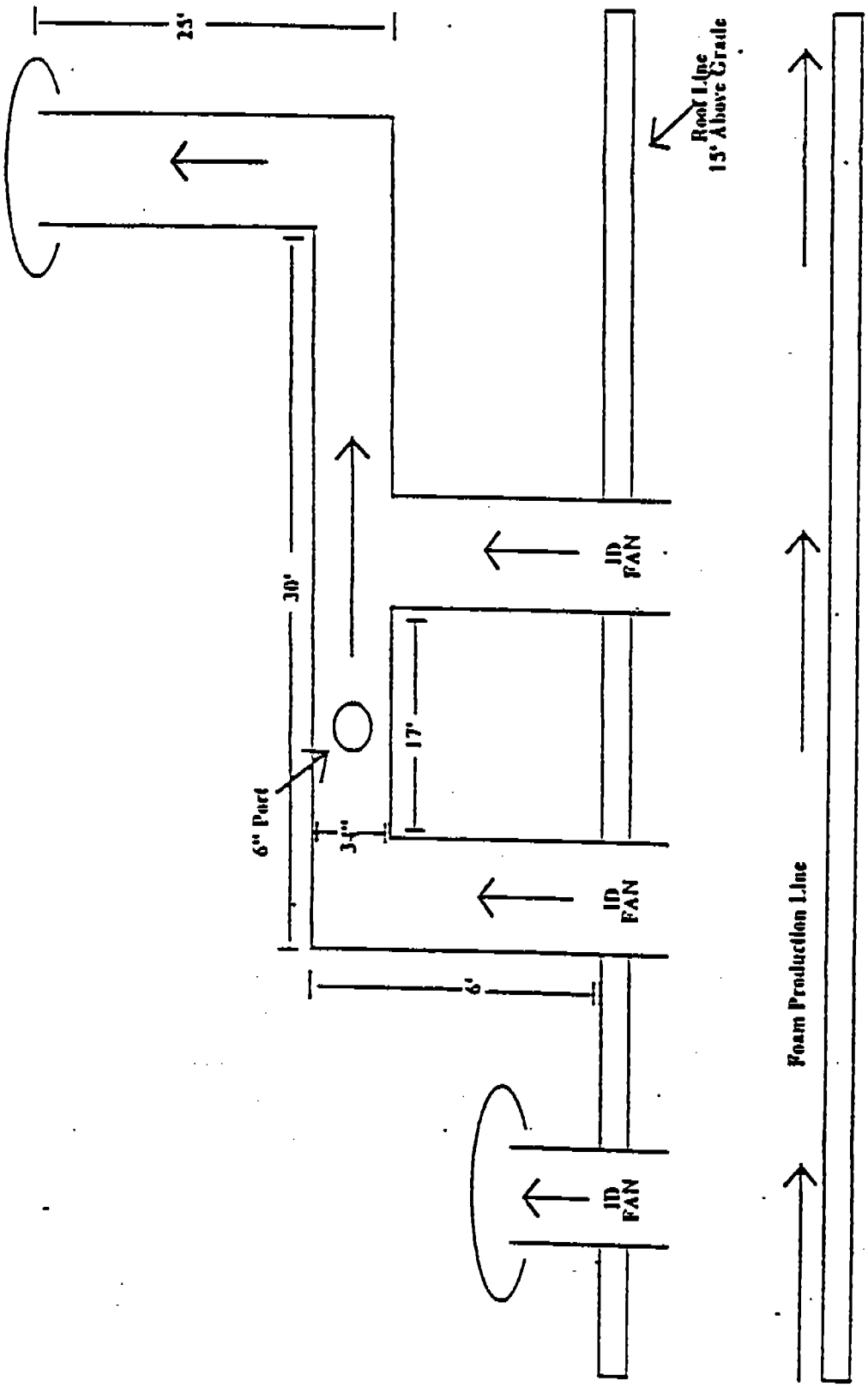


Figure 3-1. Sample Location

diameter sampling port is located in the horizontal duct midway between vertical ducts number 2 and 3, approximately 5 feet above the roof level. The roof level is approximately 15 feet above the ground.

A recovery trailer was located on the ground immediately in front of the sampling area, allowing easy communication between the sampling crew and recovery area. Two-way radio communication between the facility production personnel and the sampling crew allowed coordination between production startup and the start of each sampling run.

3.3 Test Schedule

The recovery trailer and test equipment were mobilized on Saturday, February 20, 1993. Equipment setup took place Saturday afternoon and Sunday, and testing began Monday morning.

The sampling schedule is shown in Table 3-1. Eight runs were completed, which included two extra runs above the required minimum of six.

3.4 Sample Collection

3.4.1 Quad Probe

Sampling was performed by withdrawing stack gas from a single port in the stack through a quad probe, then directing the sampled gas simultaneously to four independently operated sampling trains. The quad probe contains four similar heated sampling probes that were inserted into the stack as one unit, as shown in Figure 3-2. The front end of the quad probe was positioned in the center of the stack and remained

Table 3-1

Test Schedule

Run	Date	Start Time	Stop Time
1	2-22-93	1215	1300
2	2-22-93	1330	1410
3	2-23-93	0945	1085
4	2-23-93	1335	1415
5	2-24-93	1010	1110
6	2-24-93	1335	1420
7	2-25-93	1215	1255
8	2-25-93	1315	1355

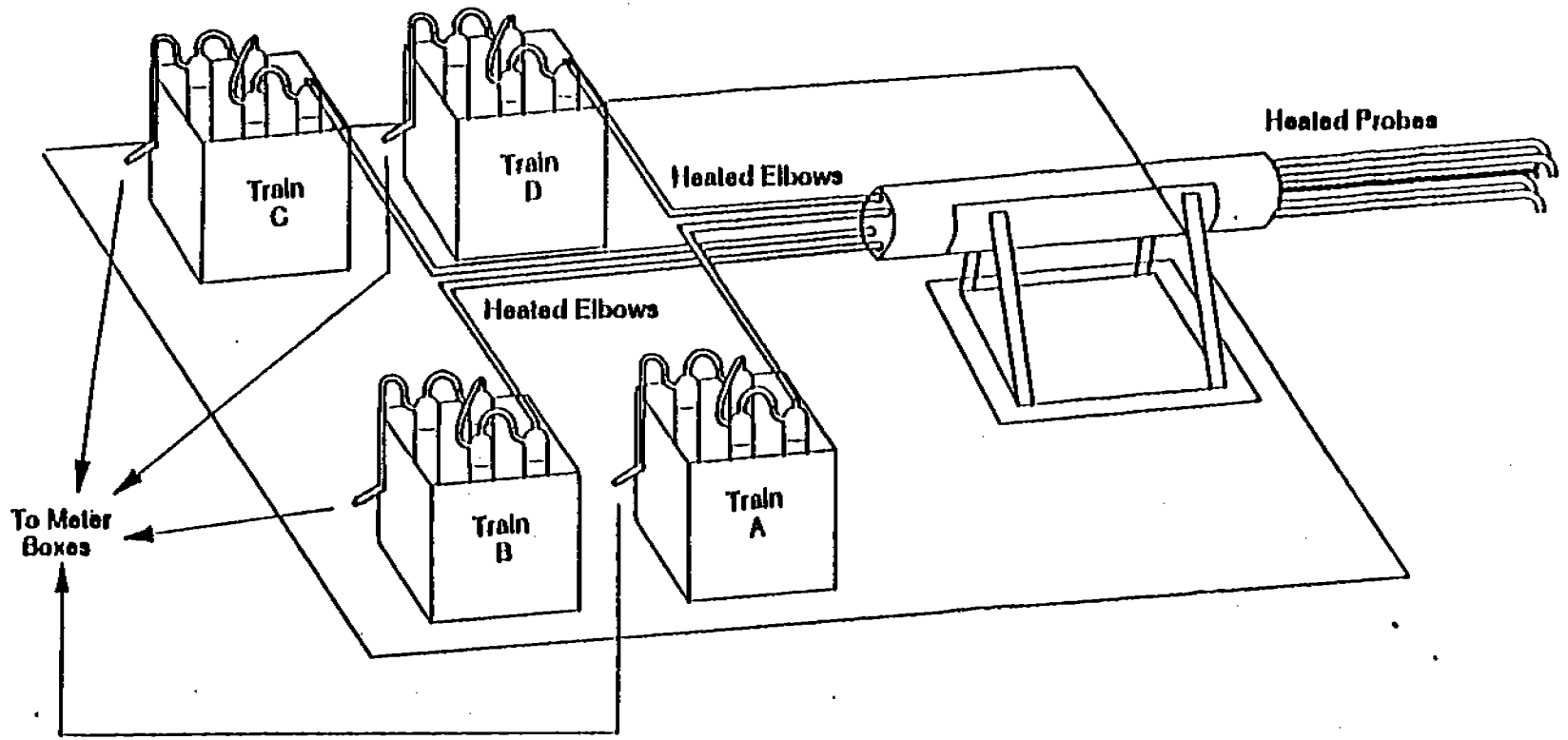


Figure 3-2. Schematic of Quad Train Setup

in that location during each test. The stack was not traversed nor were stack gas velocity measurements made, because determination of the true concentration and emission rate of the target compound in the stack gas was not required to meet the objectives of this program.

Method 301 of 40 CFR Part 63 describes field validation procedures and details the criteria for the quadruple sampling probe tip arrangement. This method requires the inside edge of sampling probe tips to be situated in a 6.0 cm x 6.0 cm square area. The area encompassed by the probe tip arrangement should occupy less than 5% of the stack cross-sectional area. The cross-sectional area of the probe tip arrangement used in this test was 5.8 square inches as measured from the probe/nozzle centerlines. This area is less than 1% of the stack cross-sectional area of 908 square inches, which satisfies the Method 301 criterion.

3.4.2 Quad-Train Assembly

Four independent sampling trains made up the quad-train assembly. Although four meter boxes were required, the velocity head (ΔP) was determined using only one set of pitot tubes. The sampling trains were identified as Train A, B, C, and D. Two of the four trains were spiked before each run. The spiking compound was added to the first impinger of these trains in the field for bias determination. The sampling train test matrix is given in Table 3-2.

3.5 Sampling Preparation

3.5.1 Glassware Preparation

All glassware used for sampling was thoroughly cleaned prior to use. This included the probe, impingers, all sample bottles and all utensils used during sample recovery. All glassware was washed with hot soapy water, rinsed with hot tap water, rinsed with distilled water and baked in a oven at 300 °C for four hours. The glassware

Table 3-2

Sampling Train Test Matrix

	Train Designation	
Run #	Spiked	Unspiked
1	A, B	C, D
2	C, D	A, B
3	A, B	C, D
4	C, D	A, B
5	A, B	C, D
6	C, D	A, B
7	A, B	C, D
8	C, D	A, B

was then triple-rinsed with HPLC grade acetonitrile, followed by triple-rinsing with HPLC grade toluene. Open ends of glassware were covered with aluminum foil to minimize potential contamination during transportation and set-up.

3.5.2 Preparation of Impinger Absorbing Solution

Historical data available from the host test site facility and data resulting from the collection of preliminary samples by Radian indicated that the concentration of TDI in the process exhaust was 1 ppm or less, depending on the density of foam being produced on any given day. At this concentration, a 30 cubic foot sample size would result in the collection of approximately 7 mg of TDI. Using the reaction stoichiometry of two moles of 1,2-PP per mole of TDI, the piperazine in toluene solution was then prepared at a concentration level three times the calculated minimum needed, or 133 μg/mL. This would provide a total of approximately 40 mg of 1,2-PP in 300 mL of impinger solution in the first impinger available for reaction with TDI. At this concentration, approximately 22 mg of TDI could be collected in the first impinger before the reagent was exhausted. This solution was prepared in the laboratory just prior to use in the field, and was used within 10 days of preparation.

3.5.3 Preparation of TDI Spiking Solution

The TDI spiking solution was prepared at a concentration of 1.5 mg of the derivatized TDI per 1 mL of acetonitrile. Fifteen mL of this spiking solution was spiked into the first impinger of two of the four trains prior to each QUAD run. This spiking scheme resulted in a total spike amount of derivatized TDI of 22.5 mg, which is equivalent to 7.83 mg of underivatized TDI. This is an amount equivalent to the amount of TDI expected to be collected in the train from the stack gas based on presurvey samples. Therefore, the amount present in the two spiked trains was designed to be at least twice the amount present in the two unspiked trains.

3.5.4 Sampling Equipment Preparation

Final sampling train preparations included calibration and leak checking of all the train equipment, including meter boxes, thermocouples, nozzles, pitot tubes, and umbilicals. Reference calibration procedures were followed when available, and the results were properly documented and archived. If a referenced calibration technique for a particular piece of apparatus was not available, then a state-of-the-art technique was used. A discussion of the techniques used to calibrate this equipment is presented below.

S-Type Pitot Tube Calibration

The EPA has specified guidelines concerning the construction and geometry of an acceptable S-Type pitot tube. If the specified design and construction guidelines are met, a pitot tube coefficient of 0.84 can be used. Information pertaining to the design and construction of the Type-S pitot tube is presented in detail in Section 4.1.1 of EPA Document 600/4-77027b. Only S-Type pitot tubes meeting the required EPA specifications were used. Pitot tubes were inspected and documented as meeting EPA specifications prior to field sampling.

Sampling Nozzle Calibration

Glass nozzles were used for sampling. All nozzles were thoroughly cleaned, visually inspected for damage , and calibrated according to the procedure outlined in Section 4.4.2 of EPA Document 600/4-77-027b.

Dry Gas Meter Calibration

Dry gas meters (DGMs) were used in the sample trains to measure the sample volume and sampling rate. All DGMs were calibrated to document the volume correction factor prior to the departure of the equipment to the field. Post-test

calibration checks were performed after the equipment was returned to Radian's laboratory. Pre- and post-test calibrations agreed to within 5 percent.

Prior to calibration, a positive pressure leak check of the system was performed using the procedure outlined in Section 4.3.2 of EPA Document 600/4-77-23b. The system was placed under approximately 10 inches of water pressure and an oil manometer was used to determine if the pressure decreased over a one-minute period.

After the sampling console was assembled and leak checked, the pump was allowed to run for 15 minutes to allow the pump and DGM to warm up. The valve was then adjusted to obtain the desired flow rate. For the pre-test calibrations, data were collected at the orifice manometer settings (ΔH) of 0.5, 1.0, 1.5, 2.0, 3.0, and 4.0 inches of water. Gas volumes of 5 ft^3 were used for the two lower orifice settings, and volumes of 10 ft^3 were used for the higher settings. The individual gas meter correction factors (γi) were calculated for each orifice setting and averaged. The method requires that each of the individual correction factors fall within $\pm 2\%$ of the average correction factor or the meter must be cleaned, adjusted, and recalibrated. In addition, Radian requires that the average correction factor be 1.00 ± 1 percent. For the post-test calibration, the meter was calibrated three times at the average orifice setting and vacuum which were used during the actual test.

Dry gas meter calibrations were performed at Radian's laboratory using an American® wet test meter as an intermediate standard. The intermediate standard is calibrated every six months against the EPA spirometer at EPA's Emission Measurement Laboratory in Research Triangle Park (RTP), North Carolina.

3.5.5 Sampling Operations

Vent gas samples were collected isokinetically from a single sampling point located in the center of the duct. Preliminary information about the stack gas velocity useful in selecting nozzle size and calculating the K-factor was obtained during the

pre-site survey. Prior to testing, a leak check of pitot lines was performed according to EPA Method 2. Oxygen (O_2) and carbon dioxide (CO_2) concentrations were ambient levels as determined by EPA Method 3. The stack gas moisture data was measured by the host facility as the relative humidity.

Preparation of Sampling Train

The four sampling trains for each QUAD run were charged and assembled in the recovery trailer. The impinger buckets were marked as Train A, B, C, or D. Tared impingers were used. Approximately 300 mL of the absorbing reagent was transferred to the first impinger and 200 mL to the second impinger. The first impinger of each train was of a Greenburg-Smith design and all remaining impingers were of the modified Greenburg-Smith design. The third impinger was empty, 200 to 300 g of silica gel was placed in the fourth impinger and 400 g of charcoal was placed in the fifth impinger. A water jacketed condenser was placed between the outlet of the first impinger and the inlet to the second impinger to promote cooling and minimize evaporative loses of toluene from the first impinger. Fifteen (15) mL of the spiking solution was pipetted into the first impinger of Trains A and B. Openings were covered with Teflon® film or aluminum foil after the assembly of the trains.

Final assembly of the sampling trains occurred at the sampling location. The complete train configuration is shown in Figure 3-3. Thermocouples were attached to measure the stack temperature and probe outlet and impinger outlet temperatures. Crushed ice was added to each impinger bucket, and the probe heaters were turned on and allowed to stabilize at 120° ± 12°C (248° ± 25°F).

The isocyanate trains were leak checked before and after each sampling run, as required in EPA Method 5. To leak check the assembled train, the nozzle end was capped off and the sampling train evacuated to a vacuum of 15 inches of Hg. After the system was evacuated and the pump isolated from the train, the volume of gas flowing through the system was timed for 60 seconds. The leak rate is required to be

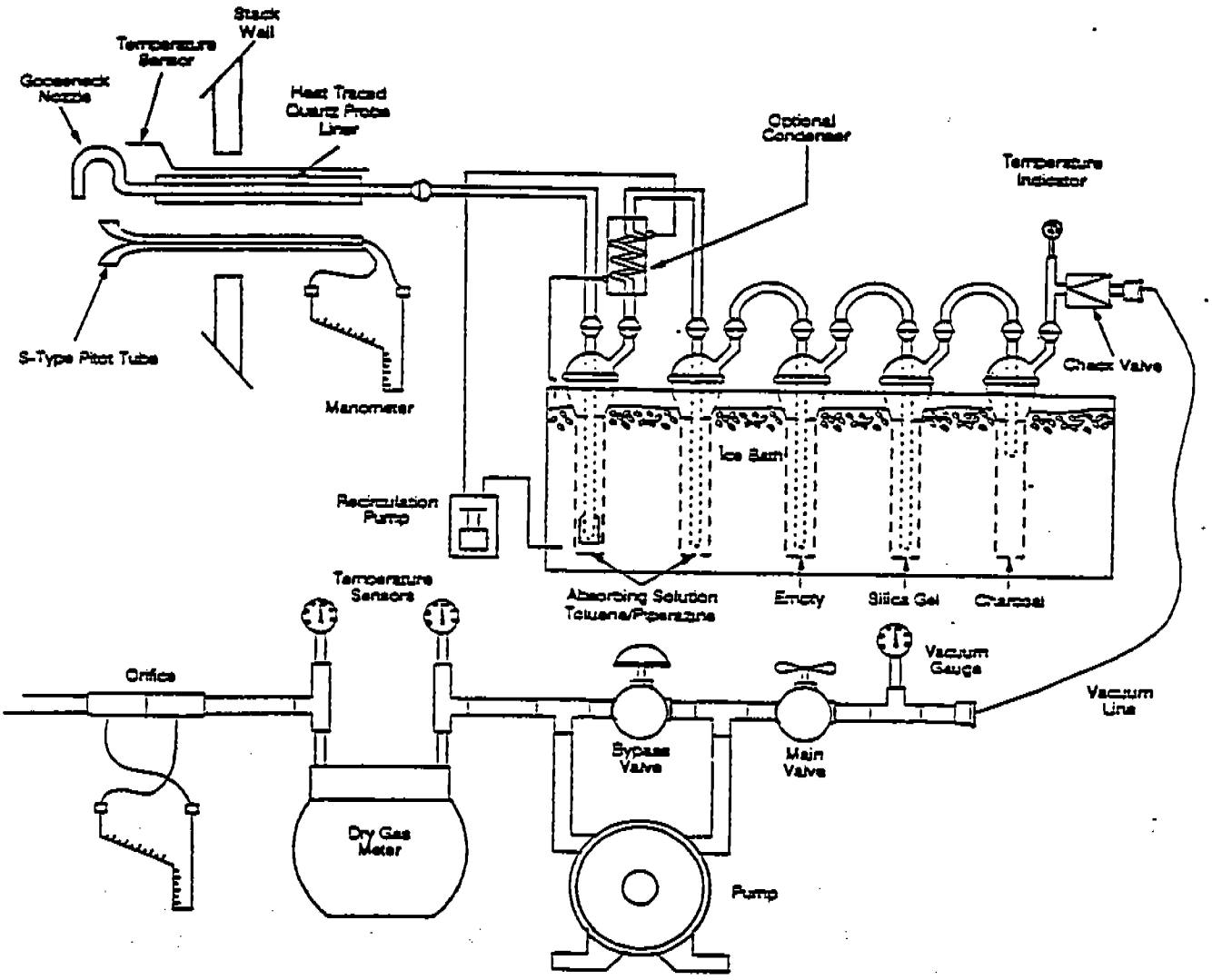


Figure 3-3. Sampling Train for Isocyanate

less than 0.02 acfm or 4% of the average sampling rate, whichever is less. After the leak rate was determined, the cap was slowly removed from the nozzle end until the vacuum in the train returned to atmospheric pressure and then the pump was turned off.

The leak rates and sampling start and stop times were recorded on the sampling task log. Also, any other events that occur during sampling were recorded on the task log (such as pitot cleaning, thermocouple malfunctions, heater malfunctions, and any other unusual occurrences). A nominal sample size of 30 cubic feet was collected in all sampling train. This was accomplished by sampling at a flowrate of 0.5 cubic feet per minute for 60 minutes. The sample volumes for each train by QUAD run are presented in Table 3-3.

3.5.6 Sample Recovery

The sample bottles containing the probe and nozzle washings and the impinger portion of the sampling trains were moved to the recovery trailer.

Each impinger was carefully removed from the impinger bucket, the outside was wiped dry, and the final impinger weight was determined and recorded to calculate stack moisture. The isocyanate sample was then collected in the following two fractions:

- First impinger contents, toluene rinses from the nozzle/probe liner and toluene/acetonitrile rinses of the first impinger and connecting glassware; and
- Contents and toluene/acetonitrile rinses from the second and third impingers and the condenser.

Recovery procedures are detailed in this section. All recovery bottles were wide mouth amber glass with Teflon® lined lids.

Table 3-3.

Quad Train Sample Volumes

Date	Run Number	Train A Vm @ 68° (ft^3)	Train B Vm @ 68° (ft^3)	Train C Vm @ 68° (ft^3)	Train D Vm @ 68° (ft^3)
2/22/93	1	33.42	33.89	33.02	33.04
2/22/93	2	29.07	29.65	28.67	28.40
2/23/93	3	34.24	35.15	33.75	33.01
2/23/93	4	30.60	31.17	30.35	29.54
2/24/93	5	34.14	34.70	34.46	32.59
2/24/93	6	35.10	35.17	34.49	33.78
2/25/93	7	31.11	31.94	30.14	29.91
2/25/93	8	30.89	29.73	30.49	31.95

Container 1 - Probe and First Impinger Contents

The contents and rinses of each of the first impingers and first impinger connectors were combined with the corresponding probe/nozzle washing solution. The entire contents of the first impinger were recovered as a single sample, even if two phases were present. The first impinger and connecting tubing were rinsed three times with 15 mL aliquots of toluene. A final rinse of the impinger with acetonitrile was also necessary to remove any water left on the impinger wall and to recover any remaining derivatized TDI.

Container 2 - Second and Third Impinger Contents/Condenser Rinse

The contents and toluene/acetonitrile rinses of the second and third impingers and the condenser of each train were collected in the same manner used for the first impinger described above. The contents of these impingers were analyzed separately from the contents collected in the first impinger to check for breakthrough; therefore, care was taken to avoid physical carryover from the first impinger to the second. The contents of the fourth and fifth impingers were weighed as previously described and then discarded.

Field Blanks

Four field blanks were prepared and recovered during the test, one on each day of testing. The four field blanks were prepared using Trains A, B, C, and D from the two sets of glassware used during the testing. A sampling train was assembled in the staging area, taken to the sampling location, and leak-checked. The probe of the blank train was heated during the generation of the field blank, but no gas sample was passed through the sampling train. The sampling train for the field blank was recovered with the same procedure described for authentic source samples..

Reagent Blank(s)

Aliquots of each lot of toluene, acetonitrile and absorbing reagent were collected daily to be analyzed as reagent blanks.

Sample Storage and Shipping

Sample containers were checked to ensure that complete labels had been affixed. The labels identified Trains A, B, C, or D, as appropriate. Teflon® lids were tightened and secured with Teflon® tape. The sample bottles were stored in a cooler packed with ice and were returned to Radian's laboratory in these coolers at the end of the field test.

3.6 Quality Control

The following quality control measures were implemented during the field testing phase of this program:

- All dry gas meters were calibrated. Calibration procedures were followed for the pitot tube/probe assembly and all thermocouple readout devices.
- Temperanures of the sampling train were maintained at the specified setting (120± 12°C) during each sampling run at levels prescribed in the test plan.
- Sampling trains were leak-checked both prior to and after sampling.
- All glassware was washed and oven-baked following appropriate method protocol, given in the test plan.
- All recovery solvents were HPLC grade and an aliquot of each was collected daily as reagent blanks.
- One field blank was collected for every two sampling runs.

- Chain of Custody forms and log books were filled in at the completion of each day of sampling.

4.0 ANALYTICAL PROCEDURES

4.1 Sample Preparation

The samples were received in the laboratory in screw-capped glass bottles with Teflon®-lined caps, sealed with Teflon® tape and stored in coolers packed with ice. Samples were logged into the laboratory sample tracking system and stored in a secure, refrigerated (4°C) sample storage area prior to analysis. Samples were prepared for analysis within 30 days of collection and analyzed within 30 days of preparation.

All labware was washed with detergent and water and rinsed with hot tap water, rinsed with deionized water, baked at 300°C, rinsed with acetonitrile and toluene prior to use. Solvents used were HPLC grade or equivalent.

Each of the two recovered samples from each train was transferred along with rinses to separate 500 mL round bottom flasks and then evaporated to dryness under vacuum in a 65°C water bath. Each round-bottom flask was then rinsed three times with separate two (2) mL aliquots of acetonitrile (ACN) and the rinses transferred to a 10-mL volumetric flask. The sample was then brought to volume with ACN and transferred to a 15-mL vial and sealed with a Teflon®-lined lid. The vial was stored in a refrigerated sample storage area at 4°C until analysis.

4.2 Chromatographic Analyses

The procedures for the HPLC analyses of the samples are described in the following sections.

4.2.1 Standard Preparation

A 300 μg/mL stock solution of TDI piperazine urea derivative was prepared by dissolving 7.5 mg of the purified crystals of the derivatized TDI in 25 mL of

ACN. [The derivatized TDI was previously prepared by adding 1 g of the neat TDI to a solution of 1-(2-pyridyl) piperazine in ACN, evaporating to dryness and recrystallizing the urea derivative three times from ACN.] Working standards for the calibration curve were made from this stock at six concentration levels in ACN ranging from 0 to 50 μg/mL. This concentration range covered the amount of TDI expected to be collected at the host facility. This stock solution was also used to prepare the field spiking solution. A check standard was prepared from a separately prepared stock solution. This check standard fell in the middle of the calibration curve.

4.2.2 Analysis

HPLC System

The HPLC system operating parameters for analysis of standards and samples were as follows:

Instrument:	RAININ HPXL Delivery System Waters 710B WISP autosampler
Data System:	Nelson 2600 (1 volt)
Column:	Zorbax ODS (4.6 mm ID x 25 cm)
Mobile Phase:	Acetonitrile/0.1M Ammonium Acetate Buffer
Gradient:	25:75 ACN/0.1 m ammonium acetate buffer, pH 6.2, hold 2 minutes, then to 60:40 by 19.5 minutes.
Detector:	RAININ Dynamax Dual-Wavelength, Ultraviolet at 254 nm
Flow Rate:	2 mL/min
Injector Volume:	50 μL
Retention Time:	2,4-TDI, 10.2 min.; 2,6-TDI 8.5 min.

Instrument Calibration

Calibration standards were prepared at seven levels as described in Section 4.2.1. Each calibration standard was injected in duplicate. Linear regression analysis of peak area response versus concentrations of TDI was used to prepare a calibration curve. Linearity of the calibration curve was confirmed by visual inspection and verified by a correlation coefficient of 0.9995. After an initial calibration curve was obtained, the calibration check standard described in Section 4.2.1 was analyzed. This standard was injected after every 3 samples, and was used for daily calibration. This check standard consistently agreed to within 10% of the true value.

All samples were analyzed in triplicate on the HPLC. An acetonitrile blank was analyzed once per day to ensure that the system was not contaminated. A check standard was analyzed prior to sample analysis, after every 3 samples, and at the end of the sample analysis each day.

4.3 Qualitative Identification

Analytes were identified by retention time. The retention time for 2,4-TDI was 10.2 min and 8.5 min for 2,6-TDI. Figures 4-1 and 4-2 show chromatograms from the analysis of first impinger contents from QUAD run number 4 for the unspiked and spiked trains respectively. As seen in the chromatograms, the TDI peaks are well separated from the peak for unreacted 1-2 PP. The peak at 17.5 min. was not identified.

4.4 Calculations

4.4.1 Calculation of the Amount of Isocyanate Collected

A least squares linear regression analysis of the calibration data was used to calculate a correlation coefficient, slope, and intercept. Concentration was used as the independent or X-variable and response was used as the dependent or Y-variable.

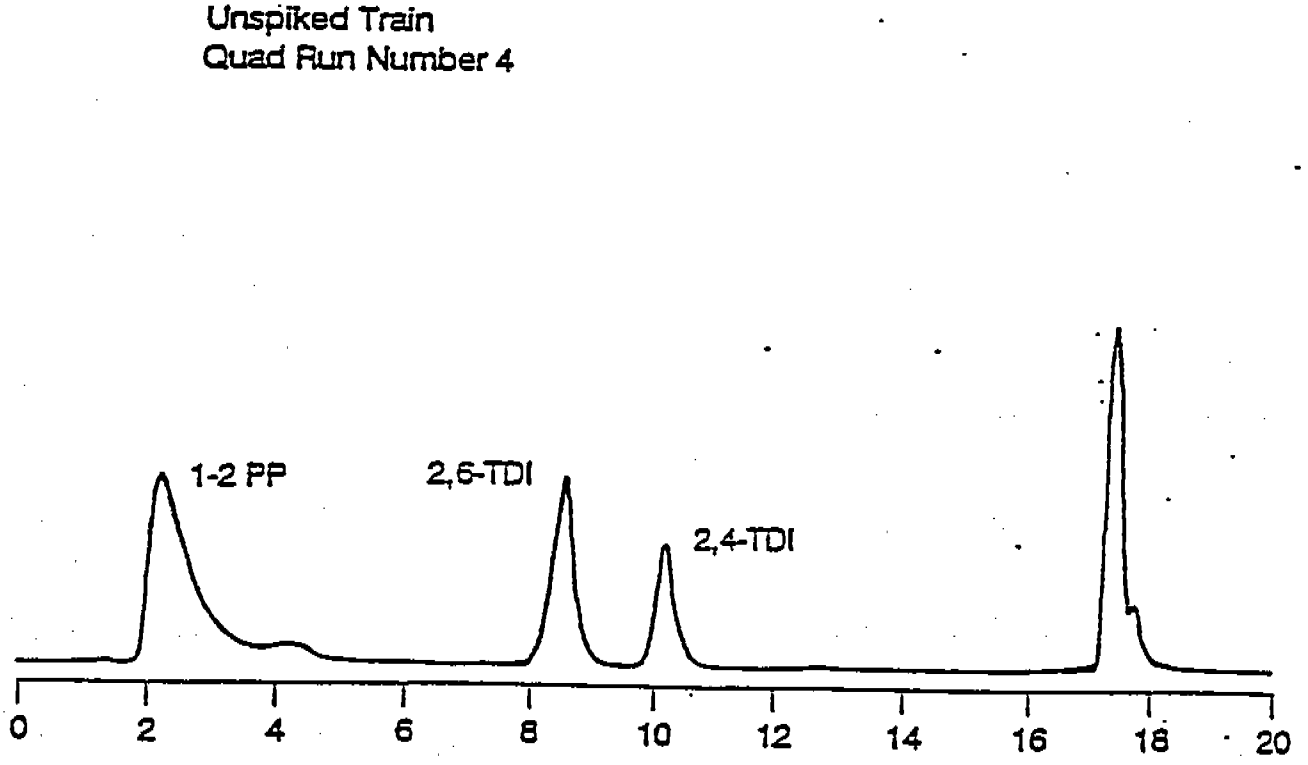


Figure 4-1. Chromatogram of Unspiked Train

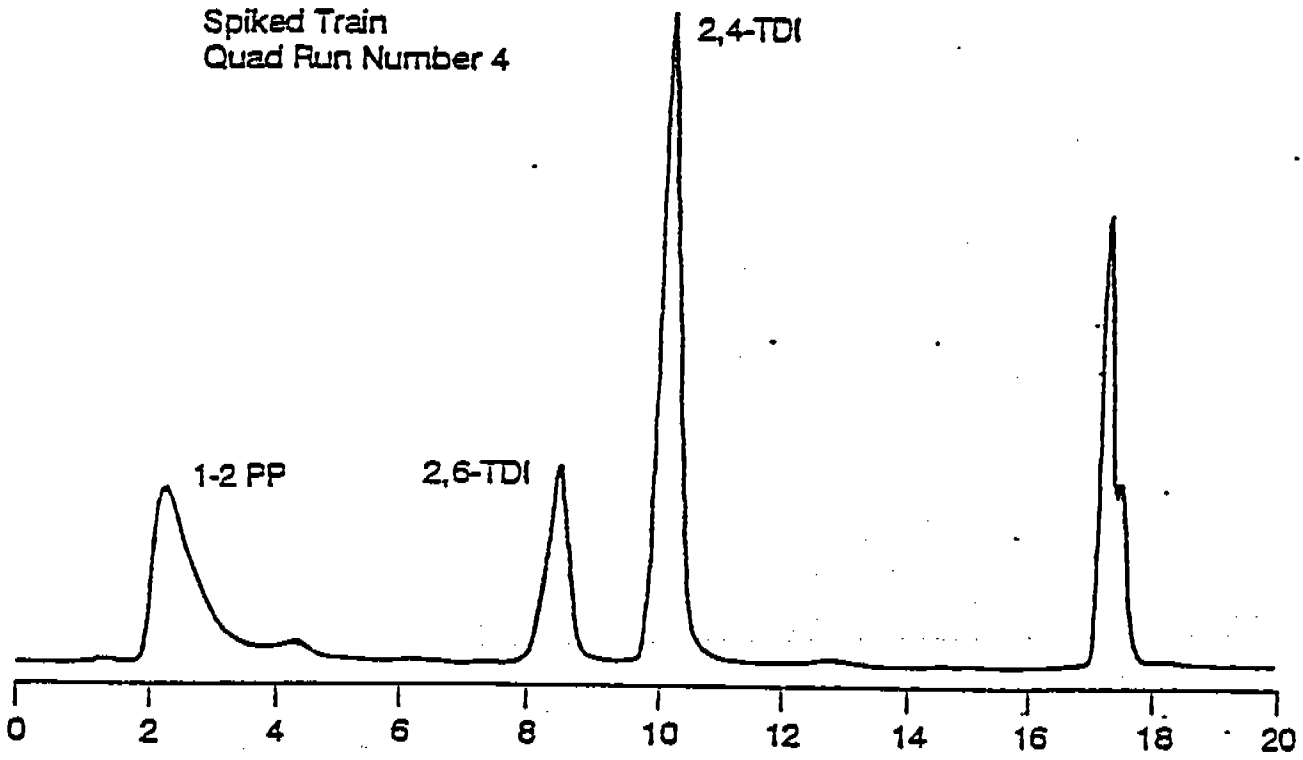


Figure 4-2 Chromatogram of Spiked Train

The concentration of isocyanate (as the derivative) in the concentrated samples was then calculated as follows:

$$\text{Concentration} = \frac{(\text{Sample Response} - \text{Intercept})}{\text{Slope}} \qquad 4\text{-}1$$

The total amount (μg) collected in a sample was then calculated by multiplying the concentration (μg/mL) times the final volume (10 mL) of ACN used to redissolve the concentrated sample.

$$\text{Amount TDI derivative} = \text{Concentration } (\mu\text{g/mL}) \times \text{Final Volume (10 mL)} \qquad 4\text{-}2$$

The equivalent amount of TDI required to generate this much derivative was calculated by multiplying the ratio of the molecular weights of TDI (174) and the TDI derivative (501) times the amount of TDI derivative (determined by using equation 4-2).

The total amount of 2,4-TDI (underivatized) collected in the unspiked and spiked trains is given in Table 4-1 and Table 4-2 respectively.

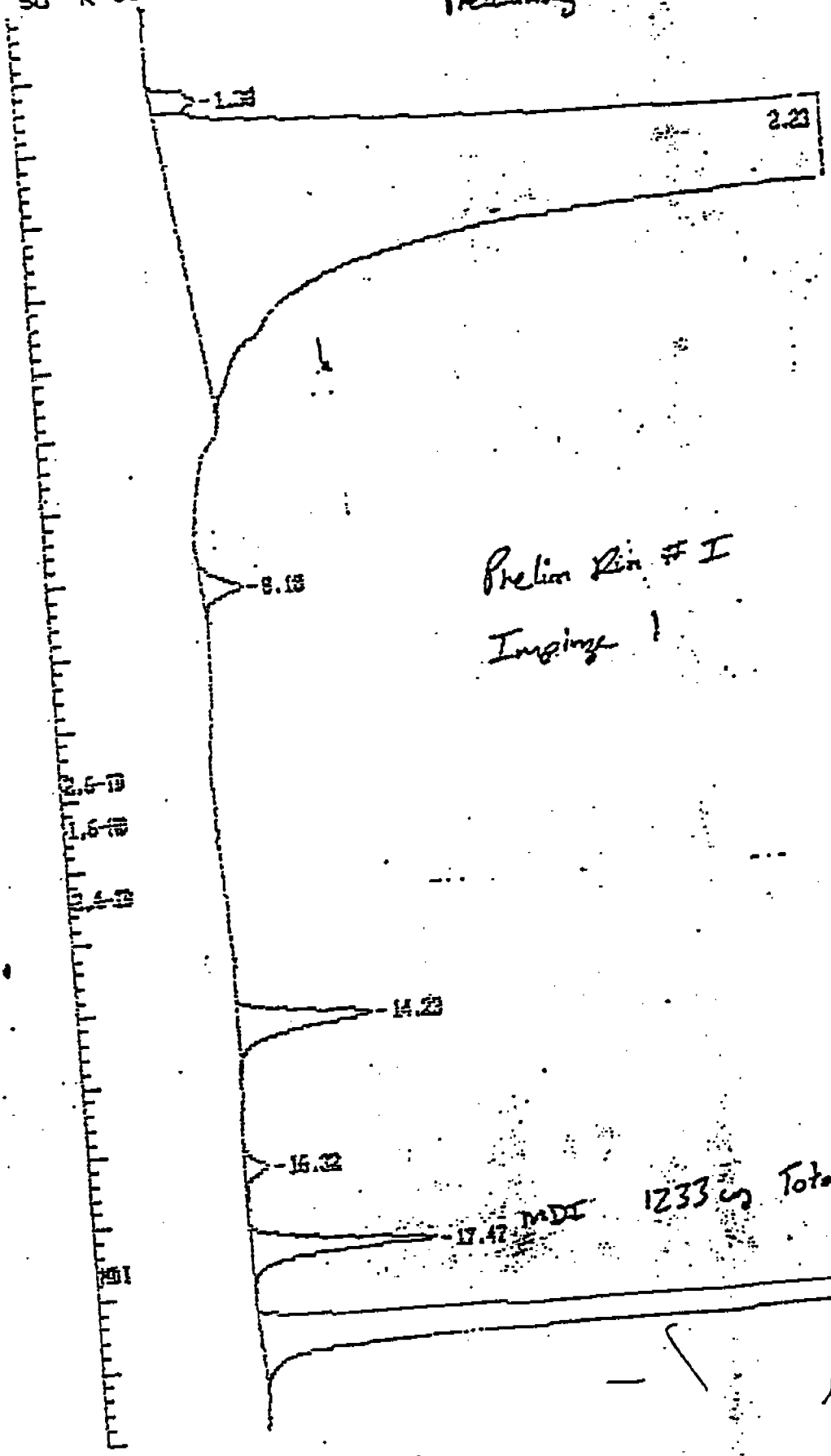
4.4.2 Normalization of the Amount of Isocyanate Collected

In order to simplify the comparison of the analytical results of the four trains in each QUAD run for subsequent calculations of bias and precision, the test plan called for the collected of 30 ft^3 of sample in each train. Due to operational variabilities inherent to each train, accurate but slightly differing sample volumes resulted as shown in Table 3-3. Therefore, it was necessary to normalize the data presented in Tables 4-1 and 4-2 to a common sample volume. The sample volume to which all data were normalized was selected to be 35.31 ft^3 which is equivalent to 1m^3. The following stepwise calculations were used to normalize the data. The data from QUAD run number 1 are used as an example.

SENT BY:

Data File = E:\S3253F6.PTS Printed on 09-10-1993 at 12:29:41
Start time: 0.00 min. Stop time: 20.00 min. Offset: 0 cts
Full Range: 50 K-Counts

Preliminary Data



Prelim Run # I
Impinger 1

1233 ug Total

Radian
IS check
ID

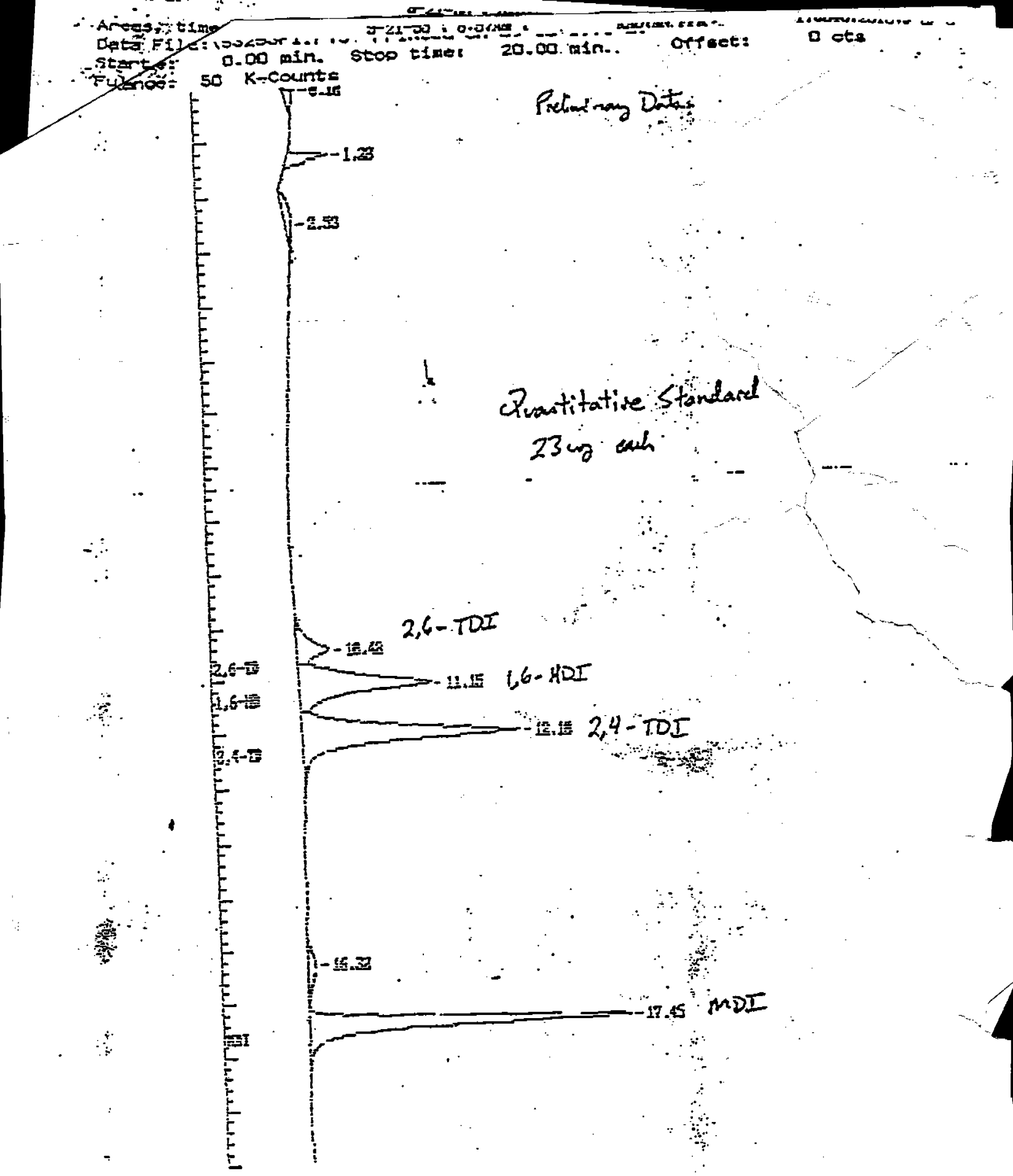

Area% : time
Data File:
Start: 0.00 min. Stop time: 20.00 min. Offset: 0 cts
Fullnes: 50 K-Counts
Preliminary Data
1.23
2.53
Quantitative Standard
23 ug each
2,6-TDI
11.15 1,6-HDI
12.15 2,4-TDI
17.45 MDI

Table 4-1

2,4-TDI Detected in Unspiked Trains, μg

Train[1]	QUAD Run No.											
	1			2			3			4		
	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total
A	--	--	--	5114	61	5175	--	--	--	1832	16	1848
B	--	--	--	5224	40	5264	--	--	--	1864	24	1888
C	4409[2]	18	4427	--	--	--	3281	32	3313	--	--	--
D	4416	85	4501	--	--	--	2928	33	2960	--	--	--

[1]The unspiked trains alternated from run to run, C and D then A and B.
[2]All values are in micrograms of underivatized TDI.

Table 4-1 (Continued)

Train[1]	QUAD Run No.											
	5			6			7			8		
	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total
A	--	--	--	7880	105	7993	--	--	--	3521	53	3574
B	--	--	--	7488	89	7577	--	--	--	3805	50	3855
C	4810	17	4827	--	--	--	2160	23	2183	--	--	--
D	5054	42	5096	--	--	--	2180	36	2216	--	--	--

[1]The unspiked trains alternated from run to run, C and D then A and B.
[2]All values are in micrograms of underivatized TDI.

Table 4-2

2,4-TDI Detected in Spiked Trains, μg

Train[1]	QUAD Run No.											
	1			2			3			4		
	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total
A	11943[2]	64	12007	--	--	--	11488	36	11524	--	--	--
B	11301	28	11329	--	--	--	12024	38	12062	--	--	--
C	--	--	--	12045	35	12080	--	--	--	9329	58	9387
D	--	--	--	12454	49	12503	--	--	--	9429	26	9455

[1]The spiked trains alternated from run to run, A and B then C and D.
[2]All values are in micrograms of underivatized TDI.

Table 4-2 (Continued)

Train[1]	QUAD Run No.											
	5			6			7			8		
	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total	Imp 1	Imp 2	Total
A	12014	45	12059	--	--	--	10094	46	10140	--	--	--
B	12588	37	12625	--	--	--	9003	40	9043	--	--	--
C	--	--	--	15201	88	15289	--	--	--	10561	45	10606
D	--	--	--	15173	96	15269	--	--	--	10315	44	10359

[1]The spiked trains alternated from run to run, A and B then C and D.
[2]All values are in micrograms of underivatized TDI.

Step 1 Normalize unspiked Trains C and D first impinger amounts (μg) to the sample volume collected (cubic feet) in spiked Train A;

$$\text{Train C} \quad \frac{33.42\ ft^3}{33.02\ ft^3} X\ 4409\ \mu g = 4462\ \mu g \qquad 4\text{-}3A$$

$$\text{Train D} \quad \frac{33.42\ ft^3}{33.04\ ft^3} X\ 4416\ \mu g = 4467\ \mu g \qquad 4\text{-}3B$$

Step 2 Average the normalized, unspiked train amounts from step 1 above. Assuming the collection efficiency of all trains to be the same, this value would also be the amount of TDI that would be collected by Train A due to sampling the stack gas;

$$\frac{4462\ \mu g + 4467 \mu g}{2} = 4465\ \mu g \qquad 4\text{-}4$$

Step 3 Subtract the average value (step 2) from the uncorrected amount (sampled amount plus spike) for spiked Train A, first impinger, to get recovered spike amount;

$$11943\ \mu g - 4465\ \mu g = 7478\ \mu g \qquad 4\text{-}5$$

Step 4 Normalize the amount collected in spiked Train A, first impinger to 35.31 ft^3 using the sample volume for Train A and the value obtained in step 2;

$$\frac{35.31\ ft^3}{33.42\ ft^3} X\ 4465\ \mu g = 4718\ \mu g \qquad 4\text{-}6$$

Step 5 Normalize the amount collected in the second impinger of spiked Train A to 35.31 ft^3 using the sample volume for Train A and the amount determined by HPLC;

$$\frac{35.31\ ft^3}{33.42\ ft^3}\ X\ 63.9\ \mu g\ =\ 67.5\ \mu g \qquad 4\text{-}7$$

Step 6 Sum the values determined from steps 3, 4 and 5 to get the total amount of TDI found in spiked Train A, normalized to 35.31 ft^3;

$$7478\ \mu g\ +\ 4718\ \mu g\ +\ 67.5 \mu g\ =\ 12264\ \mu g \qquad 4\text{-}8$$

Steps 1-6 can be repeated for similar calculations for spiked Train B. The total amount of TDI collected in each of the unspiked trains can be determined by first normalizing the amounts found in the two impingers of each train to $1m^3$ and then summing the two values. The raw and normalized data for all analysis results are presented in Appendix A. The resulting normalized values are summarized in Tables 4-3 and 4-4.

4.5 Quality Control

Quality control procedures that were implemented for this program include:

- Adhering to applicable sampling and analysis protocols;
- Collecting and analyzing field blanks, trip blanks, reagent blanks, and laboratory blanks;
- Tracking samples from collection to analysis;
- Calibrating all analytical equipment prior to use:
- Maintaining accurate and complete written documentation;
- If any changes were made to the analytical system (i.e., column changed, column maintenance), a calibration check was performed to verify the validity of the calibration curve. If the calibration check did not meet acceptance criteria, the analytical system was recalibrated.

Table 4-3

Normalized Amount of 2,4-TDI Detected in Unspiked Trains, μg

Train[1]	QUAD Run No.							
	1	2	3	4	5	6	7	8
A	--	6287	--	2132	--	8042	--	4086
B	--	6270	--	2139	--	7608	--	4579
C	4735[2]	--	3466	--	4947	--	2557	--
D	4811	--	3166	--	5522	--	2616	--

[1]The unspiked trains alternated from run to run, C and D then A and B.
[2]All values are in micrograms of underivatized TDI, normalized to a sample volume of 35.31 ft^3 ($1m^3$).

Table 4-4

Normalized Amount of 2,4-TDI Detected in Spiked Trains, μg

Train[1]	QUAD Run No.							
	1	2	3	4	5	6	7	8
A	12264[2]	--	11625	--	12233	--	10450	--
B	11520	--	12078	--	12717	--	9290	--
C	--	13258	--	9694	--	15471	--	11197
D	--	13733	--	9805	--	15610	--	10947

[1]The spiked trains alternated from run to run, A and B then C and D.
[2]All values are in micrograms of underivatized TDI, normalized to a sample volume of 35.31 ft^3 ($1m^3$).

- Analysis of field spiked QC samples; and
- Analysis of check standards every 3 samples.

5.0 RESULTS AND DISCUSSION

This section presents the results of the eight sampling runs relative to the criteria for method precision and bias. Fractional results are also presented to show the amount of isocyanate breakthrough occurring in the impinger train. All sample fractions were prepared and analyzed for toluene diisocyanate at Radian's Research Triangle Park laboratory.

5.1 Bias and Precision

Table 5-1 is a summary table which presents the results of the statistical evaluation of the test data following the EPA Method 301 criteria showing the method precision and bias for 2-4 TDI. Method 301 requires valid data from a minimum of six QUAD runs. Table 5-1 presents data from all eight runs. Precision is shown as the percent relative standard deviation of the measured amounts of TDI in the samples. Results for precision of both the spiked and unspiked samples were less than 5 percent RSD, which is well within the limits of acceptable precision (upper limit of 50%) given in EPA Method 301.

Using the data from all eight QUAD runs, method bias was measured at -395 micrograms. This value was determined to be statistically significant at the 95% confidence level, using the t statistic calculated for the analytical data. A correction factor of 1.053 was calculated for use with the method to compensate for the bias should the method be used to measure TDI emissions from similar sources.

Using the data from only seven QUAD runs (eliminating run 8 because this run had the lowest average % recovery and the final leak check for one of the trains was questionable), the method bias was -295 micrograms. This bias was not statistically significant and therefore no correction factor was calculated. In either case, the criteria for an acceptable method were met (i.e., a correction factor between 0.7 and 1.3).

Table 5-1

Summary of Method 301 Statistical Calculations

Parameter	Spiked Trains		Unspiked Trains	
	7 Runs	8 Runs	7 Runs	8 Runs
Spiked Amount[1]	7828	7828	--	--
RSD, %	3.6	3.4	4.7	5.2
Average Bias[1]	-295	-395	--	--
Bias Significant?	No	Yes	--	--
Correction Factor	1.0	1.053	--	--

[1]Values are presented as μg of underivatized TDI

5.2 Breakthrough and Recovery

This section presents details of the breakthrough and recovery results for the field samples, as well as recovery information for the spiked compound (2,4-TDI).

5.2.1 Breakthrough

Tables 4-1 and 4-2 provide a summary of the combined total mass of 2,4-TDI collected in the probe/first impinger and second/third impinger samples for the unspiked and spiked trains, respectively. These totals are used as a basis for calculating breakthrough of the TDI from the first impinger to the second impinger. The mass of compound found in the probe/first impinger fraction and in the second impinger fraction were each divided by the total mass of TDI for that train and then multiplied by 100 to yield the percent of the total TDI found in the separate train sections. The results are presented in Table 5-2 and 5-3 for the spiked and unspiked trains respectively.

The average breakthrough for the spiked trains was 1.5% and for the unspiked trains 1.1%. More than 98% of the TDI was collected in the first impinger under the sampling conditions used in this study.

The amount of the toluene contained in the first impingers of each of the trains was reduced by approximately 25% (by weight) during the sampling run due to evaporation. The second impingers showed, on the average, a net gain of approximately 5%. The remainder was collected in the silica gel and the charcoal, both of which showed net weight gains. The total weight gained in the train components following the first impinger more than compensate for loses from the first impinger, probably due to the collection of a small amount of moisture. The loss of toluene from the first impinger was minimized by keeping the impingers in an ice bath and placing a water cooled condenser between the outlet of the first impinger and the inlet of the second impinger.

Table 5-2

Distribution of 2,4-TDI Within the Spiked Trains

Train[1]	Impinger No.	QUAD Run No.							
		1	2	3	4	5	6	7	8
A	1	98.5[2]	--	99.0	--	99.0	--	98.0	--
	2	1.5	--	1.0	--	1.0	--	2.0	--
B	1	99.2	--	99.1	--	99.2	--	97.0	--
	2	0.8	--	0.9	--	0.8	--	3.0	--
C	1	--	99.2	--	96.4	--	98.8	--	98.4
	2	--	0.8	--	3.6	--	1.2	--	1.6
D	1	--	99.0	--	98.5	--	98.7	--	98.4
	2	--	1.0	--	1.5	--	1.3	--	1.6
Average/ % RSD	1	98.5/0.81							
	2	1.5/54.4							

[1]Spiked Trains alternate from run to run, A and B, then C and D.
[2]Values are a percentage of the total amount of 2-4 TDI determined to be in each train.

Table 5-3

Distribution of 2,4-TDI Within the Unspiked Trains

Train[1]	Impinger No.	QUAD Run No.							
		1	2	3	4	5	6	7	8
A	1	--	98.8	--	99.1	--	98.7	--	98.5
	2	--	1.2	--	0.9	--	1.3	--	1.5
B	1	--	99.2	--	98.8	--	98.8	--	98.7
	2	--	0.8	--	1.2	--	1.2	--	1.3
C	1	99.6[2]	--	99.0	--	99.6	--	99.0	--
	2	0.4	--	1.0	--	0.4	--	1.0	--
D	1	99.1	--	98.9	--	99.2	--	98.4	--
	2	1.9	--	1.1	--	0.8	--	1.6	--
Average/ % RSD	1	98.9/0.41							
	2	1.1/37.1							

[1]Unspiked Trains alternate from run to run, C and D, then A and B.
[2]Values are a percentage of the total amount of 2,4-TDI determined to be in each train.

5.2.2 Recovery

One of the objectives of this test program was to obtain bias and precision data to validate the proposed test method for isocyanates. Samples from two of the four trains of each quad assembly were spiked with TDI before each sampling run. The estimation of method bias is based on the percentage of the TDI spikes recovered. Analytical results used for this calculation are the averages of the triplicate analysis results for each spiked sample. A summary of the spiked TDI recovery percentages is presented in Table 5-4.

The percent recovery was calculated for each spiked train for each run following the calculation procedures outlined in steps 1-3 of Section 5.0. The value obtained at step 3, the amount of spike recovered, is divided by the actual amount of TDI spiked, 7827 μg, multiplied by 100. An average recovery was determined by averaging the 16 individual run recoveries.

The recovery for TDI ranged between 83 and 112 percent and averaged 95 percent with a %RSD of 8.2.

5.3 Quality Assurance/Quality Control

As a part of the testing for Work Assignment No. 55, Radian designed and implemented a quality assurance/quality control (QA/QC) effort tailored to meet the specific needs of this project. The testing was conducted in accordance with QA/QC procedures described in the Quality Assurance Project Plan (QAPP). The results of the QA/QC effort demonstrate that the data are reliable and meet project objectives for completeness and representativeness. The data met the QA objectives for precision and accuracy and there are no data quality issues that effect conclusions regarding the objectives of this project.

Table 5-4

Percent Recovery of the Spiked 2,4-TDI

Train[1]	QUAD Run No.							
	1	2	3	4	5	6	7	8
A	96[2]	--	106	--	89	--	100	--
B	86	--	112	--	96	--	86	--
C	--	89	--	97	--	98	--	88
D	--	95	--	98	--	99	--	83
Average	95							
% RSD	8.2							

[1]Spiked Trains alternated from run to run, A and B, then C and D.
[2]Values are a percentage based upon a spiked amount of 7827.8 μg as 2,4-TDI.

The primary objectives of the QA/QC effort were to control, assess, and document data quality. In order to accomplish these objectives, the QA/QC approach consisted of the following key elements:

- Definition of data quality objectives that reflect the overall technical objectives of the project;
- Design of a sampling, analytical, QA/QC, and data analysis system to meet these objectives; and
- Initiation of corrective action when measurement system performance did not meet the specifications.

These elements include the use of selected standard sampling and analytical procedures as components of the overall approach in addition to, specified calibration requirements, QC checks, data reduction and validation procedures, and sample tracking.

A summary of analysis results for QA/QC samples, which includes measures of precision and accuracy and limitations in the use of these data is presented in this section.

5.3.1 Overview of Data Quality

The QAPjP established specific QA objectives for precision (15% RSD), accuracy (±30%), and completeness (100%) for the determination of TDI emissions. The statistical results presented in Table 5-1 and the % recovery values given in Table 5-4 show that the objectives were met. The data quality acceptance criteria and the experimental results are summarized in Table 5-5. Results for spike/spike duplicates and triplicate analyses were compared with the criteria. In all cases the criteria were met. Other data quality indicators for each type of analysis are also presented throughout the remainder of Section 5.3.

There are no cases where data quality issues impair the study's conclusions with respect to the validity of the sampling and analytical test method procedures. With

Table 5-5

Data Quality Acceptance Criteria and Results

Parameter	Criteria	Results
TDI Spike Recovery	70 - 130%	83 - 112%
TDI Analysis Results QUAD Train, % RSD	15%	5%
Individual DGM Correction Factor Agreement	±2% of Avg	<2%
Analytical Balance	≤0.1 g of Class S Weights	<0.1 g
HPLC Linearity Correlation Coeff.	>0.995	0.9995
HPLC Retention Time Variation	±15%	±10%
HPLC Calibration Check	±10% of Curve	±9%
HPLC System Blank	<0.1% Analyte level	<0.1%
HPLC Replicate Analyses	±10% of 1st injection	±2%
HPLC Method Spikes	±20% of theoretical	±5%

exception of a limited number of samples, the quality of measurement data generated for the test parameters fully meets the data quality objectives outlined in the QAPjP.

5.3.2 Sampling Quality Control

Quality control activities associated with the field sampling are described in the QAPjP. These activities include adherence to accepted reference method protocols, use of standardized data recording sheets, equipment calibration, and collection of field blanks.

Stack sampling QC data, including sampling rates, sample volume collected, maximum recorded leak rate, and maximum allowable leak rate, are summarized in Table 5-6 for each run. All of the data quality indicators are within acceptable limits, with the exception of a slightly high leak rate value for Train C Run 8. However, this train was leak checked at a vacuum of 7 inches of mercury which was almost twice that achieved during sampling and the leak would therefore have very little, if any, effect on the data. The leak rate criterion is <4% of the average sampling rate or 0.02 dscf, whichever is less.

5.3.3 Sample Storage and Holding Time

Sample hold times specified in the QAPP were met for all samples. All samples were prepared within 30 days of collection and analyzed within 30 days of preparation.

5.3.4 Analytical Quality Control

Results for method spikes, field spikes, field blanks, reagent blanks and method blanks are summarized in Table 5-7. These samples served the dual purpose of controlling and assessing measurement data quality, and providing the basis for precision and accuracy estimates. The QC acceptance criteria for each of these types of samples

Table 5-6

Sampling Train Leak Summary

Run Number	Std. Metered Volume (dscf)	Average Sampling Rate (dscfm)	Maximum Leak Check (dscf@ in Hg)	4% Sample Rate (dscfm)	Acceptable[a] Leak Rate?
1A	33.42	0.743	0.010 @ 10	0.030	Yes
1B	33.89	0.753	0.010 @ 15	0.030	Yes
1C	33.02	0.734	0.010 @ 8	0.029	Yes
1D	33.04	0.734	0.020 @ 10	0.029	Yes
2A	29.07	0.727	0.016 @ 8	0.029	Yes
2B	29.65	0.741	0.009 @ 8	0.030	Yes
2C	28.67	0.717	0.010 @ 7	0.029	Yes
2D	28.40	0.710	0.010 @ 8	0.028	Yes
3A	34.24	0.571	0.012 @ 10	0.023	Yes
3B	35.15	0.586	0.010 @ 8	0.023	Yes
3C	33.75	0.563	0.009 @ 8	0.023	Yes
3D	33.01	0.550	0.020 @ 5	0.022	Yes
4A	30.60	0.765	0.012 @ 8	0.031	Yes
4B	31.17	0.779	0.012 @ 7	0.031	Yes
4C	30.35	0.759	0.008 @ 7	0.030	Yes
4D	29.54	0.739	0.015 @ 10	0.030	Yes
5A	34.14	0.569	0.014 @ 10	0.023	Yes
5B	34.70	0.578	0.012 @ 8	0.023	Yes
5C	34.46	0.574	0.012 @ 8	0.023	Yes
5D	32.59	0.543	0.016 @ 7	0.022	Yes
6A	35.10	0.780	0.007 @ 7	0.031	Yes
6B	35.17	0.782	0.010 @ 8	0.031	Yes
6C	34.49	0.766	0.008 @ 7	0.031	Yes
6D	33.78	0.751	0.008 @ 10	0.030	Yes
7A	31.11	0.778	0.015 @ 9	0.031	Yes
7B	31.94	0.799	0.011 @ 8	0.032	Yes
7C	30.14	0.754	0.009 @ 7	0.030	Yes
7D	29.91	0.748	0.014 @ 10	0.030	Yes
8A	30.89	0.772	0.009 @ 10	0.031	Yes
8B	29.73	0.743	0.011 @ 8	0.030	Yes
8C	30.49	0.762	0.021 @ 7	0.030	No
8D	31.95	0.799	0.018 @ 8	0.032	Yes

[a]The maximum acceptable leak rate is the lesser of 0.020 dscfm or 4% of the average sampling rate.

Table 5-7

Summary of Analytical Quality Control Results

Sample ID	Total Detected μg	Theoretical μg	Percent Error %
Field Blank A	2.5	NA[4]	NA
Field Blank B	8.3	NA	NA
Field Blank C	6.4	NA	NA
Field Spike 1	7570	7828	96.7
Field Spike 2	7686	7828	98.2
Method Spike 1	8120	7828	104
Method Spike 2	7838	7828	100
Method Spike 3	7890	7828	101
Method Spike 4	7945	7828	101
Toluene Reagent Blank[1]	0.5	NA	NA
ACN Reagent Blank[2]	0.4	NA	NA
Method Blank[3]	10.2	NA	NA

[1]Average of four, ranging from 0.1 to 1.2 μg
[2]Average of four, ranging from 0.1 to 0.8 μg
[3]Average of three, ranging from 0.3 to 20.7 μg
[4]NA, Not Applicable

were met as shown in Table 5-5. Field blanks were collected by assembling a sampling train as if to collect a sample, transporting to the sampling location, leak checking and returning the train to the onsite laboratory for recovery. Field spikes and method spikes were prepared by spiking approximately 300 mL of the toluene 1,2-PP solution with 15 mL of the field spiking solution. Method and reagent blanks were prepared by evaporating approximately 300 mL of solvent to dryness and dissolving any residue with 10 mL of ACN. All spikes and blanks met the data acceptance criteria listed in Table 5-5.

No blank contamination problems were identified during the analysis of field and laboratory blanks and no blank corrections were performed for the reported data. All blank analysis data are presented along with other QC and field sample results in Appendix A.

APPENDIX A

Analytical Data for Samples, Blanks, Spikes and Quality Control Samples

Sample Name	AREA	AMOUNT ug/mL	QC Con ug/mL	QC Bias %	Dilution Factor	Amount Sample ug	Avg Amt Sample ug	Volume Sampled Cu Ft	Sampling Factor	Adjusted Avg ug	Total Train ug	Amount Spiked ug	Spike Recovery %	Train ID
ISO-SCF-32293-4	1263013	5.90	5.40641	9%										
ISO-SCF-32293-4	1253783	5.86	5.40641	8%										
ISO-SCF-32293-4	1249399	5.84	5.40641	8%										
ARL-1	1277072	5.97			2000	11931.6	11942.9	33.42	1.05669	12196.0	12263.5	7827.81	95.69%	1-A-1
ARL-1	1276918	5.97			2000	11930.1								
ARL-1	1280852	5.98			2000	11966.8								
ARL-2	135291	0.64			100	64.1	63.9	33.42	1.05669	67.5				1-A-2
ARL-2	135913	0.64			100	64.4								
ARL-2	133152	0.63			100	63.1								
ARL-3	1196354	5.59			2000	11178.7	11300.8	33.89	1.04204	11491.1	11520.1	7827.81	86.19%	1-B-1
ARL-3	1214532	5.67			2000	11348.3								
ARL-3	1217429	5.69			2000	11375.3								
ARL-4	59159	0.29			100	28.6	27.8	33.89	1.04204	29.0				1-B-2
ARL-4	57134	0.28			100	27.7								
ARL-4	56201	0.27			100	27.2								
ISO-SCF-32293-4	1255771	5.87	5.40641	9%										
ISO-SCF-32293-4	1251918	5.85	5.40641	8%										
ISO-SCF-32293-4	1242330	5.80	5.40641	7%										
ARL-5	471546	2.21			2000	4418.4	4409.3	33.02	1.06949	4715.7	4735.0			1-C-1
ARL-5	470785	2.21			2000	4411.3								
ARL-5	469380	2.20			2000	4398.2								
ARL-6	35898	0.18			100	17.8	18.1	33.02	1.06949	19.3				1-C-2
ARL-6	37029	0.18			100	18.3								
ARL-6	36906	0.18			100	18.2								
ARL-7	469526	2.20			2000	4399.5	4416.1	33.04	1.06885	4720.1	4811.1			1-D-1
ARL-7	461467	2.16			2000	4324.4								
ARL-7	482909	2.26			2000	4524.4								
ARL-8	180144	0.85			100	85.0	85.1	33.04	1.06885	90.9				1-D-2
ARL-8	179633	0.85			100	84.8								
ARL-8	181047	0.85			100	85.4								
ISO-SCF-32293-4	1238919	5.79	5.40641	7%										
ISO-SCF-32293-4	1245039	5.82	5.40641	8%										
ISO-SCF-32293-4	1235673	5.77	5.40641	7%										

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Sample Name	AREA	AMOUNT ug/mL	QC Con ug/mL	QC Bias %	Dilution Factor	Amount Sample ug	Avg Amt Sample ug	Volume Sampled Cu Ft	Sampling Factor	Adjusted Avg ug	Total Train ug	Amount Spiked ug	Spike Recovery %	Train ID
														2-A-1
ARL-9	544346	2.55			2000	5097.4	5114.2	29.07	1.21481	6212.9	6287.4			
ARL-9	548157	2.57			2000	5132.9								
ARL-9	545954	2.56			2000	5112.4								2-A-2
ARL-10	130306	0.62			100	61.8	61.4	29.07	1.21481	74.6				
ARL-10	130940	0.62			100	62.1								
ARL-10	127140	0.60			100	60.3								2-B-1
ARL-11	567669	2.66			2000	5314.9	5224.4	29.65	1.19105	6222.5	6269.9			
ARL-11	563460	2.64			2000	5275.7								
ARL-11	542754	2.54			2000	5082.6								2-B-2
ARL-12	83414	0.40			100	39.9	39.8	29.65	1.19105	47.4				
ARL-12	83620	0.40			100	40.0								
ARL-12	82237	0.39			100	39.4								
ISO-SCF-32293-4	1220899	5.70	5.40641	6%	1	5.7								
ISO-SCF-32293-4	1232005	5.76	5.40641	6%	1	5.8								
ISO-SCF-32293-4	1230936	5.75	5.40641	6%	1	5.8								2-C-1
ARL-13	1287864	6.02			2000	12032.2	12045.3	28.67	1.23176	13215.1	13258.2	7827.81	89.16%	
ARL-13	1288870	6.02			2000	12041.6								
ARL-13	1291043	6.03			2000	12061.9								2-C-2
ARL-14	71522	0.34			100	34.4	35.0	28.67	1.23176	43.1				
ARL-14	73423	0.35			100	35.3								
ARL-14	73513	0.35			100	35.3								
ARL-15	1335291	6.24			2000	12474.6	12454.1	28.40	1.24347	13671.5	13732.6	7827.81	95.22%	2-D-1
ARL-15	1334709	6.23			2000	12469.2								
ARL-15	1329284	6.21			2000	12418.6								2-D-2
ARL-16	103190	0.49			100	49.1	49.1	28.40	1.24347	61.1				
ARL-16	103848	0.49			100	49.4								
ARL-16	102349	0.49			100	48.7								
ISO-SCF-32293-4	1246426	5.82	5.40641	8%	1	5.8								
ISO-SCF-32293-4	1237852	5.78	5.40641	7%	1	5.8								
ISO-SCF-32293-4	1239959	5.79	5.40641	7%	1	5.8								

Sample Name	AREA	AMOUNT ug/mL	QC Con ng/mL	QC Bias %	Dilution Factor	Amount Sample ug	Avg Amt Sample ug	Volume Sampled Cu Ft	Sampling Factor	Adjusted Avg ug	Total Train ug	Amount Spiked ug	Spike Recovery %	Train ID
ARL-17	1229990	5.75			2000	11492.4	11487.9	34.24	1.03139	11587.8	11624.8	7827.81	106.14%	3-A-1
ARL-17	1214060	5.67			2000	11343.9								
ARL-17	1244450	5.81			2000	11627.3								
ARL-18	75825	0.36			100	36.4	35.9	34.24	1.03139	37.0				3-A-2
ARL-18	74917	0.36			100	36.0								
ARL-18	73672	0.35			100	35.4								
ARL-19	1282836	5.99			2000	11985.3	12024.4	35.15	1.00468	12039.7	12077.7	7827.81	111.93%	3-B-1
ARL-19	1289518	6.02			2000	12047.7								
ARL-19	1288725	6.02			2000	12040.3								
ARL-20	79007	0.38			100	37.9	37.8	35.15	1.00468	38.0				3-B-2
ARL-20	78713	0.38			100	37.7								
ARL-20	79021	0.38			100	37.9								
ISO-SCF-32293-4	1263449	5.90	5.40641	9%	1	5.9								
ISO-SCF-32293-4	1253499	5.86	5.40641	8%	1	5.9								
ISO-SCF-32293-4	1260480	5.89	5.40641	9%	1	5.9								
ARL-21	351376	1.65			2000	3297.6	3281.0	33.75	1.04636	3433.1	3466.4			3-C-1
ARL-21	343323	1.61			2000	3222.4								
ARL-21	354099	1.66			2000	3323.0								
ARL-22	65492	0.32			100	31.6	31.8	33.75	1.04636	33.3				3-C-2
ARL-22	66002	0.32			100	31.8								
ARL-22	66603	0.32			100	32.1								
ARL-23	319713	1.50			2000	3002.2	2927.6	33.01	1.06982	3132.0	3165.7			3-D-1
ARL-23	310818	1.46			2000	2919.3								
ARL-23	304609	1.43			2000	2861.4								
ARL-24	65115	0.31			100	31.4	31.5	33.01	1.06982	33.7				3-D-2
ARL-24	66054	0.32			100	31.8								
ARL-24	64767	0.31			100	31.2								
ISO-SCF-32293-4	1223529	5.72	5.40641	6%	1	5.7								
ISO-SCF-32293-4	1220297	5.70	5.40641	5%	1	5.7								
ISO-SCF-32293-4	1183133	5.70	5.40641	5%										

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Sample Name	AREA	AMOUNT ug/mL	QC Con ug/mL	QC Bias %	Dilution Factor	Amount Sample ug	Avg Amt Sample ug	Volume Sampled Cu Ft	Sampling Factor	Adjusted Avg ug	Total Train ug	Amount Spiked ug	Spike Recovery %	Train ID
														4-A-1
ARL-25	198810	0.94			2000	1874.6	1831.7	30.60	1.15407	2113.9	2132.1			
ARL-25	195931	0.92			2000	1847.7								
ARL-25	187688	0.89			2000	1772.7								
ARL-26	33336	0.17			100	16.6	15.8	30.60	1.15407	18.3				4-A-2
ARL-26	32875	0.16			100	16.3								
ARL-26	29079	0.15			100	14.6								
ARL-27	200805	0.95			2000	1893.2	1864.2	31.17	1.13297	2112.1	2138.7			4-B-1
ARL-27	200538	0.95			2000	1890.7								
ARL-27	191767	0.90			2000	1808.9								
ARL-28	48281	0.24			100	23.5	23.5	31.17	1.13297	26.6				4-B-2
ARL-28	49506	0.24			100	24.1								
ARL-28	46705	0.23			100	22.8								
ISO-SCF-32293-4	1202635	5.62	5.40641	4%	1	5.6								
ISO-SCF-32293-4	1219147	5.70	5.40641	5%	1	5.7								
ARL-29	1001159	4.68			2000	9358.1	9329.4	30.35	1.16358	9626.4	9693.9	7827.81	96.56%	4-C-1
ARL-29	987039	4.61			2000	9226.4								
ARL-29	1006035	4.70			2000	9403.6								
ARL-30	124507	0.59			100	59.1	58.0	30.35	1.16358	67.5				4-C-2
ARL-30	122754	0.58			100	58.3								
ARL-30	119182	0.57			100	56.6								
ARL-31	1004933	4.70			2000	9393.3	9428.7	29.54	1.19549	9774.2	9804.7	7827.81	97.97%	4-D-1
ARL-31	1018359	4.76			2000	9518.5								
ARL-31	1002870	4.69			2000	9374.1								
ARL-32	53598	0.26			100	26.0	25.5	29.54	1.19549	30.5				4-D-2
ARL-32	53113	0.26			100	25.8								
ARL-32	50832	0.25			100	24.7								
ISO-SCF-32293-4	1200453	5.61	5.40641	4%	1	5.6								
ISO-SCF-32293-4	1204115	5.63	5.40641	4%	1	5.6								
ISO-SCF-32293-4	1189454	5.56	5.40641	3%	1	5.6								

Sample Name	AREA	AMOUNT ug/mL	QC Con ug/mL	QC Bias %	Dilution Factor	Amount Sample ug	Avg Amt Sample ug	Volume Sampled Cu Ft	Sampling Factor	Adjusted Avg ug	Total Train ug	Amount Spiked ug	Spike Recovery %	Train ID
ARL-33	1309769	6.12			2000	12236.5	12014.2	34.14	1.03441	12187.3	12233.3	7827.81	89.41%	5-A-1
ARL-33	1323802	6.18			2000	12367.4								
ARL-33	1224229	5.72			2000	11438.7								
ARL-34	103486	0.49			100	49.3	44.5	34.14	1.03441	46.1				5-D-1
ARL-34	103836	0.49			100	49.4								
ARL-34	72585	0.35			100	34.9								
ARL-35	1369996	6.40			2000	12798.3	12588.1	34.70	1.01771	12678.6	12716.7	7827.81	95.59%	5-D-1
ARL-35	1382908	6.46			2000	12918.7								
ARL-35	1289467	6.02			2000	12047.2								
ARL-36	84360	0.40			100	40.4	37.4	34.70	1.01771	38.0				5-D-2
ARL-36	85164	0.41			100	40.7								
ARL-36	64462	0.31			100	31.1								
ISO-SCF-32293-4	1198549	5.60	5.40641	4%	1	5.6								
ISO-SCF-32293-4	1178529	5.51	5.40641	2%	1	5.5								
ARL-37	511915	2.40			2000	4794.9	4809.8	34.46	1.02480	4929.1	4946.9			5-C-1
ARL-37	520667	2.44			2000	4876.5								
ARL-37	507945	2.38			2000	4757.9								
ARL-38	36452	0.18			100	18.0	17.4	34.46	1.02480	17.8				5-C-2
ARL-38	36462	0.18			100	18.0								
ARL-38	32321	0.16			100	16.1								
ARL-39	532851	2.50			2000	4990.2	5054.0	32.59	1.08360	5476.5	5521.9			5-D-1
ARL-39	544154	2.55			2000	5095.6								
ARL-39	542066	2.54			2000	5076.1								
ARL-40	90692	0.43			100	43.3	41.9	32.59	1.08360	45.4				5-D-2
ARL-40	82975	0.40			100	39.7								
ARL-40	89246	0.43			100	42.6								
ISO-SCF-32293-4	1187611	5.55	5.40641	3%	1	5.5								
ISO-SCF-32293-4	1190464	5.60	5.40641	4%	1	5.6								
ISO-SCF-32293-4	1183133	5.53	5.40641	2%	1	5.5								

Sample Name	AREA	AMOUNT ug/mL	QC Con ug/mL	QC Bias %	Dilution Factor	Amount Sample ug	Avg Amt Sample ug	Volume Sampled Cu Ft	Sampling Factor	Adjusted Avg ug	Total Train ug	Amount Spiked ug	Spike Recovery %	Train ID
ARL-41	861252	4.03			2000	8053.2	7887.9	35.10	1.00612	7936.1	8041.6			6-A-1
ARL-41	860232	4.02			2000	8043.7								
ARL-41	809094	3.78			2000	7566.7								
ARL-42	227095	1.07			100	106.9	104.8	35.10	1.00612	105.4				6-A-2
ARL-42	228142	1.07			100	107.4								
ARL-42	212430	1.00			100	100.1								
ARL-43	815730	3.81			2000	7628.6	7488.0	35.17	1.00411	7518.8	7607.6			6-B-1
ARL-43	825689	3.86			2000	7721.5								
ARL-43	760533	3.56			2000	7113.8								
ARL-44	193894	0.91			100	91.4	88.5	35.17	1.00411	88.8				6-B-2
ARL-44	197908	0.93			100	93.1								
ARL-44	170746	0.81			100	80.6								
ISO-SCF-32293-4	1189088	5.56	5.40641	3%	1	5.6								
ISO-SCF-32293-4	1190921	5.56	5.40641	3%	1	5.6								
ARL-45	1656820	7.74			2000	15473.5	15201.1	34.49	1.02391	15381.5	15471.2	7827.81	97.69%	6-C-1
ARL-45	1652121	7.71			2000	15429.7								
ARL-45	1573883	7.35			2000	14700.0								
ARL-46	187832	0.89			100	88.6	87.6	34.49	1.02391	89.7				6-C-2
ARL-46	195647	0.92			100	92.3								
ARL-46	173379	0.82			100	81.9								
ARL-47	1649873	7.70			2000	15408.7	15173.2	33.78	1.04543	15509.0	15609.8	7827.81	99.46%	6-D-1
ARL-47	1634325	7.63			2000	15263.7								
ARL-47	1589678	7.42			2000	14847.3								
ARL-48	220417	1.04			100	103.8	96.3	33.78	1.04543	100.7				6-D-2
ARL-48	206802	0.97			100	97.5								
ARL-48	186023	0.88			100	87.8								
ISO-SCF-32293-4	1205054	5.63	5.40641	4%	1	5.6								
ISO-SCF-32293-4	1195876	5.59	5.40641	3%	1	5.6								
ISO-SCF-32293-4	1183684	5.53	5.40641	2%	1	5.5								

Sample Name	AREA	AMOUNT ug/mL	QC Con ug/mL	QC Bias %	Dilution Factor	Amount Sample ug	Avg Amt Sample ug	Volume Sampled Cu Ft	Sampling Factor	Adjusted Avg ug	Total Train ug	Amount Spiked ug	Spike Recovery %	Train ID
ARL-49	1081312	5.05			2000	10105.7	10094.4	31.11	1.13515	10398.3	10450.0	7827.81	100.45%	7-A-1
ARL-49	1074952	5.02			2000	10046.4								
ARL-49	1084020	5.07			2000	10131.0								
ARL-50	98427	0.47			100	46.9	45.6	31.11	1.13515	51.8				7-A-2
ARL-50	96270	0.46			100	45.9								
ARL-50	92145	0.44			100	44.0								
ARL-51	963252	4.50			2000	9004.6	9002.6	31.94	1.10566	9246.5	9290.2	7827.81	85.63%	7-B-1
ARL-51	970463	4.54			2000	9071.8								
ARL-51	955412	4.47			2000	8931.4								
ARL-52	83965	0.40			100	40.2	39.5	31.94	1.10566	43.6				7-B-2
ARL-52	83998	0.40			100	40.2								
ARL-52	79455	0.38			100	38.1								
ISO-SCF-32293-4	1194001	5.58	5.40641	3%	1	5.6								
ISO-SCF-32293-4	1201282	5.61	5.40641	4%	1	5.6								
ARL-53	230346	1.08			2000	2168.7	2159.8	30.14	1.17169	2530.6	2557.9			7-C-1
ARL-53	232911	1.10			2000	2192.6								
ARL-53	224911	1.06			2000	2118.0								
ARL-54	49290	0.24			100	24.0	23.3	30.14	1.17169	27.3				7-C-2
ARL-54	49749	0.24			100	24.2								
ARL-54	44499	0.22			100	21.8								
ARL-55	237247	1.12			2000	2233.1	2180.2	29.91	1.18070	2574.2	2616.4			7-D-1
ARL-55	228829	1.08			2000	2154.5								
ARL-55	228660	1.08			2000	2153.0								
ARL-56	75486	0.36			100	36.2	35.8	29.91	1.18070	42.3				7-D-2
ARL-56	75034	0.36			100	36.0								
ARL-56	73273	0.35			100	35.2								
ISO-SCF-32293-4	1201622	5.61	5.40641	4%	1	5.6								
ISO-SCF-32293-4	1192039	5.57	5.40641	3%	1	5.6								
ISO-SCF-32293-4	1184261	5.53	5.40641	2%	1	5.5								

Sample Name	AREA	AMOUNT ug/mL	QC Con ug/mL	QC Bias %	Dilution Factor	Amount Sample ug	Avg Amt Sample ug	Volume Sampled Cu Ft	Sampling Factor	Adjusted Avg ug	Total Train ug	Amount Spiked ug	Spike Recovery %	Train ID
														8-A-1
ARL-57	374801	1.76			2000	3516.0	3520.7	30.89	1.14324	4025.0	4086.0			
ARL-57	377410	1.77			2000	3540.4								
ARL-57	373681	1.75			2000	3505.6								
ARL-58	111353	0.53			100	52.9	53.4	30.89	1.14324	61.0				8-A-2
ARL-58	112493	0.53			100	53.5								
ARL-58	113066	0.54			100	53.7								
ARL-59	406883	1.91			2000	3815.3	3805.4	29.73	1.18785	4520.2	4579.2			8-B-1
ARL-59	401924	1.88			2000	3769.0								
ARL-59	408657	1.92			2000	3831.8								
ARL-60	105005	0.50			100	50.0	49.7	29.73	1.18785	59.0				8-B-2
ARL-60	104950	0.50			100	50.0								
ARL-60	102971	0.49			100	49.0								
ISO-SCF-32293-4	1107542	5.59	5.40641	3%	1	5.6								
ISO-SCF-32293-4	1200068	5.61	5.40641	4%	1	5.6								
ISO-SCF-32293-4	1190471	5.56	5.40641	3%	1	5.6								
ARL-61	1137017	5.31			2000	10625.3	10561.2	30.49	1.15824	11144.9	11197.4	7827.81	88.46%	8-C-1
ARL-61	1120589	5.24			2000	10471.9								
ARL-61	1132853	5.29			2000	10586.4								
ARL-62	94647	0.45			100	45.2	45.3	30.49	1.15824	52.5				8-C-2
ARL-62	95991	0.46			100	45.8								
ARL-62	94335	0.45			100	45.0								
ARL-63	1108755	5.18			2000	10361.7	10314.5	31.95	1.10531	10721.6	10770.2	7827.81	83.01%	8-D-1
ARL-63	1096270	5.12			2000	10245.2								
ARL-63	1106072	5.17			2000	10336.7								
ARL-64	92259	0.44			100	44.0	44.0	31.95	1.10531	48.6				8-D-2
ARL-64	92558	0.44			100	44.2								
ARL-64	91667	0.44			100	43.8								
ISO-SCF-32293-4	1186551	5.54	5.40641	3%	1	5.5								
ISO-SCF-32293-4	1187157	5.55	5.40641	3%	1	5.5								
ISO-SCF-32293-4	1196473	5.59	5.40641	3%	1	5.6								

Sample Name	FILE	AREA	AMOUNT ug/mL	QC Con ug/mL	QC Bias %	Dilution Factor	Amount Sample	Avg Amt Sample	Amount Spiked	Spike Recovery	Train ID
ISO-SCF-32293-4	S3083F4	1263013	5.90	5.41	9%	1	5.9	5.9			QC
ISO-SCF-32293-4	S3083F5	1253783	5.86	5.41	8%	1	5.9				
ISO-SCF-32293-4	S3083F6	1249399	5.84	5.41	8%	1	5.8				
ARL-81	S3083F19	30452	0.15			10	1.5	1.6			FBA
ARL-81	S3083F20	31446	0.16			10	1.6				
ARL-81	S3083F21	33523	0.17			10	1.7				
ARL-104	S3083F22	809699	3.79			2000	7572.4	7569.9	7827.81	97%	FS-1
ARL-104	S3083F23	808659	3.78			2000	7562.7				
ARL-104	S3083F24	809952	3.79			2000	7574.7				
ISO-SCF-32293-4	S3083F25	1255771	5.87	5.41	9%	1	5.9	5.8			QC
ISO-SCF-32293-4	S3083F26	1251918	5.85	5.41	8%	1	5.8				
ISO-SCF-32293-4	S3083F27	1242330	5.80	5.41	7%	1	5.8				
ARL-82	S3083F40	16055	0.08			10	0.8	0.9			FBA
ARL-82	S3083F41	16597	0.09			10	0.9				
ARL-82	S3083F42	16113	0.09			10	0.9				
ARL-105	S3083F43	832058	3.89			2000	7780.9	7686.3	7827.81	98%	FS-2
ARL-105	S3083F44	822507	3.85			2000	7691.8				
ARL-105	S3083F45	811167	3.79			2000	7586.1				
ISO-SCF-32293-4	S3083F46	1238919	5.79	5.41	7%	1	5.8	5.8			QC
ISO-SCF-32293-4	S3083F47	1245039	5.82	5.41	8%	1	5.8				
ISO-SCF-32293-4	S3083F48	1235673	5.77	5.41	7%	1	5.8				
ARL-83	S3084F13	163746	0.77			10	7.7	7.7			FBB
ARL-83	S3084F14	162706	0.77			10	7.7				
ARL-83	S3084F15	164806	0.78			10	7.8				
ARL-106	S3084F16	869707	4.07			2000	8132.1	8120.1	7827.81	104%	MS-1
ARL-106	S3084F17	867360	4.06			2000	8110.2				
ARL-106	S3084F18	868206	4.06			2000	8118.1				
ISO-SCF-32293-4	S3084F19	1220899	5.70	5.41	6%	1	5.7	5.7			QC
ISO-SCF-32293-4	S3084F20	1232005	5.76	5.41	6%	1	5.8				
ISO-SCF-32293-4	S3084F21	1230936	5.75	5.41	6%	1	5.8				
ARL-84	S3084F34	33054	0.16			10	1.6	1.6			FBB
ARL-84	S3084F35	32381	0.16			10	1.6				
ARL-84	S3084F36	32300	0.16			10	1.6				

Sample Name	FILE	AREA	AMOUNT ug/mL	QC Con ug/mL	QC Bias %	Dilution Factor	Amount Sample	Avg Amt Sample	Amount Spiked	Spike Recovery	Train ID
ARL-107	S3084F37	829745	3.88			2000	7759.3	7837.5	7827.81	100%	MS-2
ARL-107	S3084F38	838117	3.92			2000	7837.4				
ARL-107	S3084F39	846508	3.96			2000	7915.7				
ISO-SCF-32293-4	S3084F40	1246426	5.82	5.41	8%	1	5.8	5.8			QC
ISO-SCF-32293-4	S3084F41	1237852	5.78	5.41	7%	1	5.8				
ISO-SCF-32293-4	S3084F42	1239959	5.79	5.41	7%	1	5.8				
ARL-85	S3085F19	75475	0.36			10	3.6	3.6			FBC
ARL-85	S3085F20	75608	0.36			10	3.6				
ARL-85	S3085F21	72681	0.35			10	3.5				
ARL-108	S3085F22	847084	3.96			2000	7921.1	7890.2	7827.81	101%	MS-3
ARL-108	S3085F23	836897	3.91			2000	7826.0				
ARL-108	S3085F24	847337	3.96			2000	7923.4				
ISO-SCF-32293-4	S3085F25	1263449	5.90	5.41	9%	1	5.9	5.9			QC
ISO-SCF-32293-4	S3085F26	1253499	5.86	5.41	8%	1	5.9				
ISO-SCF-32293-4	S3085F27	1260480	5.89	5.41	9%	1	5.9				
ARL-86	S3085F40	59577	0.29			10	2.9	2.8			FBC
ARL-86	S3085F41	56343	0.27			10	2.7				
ARL-86	S3085F42	59626	0.29			10	2.9				
ARL-109	S3085F43	851309	3.98			2000	7960.5	7944.8	7827.81	101%	MS-4
ARL-109	S3085F44	850793	3.98			2000	7955.6				
ARL-109	S3085F45	846800	3.96			2000	7918.4				
ISO-SCF-32293-4	S3085F46	1245663	5.82	5.41	8%	1	5.8	4.0			QC
ISO-SCF-32293-4	S3085F47	0	0.01	5.41	-100%	1	0.0				
ISO-SCF-32293-4	S3085F48	1296988	6.06	5.41	12%	1	6.1				
ISO-SCF-32293-4	S3098F1	1158548	5.41	5.41	0%	1	5.4				
ARL-89	S3098F2	0	0.01			10	0.1	0.1			T-RB1
ARL-89	S3098F3	0	0.01			10	0.1				
ARL-89	S3098F4	0	0.01			10	0.1				
ARL-90	S3098F5	0	0.01			10	0.1	0.3			T-RB2
ARL-90	S3098F6	5758.5	0.04			10	0.4				
ARL-90	S3098F7	5867.5	0.04			10	0.4				
ARL-91	S3098F8	0	0.01			10	0.1	0.2			T-RB3
ARL-91	S3098F9	3273	0.03			10	0.3				
ARL-91	S3098F10	0	0.01			10	0.1				

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Sample Name	FILE	AREA	AMOUNT ug/mL	QC Con ug/mL	QC Bias %	Dilution Factor	Amount Sample	Avg Amt Sample	Amount Spiked	Spike Recovery	Train ID
ARL-92	S3098F11	26248	0.13			10	1.3	1.2			T-RB4
ARL-92	S3098F12	22909.08	0.12			10	1.2				
ARL-92	S3098F13	22154	0.11			10	1.1				
ISO-SCF-32293-4	S3098F14	1202486	5.62	5.41	4%	1	5.6	5.7			QC
ISO-SCF-32293-4	S3098F15	1212015	5.66	5.41	5%	1	5.7				
ISO-SCF-32293-4	S3098F16	1220989	5.70	5.41	6%	1	5.7				
ARL-94	S3098F17	0	0.01			10	0.1	0.2			A-RB1
ARL-94	S3098F18	5431	0.04			10	0.4				
ARL-94	S3098F19	0	0.01			10	0.1				
ARL-95	S3098F20	0	0.01			10	0.1	0.1			A-RB2
ARL-95	S3098F21	0	0.01			10	0.1				
ARL-95	S3098F22	0	0.01			10	0.1				
ARL-96	S3098F23	6352.5	0.04			10	0.4	0.4			A-RB3
ARL-96	S3098F24	6436	0.04			10	0.4				
ARL-96	S3098F25	5886	0.04			10	0.4				
ARL-97	S3098F26	25806	0.13			10	1.3	0.8			A-RB4
ARL-97	S3098F27	21934	0.11			10	1.1				
ARL-97	S3098F28	0	0.01			10	0.1				
ISO-SCF-32293-4	S3098F29	1164624	5.44	5.41	1%	1	5.4	5.4			QC
ISO-SCF-32293-4	S3098F30	1159319	5.42	5.41	0%	1	5.4				
ISO-SCF-32293-4	S3098F31	1149310	5.37	5.41	-1%	1	5.4				
ARL-99	S3098F32	0	0.01			10	0.1	0.1			ABS-RB
ARL-99	S3098F33	0	0.01			10	0.1				
ARL-99	S3098F34	0	0.01			10	0.1				
ARL-100	S3098F35	0	0.01			10	0.1	0.1			ABS-RB
ARL-100	S3098F36	0	0.01			10	0.1				
ARL-100	S3098F37	0	0.01			10	0.1				
ARL-101	S3098F38	15010.13	0.08			10	0.8	0.9			ABS-RB
ARL-101	S3098F39	15823	0.08			10	0.8				
ARL-101	S3098F40	23127	0.12			10	1.2				
ARL-102	S3098F41	0	0.01			10	0.1	0.1			ABS-RB
ARL-102	S3098F42	0	0.01			10	0.1				
ARL-102	S3098F43	0	0.01			10	0.1				

Sample Name	FILE	AREA	AMOUNT ug/mL	QC Con ug/mL	QC Bias %	Dilution Factor	Amount Sample	Avg Amt Sample	Amount Spiked	Spike Recovery	Train ID
ISO-SCF-32293-4	S3098F44	1187727	5.55	5.41	3%	1	5.5	5.6			QC
ISO-SCF-32293-4	S3098F45	1199251	5.60	5.41	4%	1	5.6				
ISO-SCF-32293-4	S3098F46	1206006	5.63	5.41	4%	1	5.6				
ARL-117	S3098F47	4701	0.03			10	0.3	0.3			MB-1
ARL-117	S3098F48	4680.5	0.03			10	0.3				
ARL-117	S3098F49	5001	0.03			10	0.3				
ARL-118	S3098F50	204900	0.96			10	9.6	9.7			MB-2
ARL-118	S3098F51	207157	0.98			10	9.8				
ARL-118	S3098F52	207481	0.98			10	9.8				
ARL-119	S3098F53	446217.5	2.09			10	20.9	20.7			MB-3
ARL-119	S3098F54	427833.1	2.01			10	20.1				
ARL-119	S3098F55	452112	2.12			10	21.2				
ISO-SCF-4893-1	S3098F56	1164164	5.44	5.41	1%	1	5.4	5.5			QC
ISO-SCF-4893-1	S3098F57	1176245	5.50	5.41	2%	1	5.5				
ISO-SCF-4893-3	S3098F58	1160212	5.42	5.41	0%	1	5.4				

2,4-TDI Summary Information

Amount of 2,4-TDI Spiked into the trains: 7827.81 ug

Percent Recovery for Spiked Quad Trains

Quad No.	1		2		3		4		5		6		7		8			
Train ID	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	Average	RSD
% Recovery	95.69%	86.19%	89.16%	95.22%	106.14%	111.93%	96.56%	97.97%	89.41%	95.59%	97.69%	99.46%	100.45%	85.63%	88.46%	83.01%	95%	8%
Total ug	12263	11520	13258	13733	11625	12078	9694	9805	12233	12717	15471	15610	10450	9290	11197	10770	11962	16%

Amount Collected in Unspiked Quad Trains

Quad No.	1		2		3		4		5		6		7		8			
Train ID	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	Average	RSD
Total ug	4735	4611	6287	6270	3466	3166	2132	2139	4947	5522	8042	7608	2558	2616	4086	4579	4560	41%

Percent Carry over from 1st Impinger in Spiked Quad Trains

Quad No.	1		2		3		4		5		6		7		8			
Train ID	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	Average	RSD
1st Impinger	98.48%	99.21%	99.21%	98.97%	99.02%	99.11%	96.38%	98.46%	98.95%	99.22%	98.83%	98.71%	98.03%	97.02%	98.44%	98.35%	98.52%	0.81%
2nd Impinger	1.52%	0.79%	0.79%	1.03%	0.98%	0.89%	3.62%	1.54%	1.05%	0.78%	1.17%	1.29%	1.97%	2.98%	1.56%	1.65%	1.48%	54.36%

Percent Carry over from 1st Impinger in Unspiked Quad Trains

Quad No.	1		2		3		4		5		6		7		8			
Train ID	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	Average	RSD
1st Impinger	99.59%	98.11%	98.81%	99.24%	99.04%	98.94%	99.14%	98.76%	99.64%	99.18%	98.69%	98.83%	98.93%	98.38%	98.51%	98.71%	98.91%	0.41%
2nd Impinger	0.41%	1.89%	1.19%	0.76%	0.96%	1.06%	0.86%	1.24%	0.36%	0.82%	1.31%	1.17%	1.07%	1.62%	1.49%	1.29%	1.09%	37.05%

AREAL WA 55 -- Method 301 Results

Using Modified Data

Run	Train				Amount	Precision of UNSpiked Samples			
#	A	B	C	D	Spiked	Diff	STDu	STDm	RSD
1	12263.0	11520.0	4735.0	4811.0	7827.81	-76.00	216.596	30.942	4.721
2	6287.0	6270.0	13258.0	13733.0	7827.81	17.00			
3	11625.0	12078.0	3466.0	3166.0	7827.81	300.00			
4	2132.0	2139.0	9694.0	9805.0	7827.81	-7.00			
5	12233.0	12717.0	4947.0	5522.0	7827.81	-575.00			
6	8084.0	7608.0	15471.0	15610.0	7827.81	476.00			
7	10450.0	9290.0	2557.0	2616.0	7827.81	-59.00			

AREAL WA 55 -- Method 301 Results

Using Modified Data

Run	Train				Amount	Precision of Spiked Samples				Bias				
#	A	B	C	D	Spiked	Diff	SDs	SDm	RSD	Run	Compound	SD	t Test	CF
1	12263.0	11520.0	4735.0	4811.0	7827.81	743.00	430.48	162.71	3.55	-709.31	-295.41	481.90	-1.622	N/A
2	6287.0	6270.0	13258.0	13733.0	7827.81	-475.00				-610.81			^	
3	11625.0	12078.0	3466.0	3166.0	7827.81	-453.00				707.69			|	
4	2132.0	2139.0	9694.0	9805.0	7827.81	-111.00				-213.81			critical Value	
5	12233.0	12717.0	4947.0	5522.0	7827.81	-484.00				-587.31			is 2.160	
6	8084.0	7608.0	15471.0	15610.0	7827.81	-139.00				-133.31				
7	10450.0	9290.0	2557.0	2616.0	7827.81	1160.00				-544.31				

AREAL WA 55 -- Method 301 Results

Using Modified Data

Run	Train				Amount	Precision of UNSpiked Samples			
#	A	B	C	D	Spiked	Diff	STDu	STDm	RSD
1	12263.0	11520.0	4735.0	4811.0	7827.81	-76.00	237.150	29.644	5.205
2	6287.0	6270.0	13258.0	13733.0	7827.81	17.00			
3	11625.0	12078.0	3466.0	3166.0	7827.81	300.00			
4	2132.0	2139.0	9694.0	9805.0	7827.81	-7.00			
5	12233.0	12717.0	4947.0	5522.0	7827.81	-575.00			
6	8084.0	7608.0	15471.0	15610.0	7827.81	476.00			
7	10450.0	9290.0	2557.0	2616.0	7827.81	-59.00			
8	4086.0	4579.0	11197.0	10947.0	7827.81	-493.00			

EAL WA 55 -- Method 301 Results
sing Modified Data

	Train			Amount	Precision of Spiked Samples				Bias				
A	B	C	D	Spiked	Diff	SDs	SDm	RSD	Run	Compound	SD	t Test	CF
12263.0	11520.0	4735.0	4811.0	7827.81	743.00	407.50	144.07	3.40	-709.31	-394.53	471.48	-2.367	1.053
6287.0	6270.0	13258.0	13733.0	7827.81	-475.00				-610.81			>	
11625.0	12078.0	3466.0	3166.0	7827.81	-453.00				707.69			|	
2132.0	2139.0	9694.0	9805.0	7827.81	-111.00				-213.81			critical Value	
12233.0	12717.0	4947.0	5522.0	7827.81	-484.00				-587.31			is 2.131	
8084.0	7608.0	15471.0	15610.0	7827.81	-139.00				-133.31				
10450.0	9290.0	2557.0	2616.0	7827.81	1160.00				-544.31				
4086.0	4579.0	11197.0	10947.0	7827.81	250.00				-1088.31				

EPA
METHOD 0011

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

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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

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

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

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.

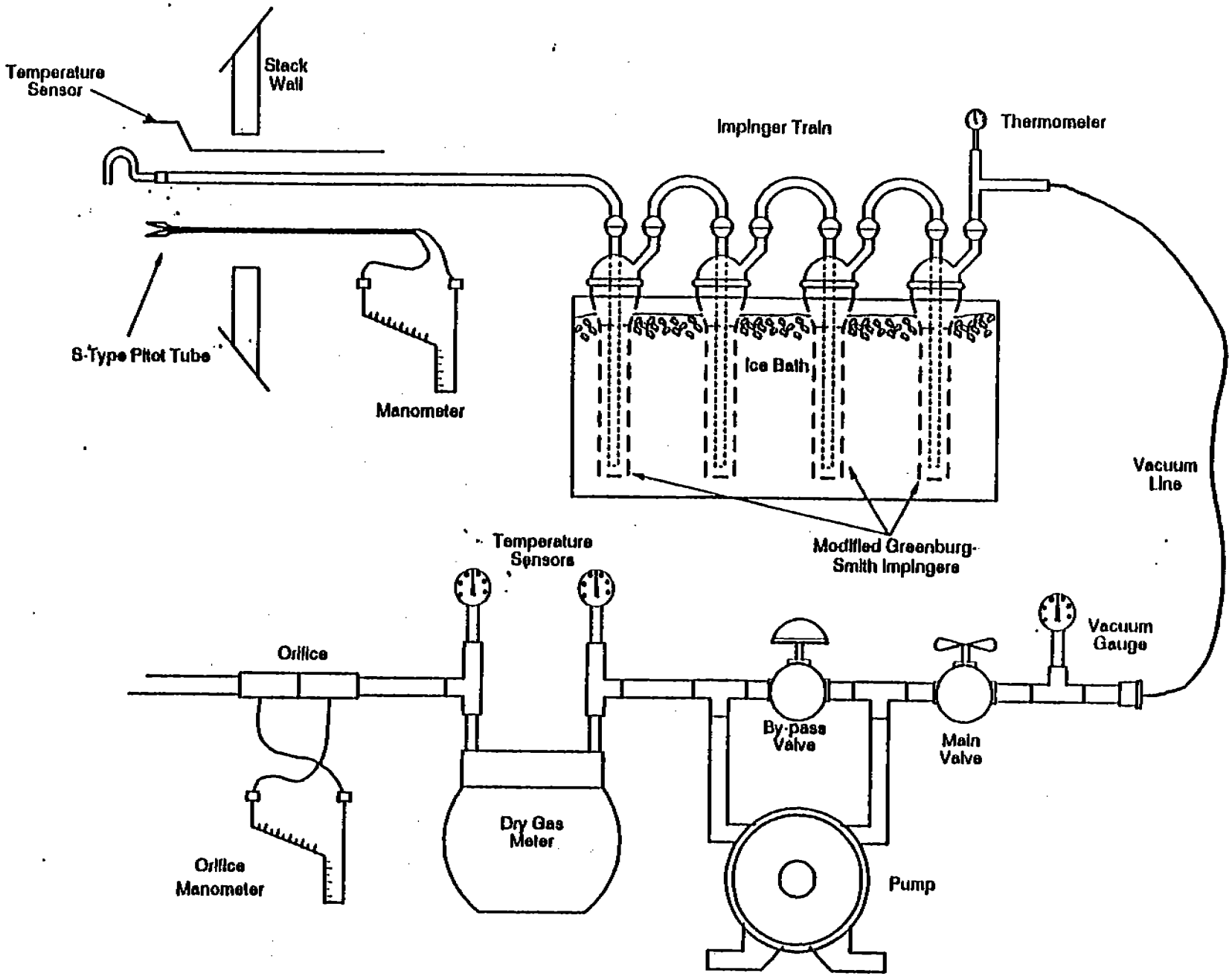
12.0 METHOD PERFORMANCE

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

340345R

Plant _____

Location _____

Operator _____

Date _____

Run No. _____

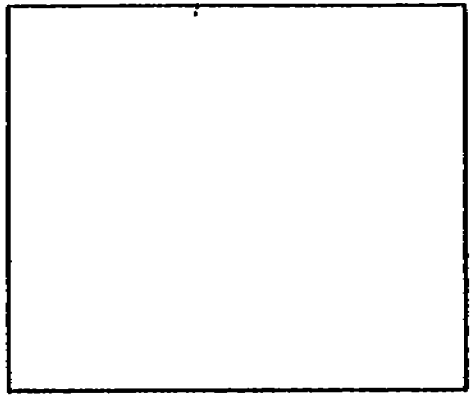
Sample Box No. _____

Meter Box No. _____

Meter H@ _____

C Factor _____

Pilot 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										

3404346R

Figure 2. Field Data Sheet

APPENDIX K

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.

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, %

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

$$\%EA = \frac{100(\%O_2 - 0.5\%\ CO)}{0.264\%\ N_2 - \%O_2 + 0.5\%\ CO}$$

$$M_d = 0.44(\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%N_2 + \%CO)$$

$$M_s = M_d\ (I - B_{ws}) + 0.18\ B_{ws}$$

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

METHOD 5
CALCULATION EQUATIONS

$$V_{m(std)} = 17.65\ V_m\ \gamma\ \left(\frac{P_{bar} + \overline{\Delta H}/13.6}{T_{m(avg)}}\right)$$

$$V_{w(std)} = 0.0472\ V_{lc}$$

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

$$I = 0.0944\ \left(\frac{T_{s(avg)}\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (I - B_{ws})}\right)$$

$$C_s = \frac{15.43\ M_p}{V_{m(std)}}$$

$$C_a = \frac{272.3\ M_p\ P_s}{T_{s(avg)}\ (V_{w(std)} + V_{m(std)})}$$

$$(\dot{m}_p)_1 = 8.5714\ x\ 10^{-3}\ C_s\ Q_{s,\,d}$$

$$(\dot{m}_p)_2 = \frac{1.3228 \times 10^{-1} M_p A}{\theta A_n}$$

$$\dot{m}_p = \frac{(\dot{m}_p)_1 + (\dot{m}_p)_2}{2}$$

CALCULATION EQUATIONS

METHOD 6

$$V_{std} = 17.64 \frac{V_m P_b \gamma}{T_m} \text{ (MIDGET IMPINGER VERSION)}$$

$$V_{std} = \frac{17.64\ V_m\ (P_b + \frac{\overline{\Delta H}}{13.6})\gamma}{T_m} \text{ (LARGE IMPINGER VERSION)}$$

$$MEQ = (V_t - V_{tb})\ N\ (\frac{V_{soln}}{V_a})\ DF$$

$$C_s = \frac{7.06\ x\ 10^{-5}\ MEQ}{V_{std}}$$

$$E = \frac{20.90\ C_s F_d}{20.90 - \overline{B}'_{O_2}} = \frac{F_c C_s}{\overline{B}'_{CO_2}}$$

$$C_s\ (MG/DSCM) = 1.60186\ x\ 10^7\ C_s$$

$$C_s\ (GR/DSCF) = 7000\ C_s$$

$$C_s\ (ppm,\ dry) = 6.02119\ x\ 10^6\ C_s$$

$$C_s\ (ppm,\ wet) = 6.02119\ x\ 10^6\ C_s\ (1 - \frac{MC}{100})$$

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SYMBOLS

$\bar{B}\ O_2$	=	Average oxygen content in flue gas, % v/v, dry
$\bar{B}\ CO_2$	=	Average carbon dioxide content in flue gas, % v/v, dry
C_s	=	Concentration of sulfur dioxide in flue gas, dry basis, corrected to standard conditions, LB/DSCF
C_s (GR/DSCF)	=	Concentration of sulfur dioxide in flue gas, dry basis, corrected to standard conditions, GR/DSCF
C_s (MG/DSCM)	=	Concentration of sulfur dioxide in flue gas, dry basis, corrected to standard conditions, MG/DSCM
DF	=	Dilution Factor
E	=	Emission factor, LB of $SO_2/10^6$BTU
Fd	=	Dry oxygen F-Factor for given fuel type, DSCF/10^6BTU
Fc	=	Carbon dioxide F-Factor for given fuel type, DSCF/10^6BTU
ΔH	=	Average pressure drop across calibrated orifice, IN. W.C.
Υ	=	Dry test meter correction factor, dimensionless
MC	=	Moisture content of flue gas, % v/v
MEQ	=	Total milliequivalents of SO_2 in gas sample
N	=	Normality of barium perchlorate titrant
P_b	=	Barometric pressure at the dry gas meter, IN. HG.
C_s (ppm-dry)	=	Concentration of sulfur dioxide in flue gas, dry basis, (v/v), ppm
C_s (ppm-wet)	=	Concentration of sulfur dioxide in flue gas, wet basis, (v/v), ppm
T_m	=	Absolute average dry gas meter temperature, °R
V_a	=	Volume of sample aliquot titrated, cc
V_m	=	Dry gas volume as measured by the dry gas meter, DCF
V_{std}	=	Dry gas volume as measured by the dry gas meter, corrected to standard conditions (at 68 °F and 1 atmosphere), DSCF

V_{soln} = Total volume of the solution in which the sulfur dioxide sample is contained, cc

V_t = Volume of barium perchlorate titrant used for the sample, cc (average of replicate titrations)

V_{tb} = Volume of barium perchlorate titrant used for the blank, cc

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

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)

METHOD 25A

Total Gaseous Organics Calculation Equation

GR C/SCF = 2.180×10^{-4} (ppm, w)

GR C/DSCF = 2.180×10^{-4} (ppm, w)/(1-MC/100)

LB C/HR = 8.5714×10^{-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)

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

INTERPOLL LABORATORIES, INC

Concentration Calculation Equations for MDI

1. Structure:	2. Molecular weight: 250.26 g/g-mole

3. Mass/volume Concentration:

$$Cug/Nm3 = \frac{35.314\ m}{Vstd}$$

where m = Total mass of MDI in sample in micrograms (ug), and

Vstd = Total volume of exhaust gas or air sampled in dry standard cubic feet (DSCF).

4. Volume/volume Concentration:

$$Cppmv = \left(\frac{24.054\ ul}{250.26\ ug}\right)\left(\frac{1Nm^3}{1000L}\right)\left(\frac{35.314\ m}{Vstd}\right)$$

$$Cppmv = (9.612 \times 10^{-5})Cug/Nm3$$

5. Notes: * see Excel spreadsheet:
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Derived by: Sheri P.	Date: 4-27-95

Form S-511

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Average Gas Concentration

(Eq. 6C - 1)

$$C_{gas} = (\bar{C} - C_o) \frac{CMA}{(C_M - C_o)}$$

$$C_o = \frac{C_{0i} + C_{0F}}{2}$$

where: C_{0i}: Initial zero response
C_{0F}: Final zero response

$$C_M = \frac{C_{si} + C_{SF}}{2}$$

where: C_{si}: Initial span response
C_{SF}: Final span response

C_{MA} = Span tank concentration

$\bar{C}$ = Data logger average

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						Report No. 6-8201	
		LOUISIANA PACIFIC CORPORATION					
		Newberry, Michigan					
PRESS VENTS							
8/29/96							
				MDI CALCULATIONS			
	TIME	**Vstd**	**Mass**	**Flow**	**Conc**	**Conc**	**Mass Rate**
RUN #	(HRS)	(DSCF)	(ug)	DSCFM	(mg/Nm3)	ppm	(LB/HR)
1	0900-1002	44.41	310	202257	0.246	0.0237	0.1867
2	1035-1136	44.93	270	205362	0.212	0.0204	0.1632
3	1210-1311	44.26	57	201740	0.045	0.0044	0.0344
AVG			**212**		**0.168**		**0.1281**

LOUISIANA PACIFIC
Newberry, Michigan

Report No. 6-8201

TEST 2
DRYER RTO OUTLET

Sulfur Dioxide
LB/HR Calculations

RUN		SO2 ppm	Flow	LB/DSCF		LB/HR
1	<	1	36861	1.66E-07	<	0.368
2	<	1	34827	1.66E-07	<	0.347
3	<	1	35163	1.66E-07	<	0.351
AVG	<	1			<	0.355

Oxides of Nitrogen
LB/HR Calculations

RUN	NOx ppm	Flow	LB/DSCF	LB/HR
1	22.3	36861	2.66E-06	5.889
2	26.1	34827	3.12E-06	6.512
3	23.4	35163	2.79E-06	5.894
AVG	23.9			6.098

Carbon Monoxide
LB/HR Calculations

RUN	CO ppm	Flow	LB/DSCF	LB/HR
1	77.8	36861	5.65E-06	12.502
2	53.2	34827	3.87E-06	8.077
3	29.9	35163	2.17E-06	4.584
AVG	53.6			8.388

TEST 2
DRYER PRIMARY CYCLONE EXHAUST

Oxides of Nitrogen
LB/HR Calculations

RUN	NOx ppm	Flow	LB/DSCF	LB/HR
1	38.95	31359	4.65E-06	8.75005
2	19.80	31613	2.36E-06	4.484063
3	25.49	34409	3.04E-06	6.283227
AVG	28.08			6.50578

Carbon Monoxide
LB/HR Calculations

RUN	CO ppm	Flow	LB/DSCF	LB/HR
1	872.93	31359	6.34E-05	119.3406
2	409.42	31613	2.97E-05	56.42628
3	421.86	34409	3.07E-05	63.283
AVG	568.07			79.6833

E-TUBE OUTLET
TEST 2

Oxides of Nitrogen
LB/HR Calculations

RUN	NOx ppm	Flow	LB/DSCF	LB/HR
1	13.23	35023	1.58E-06	3.319358
2	14.05	37164	1.68E-06	3.740586
3	17.66	36184	2.11E-06	4.577708
AVG	14.98			3.879217

Carbon Monoxide
LB/HR Calculations

RUN	CO ppm	Flow	LB/DSCF	LB/HR
1	770.34	35023	5.6E-05	117.6203
2	356.11	37164	2.59E-05	57.697
3	412.34	36184	3E-05	65.04571
AVG	512.93			80.12102

PRESS VENTS
TEST 9

Oxides of Nitrogen
LB/HR Calculations

RUN	NOx ppm	Flow	LB/DSCF	LB/HR
1	0.84	191539	1E-07	1.152597
2	1.61	188269	1.92E-07	2.171429
3	1.41	193848	1.68E-07	1.958039
AVG	1.29			1.760688

Carbon Monoxide
LB/HR Calculations

RUN	CO ppm	Flow	LB/DSCF	LB/HR
1	6.19	191539	4.5E-07	5.168857
2	3.18	188269	2.31E-07	2.610073
3	2.40	193848	1.74E-07	2.028239
AVG	3.92			3.269056

			LP/NEWBERRY				Report No. 6-8201	
			DRYER RTO OUTLET					
			TEST 2					
	NOX		**NOX**			**CO**		**CO**
RUN	**WET**	**MC**	**DRY**		**RUN**	**WET**	**MC**	**DRY**
1	17.2	22.8	22.3		1	60.09	22.8	77.8
2	19.4	25.7	26.1		2	39.5	25.7	53.2
3	17.4	25.5	23.4		3	22.28	25.5	29.9
AVG	18.0		23.9		AVG	40.6		53.6

Report No. 6-8201

LOUISIANA PACIFIC CORPORATION
NEWBERRY, MICHIGAN

Total HydroCarbons Calculations

Dryer Primary Cyclone Exhaust

TEST #	RUN	MC%		CONC (ppmC,w)	GASFLOW (DSCFM)		MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
2	1	24.2		321	31359		24.81			0.0923193
	2	22.8		276	31613		21.12			0.0779378
	3	19.2		280	34409		22.28			0.0755446
								292.33333	22.73793	

E-Tube Outlet

TEST #	RUN	MC%		CONC (ppmC,w)	GASFLOW (DSCFM)		MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
2	1	27.5		245	35023		22.12			0.073669
	2	25.1		148	37164		13.72			0.0430761
	3	26.5		131	36184		12.05			0.0388544
								174.66667	15.96251	

Dryer RTO Outlet

TEST #	RUN	MC%		CONC (ppmC,w)	GASFLOW (DSCFM)		MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
2	1	22.8		5.75	36861		0.51			0.0016237
	2	25.7	<	1	34824	<	0.09			0.0002934
	3	25.5	<	1	35163	<	0.09			0.0002926
								2.5833333	0.229594	

Press Vents

TEST #	RUN	MC%		CONC (ppmC,w)	GASFLOW (DSCFM)		MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
9	1	1.6		1.9	202257		0.73			0.0004209
	2	1.2		10.4	205362		4.04			0.0022947
	3	1.5		3.4	201740		1.30			0.0007525
								5.2333333	2.023409	

APPENDIX L

SAMPLING TRAIN CALIBRATION DATA

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job L.P. Newberry Date 8-27-96

Operator E. J. Module No. 4

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data:

Bar press 29.26 in.Hg θ = .9945 ΔH@ 1.75 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(782.30)		
2.5	784.19	59	55
5.0	786.06	61	57
7.5	787.95	62	57
10	789.81	64	58
	V_m = 7.51	Avg(t_m) = 59.13	°F

Calculate Y_{cr} as follows:

$$Y_{cr} = \frac{1.786}{\theta\, V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cr} = \frac{1.786}{(.9945)(7.51)}\left[\frac{(59.13) + 460}{(29.26)}\right]^{0.5} \quad 4.2)$$

$$Y_{cr} = 1.00$$

If Y_{cr} 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, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job C.P. Newberry Date 8-28-96

Operator EJ Module No. 4

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data:

Bar press 29.31 in.Hg θ = .9945 ΔH@ 1.75 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(110.00)		
2.5	111.90	64	61
5.0	113.80	66	62
7.5	115.72	67	62
10	117.64	69	63
	V_m = 7.64	Avg(t_m) = 64.25	°F

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{\theta\, V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(.9945)\,(7.64)}\left[\frac{(64.25) + 460}{(29.31)}\right]^{0.5} \quad 4.23$$

$$Y_{cn} = .994$$

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, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job LP/NEWBERRY Date 8-27-96

Operator R. ROSENTHAL Module No. 7

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data:

Bar press 29.26 in.Hg θ = .9976 ΔH@ 1.95 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(665.20)		
2.5	667.06	64	58
5.0	668.92	67	59
7.5	670.78	71	60
10	672.72	71	61
	V_m = 7.52	Avg(t_m) = 63.8	°F

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{\theta\, V_m} \left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

7.50
.2381

$$Y_{cn} = \frac{1.786}{(\quad)(\quad)} \left[\frac{(\quad) + 460}{(\quad)}\right]^{0.5}$$

Y_{cn} = 1.007

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, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job LP/WEG Berry Date 8-28-96

Operator R. Rosenthal Module No. 7

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data:

Bar press 29.36 in.Hg θ = 1.95 ΔH@ .9976 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
[redacted]	(847.90)	[redacted]	
2.5	849.82	61	58
5.0	851.68	67	60
7.5	853.55	70	60
10	855.41	72	61
[redacted]	V_m = 7.51	Avg(t_m) = 63.6	°F

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{\theta\, V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

7.492 4.223
.2384

$$Y_{cn} = \frac{1.786}{(\quad)(\quad)}\left[\frac{(\quad) + 460}{(\quad)}\right]^{0.5}$$

Y_{cn} = 1.006

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, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job LP/NEWBERRY Date 8-28-96

Operator R. ROSENTHAL Module No. 9

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data:

Bar press 29.36 in.Hg θ = 1.80 ΔH@ 1.0034 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(212.30)		
2.5	214.17	59	56
5.0	216.05	60	57
7.5	217.92	61	57
10	219.80	64	58
	V_m = 7.50	Avg(t_m) = 59	°F

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{\theta\, V_m} \left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

7.525
.2373

$$Y_{cn} = \frac{1.786}{(\quad)(\quad)} \left[\frac{(\quad) + 460}{(\quad)}\right]^{0.5}$$

$$Y_{cn} = .997$$

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, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job A.P. Lewisberry, MI Date 8-27-96

Operator M. Kowalski Module No. 10

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data:

Bar press 29.26 in.Hg θ = 1.0007 ΔH@ 1.93 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
[redacted]	(494.30)	[redacted]	
2.5	496.22	75	74
5.0	499.05	76	73
7.5	499.90	77	72
10	501.73	79	72
[redacted]	V_m = 7.43	Avg(t_m) =	74.75 °F

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{\theta\, V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(1.0007)(7.43)}\left[\frac{(74.75) + 460}{(29.26)}\right]^{0.5}$$

$$Y_{cn} = 1.027$$

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, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job Louisiana Pacific / Newberry Date 8-26-96

Operator Mark Petersen Module No. 14

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data:

Bar press 29.20 in.Hg θ = .9929 ΔH@ 1.82 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(575.00)		
2.5	576.88	82	73
5.0	578.76	83	73
7.5	580.65	84	73
10	582.53	85	73
	V_m = 7.53	Avg(t_m) = 78.25	°F

Calculate Y_{cm} as follows:

$$Y_{cm} = \frac{1.786}{\theta\, V_m} \left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cm} = \frac{1.786}{(0.9929)\,(7.53)} \left[\frac{(78.25) + 460}{(29.20)}\right]^{0.5}$$

$$Y_{cm} = 1.026$$

If Y_{cm} 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, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: September 3, 1996

Meter Box No. : 4 (Rockwell Dry Test Meter Serial No. 964552)

Date of Last Calibration: August 6, 1996
Calibration Technician: S. Fjelsta
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.)
August 23, 1996	6-8194	648.20	775.56	127.36	127.36
August 27, 1996	6-8201	782.30	1280.64	498.34	625.70

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: September 3, 1996

Meter Box No. : 7 (Rockwell Dry Test Meter Serial No. 964550)

Date of Last Calibration: February 7, 1996
Calibration Technician: S. Kelker
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.)
March 22, 1996	6-7452	719.60	821.88	102.28	102.28
May 02, 1996	6-7648	831.50	942.71	111.21	213.49
June 18, 1996	6-7862	953.10	1584.11	631.01	844.50
August 20, 1996	6-8174	1586.00	1662.73	76.73	921.23
August 27, 1996	6-8201	1665.20	2016.73	351.53	1272.76

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: September 3, 1996

Meter Box No. : 9 (Rockwell Dry Test Meter Serial No. 964549)

Date of Last Calibration: January 15, 1996
Calibration Technician: S. Fjelsta
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.)
August 8, 1996	6-8085	660.50	954.80	294.30	294.30
August 20, 1996	6-8173	959.20	1210.89	251.69	545.99
August 28, 1996	6-8201	1212.30	1219.80	7.50	553.49

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: September 3, 1996

Meter Box No. : 10 (Rockwell Dry Test Meter Serial No. 1334112)

Date of Last Calibration: August 23, 1996
Calibration Technician: D. Van Hoever
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.)
August 27, 1996	6-8201	494.30	981.60	487.30	487.30

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: September 3, 1996

Meter Box No. : 14 (Rockwell Dry Test Meter Serial No. 1334123)

Date of Last Calibration: August 5, 1996
Calibration Technician: S. Fjelsta
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.)
August 8, 1996	6-8085	256.00	559.76	303.76	303.76
August 27, 1996	6-8201	575.00	926.25	351.25	655.01

* Total volume through meter since last calibration.

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

Date 8-6-96
Bar. Press. 28.98 IN.HG
Wet Test Meter No. AL-20

Control Module No. 4
Serial No. DTM 96552
Technician SF

ΔH (IN.WC)		Gas Volume Wet Test Meter	* Cal. Index φ	* Diff. Wet Test Meter ΔP_w	Gas Volume Dry Test Meter (ft^3)		Gas Temperatures			Time θ	Meter Coeff.	Orifice Const.	C_f
							Wet Test t_w (°F)	Dry Test					
Nominal	Actual	(ft^3)	(%)	(IN.WC.)	V_{di}	V_{df}		t_{di} (°F)	t_{do} (°F)	(Min/ Sec)	Y	ΔH@	
0.5	0.5	2	99.85	0.01	636.37	638.40	73	86	80	4/53	1.00090	1.711	
1.2	1.2	3	99.91	0.025	642.57	645.58	73	89	82	4/50	.99612	1.778	
2.0	2.0	3	99.93	0.055	629.20	632.27	73	88	79	3/43	.99059	1.758	
3.3	3.3	5	100.00	0.09	617.00	622.07	73	85	77	4/48	.99246	1.747	
4.7		5	100.02	0.12	623.60	628.68	73	89	79	4/04	.99262	1.775	
	2	3	4	5	6	7	8	9	10	11/12 Avg	.9945	1.75	

Positive leak check performed by SF
Meter was in tolerance [X]
Approved by

Meter was not in tolerance ☐: readjusted linkage
Meter was not in tolerance ☐: changed dry test meter
Date 8/6/96

*Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

Date: 2/7/96
Bar. Press.: 28.61 IN.HG
Wet Test Meter No.: AL-20

Control Module No.: 7
Serial No. DTM: 964550
Technician: Steve Kelker

ΔH (IN.WC)		Gas Volume Wet Test Meter	* Cal. Index	* Diff. Wet Test Meter ΔP_w	Gas Volume Dry Test Meter (ft^3)		Gas Temperatures			Time	Meter Coefl.	Orifice Const.	C_f
							Wet Test	Dry Test					
Nominal	Actual	(ft^3)	(%)	(IN.WC.)	V_{di}	V_{df}	t_w (°F)	t_{di} (°F)	t_{df} (°F)	θ (Min/Sec)	Y	ΔH@	
0.5	0.5	2	99.85	0.01	684.210	686.212	70	74	71	5/03	1.0009	1.869	
1.2	1.2	3	99.91	0.025	680.194	683.208	70	71	70	4/58	.9923	1.933	
2.0	2.0	3	99.93	0.055	676.275	679.281	69.8	75	71	3/54	.9961	1.975	
3.3	3.3	5	100.00	0.09	688.198	693.199	70	80	72	5/03	.9930	1.973	
4.7	4.7	5	100.02	0.12	695.190	700.191	70	86	73	4/17	1.0055	1.989	
		1	3	4	5	6	7	8	9	10	Avg		
											.9976	1.95	

Positive leak check performed by: SK
Meter was in tolerance: ☒
Approved by:

Meter was not in tolerance: ☐: readjusted linkage
Meter was not in tolerance: ☐: changed dry test meter
Date: 2/8/96

*Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

Date 1-15-96
Bar. Press. 29.57 IN.HG
Wet Test Meter No. AL-20

Control Module No. 9
Serial No. DTM 964549
Technician S.Fjelsta

ΔH (IN.WC)		Gas Volume Wet Test Meter	* Cal. Index	* Diff. Wet Test Meter	Gas Volume Dry Test Meter (ft³)		Gas Temperatures			Time	Meter Coeff.	Orifice Const.	C_i
							Wet Test	Dry Test					
Nominal	Actual	(ft³)	(%)	ΔP_w (IN.WC.)	V_{di}	V_{df}	t_w (°F)	t_{di} (°F)	t_{df} (°F)	θ (Min/Sec)	Y	ΔH@	
0.5	0.5	2	99.85	0.01	634.304	636.299	69.5	69	66	4/56	0.99516	1.742	
1.2	1.2	3	99.91	0.025	637.016	640.011	69.5	75	68	4/50	1.00116	1.768	
2.0	2.0	3	99.93	0.055	640.507	643.489	69.5	77	69	3/46	1.00682	1.784	
3.3	3.3	5	100.00	0.09	643.861	648.870	69.5	81	71	4/59	1.00600	1.842	
4.7	4.7	6	100.02	0.12	649.564	655.557	69.5	85	71	5/04	1.00723	1.822	
	2	3	4	5	6	7	8	9	10	11/12 Avg	1.0034	1.80	

Positive leak check performed by S. Fjelsta
Meter was in tolerance
Approved by

Meter was not in tolerance ☐: readjusted linkage
Meter was not in tolerance ☐: changed dry test meter
Date 1/17/96

*Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

Date 8/23/96
Bar. Press. 29.33 IN.HG
Wet Test Meter No. AL-20

Control Module No. 10
Serial No. DTM 1334112
Technician D. VanHoever

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. ΔH@	C_f
0.5	.5	~~2~~ 1.5	99.85	0.01	490.375	491.905	70.5	87	73	3:48	.9952	1.81	
1.2	1.2	~~3~~ 2.5	99.91	0.025	487.33	489.86	70.5	89	73	4:15	1.0037	1.95	
2.0	2.0	3	99.93	0.055	473.84	476.84	71.5	79	67	3:56	.9970	1.97	
3.3	3.3	~~5~~ 3.5	100.00	0.09	477.34	480.84	71.5	84	69	3:34	1.0009	1.95	
4.7	4.7	5	100.02	0.12	481.83	486.83	70.5	90	71	4:18	1.0069	1.96	
	2	3	4	5	6	7	8	9	10	Avg	1.0007	1.93	

Positive leak check performed by
Meter was in tolerance
Approved by

Meter was not in tolerance ☐: readjusted linkage
Meter was not in tolerance ☐: changed dry test meter
Date 8/23/96

*Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

Date 8-5-96
Bar. Press. 28.57 IN.HG
Wet Test Meter No. AL-20

Control Module No. 14
Serial No. DTM 1334123
Technician SF

ΔH (IN.WC)		Gas Volume Wet Test Meter	* Cal. Index	* Diff. Wet Test Meter ΔP_w	Gas Volume Dry Test Meter (ft^3)		Gas Temperatures			Time	Meter Coeff.	Orifice Const.	C_p
							Wet Test t_w (°F)	Dry Test					
Nominal	Actual	(ft^3)	(%)	(IN.WC.)	V_{di}	V_{df}		t_{di} (°F)	t_{do} (°F)	(Min/ Sec)	Y	ΔH@	
0.5	.5	2	99.85	0.01	247.74	249.80	71	90	78	4/55	.991862	1.725	
1.2	1.2	3	99.91	0.025	244.31	247.41	71	93	78	4/55	.99018	1.833	
2.0	2.0	3	99.93	0.055	227.22	230.28	71	87	76	3/48	.99388	1.837	
3.3	3.3	5	100.00	0.09	231.21	236.33	71	93	77	4/57	.99373	1.837	
4.7	4.7	5	100.02	0.12	238.05	243.17	71	97	78	4/11	.99489	1.855	
											~~.99018~~	~~1.833~~	
	2	3	4	5	6	7	8	9	10	11/12 Avg	.9929	1.818	

Positive leak check performed by SF
Meter was in tolerance ☒
Approved by Daniel L. Poe

Meter was not in tolerance ☐: readjusted linkage
Meter was not in tolerance ☐: changed dry test meter
Date 8-6-96

*Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

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L-17

CURVE NUMBER 12

Equimeter INCORPORATED A BTR Company

805 Liberty Blvd., DuBois, PA 15801

TEST METER PERFORMANCE

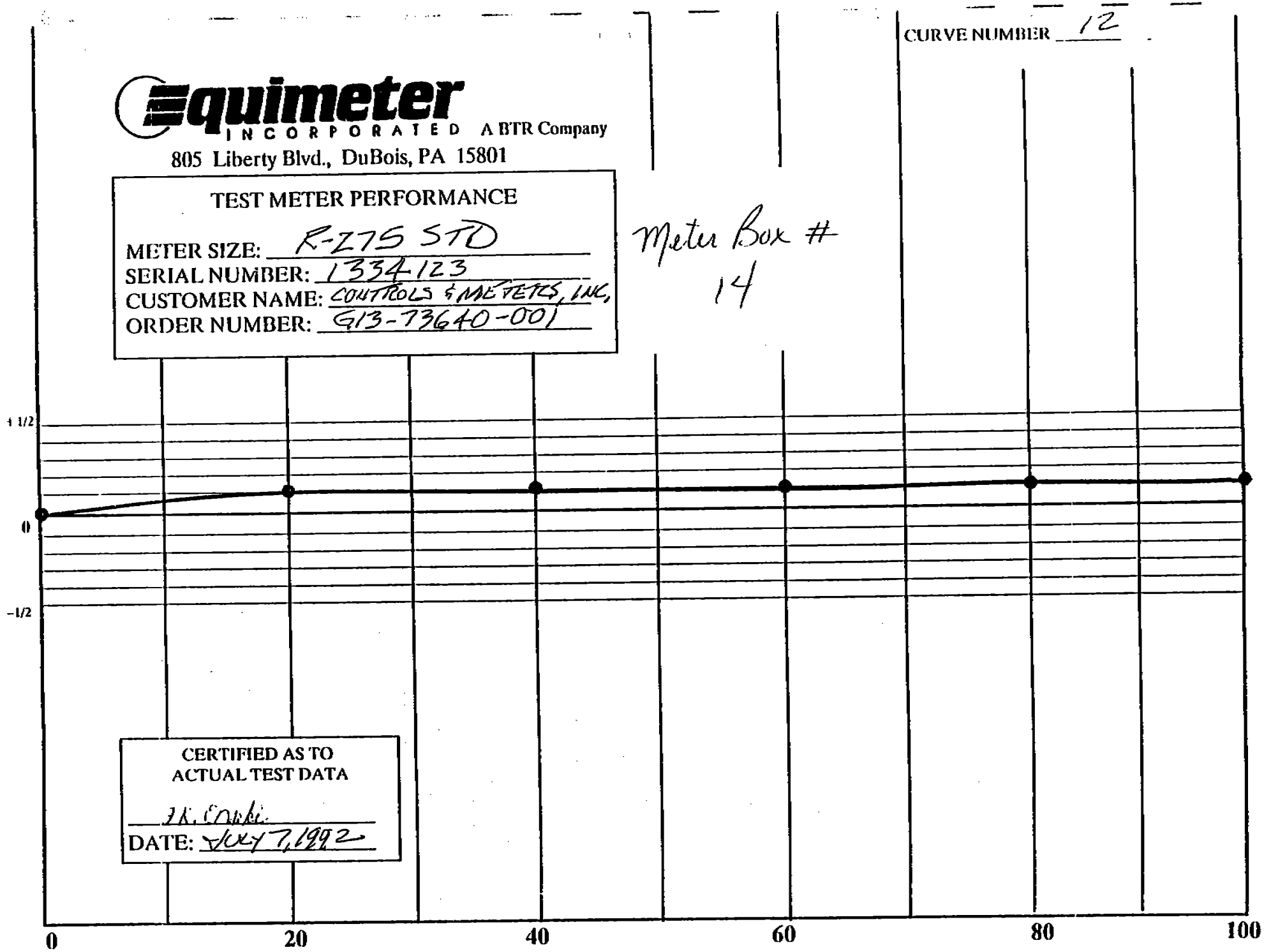
METER SIZE: R-175 STD

SERIAL NUMBER: 1334123

CUSTOMER NAME: CONTROLS & METERS, INC.

ORDER NUMBER: G13-73640-001

Meter Box # 14



CERTIFIED AS TO ACTUAL TEST DATA

J.K. Cook

DATE: July 7, 1992

L-18

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Temperature Measurement Device Calibration Sheet

Unit Under Test:

Vendor: Wavetek
Model: DM23XT
Range: 0 - 1900 °F
Date of Calibration: 8-5-96
Method of Calibration:

Serial Number: 50610065 #2
Thermocouple Type: K
Technician: Mark Peterson
PDT No.: n/a

☐ 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 ± ° 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	0.22
100	100	98	2	0.36
200	200	202	2	.30
300	300	300	0	0
400	400	397	3	.35
500	500	497	3	.31
600	600	600	0	0
700	700	700	0	0
800	800	806	6	.48
900	900	908	8	.59
1000	1000	1013	13	.89
1100				
1200				
1300				
1400				
1500				
1600				
1700				
1800				
1900				
2000				
2100				
		Averages:	3.45	0.38

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.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Temperature Measurement Device Calibration Sheet

Unit Under Test:
dor: Omega
Model: HH81
Range: 0-2100 °F
Date of Calibration: 5/22/96
Serial Number: NC-735X1493
Thermocouple Type: K
Technician: Steve Kelker
PDT No.: 37

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	
			at (°F)	(%)
0	0	-4	4	.870
100	100	97	3	.536
200	200	198	2	.303
300	300	297	3	.395
400	400	396	4	.465
500	500	497	3	.313
600	600	598	2	.189
700	700	698	2	.172
800	800	800	0	0
900	900	899	1	.074
1000	1000	999	1	.068
1100	1100	1097	3	.192
1200	1200	1199	1	.060
1300	1300	1297	3	.170
1400	1400	1400	0	0
1500	1500	1498	2	.102
1600	1600	1600	0	0
1700	1700	1698	2	.093
1800	1800	1800	0	0
1900	1900	1897	3	.127
2000	2000	1998	2	.081
2100	2100	2095	5	.195
		Averages:	2.09	.200

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.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Temperature Measurement Device Calibration Sheet

Unit Under Test:
Vendor: Omega
Model: HH81
Range: °F
Date of Calibration: 7-11-96
Serial Number: 74JX1560 ~~73...~~ Dit
Thermocouple Type: K
Technician: D. Hullemann
PDT No. 45

☐ 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	-3	3	0.65
100	100	98	2	0.35
200	200	200	0	0.00
300	300	298	2	0.26
400	400	398	2	0.23
500	500	498	2	0.21
600	600	600	0	0.00
700	700	698	2	0.17
800	800	801	1	0.08
900	900	899	1	0.07
1000	1000	1000	0	0.00
1100	1100	1100	0	0.00
1200	1200	1200	0	0.00
1300	1300	1298	2	0.11
1400	1400	1401	1	0.05
1500	1500	1499	1	0.05
1600	1600	1602	2	0.10
1700	1700	1700	0	0.00
1800	1800	1802	2	0.16
1900	1900	1900	0	0.00
2000	2000	2000	0	0.00
2100	2100	2099	1	0.04
		Averages:	1.09	0.11

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.

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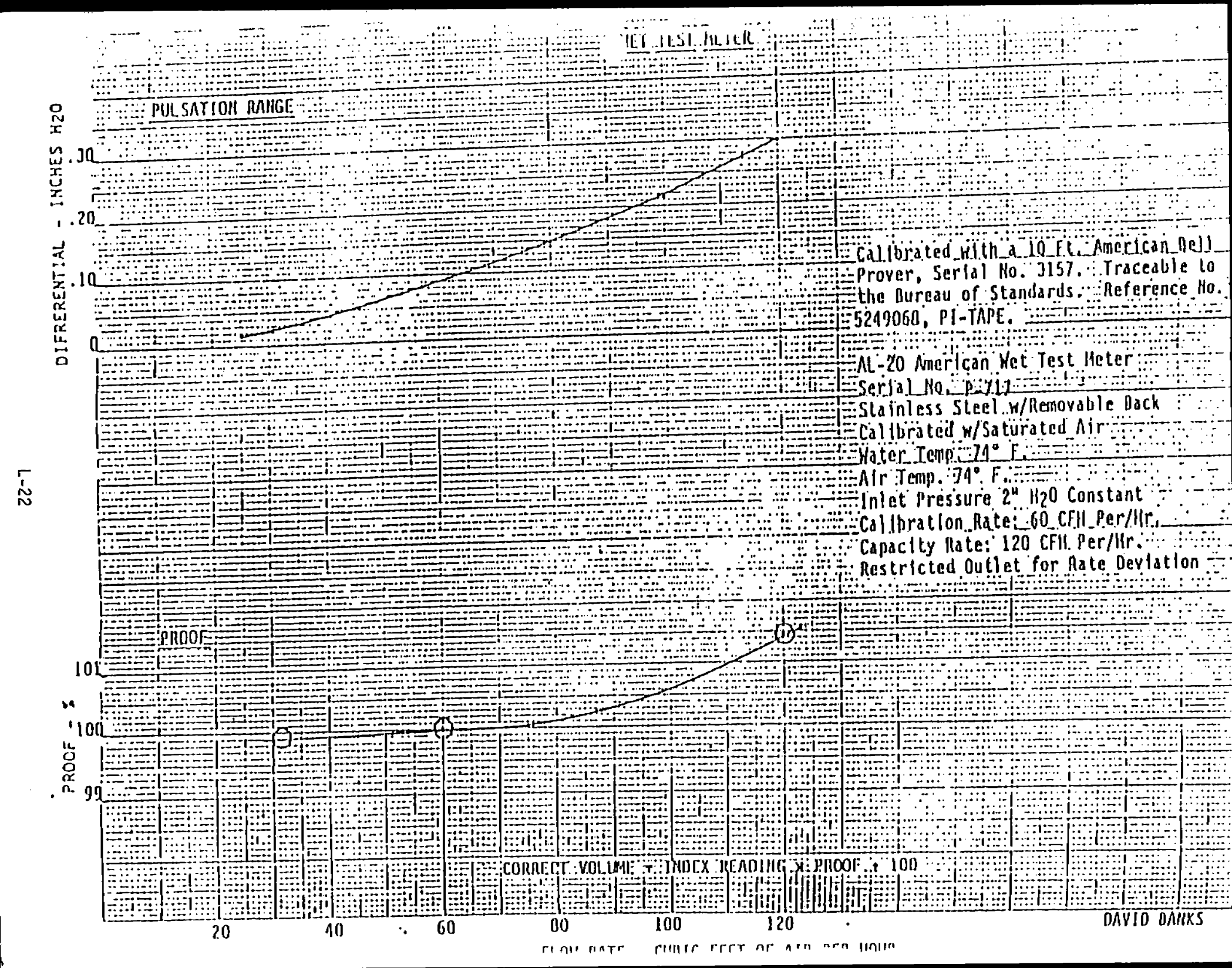
WET TEST METER
PULSATION RANGE
DIFFERENTIAL - INCHES H2O
.30
.20
.10
0
PROOF
101
100
99
PROOF - %
Calibrated with a 10 Ft. American Bell Prover, Serial No. 3157. Traceable to the Bureau of Standards. Reference No. 5249060, PI-TAPE.
AL-20 American Wet Test Meter
Serial No. P 711
Stainless Steel w/Removable Back
Calibrated w/Saturated Air
Water Temp. 74° F.
Air Temp. 74° F.
Inlet Pressure 2" H2O Constant
Calibration Rate: 60 CFH Per/Hr.
Capacity Rate: 120 CFH Per/Hr.
Restricted Outlet for Rate Deviation
CORRECT VOLUME = INDEX READING X PROOF ÷ 100
20
40
60
80
100
120
DAVID BANKS

Interpoll Laboratories, Inc.
(612) 786-6020

S-Type Pitot Tube Inspection Sheet

Probe or Pitot Tube No. 27-4A (Glass)

Pitot tube dimensions:

1. External tubing diameter (D_t) .312 IN.
2. Base to Side A opening plane (P_A) .4665 IN.
3. Base to Side B opening plane (P_B) .470 IN.

Alignment:

4. α_1 < 10° ∠10° 1°0'
5. α_2 < 10° ∠10° 0° 55'

6. B_1 < 5° ∠5° 3° 50'
7. B_2 < 5° ∠5° 0° 15'

8. Z <.125" ∠.125" .029"
9. W <.0625" ∠.0625" A .0195 B .015

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle 3/4" .764"
11. Pitot to probe sheath 4 3/8" 4.572
12. Pitot to thermocouple (parallel to probe) 3" 3" TO CENTER OF HOLE
13. Pitot to thermocouple (perpendicular to probe) NA

☒ 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: 3-1-95

Inspected by: Gary Blenbush

CFR Title 40 Part 60 Appenidix A Method 2

S-348

Interpoll Laboratories, Inc.
(612) 786-6020

S-Type Pitot Tube Inspection Sheet

Probe or Pitot Tube No. 27-5

Pitot tube dimensions:

1. External tubing diameter (D_t) .312 IN.
2. Base to Side A opening plane (P_A) .4675 IN.
3. Base to Side B opening plane (P_B) .4515 IN.

Alignment:

4. α_1	< 10°	<10°	0° 35'
5. α_2	< 10°	<10°	0° 35'
6. B_1	< 5°	<5°	0° 0' 30"
7. B_2	< 5°	<5°	0° 50'
8. Z	<.125"	<.125"	.013"
9. W	<.0625"	<.0625"	A .013" B .001"

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle 3/4" .750"
11. Pitot to probe sheath 4 3/8" 4.380
12. Pitot to thermocouple (parallel to probe) 3" 2.956"
13. Pitot to thermocouple (perpendicular to probe) NA

☒ 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:

8-1-95

Inspected by:

Harry Blankenship

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. 29-6

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. 31-6

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" ,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) ,750 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:

CFR Title 40 Part 60 Appenidix A Method 2

S-348

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 8-27-96
Technician: Scott Fjelsta
Nozzle Number: 9-4

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	0.251
2	0.249
3	0.252
Average	0.251

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 8-28-96
Technician: Scott Fjelsta
Nozzle Number: 1-7

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	0.230
2	0.231
3	0.230
Average	0.230

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 8-27-96
Technician: Mark Kaehler
Nozzle Number: 1-3

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	0.184
2	0.186
3	0.187
Average	0.186

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 8-28-96
Technician: Mark Kaehler
Nozzle Number: 2-3

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	0.180
2	0.181
3	0.179
Average	0.180

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 8-27-96
Technician: Jamie Bainville
Nozzle Number: 9-3

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	0.190
2	0.187
3	0.188
Average	0.188

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 8-28-96
Technician: Bob Aschenbach
Nozzle Number: 1-6

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	0.298
2	0.298
3	0.297
Average	0.298

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 8-28-96
Technician: Ed Juers
Nozzle Number: 1-5

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	0.189
2	0.190
3	0.191
Average	0.190

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date: 7-8-96
Technician: E. Sivers
Mercury Column Barometer No.: 1
Aneroid Barometer No.: 10724004

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjusted Mercury Barometer Read	Initial Aneroid Barometer Read	Difference (P_{ba} - P_{bm})
28.93	74	.119	28.81	28.91	.1

Has this barometer shown any consistent problems with calibration? Yes/No. If yes, explain. offset - -1419
slope .9251

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. Aneroid barometer will be calibrated to the adjusted mercury barometer readings.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 8-12-96
Technician SF
Mercury Column Barometer No. Room 125
Aneroid Barometer No. 20901010

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjusted Mercury Barometer Read	Initial Aneroid Barometer Read	Difference (P_{ba} - P_{bm})
29.26	79	.135	29.13	29.21	0.08

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. Aneroid barometer will be calibrated to the adjusted mercury barometer readings.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date: 10-17-95
Technician: R.R.
Mercury Column Barometer No.: NOVA-1
Aneroid Barometer No.: 560209

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjusted Mercury Barometer Read	Initial Aneroid Barometer Read	Difference (P_{ba} - P_{bm})
28.91	82	.14	28.77	28.76	.01

Has this barometer shown any consistent problems with calibration? Yes/No. If yes, explain. BAROMETER HAS BEEN REPAIRED

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. Aneroid barometer will be calibrated to the adjusted mercury barometer readings.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 7-11-96
Technician Mark Gaebler
Mercury Column Barometer No. LAB 1
Aneroid Barometer No. 21029004

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjusted Mercury Barometer Read	Initial Aneroid Barometer Read	Difference (P_{ba} - P_{bm})
29.19	90	.137	29.043	29.05	.007

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. Aneroid barometer will be calibrated to the adjusted mercury barometer readings.

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