Background Report Reference

AP-42 Section Number: 10.6.1

Background Report Section: 4

Reference Number: 72

Title: Results of the March 21, 1996 Air Emission Compliance Test of the Line 1 Thermal Oil Heater At The Louisiana-Pacific Plant in Hayward, Wisconsin

Interpoll Laboratories, Inc.

April 1996

Interpoll Laboratories, Inc.
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RESULTS OF THE MARCH 21, 1996 AIR EMISSION COMPLIANCE TEST OF THE LINE 1 THERMAL OIL HEATER AT THE LOUISIANA PACIFIC PLANT IN HAYWARD, WISCONSIN

Submitted to:

LOUISIANA-PACIFIC CORPORATION
Route 8, Box 8263
Hayward, Wisconsin 54843

Attention:

Keith Seelig

Approved by:

Daniel Despen
Manager
Stationary Source Testing Department

Report Number 6-7451E
April 24, 1996
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^{6}BTU	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
$<$	$\leq$ (when following a number)

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

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

1 INTRODUCTION

On March 21, 1996 Interpoll Laboratories personnel conducted a particulate emission compliance test of the Line 1 Thermal Oil Heater at the Louisiana Pacific Plant in Hayward, Wisconsin. On-site testing was performed by Jamie Bainville and Jim Lorenz. Coordination between testing activities and plant operation was provided by Keith Selig of Louisiana Pacific Corporation. The tests were not witnessed by a member of the Wisconsin Department of Natural Resources.

Particulate determinations were performed in accordance with EPA Methods 2 - 5, CFR Title 40, Part 60, Appendix A (revised July 1, 1995). A preliminary volumetric flow rate determination was performed to select the appropriate nozzle diameter required for isokinetic sample withdrawal. An Interpoll Labs sampling train which meets or exceeds specifications in the above-cited reference was used to extract particulate samples by means of a heated glass-lined probe. Wet catch samples were colleccted in the back half of the Method 5 sampling train and analyzed as per Wisconsin DNR Protcol.

An integrated flue gas sample was extracted simultaneously with the particulate sampling train 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.

Testing was conducted from two test ports oriented at 90° on the stack. These test ports are located approximately 4.8 diameters downstream and 2.3 diameters upstream of the nearest flow disturbance. A 20-point traverse was used to collect representative particulate samples. Each traverse point was sampled 3 minutes to give a total sampling time of 60 minutes per run.

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

2 SUMMARY AND DISCUSSION

The results of the air emission compliance tests are summarized in Table 1. An overview of the results is presented in the table below:

Parameter		Measured
Particulate		
(Dry + Wet Catch)		
	(GR/DSCF)	0.0147
	($LB/10^6BTU$)	0.056
(Dry Catch Only)		
	(GR/DSCF)	0.010
	($LB/10^6BTU$)	0.040

The wet catch portion of the first sampling run was accidentally spilled during recovery, therefore, this run was voided by the Interpoll Laboratories field engineer. An additional test run was performed immediately following the third test run. No other difficulties were encountered in the field or in the laboratory evaluation of the samples. 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 March 21, 1996 Particulate Emission Test of the Line 1 Thermal Oil Heater Stack at the Louisiana Pacific Plant in Hayward, Wisconsin.

ITEM		Run 1	Run 2	Run 3
Date of test		03-21-96	03-21-96	03-21-96
Time runs were done	(HRS)	1038/1145	1210/1312	1340/1445
Steam flow	(KLB/HR)			
Volumetric flow				
actual	(ACFM)	17922	19125	19072
standard	(DSCFM)	10922	11762	11338
Gas temperature	(DEG-F)	306	310	308
Moisture content	(%V/V)	9.62	8.21	11.53
Gas composition	(%V/V,dry)			
carbon dioxide		7.10	6.50	5.30
oxygen		12.80	13.40	14.80
nitrogen		80.10	80.10	79.90
Isokinetic variation	(%)	97.0	97.5	100.2
Particulate concentration				
actual	(GR/ACF)	.007330	.0113	.00811
standard	(GR/DSCF)	.0120	.0184	.0136
Part. emission rate	(LB/HR)	1.13	1.86	1.33
Emission factor	(LB/MMBTU)	0.041	0.067	0.061

Note: Dry + Organic/Inorganic Wet Catch

Table 1b Summary of the Results of the March 21, 1996 Particulate Emission Test of the Line 1 Thermal Oil Heater Stack at the Louisiana Pacific Plant in Hayward, Wisconsin.

ITEM		Run 1	Run 2	Run 3
Date of test		03-21-96	03-21-96	03-21-96
Time runs were done	(HRS)	1038/1145	1210/1312	1340/1445
Steam flow	(KLB/HR)			
Volumetric flow				
actual	(ACFM)	17922	19125	19072
standard	(DSCFM)	10922	11762	11338
Gas temperature	(DEG-F)	306	310	308
Moisture content	(%V/V)	9.62	8.21	11.53
Gas composition	(%V/V,dry)			
carbon dioxide		7.10	6.50	5.30
oxygen		12.80	13.40	14.80
nitrogen		80.10	80.10	79.90
Isokinetic variation	(%)	97.0	97.5	100.2
Particulate concentration				
actual	(GR/ACF)	.006409	.006016	.00655
standard	(GR/DSCF)	.0105	.009786	.0110
Part. emission rate	(LB/HR)	0.985	0.987	1.07
Emission factor	(LB/MMBTU)	0.035	0.036	0.049

Note: Dry Catch Only

3 RESULTS

The results of all field and laboratory evaluations are presented in this section. Gas composition (Orsat and moisture) are presented first followed by the computer printout of the particulate 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 particulate emission rate has been calculated using the product of the concentration times flow method.

3.1 Orsat & Moisture Analyses

Test No. 18
Line 1 Thermal Oil Heater Stack

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

	Run 1	Run 2	Run 3
Date of run	03-21-96	03-21-96	03-21-96
Dry basis (orsat)			
carbon dioxide............	7.10	6.50	5.30
oxygen....................	12.80	13.40	14.80
nitrogen..................	80.10	80.10	79.90
Wet basis (orsat)			
carbon dioxide............	6.42	5.97	4.69
oxygen....................	11.57	12.30	13.09
nitrogen..................	72.39	73.53	70.69
water vapor...............	9.62	8.21	11.53
Dry molecular weight........	29.65	29.58	29.44
Wet molecular weight........	28.53	28.63	28.12
Specific gravity............	0.985	0.989	0.971
Water mass flow......(LB/HR)	3261	2950	4145
FO	1.141	1.154	1.151

3.2 Results of Particulate Determinations

Test No. 18
Line 1 Thermal Oil Heater Stack

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

	Run 1	Run 2	Run 3
Date of run	03-21-96	03-21-96	03-21-96
Time run start/end.....(HRS)	1038/1145	1210/1312	1340/1445
Static pressure......(IN.WC)	-0.12	-0.12	0.00
Cross sectional area (SQ.FT)	14.75	14.75	14.75
Pitot tube coefficient......	.840	.840	.840
Water in sample gas			
condenser.............(ML)	0.0	0.0	0.0
impingers..........(GRAMS)	88.0	79.0	118.0
desiccant..........(GRAMS)	11.0	11.0	12.0
total..............(GRAMS)	99.0	90.0	130.0
Total particulate material..			
..........collected(grams)	0.0342	0.0566	0.0416
Gas meter coefficient.......	1.0023	1.0023	1.0023
Barometric pressure..(IN.HG)	29.26	29.26	29.26
Avg. orif.pres.drop..(IN.WC)	1.75	2.08	2.04
Avg. gas meter temp..(DEF-F)	58.0	65.5	67.6
Volume through gas meter....			
at meter conditions...(CF)	43.72	47.96	47.72
standard conditions.(DSCF)	43.86	47.46	47.03
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.........(IN)	.432	.432	.432
Avg.stack gas temp ..(DEG-F)	306	310	308
Volumetric flow rate........			
actual..............(ACFM)	17922	19125	19072
dry standard.......(DSCFM)	10922	11762	11338
Isokinetic variation.....(%)	97.0	97.5	100.2
Particulate concentration...			
actual............(GR/ACF)	0.00733	0.01131	0.00811
dry standard.....(GR/DSCF)	0.01203	0.01840	0.01365
Particle mass rate...(LB/HR)	1.126	1.855	1.33
F-factor ....(DSCF/MMBTU)	9140	9140	9140
Emission factor...(LB/MMBTU)	0.041	0.067	0.061

4 RESULTS OF FUEL ANALYSIS

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

Date:	3/28/96
Client:	LOUISIANA-PACIFIC, HAYWARD
Laboratory Log Number:	7451-64-9999
Sample Collected:	3/21/96
Sample Received:	3/22/96
Source:	LINE 1 KONUS
Sample Identification:	TEST 18, WOOD

Proximate and Ultimate Analysis WT %

Proximate Analysis WT %

Parameter	Moisture & Ash Free	Moisture Free	As Received
Moisture, Total			43.45
Ash		3.16	1.79
Volatile Matter	81.07	78.51	44.40
Fixed Carbon (calculation)	18.93	18.33	10.37
Sulfur	0.02	0.02	0.01
Heating Value, BTU/LB.	8434	8168	4619

Ultimate Analysis WT %

Parameter	Moisture & Ash Free	Moisture Free	As Received
Moisture, Total			43.45
Ash		3.16	1.79
Carbon	51.54	49.91	28.23
Hydrogen	4.99	4.84	2.74
Nitrogen	0.06	0.06	0.03
Oxygen (calculated)	43.39	42.02	23.76
Sulfur	0.02	0.02	0.01

Respectfully submitted,

David J. Schneider

David J. Schneider, Manager
Chemistry Department

9141

APPENDIX A

PRELIMINARY VOLUMETRIC FLOW RATE DETERMINATION

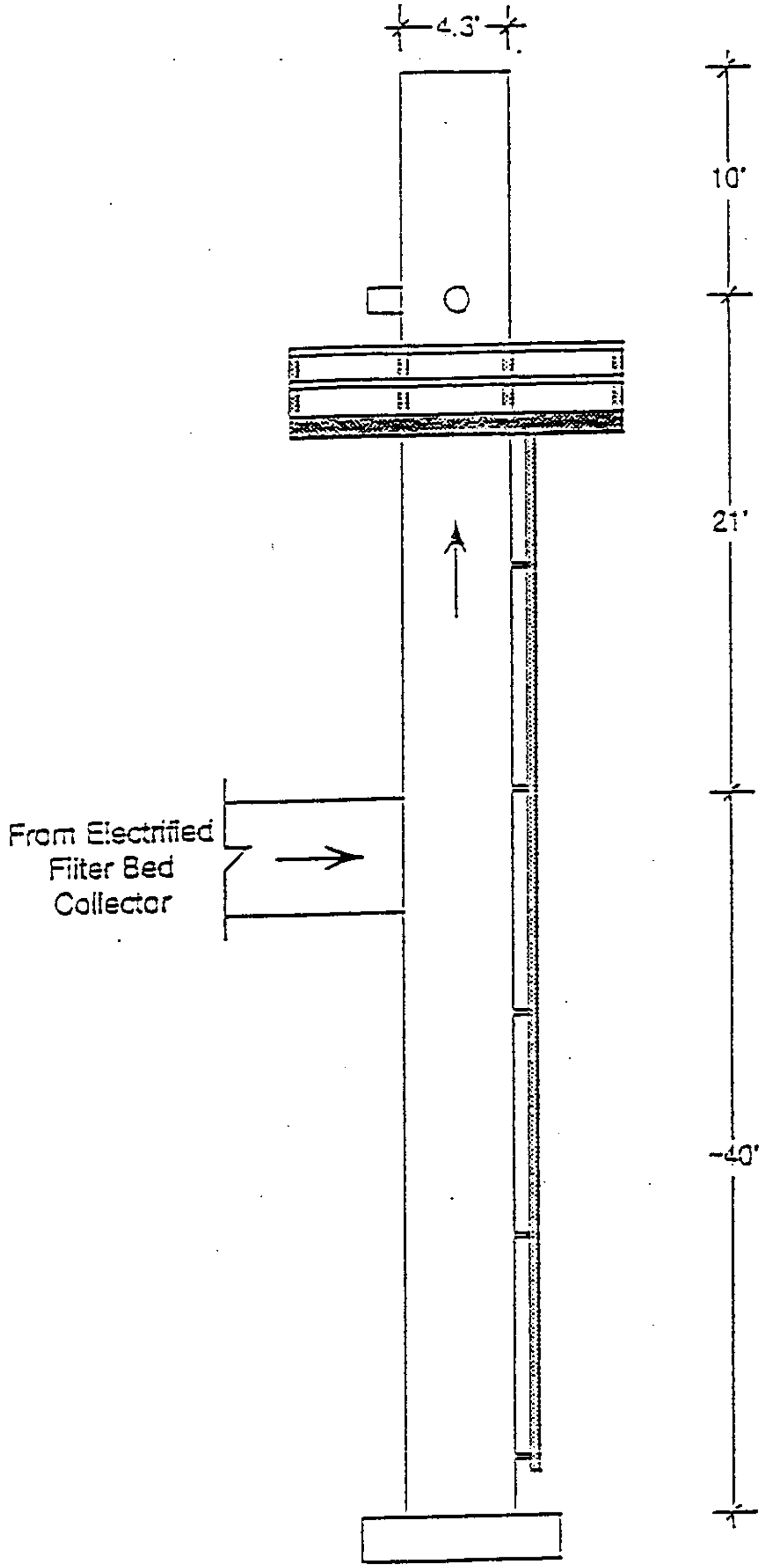
Test No. 18
Line 1 Thermal Oil Heater Stack

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

Date of Determination............	03-21-96
Time of Determination.......(HRS)	800
Barometric pressure.......(IN.HG)	29.26
Pitot tube coefficient...........	.84
Number of sampling ports.........	2
Total number of points...........	20
Shape of duct....................	Round
Stack diameter...............(IN)	52
Duct area.................(SQ.FT)	14.75
Direction of flow................	UP
Static pressure...........(IN.WC)	-.115
Avg. gas temp.............(DEG-F)	288
Moisture content..........(% V/V)	10.78
Avg. linear velocity.....(FT/SEC)	19.8
Gas density..............(LB/ACF)	.05088
Molecular weight......(LB/LBMOLE)	29.65
Mass flow of gas..........(LB/HR)	53358
Volumetric flow rate.............	
actual....................(ACFM)	17478
dry standard.............(DSCFM)	10761

APPENDIX B

LOCATION OF TEST PORTS



HAYWARD, WI
DRAWING 10
LINE 1
THERMAL OIL HEATER
STACK
ELEVATION

APPENDIX C

FIELD DATA SHEETS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job LP HAWARD
Source LINE 1 THERMO OIL HEATER STACK
Test 1B Run___ Date 3-21-96
Stack Dimen. 52 IN.
Dry Bulb ______°F Wet bulb ______°F
Manometer ☒Reg. ☐Exp ☐Elec.
Barometric Pressure 29.26 IN.HG
Static Pressure -.115 IN.WC
Operators J. BAINVILLE, J. Lorenz
Pitot No. V2375 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
		Port Length: 6.5 IN.		Time Start: 800 HRS	
A 1		1.35	7.85	.06	
2		4.26	10.76	.07	
3		7.59	14.09	.075	
4		11.75	18.25	.09	
5		17.79	24.29	.095	
6		34.22	40.71	.105	
7		40.24	46.74	.11	
8		44.41	50.90	.1	
9		47.74	54.24	.105	
10		50.64	57.14	.08	
B 1				.07	
2				.09	
3				.1	
4				.11	
5				.11	
6				.09	
7				.07	
8				.065	
9				.06	
10				.055	
Temp. Meas. Device & S/N:				Time End: HRS	

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

460.4
454.3

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

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP/HAYWARD Date 3-21-96 Test 18 Run 1

Source LINE No. 1 KOLLUS STACK No. of traverse points 20

Method 5 Filter holder: 4" glass Filter type: glass fiber

Sample Train Leak Check:

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

Post test: .00 cfm at 6 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used:

7989

Recovery solvent(s)

☒acetone

☐other(s)

No. of probe wash bottles: 1

Sample recovered by: J. BAINVILLE

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	594	496	98
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1425	1418	7
Total			105

Integrated Gas Sampling Data:

Bag Pump No. 27B Box No. 28 Bag No. 1

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

Pretest leak check: 0 cc/min at 400 IN.HG

Time start: 850 (HRS) Time end: 955 (HRS)

Sampling rate: 400 cc/min Operator: JB

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LP/HAYWARD
Source LINE No. 1 KONUS STACK
Date 3-21-96 Test 18 Run 1

Operators JB/JL
Meter Box No. 13 ΔH@ 1.82 in.WC
Gasmeter Coeff. 1.0023

Nozzle No. 5-7
Nozzle Dia. .432 in.
Bar. Press. 29.28 in.Hg

Pitot No. 23y-5
C_p .840
H_2O 10 %

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)
	(9:50)	458.33											
1	3	459.89	.045	.86	9.78	2	280	234	229	39	41	32	
2	6	461.61	.050	1.03	1.43	2	280				45	34	
3	9	463.50	.055	1.48	3.71	3	283	241	235	37	49	34	
4	12	465.25	.055	1.13	5.45	3	285				50	36	
5	15	467.33	.080	1.65	7.56	4	287	237	245	39	53	37	
6	18	469.20	.100	2.06	9.41	5	289				55	39	
7	21	472.20	.110	2.27	2.39	5	290	236	260	40	57	38	
8	24	474.62	.100	2.07	4.76	5	291				56	38	
9	27	476.84	.090	1.74	6.98	4	291	243	271	38	55	41	
10	30	479.00	.080	1.50	9.01	4	280				58	40	
1	33	480.92	.075	1.41	0.97	3	286	247	272	41	57	43	
2	36	482.86	.070	1.31	2.96	3	286				60	44	
3	39	484.97	.085	1.59	4.94	4	290	249	270	40	60	44	
4	42	487.28	.105	1.95	7.25	5	293				61	45	
5	45	489.40	.100	1.86	9.51	4	295	243	271	41	60	45	
6	48	491.35	.080	1.48	1.52	4	297				61	46	
7	51	493.35	.080	1.49	3.55	4	293	246	274	41	60	46	
8	54	495.33	.075	1.39	5.50	4	299				59	46	
9	57	497.30	.065	1.20	7.32	3	297	244	271	42	59	46	
10	60	499.13	.07	1.30	9.21	4	296				59	47	
	(955)												
	θ = 60	V_m = 40.8		$\overline{\Delta H}$ = 1.54							Avg. = 57.3		

W=16

C-3

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP / HAYWARD Date 3-21-96 Test 18 Run 2

Source LINE NO 1 KOKILS STACK No. of traverse points 20

Method 5 Filter holder: 4" glass Filter type: glass fiber

Sample Train Leak Check:

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

Post test: .00 cfm at 6 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: Recovery solvent(s)

7927

☒acetone

☐other(s)

No. of probe wash bottles: 1

Sample recovered by: R.R. / J.B. / J.L.

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	564	476	88
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1528	1517	11
Total			99

Integrated Gas Sampling Data:

Bag Pump No. 27B Box No. 28 Bag No. 2

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

Pretest leak check: 0 cc/min at 22 IN.HG

Time start: 1038 (HRS) Time end: 1145 (HRS)

Sampling rate: 400 cc/min Operator: J.B.

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

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

[redacted] LA[redacted]ATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LP/ HAYWARD
Source LTLY NO. 1 KONUS STACK
Date 3-21-96 Test 18 Run 2

Operators J.B. / J.L
Meter Box No. 13 ΔH@ 1.82 in.WC
Gasmeter Coeff. 1.0023

Nozzle No. 5-7
Nozzle Dia. .432 in.
Bar. Press. 29.26 in.Hg

Pitot No. 23V-5'
C_p .840
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)
	1038	(499.67)											
B 1	3	501.80	.075	1.50	1.71	4	301	232	245	39	50	47	
2	6	504.05	.100	1.97	4.02	5	302				57	47	
3	9	506.35	.095	1.88	6.28	5	304	239	257	40	59	47	
4	12	508.63	.105	2.08	8.67	5	305				60	47	
5	15	511.08	.110	2.17	1.11	5	309	236	259	39	62	49	
6	18	513.40	.050	1.98	3.51	5	308				63	49	
7	21	515.70	.080	1.58	5.59	5	310	232	268	38	64	50	
8	24	517.80	.080	1.59	7.69	5	309				64	50	
9	27	519.80	.075	1.49	9.72	4	308	233	270	39	64	50	
10	30	521.59	.060	1.20	1.54	3	305				64	50	
A 1	33	523.18	.050	.99	3.20	3	307	232	272	40	62	51	
2	36	524.93	.055	1.10	4.95	3	299				63	51	
3	39	526.71	.060	1.20	6.77	3	303	228	269	39	64	52	
4	42	528.83	.080	1.60	8.88	4	306				64	52	
5	45	531.12	.095	1.90	1.17	5	306	231	270	39	65	52	
6	48	533.48	.100	2.00	3.52	5	305				65	52	
7	51	536.12	.130	2.58	6.19	6	309	234	270	38	65	52	
8	54	538.80	.11	2.19	8.65	6	307				65	53	
9	57	541.08	.11	2.19	1.12	6	305	232	268	40	67	54	
10	60	543.39	.095	1.91	3.42	5	303				67	55	
	(1145)												
	θ = 60	V_m = 43.72		ΔH = 1.75							Avg. =	58.0	

C-5

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/HAYWARD Date 3-21-96 Test 18 Run 3

Source LINE No.1 Kones STACK No. of traverse points 20

Method 5 Filter holder: 4" glASS Filter type: glASS fiber

Sample Train Leak Check:

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

Post test: .00 cfm at 5 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: 7986

Recovery solvent(s)

☒acetone

☐other(s)

No. of probe wash bottles: 1

Sample recovered by: R.R. / J.B. / J.L.

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	565	486	79
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1436	1425	11
Total			90

Integrated Gas Sampling Data:

Bag Pump No. 273 Box No. 28 Bag No. 3

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

Pretest leak check: 0 cc/min at 22 IN.HG

Time start: 1210 (HRS) Time end: 1315 (HRS)

Sampling rate: 400 cc/min Operator: JR

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

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

[redacted] LABORATOR[redacted]
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LP/HAYWARD
Source LINE No. 1 KONUS STACK
Date 3-21-96 Test 18 Run 3

Operators J.B. / R.D.
Meter Box No. 13 ΔH@ 1.82 in.WC
Gasmeter Coeff. 1.0023

Nozzle No. 5-7
Nozzle Dia. .432 in.
Bar. Press. 29.26 in.Hg

Pitot No. 23v-5
C_p .840
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)
	(12:10)	(543.63)											
A 1	3	545.67	.065	1.35	5.56	3	305				63	58	
2	6	547.66	.07	1.45	7.57	4	308	220	245	39	68	57	
3	9	549.81	.08	1.67	9.73	4	307				69	58	
4	12	551.96	.08	1.67	1.89	4	309	231	252	39	70	58	
5	15	554.25	.100	2.08	4.30	5	310				70	58	
6	18	558.97	.130	2.70	7.05	6	310	235	257	40	69	58	
7	21	559.75	.128	2.66	9.77	6	311				69	58	
8	24	562.37	.122	2.53	2.43	6	312	236	264	39	71	59	
9	27	564.85	.105	2.18	4.90	5	312				71	59	
10	30	567.26	.094	1.98	7.26	5	304	234	263	41	72	61	
B 1	33	569.71	.097	2.05	9.65	5	304				68	61	
2	36	572.32	.114	2.38	2.23	5	309	234	258	40	70	61	
3	39	574.93	.120	2.51	4.88	6	309				72	62	
4	42	577.58	.125	2.60	7.59	6	314	239	268	40	72	62	
5	45	580.22	.115	2.39	0.18	6	315				73	62	
6	48	582.86	.120	2.50	2.83	6	314	234	270	41	73	63	
7	51	585.42	.106	2.20	5.32	5	317				74	63	
8	54	587.60	.088	1.83	7.60	4	317	234	271	41	74	63	
9	57	589.50	.060	1.26	9.48	3	313				73	63	
10	60	591.54	.075	1.58	1.59	3	309	237	269	40	74	64	
	(1312)												
	θ - 60	V_m - 47.96		ΔH - 2.08							Avg. - 65.5		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP HAYWARD
Date 3-21-96 Test 18 Run 4
Source LiCl Kamas Stack
No. of traverse points 20
Method 5 Filter holder: Glass
Filter type: Glass

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0 cfm at 7 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used:
7187

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

No. of probe wash bottles: 1
Sample recovered by: S. Barnhill / KK/SL

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impinger No. 1	618	500	118
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1590	1578	12
Total			~~140~~ 130 SAB 3/28/96

Integrated Gas Sampling Data:

Bag Pump No. 27B
Box No. 28 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0 cc/min at 22 IN.HG
Time start: 1340 (HRS) Time end: 1445 (HRS)
Sampling rate: 400 cc/min Operator: SD

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

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[redacted]ERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LP/HAYWOOD
Source LI-C No 1 Kones Stack
Date 3-21-96 Test 18 Run 4

3 Baynville 3.L
13 ΔH@ 1.82 in.WC
1.0023

Nozzle No. 5-7
Nozzle Dia. .432 in.
Bar. Press. 29.26 in.Hg

Pitot No. 230-5'
C_p .840
H_2O 10 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head	Orifice	Des. Volt	VAC. (in.Hg)	Stack (°F)	Probe (°F)	Oven (°F)	Imp. (°F)	Gas/In (°F)	Gas/Out (°F)	Oxygen (% v/v)
	(1340)	(592.00)											
B 1	3	594.50	.105	2.21	4.48	5	304	233	245	37	62	60	
2	6	596.80	.090	1.87	6.77	4	306				64	60	
3	9	599.40	.100	2.20	9.31	5	307	235	250	37	65	60	
4	12	601.57	.120	2.48	1.94	5	308				67	59	
5	15	604.50	.120	2.49	4.57	5	310	234	247	39	69	60	
6	18	607.10	.120	2.49	7.21	5	312				70	60	
7	21	609.70	.110	2.29	9.75	5	312	246	256	38	71	60	
8	24	612.00	.095	1.98	2.10	5	311				71	61	
9	27	614.36	.090	1.88	4.40	4	310	249	259	39	72	61	
10	30	616.48	.075	1.57	6.51	4	308				72	61	
A 1	33	618.30	.055	1.15	8.31	3	308	256	259	38	70	62	
2	36	620.30	.075	1.59	0.43	4	299	~~250~~	~~26~~		72	62	
3	39	622.45	.075	1.59	2.55	4	301	250	261	39	73	63	
4	42	624.90	.100	2.10	4.98	5	308				74	63	
5	45	627.41	.100	2.10	7.41	5	310	245	269	40	74	63	
6	48	629.83	.110	2.31	9.96	6	311				74	63	
7	51	632.40	.110	2.30	2.51	6	312	240	271	40	74	64	
8	54	635.00	.105	2.20	5.00	6	313				74	63	
9	57	637.46	.100	2.10	7.44	6	310	243	269	41	74	64	
10	60	639.72	.09	1.91	9.76	5	304				74	64	
	(1445)												
	θ = 60	V_m = 47.72		ΔH = 2.04							Avg. = 67.6		

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APPENDIX D

INTERPOLL LABORATORIES ANALYTICAL RESULTS

INTERPOLL LABORATORIES, INC.

(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job	LP/HAYWARD	Source	Line 1 Konus
Team Leader	JB	Test Site	Stack
Date Submitted		Date of Test	3-21-96
Test No.	18	No. of Runs Completed	3
Date of Analysis		Technician	ET

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
18-1	7451-61	1	0	7.1	19.9	7.1	12.8	
		2	0	7.1	19.9	7.1	12.8	
	☒B☐F	Avg				7.1	12.8	
18-2	62	1	0	6.5	19.9	6.5	13.4	
		2	0	6.5	19.9	6.5	13.4	
	☒B☐F	Avg				6.5	13.4	
18-3	63	1	0	5.3	20.1	5.3	14.8	
		2	0	5.3	20.1	5.3	14.8	
	☒B☐F	Avg				5.3	14.8	
		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 $F_0 = \frac{20.9 - O_2}{CO_2}$

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.
(612) 786-6020

Impinger Catch Data Reporting Sheet

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

Job	LP/Hayward	Source/Site	Line No. 1 Konus/Stack
Date Submitted	3-22-96	Test No.	18
Date of Analysis	3-27-96	Technician	B.O.

	Solvent Phase	Aqueous Phase
Test: 18 Run: 1	Dish No: 58	Dish No: 703
Log No: 7451-57I	Dish + Sample Wt: 40.7126 g	Dish + Sample Wt: 46.8705 g
Color & Appearance:	Dish Tare Wt: 40.7126 g	Dish Tare Wt: 46.8704 g
	Fraction Wt: 0.0000 g	Fraction Wt: 0.0001 g
Comments:	Smpl Vol: 200 ml, Alqt: 200 ml, Factor: 1.000	Smpl Vol: 200 ml, Alqt: 100 ml, Factor: 2.000
	Sample Wt: 0.0000 g	Sample Wt: 0.0002 g
Test: 18 Run: 2	Dish No: 62	Dish No: 714
Log No: -58I	Dish + Sample Wt: 50.8913 g	Dish + Sample Wt: 48.6346 g
Color & Appearance:	Dish Tare Wt: 50.8883 g	Dish Tare Wt: 48.6341 g
	Fraction Wt: 0.0030 g	Fraction Wt: 0.0005 g
Comments:	Smpl Vol: 290 ml, Alqt: 290 ml, Factor 1.000	Smpl Vol: 290 ml, Alqt: 100 ml, Factor 2.900
	Sample Wt: 0.0030 g	Sample Wt: 0.0015 g
Test: 18 Run: 3	Dish No: 65	Dish No: 718
Log No: -59I	Dish + Sample Wt: 44.6607 g	Dish + Sample Wt: 41.3981 g
Color & Appearance:	Dish Tare Wt: 44.6570 g	Dish Tare Wt: 41.3909 g
	Fraction Wt: 0.0037 g	Fraction Wt: 0.0072 g
Comments:	Smpl Vol: 320 ml, Alqt: 320 ml, Factor 1.000	Smpl Vol: 320 ml, Alqt: 100 ml, Factor 3.200
	Sample Wt: 0.0037 g	Sample Wt: 0.0230 g
Test: 18 Run: 4	Dish No: 68	Dish No: 728
Log No: -60I	Dish + Sample Wt: 43.1614 g	Dish + Sample Wt: 42.9810 g
Color & Appearance:	Dish Tare Wt: 43.1548 g	Dish Tare Wt: 42.9805 g
	Fraction Wt: 0.0066 g	Fraction Wt: 0.0005 g
Comments:	Smpl Vol: 310 ml, Alqt: 310 ml, Factor 1.000	Smpl Vol: 310 ml, Alqt: 100 ml, Factor 3.100
	Sample Wt: 0.0066 g	Sample Wt: 0.0016 g

Note: Factor = Sample Volume/Aliquot Volume

Blank Solvent Wt. 0.0000 g

√ gy

	RUN 1	RUN 2	RUN 3	RUN 4
Results of Solvent Phase g	0.0000	0.0030	0.0037	0.0066
Results of Aqueous Phase g	0.0000	0.0013	0.0228	0.0014

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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 / HAYWARD	Source/Site	LINE 1 KONUS STACK
Date Submitted		Test No.	18
Date of Analysis	4-4-96	Technician	SCB

Transport Leakage☐ None☒ ______ ml Solvent ______

Test: 18	Run: 0	Dish No: 23	
Log No: 7451- 56P		Dish + Sample Wt: 46.0848	g
Volume of Solvent	120 ml	Dish Tare Wt: 46.0847	g
*Solvent Residue	ug/ml	Sample Wt: .0001	g
Test: 18	Run: 1	Dish No: 882	
Vol. of Solvent	130 ml	Dish + Sample Wt: 38.1192	g
Log Number -57P		Dish Tare Wt: 38.0970	g
Comments		Sample Wt: .0212	g
Test: 18	Run: 2	Dish No: 849	
Vol. of Solvent	150 ml	Dish + Sample Wt: 46.5371	g
Log Number -58P		Dish Tare Wt: 46.5298	g
Comments		Sample Wt: .0073	g
Test: 18	Run: 3	Dish No: 93	
Vol. of Solvent	160 ml	Dish + Sample Wt: 53.9928	g
Log Number -59P		Dish Tare Wt: 53.9832	g
Comments		Sample Wt: .0096	g

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

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

√SW

		RUN 0	RUN 1	RUN 2	RUN 3
Results of Solvent Rinse	g	.0001	.0211 D-3	.0072	.0095

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/HAYWARD	Source/Site	LINE 1 KONUS STACK
Date Submitted		Test No.	18
Date of Analysis	4-4-96	Technician	SLB

Transport Leakage ☐ None ☒ ______ ml Solvent ______

Test: 18	Run: 4	Dish No: 622
Log No: 7451-60P		Dish + Sample Wt: 48.8508 g
Volume of Solvent	165 ml	Dish Tare Wt: 48.8492 g
*Solvent Residue	ug/ml	Sample Wt: .0016 g
Test:	Run:	Dish No:
Vol. of Solvent	ml	Dish + Sample Wt: g
Log Number		Dish Tare Wt: g
Comments		Sample Wt: g
Test:	Run:	Dish No:
Vol. of Solvent	ml	Dish + Sample Wt: g
Log Number		Dish Tare Wt: g
Comments		Sample Wt: g
Test:	Run:	Dish No:
Vol. of Solvent		Dish + Sample Wt: g
Log Number		Dish Tare Wt: g
Comments		Sample Wt: g

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

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

✓SN

	RUN 4	RUN	RUN	RUN
Results of Solvent Rinse g	0.0015	D-4		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Filter Gravimetrics Reporting Sheet

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

Job	LP/HAYWARD	Source/Site	LINE ' KONUS STACK
Date Submitted		Test No.	18
Date of Analysis	4-8-6	Technician	SLB

Test: 18	Run: 0	Filter No:	7988
Field Blank:		Filter Type:	4" G.F
Log No: 7451-56F		Filter + Sample Wt:	.8561 g
Color: WHITE		Filter Tare Wt:	.8561 g
		Sample Wt:	.0000 g
Test: 18	Run: 1	Filter No:	7989
Log No: -57F		Filter Type:	4" G.F.
Color: LIGHT TAN		Filter + Sample Wt:	.8694 g
		Filter Tare Wt:	.8463 g
		Sample Wt:	.0231 g
Test: 18	Run: 2	Filter No:	7977
Log No: -58F		Filter Type:	4" G.F.
Color: LIGHT TAN		Filter + Sample Wt:	.9824 g
		Filter Tare Wt:	.9597 g
		Sample Wt:	.0227 g
Test: 18	Run: 3	Filter No:	7986
Log No: -59F		Filter Type:	4" G.F.
Color: LIGHT TAN		Filter + Sample Wt:	.8771 g
		Filter Tare Wt:	.8565 g
		Sample Wt:	.0206 g

√SLV

	RUN 0	RUN 1	RUN 2	RUN 3
Results of Filter Analysis g	.0000	.0231	.0227	.0206

	RUN	RUN	RUN	RUN
Total Mass g				

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Filter Gravimetrics Reporting Sheet

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

Job	LP / HAYWARD	Source/Site	ZINC NO. 1 RONUS STACK
Date Submitted		Test No.	18
Date of Analysis	4-7-90	Technician	SLR

Test: 18	Run: 4	Filter No: 7987	
Field Blank:		Filter Type: 4" G.F.	
Log No: 7951-60F		Filter + Sample Wt: .8761	g
Color: GREY		Filter Tare Wt: .8440	g
		Sample Wt: .0321	g
Test:	Run:	Filter No:	
Log No:		Filter Type:	
Color:		Filter + Sample Wt:	g
		Filter Tare Wt:	g
		Sample Wt:	g
Test:	Run:	Filter No:	
Log No:		Filter Type:	
Color:		Filter + Sample Wt:	g
		Filter Tare Wt:	g
		Sample Wt:	g
Test:	Run:	Filter No:	
Log No:		Filter Type:	
Color:		Filter + Sample Wt:	g
		Filter Tare Wt:	g
		Sample Wt:	g

√gy

	RUN 4	RUN	RUN	RUN
Results of Filter Analysis g	.0321			

	RUN	RUN	RUN	RUN
Total Mass g				

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job LP/HAYWARD Source LINE No. 1 KONUS Site STACK Log No. 7451
Field Engineer J. BAZINVILLE Date of Test 3-21-96 Test No. 18 No. of Runs 4

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		
	Impingers: ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☒ ACETONE 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		
—	**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
James Bunnell INTERPOLL LABS	[signature] / Interpoll	3/22/96 1115

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APPENDIX E

OPERATIONAL DATA

HAYWARD LINE 1 THERMAL OIL (REVISED)

CONTENTS	PAGE
TEST SCHEDULES	1
LINE 2 THERMAL OIL , DRYER & PRESS DATA SUMMARY	2
LINE 1 THERMAL OIL HEATER MARCH 21, 1996 PM	
PRODUCTION/SUMMARY	3
PRESS REPORT	4
PRESS CHARTS	5
KONUS DATA SHEETS	6-8
PRESS RTO CHART	9
BOARD WEIGHTS/THICKNESSES	10

HAYWARD TESTING MARCH 21st, 1996
Test schedule

Line 1 Thermal Oil Stack

	POLLUTAN	RUN #1	RUN #2	RUN #3
3-21	PM	850-955	1038-1145	1210-1312

HAYWARD LINE 1 TESTING MARCH 21, 1996
Line 1 process data summary

LINE 1 THERMAL OIL HEATER MARCH 21, 1996 - PM

18.73 =Production rate in Tons per hour
0.58 =K3 estimated Tons per hour of fuel burned based on fuel measurement
10.41 =K3 estimated mmBTU per hour input based on fuel measurement
0.88 =K4 estimated Tons per hour of fuel burned based on fuel measurement
15.77 =K4 estimated mmBTU per hour input based on fuel measurement
1.45 =Total tons of dry bark per hour input
26.18 =Total mmBTU per hour input

HAYWARD LINE 1 MARCH 21, 1996
THERMAL OIL STACK - PM

DATA TIME	START=	08:45	END=	08:55	HOURS=	0.17
	START=	09:10	END=	13:15	HOURS=	4.08
					TOTAL=	4.25

BOARD WEIGHTS - LBS
average weights determined by taking bundle weights divided by peices per unit over the testing period.

7/16"
per/peice 48.77
per/ 8' x 16' 195.07

PLANT PRODUCTION RATE

4.25 =hours during testing
68 =pressloads
816 =no. of 8'x16' boards produced (pressloads x 8 boards per load)
159,179 =lbs of finished product (boards produced x weight of finished board)
37,454 =lbs of finished product per hour (lbs of finshed product / hours)
18.73 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY BARK INPUT

K1
13.89 =K1 fuel calibration in pounds per count
589 =K1 counts during testing hours
8,181 =K1 lbs of wet fuel burned during testing
4.25 =hours during testing
39.90% =average moisture content of fuel
4,917 =total pounds of dry fuel burned during testing (wet pounds x (1- moisture content))
1,156.92 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.58 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9,000 =estimated BTU content per pound of dry fuel,
10.41 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

K2
13.89 =K2 fuel calibration in pounds per count
892 =K2 counts during testing hours
12,390 =K2 lbs of wet fuel burned during testing
4.25 =hours during testing
39.90% =average moisture content of fuel
7,446 =total pounds of dry fuel burned during testing (wet pounds x (1- moisture content))
1,752.07 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.88 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9,000 =estimated BTU content per pound of dry fuel,
15.77 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

FUEL BURNING RATE ESTIMATED TEMPERATURE DIFFERENTIAL

K1
454.40 =average incoming oil temperature on degrees f.
481.30 =average outgoinging oil temperature on degrees f.
60 =temperature differential at 100% capacity in degrees f
26.9 =actual temperature differential
19.4 =maximum mmbtu input at 100% capacity
8.70 =estimated mmbtu input per hour (actual temp. diff. / max temp. diff.) x max mmbtu input
9,000 =estimated BTU content per pound of dry fuel,
0.48 =estimated tons of dry fuel burned per hour during testing (btu input / btu content of dry fuel/2000)

K2
428.30 =average incoming oil temperature on degrees f.
471.40 =average outgoinging oil temperature on degrees f.
60 =temperature differential at 100% capacity in degrees f
43.1 =actual temperature differential
19.4 =maximum mmbtu input at 100% capacity
13.94 =estimated mmbtu input per hour (actual temp. diff. / max temp. diff.) x max mmbtu input
9,000 =estimated BTU content per pound of dry fuel,
0.77 =estimated tons of dry fuel burned per hour during testing (btu input / btu content of dry fuel/2000)

PRESS REPORT - LINE (1) 2

DATE: 3/5/06

OPERATOR: Meyers

SHIFT: Fri

CREW: C

THICKNESS: 7/16

PRESS LDS: 196 7/16

OVERALL TIMER: 157

DECOMPRESSION TIME: 14+1

PRESS TEMP: 215

TOTAL REJECTS: —

LOG COUNT: 1,435

LINE SPEED	THKNS.	FROM	TO
55	7/16	700	923
58	7/16	923	210
59	7/16	210	700

S-89
C 23

F.C.O.S. HYD. RADIATOR: 10:00 TIME

PRESS BLOWN DOWN: 9:30

SPINNER HEADS FLUSHED: — TIME

SURFACE BLENDER HOSED: — TIME

FORMER HYD RADIATOR: — TIME

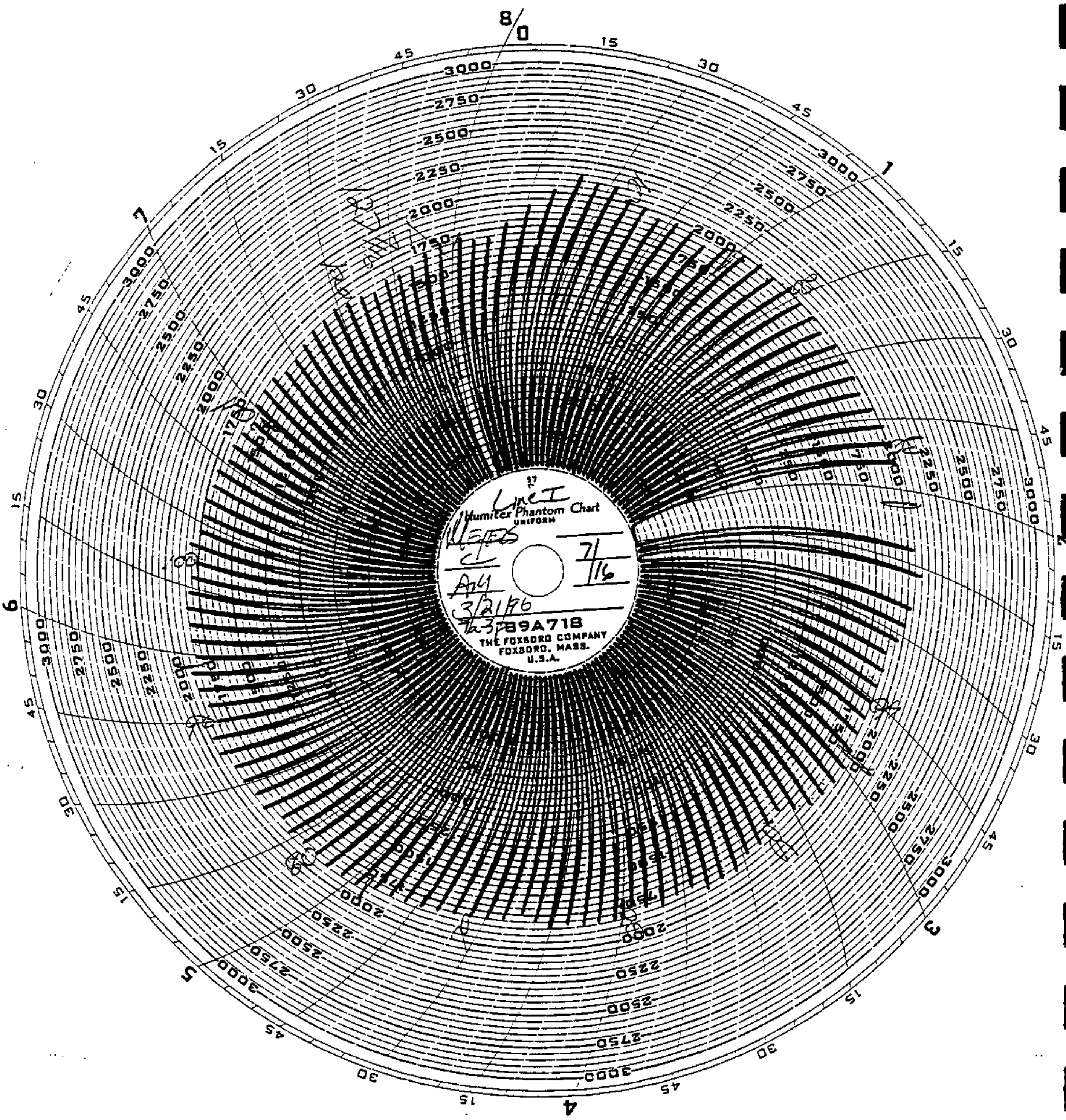
LS C

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
—	—	—				Replaced form screen.
9:00	9:18		18			Fuse blown for Loader Boom Brake;
						Kept tripping out Loader Boom.

DOWNTIME CODE: M - MECHANICAL 18 E - ELECTRICAL O - OPERATOR

4

LINE I
PRESS CHART
3/21/96
0700 - 1500



5

KONUS DATA READINGS EVERY 10 MINUTES /

PLANT Hayward L.P

BY Pat m

DATE 3-21-96 PAGE / OF 1

TIME	K1 OIL IN TEMP	K1 OIL OUT TEMP	K1 I.D. FAN W.C	K2 OIL IN TEMP	K2 OIL OUT TEMP	K2 I.D. FAN W.C	K3 OIL IN TEMP	K3 OIL OUT TEMP	K3 I.D. FAN W.C	K4 OIL IN TEMP	K4 OIL OUT TEMP	K4 I.D. FAN W.C	FUEL COUNT K1	FUEL COUNT K2	FUEL COUNT K3	FUEL COUNT K4	ONCE/HR BARK MOISTURE
8:30	234	253	-0.4	219	233	-3							333	412			40.1
8:45	233	251	-0.4	219	241	-2.6							560	472			39.6
9:00	235	254	-0.3	221	247	-2.2							418	514			39.8
9:15	239	256	-0.4	219	253	-2.0							457	561			40.5
9:30	239	258	-0.4	225	250	-2.4							490	605			39.3
9:45	232	250	-0.4	219	245	-2.2							528	661			40.2
10:00	232	244	-0.4	219	244	-2.4							556	702			40.3
10:15	232	246	-0.4	219	240	-2.4							593	757			39.6
10:30	232	244	-0.4	216	238	-2.4							629	816			
1045	233	256	-0.4	220	242	-2.2							672	873			
11:00	236	256	-0.4	223	249	-2.4							717	929			
11:15	240	257	-0.4	227	248	-2.4							770	997			
11:30	235	254	-0.4	220	239	-2.6							819	1059			
11:45	236	253	-0.4	221	244	-2.4							864	1106			
12:00	237	256	-0.4	224	251	-2.2							911	1145			
12:15	235	247	-0.4	221	246	-2.2							953	1184			
12:30	232	241	-0.4	217	237	-2.4							1004	1221			
12:45	233	241	-0.5	218	242	-2.4							1050	1278			
1:00	234	240	-0.5	218	241	-2.4							1105	1325			
1:15	231	241	-0.5	216	237	-2.6							1149	1364			
1:30	234	252	-0.4	220	243	-2.4							1201	1422			
1:45	234	254	-0.4	220	244	-2.4							1251	1475			
2:00	238	256	-0.4	225	246	-2.2							1291	1524			
2:15	235	255	-0.5	225	249	-2.2							1335	1586			
230	241	256	-0.4	229	251	-2.2							1374	1631			
2:45	234	250	-0.5	221	250	-1.6							1416	1685			
3:00	234	253	-0.4	220	248	-2.2							1458	1729			

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Page 1 of 1

Konus EFB Readings date 3-21-96

Plant Hayward L.P. by Pat M

readings every 10 minutes

time	K1 and K2						K3 and K4					
	Bed Volt	Bed Current	Ion Volt	Ion Current	EFB Press.	Baghouse Press.	Bed Volt	Bed Current	Ion Volt	Ion Current	EFB Press.	Baghouse Press.
8:30	11.5	1.4	30	3.8	0.8	3.5						
8:45	9.5	1.4	28	3.8	1.6	2.5						
9:00	12.0	1.6	28	3.6	2.0	2.0						
9:15	12.0	1.4	28	3.4	2.2	2.5						
9:30	12.0	1.4	28	3.6	2.2	2.5						
9:45	12.0	1.6	28	3.6	2.4	2.0						
10:00	12.0	1.6	28	3.6	2.6	2.0						
10:15	12.0	1.6	28	3.6	2.6	2.0						
10:30	12.0	1.6	28	3.8	2.6	2.0						
10:45	11.5	1.6	28	3.8	2.0	2.5						
11:00	11.5	1.8	27	4.0	1.8	2.0						
11:15	11.5	2.0	27	4.0	1.8	2.5						
11:30	11.5	2.0	27	3.6	1.8	2.0						
11:45	10.0	1.8	27	4.0	2.0	2.5						
12:00	11.5	2.0	28	3.4	2.2	2.5						
12:15	11.5	2.0	27	3.4	2.0	2.5						
12:30	11.5	1.8	27	3.6	2.4	2.0						
12:45	11.5	1.8	27	3.6	2.6	2.0						
1:00	9.0	1.6	27	3.8	2.4	2.5						
1:15	11.5	1.6	27	3.8	2.2	2.5						
1:30	11.5	1.8	28	3.6	2.0	2.5						
1:45	9.5	2.2	29	3.8	2.0	2.5						
2:00	11.5	2.0	29	3.8	2.0	2.0						
2:15	11.6	2.0	28	3.6	2.2	2.5						
2:30	11.0	2.0	29	3.6	2.0	2.0						
2:45	11.0	2.2	28	3.8	2.0	2.5						
3:00	11.0	2.0	28	3.8	2.0	2.5						

SHIFT: I OR II
LINES 1 & 2

K-1 - K-2

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	13	12.5	12	12	11.5	11.5	11.5	11.5	10	11	11	11
Bed Amperage (MA)	.08	.10	.14	.15	.17	.20	.16	.18	.20	.21	.22	.22
Ionizer Voltage (KV)	27	28	28	27	27	27	28	29	28	28	28	26
Ionizer Amperage (MA)	3.0	3.2	3.6	3.8	3.9	3.4	3.6	3.8	4.0	3.6	3.0	3.4
EFB Pressure Drop (In.)	0	1.7	1.7	2.2	2.6	2.2	2.4	2.1	2.0	1.8	1.6	1.6
Inlet Temperature	378	395	401	411	416	418	403	411	418	419	420	419
Outlet Temperature	290	297	303	312	320	323	323	323	327	327	330	329
Rock Flow	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Condition Code*	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Rock Usage/Shift: ______

K-3 - K-4

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	6.5	6.5	6.5	6.5	6.5	6.5	6.8	7	7	7	7	7
Bed Amperage (MA)	.20	.20	.20	.18	.18	.18	.20	.20	.18	.18	.18	.17
Ionizer Voltage (KV)	21	21	21	21	20	20	21	21	21	21	21	21
Ionizer Amperage (MA)	2.0	2.0	2.0	2.1	2.6	2.0	2.0	2.2	2.0	2.0	2.1	2.2
EFB Pressure Drop (In.)	.04	.04	.05	.04	.04	.04	.05	.04	.04	.04	.04	.04
Inlet Temperature	499	475	484	449	437	439	443	435	449	453	4.8	480
Outlet Temperature	395	398	396	397	407	403	407	403	404	405	407	400
Rock Flow	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Condition Code*	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Rock Usage/Shift: ______

Baghouse Pressure Drop: (in.)	7	8	9	10	11	12	1	2	3	4	5	6
L-I	2.4	2.3	2.5	2.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
L-II	4.8	4.8	4.8	4.7	4.7	4.7	4.4	4.4	4.6	4.4	4.4	4.6

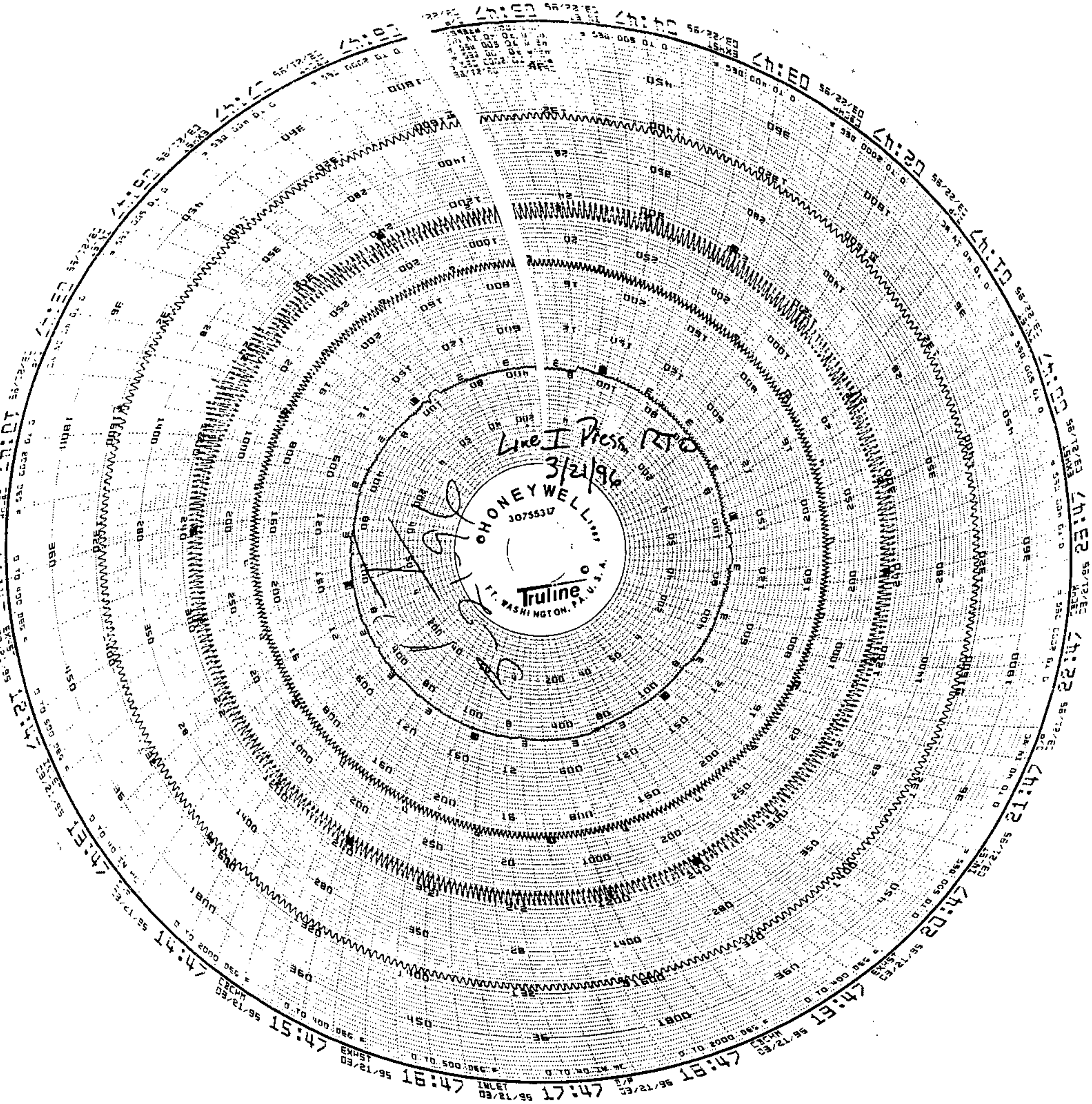
Comments/Problems: ______

*Condition Codes
1) Start up/shutdown
2) Konus down
3) Moisture in bed
4) Adding rock
5) Power Outage
6) Checking EFB
7) Konus on oil
8) Maintenance

VOLUME PER SHIFT

LINE I	1 1/2
LINE II	1 1/2

123/EFBFORMS/KNSRPT


Line I Press, RTO
3/21/96
HONEYWELL
Truline
FT. WASHINGTON, PA. U.S.A.

9

3/21 1-3
26 114718

DATE: 3-21-96 - 1
SHIFT/CREW: 7AM 2nd C
OPERATOR: Atkinson

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
7/16 1	#4206	39 3/4	7/16 36	#4433	39 3/4
2	Called	39 3/4	37		39 1/2
3		40	38		39 5/8
4	#4208	39 5/8	39		39 1/2
5		40	40	#4376	39 5/8
6		40	41		39 1/2
7	Called	40	42		39 5/8
8	#4411	40 1/4	43		39 1/2
9		39 7/8	44	#4436	39 1/2
10		39 1/2	45		39 1/2
11		39 1/2	46		39 3/4
12	#4318	39 1/2	47		39 3/4
13		39 1/2	48	#4569	39 3/4
14		39 1/2	49		39 3/4
15		39 1/2	50		39 3/4
16	#4412	39 1/2	51		39 3/4
17		39 1/2	52	#4451	39 1/2
18		39 1/2	53		39 3/4
19		39 3/4	54		39 7/8
20	#4442	39 1/2	55		39 3/4
21		39 1/2	56	4360	39 1/2
22		39 1/2	57		39 3/4
23		39 1/2	58		39 1/2
24	#4430	39 1/2	59		39 3/4
25		39 3/8	60	4331	39 3/4
26		39 1/2	61		39 1/2
27		39 1/4	62		39 1/2
28	#4446	39 1/2	63		39 1/2
29		39 1/2	64	#4379	39 1/2
30		39 1/2	65		39 3/4
31		39 5/8	66		39 3/4
32	#4453	39 5/8	67	Called	40
33		39 3/4	68	4342	40
34		39 5/8	69		39 7/8
35		39 3/4	70		39 1/2

APPENDIX F

PROCEDURES

Particulate Loading and Emission Rates

The particulate emission rates were determined per EPA Methods 1 - 5, CFR Title 40, Part 60, Appendix A (revised July 1, 1992). In this procedure a preliminary velocity profile of the gases in the flue is obtained by means of a temperature and velocity traverse. On the basis of these values, sampling nozzles of appropriate diameter are selected to allow isokinetic sampling, a necessary prerequisite for obtaining a representative sample.

The sampling train consists of a heated glass-lined sampling probe equipped with a Type S pitot and a thermocouple.. The probe is attached to a sampling module which houses the all-glass in line filter holder in a temperature controlled oven. The sampling module also houses the impinger case and a Drierite filled column. The sampling module is connected by means of an umbilical cord to the control module. The control module houses the dry test gas meter, the calibrated orifice, a leakless pump, two inclined manometers, and all controls required for operating the sampling train.

Particulate samples are collected as follows: The sample gas is drawn through the sampling probe isokinetically and passed through a 4-inch diameter Gelman Type A/E glass fiber filter where particulates are removed. The sample gas is then passed through an ice-cooled impinger train and a desiccant-packed column which absorbs remaining moisture. The sample gas then passes through a vacuum pump followed by a dry test gas meter. The gas meter integrates the sample gas flow throughout the course of the test. A calibrated orifice attached to the outlet of the gasmeter provides real time flow rate data.

A representative particulate sample was acquired by sampling for equal periods of time at the centroid of a number of equal area regions in the duct. The sampling rate is adjusted at each test point maintaining isokinetic sampling conditions. Nomographs are used for rapid determination of the sampling rate.

Particulate Loading and Emission Rates

After sampling is complete, the filter is removed and placed in a clean container. The nozzle and inlet side of the filter holder are quantitatively washed with acetone and the washings are stored in a second container. A brush is often used in the cleaning step to help dislodge deposits. The samples are returned to the laboratory where they are logged in and analyzed. The volume of the acetone rinse ("probe wash") is noted and then the rinse is quantitatively transferred to a tared 120 cc porcelain evaporating dish and the acetone evaporated off at 97-105 °F. This temperature is used to prevent condensation of atmospheric moisture due to the cooling effect induced by the evaporation of acetone. The acetone-free sample is then transferred to an oven and dried at 105 °C for 30 minutes, cooled in a desiccator over Drierite, and then weighed to the nearest .01 mg. The filter sample is quantitatively transferred to a 6-inch watch glass and dried in an oven at 105 °C for two hours. The filter and watch glass are then cooled in a desiccator and the filter weighed to the nearest .01 mg. All weighings are performed in a balance room where the relative humidity is hydrostatted to less than 50% relative humidity. Microscopic examination of the samples is performed if any unusual characteristics are observed. The weight of the acetone rinse is corrected for the acetone blank. The Drierite column is weighed on-site and the water collected by Drierite is added to the condensate so that the total amount of absorbed water may be ascertained.

Integrated flue gas samples for Orsat analysis were collected simultaneously with each pollutant sample. The samples were collected in 15-liter gas sampling bags at a constant flow rate throughout each particulate run. The bags were at a constant flow rate throughout each particulate run. The bags were then returned to the laboratory and analyzed by Orsat analysis. Standard commercially prepared solutions were used in the Orsat analyzer (sat. KOH for carbon dioxide and reduced methylene blue for oxygen).

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Condensible Organic Compounds Analysis

(State of Wisconsin - EPA Method 5)

Method II-8672-WI

Equipment: Separatory funnel - 500 cc with Teflon stopcock

Powder funnel - 75 mm ID with a glass wool plug

Evaporating dish(es) - 200 cc or 250 cc beaker

Reagents: Methylene chloride

Sodium sulfate - (ACS) granular anhydrous (purified by heating for four hours in a shallow tray)

SAMPLING

An all-glass impinger assembly is used in the back half of the EPA Method 5 sampling train when an organic wet catch is to be collected. The impinger assembly consists of a modified impinger, a Greenburg Smith impinger followed by another modified impinger. The third impinger should have a temperature measuring device at the outlet upstream of a final impinger or desiccant column to monitor the temperature of the outlet gas stream. Prior to the start of the test, each of the first two impingers should be charged with 100 g of Class I water. The Method 5 train should be operated as provided for in EPA Method 5. Ice should be added to the impinger bath to keep the temperature of the gas at the outlet at or less than 68°F. After the post test leak check, the impinger train is removed and impinger contents poured into a tared all-glass sample bottle and closed with a Teflon-lined cap. The sample bottle is then weighed and the total condensate calculated by subtraction of the bottle tare weight and the weight of initial water added to the impingers (200 g). A label is affixed and the sample is returned to the laboratory for analysis. The sample should be stored at 4°C if the analysis is not conducted within 48 hours.

ANALYSIS

1. Sample bottles are removed from storage and the contents quantitatively transferred to a clean 500 cc separatory funnel equipped with a Teflon stopcock.

2. Rinse the sample container with distilled water and add to separatory funnel.

3. Then rinse the sample container with acetone and pour through sodium sulfate into a tare beaker marked A.

4. The sample is then extracted consecutively with three 50 cc aliquots of methylene chloride. The extraction is performed according to normal laboratory practice observing the customary safety precaution of releasing excess pressure after each shaking.

5. After each of the three extractions are completed, the organic solvent should be dried by passing it through a funnel containing anhydrous sodium sulfate and collecting it and two 50 cc rinses in the tared beaker marked A (the same one used to catch the acetone container rinse).

6. Evaporate to dryness in a hood at 70°F or less. Do not evaporate so quickly as to allow evaporative cooling to lower the temperature of the container below the dew point otherwise water will be condensed in the container.

7. Desiccate for two hours in a sealed desiccator and final weigh. Report all results in grams. All weighings should be made to nearest 0.1 mg (four places).

8. The remaining liquid in the separatory funnel is then transferred to a tared beaker marked B and is evaporated to dryness at 220°F ± 10°F. The analyst may take an aliquot of the sample, transferring it to a tared beaker and evaporate to dryness at 220°F ± 10°F. If an aliquot is used, the weight of the sample and aliquot will have to be taken to correct for the total sample weight.

9. After the drying step, the sample is cooled in a desiccator and weighted to a constant weight to the nearest 0.1 mg.

Calculation (if aliquot is taken):

$$\text{grams} = \frac{\text{(grams recovered from aliquot)} \times \text{(total volume (ml) or grams of sample)}}{\text{(aliquot volume (ml) or grams used)}}$$

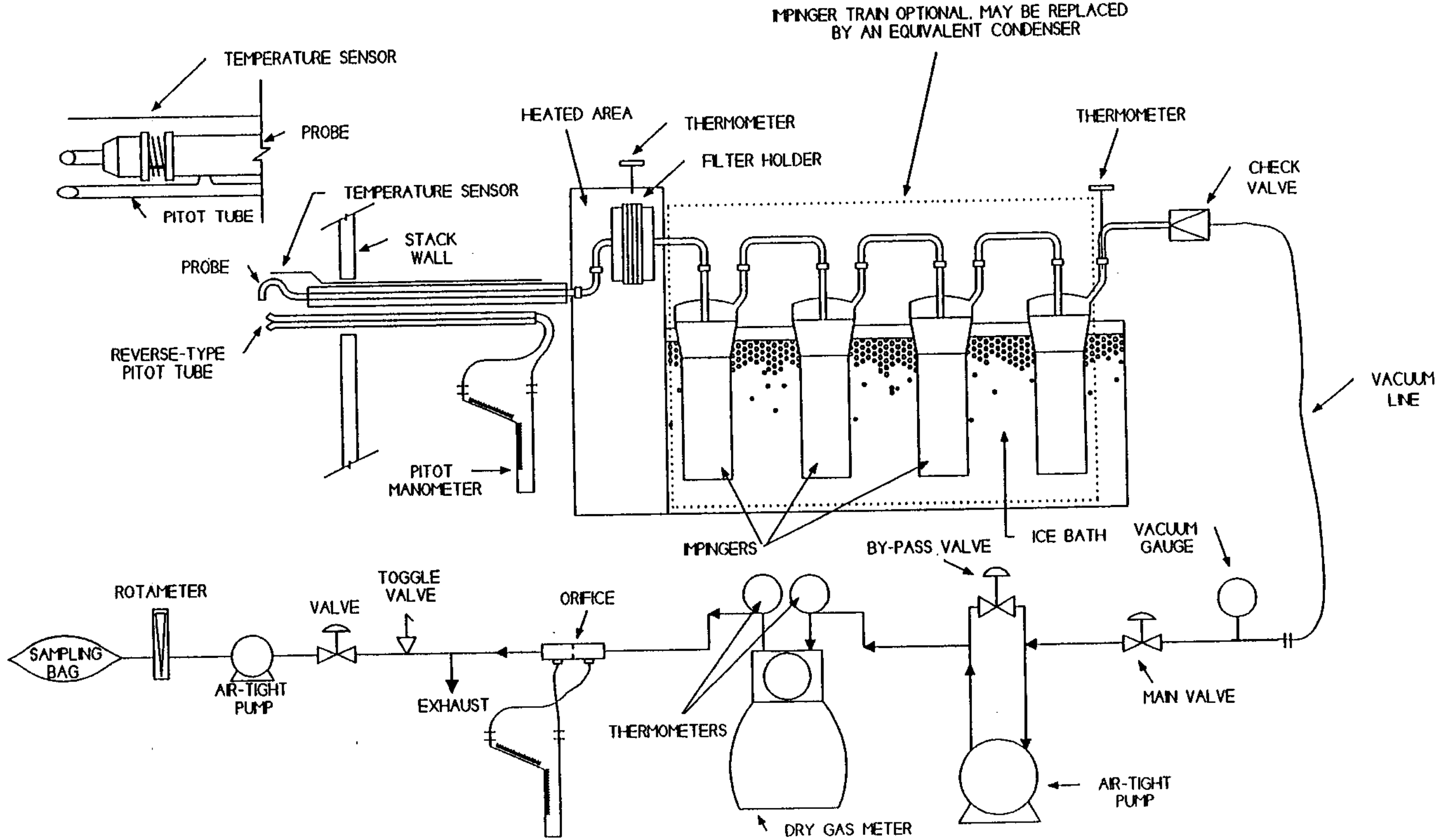
If volume is used, it must be used for both the aliquot and sample. The same goes for using weight.

10. A field blank should be analyzed in an identical manner. If a field blank is not submitted, take an aliquot of Class I water equal in volume to the samples and analyze in a similar manner.

11. The results for container A are to be marked in the organic section of Interpoll Form #LSC-03G.

12. The results for container B are to be marked in the inorganic section of Interpoll Form #LSC-03G.

PARTICULATE SAMPLING TRAIN



APPENDIX G

CALCULATION EQUATIONS

METHOD 2
CALCULATION EQUATIONS

$$\overline{V_s} = 85.49\ C_p\ (\sqrt{\Delta p})_{avg}\ \sqrt{\frac{T_{s(avg)}}{P_s\ M_s}}$$

$$Q_{s,\,d} = 60\ (1\ - B_{ws})\ \overline{V_s}\ A\ (\frac{528}{T_{s\ (avg)}})\ (\frac{P_s}{29.92})$$

$$Q_a = 60\ \overline{V_s}\ A$$

$$\dot{m}_g = \frac{4.995\ Q_{s,\,d}\ G_d}{1\ -\ B_{ws}}$$

$$RH^* = 100\ (vp_{twb}\ -\ 0.0003641\ P_s\ (T_{db}\ -\ T_{wb}))/vp_{tdb}$$

$$B_{ws}^* = RH(vp_{tdb})/P_s$$

$$\rho = \frac{4.585\ x\ 10^{-2}\ P_s M_s}{T_s\ (avg)}$$

*Alternate equations for calculating moisture content from wet bulb and dry bulb data.

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SYMBOLS

A	=	Cross Sectional area of stack, SQ. FT.
A_n	=	Cross sectional area of nozzle, SQ. FT.
B_{ws}	=	Water vapor in gas stream, proportion by volume
C_p	=	Pitot tube coefficient, dimensionless
C_a	=	Concentration of particulate matter in stack gas, wet basis, GR/ACF
C_s	=	Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, GR/DSCF
EA	=	Excess air, percent by volume
γ	=	Dry test meter correction factor, dimensionless
G_d	=	Specific gravity (relative to air), dimensionless
I	=	Isokinetic variation, percent by volume
M_d	=	Molecular weight of stack gas, dry basis, g/g - mole.
$\dot{m}_g$	=	Mass flow of wet flue gas, LB/HR
$\dot{m}_p$	=	Particulate mass flow, LB/HR
M_s	=	Molecular weight of stack gas, wet basis, g/g mole.
M_p	=	Total amount of particulate matter collected, g
P_{bar}	=	Atmospheric pressure, IN. HG. (uncompensated)
P_g	=	Stack static gas pressure, IN. WC.
P_s	=	Absolute pressure of stack gas, IN. HG.
P_{std}	=	Standard absolute pressure, 29.92 IN. HG.
A_a	=	Actual volumetric stack gas flow rate, ACFM
$Q_{s,d}$	=	Dry volumetric stack gas flow rate corrected to standard conditions, DSCFM
RH	=	Relative humidity, %

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T_{db}	=	Dry bulb temperature of stack gas, °F
T_{wb}	=	Wet bulb temperature of stack gas, °F
$T_{m(avg)}$	=	Absolute average dry gas meter temperature, °R
$T_{s(avg)}$	=	Absolute average stack temperature, °R
T_{std}	=	Standard absolute temperature, 528 °R (68 °F)
θ	=	Total sampling time, min.
V_{lc}	=	Total volume of liquid collected in impingers and silica gel, ml
V_m	=	Volume of gas sample as measured by dry gas meter, CF
$V_{m(std)}$	=	Volume of gas sample measured by the dry gas meter corrected to standard conditions, DSCF
$V_{w(std)}$	=	Volume of water vapor in the gas sample corrected to standard conditions, SCF
$\bar{V}_s$	=	Average actual stack gas velocity, FT/SEC
vp_{tdb}	=	Vapor pressure at T_{db}, IN. HG.
vp_{twb}	=	Vapor pressure at T_{wb}, IN. HG.
$\overline{\Delta H}$	=	Average pressure differential across the orifice meter, IN. WC.
ΔP	=	Velocity pressure of stack gas, IN. WC.
γ	=	Dry test meter correction coefficient, dimensionless
ρ	=	Actual gas density, LB/ACF

METHOD 3
CALCULATION EQUATIONS

$$\%EA = \frac{100(\%O_2 - 0.5\%\ CO)}{0.264\%\ N_2 - \%O_2 + 0.5\%\ CO}$$

$$M_d = 0.44(\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%N_2 + \%CO)$$

$$M_s = M_d\ (I - B_{ws}) + 0.18\ B_{ws}$$

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

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METHOD 5
CALCULATION EQUATIONS

$$V_{m(std)} = 17.65\ V_m\ \gamma\ \left(\frac{P_{bar} + \overline{\Delta H}/13.6}{T_{m(avg)}}\right)$$

$$V_{w(std)} = 0.0472\ V_{ls}$$

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

$$I = 0.0944\ \left(\frac{T_{s(avg)}\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (I - B_{ws})}\right)$$

$$C_s = \frac{15.43\ M_p}{V_{m(std)}}$$

$$C_a = \frac{272.3\ M_p\ P_s}{T_{s(avg)}\ (V_{w(std)} + V_{m(std)})}$$

$$(\dot{m}_p)_1 = 8.5714\ x\ 10^{-3}\ C_s\ Q_{s,\ d}$$

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$$(\dot{m}_p)_2 = \frac{1.3228 \ x \ 10^{-1} \ M_p \ A}{\theta \ A_n}$$

$$\dot{m}_p = \frac{(\dot{m}_p)_1 + (\dot{m}_p)_2}{2}$$

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APPENDIX H

SAMPLING TRAIN CALIBRATION DATA

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job LP HAYWARD Date 3-21-96

Operator J. BACJVILLE J. LORENZ Module No. 13

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 = ~~1.82~~ 1.0023 ΔH@ 1.82 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(450.90)		
2.5	452.74	32	18
5.0	454.57	36	19
7.5	456.36	37	20
10	458.14	40	21
	V_m = 7.24	Avg(t_m) = 27.9 °F	

Calculate Y_{cn} as follows:

$$Y_{cn} = \frac{1.786}{\theta\ V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

7.366

,246 4.083

$$Y_{cn} = \frac{1.786}{(1.0023)\ (7.24)}\left[\frac{(27.9) + 460}{(29.26)}\right]^{0.5}$$

Y_{cn} = 1.005

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

Meter Box Calibration and Usage Status

Date of Report: March 26, 1996

Meter Box No. : 13 (Rockwell Dry Test Meter Serial No. 1334119)

Date of Last Calibration: January 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.)
March 19, 1996	6-7451	315.18	639.72	324.54	324.54

* Total volume through meter since last calibration.

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

Date 1-5-95
Bar. Press. 29.60 IN.HG
Wet Test Meter No. AL-20

Control Module No. 13
Serial No. DTM 1334119
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_t
							Wet Test t_w	Dry Test					
Nominal	Actual	(ft^3)	(%)	(IN.WC.)	V_{di}	V_{df}	(°F)	t_{di} (°F)	t_{do} (°F)	(Min/Sec)	Y	ΔH@	
0.5	0.5	2	99.85	0.01	295.745	297.811	65	92	72	5/01	0.99664	1.7184	
1.2	1.2	3	99.91	0.025	292.358	295.450	65	95	72	5/01	1.00049	1.8257	
2.0	2.0	3	99.93	0.055	288.874	291.955	65	97	72	3/55	1.00404	1.8506	
3.3	3.3	5	100.00	0.09	282.735	287.843	65	97	71	5/05	1.00581	1.8508	
4.7	4.7	5	100.02	0.12	275.830	280.910	65	94	68	4/16	1.00425	1.8599	
	2	3	4	5	6	7	8	9	10	11/12			
										Avg	1.00225	1.82	

Positive leak check performed by SF
Meter was in tolerance ☒
Approved by
Meter was not in tolerance ☐: readjusted linkage
Meter was not in tolerance ☐: changed dry test meter
Date 1/9/96

*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

S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 23-5

Pitot tube dimensions:

1. External tubing diameter (D_t) .316 IN.
2. Base to Side A opening plane (P_A) .460 IN.
3. Base to Side B opening plane (P_B) .460 IN.

Alignment:

4. α_1 < 10° 0
5. α_2 < 10° 0

6. B_1 < 5° 0
7. B_2 < 5° 0

8. Z <.125" .02
9. W <.0625" .01

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .760 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

☒ Meets all EPA design criteria thus C_p = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
C_p = ______

Date of Inspection: 2/-8-94

Inspected by: [signature]

CFR Title 40 Part 60 Appenidix A Method 2

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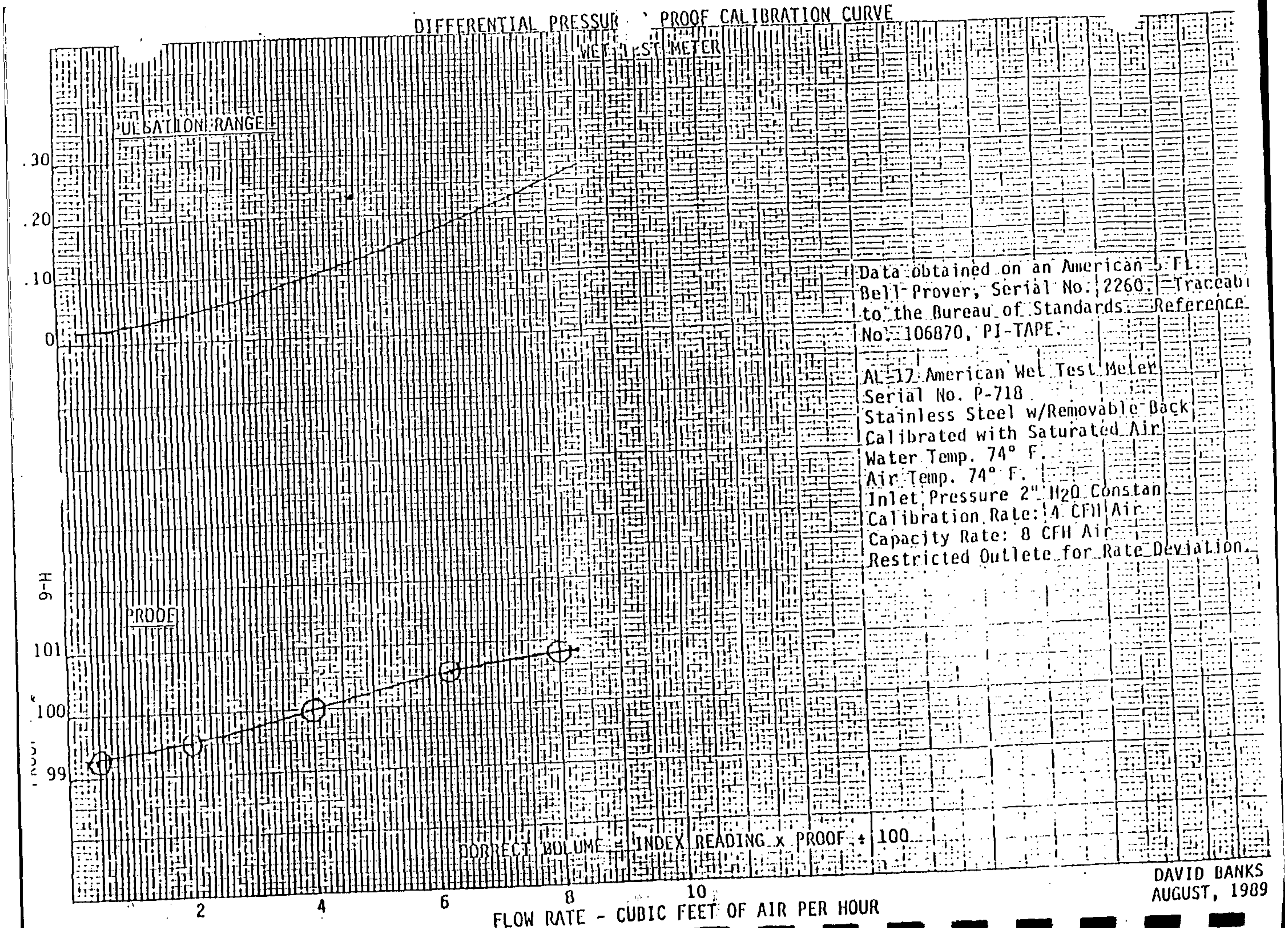
Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 03-21-96
Technician: Jamie Bainville
Nozzle Number: 5-7

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	0.432
2	0.431
3	0.432
Average	0.432


DIFFERENTIAL PRESSUR ' PROOF CALIBRATION CURVE
WET T ST METER
ULSATION RANGE
.30
.20
.10
0
PROOF
101
100
99
Data obtained on an American 5 Ft.
Bell Prover, Serial No. 2260. Traceab
to the Bureau of Standards. Reference
No. 106870, PI-TAPE.
AL-17 American Wet Test Meter
Serial No. P-718
Stainless Steel w/Removable Back
Calibrated with Saturated Air
Water Temp. 74° F.
Air Temp. 74° F.
Inlet Pressure 2" H2O Constan
Calibration Rate: 4 CFH Air
Capacity Rate: 8 CFH Air
Restricted Outlete for Rate Deviation.
CORRECT VOLUME = INDEX READING x PROOF ÷ 100
2
4
6
8
10
FLOW RATE - CUBIC FEET OF AIR PER HOUR
DAVID BANKS
AUGUST, 1989