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RESULTS OF THE APRIL 12 & 13, 1995 AIR EMISSION COMPLIANCE TESTS AT THE LOUISIANA PACIFIC OSB PLANT SAGOLA, MICHIGAN

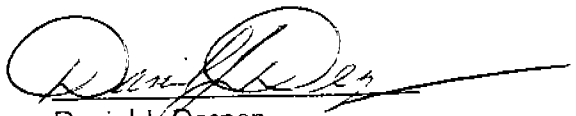
Submitted to:

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

Attention:

Sue Somers

Approved by:



Daniel J. Despen
Manager
Stationary Source Testing Department

Report Number 5-5194
April 21, 1995
SP/slp

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APPENDICES:

Louisiana-Pacific Corporation

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May 23, 1995 via federal express

Mr. Michael F. Wood, Director
Multi Media Enforcement & Strategic Planning Division
United States Environmental Protection Agency
Aerials Rios Blvd.
1200 Pennsylvania, N.W., 7th Floor
Room 3119C
Washington, D.C. 20004

Mr Laxmi Kesari
United States Environmental Protection Agency
Mail Code 2248A
401 M. Street SW
Washington D.C. 20460

Re: Clean Air Enforcement Action - United States V. Louisiana-Pacific Corporation, No: Cv 93-0869 (W.D.La)

Dear Gentlemen:

Attached please find two copies of a report entitled "Results of the April 12 & 13, 1995 Air Emission Compliance Tests at the Louisiana-Pacific OSB Plant, Sagola, Michigan" This testing was performed on the press RTO.

If you have any questions regarding this information please contact me.

Sincerely,

S. M. Somers

Susan Somers

cc: Elizabeth Smith - Portland w/enc
Al Lawrence - Sagola
Ward Johnson - Sagola, w/enc
Norm Radford Jr. - Vinson & Elkins
Keith Seelig - Hayward

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

On April 12 & 13, 1995 Interpoll Laboratories personnel conducted Air Emission Compliance tests at the Louisiana Pacific Corporation (LP) OSB Plant Located in Sagola, Michigan on the following sources:

Source	Parameters
Press RTO Inlet	PM,CO,CH_2O,Phenol,THC's,MDI
Press RTO Stack	PM,CO,CH_2O,Phenol,THC's,MDI

On-site testing was performed by Ed Trowbridge, Bob Aschenbach, Ken Nuessmeier, and Steve Kelker. Coordination between testing activities and plant operation was provided by Sue Somers of LP. The tests were witnessed by Warren Dellies of the Michigan Department of Natural Resources.

The Sagola plant operates three 12 x 60 Heil wafer dryers fired by Coen burners, a press and one GEKA thermal oil heater. Press emissions are ducted to an RTO prior to exhaust to the atmosphere.

Particulate evaluations were performed in accordance with EPA Methods 2-5, CFR Title 40, Part 60, Appendix A (revised July 1, 1994). A preliminary determination of the gas linear velocity profile was made at each test location before the first particulate determination to allow selection of the appropriate nozzle diameter for isokinetic sample withdrawal. An Interpoll Labs sampling train which meets or exceeds specifications in the above-cited reference was used to isokinetically extract particulate samples by means of a heated glass-lined probe. Wet catch samples were collected in the back half of the Method 5 sampling train and analyzed in accordance with EPA Method 202.

The oxygen, carbon dioxide, and carbon monoxide determinations were performed in accordance with EPA Methods 3A and 10. For the instrumental determinations a slip stream of exhaust gas was drawn from the exhaust gas stream using test ports provided by the plant using a heat-traced probe and filter assembly. After passing through the filter, the gas passed through a perm-tube dryer to remove moisture. The particulate-free dry gas was then transported to the analyzer with the excess exhausted to the atmosphere through a

calibrated orifice which was used to ensure that the flow from the stack exceeded the requirements of the analyzer. A three-way valve on the probe was used to introduce standard gas for the "system bias check". The analog response of the O_2, CO_2, and CO analyzers was recorded using a computer datalogger and backed up with a strip chart recorder. The analyzers were calibrated with Linde and National Specialty Gases.

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.

Phenol concentrations were determined from each source using a Method 5 sampling train with neutral buffered absorbing reagent. The first impinger in each sampling was spiked with isotopically-labeled phenol (phenol-d_5) and 2-fluorophenol for sampling and recovery efficiency surrogates. The recovered samples were extracted and analyzed by GC/MS for phenol, phenol-d_5, and 2-fluorophenol.

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 Press RTO Inlet was conducted from two test ports oriented at 90 degrees. These test ports are located 2.1 stack diameters downstream and 4.5 stack diameters upstream of the nearest flow disturbances. A 24-point traverse was used to collect the particulate, formaldehyde, and phenol samples. Each traverse point was sampled 2.5 minutes to give a total sampling time of 60 minutes per run.

Testing on the Press RTO Stack was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located 5.5 stack diameters downstream and 4.3 stack diameters upstream of the nearest flow disturbances. A 20-point traverse was used to collect the particulate, formaldehyde, and phenol 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 important results of the particulate emission compliance tests are summarized in Tables 1 - 7. 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 table below:

PARAMETER Units	PRESS RTO INLET	PRESS RTO STACK	REMOVAL EFFICIENCY (%)
Particulate			
. . . . . (GR/DSCF)	0.0250	0.0154	
. . . . . (LB/HR)	12.5	10.3	18
Carbon Monoxide			
. . . . . (ppm,d)	13	16	
. . . . . (LB/HR)	3.3	5.4	N/A
Formaldehyde			
. . . . . (ppm,d)	7.3	0.18	
. . . . . (LB/HR)	2.0	0.066	97
Phenol			
. . . . . (ppm,d)	< 0.20	< 0.16	
. . . . . (LB/HR)	< 0.17	< 0.19	N/A
MDI			
. . . . . (ppb,d)	7.2	< 0.3	
. . . . . (LB/HR)	0.0167	< 0.0008	≥ 95
THC's			
. . . . . (ppmC,w)	48	1.5	
. . . . . (LB/HR)	5.4	0.23	96

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 April 13, 1995 Particulate Determinations of the Press RTO Inlet at the Louisiana Pacific Plant Located in Sagola, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		04-13-95	04-13-95	04-13-95
Time runs were done	(HRS)	1528/1629	1705/1811	1834/1937
Volumetric flow				
actual	(ACFM)	69040	71270	70799
standard	(DSCFM)	57784	59136	58674
Gas temperature	(DEG-F)	117	120	120
Moisture content	(%V/V)	2.66	3.10	3.10
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	(%)	93.8	93.4	94.1
Particulate concentration				
actual	(GR/ACF)	.0397	.0109	.0119
standard	(GR/DSCF)	.0474	.0131	.0144
Part. emission rate	(LB/HR)	23.49	6.66	7.23

Note: Dry + Method 202 Condensible Particulate Material

Table 1b Summary of the Results of the April 13, 1995 Particulate Determinations of the Press RTO Inlet at the Louisiana Pacific Plant Located in Sagola, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		04-13-95	04-13-95	04-13-95
Time runs were done	(HRS)	1528/1629	1705/1811	1834/1937
Volumetric flow				
actual	(ACFM)	69040	71270	70799
standard	(DSCFM)	57784	59136	58674
Gas temperature	(DEG-F)	117	120	120
Moisture content	(%V/V)	2.66	3.10	3.10
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	(%)	93.8	93.4	94.1
Particulate concentration				
actual	(GR/ACF)	.005282	.002327	.004162
standard	(GR/DSCF)	.006314	.002805	.005024
Part. emission rate	(LB/HR)	3.13	1.42	2.53

Note: Dry Catch Only

Table 2a Summary of the Results of the April 13, 1995 Particulate Emission Test of the Press RTO Outlet at the Louisiana Pacific Plant Located in Sagola, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		04-13-95	04-13-95	04-13-95
Time runs were done	(HRS)	1527/1630	1705/1811	1834/1937
Volumetric flow				
actual	(ACFM)	114626	113030	113660
standard	(DSCFM)	78360	76947	77077
Gas temperature	(DEG-F)	249	250	249
Moisture content	(%V/V)	3.01	3.27	3.73
Gas composition	(%V/V,dry)			
carbon dioxide		0.35	0.34	0.34
oxygen		20.52	20.51	20.52
nitrogen		79.13	79.15	79.14
Isokinetic variation	(%)	100.5	100.2	100.4
Particulate concentration				
actual	(GR/ACF)	.0188	.007794	.004839
standard	(GR/DSCF)	.0275	.0115	.007139
Part. emission rate	(LB/HR)	18.48	7.55	4.72

Note: Dry + Method 202 Condensible Particulate Material

Table 2b Summary of the Results of the April 13, 1995 Particulate Emission Test of the Press RTO Outlet at the Louisiana Pacific Plant Located in Sagola, Michigan.

ITEM		Run 1	Run 2	Run 3
Date of test		04-13-95	04-13-95	04-13-95
Time runs were done	(HRS)	1527/1630	1705/1811	1834/1937
Volumetric flow				
actual	(ACFM)	114626	113030	113660
standard	(DSCFM)	78360	76947	77077
Gas temperature	(DEG-F)	249	250	249
Moisture content	(%V/V)	3.01	3.27	3.73
Gas composition	(%V/V,dry)			
carbon dioxide		0.35	0.34	0.34
oxygen		20.52	20.51	20.52
nitrogen		79.13	79.15	79.14
Isokinetic variation	(%)	100.5	100.2	100.4
Particulate concentration				
actual	(GR/ACF)	.000897	.000638	.000927
standard	(GR/DSCF)	.001312	.000938	.001368
Part. emission rate	(LB/HR)	0.881	0.618	0.904

Note: Dry Catch Only

Table 3. Summary of the April 13, 1995 **Carbon Monoxide** Emission Compliance Tests at the Louisiana Pacific Plant in Sagola, Michigan.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
(Press RTO Inlet)			
4-13-95	1528-1629	17	4.3
4-13-95	1705-1811	11	2.8
4-13-95	1834-1937	11	2.8
Avg		13	3.3
(Press RTO Stack)			
4-13-95	1527-1630	15	5.1
4-13-95	1705-1811	16	5.4
4-13-95	1834-1937	17	5.7
Avg		16	5.4

Table 4. Summary of the April 12, 1995 **Formaldehyde** Emission Compliance Tests at the Louisiana Pacific Plant in Sagola, Michigan.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
(Press RTO Inlet)			
4-12-95	1715-1821	7.2	2.0
4-12-95	1908-2012	7.0	2.0
4-12-95	2048-2151	7.6	2.1
Avg		7.3	2.0
(Press RTO Stack)			
4-12-95	1715-1820	0.18	0.064
4-12-95	1908-2012	0.17	0.062
4-12-95	2048-2152	0.20	0.072
Avg		0.18	0.066

Table 5. Summary of the April 13, 1995 **Phenol** Emission Compliance Tests at the Louisiana Pacific Plant in Sagola, Michigan.

Date	Time (HRS)	Concentration (ppm,d)	Emission Rate (LB/HR)
(Press RTO Inlet)			
4-13-95	0900-1040	< 0.19	< 0.17
4-13-95	1120-1225	< 0.20	< 0.17
4-13-95	1333-1436	< 0.20	< 0.17
Avg		< 0.20	< 0.17
(Press RTO Stack)			
4-13-95	0900-1041	< 0.16	< 0.19
4-13-95	1120-1224	< 0.17	< 0.19
4-13-95	1333-1437	< 0.16	< 0.19
Avg		< 0.16	< 0.19

Table 6. Summary of the April 12, 1995 **MDI** Emission Compliance Tests at the Louisiana Pacific Plant in Sagola, Michigan.

Date	Time (HRS)	Concentration (ppb,d)	Emission Rate (LB/HR)
(Press RTO Inlet)			
4-12-95	0955-1135	4.8	0.0107
4-12-95	1245-1400	7.7	0.0170
4-12-95	1455-1607	9.1	0.0224
Avg		7.2	0.0167
(Press RTO Stack)			
4-12-95	0955-1135	< 0.3	< 0.0008
4-12-95	1245-1358	< 0.3	< 0.0008
4-12-95	1455-1605	< 0.3	< 0.0008
Avg		< 0.3	< 0.0008

Table 7. Summary of the April 12, 1995 **Total Hydrocarbons** Emission Compliance Tests at the Louisiana Pacific Plant in Sagola, Michigan.

Date	Time (HRS)	Concentration (ppmC,w)	Emission Rate (LB/HR)
(Press RTO Inlet)			
4-12-95	1048-1148	50	5.4
4-12-95	1400-1500	46	5.0
4-12-95	1600-1700	47	5.7
Avg		48	5.4
(Press RTO Stack)			
4-12-95	1048-1148	1.6	0.24
4-12-95	1400-1500	1.4	0.21
4-12-95	1600-1700	1.5	0.23
Avg		1.5	0.23

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, carbon monoxide, formaldehyde, phenol, MDI, and total hydrocarbons results. Preliminary measurements including test port locations are given in the appendices.

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

3.1 Results of Orsat and Moisture Determinations

Test No. 2
Press RTO Outlet
(MDI)

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

	Run 1	Run 2	Run 3
Date of run	04-12-95	04-12-95	04-12-95
Dry basis (orsat)			
carbon dioxide.....	0.43	0.16	0.42
oxygen.....	20.47	20.88	20.57
nitrogen.....	79.10	78.96	79.01
Wet basis (orsat)			
carbon dioxide.....	0.42	0.16	0.41
oxygen.....	19.89	20.51	20.14
nitrogen.....	76.87	77.54	77.36
water vapor.....	2.82	1.79	2.08
Dry molecular weight.....	28.89	28.86	28.89
Wet molecular weight.....	28.58	28.67	28.66
Specific gravity.....	0.987	0.990	0.990
Water mass flow.....(LB/HR)			
FO	1.000	0.125	0.786

Test No. 3
Press RTO Inlet
(MDI)

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

	Run 1	Run 2	Run 3
Date of run	04-12-95	04-12-95	04-12-95
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.....	20.48	20.34	20.37
nitrogen.....	77.49	76.94	77.05
water vapor.....	2.00	2.70	2.56
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.62	28.55	28.56
Specific gravity.....	0.989	0.986	0.987
Water mass flow.....(LB/HR)			

Test No. 4
Press RTO Outlet

(Formaldehyde)

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

	Run 1	Run 2	Run 3
Date of run	04-12-95	04-12-95	04-12-95
Dry basis (orsat)			
carbon dioxide.....	0.33	0.32	0.31
oxygen.....	20.50	20.50	20.50
nitrogen.....	79.17	79.18	79.19
Wet basis (orsat)			
carbon dioxide.....	0.32	0.31	0.30
oxygen.....	19.95	20.07	19.99
nitrogen.....	77.05	77.52	77.22
water vapor.....	2.68	2.10	2.48
Dry molecular weight.....	28.87	28.87	28.87
Wet molecular weight.....	28.58	28.64	28.60
Specific gravity.....	0.987	0.989	0.988
Water mass flow.....(LB/HR)			
FO	1.212	1.250	1.290

Test No. 5
Press RTO Inlet

(Formaldehyde)

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

	Run 1	Run 2	Run 3
Date of run	04-12-95	04-12-95	04-12-95
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.69	20.53	20.31
nitrogen.....	78.28	77.68	76.85
water vapor.....	1.00	1.76	2.80
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.73	28.65	28.54
Specific gravity.....	0.992	0.990	0.986
Water mass flow.....(LB/HR)			

Test No. 6
Press RTO Outlet

(Phenol)

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

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
Dry basis (orsat)			
carbon dioxide.....	0.19	0.10	0.35
oxygen.....	20.40	20.45	20.49
nitrogen.....	79.41	79.45	79.16
Wet basis (orsat)			
carbon dioxide.....	0.19	0.10	0.34
oxygen.....	19.99	19.98	20.02
nitrogen.....	77.83	77.62	77.36
water vapor.....	1.99	2.31	2.27
Dry molecular weight.....	28.85	28.83	28.88
Wet molecular weight.....	28.63	28.58	28.63
Specific gravity.....	0.989	0.987	0.989
Water mass flow.....(LB/HR)			
FO	2.632	4.500	1.171

Test No. 7
Press RTO Inlet

(Phenol)

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

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
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.....	20.39	20.17	20.44
nitrogen.....	77.14	76.29	77.32
water vapor.....	2.44	3.51	2.21
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.58	28.46	28.60
Specific gravity.....	0.987	0.983	0.988
Water mass flow.....(LB/HR)			

Test No. 8
Press RTO Outlet

(Particulate)

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

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
Dry basis (orsat)			
carbon dioxide.....	0.35	0.34	0.34
oxygen.....	20.52	20.51	20.52
nitrogen.....	79.13	79.15	79.14
Wet basis (orsat)			
carbon dioxide.....	0.34	0.33	0.33
oxygen.....	19.90	19.84	19.75
nitrogen.....	76.75	76.56	76.19
water vapor.....	3.01	3.27	3.73
Dry molecular weight.....	28.88	28.87	28.88
Wet molecular weight.....	28.55	28.52	28.47
Specific gravity.....	0.986	0.985	0.983
Water mass flow.....(LB/HR)	6829	7289	8375
FO	1.086	1.147	1.118

Test No. 9
Press RTO Inlet
(Particulate)

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

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
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.....	20.34	20.25	20.25
nitrogen.....	76.96	76.62	76.62
water vapor.....	2.66	3.10	3.10
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.55	28.50	28.50
Specific gravity.....	0.986	0.985	0.985
Water mass flow.....(LB/HR)	4437	5305	5264

3.2 Results of Particulate Determinations

Test No. 8
Press RTO Outlet

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

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
Time run start/end.....(HRS)	1527/1630	1705/1811	1834/1937
Static pressure.....(IN.WC)	-0.59	-0.59	-0.59
Cross sectional area (SQ.FT)	33.40	33.40	33.40
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	22.0	23.0	20.0
desiccant.....(GRAMS)	9.0	10.0	18.0
total.....(GRAMS)	31.0	33.0	38.0
Total particulate material..			
.....collected(grams)	0.0839	0.0342	0.0214
Gas meter coefficient.....	0.9962	0.9962	0.9962
Barometric pressure..(IN.HG)	28.35	28.35	28.35
Avg. orif.pres.drop..(IN.WC)	2.08	2.01	2.03
Avg. gas meter temp..(DEF-F)	79.8	84.3	84.1
Volume through gas meter....			
at meter conditions...(CF)	50.70	50.08	50.25
standard conditions.(DSCF)	47.04	46.08	46.25
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.247	.247	.247
Avg.stack gas temp ..(DEG-F)	249	250	249
Volumetric flow rate.....			
actual.....(ACFM)	114626	113030	113660
dry standard.....(DSCFM)	78360	76947	77077
Isokinetic variation.....(%)	100.5	100.2	100.4
Particulate concentration...			
actual.....(GR/ACF)	0.01880	0.00779	0.00484
dry standard.....(GR/DSCF)	0.02752	0.01145	0.00714
Particle mass rate...(LB/HR)	18.483	7.554	4.717

Test No. 9
Press RTO Inlet

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

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
Time run start/end.....(HRS)	1528/1629	1705/1811	1834/1937
Static pressure.....(IN.WC)	-3.00	-3.00	-3.00
Cross sectional area (SQ.FT)	17.88	17.88	17.88
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	17.0	17.0	13.0
desiccant.....(GRAMS)	4.0	8.0	12.0
total.....(GRAMS)	21.0	25.0	25.0
Total particulate material..			
.....collected(grams)	0.1112	0.0314	0.0343
Gas meter coefficient.....	0.9947	0.9947	0.9947
Barometric pressure..(IN.HG)	28.35	28.35	28.35
Avg. orif.pres.drop..(IN.WC)	1.56	1.63	1.62
Avg. gas meter temp..(DEF-F)	117.2	119.7	120.4
Volume through gas meter....			
at meter conditions...(CF)	41.80	42.77	42.82
standard conditions.(DSCF)	36.17	36.86	36.85
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.191	.191	.191
Avg.stack gas temp ..(DEG-F)	117	120	120
Volumetric flow rate.....			
actual.....(ACFM)	69040	71270	70799
dry standard.....(DSCFM)	57784	59136	58674
Isokinetic variation.....(%)	93.8	93.4	94.1
Particulate concentration...			
actual.....(GR/ACF)	0.03969	0.01090	0.01191
dry standard.....(GR/DSCF)	0.04744	0.01314	0.01437
Particle mass rate...(LB/HR)	23.494	6.663	7.229

3.3 Results of Carbon Monoxide Determinations

Test No. 9
Press RTO Inlet

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

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
Time run start/end.....(HRS)	1528-1629	1705-1811	1834-1937
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	2.66	3.10	3.10
O2 Concentration.....(%V/V)	20.90	20.90	20.90
Volumetric flow rate (DSCFM)	57784	59136	58674
CO concentration.....			
(GR/DSCF).....	0.0087	0.0056	0.0056
(MG/DSCM).....	19.81	12.82	12.82
(PPM-WET).....	16.55	10.66	10.66
(PPM-DRY).....	17.00	11.00	11.00
CO emission rate.....(LB/HR)	4.284	2.837	2.815

CO = Carbon monoxide

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

Test No. 8
Press RTO Outlet

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

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
Time run start/end.....(HRS)	1528-1629	1705-1811	1834-1937
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	3.01	3.27	3.73
O2 Concentration.....(%V/V)	20.52	20.51	20.52
Volumetric flow rate (DSCFM)	78360	76947	77077
CO concentration.....			
(GR/DSCF).....	0.0076	0.0081	0.0087
(MG/DSCM).....	17.47	18.64	19.81
(PPM-WET).....	14.55	15.48	16.37
(PPM-DRY).....	15.00	16.00	17.00
CO emission rate.....(LB/HR)	5.126	5.369	5.715

CO = Carbon monoxide

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

3.4 Results of Formaldehyde Determinations

Test No. 5
Press RTO Inlet

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

	Run 1	Run 2	Run 3
Date of run	04-12-95	04-12-95	04-12-95
Time run start/end.....(HRS)	1715/1821	1908/2012	2048/2151
Static pressure.....(IN.WC)	-3.50	-3.50	-3.50
Cross sectional area (SQ.FT)	17.88	17.88	17.88
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	5.0	8.0	16.0
desiccant.....(GRAMS)	7.0	14.0	19.0
total.....(GRAMS)	12.0	22.0	35.0
Formaldehyde in sample..(uG)	14000	14200	15200
Gas meter coefficient.....	0.9947	0.9947	0.9947
Barometric pressure..(IN.HG)	28.24	28.24	28.24
Avg. orif.pres.drop..(IN.WC)	3.24	3.54	3.45
Avg. gas meter temp..(DEF-F)	77.7	87.8	86.8
Volume through gas meter....			
at meter conditions...(CF)	60.08	63.43	62.57
standard conditions.(DSCF)	55.83	57.90	57.21
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.227	.227	.227
Avg.stack gas temp ..(DEG-F)	121	119	118
Volumetric flow rate.....			
actual.....(ACFM)	71296	73508	72551
dry standard.....(DSCFM)	59989	61559	60285
Isokinetic variation.....(%)	98.7	99.8	100.7
CH2O concentration.....			
(GR/DSCF).....	0.0039	0.0038	0.0041
(MG/DSCM).....	8.93	8.74	9.47
(PPM-DRY).....	7.15	7.00	7.58
(PPM-WET).....	7.08	6.88	7.37
CH2O emission rate...(LB/HR)	2.00540	2.01418	2.13652

CH2O = Formaldehyde

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

Test No. 4
Press RTO Outlet

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

	Run 1	Run 2	Run 3
Date of run	04-12-95	04-12-95	04-12-95
Time run start/end.....(HRS)	1715/1820	1908/2012	2048/2152
Static pressure.....(IN.WC)	-0.59	-0.59	-0.59
Cross sectional area (SQ.FT)	33.40	33.40	33.40
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	16.0	10.0	15.0
desiccant.....(GRAMS)	11.0	11.0	10.0
total.....(GRAMS)	27.0	21.0	25.0
Formaldehyde in sample..(uG)	285	273	318
Gas meter coefficient.....	0.9962	0.9962	0.9962
Barometric pressure..(IN.HG)	28.24	28.24	28.24
Avg. orif.pres.drop..(IN.WC)	2.00	2.01	2.01
Avg. gas meter temp..(DEF-F)	75.6	77.0	76.9
Volume through gas meter....			
at meter conditions...(CF)	49.65	49.80	49.80
standard conditions.(DSCF)	46.24	46.26	46.27
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.245	.245	.245
Avg.stack gas temp ..(DEG-F)	254	256	254
Volumetric flow rate.....			
actual.....(ACFM)	115662	116125	115471
dry standard.....(DSCFM)	78434	78988	78501
Isokinetic variation.....(%)	100.3	99.6	100.3
CH2O concentration.....			
(GR/DSCF).....	0.0001	0.0001	0.0001
(MG/DSCM).....	0.22	0.21	0.24
(PPM-DRY).....	0.18	0.17	0.20
(PPM-WET).....	0.17	0.16	0.19
CH2O emission rate...(LB/HR)	0.06424	0.06194	0.07170

CH2O = Formaldehyde

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

3.5 Results of Phenol Determinations

Test No. 6
Press RTO Outlet

Results of Phenol Determinations ----------

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
Time run start/end.....(HRS)	0900/1041	1120/1224	1333/1437
Barometric pressure..(IN.HG)	28.35	28.35	28.35
Meter temperature....(DEG-F)	59.60	81.00	82.80
Meter correction coefficient	0.9962	0.9962	0.9962
Volume through gas meter....			
at meter conditions...(CF)	48.250	49.650	50.600
standard conditions (DSCF)	46.516	45.976	46.708
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	1.99	2.31	2.27
Volumetric flow rate (DSCFM)	78340	77233	78340
Phenol in sample.....(uG)	840.00<	840.00<	840.00<
Phenol concentration.....			
(GR/10^{3}DSCF).....	0.2786<	0.2819<	0.2775<
(uG/DSCM).....	638.18<	645.68<	635.55<
(PPB-DRY).....	163.08<	165.00<	162.41<
(PPB-WET).....	159.84<	161.19<	158.72<
Phenol emis. rate(10^{-3}LB/HR)	187.094<	186.617<	186.322<

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

Analysis performed according to NIOSH Method 3502

Test No. 6
Press RTO Outlet

Sampling Data for Phenol Determinations.....

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
Time run start/end.....(HRS)	900/1041	1120/1224	1333/1437
Static pressure.....(IN.WC)	-0.59	-0.59	-0.59
Cross sectional area (SQ.FT)	33.40	33.40	33.40
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	12.0	10.0	13.0
desiccant.....(GRAMS)	8.0	13.0	10.0
total.....(GRAMS)	20.0	23.0	23.0
Gas meter coefficient.....	0.9962	0.9962	0.9962
Barometric pressure..(IN.HG)	28.35	28.35	28.35
Avg. orif.pres.drop..(IN.WC)	1.96	1.99	2.06
Avg. gas meter temp..(DEF-F)	59.6	81.0	82.8
Volume through gas meter....			
at meter conditions...(CF)	48.25	49.65	50.60
standard conditions.(DSCF)	46.50	45.96	46.69
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.247	.247	.247
Avg.stack gas temp ..(DEG-F)	248	252	249
Volumetric flow rate.....			
actual.....(ACFM)	113303	112721	113797
dry standard.....(DSCFM)	78340	77233	78340
Isokinetic variation.....(%)	99.3	99.6	99.8

Test No. 7
Press RTO Inlet

Results of Phenol Determinations ----------

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
Time run start/end.....(HRS)	0900/1040	1120/1225	1333/1436
Barometric pressure..(IN.HG)	28.35	28.35	28.35
Meter temperature....(DEG-F)	72.20	84.20	81.50
Meter correction coefficient	0.9947	0.9947	0.9947
Volume through gas meter....			
at meter conditions...(CF)	42.200	42.350	40.690
standard conditions (DSCF)	39.624	38.886	37.537
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	2.44	3.51	2.21
Volumetric flow rate (DSCFM)	60451	58907	57532
Phenol in sample.....(uG)	840.00<	840.00<	840.00<
Phenol concentration.....			
(GR/10^{3}DSCF).....	0.3271<	0.3333<	0.3453<
(uG/DSCM).....	749.17<	763.39<	790.84<
(PPB-DRY).....	191.44<	195.08<	202.09<
(PPB-WET).....	186.77<	188.23<	197.63<
Phenol emis. rate(10^{-3}LB/HR)	169.479<	168.285<	170.266<

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

Analysis performed according to NIOSH Method 3502

Test No. 7
Press RTO Inlet

Sampling Data for Phenol Determinations.....

	Run 1	Run 2	Run 3
Date of run	04-13-95	04-13-95	04-13-95
Time run start/end.....(HRS)	900/1040	1120/1225	1333/1436
Static pressure.....(IN.WC)	-3.00	-3.00	-3.00
Cross sectional area (SQ.FT)	17.88	17.88	17.88
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	12.0	20.0	11.0
desiccant.....(GRAMS)	9.0	10.0	7.0
total.....(GRAMS)	21.0	30.0	18.0
Gas meter coefficient.....	0.9947	0.9947	0.9947
Barometric pressure..(IN.HG)	28.35	28.35	28.35
Avg. orif.pres.drop..(IN.WC)	1.61	1.59	1.47
Avg. gas meter temp..(DEF-F)	72.2	84.2	81.5
Volume through gas meter....			
at meter conditions...(CF)	42.20	42.35	40.69
standard conditions.(DSCF)	39.61	38.87	37.52
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.189	.189	.189
Avg.stack gas temp ..(DEG-F)	115	118	118
Volumetric flow rate.....			
actual.....(ACFM)	71783	71030	68529
dry standard.....(DSCFM)	60451	58907	57532
Isokinetic variation.....(%)	100.3	101.0	99.8

3.6 Results of MDI Determinations

Test No. 3
Press RTO Inlet

Results of MDI Determinations.....

	Run 1	Run 2	Run 3
Date of run	04-12-95	04-12-95	04-12-95
Time run start/end.....(HRS)	955/1135	1245/1400	1455/1607
Static pressure.....(IN.WC)	-3.60	-3.60	-3.60
Cross sectional area (SQ.FT)	17.88	17.88	17.88
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	-8.0	-35.0	-25.0
desiccant.....(GRAMS)	24.0	57.0	48.0
total.....(GRAMS)	16.0	22.0	23.0
MDI in sample.....(ug)	52.5	84.5	111
Gas meter coefficient.....	0.9947	0.9947	0.9947
Barometric pressure..(IN.HG)	28.24	28.24	28.24
Avg. orif.pres.drop..(IN.WC)	1.42	1.46	1.75
Avg. gas meter temp..(DEF-F)	70.3	73.5	71.6
Volume through gas meter....			
at meter conditions...(CF)	39.48	40.12	44.10
standard conditions.(DSCF)	37.03	37.41	41.29
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.189	.189	.189
Avg.stack gas temp ..(DEG-F)	116	117	121
Volumetric flow rate.....			
actual.....(ACFM)	67943	68492	76136
dry standard.....(DSCFM)	57058	57054	63006
Isokinetic variation.....(%)	99.3	100.3	100.3
MDI Concentration .....(ppb,d)	4.8	7.7	9.1
MDI Emission Rate .....(LB/HR)	0.0107	0.0170	0.0224

Test No. 2
Press RTO Outlet

Results of MDI Determinations.....

	Run 1	Run 2	Run 3
Date of run	04-12-95	04-12-95	04-12-95
Time run start/end.....(HRS)	955/1135	1245/1358	1455/1605
Static pressure.....(IN.WC)	-0.59	-0.59	-0.59
Cross sectional area (SQ.FT)	33.40	33.40	33.40
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	-29.0	-23.0	-32.0
desiccant.....(GRAMS)	48.0	35.0	46.0
total.....(GRAMS)	19.0	12.0	14.0
MDI in sample.....(ug)	< 2.5	< 2.5	< 2.5
Gas meter coefficient.....	0.9962	0.9962	0.9962
Barometric pressure..(IN.HG)	28.24	28.24	28.24
Avg. orif.pres.drop..(IN.WC)	0.90	0.89	0.89
Avg. gas meter temp..(DEF-F)	77.3	73.3	70.4
Volume through gas meter....			
at meter conditions...(CF)	33.40	33.20	33.10
standard conditions.(DSCF)	30.92	30.97	31.04
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.200	.200	.200
Avg.stack gas temp ..(DEG-F)	248	253	253
Volumetric flow rate.....			
actual.....(ACFM)	114653	115821	116161
dry standard.....(DSCFM)	78310	79384	79373
Isokinetic variation.....(%)	100.8	99.6	99.8
MDI Concentration			
.....(ppb,d)	< 0.3	< 0.3	< 0.3
MDI Emission Rate			
.....(LB/HR)	< 0.00084	< 0.00084	< 0.00084

3.7 Results of Total Hydrocarbons Determinations

Test No. 3
Press RTO Inlet

Results of Total Hydrocarbons Determinations----------Method25A

	Run 1	Run 2	Run 3
Date of run	4-12-95	4-12-95	4-12-95
Time run start/end (HRS)	1048-1148	1400-1500	1600-1700
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	2.0	2.7	2.6
Oxygen content (%V/V)	20.9	20.9	20.9
Volumetric flow rate (DSCFM)	57060	57055	63010
THC concentration			
ppmC,wet (as carbon)	50	46	47
THC emission rate (LB/HR)	5.4	5.0	5.7

Test No. 2
Press RTO Outlet

Results of Total Hydrocarbons Determinations——————————Method 25A

	Run 1	Run 2	Run 3
Date of run	4-12-95	4-12-95	4-12-95
Time run start/end (HRS)	1048-1148	1400-1500	1600-1700
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	2.8	1.8	2.1
Oxygen content (%V/V)	20.47	20.88	20.57
Volumetric flow rate (DSCFM)	78310	79385	79370
THC concentration			
ppmC,wet (as carbon)	1.6	1.4	1.5
THC emission rate (LB/HR)	0.24	0.21	0.23

APPENDIX A

RESULTS OF VOLUMETRIC FLOW RATE DETERMINATIONS

Test No. 3
Press RTO Inlet

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

Date of Determination.....	04-12-95
Time of Determination.....(HRS)	816
Barometric pressure.....(IN.HG)	28.24
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	57.25
Duct area.....(SQ.FT)	17.88
Direction of flow.....	UP
Static pressure.....(IN.WC)	-3.6
Avg. gas temp.....(DEG-F)	106
Moisture content.....(% V/V)	2.00
Avg. linear velocity.....(FT/SEC)	69.5
Gas density.....(LB/ACF)	.06484
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	290105
Volumetric flow rate.....	
actual.....(ACFM)	74574
dry standard.....(DSCFM)	63747

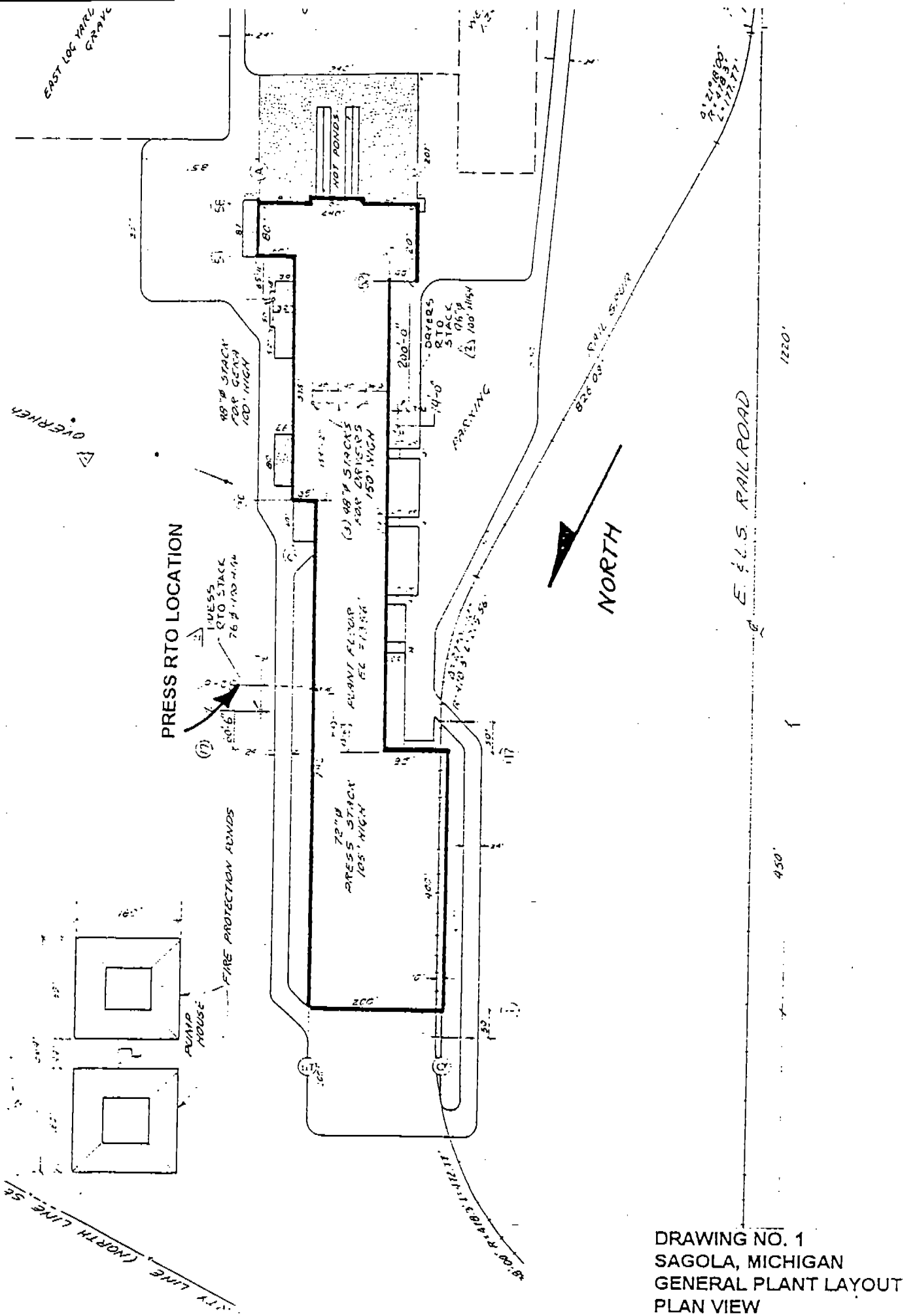
Test No. 2
Press RTO Outlet

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

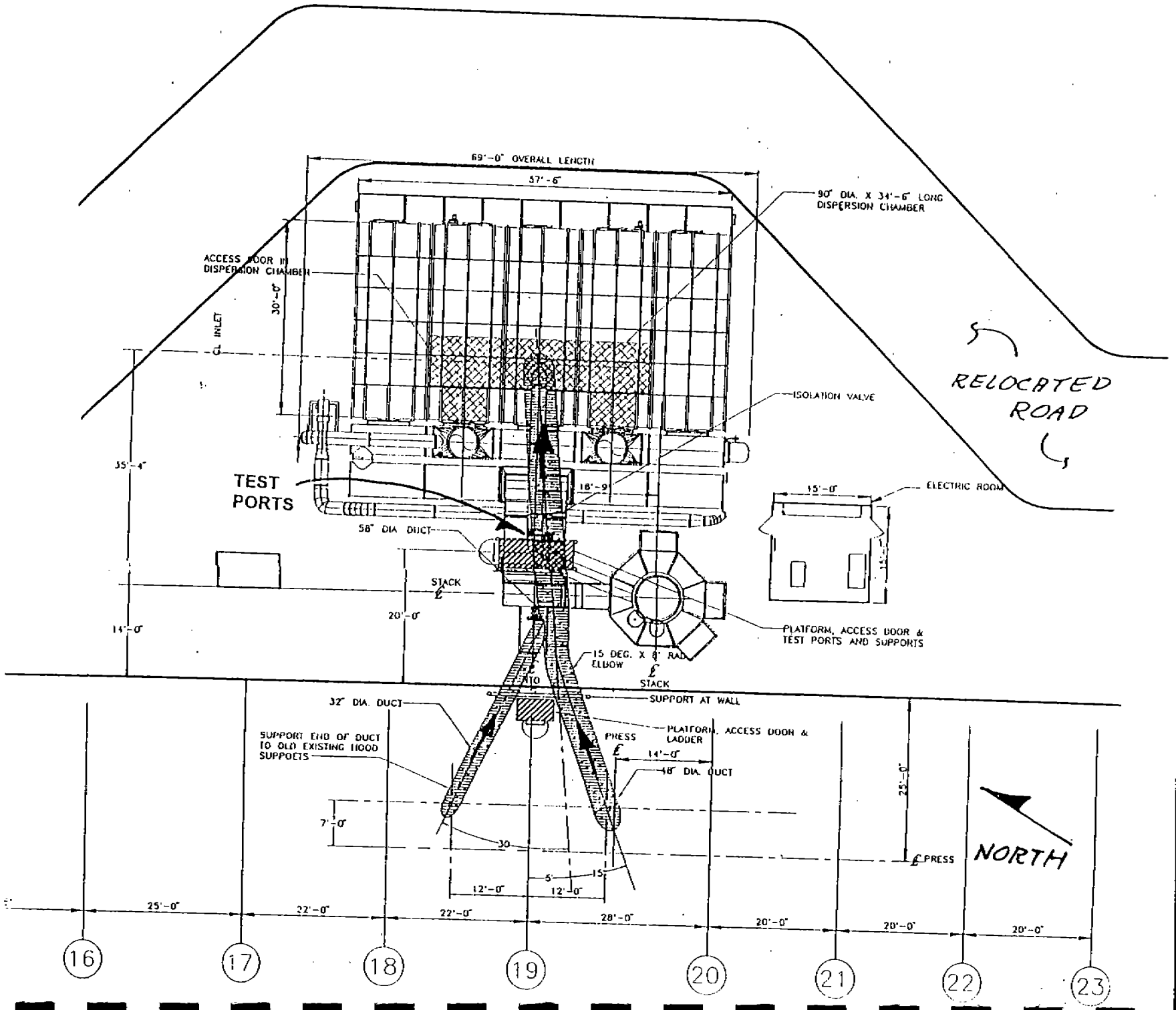
Date of Determination.....	04-12-95
Time of Determination.....(HRS)	850
Barometric pressure.....(IN.HG)	28.24
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	20
Shape of duct.....	Round
Stack diameter.....(IN)	78.25
Duct area.....(SQ.FT)	33.40
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.59
Avg. gas temp.....(DEG-F)	242
Moisture content.....(% V/V)	2.82
Avg. linear velocity.....(FT/SEC)	54.3
Gas density.....(LB/ACF)	.05261
Molecular weight.....(LB/LBMOLE)	28.89
Mass flow of gas.....(LB/HR)	343226
Volumetric flow rate.....	
actual.....(ACFM)	108734
dry standard.....(DSCFM)	74902

APPENDIX B

LOCATION OF TEST PORTS

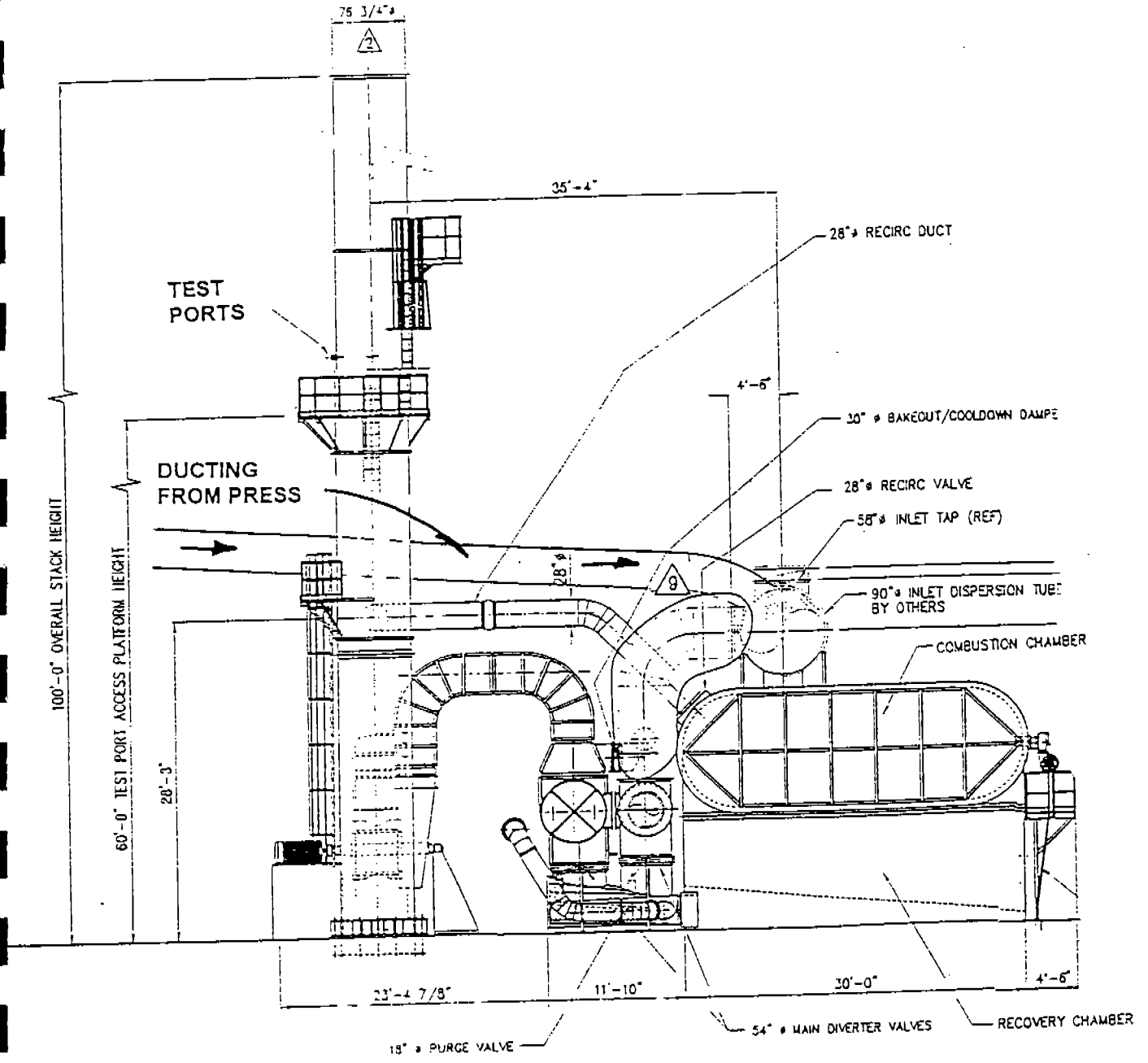


DRAWING NO. 1
SAGOLA, MICHIGAN
GENERAL PLANT LAYOUT
PLAN VIEW



B-2

DRAWING NO. 2
SAGOLA, MICHIGAN
PRESS RTO LAYOUT
PLAN VIEW



DRAWING NO. 3
SAGOLA, MICHIGAN
PRESS RTO
ELEVATION FACING NORTH

APPENDIX C

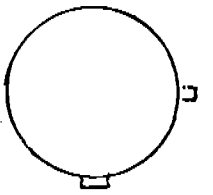
FIELD DATA SHEETS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job LP/SEGOLA
Source PLESS RTO STACK
Test 2 Run 0 Date 4-12-95
Stack Dimen. 78.25 IN.
Dry Bulb ____ °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.24 IN.HG
Static Pressure -.59 IN.WC
Operators E.TROWBRIDGE - S. KEITH
Pitot No. YM5-8 C_p .840
MDI

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: 4.25 IN.		Time Start: 0850 HRS	
A 1	.026	2.03	6.28	.58	
2	.082	6.42	10.67	.64	
3	.146	11.42	15.67	.63	
4	.226	17.68	21.93	.78	
5	.342	26.76	31.01	.70	242
6	.658	51.48	55.74	.78	
7	.774	60.57	64.82	.77	
8	.854	66.83	71.08	.80	
9	.918	71.83	76.08	.67	
10	.974	76.22	80.46	.62	
B 1				.68	
2				.77	
3				.78	
4				.80	242
5				.76	
6				.65	
7				.63	
8				.50	
9				.40	
10				.32	
	FT/SEC	54.10			
	ACFM	108406			
		75518			

Temp. Meas. Device & S/N: PDT-34
Time End: 0905 HRS

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

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/SOGOLA Date 4/12-25 Test 2 Run 1
Source PRESS No. of traverse points 20
Method _____ Filter holder: _____ Filter type: N.A

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☑
Post test: 0 cfm at 5 IN. HG (vac) ☑

Particulate Catch Data:

No. of filters used: _____

Recovery solvent(s)

☐ acetone _____
☒ other(s) _____

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	469	523	-54
Impinger No. 2	466	441	25
Impinger No. 3			
Condenser			
Desiccant	1432	1429	3
CHARCOAL	1532 1473	1510 1450	22 23
Total			19

Integrated Gas Sampling Data:

Bag Pump No. 318 Box No. 30 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 IN.HG
Time start: 0956 (HRS) Time end: _____ (HRS)
Sampling rate: 400 cc/min Operator: ET

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

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

[redacted] (612) 786-6020

EPA Method 5 Field Data Sheet

Job: LP/SEGOLA
Source: EXPASS RTO STACK
Date: 4-10-95 Test: 02 Run: 1

Operators: ET-SK
Meter Box No.: 2 ΔH@ 1.77 in.WC
Gasmeter Coeff.: .9862

Nozzle No.: GLASS
Nozzle Dia.: .260 in.
Bar. Press.: 28.24 in.Hg

Pilot No.: HS-8
C_p: .84
H_2O: 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)
[redacted]	0955	505.10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
A 10	3	506.62	.58	.71	6.57	3	245	226	235	33	64	59	20.6
9	6	508.15	.62	.75	8.08	3.5	245				70	60	20.6
8	9	504.70	.67	.81	9.65	3.5	247	227	262	34	73	61	20.5
7	12	511.35	.70	.85	1.27	4	244				73	64	20.7
6	15	512.99	.72	.88	2.91	4	245	230	237	35	77	65	20.8
5	18	514.73	.78	.96	4.63	4	245				80	66	20.8
4	21	516.45	.78	.96	4.34	4	248	228	257	34	82	66	20.7
3	24	518.14	.75	.92	8.03	4	248				83	67	20.7
2	27	519.78	.70	.86	9.67	3.8	248	226	242	35	84	68	20.8
1	30	521.30	.66	.81	1.26	3.7	248				85	70	20.8
8 10	33	522.50	.84	1.04	3.26	4	247	225	268	35	84	76	20.5
9	36	523.32	.82	1.03	5.05	4	242	226			87	77	20.8
8	39	526.91	.80	.99	6.82	4	253	230	257	33	88	77	20.9
7	42	528.44	.75	.93	8.53	4	253				89	78	20.9
6	45	530.50	.90	1.12	0.40	4	253	229	266	33	90	79	20.8
5	48	532.29	.80	1.01	2.19	4	244				90	80	20.7
4	51	533.94	.70	.88	3.86	3.8	245	229	262	33	90	80	20.7
3	54	535.65	.68	.85	5.49	3.8	252				90	80	20.8
2	57	537.16	.65	.81	7.09	3.7	254	228	266	33	90	80	20.8
1	60	538.90	.60	.75	8.63	3.5	254				91	80	20.8
	(1135)												
[redacted]	θ = 60	V_m = 33.40	[redacted]	ΔH = 80	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Avg. = 77.3		[redacted]

POINT UP

CHANGE CHANGED LINE SET AT 521.50

C-3

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/SEGOLA Date 4-12-95 Test 2 Run 2
Source PRESS RTO STACK No. of traverse points 20
Method MDE Filter holder: NA Filter type: NA

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: .01 cfm at 5 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: Recovery solvent(s)

☐ acetone
☒ other(s)

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	487	522	-35
Impinger No. 2	453	441	12
Impinger No. 3			
Condenser			
Desiccant	1436	1432	4
CHARCOAL	1490 1506	1469 1496	21 10
Total			12

Integrated Gas Sampling Data:

Bag Pump No. 318 Box No. 30 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 IN.HG
Time start: 1246 (HRS) Time end: 1357 (HRS)
Sampling rate: 400 cc/min Operator:

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

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

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job: LP/SEQUA
Source: PROCESS RTO STACK
Date: 4-12-95 Test 2 Run 2

Operators: ET-SK
Meter Box No. 2 ΔH@ 1.77 in.WC
Gasmeter Coeff. 1.9962

Nozzle No. GLASS
Nozzle Dia. .200 in.
Bar. Press. 28.24 in.Hg

Pitot No. 4/NS-8
C_p .84
H_2O 2.5 %

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)
	1245	539.10											
13 10	3	540.94	.85	1.04	0.89	4	251	227	232	33	67	65	20.5
					2.62	4	252				68	66	20.0
9	6	542.75	.92	.98									
8	9	544.45	.80	.96	4.33	4	253	229	248	33	70	66	19.9
7	12	546.20	.85	1.02	6.09	4	253				71	66	19.7
6	15	547.95	.90	1.08	7.91	4	253	231	234	33	73	64	18.2
5	18	549.74	.82	.99	9.65	4	251				75	65	18.6
4	21	551.35	.70	.84	1.26	3.7	254	228	238	34	78	65	18.1
3	24	552.93	.67	.81	2.83	3.6	253				80	66	19.9
2	27	554.48	.65	.78	4.39	3.2	254	231	235	35	83	68	20.8
1	30	555.99	.60	.73	5.90	3.0	251				84	69	20.8
A 10	33	557.50	.60	.73	7.41	3.0	252	231	233	34	75	69	20.7
9	36	559.10	.65	.78	8.96	3.1	253				77	69	20.7
8	39	560.66	.67	.81	0.54	3.2	254	229	238	34	80	69	20.7
7	42	562.30	.70	.85	2.16	3.2	254				81	69	20.7
6	45	563.98	.74	.90	3.83	3.2	254	229	235	34	82	70	20.8
5	48	565.48	.82	1.00	5.59	3.3	253				84	70	20.7
4	51	567.42	.78	.95	7.31	3.3	253	230	236	34	85	71	20.7
3	54	569.12	.74	.90	8.98	3.2	253				85	72	20.7
2	57	570.70	.70	.84	0.62	3.0	253	225	238	34	86	72	20.8
1	60	572.30	.68	.83	2.23	3.0	255				86	72	20.8
	(1358)												
	θ = 60	V_m = 33.20		ΔH = .89							Avg. = 73.3		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/SABOLA Date 4-12-95 Test 2 Run 3
Source PROSS RTO STACK No. of traverse points 20
Method MDI Filter holder: NA Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0 cfm at 5 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: Recovery solvent(s)

☐ acetone
☒ other(s)

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	482	527	-45
Impinger No. 2	452	439	13
Impinger No. 3			
Condenser			
Desiccant	1438	1436	2
CHARCOAL	1482 1455	1460 1463	22 22
Total			14

Integrated Gas Sampling Data:

Bag Pump No. 316 Box No. 30 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: ET

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/SOGOLA
Source: PRESS RFO STACK
Date: 4-12-95 Test 2 Run 3

Operators: ET - SK
Meter Box No.: 2 ΔH@ 1.77 in.WC
Gasmeter Coeff.: .9962

Nozzle No.: GLASS
Nozzle Dia.: .200 in.
Bar. Press.: 28.24 in.Hg

Pitot No.: 4mm-8
C_p: .84
H_2O: 2.5 %

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)
	1455	572.80											
A 10	3	574.33	.58	.70	4.27	3	254	228	239	33	67	65	
9	6	575.84	.64	.76	5.79	3	253				68	65	
8	9	577.35	.66	.79	7.34	3.2	253	230	231	34	70	65	
7	12	579.00	.72	.86	8.97	3.5	253				73	65	
6	15	580.67	.77	.93	0.65	3.8	251	228	239	34	74	65	
5	18	582.40	.78	.94	2.35	3.8	254				75	65	
4	21	584.22	.88	1.06	4.15	4	254	230	255	38	74	65	
3	24	584.95	.80	.96	5.86	4.	254			36	77	65	
2	27	587.55	.70	.85	7.48	3.8	251	232	245	38	77	65	
1	30	589.06	.65	.78	9.03	3.6	256				77	65	
B 10	33	590.80	.80	.96	0.75	4.0	254	229	249	37	70	63	
9	36	592.58	.84	1.00	2.49	4.0	254				72	63	
8	39	594.36	.86	1.03	4.27	4.0	254	228	247	35	73	63	
7	42	595.97	.74	.89	5.91	3.8	252				75	63	
6	45	597.84	.90	1.08	7.73	4.1	252	226	244	36	78	62	
5	48	599.57	.82	.99	9.47	4	252				81	62	
4	51	601.24	.75	.91	1.14	4	252	228	240	37	83	47	
3	54	602.80	.68	.83	2.74	3.8	253				84	68	
2	57	604.38	.66	.80	4.32	3.7	253	229	243	37	85	69	
1	60	605.90	.60	.73	5.83	3.5	252				85	69	
	(1605)												
	0 - 60	V_m = 33.10		ΔH = .89							Avg. = 70.4		

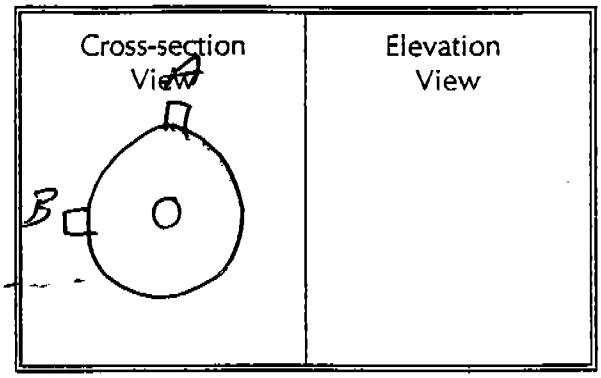
C-7

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LP / SAGOLA
Source: PRESS RTO INLET
Test: 3 Run Date: 4-7-95
Stack Dimen.: 57.25 IN.
Dry Bulb: °F Wet bulb: °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 28.24 IN.HG
Static Pressure: -3.60 IN.WC
Operators: B ASCHENBACH K NUESSMEIER
Pitot No.: 270-3 C_p: .84
MDI

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 3.75 IN.		Time Start: 0816 HRS	
A- 1				1.45	
2				1.45	
3				1.75	
4				1.70	
5				1.90	
6				1.50	106
7				1.45	
8				1.20	
9				1.45	
10				1.45	
11				1.20	
12				1.25	
B 1				.80	
2				.95	
3				1.20	
4				1.25	
5				1.45	
6				1.50	106
7				1.70	
8				1.25	
9		FT/SEC	69.58	1.10	
10		ACFM	74633	1.15	
11		DSCFM	63486	1.05	
12				1.00	
Temp. Meas. Device & S/N: PDT 38				AVG DP 1.34 Time End 0825 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 LPI/SHOALS
Source MOSS 210 INLET
Method MDI Filter holder: ✓

Date 4-12-95 Test 3 Run 1
No. of traverse points 24
Filter type: 10

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.0 cfm at 5 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: 1

Recovery solvent(s)
☐ acetone
☑ other(s) Acetonitrile, toluene

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	475	537	-62
Impinger No. 2	459	436	23
Impinger Caracal 1	1498	1484	14
Condenser Carbon 2	1497	1480	17
Desiccant	1421	1419	2
Caracal 3	1489	1467	22
Total			16

Integrated Gas Sampling Data:

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

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

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job CP / SAGOLA
Source Press 270 INLET
Date 4-10-95 Test 3 Run 1

Operators BA KN
Meter Box No. 2 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9947

Nozzle No. Glass
Nozzle Dia. .189 in.
Bar. Press. 28.24 in.Hg

Pitot No. 31V-6
C_p .84
H_2O 2.5 %

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)
	(0955	(144.00											
B-1	2.5	145.64	1.20	1.50	5.67	5	117	247	264	45	56	59	20.9
2	5	147.27	1.10	1.39	7.29	5	119				61	56	20.9
3	7.5	148.92	1.20	1.52	8.98	5	117	250	264	42	63	57	20.9
4	10	150.70	1.30	1.66	0.76	5	117				65	61	20.9
5	12.5	152.56	1.40	1.79	2.60	5.5	117	243	245	37	67	62	20.9
6	15	154.46	1.60	2.05	4.58	6	117				69	62	20.9
7	17.5	156.30	1.35	1.74	6.41	5.5	117	245	237	37	69	62	20.9
8	20	158.00	1.10	1.41	8.06	5	118				70	63	20.9
9	22.5	159.60	1.00	1.29	9.63	4.5	119	243	250	37	73	64	20.9
10	25	161.08	.83	1.07	161.07	4	120				75	66	20.9
11	27.5	162.46	.70	.91	2.39	4	119	244	247	37	76	67	20.9
12	30	163.77	.70	.94	3.75	4	98				77	67	20.9
A-1	32.5	165.39	1.05	1.37	5.38	5	118	246	254	37	74	69	20.9
2	35	167.01	1.05	1.36	7.00	5	120				76	70	20.9
3	37.5	168.85	1.45	1.89	8.92	6	118	250	251	35	77	70	20.9
4	40	170.65	1.20	1.56	0.66	6	119				78	71	20.9
5	42.5	172.45	1.30	1.70	2.48	6	119	247	251	38	78	71	20.9
6	45	174.30	1.50	1.96	4.43	7	118				79	71	20.9
7	47.5	176.17	1.30	1.69	6.25	6	122	247	239	38	79	71	20.9
8	50	177.85	1.05	1.36	7.88	5	122				80	72	20.9
9	52.5	179.31	.80	1.05	9.31	4	117	250	241	37	81	72	20.9
10	55	180.70	.75	1.00	0.71	4	110				82	74	20.9
11	57.5	182.10	.74	.99	2.11	4	109	248	243	38	83	75	20.9
12	60	183.48	.70	.95	3.48	4	106				83	75	20.9
(	(1135												
	θ = 60	V_m = 39.48		1.42 ΔH =							Avg. = 70.3		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP/ SAGOCA
Source Press RTO INLET
Method MDI Filter holder: NA

Date 4-12-95 Test 3 Run 2
No. of traverse points 24
Filter type: NA

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

Particulate Catch Data:
No. of filters used:

NA

Recovery solvent(s)

☐ acetone
☒ other(s) Acetonitrile
Toluene

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	474	521	-47
Impinger No. 2	450	438	12
Impinger No. 3			
Condenser			
Desiccant	1384	1370	14
Charcoal	1506	1484	22
Charcoal	1501	1480	21
Total			22

Integrated Gas Sampling Data: Ambient

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

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

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LPI 5460 LA
Source Press RTO INLET
Date 4-12-95 Test 3 Run 2

Operators SA KW
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9947

Nozzle No. Glass
Nozzle Dia. .189 in.
Bar. Press. 28.24 in.Hg

Pitot No. 3W6
C_p .84
H_2O 2.5 %

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)
	(1245)	(184.00)											
A-1	2.5	185.79	1.15	1.48	5.69	5	121	238	241	35	61	61	20.9
2	5	187.33	1.10	1.40	7.32	5	117				62	61	20.9
3	7.5	189.08	1.20	1.53	9.03	5	117	240	245	35	64	62	20.9
4	10	190.71	1.05	1.35	0.63	5	117				66	62	20.9
5	12.5	192.53	1.40	1.79	2.48	6	120	250	240	34	69	64	20.9
6	15	194.40	1.56	1.93	4.46	6	119				72	66	20.9
7	17.5	196.41	1.60	2.07	6.40	7	119	250	246	37	74	67	20.9
8	20	198.10	1.10	1.42	8.06	5.5	120				76	68	20.9
9	22.5	199.84	1.20	1.55	9.79	5.5	121	246	256	34	76	69	20.9
10	25	201.44	.99	1.28	1.37	5	121				77	70	20.9
11	27.5	203.09	1.10	1.42	3.04	5	123	249	259	37	79	71	20.9
-12	30	204.66	.90	1.17	4.55	5	120				80	72	20.9
1	32.5	206.37	1.20	1.56	6.30	5	122	242	252	36	75	70	20.9
2	35	208.00	.98	1.28	7.88	5	116				77	70	20.9
3	37.5	209.65	1.20	~~1.53~~	9.63	5	117	247	256	35	78	72	20.9
4	40	211.40	1.20	1.57	1.37	5.5	119				81	73	20.9
5	42.5	213.40	1.60	2.10	3.46	7	119	249	252	35	83	74	20.9
6	45	215.39	1.50	1.97	5.36	6.5	120				84	75	20.9
7	47.5	217.36	1.40	1.83	7.26	6	122	249	253	34	84	76	20.9
8	50	218.99	.90	1.18	8.75	5	120				84	76	20.9
9	~~52.5~~	~~220.04~~	.40	.53	9.82	3.5	110	247	250	34	85	76	20.9
10	55	221.40	.85	1.16	1.33	5	100				84	76	20.9
11	57.5	222.77	.65	.89	2.86	4	100	256	254	38	86	77	20.9
12	60	224.12	.65	.89	3.98	4	100				86	78	20.9
	(1480)												
	θ = 60	V_m = 40.12		1.46 ΔH =							Avg. = 73.5		

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

Job LP/ 5460LA
Source Press RTO INLET
Method MD I Filter holder: LA

Date 4-12-95 Test 3 Run 3
No. of traverse points 24
Filter type: LA

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:

NA

Recovery solvent(s)

☐ acetone
☒ other(s) Toluene Acetonitrile

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	485	520	-35
Impinger No. 2	446	436	10
Impinger No. 3			
Condenser			
Desiccant	1428	1421	7
Charcoal Charcoal	1480 1497	1455 1481	25 16
Total			23

Integrated Gas Sampling Data: Ambient

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

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

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

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INTERPOLL LABORATORIES, INC.
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EPA Method 5 Field Data Sheet

Job CP/ Saccola
Source Press RTO Inlet
Date 4-12-95 Test 3 Run 3

Operators BA KN
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9947

Nozzle No. Glass
Nozzle Dia. .189 in.
Bar. Press. 28.24 in.Hg

Pitot No. 31U-6
C_p .84
H_2O 2.50 %

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)
	(1455)	224.50											
B-1	2.5	226.28	1.20	1.57	6.24	5	116	256	257	38	64	65	20.9
2	5	228.07	1.26	1.54	7.96	5	118				66	64	20.9
3	7.5	229.91	1.46	1.79	9.81	6	119	256	249	38	67	65	20.9
4	10	231.69	1.35	1.23	1.64	5.5	119				68	65	20.9
5	12.5	233.69	1.60	2.06	3.62	6.5	119	267	248	37	69	66	20.9
6	15	235.78	1.80	2.30	5.72	7	124				71	66	20.9
7	17.5	237.84	1.70	2.17	7.76	7	124	254	250	38	72	66	20.9
8	20	239.72	1.46	1.79	9.62	6	124				72	66	20.9
9	22.5	241.63	1.50	1.92	1.55	6	123	267	250	37	73	67	20.9
10	25	243.55	1.50	1.92	3.47	6	125				75	68	20.9
11	27.5	245.36	1.30	1.67	5.27	5.5	125	267	256	36	76	68	20.9
12	30	247.04	1.10	1.42	6.93	5	123				76	69	20.9
B-1	32.5	248.66	1.05	1.37	8.56	5	119	237	248	36	71	67	20.9
2	35	250.34	1.20	1.55	0.29	5	118				74	68	20.9
3	37.5	252.03	1.10	1.42	1.95	5	122	251	249	37	76	68	20.9
4	40	253.77	1.25	1.62	3.72	5.5	121				77	69	20.9
5	42.5	255.52	1.20	1.56	5.46	5	121	246	238	38	79	70	20.9
6	45	257.32	1.40	1.82	7.34	6	122				80	71	20.9
7	47.5	259.27	1.50	1.95	9.29	6.5	122	238	247	40	80	71	20.9
8	50	261.18	1.40	1.82	1.18	6.5	123				81	72	20.9
9	52.5	263.24	1.70	2.21	3.25	7	122	230	244	37	81	72	20.9
10	55	265.21	1.56	1.95	5.21	6.5	122				82	73	20.9
11	57.5	267.03	1.20	1.56	6.96	5.5	123	249	239	37	82	73	20.9
12	60	268.60	.90	1.19	8.48	5	117				82	73	20.9
	(1607)												
	θ = 60	V_m = 44.10		ΔH = 1.75							Avg. =	71.6	

INTERPOLL LABORATORIES, INC.
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EPA Method 2 Field Data Sheet

Job: LOUISIANA PACIFIC/SEGOLA, MN#
Source: PRESS RTO STACK
Test: 2 Run: Date: 4-12-95
Stack Dimen.: 78.25 IN.
Dry Bulb: °F Wet bulb: °F
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.
Barometric Pressure: 28.24 IN.HG
Static Pressure: -.59 IN.WC
Operators: FITZGERALD - S.
Pitot No.: 4MS-8 C_p: .840
CH_2O

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: 4 1/4 IN.		Time Start:	HRS
A 1	.026	1.98	5.98		
2	.082	6.23	10.23		
3	.146	11.10	15.10		
4	.226	17.18	21.18		
5	.342	25.99	29.99		
6	.658	50.00	54.00		
7	.774	58.82	62.82		
8	.854	64.90	68.90		
9	.918	69.77	73.77		
10	.974	74.02	78.02		
B 1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Temp. Meas. Device & S/N:

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 L/I Segala
Date 4-12-95 Test 2 Run 1
Source Miss RTO STACK
No. of traverse points 20
Method S-0011 Filter holder: N/A
Filter type: NA

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:

N/A

Recovery solvent(s)

☐ acetone
☒ other(s) H2O

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		100	
Impinger No. 2	216	100	16
Impinger No. 3			
Condenser			
Desiccant	1450	1439	11
Total			27

Integrated Gas Sampling Data:

Bag Pump No. 318
Box No. 30 Bag No. 1
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: ET

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

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[redacted]NT[redacted]LL [redacted]ORA[redacted]RIES [redacted]C.

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EPA Method 5 Field Data Sheet

Job LP/SOGOL4 Operators ET-SK Nozzle No. Glass Pitot No. 4M15-8

Source Boss RTO STACK Meter Box No. #2 ΔH@ 1.77 in.WC Nozzle Dia. .245 in. C_p .840

Date 4-12-95 Test # Run 1 Gasmeter Coeff. .9962 Bar. Press. 28.24 in.Hg H_2O 2.5 %

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)
[redacted]	1715	606.20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
B 10	3	608.90	.82	2.23	8.82	6.0	253	228	242	34	67	59	
9	6	611.40	.80	2.14	1.35	6.0	253				72	63	
8	9	614.08	.82	2.21	3.94	6.0	253	230	240	34	75	63	
7	12	616.65	.85	2.30	6.59	6.1	253				75	63	
6	15	619.35	.90	2.44	9.31	6.2	251	228	236	40	82	67	
5	18	621.97	.80	2.18	1.90	6.0	253				82	67	
4	21	624.40	.70	1.91		5.5	253	226	228	44	83	67	
3	24	626.85	.68	1.86	6.72	5.4	253				84	68	
2	27	629.15	.65	1.78	9.07	5.2	253	228	230	43	86	69	
1	30	631.35	.58	1.59	1.29	5.0	254				86	70	
A 10	33	633.65	.62	1.70	3.59	5.0	253	230	234	43	83	70	
9	36	635.99	.65	1.78	5.93	5.0	255				85	71	
8	39	638.40	.67	1.83	8.32	5.1	256	232	236	43	85	71	
7	42	640.40	.72	1.97	0.79	5.2	256				87	71	
6	45	643.44	.77	2.11	3.35	5.5	256	231	243	43	87	71	
5	48	645.98	.75	2.06	5.88	5.5	255				87	71	
4	51	648.52	.78	2.14	8.45	5.5	255	234	240	42	88	72	
3	54	651.05	.74	2.04	0.97	5.5	255				88	72	
2	57	653.45	.69	1.87	3.38	5.2	255	232	244	42	88	72	
1	60	655.85	.65	1.79	5.74	5.0	255				88	72	
	(1820)												
[redacted]	θ = 60	V_m = 49.65	[redacted]	ΔH = 2.00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Avg. = 75.6	[redacted]	

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

Job LP/SeGOLA Date 4-12-95 Test 4 Run 2
Source PRESS RTO STACK No. of traverse points 20
Method S-0011 Filter holder: NA Filter type: NA

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

Particulate Catch Data:
No. of filters used: NA

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		100	
Impinger No. 2	210	200	10
Impinger No. 3			
Condenser			
Desiccant	1449	1438	11
Total			21

Integrated Gas Sampling Data:

Bag Pump No. 318 Box No. 30 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 0.5 IN.HG
Time start: (HRS) Time end: (HRS)
Sampling rate: 400 cc/min Operator: ET

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

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INTERPOLL LABORATORIES, INC.
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EPA Method 5 Field Data Sheet

Job: LP/SOGOLA
Source: ROSS RTO STACK
Date: 4-12-95 Test: 2 Run: 2

Operators: ET-SK
Meter Box No.: 2 ΔH@ 1.77 in.WC
Gasmeter Coeff.: 1.956 2

Nozzle No.: GLASS
Nozzle Dia.: .1245 in.
Bar. Press.: 28.24 in.Hg

Pitot No.: Y-US-S
C_p: .84
H_2O: 2.6 %

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)
	1908	656.90											
A 10	3	659.20	.62	1.69	4.18	4	255	230	242	40	73	65	
9	6	661.54	.65	1.75	1.49	4	255				74	65	
8	9	663.88	.70	1.84	3.84	4.2	254	234	240	39	81	65	
7	12	666.30	.72	1.95	6.34	4.5	256				83	66	
6	15	668.83	.76	2.06	8.86	5.10	256	232	238	42	84	66	
5	18	671.38	.78	2.12	1.41	5.5	256				84	67	
4	21	674.04	.82	2.23	4.04	5.7	256	230	239	42	86	68	
3	24	676.65	.80	2.18	6.63	5.7	256				86	68	
2	27	679.10	.70	1.91	9.06	5.0	257	231	238	42	86	68	
1	30	681.45	.66	1.80	1.42	4.8	256				57	49	
B 10	33	683.98	.75	2.05	3.94	5.1	257	228	241	40	82	70	
9	36	686.60	.78	2.12	6.50	5.3	256				84	70	
8	39	689.22	.85	2.32	9.17	6.0	256	231	244	41	86	71	
7	42	691.80	.75	2.05	1.70	5.2	256				88	72	
6	45	694.54	.90	2.47	4.46	6.2	256	229	256	42	88	72	
5	48	697.17	.82	2.25	7.11	5.8	256				88	72	
4	51	699.70	.74	2.02	9.61	5.5	259	232	241	42	88	72	
3	54	702.10	.68	1.86	2.02	5.0	257				89	73	
2	57	704.40	.65	1.78	4.38	4.5	257	235	245	44	89	73	
1	60	706.70	.60	1.65	6.65	4.2	257				89	73	
	(2012)												
	θ = 60	V_m = 49.80		ΔH = 2.01							Avg. = 770		

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

Job LP/SeGOLA — Date 4-12-95 Test #2 Run 3
Source PLANT STACK — No. of traverse points 20
Method S-0011 Filter holder: NA — Filter type: NA

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: — Recovery solvent(s)

☐ acetone
☒ other(s) H2O

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		100	
Impinger No. 2	215	100	15
Impinger No. 3			
Condenser			
Desiccant	1460	1450	10
Total			25

Integrated Gas Sampling Data:

Bag Pump No. 318 — Box No. 30 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: ET

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

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INTERPOLL LABORATORIES, INC.
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EPA Method 5 Field Data Sheet

Job: 4-P/SOGOLA
Source: PRESS RTO STACK
Date: 4-12-95 Test: 4 Run: 3

Operators: ET-SC
Meter Box No.: 2 ΔH@ 1.77 in.WC
Gasmeter Coeff.: .9962

Nozzle No.: GLASS
Nozzle Dia.: .245 in.
Bar. Press.: 28.24 in.Hg

Pilot No.: 4M5-8
C_p: .84
H_2O: 2.2 %

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)
	2048	707.10					254	230	248	35	71	68	
B 10	3	709.65	.75	2.07	2.62	5.0	254				74	68	
9	6	712.30	.82	2.23	0.23	6.0	254	232	242	38	77	68	
8	9	714.90	.80	2.18	4.81	5.8	254				80	68	
7	12	717.55	.84	2.29	7.46	6.0	254	235	246	39	81	69	
6	15	720.28	.90	2.46	0.24	6.0	254				83	69	
5	18	722.90	.80	2.19	2.80	5.8	255	232	243	40	84	70	
4	21	725.30	.70	1.92	5.24	5.2	255				85	70	
3	24	727.70	.68	1.87	7.65	5.0	255	235	240	40	85	71	
2	27	730.05	.66	1.82	0.02	5.0	254				85	71	
1	30	732.30	.60	1.66	2.28	4.7	254	238	257	40	81	71	
A 10	33	734.65	.62	1.71	4.59	4.7	255				83	71	
9	36	736.97	.64	1.76	6.92	4.7	255	234	252	40	84	71	
8	39	739.35	.68	1.87	9.32	5.0	253				86	72	
7	42	741.85	.72	1.99	1.80	5.2	251	237	255	40	86	72	
6	45	744.34	.74	2.05	4.33	5.3	254				87	72	
5	48	746.97	.78	2.16	6.91	5.8	254	234	246	41	88	72	
4	51	749.48	.75	2.07	9.45	5.4	252				88	73	
3	54	752.01	.73	2.03	1.96	5.4	252	232	251	41	88	73	
2	57	754.45	.70	1.95	4.42	5.2	252				88	73	
1	60	756.90	.68	1.89	6.85	5.1							
	(2/32)												
	θ = 60	V_m = 49.80		ΔH 2.01							Avg. = 76.9		

INTERPOLL LABORATORIES, INC.
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EPA Method 2 Field Data Sheet

Job LP / SAGOLA
Source PRESS RTO INLET
Test 5 Run Date 4-12-95
Stack Dimen. 57.25 IN.
Dry Bulb °F Wet bulb °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.24 IN.HG
Static Pressure -3.50 IN.WC
Operators B. Aschenbach K. Duesshaver
Pitot No. 31U-6 C_p .84
CH_2O

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: 3.75 IN.		Time Start:	HRS
-1		USED FLOWS FROM			
2		MDT TEST			
3		TEST NO 3 OF			
4		4-12-95			
5					
6					
7					
8					
9					
10					
11					
12					
-1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
Temp. Meas. Device & S/N:				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 IPI STACK A Date 4-12-95 Test 5 Run 1
Source Press RTO Duct No. of traverse points 24
Method ____ Filter holder: ☒ Filter type: A

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: ____

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	555	550	5
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1390	1383	7
Total			12

Integrated Gas Sampling Data: 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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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job: CP/ STACCA
Source: Dryer RTO INLET
Date: 4-12-95 Test 5 Run 1

Operators: GA KN
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9947

Nozzle No. Glass
Nozzle Dia. .227 in.
Bar. Press. 28.24 in.Hg

Pitot No. 31U-6
C_p .84
H_2O 3.5 %

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)
	(1715)	(269.20)											
B-1	2.5	271.64	1.20	3.21	1.68	7	122	255	246	39	65	62	20.9
2	5	274.12	1.20	3.18	4.13	7	120				68	64	20.9
3	7.5	276.43	1.10	2.93	6.50	7	120	259	255	38	70	64	20.9
4	10	279.00	1.30	3.45	9.07	8	123				73	65	20.9
5	12.5	281.77	1.55	4.12	1.88	10	122	246	243	37	75	66	20.9
6	15	284.52	1.45	3.88	4.61	9.5	121				75	66	20.9
7	17.5	287.06	1.20	3.21	7.09	8	122	239	244	38	76	67	20.9
8	20	289.73	1.46	3.23	9.77	9	125				77	68	20.9
9	22.5	292.28	1.26	3.22	2.26	8	123	236	239	40	79	69	20.9
10	25	294.63	1.00	2.69	4.54	7	123				82	71	20.9
11	27.5	296.80	.90	2.45	6.73	6	120	240	245	37	84	72	20.9
12	30	298.94	.85	2.33	8.86	5.5	118				84	72	20.9
-1	32.5	301.36	1.10	2.98	1.27	7	123	246	246	36	86	73	20.9
2	35	303.82	1.15	3.15	3.76	7.5	117				85	74	20.9
3	37.5	306.30	1.20	3.27	6.29	8	120	245	250	37	98	74	20.9
4	40	309.00	1.40	3.85	9.03	9	118				89	78	20.9
5	42.5	311.58	1.15	3.17	1.53	8	118	248	235	37	93	75	20.9
6	45	314.36	1.50	4.13	4.38	10	119				94	82	20.9
7	47.5	317.29	1.70	4.67	7.42	11	123	240	245	38	94	85	20.9
8	50	319.95	1.20	3.32	0.00	8	122				89	79	20.9
9	52.5	322.53	1.20	3.28	2.54	8	123	239	246	38	90	80	20.9
10	55	324.92	1.05	2.89	4.93	7	122				90	80	20.9
11	57.5	327.08	.80	2.21	7.02	5.5	120	243	245	39	88	80	20.9
12	60	329.28	.90	2.48	9.24	6	120				88	80	20.9
	(1821)												
	θ = 66	V_m = 60.08		3.24 ΔH =							Avg. = 77.7		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LPI SAGON
Source PRESS RTO INLET
Method ____ Filter holder: N/A

Date 4-12-95 Test 5 Run 2
No. of traverse points 24
Filter type: N/A

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.0 cfm at 14 IN. HG (vac) ☒

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

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	477	469	8
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1445	1431	14
Total			22

Integrated Gas Sampling Data: Ambient

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

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

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LP / Saco A
Source Cross AQ Inlet
Date 4-12-95 Test 5 Run 2

Operators SA KN
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9947

Nozzle No. G1455
Nozzle Dia. .227 in.
Bar. Press. 28.24 in.Hg

Pitot No. 32U-6
C_p .84
H_2O 2.0 %

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)
	(1908)	(329.60)											
B - 1	2.5	331.05	1.10	3.01	2.02	7	122	245	254	38	88	85	20.9
2	5.0	334.34	1.05	2.94	4.43	7	118				90	85	20.9
3	7.5	336.92	1.20	3.37	7.02	8	117	245	250	35	92	85	20.9
4	10	339.52	1.20	3.37	9.61	8	117				92	85	20.9
5	12.5	342.18	1.30	3.63	2.24	8.5	121	243	249	35	92	85	20.9
6	15	345.02	1.50	4.17	5.17	10	122				92	85	20.9
7	17.5	347.81	1.40	3.90	7.95	10	121	255	245	35	91	85	20.9
8	20	350.69	1.50	4.18	0.83	10.5	121				90	84	20.9
9	22.5	353.47	1.30	3.62	3.50	9	121	240	249	36	90	84	20.9
10	25	356.24	1.40	3.89	6.28	10	121				90	84	20.9
11	27.5	358.89	1.20	3.34	8.85	8	122	244	255	37	91	84	20.9
12	30	361.44	1.20	3.37	1.44	8	117				91	85	20.9
-1	32.5	363.93	1.10	3.07	3.91	7.5	121	243	250	35	89	84	20.9
2	35	366.40	1.05	2.95	6.33	7	116				90	84	20.9
3	37.5	368.70	1.00	2.79	8.68	7	120	239	251	35	91	84	20.9
4	40	371.10	1.20	3.36	1.26	7	118				92	85	20.9
5	42.5	373.90	1.40	3.92	4.05	10	118	235	245	36	92	85	20.9
6	45	376.86	1.50	4.20	6.94	10	118				92	85	20.9
7	47.5	379.91	1.70	4.75	0.01	12	119	241	254	37	92	85	20.9
8	50	382.60	1.30	3.63	2.65	9	121				91	85	20.9
9	52.5	385.28	1.30	3.64	5.38	9	118	235	251	38	91	85	20.9
10	55	388.06	1.40	3.92	8.17	10	118				91	85	20.9
11	57.5	390.49	1.05	2.95	0.59	7.5	118	240	250	38	91	85	20.9
12	60	393.03	1.05	2.95	3.01	7.5	118				91	85	20.9
	(0082)												
	θ = 60	V_m = 63.43		3.54 ΔH =							Avg. = 878		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP / STOCK A
Date 4-12-95 Test 3 Run 3
Source PROC'S EFO DUCT
No. of traverse points 24
Method ____ Filter holder: A
Filter type: A

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.0 cfm at 14 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: A

Recovery solvent(s)

☐ acetone
☒ other(s) MEOH

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	479	463	16
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1409	1390	19
Total			35

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: ____

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

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LPI/$400M
Source BOSS RTO INLET
Date 4-12-95 Test 5 Run 3

Operators SA KN
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9947

Nozzle No. GLOSS
Nozzle Dia. .227 in.
Bar. Press. 28.24 in.Hg

Pitot No. 3106
C_p .84
H_2O 2.0 %

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)
	(2048)	(393.40)											
B-1	2.5	395.80	1.10	3.09	5.87	6	118	227	240	38	84	81	20.9
2	5	398.30	1.20	3.32	8.43	7.5	120				87	82	20.9
3	7.5	400.75	1.05	2.93	0.83	7	117	232	250	36	89	83	20.9
4	10	403.35	1.20	3.36	3.41	8	117				90	83	20.9
5	12.5	405.87	1.10	3.08	5.88	7	117	240	251	36	91	84	20.9
6	15	408.60	1.40	3.92	8.67	9	118				91	84	20.9
7	17.5	411.44	1.50	4.19	1.55	10	119	254	262	38	91	84	20.9
8	20	414.17	1.30	3.63	4.23	9	119				91	84	20.9
9	22.5	416.87	1.30	3.61	6.91	9	122	245	255	35	91	85	20.9
10	25	419.78	1.60	4.44	9.88	10	122				91	85	20.9
11	27.5	422.35	1.05	2.98	2.31	7	120	245	255	33	91	84	20.9
12	30	424.80	1.05	3.00	4.75	7	107				91	84	20.9
-1	32.5	427.16	1.00	2.80	7.11	6.5	119	245	254	31	88	84	20.9
2	35	429.59	1.10	3.06	9.58	7	121				90	84	20.9
3	37.5	431.95	1.00	2.80	1.93	6.5	119	246	254	38	91	84	20.9
4	40	434.42	1.30	3.62	4.61	8.5	121				90	85	20.9
5	42.5	437.46	1.50	4.19	7.49	10	119	234	248	38	91	85	20.9
6	45	440.22	1.35	3.78	0.23	9	118				91	84	20.9
7	47.5	443.10	1.60	4.47	3.20	10	118	234	249	38	89	84	20.9
8	50	445.89	1.40	3.92	5.99	9	117				89	84	20.9
9	52.5	448.45	1.10	3.08	8.46	7.5	118	241	250	36	89	84	20.9
10	55	450.98	1.10	3.07	0.92	7.5	119				90	84	20.9
11	57.5	453.63	1.25	3.50	3.56	8	117	243	250	39	90	84	20.9
12	60	455.97	1.05	2.98	5.99	8	111				90	84	20.9
	(2151)												
	θ = 60	V_m = 62.57		ΔH^2 3.45							Avg. =	84.8	

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job LP Sagola
Source Press RTO Stack
Test 6 Run 0 Date 4-13-95
Stack Dimen. 78.25 IN.
Dry Bulb ____ °F Wet bulb ____ °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.35 IN.HG
Static Pressure -.59 IN.WC
Operators E.T. SK
Pitot No. ____ C_p .84

Drawing of Test Site

Cross-section View	Elevation View

Phenol

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
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/SCRUB Date 4-13-95 Test 6 Run 1
Source RMC RTO stack No. of traverse points 20
Method 5/17 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 6 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: Recovery solvent(s)

☐ acetone
☒ other(s) DI

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		100	12
Impinger No. 2		100	
Impinger No. 3			
Condenser			
Desiccant	1412	1404	8
Total			20

Integrated Gas Sampling Data:

Bag Pump No. 318 Box No. 30 Bag No. 1
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: 1400 cc/min Operator: ET

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 LF/5-40LA
Source FLOSS RTO STACK
Date 1-13-95 Test 6 Run 1

Operators ET-SK
Meter Box No. 2 ΔH@ 1.77 in.WC
Gasmeter Coeff. .9962

Nozzle No. 9-4
Nozzle Dia. .247 in.
Bar. Press. 28.35 in.Hg

Pitot No. 4M5-8
C_p .84
H_2O ____ %

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]	0900	757.20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A 10	3	759.45	.62	1.68	9.41	4	248	227	235	38	44	40	
9	6	761.74	.65	1.73	1.65	4	251				52	42	
8	9	764.07	.68	1.83	3.96	4.2	248	230	241	37	55	42	
7	12	766.40	.72	1.94	6.33	4.5	251				57	43	
6	15	768.80	.75	2.03	8.77	5.0	249	232	249	37	52	46	
5	18	771.30	.78	2.10	1.25	5.0	251				56	47	
4	21	773.82	.80	2.17	3.77	5.2	245	227	253	33	60	47	
3	24	776.30	.78	2.12	6.27	5.1	250				63	47	
2	27	778.72	.70	1.92	8.65	5.0	247	229	250	37	65	47	
1	30	780.90	.60	1.65	0.86	4	247				67	48	
B 10	33	783.40	.74	2.04	3.32	5.0	247	229	248	36	69	48	
9	36	785.85	.76	2.10	5.82	5.1	247				71	50	
8	39	788.33	.80	2.22	8.34	5.2	247	231	245	55	74	52	
7	42	790.92	.75	2.08	0.89	5	248				78	53	
6	45	793.35	.72	2.01	3.35	5	248	230	247	36	81	55	
5	48	795.92	.75	2.10	5.88	5.1	248				83	57	
4	51	798.37	.70	1.97	8.33	5	248	252	242	37	84	63	
3	54	800.73	.68	1.93	0.76	4.8	246				85	63	
2	57	803.10	.64	1.82	3.12	4.5	246	230	246	37	87	62	
1	60	805.45	.60	1.71	5.42	4.3	246				87	62	
	(1041)												
[illegible]	0 - 60	V_m - 48.25	[illegible]	ΔH - .96	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Avg. - 596		[illegible]

M12 PM only if 04/15

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/Kessler Date 4-18-95 Test 6 Run 2
Source Pure ATO Stack No. of traverse points 20
Method 5/17 Filter holder: NA Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☐
Post test: 0 cfm at 6 IN. HG (vac) ☑

Particulate Catch Data:

No. of filters used: Recovery solvent(s)

_____ ☐ acetone _____
_____ ☒ other(s) DI

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		100	
Impinger No. 2	210	100	10
Impinger No. 3		0	
Condenser			
Desiccant	1423	1410	13
Total			23

Integrated Gas Sampling Data:

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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[redacted]

(612) 786-6020

EPA Method 5 Field Data Sheet

Job: LP/SEGOLA
Source: Rock KTO Stack
Date: 4-13-95 Test 6 Run 2

Operators:
Meter Box No. 2 ΔH@ 1.77 in.WC
Gasmeter Coeff. 1.9962

Nozzle No. 9-4
Nozzle Dia. .247 in.
Bar. Press. 28.35 in.Hg

Pitot No. YM5-8
C_p .840
H_2O [redacted] %

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)
[redacted]	1120	806.20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
B 10	3	808.50	.62	1.70	8.45	4	253	229	245	37	73	67	
9	6	811.00	.75	2.10	0.97	√	254				78	27	
8	9	813.44	.70	1.97	3.42	4.9	254	229	245	34	79	65	
7	12	816.02	.76	2.13	5.97	√	255				82	65	
6	15	818.70	.90	2.53	8.75	6	255	232	249	35	84	71	
5	18	821.35	.74	2.09	1.29	√	256				88	72	
4	21	823.72	.65	1.85	3.68	4.9	256	230	247	35	89	73	
3	24	826.15	.68	1.94	6.13	4.9	254				89	73	
2	27	828.55	.65	1.87	8.54	4.9	249	233	257	37	90	75	
1	30	830.80	.55	1.58	0.76	4	250				91	75	
A 10	33	833.10	.62	1.79	3.13	4.2	248	228	247	36	86	75	
9	36	835.54	.68	1.95	5.59	4.9	248				87	75	
8	39	838.04	.70	2.01	8.08	√.0	249	231	242	42	88	75	
7	42	840.70	.75	2.15	0.67	√.3	250				90	75	
6	45	843.30	.75	2.15	3.26	√.3	252	233	251	39	93	77	
5	48	845.78	.72	2.06	√.79	√.2	256				94	77	
4	51	848.35	.74	2.13	8.38	5.3	253	229	257	40	94	77	
3	54	850.90	.72	2.08	0.93	5.3	253				96	80	
2	√7	853.50	.70	2.04	3.46	√.3	249	230	260	39	96	81	
1	60	855.85	.60	1.74	5.80	√.3	251				96	81	
	(1224)												
[redacted]	θ = 60	V_m = 49.65	[redacted]	ΔH = 1.99	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Avg. = 81.0		[redacted]

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP/Nesola Date 4-13-95 Test 6 Run 3
Source Luna RTO stack No. of traverse points 20
Method 5/17 Filter holder: NA Filter type: NA

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☑
Post test: 0 cfm at 1 IN. HG (vac) ☑

Particulate Catch Data:
No. of filters used: Recovery solvent(s)

☐ acetone
☐ other(s)

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		100	
Impinger No. 2	213	100	13
Impinger No. 3		0	
Condenser			
Desiccant	1433	1423	10
Total			23

Integrated Gas Sampling Data:

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:

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

[redacted]

(612) 786-6020

EPA Method 5 Field Data Sheet

Job: [redacted] Source: Fuel RTO Stack Date: 4-13-95 Test 6 Run 3

Operators: ET-SK
Meter Box No. 2 ΔH@ 1.77 in.WC
Gasmeter Coeff. .9962

Nozzle No. S-4
Nozzle Dia. .247 in.
Bar. Press. 28.35 in.Hg

Pilot No. 1/1115-8
C_p .84
H_2O %

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)
[redacted]	1333	856.10	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
A 10	3	858.45	.62	1.78	8.45	4.8	249	251	258	37	69	68	
9	6	860.88	.46	1.85	0.82	5	250				71	68	
8	9	863.25	.68	1.91	3.22	5	250	231	266	39	80	71	
7	12	866.75	.72	2.05	5.73	5.2	248				83	73	
6	15	868.33	.75	2.14	8.30	5.5	250	234	260	40	85	74	
5	18	870.90	.78	2.22	0.92	6.0	254				86	74	
4	21	873.50	.76	2.18	3.52	5.9	248	230	258	40	87	74	
3	24	876.22	.80	2.30	6.19	6.1	248				89	75	
2	27	878.72	.72	2.07	8.72	5.5	248	231	261	40	90	75	
1	50	881.21	.68	1.96	1.19	5.2	249				91	77	
B 10	53	883.74	.74	2.15	3.77	5.8	250	228	257	39	89	79	
9	56	886.40	.78	2.25	6.42	6.0	250				91	80	
8	39	889.18	.84	2.48	9.21	6.7	250	233	250	40	92	80	
7	42	891.80	.72	2.09	1.76	6	249				94	80	
6	45	894.30	.76	2.04	4.29	5.9	248	235	256	40	95	82	
5	48	896.88	.72	2.11	6.86	6	246				94	82	
4	51	899.41	.70	2.03	9.39	6	250	231	248	37	95	82	
3	54	901.90	.68	1.98	1.89	6	250				96	83	
2	57	904.32	.65	1.90	4.53	5.8	248	230	262	38	96	83	
1	60	906.70	.60	1.75	6.68	5.3	248				96	83	
	(1437)												
[redacted]	θ - 40	V_m - 50.60	[redacted]	ΔH 2.04	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Avg. - 82.8	[redacted]	

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: CP/ SAGOLA
Source: Press RTO INLET
Test: 7 Run ___ Date 4-13-95
Stack Dimen. 57.25 IN.
Dry Bulb ___ °F Wet bulb ___ °F
Manometer ☒Reg. ☐Exp ☐Elec.
Barometric Pressure 28.35 IN.HG
Static Pressure -3.00 IN.WC
Operators B Aschenbach & Nuessmeier
Pitot No. 31u-6 C_p .84
Phenol

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
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 CP/ SAGOLA
Date 4-13-95 Test 2 Run 1
Source PRESS RTO DUCT
No. of traverse points 24
Method ____ Filter holder: LA
Filter type: LA

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: NA

Recovery solvent(s)

☐ acetone
☒ other(s) DF WATER

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	286	278	8
Impinger No. 2	280	276	4
Impinger No. 3			
Condenser			
Desiccant	1409	1400	9
Total			21

Integrated Gas Sampling Data: Ambient

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

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

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job CPI SAGOLA
Source Press RTO Inlet
Date 4-13-95 Test 2 Run 1

Operators BA KW
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9947

Nozzle No. G1055
Nozzle Dia. .189 in.
Bar. Press. 28.35 in.Hg

Pitot No. 3106
C_p .84
H_2O 2.0 %

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)
	(0900)	(464.90)											
B-1	2.5	466.60	1.10	1.42	6.53	4	114	244	250	40	58	56	20.9
2	5	468.30	1.20	1.55	8.24	4	113				63	57	20.9
3	7.5	469.94	1.05	1.36	9.84	4	114	250	244	32	68	60	20.9
4	10	471.69	1.25	1.62	1.60	4	118				70	60	20.9
5	12.5	473.44	1.60	2.08	3.59	5	115	267	247	31	72	62	20.9
6	15	475.55	1.40	1.82	5.46	5	117				64	61	20.9
7	17.5	477.54	1.60	2.07	7.44	5	116	285	225	34	67	63	20.9
8	20	479.44	1.45	1.89	9.33	5	114				71	64	20.9
9	22.5	481.28	1.30	1.71	1.14	4.5	113	228	229	38	72	65	20.9
10	25	483.32	1.70	2.22	3.21	5	117				74	66	20.9
11	27.5	484.96	1.00	1.32	4.80	4	114	225	230	37	76	67	20.9
12	30	486.44	.85	1.12	6.27	3.5	118				77	68	20.9
-1	32.5	488.12	1.10	1.46	7.95	4	112	238	245	33	76	69	20.9
2	35	489.75	1.05	1.40	9.60	4	111				80	70	20.9
3	37.5	491.36	1.10	1.46	1.28	4	115	268	232	33	80	71	20.9
4	40	493.15	1.30	1.74	3.12	4	112				81	71	20.9
5	42.5	495.05	1.40	1.87	5.03	5	112	267	241	38	83	73	20.9
6	45	497.05	1.50	2.00	7.00	5	115				85	74	20.9
7	47.5	498.94	1.30	1.74	8.85	4.5	114	231	238	37	86	75	20.9
8	50	500.65	1.10	1.46	0.55	4	120				86	75	20.9
9	52.5	502.44	1.20	1.60	2.32	4	117	251	231	37	85	75	20.9
10	55	504.02	1.00	1.33	3.94	4	121				87	76	20.9
11	57.5	505.59	1.05	1.40	5.60	4	120	258	235	37	86	77	20.9
12	60	507.10	.80	1.08	7.06	3.5	110				87	77	20.9
	(1040)												
	θ = 60	V_m = 42.20		ΔH = 1.61							Avg. = 72.2		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP / SAGOLA
Date 4-13-95 Test 7 Run 2
Source PRESS RTO INLET
No. of traverse points 24
Method _____ Filter holder: LA
Filter type: LA

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: 1A

Recovery solvent(s)

☐ acetone
☒ other(s) DI WATER

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	310	294	16
Impinger No. 2	292	288	4
Impinger No. 3			
Condenser			
Desiccant	1450	1440	10
Total			30

Integrated Gas Sampling Data:

Ambient

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

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

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job: CP / SAGOLA | Operators: SA KN | Nozzle No.: Glass | Pitot No.: 310-6
Source: Boss RTO INLET | Meter Box No.: 2 ΔH@ 1.95 in.WC | Nozzle Dia.: .187 in. | C_p: .84
Date: 4-13-95 Test: 2 Run: 2 | Gasmeter Coeff.: .9947 | Bar. Press.: 28.35 in.Hg | H_2O: 2.4 %

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	
	(1120)	(507.30)											
B-1	2.5	508.97	1.05	1.37	8.92	4	119	240	239	38	82	78	20.9
2	5	510.69	1.10	1.46	0.61	4	118				85	78	20.9
3	7.5	512.61	1.40	1.86	2.53	5	118	249	251	36	87	80	20.9
4	10	514.54	1.30	1.73	4.37	5	120				87	80	20.9
5	12.5	516.52	1.50	1.99	6.35	5	120	260	243	37	88	81	20.9
6	15	518.57	1.50	1.99	8.34	5	121				85	79	20.9
7	17.5	520.58	1.70	2.25	0.44	5	120	260	245	35	87	79	20.9
8	20	522.50	1.30	1.72	2.28	4	121				87	80	20.9
9	22.5	524.13	1.20	1.59	4.05	4	122	260	238	34	87	80	20.9
10	25	525.73	1.00	1.32	5.67	4	120				86	80	20.9
11	27.5	527.31	.90	1.20	7.21	4	118	265	237	33	85	79	20.9
12	30	528.77	.80	1.08	8.67	3.5	110				85	78	20.9
-1	32.5	530.60	1.30	1.71	0.51	5	122	270	243	34	84	78	20.9
2	35	532.36	1.10	1.46	2.20	4	118				85	78	20.9
3	37.5	533.95	1.10	1.46	3.90	4	118	260	245	32	87	80	20.9
4	40	535.91	1.50	2.00	5.88	6	120				81	81	20.9
5	42.5	538.02	1.60	2.13	7.93	6	120	262	240	35	91	81	20.9
6	45	540.07	1.60	2.13	9.88	6	122				92	83	20.9
7	47.5	542.01	1.40	1.87	1.91	5	120	260	237	34	94	83	20.9
8	50	543.60	1.00	1.33	3.54	4	124				94	84	20.9
9	52.5	545.18	1.00	1.35	5.18	4	118	245	238	33	93	83	20.9
10	55	546.61	.80	1.09	6.66	3.5	110				91	83	20.9
11	52.5	548.10	.70	.97	8.05	3	100	250	240	33	91	82	20.9
12	60	549.65	.85	1.18	9.58	3.5	100				91	82	20.9
	(1225)												
	θ 60	V_m = 42.35		ΔH = 1.59							Avg. = 84.2		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP / SAGOLA
Date 4-13-95 Test 7 Run 3
Source PROSS RTO INLET
No. of traverse points 24
Method ____ Filter holder: NA
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.0 cfm at 9 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: NA

Recovery solvent(s)

☐ acetone
☒ other(s) DI WATER

No. of probe wash bottles: ____
Sample recovered by: BA

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	300	295	5
Impinger No. 2	295	292	6
Impinger No. 3			
Condenser			
Desiccant	1416	1409	7
Total			18

Integrated Gas Sampling Data: Ambient

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

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

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job: UPI SAGOLA
Source: Cross Ref Inlet
Date: 4-13-95 Test 7 Run 3

Operators: GA KW
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9947

Nozzle No. 6105 S
Nozzle Dia. .189 in.
Bar. Press. 28.55 in.Hg

Pitot No. 316
C_p .84
H_2O 2.75 %

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	
	(1333)	(550.00)											
B -1	2.5	551.68	1.05	1.40	1.66	4	117	235	241	38	77	73	20.9
2	5	553.27	.95	1.25	3.22	4	113				82	74	20.9
3	7.5	554.80	1.00	1.31	4.82	4	117	263	248	35	83	75	20.9
4	10	556.58	1.20	1.57	6.58	4	119				85	76	20.9
5	12.5	558.40	1.30	1.71	8.41	4.5	118	260	252	35	86	76	20.9
6	15	560.31	1.40	1.84	0.31	5	119				88	77	20.9
7	17.5	562.28	1.50	1.98	2.29	5	120	246	248	37	88	77	20.9
8	20	564.16	1.30	1.71	4.12	4.5	122				89	77	20.9
9	22.5	565.92	1.10	1.46	5.82	4	118	243	242	37	88	77	20.9
10	25	567.53	.80	1.07	7.27	3.5	112				88	77	20.9
11	27.5	568.82	.80	1.07	8.23	3.5	110	245	250	36	87	77	20.9
12	30	570.18	.75	1.00	0.13	3	115				87	77	20.9
-1	32.5	571.95	1.20	1.59	1.90	4	117	245	246	37	84	76	20.9
2	35	573.69	1.10	1.46	3.55	4	115				86	77	20.9
3	37.5	575.20	.95	1.26	5.16	4	117	240	246	36	87	77	20.9
4	40	576.91	1.20	1.59	6.93	5	118				87	77	20.9
5	42.5	578.80	1.40	1.85	8.84	5	118	257	250	35	88	77	20.9
6	45	580.66	1.30	1.71	0.67	4.5	120				88	77	20.9
7	47.5	582.57	1.40	1.85	2.58	5	120	258	250	37	89	77	20.9
8	50	584.43	1.30	1.70	4.41	4.5	124				89	77	20.9
9	52.5	586.08	1.10	1.46	6.11	4	118	246	238	36	88	77	20.9
10	55	587.69	.95	1.24	7.67	4	126				87	77	20.9
11	57.5	589.30	.85	1.11	9.16	4	123	261	240	35	87	77	20.9
12	60	590.69	.80	1.05	0.60	3.5	121				87	78	20.9
	(1436)												
	θ = 60	V_m = 40.69		ΔH = 1.47							Avg. = 81.5		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LP Sagola

Source: Press RTO Stack

Test: 8 Run: 0 Date: 4-13-95

Stack Dimen.: 78.25 IN.

Dry Bulb: ______ °F Wet bulb: ______ °F

Manometer: ☐ Reg. ☐ Exp ☐ Elec.

Barometric Pressure: 28.35 IN.HG

Static Pressure: -.59 IN.WC

Operators: ET SK

Pitot No.: ______ C_p: .84

Drawing of Test Site

Cross-section View	Elevation View

Particulate

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
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 CP/SEGOLA Date 4-13-95 Test 8 Run 1
Source PLESS RTO STACK No. of traverse points 20
Method 5 Filter holder: 4" Filter type: GF

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0 cfm at 6 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: 5679

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		100	
Impinger No. 2		100	22
Impinger No. 3		0	
Condenser			
Desiccant	1429	1420	9
Total			31

Integrated Gas Sampling Data:

Bag Pump No. B31 Box No. 30 Bag No. 1
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: ET

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

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[redacted]

(612) 786-6020

EPA Method 5 Field Data Sheet

Job: LA/SIERRA
Source: PRESS RTO STACK
Date: 4-13-95 Test: 8 Run: 1

Operators: ET-SK
Meter Box No.: 2 ΔH@ 1.77 in.WC
Gasmeter Coeff.: .9862

Nozzle No.: 9-3
Nozzle Dia.: .247 in.
Bar. Press.: 28.30 in.Hg

Pitot No.: 31V-8
C_p: .84
H_2O: %

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)
	1527	907.40			4.94	5.5	246	237	245	57	69	68	
B 10	3	910.00	.72	2.08			250				70	68	
9	6	912.40	.68	1.91	2.35	5.5							
8	9	914.99	.80	2.25	4.96	6.0	247	232	247	38	75	48	
7	12	917.70	.84	2.36	7.64	6.1	252				79	69	
6	15	920.50	.90	2.54	0.42	6.9	252	255	248	35	80	69	
5	18	923.08	.82	2.32	3.09	6.5	250				84	72	
4	21	925.60	.70	2.00	5.58	5.9	248	237	253	36	84	72	
3	24	928.10	.68	1.94	8.03	5.7	248				84	73	
2	27	930.45	.64	1.84	0.14	5.2	248	258	257	38	86	73	
1	30	932.75	.60	1.72	2.72	5.0	247				86	72	
A 10	33	935.10	.62	1.78	5.07	5	247	236	261	38	88	75	
9	36	937.58	.70	2.02	7.57	5.2	247				89	76	
8	39	940.02	.68	1.96	0.04	5.2	250	239	260	39	90	76	
7	42	942.52	.72	2.07	2.58	5.5	250				90	76	
6	45	945.10	.74	2.13	5.15	5.8	250	259	254	38	91	76	
5	48	947.60	.80	2.31	7.83	6.2	249				93	76	
4	51	950.03	.78	2.25	0.49	6.1	249	241	258	38	94	78	
3	54	952.03	.72	2.09	3.04	6.0	248				95	79	
2	57	955.05	.70	2.04	5.57	6.0	248	240	252	40	95	80	
1	60	958.10	.67	1.95	8.05		248				95	80	
	(1630)												
	0 - 60	V_m = 50.170		ΔH 2.08							Avg. = 78.8		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/SEGOLA Date 4-13-95 Test 8 Run 2
Source PRESS RTO STACK No. of traverse points 20
Method 5 Filter holder: GLASS Filter type: GF

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☑
Post test: 0 cfm at 8 IN. HG (vac) ☑

Particulate Catch Data:
No. of filters used: 5480

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		100	
Impinger No. 2	223	100	23
Impinger No. 3		0	
Condenser			
Desiccant	1496	1486	10
Total			33

Integrated Gas Sampling Data:

Bag Pump No. 318 Box No. 30 Bag No. 2
Bag Material: 5-laver 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: ET

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

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

[redacted]

(612) 786-6020

EPA Method 5 Field Data Sheet

Job: LP/SEGOLA
Source: PROSS RTO STACK
Date: 4-13-95 Test: 8 Run: 2

Operators: ET-SK
Meter Box No.: 2 ΔH@ 1.77 in.WC
Gasmeter Coeff.: .9962

Nozzle No.: 9-4
Nozzle Dia.: .247 in.
Bar. Press.: 28.35 in.Hg

Pitot No.: 3148
C_p: .84
H_2O: %

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)
[redacted]	1705	958.70	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
A 10	3	961.17	.68	1.93	1.14	5.0	252	232	247	38	79	75	
9	6	963.50	.62	1.75	3.47	5.0	249				82	74	
8	9	965.92	.68	1.92	5.90	5.1	252	230	268	38	84	73	
7	12	968.50	.72	2.04		5.5	251				84	75	
6	15	970.99	.74	2.09	0.95	6	251	230	270	37	88	75	
5	18	973.66	.82	2.33	3.64	6.5	251				88	76	
4	21	974.14	.70	1.99	6.13	6	250	234	265	38	89	76	
3	24	978.60	.68	1.94	8.59	5.9	251				91	76	
2	27	980.04	.65	1.84	0.99	5.5	251	235	262	38	93	77	
1	30	983.40	.62	1.78	3.35	5.2	248				93	78	
B 10	33	985.90	.72	2.06	5.89	5.8	250	233	256	38	91	78	
9	36	988.50	.76	2.18	8.50	6.0	249				91	78	
8	39	991.22	.82	2.35	1.21	6.5	244	255	258	38	92	78	
7	42	993.82	.75	2.14	3.80	6.1	252				95	80	
6	45	996.40	.72	2.07	6.35	6.0	250	236	246	36	94	80	
5	48	998.90	.70	2.02	8.87	6.0	248				96	80	
4	51	1001.50	.75	2.16	1.47	6.1	250	237	251	37	97	82	
3	54	1003.99	.68	1.97	3.96	5.9	248				96	82	
2	57	1006.45	.65	1.88	6.40	5.6	249	232	250	38	94	82	
1	60	1008.78	.60	1.73	8.74	5.0	249				96	82	
	(1811)												
[redacted]	0 - 60	V_m = 50.08	[redacted]	ΔH = 2.01	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Avg. = 84.3		[redacted]

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP/SEMOIA Date 4-13-95 Test 8 Run 3
Source GLASS LTD STACK No. of traverse points 20
Method 5 Filter holder: GLASS Filter type: GF

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0 cfm at 8 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: 5681

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		100	
Impinger No. 2	220	100	20
Impinger No. 3		0	
Condenser			
Desiccant	1438	1420	18
Total			38

Integrated Gas Sampling Data:

Bag Pump No. 318 Box No. 30 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: C cc/min at 15 IN.HG
Time start: (HRS) Time end: (HRS)
Sampling rate: 400 cc/min Operator: EF

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

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

[redacted]

(612) 786-6020

EPA Method 5 Field Data Sheet

Job LP/SOBOLA
Source PLANT 55 RTO STACK
Date 4-13-95 Test 8 Run 3

Operators ZT-SK
Meter Box No. 2 ΔH@ 1.77 in.WC
Gasmeter Coeff. .9962

Nozzle No. 9-4
Nozzle Dia. .247 in.
Bar. Press. 28.35 in.Hg

Pitot No. 31V-8
C_p .84
H_2O [redacted] %

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)
[redacted]	1834	9.00	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
B 10	3	11.52	.70	2.00	1.49	4.0	249	235	247	35	79	78	
9	6	14.14	.78	2.21	4.10	4.8	246				80	78	
8	9	16.45	.72	2.04	6.61	6.2	248	237	253	37	81	76	
7	12	19.42	.87	2.47	9.37	7.2	245				83	76	
6	15	21.95	.72	2.04	1.89	4.5	246	235	247	37	85	73	
5	18	24.58	.78	2.20	4.50	4.8	249				88	73	
4	21	27.04	.72	2.04	7.01	6.5	249	232	251	38	89	73	
3	24	29.50	.68	1.93	9.46	6.0	249				91	76	
2	27	31.86	.65	1.84	1.84	5.8	252	230	251	38	91	76	
1	30	34.22	.62	1.76	4.20	5.5	251				92	77	
A 10	33	36.50	.60	1.71	6.51	5.2	251	234	252	37	93	77	
9	36	38.97	.67	1.91	8.96	6.0	250				93	79	
8	39	41.42	.69	1.97	1.44	6.00	250	232	250	37	95	80	
7	42	43.92	.70	2.01	3.96	6.1	249				95	81	
6	45	46.50	.76	2.18	6.57	6.5	250	231	253	38	95	81	
5	48	49.05	.70	2.01	9.04	6.2	249				95	81	
4	51	51.73	.78	2.23	1.73	7.0	252	234	250	38	95	81	
3	54	54.30	.72	2.06	4.28	6.2	251				96	81	
2	57	56.90	.75	2.16	6.88	6.7	248	232	248	37	96	81	
1	60	59.25	.60	1.73	9.22	5.2	249				96	81	
	(1937)												
[redacted]	θ = 60	V_m = 50.25	[redacted]	ΔH@ 2.03	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Avg. = 84.1	[redacted]	

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job CP/ S4GOLA
Source Press RTO INLET
Test 8 Run ___ Date 4-13-95
Stack Dimen. 57.25 IN.
Dry Bulb ______ °F Wet bulb ______ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.35 IN.HG
Static Pressure -3.00 IN.WC
Operators D. Aschenbach K. Nuessmeier
Pitot No. 310-6 C_p .84
Particulate

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	
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 CP/ STOCKTON Date 4/13/95 Test 9 Run 1
Source PRESS RTO INLET No. of traverse points 24
Method 5 Filter holder: GLASS Filter type: GFP

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.0 cfm at 9 IN. HG (vac) ☑

Particulate Catch Data:
No. of filters used: 1 (6837)

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	217	3200	17
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1453	1449	4
Total			21

Integrated Gas Sampling Data:

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

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job CP/ SAGOLA
Source PROCESS RTO INLET
Date 4/13/95 Test 5 Run 1

Operators SA KN
Meter Box No. 2 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9947

Nozzle No. S-3
Nozzle Dia. .191 in.
Bar. Press. 28.35 in.Hg

Pitot No. 316-6
C_p .84
H_2O 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)
	(1528)	(591.00)											
1	2.5	592.73	1.10	1.50	2.69	4.5	119	228	230	35	70	69	20.9
2	5	594.46	1.05	1.37	4.32	4	117				76	73	20.9
3	7.5	596.01	.98	1.34	5.93	4	122	229	232	36	77	71	20.9
4	10	597.66	1.05	1.45	7.61	4	115				81	72	20.9
5	12.5	599.50	1.20	1.67	9.41	5	114	233	234	35	82	73	20.9
6	15	601.42	1.46	1.96	1.37	5.5	112				53	74	20.9
7	17.5	603.28	1.30	1.82	3.25	5	114	245	238	35	83	75	20.9
8	20	605.06	1.16	1.52	4.97	4.5	121				83	74	20.9
9	22.5	606.83	1.20	1.65	6.77	5	122	245	234	36	84	74	20.9
10	25	608.48	.90	1.24	8.33	4	121				83	75	20.9
11	27.5	609.90	.80	1.12	9.82	4	113	234	238	35	83	75	20.9
12	30	611.44	.85	1.19	1.35	4	111				82	75	20.9
1	32.5	612.92	.80	1.11	2.82	4	119	235	240	35	80	74	20.9
2	35	614.66	1.20	1.66	4.62	5	119				80	74	20.9
3	37.5	616.41	1.10	1.53	6.35	5	114	246	245	37	81	74	20.9
4	40	618.14	1.05	1.46	8.04	4.5	115				81	74	20.9
5	42.5	619.96	1.30	1.81	9.92	5	116	240	236	35	81	74	20.9
6	45	621.89	1.50	2.06	1.82	6	122				83	75	20.9
7	47.5	623.80	1.30	1.81	3.80	5	117	245	245	35	84	75	20.9
8	50	625.80	1.50	2.08	5.82	6	119				84	75	20.9
9	52.5	627.70	1.30	1.80	7.69	5	120	241	238	34	84	76	20.9
10	55	629.43	1.00	1.38	9.34	4.5	122				85	76	20.9
11	57.5	631.11	1.10	1.51	1.06	5	126	240	243	34	85	77	20.9
12	60	632.80	1.00	1.43	2.74	4	105				84	76	20.9
	(1675)												
	θ = 60	V_m = 41.80		ΔH 1.49							Avg. = 117.2		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP/Stoller
Source Pass RTO Duct
Method 5 Filter holder: Glass

Date 4-13-95 Test 9 Run C
No. of traverse points 24
Filter type: 4 CFF

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: .101 cfm at 9 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used:

1 (6829)

Recovery solvent(s)

☒ acetone
☐ other(s)

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		200	
Impinger No. 2	217		17
Impinger No. 3			
Condenser			
Desiccant	1424	1416	8
Total			25

Integrated Gas Sampling Data:

Ambient

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

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

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job CPI Saccca | Operators BA KK | Nozzle No. 5-3 | Pitot No. 31U-6
Source Dross RTO Inlet | Meter Box No. 7 ΔH@ 1.95 in.WC | Nozzle Dia. .151 in. | C_p .84
Date 4-13-95 Test 9 Run 2 | Gasmeter Coeff. .9947 | Bar. Press. 28.35 in.Hg | H_2O 2.5 %

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)
	(1705)	(633.60)											
B-1	2.5	634.75	1.10	1.51	4.71	4.5	119	227	237	33	72	69	20.9
2	5	636.46	1.10	1.50	6.41	4.5	116				75	69	20.9
3	7.5	638.12	1.06	1.36	8.03	4	116	236	235	33	76	70	20.9
4	10	639.79	1.10	1.50	9.74	4	119				77	70	20.9
5	12.5	641.62	1.35	1.76	1.58	5	122	239	238	36	78	70	20.9
6	15	643.36	1.20	1.63	3.36	4.5	121				81	72	20.9
7	17.5	645.22	1.30	1.77	5.23	4.5	122	238	234	36	82	73	20.9
8	20	647.19	1.45	1.97	7.18	5.5	123				83	73	20.9
9	22.5	649.02	1.20	1.63	8.96	5	126				83	74	20.9
10	25	650.82	1.20	1.64	0.75	5	120	243	243	36	83	74	20.9
11	27.5	652.74	1.30	1.77	2.61	5	124	245	245	35	82	74	20.9
12	30	654.72	.85	1.17	4.13	4	117				82	74	20.9
-1	32.5	655.70	.95	1.30	5.72	4	119	239	242	34	82	73	20.9
2	35	657.50	1.20	1.65	7.32	4.5	116				80	73	20.9
3	37.5	659.24	1.00	1.38	9.16	4.5	115	238	250	37	82	74	20.9
4	40	660.95	1.10	1.51	0.88	4.5	117				82	74	20.9
5	42.5	662.66	1.20	1.63	2.67	5	123	239	250	35	83	75	20.9
6	45	664.64	1.50	2.06	4.67	6	120				84	76	20.9
7	47.5	666.67	1.50	2.07	6.69	6	118	232	238	34	86	76	20.9
8	50	668.86	1.60	2.20	8.76	6	121				87	77	20.9
9	52.5	670.63	1.30	1.78	0.63	5	124	236	242	35	88	78	20.9
10	55	672.44	1.20	1.65	2.44	5	123				87	78	20.9
11	57.5	674.15	1.05	1.45	4.12	4.5	122	239	243	35	87	78	20.9
12	60	675.77	.90	1.26	5.70	4	110				87	78	20.8
	(1811)												
	θ = 60	V_m = 42.77		1.63 ΔH =							Avg. = 119.7		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/ S400A1 Date 4-13-95 Test 9 Run 3
Source PM 55 RTO INLET No. of traverse points 24
Method 5 Filter holder: Glass Filter type: 4" GFF

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☑
Post test: 0.0 cfm at 9 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: 1 (6830)

Recovery solvent(s)

☒ Acetone
☐ other(s)

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1		3	
Impinger No. 2	213	200	13
Impinger No. 3			
Condenser			
Desiccant	1465	1453	12
Total			25

Integrated Gas Sampling Data:

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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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LP/SAGOLA
Source Power RTO Outlet
Date 4-13-95 Test 2 Run 3

Operators BA KN
Meter Box No. 7 ΔH@ 1.95 in.WC
Gasmeter Coeff. .9947

Nozzle No. S-3
Nozzle Dia. .191 in.
Bar. Press. 28.35 in.Hg

Pitot No. 312-6
C_p .84
H_2O 2.5 %

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)
	(1634)	(676.10)											
1	2.5	677.83	1.06	1.37	7.73	5	118	225	227	33	77	74	20.9
2	5	679.57	1.65	1.44	9.41	4.5	117				81	75	20.9
3	7.5	681.19	1.00	1.37	1.05	4.5	120	227	225	31	83	76	20.9
4	10	682.93	1.10	1.51	2.76	4.5	121				83	76	20.9
5	12.5	684.56	1.10	1.52	4.49	4.5	117	229	230	34	84	77	20.9
6	15	686.35	1.40	1.93	6.44	5	118				84	76	20.9
7	17.5	688.25	1.40	1.92	8.38	5.5	121	230	232	33	84	76	20.9
8	20	690.18	1.30	1.77	0.24	5.5	124				84	77	20.9
9	22.5	692.12	1.35	1.85	2.14	6	123	229	233	34	84	78	20.9
10	25	694.05	1.25	1.72	3.98	5.5	122				85	77	20.9
11	27.5	695.68	1.05	1.44	5.66	5	123	231	235	33	86	77	20.9
12	30	697.35	1.00	1.36	7.30	5	127				87	78	20.9
-1	32.5	699.05	.95	1.31	8.90	5	123	249	238	33	86	79	20.9
2	35	700.64	.90	1.25	0.47	4.5	119				88	80	20.9
3	37.5	702.12	.85	1.18	2.00	4	117	236	238	34	90	81	20.9
4	40	703.73	1.05	1.47	3.71	4.5	116				90	81	20.9
5	42.5	705.57	1.30	1.82	5.61	6	115	231	238	33	91	82	20.9
6	45	707.53	1.35	1.88	7.54	6	120				91	82	20.9
7	47.5	709.56	1.50	2.09	9.57	6.5	118	230	242	33	91	82	20.9
8	50	711.65	1.55	2.16	1.64	6.5	119				91	82	20.9
9	52.5	713.49	1.20	1.66	3.46	5	123	229	243	34	91	82	20.9
10	55	715.41	1.30	1.80	5.34	5.5	124				92	83	20.9
11	57.5	717.22	1.25	1.73	7.20	5	123	229	243	34	93	85	20.9
12	60	718.92	1.00	1.39	8.87	5	122				95	86	20.9
	(1937)												
	θ = 60	V_m = 42.82		ΔH = 1.62							Avg. = 120.4		

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APPENDIX D

INTERPOLL LABORATORIES ANALYTICAL DATA

TABLE OF CONTENTS

Interpoll Laboratories
(612) 786-6020

EPA Method 3 Data Reporting Sheet
Orsat Analysis

Job LP/SAGOLA
Team Leader KON ROSENTHAL
Date Submitted 4-12-95
Test No. 4
Date of Analysis 4-12-95

Source PRESS RTO
Test Site STACK
Date of Test 4-12-95
No. of Runs Completed 3
Technician R.R.

Test/ Run	Sample Log Number and Type	No. of An.	Buret Readings (ml)			Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
			Zero Pt.	After CO_2	After O_2			
1		1	0.00	.35	20.85	.35	20.50	
		2	0.00	.32	20.82	.32	20.50	
	☒ B ☐ F	Avg				.33	20.50	
2		1	0.00	.32	20.82	.32	20.50	
		2	0.00	.32	20.82	.32	20.50	
	☒ B ☐ F	Avg				.32	20.50	
3		1	0.00	.31	20.81	.31	20.50	
		2	0.00	.31	20.81	.31	20.50	
	☒ B ☐ F	Avg				.31	20.50	
		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 $F_o = \frac{20.9 - O_2}{CO_2}$

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

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Impinger Catch Data Reporting Sheet

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

Job: Sagola / LP
Date Submitted: 4/27/95
Date of Analysis: 5/11/95
Source/Site: Press RTO / Stack
Test No.: 8
Technician: J. Lorenz

	Solvent Phase	Aqueous Phase
Test: 8 Run: 0	Dish No: 27	Dish No: 6
Log No: 5194 -29 I	Dish + Sample Wt: 52.4453 g	Dish + Sample Wt: 48.2730 g
Color & Appearance:	Dish Tare Wt: 52.4452 g	Dish Tare Wt: 48.2727 g
	Fraction Wt: .0001 g	Fraction Wt: .0003 g
Comments: Field Blank	Smpl Vol: 200 ml, Alqt: 100 ml, Factor: 2.000	Smpl Vol: 200 ml, Alqt: 100 ml, Factor: 2.000
	Sample Wt: .0002 g	Sample Wt: .0006 g
Test: 8 Run: 1	Dish No: 508	Dish No: 9
Log No: -30 I	Dish + Sample Wt: 46.5066 g	Dish + Sample Wt: 43.6971 g
Color & Appearance:	Dish Tare Wt: 46.5027 g	Dish Tare Wt: 43.6653 g
	Fraction Wt: .0039 g	Fraction Wt: .0318 g
Comments:	Smpl Vol: 226 ml, Alqt: 100 ml, Factor 2.260	Smpl Vol: 226 ml, Alqt: 100 ml, Factor 2.260
	Sample Wt: .0088 g	Sample Wt: .0719 g
Test: 8 Run: 2	Dish No: 509	Dish No: 22
Log No: -31 I	Dish + Sample Wt: 47.6249 g	Dish + Sample Wt: 51.3708 g
Color & Appearance:	Dish Tare Wt: 47.6204 g	Dish Tare Wt: 51.3611 g
	Fraction Wt: .0045 g	Fraction Wt: .0097 g
Comments:	Smpl Vol: 227 ml, Alqt: 100 ml, Factor 2.270 (2.270 5.1.: 5.2.95)	Smpl Vol: 227 ml, Alqt: 100 ml, Factor 2.270
	Sample Wt: .0102 g	Sample Wt: .0220 g
Test: 8 Run: 3	Dish No: 523	Dish No: 93
Log No: -32 I	Dish + Sample Wt: 49.8114 g	Dish + Sample Wt: 53.9895 g
Color & Appearance:	Dish Tare Wt: 49.8081 g	Dish Tare Wt: 53.9847 g
	Fraction Wt: .0033 g	Fraction Wt: .0048 g
Comments:	Smpl Vol: 223 ml, Alqt: 100 ml, Factor 2.230	Smpl Vol: 223 ml, Alqt: 100 ml, Factor 2.230
	Sample Wt: .0074 g	Sample Wt: .0107 g

Note: Factor = Sample Volume/Aliquot Volume

Blank Solvent Wt. .0001 g

	RUN 0 Field Blank	RUN 1	RUN 2	RUN 3
Results of Solvent Phase g	.0002	.0056	.0100	.0072
Results of Aqueous Phase D-2 g	.0006	.0713	.0214	.0101

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 / Sagok	Source/Site	Press RTO / stack
Date Submitted	4-17-95	Test No.	8
Date of Analysis	4-18-95	Technician	B.D.
Transport Leakage ☐	None ☒ ml	Solvent	Acetone

Test: 8	Run: 0	Dish No:	763
Log No:	5194-29P	Dish + Sample Wt:	45.4687 g
Volume of Solvent	100 ml	Dish Tare Wt:	45.4685 g
*Solvent Residue	2.0 ug/ml	Sample Wt:	0.0002 g
Test: 8	Run: 1	Dish No:	767
Vol. of Solvent	100 ml	Dish + Sample Wt:	42.4114 g
Log Number	-30P	Dish Tare Wt:	42.4089 g
Comments		Sample Wt:	0.0025 g
Test: 8	Run: 2	Dish No:	776
Vol. of Solvent	100 ml	Dish + Sample Wt:	45.0708 g
Log Number	-31P	Dish Tare Wt:	45.0689 g
Comments		Sample Wt:	0.0019 g
Test: 8	Run: 3	Dish No:	778
Vol. of Solvent	100ml	Dish + Sample Wt:	44.0646 g
Log Number	-32P	Dish Tare Wt:	44.0030 g
Comments		Sample Wt:	0.0016 g

*Solvent Residue 2.0 ug/ml = [(Sample Wt. 0.002 g) (10^6)]/Vol. of Sol. 100 ml

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

	RUN	RUN 1	RUN 2	RUN 3
Results of Solvent Rinse g	D-3	0.0023	0.0017	0.0014

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Filter Gravimetrics Reporting Sheet

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

Job: LP / Sagola
Date Submitted: 4-
Date of Analysis: 4-18-95
Source/Site: Press RTO / Stack
Test No.: 8
Technician: B.D.

Test: 8	Run: 0	Filter No:	7222
Field Blank:		Filter Type:	41'GF
Log No: 5194-29F		Filter + Sample Wt:	.9166 g
Color:		Filter Tare Wt:	.9166 g
		Sample Wt:	0.0000 g
Test: 8	Run: 1	Filter No:	5679
Log No: -30F		Filter Type:	41'GF
Color:		Filter + Sample Wt:	.9294 g
		Filter Tare Wt:	.9277 g
		Sample Wt:	0.0017 g
Test: 8	Run: 2	Filter No:	5680
Log No: -31F		Filter Type:	41'GF
Color:		Filter + Sample Wt:	.9321 g
		Filter Tare Wt:	.9310 g
		Sample Wt:	0.0011 g
Test: 8	Run: 3	Filter No:	5681
Log No: -32F		Filter Type:	41'GF
Color:		Filter + Sample Wt:	.9334 g
		Filter Tare Wt:	.9307 g
		Sample Wt:	0.0027 g

√9AB

	RUN	RUN 1	RUN 2	RUN 3
Results of Filter Analysis g		0.0017	0.0011	0.0027

	RUN	RUN 1	RUN 2	RUN 3
Total Mass g		0.0839	0.0342	0.0214

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Impinger Catch Data Reporting Sheet

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

Job: Smyth / L.P.
Date Submitted: 4/27/95
Date of Analysis: 5/11/95

Source/Site: Press RTO / Inlet
Test No.: 9
Technician: J. Lorenz

	Solvent Phase	Aqueous Phase
Test: 9 Run: 0	Dish No: 783	Dish No: 409
Log No: 5194-33 I	Dish + Sample Wt: 43.0875 g	Dish + Sample Wt: 46.1928 g
Color & Appearance:	Dish Tare Wt: 43.0873 g	Dish Tare Wt: 46.1927 g
	Fraction Wt: .0002 g	Fraction Wt: .0001 g
Comments: Field Blank	Smpl Vol: 200 ml, Alqt: 100 ml, Factor: 2.000	Smpl Vol: 200 ml, Alqt: 100 ml, Factor: 2.000
	Sample Wt: .0004 g	Sample Wt: .0002 g
Test: 9 Run: 1	Dish No: 788	Dish No: 609
Log No: -34 I	Dish + Sample Wt: 45.4010 g	Dish + Sample Wt: 45.6031 g
Color & Appearance:	Dish Tare Wt: 45.3991 g	Dish Tare Wt: 45.5603 g
	Fraction Wt: .0019 g	Fraction Wt: .0428 g
Comments: pH 8.35, odor slightly yellowish	Smpl Vol: 217 ml, Alqt: 100 ml, Factor 2.170	Smpl Vol: 217 ml, Alqt: 100 ml, Factor 2.170
	Sample Wt: .0041 g	Sample Wt: .0929 g
Test: 9 Run: 2	Dish No: 812	Dish No: 610
Log No: -35 I	Dish + Sample Wt: 45.2086 g	Dish + Sample Wt: 48.4461 g
Color & Appearance:	Dish Tare Wt: 45.2057 g	Dish Tare Wt: 48.4374 g
	Fraction Wt: .0029 g	Fraction Wt: .0087 g
Comments: pH 7.52 slightly yellowish	Smpl Vol: 218 ml, Alqt: 100 ml, Factor 2.180	Smpl Vol: 218 ml, Alqt: 100 ml, Factor 2.180
	Sample Wt: .0063 g	Sample Wt: .0190 g
Test: 9 Run: 3	Dish No: 732	Dish No: 611
Log No: -36 I	Dish + Sample Wt: 46.3355 g	Dish + Sample Wt: 50.0258 g
Color & Appearance:	Dish Tare Wt: 46.3326 g	Dish Tare Wt: 50.0177 g
	Fraction Wt: .0029 g	Fraction Wt: .0081 g
Comments: pH 8.68, odor slightly yellowish	Smpl Vol: 209 ml, Alqt: 100 ml, Factor 2.090	Smpl Vol: 209 ml, Alqt: 100 ml, Factor 2.090
	Sample Wt: .0061 g	Sample Wt: .0169 g

Blank Solvent Wt. .0001 g

Note: Factor = Sample Volume/Aliquot Volume

	RUN 0 Field Blank	RUN 1	RUN 2	RUN 3
Results of Solvent Phase g	.0004	.0037	.0059	.0057
Results of Aqueous Phase D-5 g	.0002	.0927	.0188	.0167

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 / Sagola	Source/Site	Press RTO / Inlet
Date Submitted	4-17-95	Test No.	9
Date of Analysis	4-18-95	Technician	B. D.
Transport Leakage ☐	None ☒ ml	Solvent	Acetone

Test: 9	Run: 0	Dish No:	725
Log No:	5194-33P	Dish + Sample Wt:	46.5080 g
Volume of Solvent	100 ml	Dish Tare Wt:	46.5078 g
*Solvent Residue	2.0 ug/ml	Sample Wt:	0.0002 g
Test: 9	Run: 1	Dish No:	749
Vol. of Solvent	100 ml	Dish + Sample Wt:	43.2995 g
Log Number	-34P	Dish Tare Wt:	43.2889 g
Comments		Sample Wt:	0.0106 g
Test: 9	Run: 2	Dish No:	755
Vol. of Solvent	100 ml	Dish + Sample Wt:	46.0033 g
Log Number	-35P	Dish Tare Wt:	45.9966 g
Comments		Sample Wt:	0.0067 g
Test: 9	Run: 3	Dish No:	747
Vol. of Solvent	100ml	Dish + Sample Wt:	43.0573 g
Log Number	-36P	Dish Tare Wt:	43.0479 g
Comments		Sample Wt:	0.0094 g

*Solvent Residue 2.0 ug/ml = [(Sample Wt. 0.0002 g) (10^6)]/Vol. of Sol. 100 ml

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

	RUN	RUN 1	RUN 2	RUN 3
Results of Solvent Rinse g	D-6	0.0104	0.0065	0.0092

Vgb

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Filter Gravimetrics Reporting Sheet

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

Job	LP/Sugolu	Source/Site	Press RTO / Inlet
Date Submitted	4-	Test No.	9
Date of Analysis	4-18-95	Technician	B.O.

Test: 9	Run: 0	Filter No:	6835	
Field Blank:		Filter Type:	4"GF	
Log No: 5194-33F		Filter + Sample Wt:	.9560	g
Color:		Filter Tare Wt:	.9559	g
		Sample Wt:	0.0001	g
Test: 9	Run: 1	Filter No:	6837	
Log No: -34F		Filter Type:	4"GF	
Color:		Filter + Sample Wt:	.9457	g
		Filter Tare Wt:	.9413	g
		Sample Wt:	0.0044	g
Test: 9	Run: 2	Filter No:	6829	
Log No: -35F		Filter Type:	4"GF	
Color:		Filter + Sample Wt:	.9556	g
		Filter Tare Wt:	.9554	g
		Sample Wt:	0.0002	g
Test: 9	Run: 3	Filter No:	6830	
Log No: -36F		Filter Type:	4"GF	
Color:		Filter + Sample Wt:	.9579	g
		Filter Tare Wt:	.9551	g
		Sample Wt:	0.0028	g

Vo(wb)

		RUN	RUN 1	RUN 2	RUN 3
Results of Filter Analysis	g		0.0044	0.0002	0.0028

		RUN	RUN 1	RUN 2	RUN 3
Total Mass	g		0.1112	0.0314	0.0344

Interpoll Laboratories, Inc.
(612)786-6020

Ion Chromatography Laboratory

DIONEX MODEL 4000i WITH ANION MICRO MEMBRANE SUPRESSION

Analyst: TPW Date of Analysis: 5/11/95

Job: L.P. Segoe Source: See Below Site: See Below

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
✓	AS4A	ml/min	1.8 mM Na_2CO_3 & 1.7 mM $NaHCO_3$	ml/min	
	AS5	ml/min	100 mM NaOH	✓	Isocratic
		ml/min			Gradient(List program below)

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
T8R0	5194-29 I	200	1	0.101	20.2	4.21×10^{-4}
T8R1	-30	226	1	<0.025	<5.65	$< 1.18 \times 10^{-4}$
T8R2	-31	227	1	↓	<5.68	$< 1.18 \times 10^{-4}$
T8R3	-32	223	1	↓	<5.58	$< 1.16 \times 10^{-4}$
T9R0	-33	200	1	0.052	10.4	2.17×10^{-4}
T9R1	-34	217	1	0.130	28.2	5.88×10^{-4}
T9R2	-35	218	1	0.055	12.0	2.50×10^{-4}
T9R3	-36	209	1	0.178	37.2	7.75×10^{-4}

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

meq = Total ug / 48000

Test 8 - Press RTO Stack

Test 9 - Press RTO Stack

LSC-08RR

	A	B	C	D	E	F	G	H	I	J
1	EPA Method 202 Calculations						Report No. 5-5194			
2	Job: **LOUISIANA PACIFIC CORP - Sagola**									
3	Date: 13-Apr-95									
4	***TEST 8 - Press RTO Outlet***									**ENTER IN**
5		Vic	Sulfate	Mc	Mr	Mi	Mo	Mb	CPM	**COMPUTER**
6	RUN	(ml)	(mg/ml)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	**(g)**
7	1	226	0.00E+00	0.00E+00	71.9	71.90	8.8	0.8	79.90	0.0799
8	2	227	0.00E+00	0.00E+00	22	22.00	10.2	0.8	31.40	0.0314
9	3	223	0.00E+00	0.00E+00	10.7	10.70	7.4	0.8	17.30	0.0173
10										
11										
12	**EPA Method 201A/202 Totals**									
13										
14		Probe	Filter	CPM	Total					
15	RUN	(mg)	(mg)	(mg)	(mg)					
16	1	2.3	1.7	79.90	83.9					
17	2	1.7	1.1	31.40	34.2					
18	3	1.4	2.7	17.30	21.4					
19										
20	Date: 13-Apr-95									
21	***TEST 9 - Press RTO Inlet***									**ENTER IN**
22		Vic	Sulfate	Mc	Mr	Mi	Mo	Mb	CPM	**COMPUTER**
23	RUN	(ml)	(mg/ml)	(mg)	(mg)	(mg)	(mg)	(mg)	(mg)	**(g)**
24	1	217	1.30E-04	5.19E-03	92.9	92.89	4.1	0.6	96.39	0.096394809
25	2	218	5.50E-05	2.21E-03	19	19.00	6.3	0.6	24.70	0.024697794
26	3	209	1.78E-03	6.85E-02	16.9	16.83	6.1	0.6	22.33	0.022331548
27										
28										
29	**EPA Method 201A/202 Totals**									
30										
31		Probe	Filter	CPM	Total					
32	RUN	(mg)	(mg)	(mg)	(mg)					
33	1	10.4	4.4	96.39	111.1948					
34	2	6.5	0.2	24.70	31.39779					
35	3	9.2	2.8	22.33	34.33155					

INTERPOLL LABORATORIES INC.
612-786-6020

Results of Formaldehyde Analysis
EPA Method 0011 (Units: Total ug)
Client: Louisiana-Pacific Corp., Sagola, Mi.
Report No.: 5194

	Field Spike			Test: 4			Source: Press RTO Stack
	Actual	Found	% Rec.	Run 0	Run 1	Run 2	Run 3
Collected		4/12/95		4/12/95	4/12/95	4/12/95	4/12/95
Log #		5194-11		5194-12	5194-13	5194-14	5194-15
Formaldehyde	750	608	81.1%	**< 0.05**	**285**	**273**	**318**

	Field Spike			Test: 5			Source: Press RTO Inlet
	Actual	Found	% Rec.	Run 0	Run 1	Run 2	Run 3
Collected		4/12/95		4/12/95	4/12/95	4/12/95	4/12/95
Log #		5194-16		5194-17	5194-18	5194-19	5194-20
Formaldehyde	750	630	84.0%	**< 0.05**	**14000**	**14200**	**15200**

ug = micrograms

Reviewed by:

Gregg W. Holman
Laboratory Director

Due Date: 4/28/95

Interpoll Laboratories
(612)786-6020

Data Reporting Sheet
(With Regulatory Limits)

CLIENT: IDO20/LP Segals

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			

SAMPLE I.D:	6/0-A,B	6/1-A,B	6/2-A,B	6/3-A,B
	Imp. Wtr	→	→	→
SAMPLE TYPE:	Blank			
LOG NO:	S194-21	-22	-23	-24

Pre OORTO Outlet

PARAMETER	UNITS	DET. LIMIT	REG. LIMIT	ANALYSIS DATE & INITIALS	METHOD				
Phenol	~~84~~ 46	40		5/9/95 RJW	8220	BDL	BDL	BDL	BDL
Surrogates						% Recovery	→	→	→
2 fluorophenol	Filed	Surrogate				88.0	50.6	56.8	55.6
Phenol D6	Field	↓	↓			65.8	62.6	63.8	69.4
2,4,6 tribromophenol	Lab	↓	↓			34.8	36.4	37.6	40.6

Footnotes: Prepdate 4/25/95

In-House Comments:

Due Date: 4/28/95

Interpoll Laboratories
(612)786-6020

Data Reporting Sheet
(With Regulatory Limits)

CLIENT: IDO20/LP Sampler

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			

SAMPLE I.D:	7/0-A,B	7/1 A,B	7/2A,B	7/3A,B
	Imp. Blank →			→
SAMPLE TYPE:	Blank			
LOG NO:	5104-25	-26	-27	-28

Prioority TO Alot

PARAMETER	UNITS	DET. LIMIT	REG. LIMIT	ANALYSIS DATE & INITIALS	METHOD				
Phenol	ug	840	5/8/95 →	RJH	8270	BDL	BDL	BDL	BDL
Surrogates						%Recovery →			→
2-fluorophenol	Field	Surrogate				56.2	72.0	44.2	45.2
Phenol D6	Field	↓				64.0	60.8	50.0	55.2
2,4,6-Tribromophenol	Lab	↓				31.4	33.6	36.8	32.8

Footnotes: Prep date 4/25/95

In-House Comments:

INTERPOLL LABORATORIES INC.
612-786-6020

Results of the MDI Analysis
EPA Draft Method No. 68-D1-0010 (Units: Total ug)
Client: Louisiana-Pacific, Sagola, Mi.
Report No.: 5194

	Field Spike			Test: 2		Source: Press RTO Stack	
	Actual	Found	% Rec.	Run 0	Run 1	Run 2	Run 3
Collected		4/12/95		4/12/95	4/12/95	4/12/95	4/12/95
Log #		5194-01		5194-02	5194-03	5194-04	5194-05
Methylene Diisocyanate	323	280	86.7%	< 2.5	< 2.5	< 2.5	< 2.5

	Field Spike			Test: 3		Source: Press RTO Inlet	
	Actual	Found	% Rec.	Run 0	Run 1	Run 2	Run 3
Collected		4/12/95		4/12/95	4/12/95	4/12/95	4/12/95
Log #		5194-06		5194-07	5194-08	5194-09	5194-10
Methylene Diisocyanate	323	282	87.3%	< 2.5	**52.5**	**84.5**	**111**

ug = micrograms

Sample matrix consisted of a 1-(2-pyridyl) piperazine impinger solution.

Reviewed by:

Gregg W. Holman
Laboratory Director

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L/S PGOLA Source: PWR RTV Site: STACK Log No.: 5764
Field Engineer: E Shattuck Date of Test: 4-12-95 Test No.: 2 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		
8	**Impingers:** ☐DI Water ☐3%H_2O_2 ☐1N NaOH ☐2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☒ 1/2 PR	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐ MDI		
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
E Shattuck / Interpoll	Interpoll	4/17/95 0900

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job CP / SAGOLA Source PRESS RTO Site INCET Log No. _____
Field Engineer BOB Date of Test 4-12-95 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		
2 2 2	**Impingers:** ☐DI Water ☐3%H_2O_2 ☐1N NaOH ☐2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☒ 1,2,3	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		
4	**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: 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
	Chuck Interpoll	4/13/95 0900

033094-G:\STACK\WP\FORMS\S-278.2

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job 4P/SO4OLA Source Pless RTO Site STACK Log No. 5794
Field Engineer [signature] Date of Test 4-12-95 Test No. 4 No. of Runs 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
	Probe Wash: ☐ Acetone ☐ $MeCl_2$	☐DI Water ☐_____	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
	Filter: ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
10	**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 ☐_____		
	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
[signature] Interpoll Labs	[signature] / Interpoll	4/12/95 0900

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job CP/SAGOLA Source PRESS RTO Site INLET Log No. _____
Field Engineer BOB Date of Test 4-12-95 Test No. 5 No. of Runs _____

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		
10 Spc	**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 ☐_____		
—	**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
	Chuck / Interpoll	4/12/95 0900

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job C-W Segala & Source Cenco CTO Site Stack Log No. 5154
Field Engineer E Trowbridge Date of Test 4-13-95 Test No. 6 No. of Runs 3

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

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

Relinquished by/Affiliation	Accepted by/Affiliation	Date
E Trowbridge / Interpoll	Chris / Interpoll	4/17/95 0900

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job CP/ S1600A Source Press RTO Site Duct Log No. _____
Field Engineer BAS Date of Test 4-13-95 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		
8 10 Rb	**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 ☐ _____		
—	**Integrated Gas:** ☐Tedlar Bag	☐ _____	☐EPA M-3 ☐ _____	☐EPA M-10		Ambient
—	**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
	Rick / Interpoll	4/12/95 0900

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: CM/SEGOLA Source: Rock KTD Site: S Cach Log No.: 5194
Field Engineer: ETROWBRIDGE Date of Test: 4-13-95 Test No.: 2 No. of Runs: 3

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

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

Relinquished by/Affiliation	Accepted by/Affiliation	Date
E. Trowbridge - Interpoll	Interpoll	4/17/95 0900

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job LP/ SAGOLA Source Cross RTO Site INLET Log No. _____
Field Engineer BB Date of Test 4-13-95 Test No. 9 No. of Runs 3

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

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

Relinquished by/Affiliation	Accepted by/Affiliation	Date
	Interpoll	4/17/95 0940

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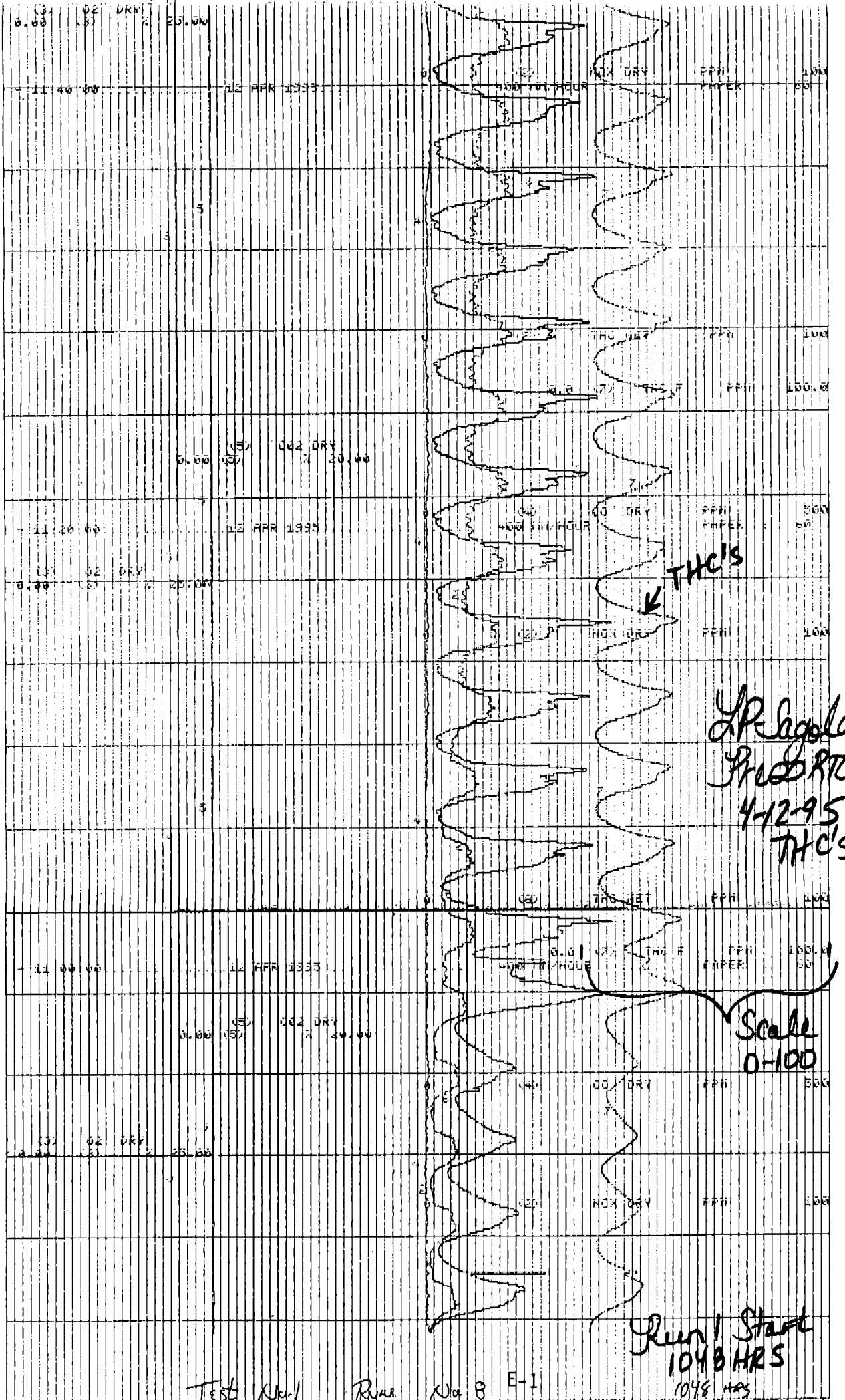
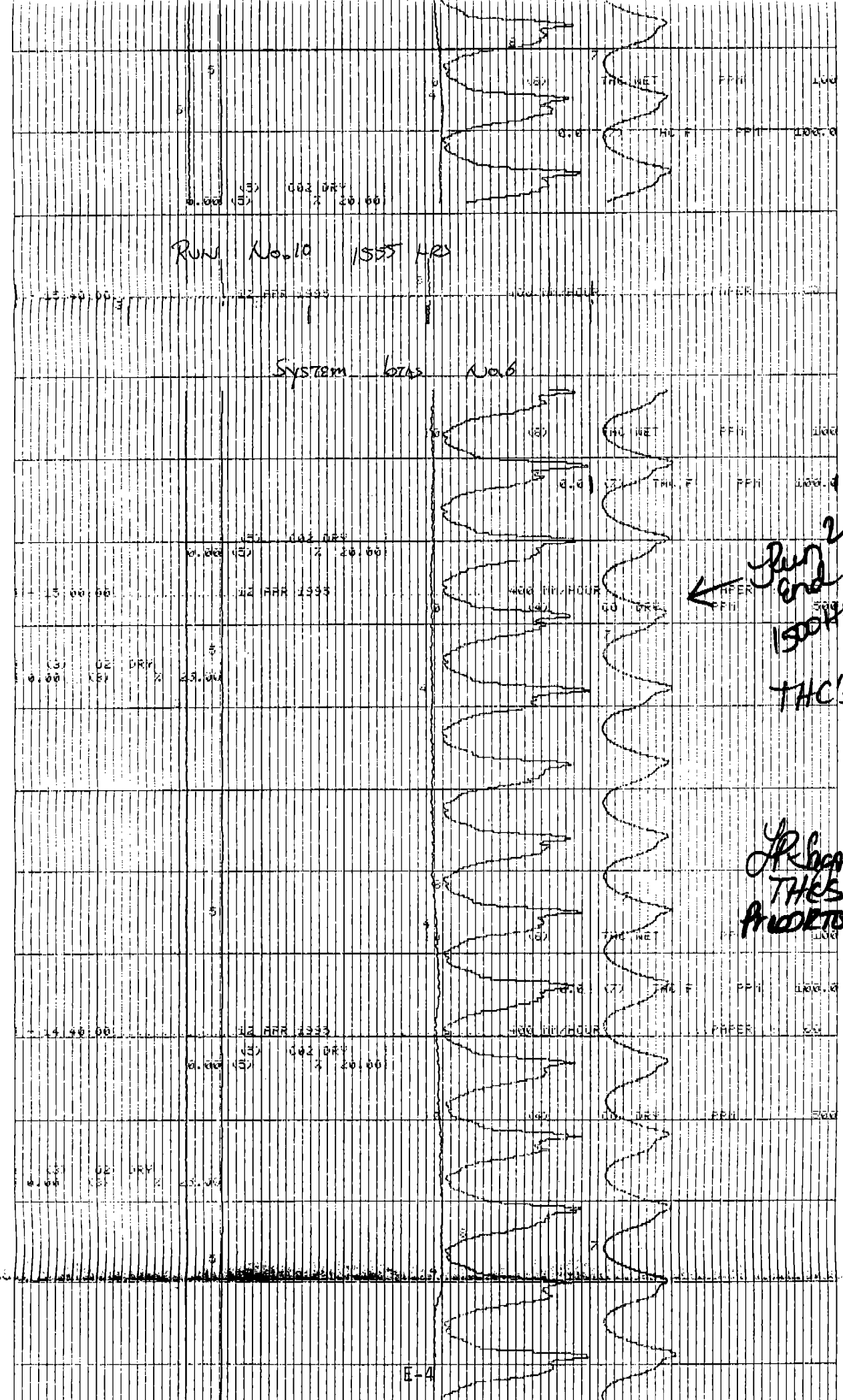
APPENDIX E

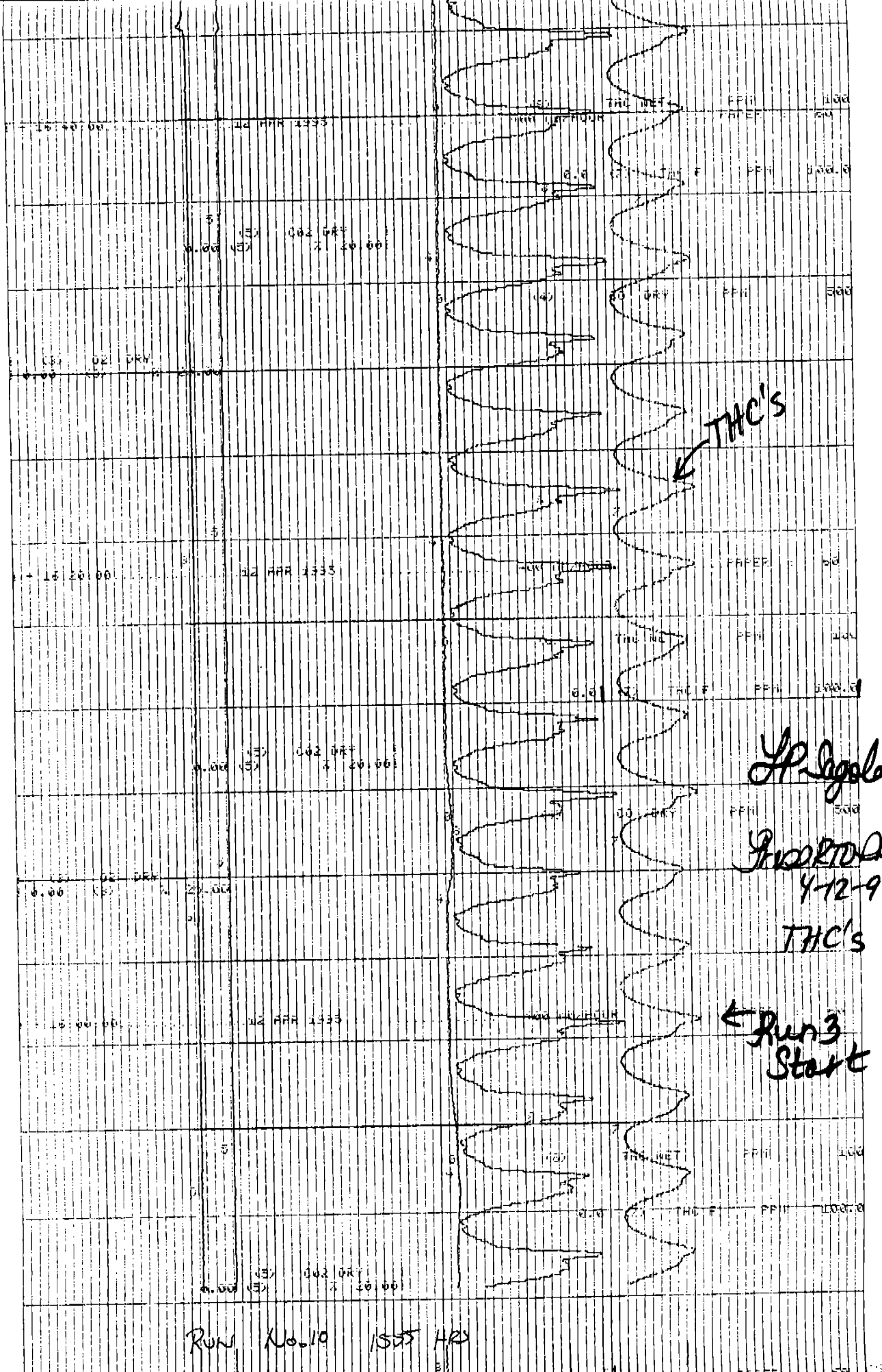
TOTAL HYDROCARBONS STRIPCHARTS

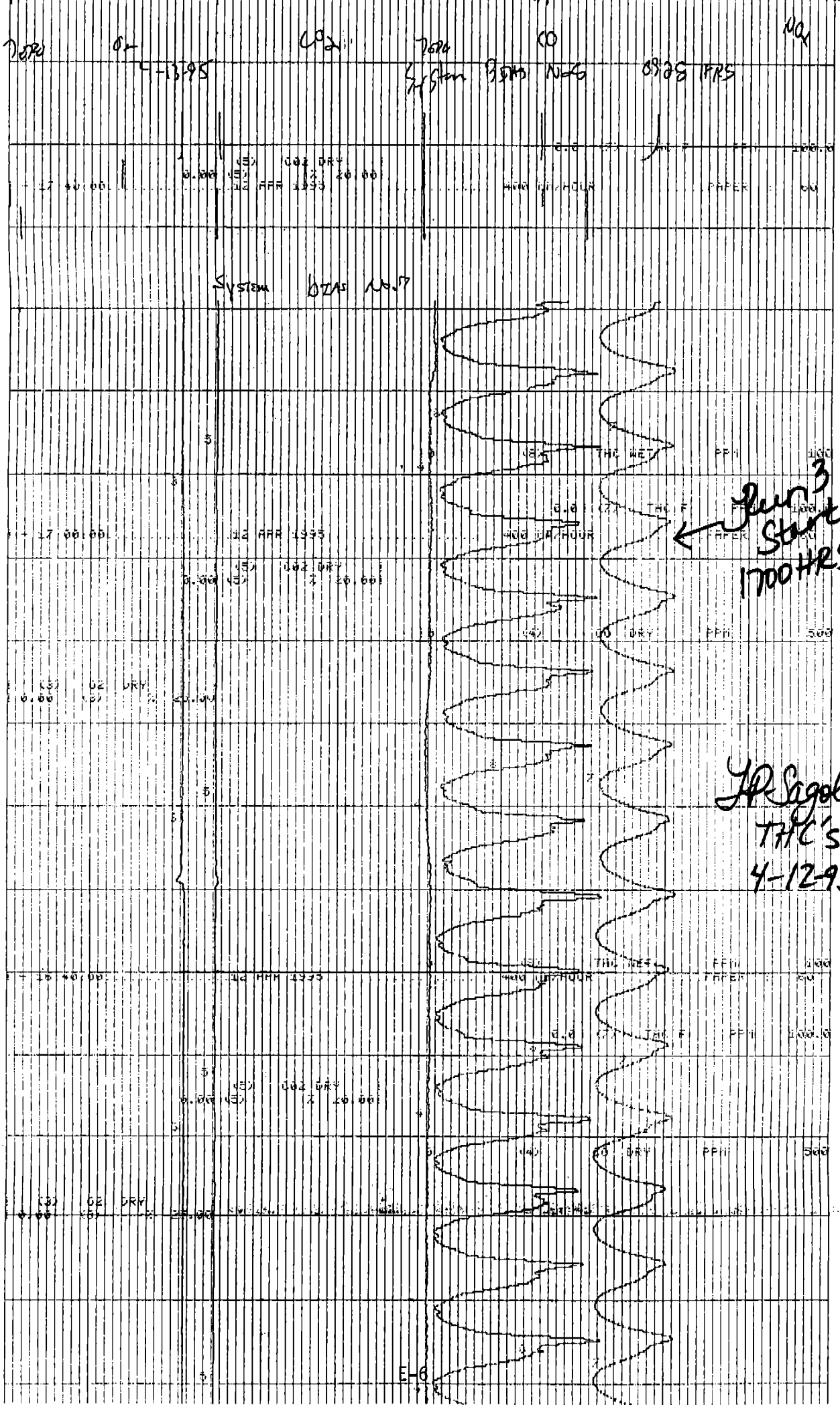

THC's
LP Sagola
RUN 8 Retest
4-12-95
THC's
Scale
0-100
Run 1 Start
1048 HRS
1048 HRS
Test Run 1
Run No 8
E-1

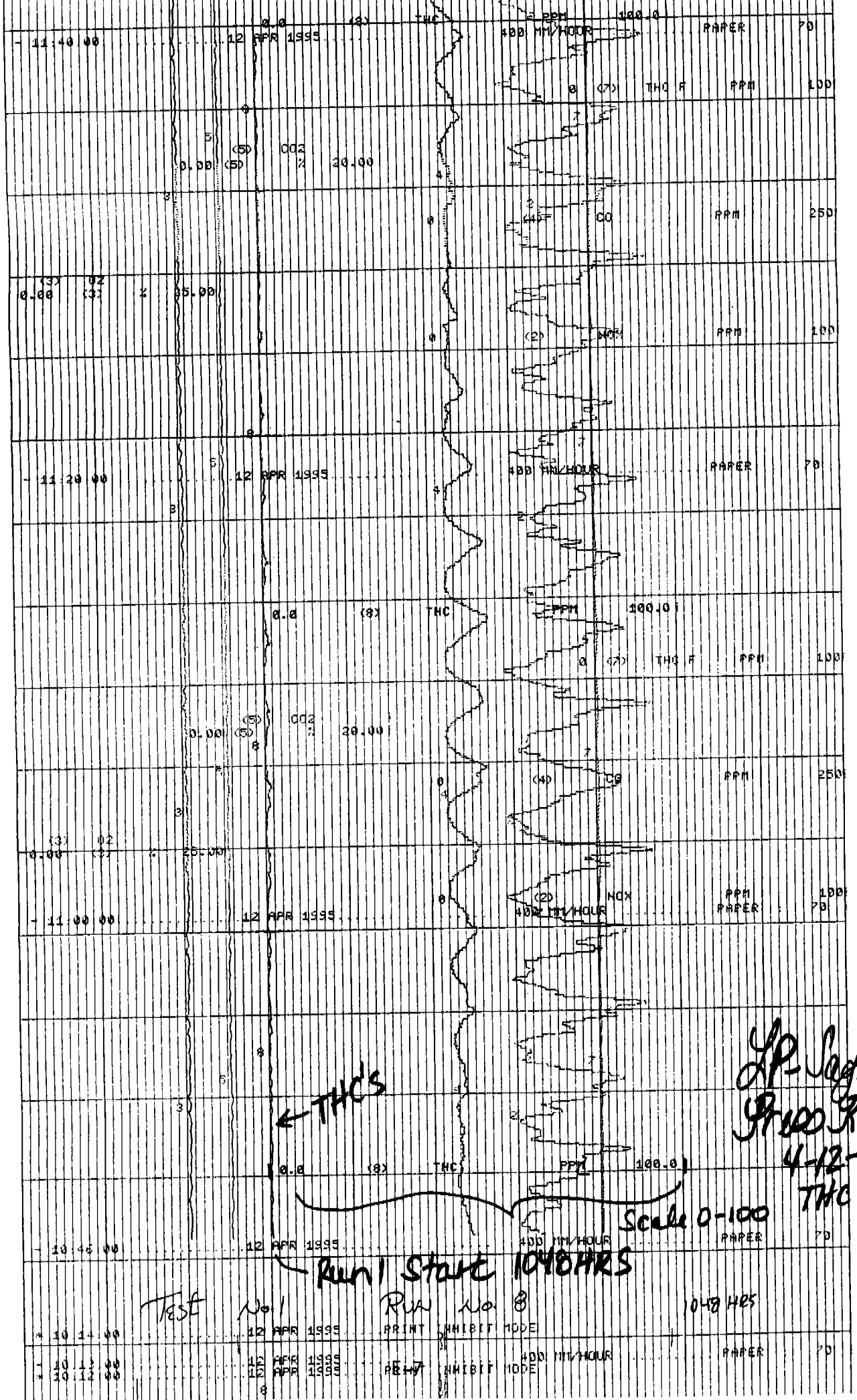
Run 1
End
1148 HRS
THC's

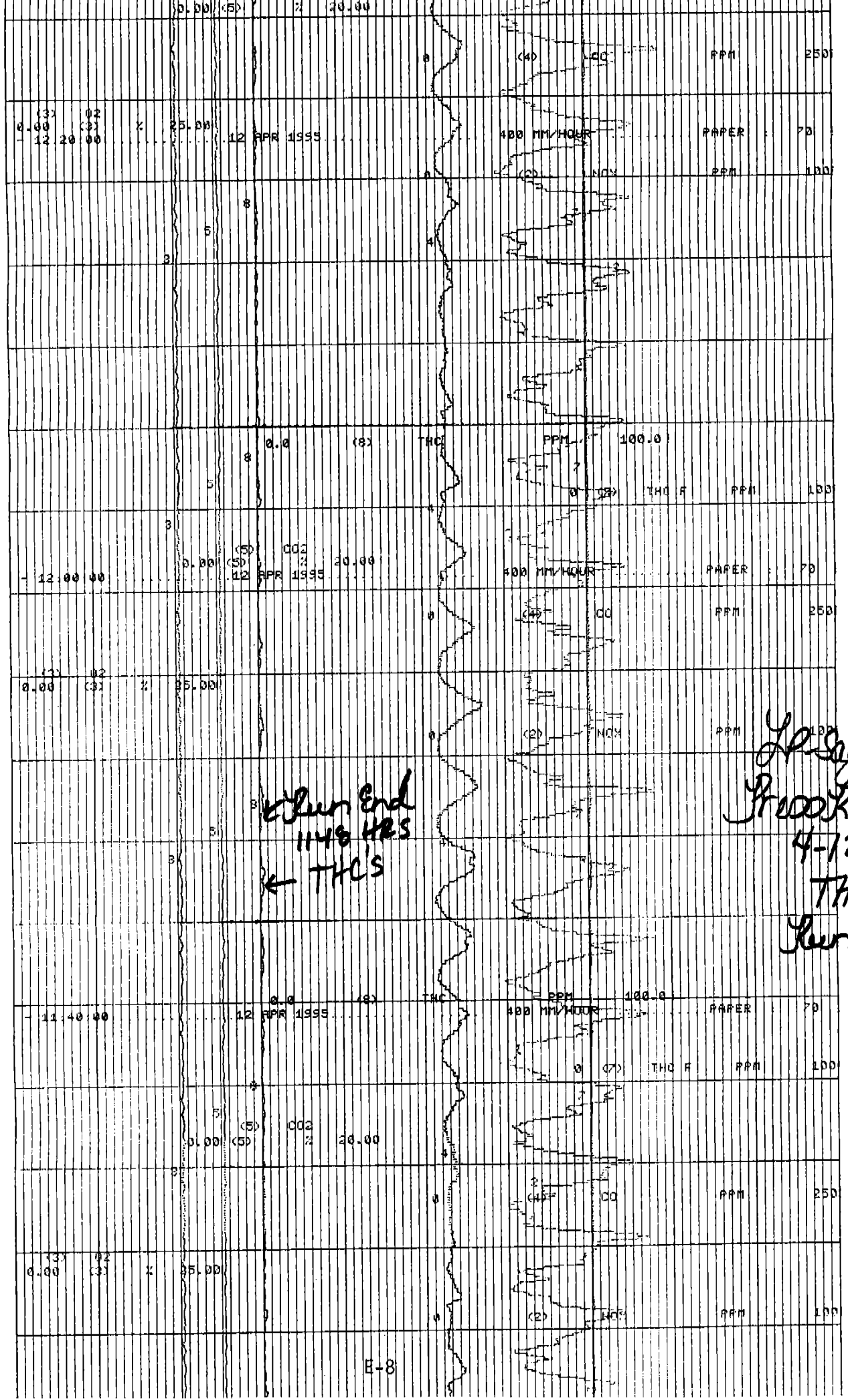
THC's
Run 2
1400HRS
Scale
0-100
Sagola
4-12-95
THC's
RUN NO. 9
1330
SYSTEM BIAS NO. 9


Run No. 10 1555 hrs
System Loss No. 6
Run 2 end 1500 hrs
THC's
THC's Problem

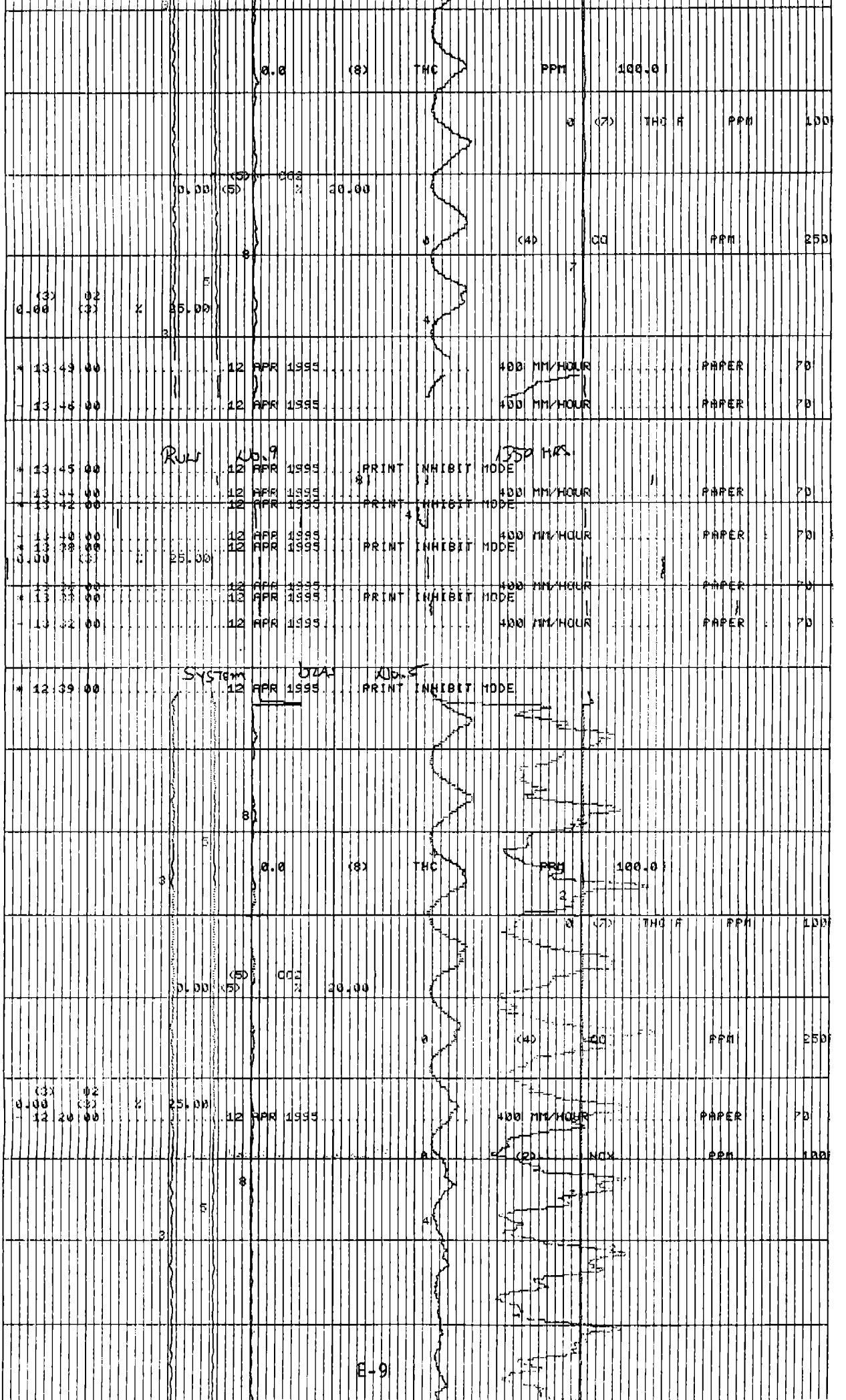

THC's
Run 3 Start
THC's
4-12-95
Run No. 10 1555 HRS

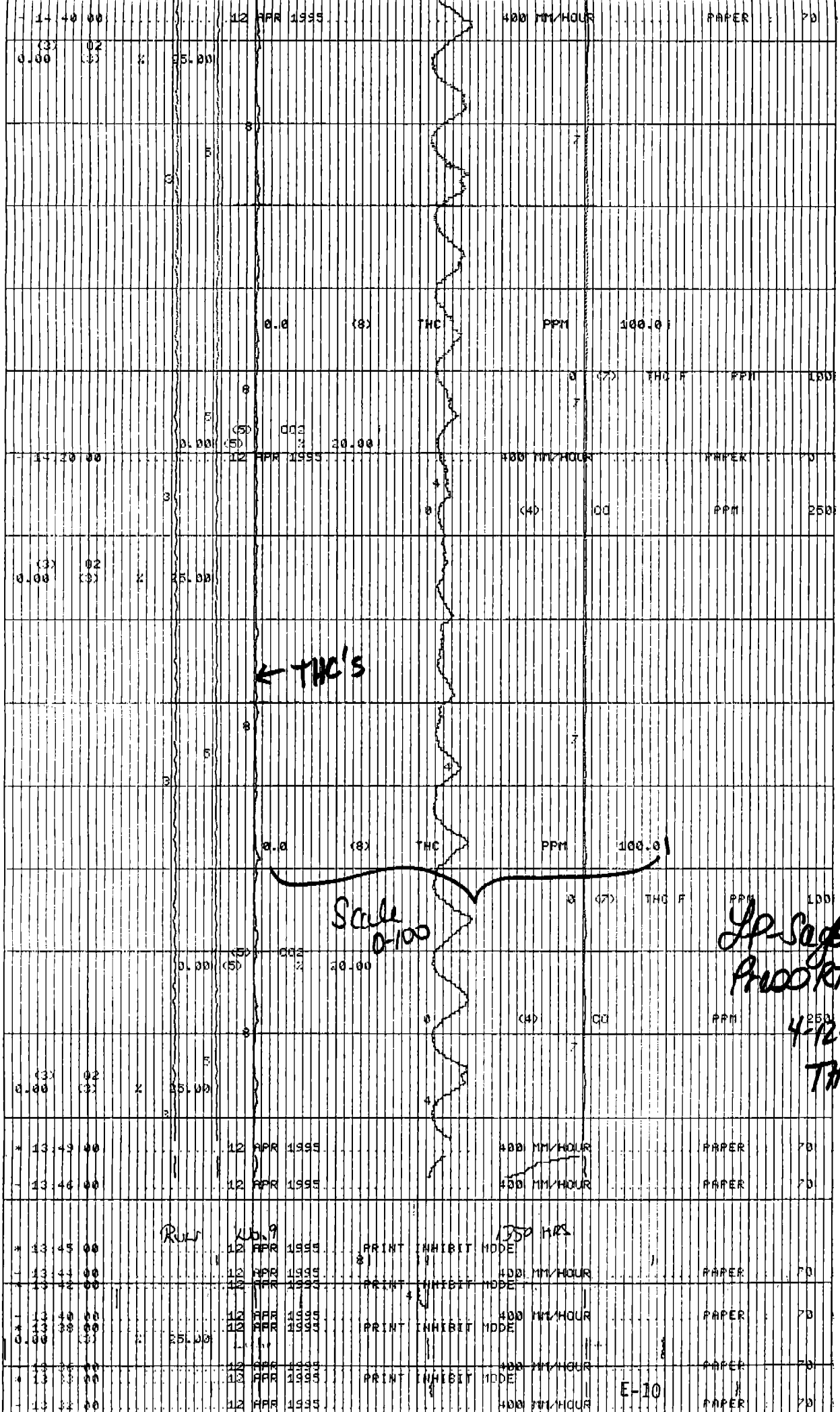

4-13-95
System Bias No.6
0828 HRS
System Bias No.7
Run 3 Start 1700 HRS
J.P. Sagola
THC's
4-12-95

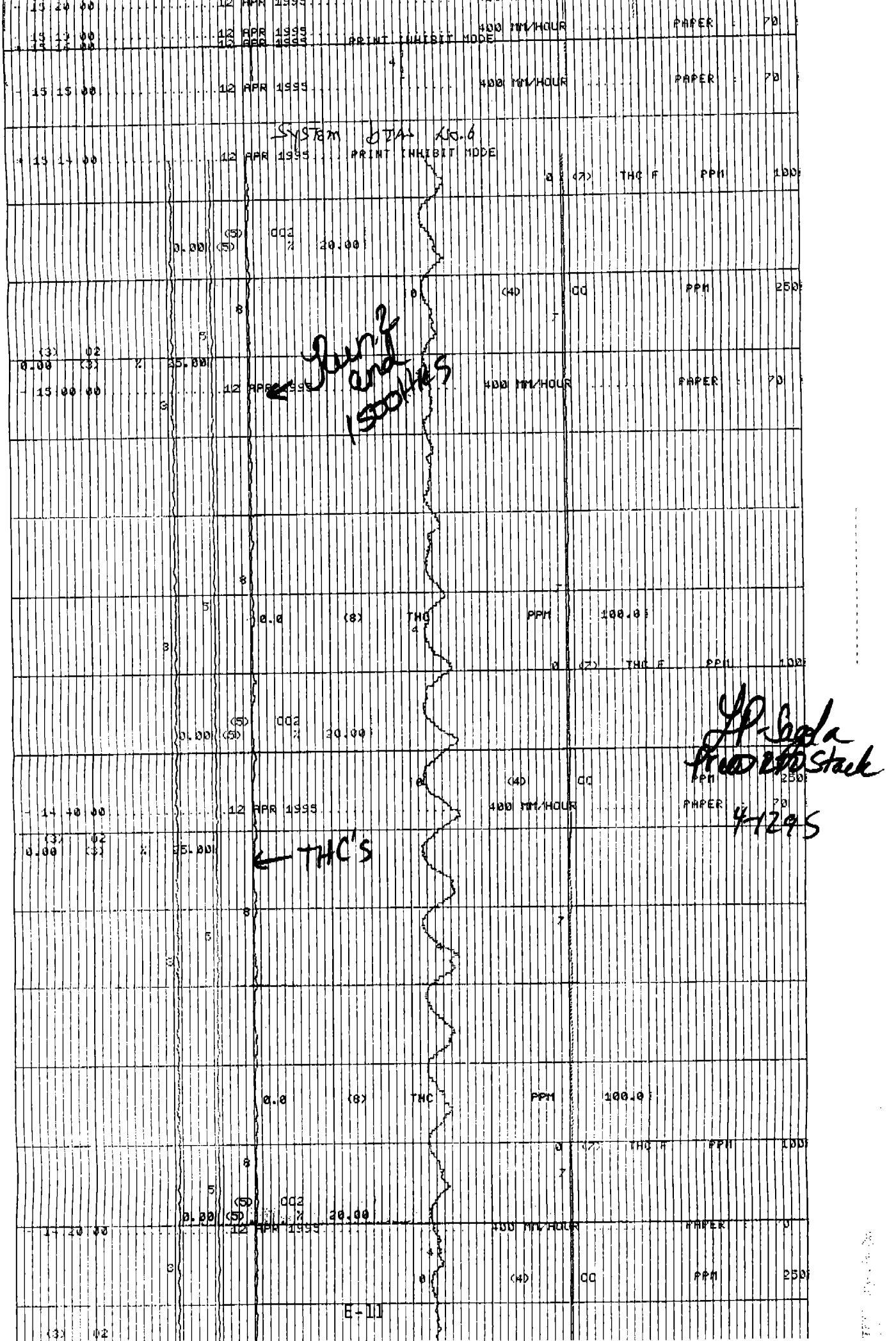

12 APR 1995
400 MM/HOUR
PAPER
THC
PPM
100.0
0.0
THC A
CO2
20.00
CO
NOX
PRINT INHIBIT MODE
LP-Segola
PR800 RTO Stack
4-12-95
THC's
← THC's
Scale 0-100
Run 1 Start 1048 HRS
Test No. 1
Run No. 8
1048 HRS

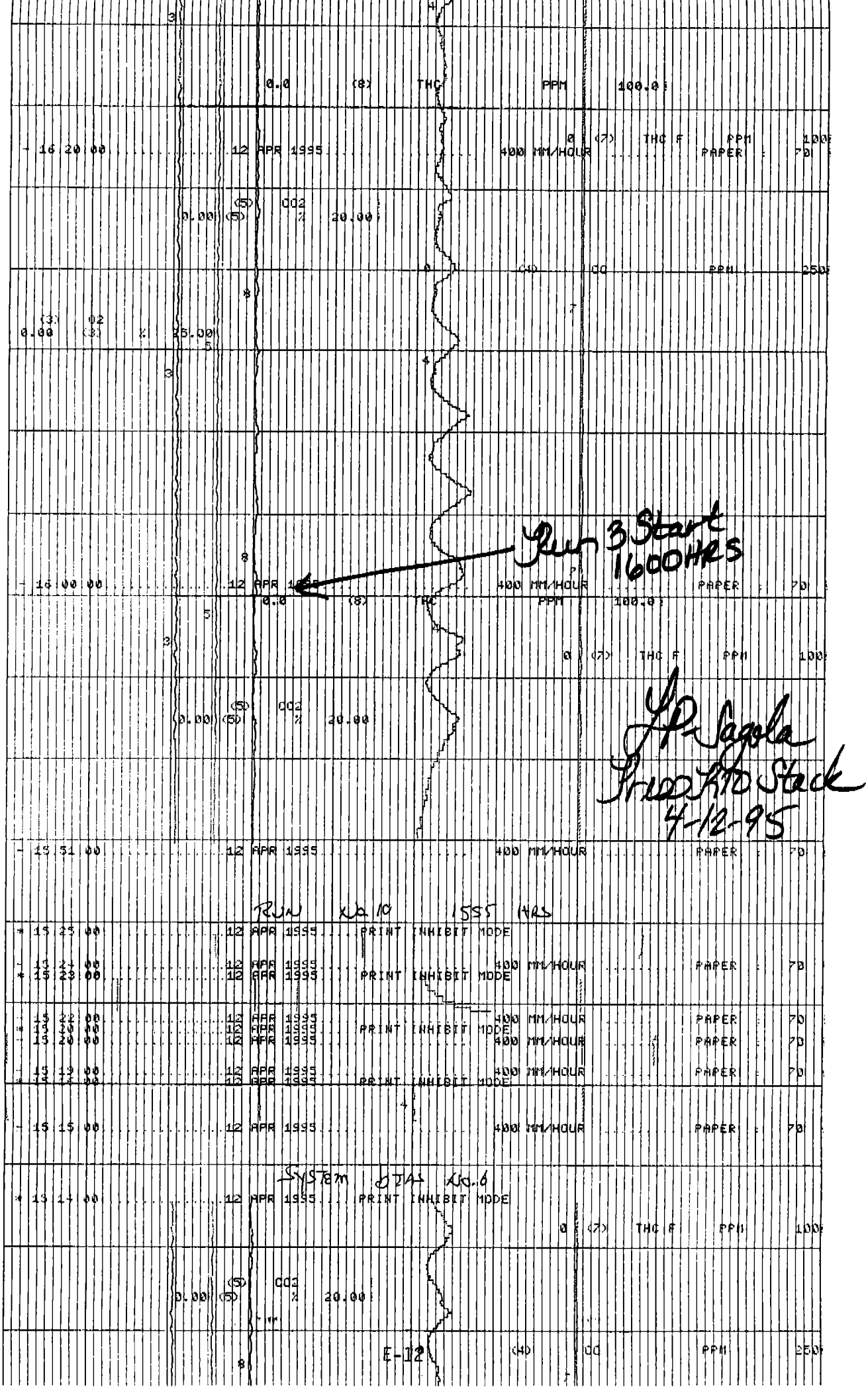


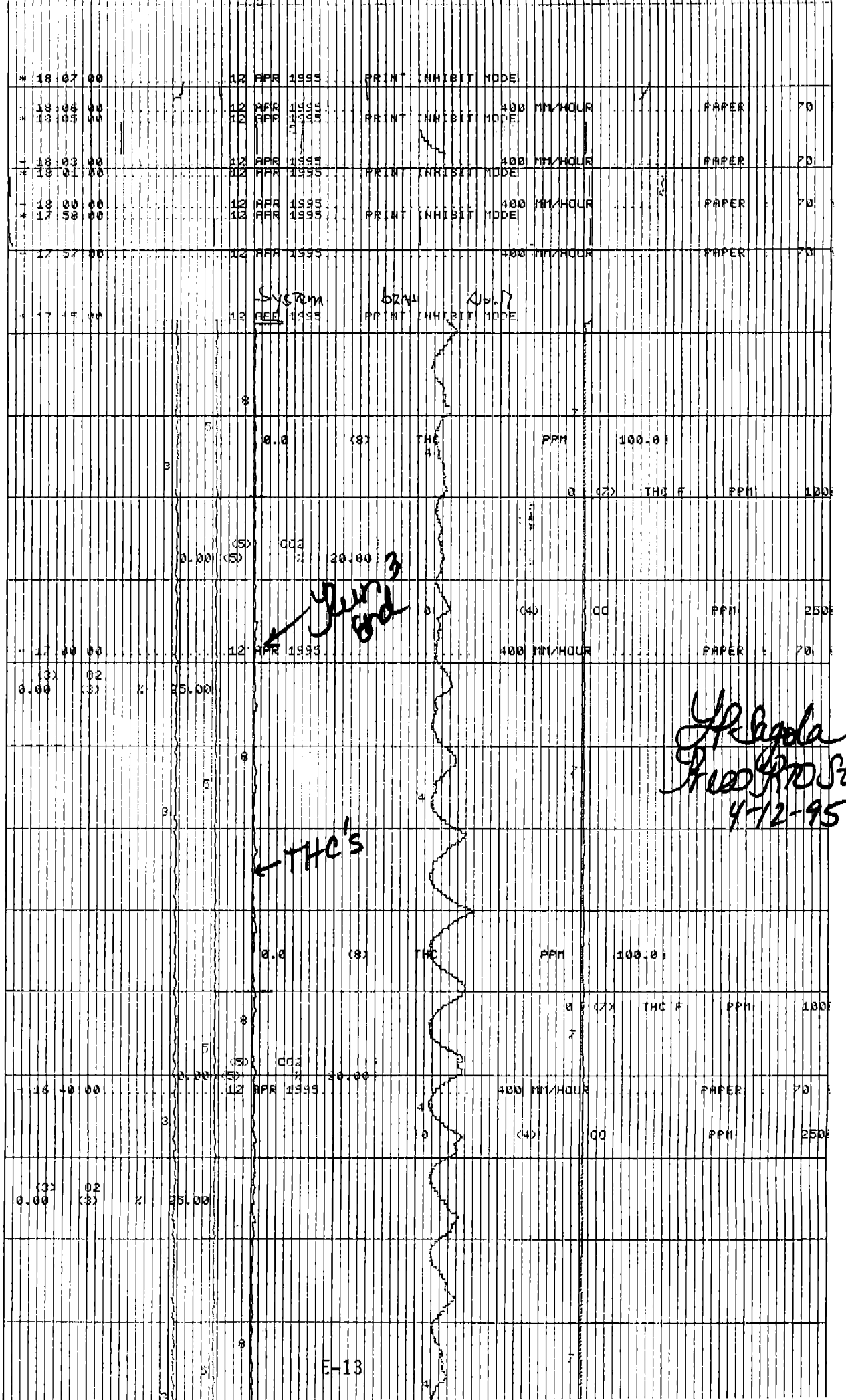
L.P. Segola
Brooks TD Stack
4-12-95
THC's
Run 1


0.0 (8) THC PPM 100.0
(7) THC A PPM 100
0.00 (5) CO 20.00
(4) CO PPM 250
(3) O2
0.00 (3) % 25.00
12 APR 1995
400 MM/HOUR
PAPER 70
PRINT INHIBIT MODE
Run No. 9
1350 hrs.
System Down No. 9
(2) NOX PPM 100


← THC's
Scale 0-100
La Salle
Prod. TO Stack
4-12-95
THC's
Run No. 9
150 hrs
E-10


System Start Up.6
PRINT INHIBIT MODE
12 APR 1995
400 MM/HOUR
PAPER
THC F PPM
CO PPM
CO2
THC PPM
Burn and 1500 lbs
THC's
Stack
4-12-95
E-11


Run 3 Start 1600 HRS
L.P. Sagola Process Stack 4-12-95
Run No. 10 1555 HRS
System Data Run No. 6
E-12


PRINT INHIBIT MODE
400 MM/HOUR
PAPER
System Back Up
Run 3
THC's
Gas Fired RTO Stack
4-12-95
PPM
THC F

APPENDIX F

THC ANALYZER SPECIFICATIONS

Ratfisch INSTRUMENTE

TOTAL HYDROCARBON ANALYZER (FLAME IONIZATION
Model RS 55

TECHNICAL DATES

MAINS : 115V/60H
RECORDER OUTPUT : 0 - 5 V / 4-20mA

MODEL: X Manual switching
__ Solenoid valves

HOUSING: __ Case, __ 19"-Rack

MEASURING RANGES:

1 = 0 –	10	C_1
2 = 0 –	100	C_1
3 = 0 –	1,000	C_1
4 = 0 –	10,000	C_1

SPECIAL OPTIONS:

Flame out alarm .....
1 Alarm .....
Sample line .....
.....

ANALYZER CONDITIONS:

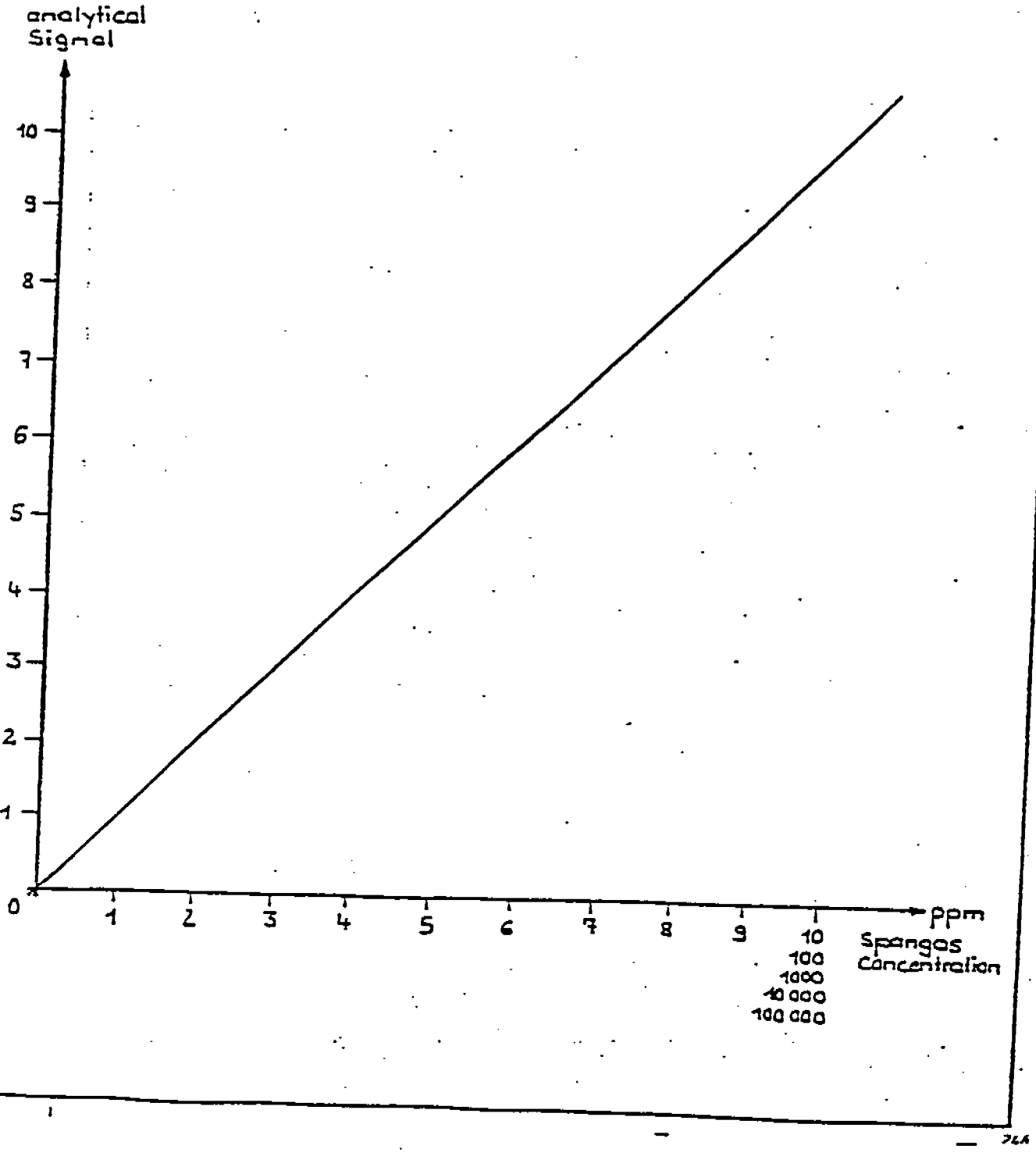
Temperature : 160 °C

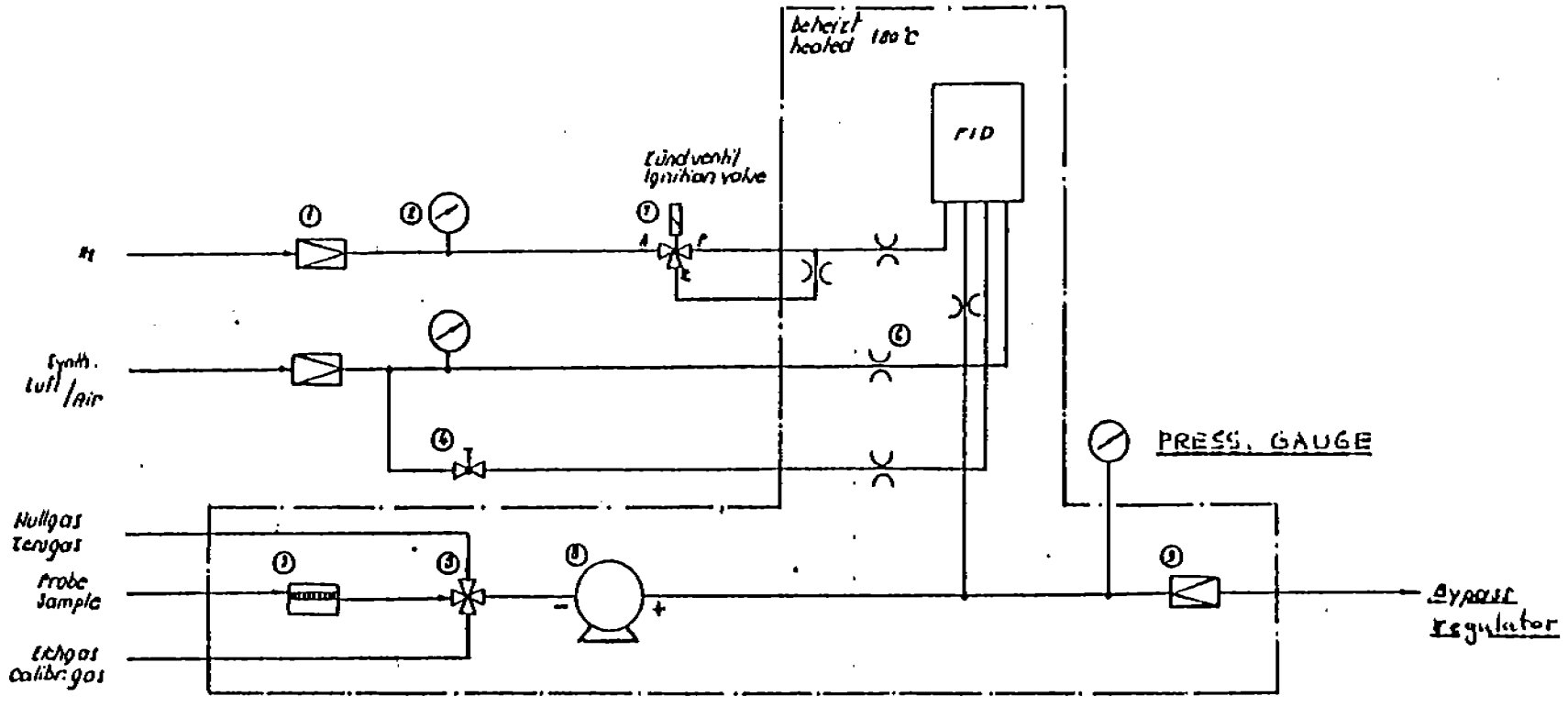
Zero Point : 3,90
Gain : 7,70

Pressure Setting : Sample/Spangas/Zerogas : 200 mbar
Fuel: Hydrogen : 0,35 bar
Combustion Air : 0,80 bar

Span Gases : 300 ppm C_1
24 000 ppm C_1

CALIBRATION DIAGRAMM





1 Druckregler
Pressure regulator
2 Manometer
Gauge
3 Filter
4 Nadelventil
Needle valve
5 3 Wege Ventil
3 way valve
6 Kapillare
capillary
7 Magnet Ventil
Solenoid valve
8 Pumpe
pump
9 Rückdruckregler
Back pressure regulator

Zündventil
Ignition valve

P-A angezogen
energised
R-A stromlos
at rest

Handumschaltung
manuel switching

Ratfisch Instruments	FLAMMEN IONISATIONS DETEKTOR Flame Ionisation Detector
Fließplan Flowdiagram	RS 55 13.04.88 dt

F-3

APPENDIX G

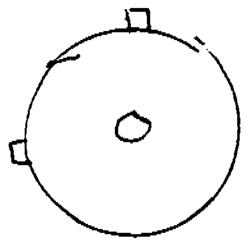
MEASUREMENT SYSTEMS PERFORMANCE SPECIFICATIONS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job Wheelabator / SAGOLA
Source Pross RTO INLET
Test 1 Run ___ Date 4-11-95
Stack Dimen. ______ ___ 57.25 IN.
Dry Bulb ______ °F Wet bulb ______ °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure ______ IN.HG
Static Pressure ______ IN.WC
Operators B ASCHENBACH K. Nuessmeier
Pitot No. ______ C_p ______
A = 260 B = 119

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: 3.75 IN.		Time Start:	HRS
1	.16	9.16	12.91		
2	.50	28.62	32.37		
3	.83	47.52	51.27		
				Time End:	HRS

Temp. Meas. Device & S/N:

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

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

INTERPOLL LABORATORIES, INC
(612) 786-6020

O_2 System Bias Check

Job: Wheelabrator / SAGOLA Source: Press RTO
Test: 1 Run: Date: 4-11-95 Site: INLET
Operator: GAS

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
				Cal. Err.	Sys. Bias			
1	0735	Zero Gas	0	0	0	0	25	0
		Upscale	13.5	13.6	13.5	-1	25	.4
2	1033	Zero Gas	0	0	0	0	25	0
		Upscale	13.5	13.6	13.5	.1	25	.4
3	1610	Zero Gas	0	0	-.2	.2	25	.8
		Upscale	13.5	13.6	13.4	.2	25	.8
4	1020	Zero Gas	0	0	-.1	.1	25	.4
		Upscale	13.5	13.6	13.6	0	25	0
5	1300	Zero Gas	0	0	.1	.1	25	.4
		Upscale	13.5	13.6	13.4	.2	25	.8
6	1535	Zero Gas	0	0	.2	.2	25	.8
		Upscale	13.5	13.6	13.6	0	25	0
7	1737	Zero Gas	0	0	.1	.1	25	.4
		Upscale	13.5	13.6	13.5	.1	25	.4
8	0938	Zero Gas	0	0	0	0	25	0
		Upscale	13.5	13.6	13.6	0	25	0
9	1310	Zero Gas	0	0	0	0	25	0
		Upscale	13.5	13.6	13.7	-.1	25	.40
10	1905	Zero Gas	0	0	0	0	25	0
		Upscale	13.5	13.6	13.7	.1	25	.4
11		Zero Gas	0	0	0	0	25	0
		Upscale	13.5	13.6	13.7	.1	25	.4
12		Zero Gas	0					
		Upscale						

*** Must be within 5% of the span for the zero or upscale cal. gas.

033194-G:\STACK\WP\FORMS\S-20-11

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO_2 System Bias Check

Job Wheelabrator/Shakopee Source Press RTO
Test 1 Run _____ Date 4-11-95 Site Inlet
Operator Bob

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
				Cal. Err.	Sys. Bias			
1	0935	Zero Gas	0	0	0	0	20	0
		Upscale	10.7	10.7	0	0	20	0
2	1033	Zero Gas	0	0	.1	.1	20	.50
		Upscale	10.7	10.7	10.7	0	20	0
3	1610	Zero Gas	0	0	.1	.1	20	.5
		Upscale	10.7	10.7	10.6	.1	20	.5
4	1020	Zero Gas	0	0	0	0	20	0
		Upscale	10.7	10.7	10.6	.1	20	.5
5	1300	Zero Gas	0	0	.1	.1	20	.5
		Upscale	10.7	10.7	10.8	.1	20	.5
6	1535	Zero Gas	0	0	.1	.1	20	.5
		Upscale	10.7	10.7	10.6	.1	20	.5
7	1735	Zero Gas	0	0	.1	.1	20	.5
		Upscale	10.7	10.7	10.6	.1	20	.5
8	0938	Zero Gas	0	0	0	0	20	0
		Upscale	10.7	10.7	10.8	.1	20	.50
9	1311	Zero Gas	0	0	0	0	20	0
		Upscale	10.7	10.7	10.9	.2	20	1.00
10	1905	Zero Gas	0	0	0	0	20	0
		Upscale	10.7	10.7	10.9	.2	20	1.0
11		Zero Gas	0	0	.2	.2	20	1.0
		Upscale	10.7	10.7	10.7	0	20	0
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

03319-G:\STACK\WP\FORMS\S-120-1

INTERPOLL LABORATORIES, INC
(612) 786-6020

THC System Bias Check

Job Wheelabrator / SA60LA Source Press RTO
Test ____ Run ____ Date 4-11-95 Site Inlet
Operator GS

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
				Cal. Err.	Sys. Bias			
1	0735	Zero Gas	0	2	0	2	100	2.0
		Upscale	36.3	30	31	1	100	1.0
2	1033	Zero Gas	0	2	1	1	100	1.0
		Upscale	36.3	30	30	0	100	0
3	1610	Zero Gas	0	2	2	0	100	0
		Upscale	30.3	30	31	1	100	1
4	1020	Zero Gas	0	2	.5	1.5	100	1.5
		Upscale	30.3	30	29	1	100	1
5	1300	Zero Gas	0	2	1	1	100	1.0
		Upscale	30.3	30	29	1	100	1.0
6	1535	Zero Gas	0	2	0	2	100	2
		Upscale	30.3	30	30	0	100	0
7	1735	Zero Gas	0	2	1	1	100	1
		Upscale	30.3	30	29	1	100	1
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

033194-C:\STACK\WP\FORMS\S-120-11

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

ob LP/Sagola 5193151194
ource Press RM STACK
est ______ Run __ Date 4-11-95
tack Dimen. 78 IN.
Dry Bulb ______ °F Wet bulb ______ °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure ______ IN.HG
Static Pressure ______ IN.WC
Operators Ron Rosenthal
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 (°F)
		Port Length:	9 IN.	Time Start:	HRS
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

O_2 System Bias Check

Job WHEELABRATOR/ LP SAGOLA 5783 Source PRESS R70
Test 1 Run ____ Date 4-11-95 Site STACK
Operator R.R.

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
				Cal. Err.	Sys. Bias			
1	810	Zero Gas	0	0	0	0	25	0
		Upscale	13.5	13.5	13.5	0	25	0
2	1035	Zero Gas	0	0	0	0	25	0
		Upscale	13.6	13.5	13.4	.1	25	.4
3	1530	Zero Gas	0	0	0	0	25	0
		Upscale	13.6	13.5	13.6	.1	25	.4
4	955	Zero Gas	0	0	0	0	25	0
		Upscale	13.6	13.5	13.5	0	25	0
5	1333	Zero Gas	0	0	.1	.1	25	.4
		Upscale	13.6	13.5	13.6	.1	25	.4
6	1515	Zero Gas	0	0	.1	.1	25	.4
		Upscale	13.6	13.5	13.6	.1	25	.4
7	1715	Zero Gas	0	0	.1	.1	25	0
		Upscale	13.6	13.5	13.7	.2	25	.8
8	925	Zero Gas	0	0	.1	.1	25	.4
		Upscale	13.6	13.5	13.5	0	25	0
9	1300	Zero Gas	0	0	.1	.1	25	.4
		Upscale	13.6	13.5	13.5	0	25	0
10	1925	Zero Gas	0	0	.1	.1	25	.4
		Upscale	13.6	13.5	13.6	.1	25	.4
11	2055	Zero Gas	0	0	.1	.1	25	.4
		Upscale	13.6	13.5	13.5	0	25	0
12		Zero Gas	0					
		Upscale						

1 4-11-95
1 4-12-95
1 4-13-95

Must be within 5% of the span for the zero or upscale cal. gas.

033194-C:\STACK\WP\FORMS\S-20-11

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO_2 System Bias Check

Job Wheelabrator/LP Sagola 5193 Source Press RTO
Test 1 Run _____ Date 4-11-95 Site STACK
Operator R.R

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
				Cal. Err.	Sys. Bias			
1	810	Zero Gas	0	0	0	0	20	0
		Upscale	11.1	10.9	11.0	.1	20	.5
2	1035	Zero Gas	0	0	0	0	20	0
		Upscale	11.1	10.9	11.2	.3	20	1.5
3	1550	Zero Gas	0	0	.1	.1	20	.5
		Upscale	11.1	10.9	10.9	0	20	0
4	955	Zero Gas	0	0	.1	.1	20	.5
		Upscale	11.1	10.9	10.9	0	20	0
5	1330	Zero Gas	0	0	0	0	20	0
		Upscale	11.1	10.9	10.9	0	20	0
6	1515	Zero Gas	0	0	0	0	20	0
		Upscale	11.1	10.9	10.9	0	20	0
7	1715	Zero Gas	0	0	0	0	20	0
		Upscale	11.1	10.9	10.9	0	20	0
8	925	Zero Gas	0	0	0	0	20	0
		Upscale	11.1	10.9	11.0	.1	20	.5
9	1300	Zero Gas	0	0	.1	.1	20	.5
		Upscale	11.1	10.9	10.9	0	20	0
10	1925	Zero Gas	0	0	.1	.1	20	0.5
		Upscale	11.1	10.9	10.9	0	20	0
11	2055	Zero Gas	0	0	.1	.1	20	.5
		Upscale	11.1	10.9	10.9	.0	20	0
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

033194-G:\STACK\WP\FORMS\S-4-20-11

INTERPOLL LABORATORIES, INC
(612) 786-6020

THC System Bias Check

Job Wheelabrator/LP Sagola 5193 Source Press R70
Test 1 Run _____ Date 4-11-95 Site STACK
Operator R.R.

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
				Cal. Err.	Sys. Bias			
1	825	Zero Gas	0	.1	.3	.2	100	.2
		Upscale	28	27.5	27.8	.3	100	.3
2	1035	Zero Gas	0	.1	.5	.4	100	.4
		Upscale	28	27.5	27.2	.3	100	.3
3	1550	Zero Gas	0	.1	0	.1	100	.1
		Upscale	28	27.5	27.8	.3	100	.3
4	955	Zero Gas	0	.1	.2	.1	100	.1
		Upscale	28	27.5	27.9	.4	100	.4
5	1330	Zero Gas	0	.1	.6	.5	100	.5
		Upscale	28	27.5	27.5	0	100	0
6	1515	Zero Gas	0	.1	.4	.3	100	.3
		Upscale	28	27.5	27.4	.1	100	.1
7	1715	Zero Gas	0	.1	.6	.5	100	.5
		Upscale	28	27.5	27.3	.2	100	.2
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						

4-11-95
4-12-95

Must be within 5% of the span for the zero or upscale cal. gas.

LPSO01

033194-C:\STACK\WP\FORMS\S-20-11

INTERPOLL LABORATORIES

Calibration Error Check

Job LP/Sagola

Test ____ Run ____ Date 4-10-95

Operator R.R.

CO
~~SO₂~~ Calibration: Time (HRS) 1500

***	Cylinder Value (ppm)	Analyzer Response (ppm)	Difference (ppm)	Span Value (ppm)	Percent of Span
Zero gas	0	1	1	500	.2
Mid level	150	148	2	500	.4
High level	300	301	1	500	.2

NO_x Calibration: Time (HRS) 1500

***	Cylinder Value (ppm)	Analyzer Response (ppm)	Difference (ppm)	Span Value (ppm)	Percent of Span
Zero gas	0	0	0	250	0
Mid level	78.2	78	0	250	0
High level	148	~~148~~ 149	0 1	250	0.4

O_2 Calibration: Time (HRS) 1500

***	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	.1	25	.4
High level	21.0	20.9	.1	25	.4

CO_2 Calibration: Time (HRS) 1500

***	Cylinder Value (ppm)	Analyzer Response (ppm)	Difference (ppm)	Span Value (ppm)	Percent of Span
Zero gas	0	0	0	20	0
Mid level	11.1	10.9	.2	20	1.0
High level	16.9	17.	.1	20	.5

Must be within 2% of the span for each calibration gas S-420-10

INTERPOLL LABORATORIES

Calibration Error Check

Job Woolabator / SAGOLA

Test 1 Run ____ Date 4-10-95

Operator BrB

CO
~~SO_2~~ Calibration: Time(HRS) 1515

***	Cylinder Value (ppm)	Analyzer Response (ppm)	Difference (ppm)	Span Value (ppm)	Percent of Span
Zero gas	0	0	0	500	0
Mid level	150	148	2	500	
High level	312	308	4	500	

NO_x Calibration: Time(HRS) 1515

***	Cylinder Value (ppm)	Analyzer Response (ppm)	Difference (ppm)	Span Value (ppm)	Percent of Span
Zero gas	0	1	1	250	
Mid level	95.2	93	2.2	250	
High level	142	142	0	250	

O_2 Calibration: Time(HRS) 1515

***	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	13.6	.1	25	.40
High level	21.2	21.1	.1	25	.40

CO_2 Calibration: Time(HRS) 1515

***	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	16.4	16.6	.2	20	1.00

Must be within 2% of the span for each calibration gas S-420-10

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 #: 88-28604 CYLINDER #:CC92831 CYL. PRESSURE:2000PSIG
EXPIRATION DATE:12/29/96 LAST ANALYSIS DATE:12/29/93
CUSTOMER:TWIN CITY OXYGEN P.O.# 7980
METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #:1667B

CYL #:CLM5046

CONC.:47.3PPM

INSTRUMENT:
BECKMAN
COMPONENT: THC

MODEL #: 400

SERIAL #: 1003052

LAST CAL.: 12/1/93

COMPONENT: C3H8 REPLICATE CONC.
MEAN CONC: 27.9PPM DATE: 12/29/93 DATE:
27.8PPM
27.9PPM
28.0PPM

COMPONENT: REPLICATE CONC.
MEAN CONC: DATE: DATE:

COMPONENT: REPLICATE CONC.
MEAN CONC: DATE: DATE:

BALANCE GAS:AIR

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919) 544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-28500 CYLINDER #:CC92947 CYL. PRESSURE:2000PSIG
EXPIRATION DATE: 12/20/96 LAST ANALYSIS DATE:12/20/93
CUSTOMER:TWIN CITY OXYGEN P.O.# 7892
METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #:1669B

CYL #:CLM812

CONC.:464PPM

INSTRUMENT:

RECEIVED
DEC 29 1993
INTERPOLL LABORATORIES

COMPONENT: BECKMAN THC

MODEL #: 400

SERIAL #: 1003052

LAST CAL.: 12/1/93

COMPONENT: PROPANE
MEAN CONC: 301PPM

REPLICATE CONC.
DATE: 12/17/93 DATE:
300PPM
301PPM
301PPM

COMPONENT:
MEAN CONC:

REPLICATE CONC.
DATE: DATE:

COMPONENT:
MEAN CONC:

REPLICATE CONC.
DATE: DATE:

BALANCE GAS:AIR

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-29869 CYLINDER #:CC112117 CYL. PRESSURE:2000PSIG
EXPIRATION DATE:3/8/97 LAST ANALYSIS DATE:3/8/94
CUSTOMER:TWIN CITY OXYGEN P.O.# 9082

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #: 1669B
CYL #: CLM789
CONC.: 464PPM

INSTRUMENT:BECKMAN THC
MODEL #:400
SERIAL #:1003052
LAST CAL.:3/1/94

COMPONENT:PROPANE		COMPONENT:		COMPONENT:	
MEAN CONC:2960PPM		MEAN CONC:		MEAN CONC:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC.	
DATE:3/8/94	DATE:	DATE:	DATE:	DATE:	DATE:
2964PPM					
2964PPM					
2962PPM					

BALANCE GAS:AIR

REPLICATE DATA

COMPONENT:PROPANE

DATE: 3/8/94

						DATE:		
Z	0	R	96.3	C	615.2	Z	R	C
R	96.2	Z	0	C	614.5	R	Z	C
Z	0	C	614.1	R	96.2	Z	C	R

REPLICATE DATA

COMPONENT:

DATE:				DATE:		
Z	R	C		Z	R	C
R	Z	C		R	Z	C
Z	C	R		Z	C	R

REPLICATE DATA

COMPONENT:

DATE:				DATE:		
Z	R	C		Z	R	C
R	Z	C		R	Z	C
Z	C	R		Z	C	R

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Richard Sykes APPROVED BY:

Interpoll Laboratories, Inc.
(612) 786-6020

CERTIFICATE OF ANALYSIS FOR MIDRANGE STANDARD GAS FOR METHOD 3A

Vendor: Linde

Cylinder No: HA4668

Date of Preparation: 4-4-90

Label: 16.99% CO_2 / 20.99% O_2 Bal N_2

Blend Specification: 2%

Results Of Analyses Of Standard Gas (by Orsat)

Date of Analysis	Run	CO_2 (% v/v)	O_2 (% v/v)
8-11-93	1	16.9	21.4
8-11-93	2	16.4	21.4
8-11-93	3	16.4	21.4
	4		
	5		
	6		
	Avg	16.9	21.4

Analyst: Mark Kadler

- ☑ Results are within 5% of the vendor tag value; use tag value.
- ☐ Results are not within 5% of the vendor tag value; conduct another set of triplicate analyses.
- ☐ All results within ± 5% of the average; relabel as above.
- ☐ All results not within ± 5% of the average; perform another set of triplicate analyses.

Approved by,

August 11, 1993
Date

Dr. Perry Konnes

S-424

LINDE

Union Carbide Industrial Gases, Inc.
Linde Division
4550 Kennedy Avenue
East Chicago, IN 46312

DATE : APRIL 4, 1990

TO: OXYGEN SERVICE COMPANY
1111 PIERCE BUTLER ROUTE
ST PAUL, MN 55104

LINDE ORDER NUMBER : 093.054.02
CUSTOMER PO NUMBER : 1243SA
CUSTOMER REL NUMBER :

DEAR SIR/MADAM:

THIS IS YOUR CERTIFICATE OF ANALYSIS FOR:

CYLINDER NUMBER	MIXTURE COMPONENTS	REQUESTED COMPOSITION	CERTIFIED COMPOSITION	CERTIFICATION ACCURACY
HA 4668	CARBON DIOXIDE	17%	16.99%	± 0.02% ABS
	OXYGEN	21%	20.99%	± 0.02% ABS
	NITROGEN	BALANCE	BALANCE	

REMARK: The Accuracy of the measuring equipment used to make this Standard is traceable to the National Institute of Standards and Technology (N.I.S.T.) formerly called the National Bureau of Standards (N.B.S.).

APPROVED BY

COA-6MP

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, N.C. 27713
(919) 544-3772

TO: TWIN CITY OXYGEN

CERTIFICATE OF ANALYSIS

DATE REPORTED:9/22/94 REFERENCE #:88-33995

MATERIAL SUBMITTED:OXYGEN AND CARBON DIOXIDE IN NITROGEN, CERTIFIED CYL. #CC100029

INFORMATION REQUESTED:RATIO ANALYSIS

METHOD OF ANALYSIS:OXYGEN ANALYZER, INFRARED

RESULT OF INVESTIGATION:

COMPONENT	SPECIFICATION	CONCENTRATION
OXYGEN	13.5%	13.6%
CARBON DIOXIDE	11.0%	10.9%
NITROGEN		BALANCE

AUTHORIZED SIGNATURE

"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."

Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083-0000
PHONE: 313-589-2950 FAX:313-589-2134

8/02/91

GENEX
4018 DUNCAN AVENUE

ST LOUIS MO 63110-0000

PROJECT #: 05-26600
PO #: 4970SA

CYLINDER #: ALM008828

ANALYTICAL ACCURACY: +-2%

COMPONENT	REQUESTED CONCENTRATION	ANALYSIS 1 (MOLES) U/M
CARBON MONOXIDE	150.0 PPM	150. PPM
NITROGEN	BALANCE	N/A

NOTES: CERTIFIED MASTER GAS

ANALYTICAL METHOD: CMG

DATE OF ANALYSIS: 7/29/91

ANALYST: Frank L. Dixon
ANALYST

APPROVED BY: L. Shapiro
SUPERVISOR

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 538035

Your P.O. # : 40142

Expiration Date : 12-22-93

Cylinder Number : ALM014239

Cylinder Pressure 1900 psig

1 of 1 Component(s)

Customer :

GENEX
C/O AES BARBER POINT COAL
91-086 KAOMI LOOP
EWA BEACH HI 96707

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES

PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # PO 3625

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER

COMPONENT	CERTIFIED CONC.
CARBON MONOXIDE	300.0 PPM

BALANCE GAS : NITROGEN

REFERENCE STD

SRM # (CRM #)	CYLINDER NUMBER	CONC.
1680	AAL16199	475.00 PPM
2636	ALM013383	243.40 PPM

INSTRUMENTATION

INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
BECKMAN 951A 270-0B2899B	6-3-92	NON-DISPERSIVE INFRARED

H-8

FIRST ANALYSIS

DATE : 6-16-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	112.30	300.68	475.00 PPM	175.00	475.00
0.00	112.30	300.68		175.00	475.00
0.00	112.30	300.68		175.00	475.00

CALCULATED RESULTS 300.68
300.68
300.68

AVERAGE : 300.68 PPM

SECOND ANALYSIS

DATE : 6-22-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	112.40	300.96	475.00 PPM	175.00	475.00
0.00	112.40	300.96		175.00	475.00
0.00	112.40	300.96		175.00	475.00

CALCULATED RESULTS 300.96
300.96
300.96

AVERAGE : 300.96 PPM

CALIBRATION CURVE 2 nd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1680	475.00	100	175.00	475.00	0.00
2636	243.40	51	91.60	244.14	0.30
GMIS	240.40	51	89.90	239.52	-0.37
1679	96.67	20	36.80	96.86	0.19
	0.00	0	0.00	0.00	0.00
		0		0.0000	0.00
		0		0.00	0.00
2636	243.4	LOW	91.60	244.14	0.00
1680	475.00	HIGH	175.00	475.00	0.00

† GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : Don Eichler Jr

Approved By : L Shapiro

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO System Bias Check

Job: WHEELABRATOR/LP SAGOLA 5793 Source: PRESS R70
Test: 1 Run: Date: 4-11-95 Site: STACK
Operator: R.R.

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
				Cal. Err.	Sys. Bias			
1	810	Zero Gas	0	1	2	1	250	.4
		Upscale	150	148	151	3	250	1.2
2	1035	Zero Gas	0	1	1	0	250	0
		Upscale	150	148	150	2	250	.8
3	1550	Zero Gas	0	1	2	1	250	.4
		Upscale	150	148	148	0	250	0
4	955	Zero Gas	0	1	2	1	250	.4
		Upscale	150	148	150	2	250	.8
5	1330	Zero Gas	0	1	1	0	250	0
		Upscale	150	148	147	1	250	.4
6	1515	Zero Gas	0	1	1	0	250	0
		Upscale	150	148	147	1	250	.4
7	1715	Zero Gas	0	1	1	0	250	0
		Upscale	150	148	148	0	250	0
8	925	Zero Gas	0	1	0	1	250	.4
		Upscale	150	148	149	1	250	.4
9	1300	Zero Gas	0	1	1	0	250	0
		Upscale	150	148	149	1	250	.4
10	1925	Zero Gas	0	1	1	0	250	0
		Upscale	150	148	149	1	250	.4
11	2055	Zero Gas	0	1	1	0	250	0
		Upscale	150	148	150	2	250	.8
12		Zero Gas	0					
		Upscale						

4-11-95
1 4-12-95
1 4-13-95

Must be within 5% of the span for the zero or upscale cal. gas.

033194-G:\STACK\WP\FORMS\S—20-11

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO System Bias Check

Job Wheelabrator / Shoala Source Press RTO
Test 1 Run ____ Date ____ Site Inlet
Operator BB

Run	Time (HRS)	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
				Cal. Err.	Sys. Bias			
1	0735	Zero Gas	0	0	1	1	500	
		Upscale	150	148	147	1	500	
2	1033	Zero Gas	0	0	0	0	500	
		Upscale	150	148	145	3	500	.6
3	1610	Zero Gas	0	0	1	1	500	.2
		Upscale	150	148	148	0	500	0
4	1020	Zero Gas	0	0	0	0	500	0
		Upscale	150	148	148	0	500	0
5	1300	Zero Gas	0	0	1.0	1	500	.2
		Upscale	150	148	146	2	500	.4
6	1535	Zero Gas	0	0	1	1	500	.2
		Upscale	150	148	147	1	500	.2
7	1737	Zero Gas	0	0	2	2	500	.4
		Upscale	150	148	147	1	500	.2
8	0930	Zero Gas	0	0	1.0	1	500	.2
		Upscale	150	148	150	2	500	.40
9	1311	Zero Gas	0	0	0	0	500	0
		Upscale	150	148	148	0	500	0
10	1505	Zero Gas	0	0	1	1	500	.2
		Upscale	150	148	150	2	500	.4
11		Zero Gas	0	0			500	
		Upscale	150	148	.48		500	
12		Zero Gas	0					
		Upscale						

Must be within 5% of the span for the zero or upscale cal. gas.

03319-C:\STACK\WP\FORMS\S-20-11

APPENDIX I

COMPUTER DATALOGGER PRINTOUTS

Interpoll Laboratories, Inc.
(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS021
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 1

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
102	09:55:00	0.02	20.68
102	09:56:00	0.03	20.76
102	09:57:00	-0.01	11.45
102	09:58:00	-0.04	0.00
102	09:59:00	-0.04	-0.03
102	10:00:00	-0.04	-0.04
102	10:01:00	-0.04	0.08
102	10:02:00	-0.04	0.17
102	10:03:00	-0.05	0.16
102	10:04:00	-0.05	0.16
102	10:05:00	-0.04	0.16
102	10:06:00	-0.05	0.16
102	10:07:00	-0.05	0.16
102	10:08:00	-0.05	0.15
102	10:09:00	8.37	8.90
102	10:10:00	10.66	13.42
102	10:11:00	10.85	13.51
102	10:12:00	11.01	13.51
102	10:13:00	11.02	13.52
102	10:14:00	1.03	19.87
102	10:15:00	0.70	21.01
102	10:16:00	0.61	20.96
102	10:17:00	0.49	21.01
102	10:18:00	0.42	21.03
102	10:19:00	0.43	20.93
102	10:20:00	0.49	20.80
102	10:21:00	0.60	20.51
102	10:22:00	0.62	20.45
102	10:23:00	0.59	20.43
102	10:24:00	0.50	20.51
102	10:25:00	0.51	20.51
102	10:26:00	0.58	20.42
102	10:27:00	0.49	20.42
102	10:28:00	0.45	20.51

Interpoll Laboratories, Inc.
(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS021
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 1

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
102	10:29:00	0.49	20.50
102	10:30:00	0.50	20.38
102	10:31:00	0.44	20.47
102	10:32:00	0.46	20.47
102	10:33:00	0.48	20.41
102	10:34:00	0.45	20.43
102	10:35:00	0.41	20.50
102	10:36:00	0.44	20.50
102	10:37:00	0.44	20.45
102	10:38:00	0.43	20.42
102	10:39:00	0.43	20.49
102	10:40:00	0.45	20.45
102	10:41:00	0.47	20.38
102	10:42:00	0.42	20.47
102	10:43:00	0.44	20.48
102	10:44:00	0.43	20.45
102	10:45:00	0.44	20.40
102	10:46:00	0.45	20.46
102	10:47:00	0.41	20.47
102	10:48:00	0.41	20.46
102	10:49:00	0.45	20.45
102	10:50:00	0.40	20.49
102	10:51:00	0.39	20.50
102	10:52:00	0.46	20.43
102	10:53:00	0.44	20.41
102	10:54:00	0.39	20.49
102	10:55:00	0.40	20.48
102	10:56:00	0.46	20.40
102	10:57:00	0.42	20.46
102	10:58:00	0.39	20.48
102	10:59:00	0.43	20.44
102	11:00:00	0.46	20.42
102	11:01:00	0.39	20.48
102	11:02:00	0.38	20.51

Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS021
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 1

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
102	11:03:00	0.47	20.43
102	11:04:00	0.42	20.40
102	11:05:00	0.38	20.50
102	11:06:00	0.43	20.49
102	11:07:00	0.46	20.37
102	11:08:00	0.41	20.45
102	11:09:00	0.41	20.46
102	11:10:00	0.45	20.41
102	11:11:00	0.41	20.45
102	11:12:00	0.38	20.51
102	11:13:00	0.41	20.49
102	11:14:00	0.43	20.45
102	11:15:00	0.42	20.41
102	11:16:00	0.41	20.48
102	11:17:00	0.43	20.46
102	11:18:00	0.45	20.38
102	11:19:00	0.40	20.48
102	11:20:00	0.44	20.46
102	11:21:00	0.41	20.46
102	11:22:00	0.42	20.42
102	11:23:00	0.45	20.46
102	11:24:00	0.41	20.46
102	11:25:00	0.40	20.46
102	11:26:00	0.45	20.43
102	11:27:00	0.43	20.46
102	11:28:00	0.39	20.49
102	11:29:00	0.44	20.43
102	11:30:00	0.44	20.43
102	11:31:00	0.40	20.46
102	11:32:00	0.40	20.47
102	11:33:00	0.45	20.41
102	11:34:00	0.44	20.43
102	11:35:00	0.39	20.47
	Run Average	0.43	20.47

* Please note: Negative numbers were not used in the calculation of averages.

Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS022
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 2

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
102	12:46:00	0.07	20.97
102	12:47:00	0.06	20.96
102	12:48:00	0.05	20.97
102	12:49:00	0.05	20.97
102	12:50:00	0.05	20.97
102	12:51:00	0.05	20.96
102	12:52:00	0.05	20.96
102	12:53:00	0.05	20.96
102	12:54:00	0.04	20.96
102	12:55:00	0.05	20.96
102	12:56:00	0.04	20.96
102	12:57:00	0.04	20.96
102	12:58:00	0.04	20.96
102	12:59:00	0.03	20.96
102	13:00:00	0.03	20.97
102	13:01:00	0.04	20.97
102	13:02:00	0.04	20.96
102	13:03:00	0.03	20.96
102	13:04:00	0.03	20.96
102	13:05:00	0.03	20.96
102	13:06:00	0.03	20.96
102	13:07:00	0.03	20.96
102	13:08:00	0.03	20.96
102	13:09:00	0.03	20.97
102	13:10:00	0.03	20.97
102	13:11:00	0.03	20.97
102	13:12:00	0.03	20.97
102	13:13:00	0.02	20.96
102	13:14:00	0.02	20.97
102	13:15:00	0.03	20.97
102	13:16:00	0.03	20.97
102	13:17:00	0.03	20.96
102	13:18:00	0.03	20.97
102	13:19:00	0.03	20.97

Interpoll Laboratories, Inc.
(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS022
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 2

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
102	13:20:00	0.03	20.98
102	13:21:00	0.03	20.98
102	13:22:00	0.03	20.98
102	13:23:00	0.03	20.97
102	13:24:00	0.03	20.97
102	13:25:00	0.03	20.97
102	13:26:00	0.03	20.97
102	13:27:00	0.03	20.97
102	13:28:00	0.03	20.98
102	13:29:00	0.02	20.98
102	13:30:00	0.02	20.98
102	13:31:00	-0.00	15.21
102	13:32:00	-0.04	-0.02
102	13:33:00	-0.03	-0.06
102	13:34:00	-0.02	0.00
102	13:35:00	-0.02	0.12
102	13:36:00	-0.03	0.25
102	13:37:00	-0.02	0.25
102	13:38:00	-0.02	0.24
102	13:39:00	-0.02	0.25
102	13:40:00	4.22	3.90
102	13:41:00	10.60	13.56
102	13:42:00	10.81	13.58
102	13:43:00	10.99	13.59
102	13:44:00	4.88	16.86
102	13:45:00	0.68	21.07
102	13:46:00	0.56	21.09
102	13:47:00	0.75	20.72
102	13:48:00	0.74	20.59
102	13:49:00	0.78	20.51
102	13:50:00	0.65	20.52
102	13:51:00	0.61	20.60
102	13:52:00	0.64	20.54
102	13:53:00	0.60	20.49

Interpoll Laboratories, Inc.
(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS022
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 2

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
102	13:54:00	0.53	20.57
102	13:55:00	0.54	20.57
102	13:56:00	0.54	20.52
102	13:57:00	0.52	20.52
102	13:58:00	0.47	20.57
	Run Average	0.16	20.88

Please note: Negative numbers were not used in the calculation of averages.

Interpoll Laboratories, Inc.
(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS023
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 3

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
102	14:56:00	0.47	20.51
102	14:57:00	0.44	20.57
102	14:58:00	0.39	20.63
102	14:59:00	0.45	20.53
102	15:00:00	0.47	20.55
102	15:01:00	0.42	20.56
102	15:02:00	0.41	20.57
102	15:03:00	0.46	20.53
102	15:04:00	0.43	20.56
102	15:05:00	0.38	20.60
102	15:06:00	0.44	20.57
102	15:07:00	0.48	20.50
102	15:08:00	0.40	20.58
102	15:09:00	0.41	20.60
102	15:10:00	0.48	20.53
102	15:11:00	0.42	20.55
102	15:12:00	0.41	20.57
102	15:13:00	0.44	20.55
102	15:14:00	0.45	20.51
102	15:15:00	0.24	20.76
102	15:16:00	0.05	9.20
102	15:17:00	0.03	0.06
102	15:18:00	0.03	0.07
102	15:19:00	0.01	0.24
102	15:20:00	0.01	0.26
102	15:21:00	0.00	0.26
102	15:22:00	4.40	4.02
102	15:23:00	10.62	13.57
102	15:24:00	10.82	13.59
102	15:25:00	3.42	17.89
102	15:26:00	0.53	21.08
102	15:27:00	0.51	21.02
102	15:28:00	0.46	21.00
102	15:29:00	0.41	21.01

Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS023
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 3

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
102	15:30:00	0.36	21.01
102	15:31:00	0.32	21.01
102	15:32:00	0.28	21.02
102	15:33:00	0.26	21.01
102	15:34:00	0.24	21.02
102	15:35:00	0.21	21.00
102	15:36:00	0.18	21.03
102	15:37:00	0.17	21.02
102	15:38:00	0.15	21.03
102	15:39:00	0.15	21.02
102	15:40:00	0.14	21.02
102	15:41:00	0.13	21.03
102	15:42:00	0.12	21.03
102	15:43:00	0.11	21.03
102	15:44:00	0.10	21.04
102	15:45:00	0.09	21.03
102	15:46:00	0.09	21.04
102	15:47:00	0.08	21.05
102	15:48:00	0.08	21.04
102	15:49:00	0.08	21.04
102	15:50:00	0.07	21.04
102	15:51:00	0.08	21.04
102	15:52:00	0.26	20.81
102	15:53:00	0.38	20.60
102	15:54:00	0.47	20.52
102	15:55:00	0.40	20.51
102	15:56:00	0.41	20.55
102	15:57:00	0.45	20.53
102	15:58:00	0.46	20.48
102	15:59:00	0.41	20.56
102	16:00:00	0.42	20.57
102	16:01:00	0.44	20.55
102	16:02:00	0.43	20.54
102	16:03:00	0.41	20.55

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS023
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 3

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
102	16:04:00	0.43	20.59
102	16:05:00	0.46	20.54
	Run Average	0.42	20.57

Please note: Negative numbers were not used in the calculation of averages.

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS061
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 1

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
103	09:20:00	-0.16	21.05
103	09:21:00	-0.16	20.80
103	09:22:00	-0.17	20.78
103	09:23:00	-0.17	20.26
103	09:24:00	-0.24	0.75
103	09:25:00	-0.24	0.13
103	09:26:00	-0.24	0.11
103	09:27:00	-0.07	0.11
103	09:28:00	-0.02	0.11
103	09:29:00	-0.02	0.19
103	09:30:00	-0.02	0.30
103	09:31:00	-0.02	0.30
103	09:32:00	-0.02	0.30
103	09:33:00	-0.02	0.30
103	09:34:00	-0.02	0.30
103	09:35:00	2.56	1.76
103	09:36:00	10.61	13.26
103	09:37:00	10.90	13.46
103	09:38:00	11.08	13.51
103	09:39:00	10.97	13.51
103	09:40:00	1.27	19.32
103	09:41:00	0.77	13.91
103	09:42:00	0.51	0.12
103	09:43:00	0.16	0.07
103	09:44:00	3.07	2.17
103	09:45:00	10.32	13.39
103	09:46:00	10.90	13.51
103	09:47:00	4.18	17.02
103	09:48:00	0.78	20.35
103	09:49:00	0.66	20.33
103	09:50:00	0.57	20.40
103	09:51:00	0.53	20.40
103	09:52:00	0.47	20.33
103	09:53:00	0.38	20.39

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS061
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 1

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
103	09:54:00	0.37	20.39
103	09:55:00	0.32	20.39
103	09:56:00	0.26	20.39
103	09:57:00	0.25	20.41
103	09:58:00	0.24	20.39
103	09:59:00	0.18	20.42
103	10:00:00	0.20	20.38
103	10:01:00	0.21	20.37
103	10:02:00	0.15	20.42
103	10:03:00	0.16	20.41
103	10:04:00	0.16	20.37
103	10:05:00	0.16	20.40
103	10:06:00	0.12	20.44
103	10:07:00	0.14	20.37
103	10:08:00	0.17	20.39
103	10:09:00	0.11	20.40
103	10:10:00	0.10	20.41
103	10:11:00	0.15	20.39
103	10:12:00	0.11	20.41
103	10:13:00	0.06	20.46
103	10:14:00	0.11	20.44
103	10:15:00	0.16	20.36
103	10:16:00	0.09	20.43
103	10:17:00	0.08	20.45
103	10:18:00	0.17	20.36
103	10:19:00	0.10	20.41
103	10:20:00	0.07	20.44
103	10:21:00	0.12	20.43
103	10:22:00	0.13	20.36
103	10:23:00	0.09	20.43
103	10:24:00	0.08	20.45
103	10:25:00	0.13	20.40
103	10:26:00	0.12	20.39
103	10:27:00	0.08	20.42

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS061
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 1

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
103	10:28:00	0.11	20.46
103	10:29:00	0.12	20.42
103	10:30:00	0.09	20.39
103	10:31:00	0.12	20.43
103	10:32:00	0.11	20.43
103	10:33:00	0.10	20.37
103	10:34:00	0.11	20.41
103	10:35:00	0.12	20.40
103	10:36:00	0.08	20.42
103	10:37:00	0.11	20.42
103	10:38:00	0.14	20.40
103	10:39:00	0.06	20.46
103	10:40:00	0.09	20.45
103	10:41:00	0.15	20.39
	Run Average	0.19	20.40

Please note: Negative numbers were not used in the calculation of averages.

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS062
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 2

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
103	11:21:00	0.12	20.43
103	11:22:00	0.10	20.41
103	11:23:00	0.13	20.45
103	11:24:00	0.09	20.47
103	11:25:00	0.10	20.41
103	11:26:00	0.13	20.44
103	11:27:00	0.11	20.43
103	11:28:00	0.08	20.45
103	11:29:00	0.12	20.43
103	11:30:00	0.13	20.42
103	11:31:00	0.06	20.49
103	11:32:00	0.09	20.47
103	11:33:00	0.16	20.39
103	11:34:00	0.08	20.45
103	11:35:00	0.07	20.50
103	11:36:00	0.15	20.44
103	11:37:00	0.10	20.42
103	11:38:00	0.08	20.46
103	11:39:00	0.12	20.45
103	11:40:00	0.12	20.39
103	11:41:00	0.08	20.47
103	11:42:00	0.08	20.48
103	11:43:00	0.11	20.44
103	11:44:00	0.11	20.44
103	11:45:00	0.10	20.43
103	11:46:00	0.10	20.47
103	11:47:00	0.10	20.45
103	11:48:00	0.08	20.43
103	11:49:00	0.07	20.50
103	11:50:00	0.11	20.48
103	11:51:00	0.11	20.40
103	11:52:00	0.09	20.45
103	11:53:00	0.06	20.47
103	11:54:00	0.06	20.47

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS062
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 2

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
103	11:55:00	0.07	20.46
103	11:56:00	0.05	20.49
103	11:57:00	0.02	20.52
103	11:58:00	0.05	20.51
103	11:59:00	0.14	20.42
103	12:00:00	0.10	20.43
103	12:01:00	0.08	20.46
103	12:02:00	0.10	20.44
103	12:03:00	0.13	20.41
103	12:04:00	0.09	20.46
103	12:05:00	0.09	20.45
103	12:06:00	0.14	20.39
103	12:07:00	0.12	20.43
103	12:08:00	0.06	20.49
103	12:09:00	0.10	20.46
103	12:10:00	0.14	20.43
103	12:11:00	0.07	20.48
103	12:12:00	0.07	20.51
103	12:13:00	0.15	20.43
103	12:14:00	0.09	20.42
103	12:15:00	0.08	20.47
103	12:16:00	0.13	20.48
103	12:17:00	0.12	20.37
103	12:18:00	0.07	20.48
103	12:19:00	0.10	20.48
103	12:20:00	0.10	20.45
103	12:21:00	0.09	20.46
103	12:22:00	0.12	20.45
103	12:23:00	0.11	20.44
103	12:24:00	0.09	20.47
	Run Average	0.10	20.45

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS063
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 3

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
103	13:34:00	0.42	20.48
103	13:35:00	0.39	20.42
103	13:36:00	0.35	20.51
103	13:37:00	0.38	20.49
103	13:38:00	0.34	20.50
103	13:39:00	0.35	20.48
103	13:40:00	0.40	20.47
103	13:41:00	0.33	20.49
103	13:42:00	0.33	20.50
103	13:43:00	0.39	20.44
103	13:44:00	0.36	20.45
103	13:45:00	0.32	20.51
103	13:46:00	0.37	20.47
103	13:47:00	0.36	20.45
103	13:48:00	0.31	20.51
103	13:49:00	0.33	20.51
103	13:50:00	0.39	20.44
103	13:51:00	0.33	20.49
103	13:52:00	0.31	20.51
103	13:53:00	0.37	20.47
103	13:54:00	0.37	20.45
103	13:55:00	0.31	20.51
103	13:56:00	0.32	20.56
103	13:57:00	0.38	20.47
103	13:58:00	0.34	20.45
103	13:59:00	0.34	20.50
103	14:00:00	0.37	20.49
103	14:01:00	0.36	20.41
103	14:02:00	0.33	20.50
103	14:03:00	0.34	20.50
103	14:04:00	0.32	20.49
103	14:05:00	0.33	20.48
103	14:06:00	0.37	20.47
103	14:07:00	0.31	20.51

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS063
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 3

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO2 (%v/v)	O2 (%v/v)
103	14:08:00	0.33	20.51
103	14:09:00	0.38	20.45
103	14:10:00	0.33	20.49
103	14:11:00	0.30	20.54
103	14:12:00	0.38	20.46
103	14:13:00	0.36	20.47
103	14:14:00	0.31	20.52
103	14:15:00	0.34	20.51
103	14:16:00	0.39	20.43
103	14:17:00	0.32	20.51
103	14:18:00	0.31	20.52
103	14:19:00	0.37	20.48
103	14:20:00	0.36	20.47
103	14:21:00	0.31	20.51
103	14:22:00	0.35	20.52
103	14:23:00	0.38	20.46
103	14:24:00	0.33	20.46
103	14:25:00	0.34	20.53
103	14:26:00	0.36	20.52
103	14:27:00	0.34	20.46
103	14:28:00	0.35	20.51
103	14:29:00	0.36	20.49
103	14:30:00	0.33	20.49
103	14:31:00	0.35	20.48
103	14:32:00	0.38	20.48
103	14:33:00	0.30	20.53
103	14:34:00	0.32	20.52
103	14:35:00	0.39	20.46
103	14:36:00	0.33	20.50
103	14:37:00	0.30	20.54
	Run Average	0.35	20.49

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Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1995 -

File Name: LPSI81
Job Number: 5-5194
Client: Louisiana - Pacific Corporation
Location: Sagola, Michigan

Press RTO Inlet -- Run 1

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	15:29:00	14.6	-0.00	21.16
103	15:30:00	15.0	0.04	21.15
103	15:31:00	15.4	0.03	21.15
103	15:32:00	15.1	0.00	21.16
103	15:33:00	14.4	0.03	21.15
103	15:34:00	19.4	0.05	21.14
103	15:35:00	23.5	0.01	21.14
103	15:36:00	23.2	0.02	21.15
103	15:37:00	22.2	0.06	21.15
103	15:38:00	19.7	0.01	21.15
103	15:39:00	17.7	0.01	21.15
103	15:40:00	18.0	0.06	21.15
103	15:41:00	16.6	0.01	21.15
103	15:42:00	15.1	0.00	21.16
103	15:43:00	16.2	0.05	21.15
103	15:44:00	15.5	0.03	21.15
103	15:45:00	13.1	0.00	21.16
103	15:46:00	13.1	0.04	21.17
103	15:47:00	13.7	0.04	21.16
103	15:48:00	13.5	0.00	21.16
103	15:49:00	14.3	0.02	21.16
103	15:50:00	15.0	0.05	21.15
103	15:51:00	14.2	0.00	21.16
103	15:52:00	14.1	0.01	21.16
103	15:53:00	15.3	0.06	21.15
103	15:54:00	15.1	0.01	21.16
103	15:55:00	13.5	0.00	21.16
103	15:56:00	13.4	0.06	21.15
103	15:57:00	13.7	0.02	21.16
103	15:58:00	13.4	0.00	21.16
103	15:59:00	14.0	0.04	21.15
103	16:00:00	14.4	0.03	21.15
103	16:01:00	13.6	-0.00	21.16
103	16:02:00	13.0	0.02	21.17

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Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1995 -

File Name: LPSI81
Job Number: 5-5194
Client: Louisiana - Pacific Corporation
Location: Sagola, Michigan

Press RTO Inlet -- Run 1

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	16:03:00	14.3	0.05	21.15
103	16:04:00	13.7	-0.00	21.16
103	16:05:00	13.9	0.01	21.17
103	16:06:00	14.6	0.05	21.16
103	16:07:00	14.0	0.00	21.16
103	16:08:00	13.0	-0.00	21.17
103	16:09:00	14.1	0.05	21.15
103	16:10:00	15.6	0.01	21.16
103	16:11:00	15.0	-0.00	21.16
103	16:12:00	15.3	0.04	21.16
103	16:13:00	15.4	0.03	21.16
103	16:14:00	15.1	-0.00	21.17
103	16:15:00	15.6	0.03	21.16
103	16:16:00	16.4	0.04	21.16
103	16:17:00	22.0	0.01	21.16
103	16:18:00	28.8	0.02	21.16
103	16:19:00	30.9	0.06	21.15
103	16:20:00	26.5	0.00	21.16
103	16:21:00	21.5	0.00	21.16
103	16:22:00	20.5	0.05	21.16
103	16:23:00	19.7	0.02	21.14
103	16:24:00	18.0	-0.00	21.16
103	16:25:00	20.4	0.04	21.15
103	16:26:00	23.0	0.03	21.15
103	16:27:00	24.0	0.01	21.14
103	16:28:00	24.2	0.04	21.13
103	16:29:00	24.0	0.04	21.15
	Run Average	17.1	0.02	21.16

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Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1995 -

File Name: LPSI82
Job Number: 5-5194
Client: Louisiana - Pacific Corporation
Location: Sagola, Michigan

Press RTO Inlet -- Run 2

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	17:06:00	9.2	-0.00	21.19
103	17:07:00	9.7	0.04	21.18
103	17:08:00	9.7	0.01	21.18
103	17:09:00	8.4	-0.01	21.19
103	17:10:00	8.7	0.03	21.19
103	17:11:00	10.7	0.03	21.19
103	17:12:00	10.5	-0.01	21.20
103	17:13:00	10.4	0.01	21.19
103	17:14:00	10.9	0.04	21.19
103	17:15:00	10.1	-0.01	21.19
103	17:16:00	9.5	0.00	21.20
103	17:17:00	10.7	0.05	21.19
103	17:18:00	10.1	-0.00	21.20
103	17:19:00	9.2	-0.01	21.20
103	17:20:00	10.4	0.04	21.19
103	17:21:00	10.3	0.00	21.20
103	17:22:00	8.4	-0.01	21.20
103	17:23:00	8.1	0.03	21.19
103	17:24:00	8.1	0.02	21.20
103	17:25:00	6.9	-0.01	21.20
103	17:26:00	7.0	0.02	21.20
103	17:27:00	8.1	0.03	21.20
103	17:28:00	6.9	-0.01	21.21
103	17:29:00	6.2	0.00	21.21
103	17:30:00	7.0	0.04	21.20
103	17:31:00	6.5	-0.01	21.20
103	17:32:00	6.0	-0.01	21.22
103	17:33:00	7.3	0.04	21.20
103	17:34:00	7.2	-0.00	21.21
103	17:35:00	8.9	-0.01	21.21
103	17:36:00	13.4	0.04	21.20
103	17:37:00	15.8	0.01	21.19
103	17:38:00	16.1	-0.01	21.20
103	17:39:00	14.9	0.02	21.20

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(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1995 -

File Name: LPSI82
Job Number: 5-5194
Client: Louisiana - Pacific Corporation
Location: Sagola, Michigan

Press RTO Inlet -- Run 2

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	17:40:00	15.0	0.02	21.19
103	17:41:00	12.2	-0.01	21.21
103	17:42:00	10.4	-0.01	21.22
103	17:43:00	9.6	-0.00	21.21
103	17:44:00	12.4	0.04	21.20
103	17:45:00	14.2	-0.00	21.20
103	17:46:00	13.5	-0.01	21.21
103	17:47:00	11.5	-0.02	21.22
103	17:48:00	10.3	0.00	21.22
103	17:49:00	11.5	0.04	21.20
103	17:50:00	10.8	-0.01	21.22
103	17:51:00	9.5	-0.01	21.21
103	17:52:00	8.8	0.03	21.21
103	17:53:00	9.0	0.02	21.21
103	17:54:00	8.1	-0.01	21.22
103	17:55:00	7.8	0.02	21.22
103	17:56:00	9.0	0.03	21.20
103	17:57:00	7.5	-0.01	21.22
103	17:58:00	8.3	0.00	21.22
103	17:59:00	11.0	0.05	21.21
103	18:00:00	12.5	-0.01	21.22
103	18:01:00	15.4	-0.01	21.22
103	18:02:00	16.6	0.05	21.20
103	18:03:00	17.2	-0.00	21.22
103	18:04:00	14.1	-0.01	21.22
103	18:05:00	13.8	0.03	21.20
103	18:06:00	16.9	0.01	21.21
103	18:07:00	15.2	-0.01	21.22
103	18:08:00	15.5	0.02	21.21
103	18:09:00	17.3	0.02	21.21
103	18:10:00	14.8	-0.01	21.22
103	18:11:00	13.8	0.00	21.22
	Run Average	10.8	0.01	21.20

Interpoll Laboratories, Inc.

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPSI83
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Inlet -- Run 3

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	18:35:00	13.9	0.02	21.22
103	18:36:00	10.5	-0.01	21.22
103	18:37:00	10.8	0.01	21.22
103	18:38:00	11.2	0.03	21.22
103	18:39:00	8.5	-0.01	21.23
103	18:40:00	8.3	-0.00	21.22
103	18:41:00	10.5	0.04	21.22
103	18:42:00	9.4	-0.01	21.23
103	18:43:00	9.8	-0.01	21.23
103	18:44:00	15.2	0.04	21.21
103	18:45:00	14.3	-0.00	21.22
103	18:46:00	11.7	-0.01	21.22
103	18:47:00	12.1	0.03	21.21
103	18:48:00	12.2	0.01	21.22
103	18:49:00	10.1	-0.02	21.23
103	18:50:00	9.8	0.02	21.22
103	18:51:00	10.6	0.02	21.22
103	18:52:00	9.0	-0.01	21.22
103	18:53:00	8.9	0.01	21.22
103	18:54:00	9.9	0.03	21.21
103	18:55:00	8.7	-0.01	21.21
103	18:56:00	8.1	-0.00	21.22
103	18:57:00	9.5	0.04	21.22
103	18:58:00	8.8	-0.01	21.22
103	18:59:00	7.7	-0.01	21.23
103	19:00:00	8.5	0.03	21.22
103	19:01:00	8.0	0.00	21.23
103	19:02:00	6.4	-0.02	21.23
103	19:03:00	7.2	0.02	21.22
103	19:04:00	9.6	0.01	21.23
103	19:05:00	8.9	-0.02	21.23
103	19:06:00	9.0	-0.01	21.20
103	19:07:00	0.1	-0.03	21.23
103	19:21:00	5.7	0.34	20.68

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPSI83
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Inlet -- Run 3

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	19:22:00	12.7	0.25	20.74
103	19:23:00	10.6	0.20	20.77
103	19:24:00	11.5	0.21	20.77
103	19:25:00	12.3	0.18	20.78
103	19:26:00	11.3	0.13	20.79
103	19:27:00	11.4	0.14	20.79
103	19:28:00	13.0	0.14	20.78
103	19:29:00	12.6	0.09	20.79
103	19:30:00	12.6	0.09	20.80
103	19:31:00	14.0	0.13	20.79
103	19:32:00	13.3	0.06	20.81
103	19:33:00	12.3	0.06	20.81
103	19:34:00	14.5	0.10	20.80
103	19:35:00	14.3	0.06	20.81
103	19:36:00	12.9	0.04	20.81
103	19:37:00	13.1	0.08	20.81
	Run Average	10.5	0.05	21.07

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS081
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 1

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	15:28:00	9.8	0.36	20.52
103	15:29:00	18.6	0.35	20.54
103	15:30:00	17.9	0.36	20.51
103	15:31:00	11.0	0.36	20.48
103	15:32:00	12.3	0.36	20.51
103	15:33:00	17.1	0.33	20.54
103	15:34:00	12.8	0.36	20.49
103	15:35:00	13.3	0.38	20.50
103	15:36:00	11.0	0.32	20.52
103	15:37:00	11.0	0.33	20.52
103	15:38:00	16.1	0.40	20.48
103	15:39:00	14.0	0.36	20.48
103	15:40:00	8.6	0.31	20.57
103	15:41:00	16.3	0.39	20.51
103	15:42:00	19.9	0.37	20.47
103	15:43:00	10.3	0.31	20.57
103	15:44:00	11.3	0.33	20.58
103	15:45:00	24.9	0.40	20.47
103	15:46:00	17.1	0.33	20.52
103	15:47:00	9.3	0.35	20.52
103	15:48:00	21.0	0.38	20.49
103	15:49:00	23.9	0.34	20.48
103	15:50:00	9.3	0.33	20.55
103	15:51:00	12.5	0.34	20.56
103	15:52:00	25.0	0.32	20.54
103	15:53:00	12.8	0.35	20.51
103	15:54:00	10.6	0.37	20.50
103	15:55:00	17.8	0.34	20.52
103	15:56:00	15.1	0.37	20.49
103	15:57:00	12.1	0.36	20.48
103	15:58:00	12.2	0.34	20.54
103	15:59:00	13.3	0.31	20.58
103	16:00:00	13.1	0.35	20.52
103	16:01:00	14.9	0.39	20.49

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS081
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 1

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	16:02:00	12.0	0.32	20.53
103	16:03:00	11.7	0.34	20.52
103	16:04:00	18.6	0.40	20.48
103	16:05:00	14.9	0.33	20.53
103	16:06:00	8.8	0.30	20.58
103	16:07:00	18.8	0.36	20.54
103	16:08:00	21.9	0.36	20.48
103	16:09:00	9.9	0.32	20.55
103	16:10:00	12.9	0.35	20.55
103	16:11:00	25.4	0.39	20.46
103	16:12:00	14.3	0.31	20.55
103	16:13:00	8.5	0.34	20.56
103	16:14:00	22.1	0.37	20.52
103	16:15:00	21.9	0.33	20.52
103	16:16:00	9.4	0.36	20.51
103	16:17:00	12.7	0.36	20.52
103	16:18:00	21.9	0.33	20.52
103	16:19:00	10.4	0.36	20.50
103	16:20:00	8.9	0.37	20.50
103	16:21:00	15.1	0.32	20.55
103	16:22:00	13.6	0.35	20.52
103	16:23:00	12.7	0.35	20.49
103	16:24:00	12.3	0.34	20.54
103	16:25:00	12.1	0.32	20.56
103	16:26:00	14.4	0.37	20.47
103	16:27:00	14.6	0.35	20.52
103	16:28:00	10.3	0.31	20.54
103	16:29:00	12.2	0.34	20.51
103	16:30:00	19.0	0.38	20.48
	Run Average	14.6	0.35	20.52

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS082
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 2

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	17:06:00	23.8	0.34	20.49
103	17:07:00	17.3	0.33	20.48
103	17:08:00	11.6	0.36	20.50
103	17:09:00	15.5	0.35	20.50
103	17:10:00	18.6	0.31	20.52
103	17:11:00	13.6	0.37	20.48
103	17:12:00	14.2	0.36	20.47
103	17:13:00	15.6	0.31	20.53
103	17:14:00	14.3	0.35	20.51
103	17:15:00	17.8	0.38	20.45
103	17:16:00	15.9	0.33	20.49
103	17:17:00	12.9	0.33	20.52
103	17:18:00	20.2	0.39	20.43
103	17:19:00	19.5	0.34	20.49
103	17:20:00	12.2	0.31	20.52
103	17:21:00	17.2	0.35	20.49
103	17:22:00	26.2	0.36	20.46
103	17:23:00	14.6	0.31	20.51
103	17:24:00	12.8	0.32	20.53
103	17:25:00	26.9	0.36	20.47
103	17:26:00	20.8	0.35	20.45
103	17:27:00	10.7	0.33	20.50
103	17:28:00	19.4	0.33	20.54
103	17:29:00	27.6	0.35	20.45
103	17:30:00	12.9	0.32	20.50
103	17:31:00	13.6	0.35	20.49
103	17:32:00	23.8	0.32	20.50
103	17:33:00	15.8	0.33	20.48
103	17:34:00	13.1	0.38	20.48
103	17:35:00	17.0	0.33	20.50
103	17:36:00	16.5	0.31	20.52
103	17:37:00	13.9	0.38	20.47
103	17:38:00	14.2	0.34	20.47
103	17:39:00	13.1	0.31	20.52

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS082
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 2

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	17:40:00	14.4	0.37	20.47
103	17:41:00	17.9	0.36	20.45
103	17:42:00	14.6	0.33	20.50
103	17:43:00	12.1	0.32	20.52
103	17:44:00	10.6	0.34	20.45
103	17:45:00	12.9	0.36	20.49
103	17:46:00	14.8	0.32	20.50
103	17:47:00	14.7	0.31	20.51
103	17:48:00	9.8	0.33	20.52
103	17:49:00	8.1	0.32	20.54
103	17:50:00	15.7	0.34	20.55
103	17:51:00	28.2	0.35	20.52
103	17:52:00	14.7	0.33	20.52
103	17:53:00	10.4	0.34	20.57
103	17:54:00	20.9	0.35	20.57
103	17:55:00	24.8	0.34	20.52
103	17:56:00	12.4	0.33	20.57
103	17:57:00	13.7	0.38	20.53
103	17:58:00	22.3	0.33	20.55
103	17:59:00	14.8	0.35	20.52
103	18:00:00	13.2	0.40	20.50
103	18:01:00	16.1	0.33	20.54
103	18:02:00	15.4	0.32	20.56
103	18:03:00	15.1	0.40	20.50
103	18:04:00	14.7	0.34	20.55
103	18:05:00	13.1	0.31	20.59
103	18:06:00	16.0	0.40	20.51
103	18:07:00	19.0	0.36	20.50
103	18:08:00	12.7	0.32	20.57
103	18:09:00	12.9	0.35	20.55
103	18:10:00	22.7	0.39	20.47
103	18:11:00	16.4	0.34	20.52
	Run Average	16.2	0.34	20.51

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS083A
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 3

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	18:35:00	13.6	0.34	20.53
103	18:36:00	22.9	0.37	20.49
103	18:37:00	16.0	0.34	20.51
103	18:38:00	11.1	0.31	20.55
103	18:39:00	23.0	0.36	20.52
103	18:40:00	22.8	0.35	20.51
103	18:41:00	11.7	0.32	20.53
103	18:42:00	15.4	0.35	20.57
103	18:43:00	28.5	0.37	20.51
103	18:44:00	15.2	0.32	20.51
103	18:45:00	11.4	0.36	20.55
103	18:46:00	21.8	0.35	20.54
103	18:47:00	19.0	0.34	20.48
103	18:48:00	11.7	0.37	20.52
103	18:49:00	14.6	0.35	20.52
103	18:50:00	18.6	0.32	20.54
103	18:51:00	14.1	0.35	20.52
103	18:52:00	14.2	0.37	20.51
103	18:53:00	13.8	0.30	20.55
103	18:54:00	13.9	0.34	20.55
103	18:55:00	17.2	0.39	20.47
103	18:56:00	15.0	0.32	20.55
103	18:57:00	12.5	0.31	20.57
103	18:58:00	19.3	0.40	20.46
103	18:59:00	19.5	0.34	20.53
103	19:00:00	12.7	0.32	20.55
103	19:01:00	16.0	0.35	20.55
103	19:02:00	25.6	0.36	20.50
103	19:03:00	15.3	0.35	20.51
103	19:04:00	12.0	0.33	20.54
103	19:05:00	24.8	0.37	20.51
103	19:06:00	20.8	0.36	20.49
103	19:07:00	10.6	0.32	20.54
103	19:08:00	17.5	0.34	20.57

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Printout of ESC Model 80 DAS
for CEM Trailer No. 2
- 1995 -

File Name: LPS083A
Job Number: 5-5194
Client: Louisiana Pacific Corporation
Location: Sagola, Michigan

Press RTO Outlet -- Run 3

Julian Date	Time (Hrs)	Conc. (dry basis unless noted) CO (ppmv)	CO2 (%v/v)	O2 (%v/v)
103	19:09:00	26.5	0.36	20.51
103	19:10:00	13.2	0.32	20.51
103	19:11:00	12.8	0.36	20.51
103	19:12:00	21.5	0.33	20.54
103	19:13:00	15.8	0.34	20.48
103	19:14:00	12.2	0.38	20.51
103	19:15:00	15.2	0.34	20.52
103	19:16:00	16.5	0.31	20.55
103	19:17:00	14.5	0.37	20.51
103	19:18:00	16.0	0.36	20.49
103	19:19:00	14.1	0.30	20.56
103	19:20:00	12.8	0.33	20.54
	Run Average	16.6	0.34	20.52

APPENDIX J

PROCESS RATE INFORMATION

Louisiana-Pacific Corporation
Northern Division
Rt. 8, Box 8263
Hayward, Wisconsin 54843
(715) 634-3454

LETTER OF TRANSMITTAL

Date: 5/3/95	
ATTENTION:	Kathy Eichstadt
RE:	

TO **Interpoll Laboratories, Inc.**
4500 Ball Road NE
Circle Pines, MN 55014-1819

WE ARE SENDING YOU

[X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop Drwgs. [ ] Prints [ ] Plans [ ] Samples [ ] Specifications

[ ] Copy of Letter [ ] Change Order [ ] 3.5" disk [ ]

COPIES	REV.	NO.	DESCRIPTION
1			26 Pages Process Data for Sagola Press Test in April 1995

THESE ARE TRANSMITTED as checked below:

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REMARKS:

Copy To: File **Signed:** Sue Somers / Sue Somers / S.S.

Sagola Press testing Apr.12 and 13, 1995
PROCESS DATA

CONTENTS

TEST SCHEDULE

Press Testing Apr. 12, 1995- MDI,VOC, CO, HCHO

DATE	POLLUTANT	RUN #1		RUN #2		RUN #3	
Apr 12	MDI	09:55	11:35	12:45	14:00	14:55	16:07
	VOC	09:55	11:35	12:45	14:00	14:55	16:07
	CO	09:55	11:35	12:45	14:00	14:55	16:07
	HCHO	17:15	18:21	19:08	20:27	20:48	21:51

Press Testing Apr. 13, 1995- TSP, Phenol

DATE	POLLUTANT	RUN #1		RUN #2		RUN #3	
Apr 12	Phenol	09:00	09:12	11:20	12:25	13:33	14:36
		09:48	10:40				
	TSP	13:33	14:37	17:05	18:11	18:36	19:40

Process Data summary

Press Testing Apr. 12, 1995- MDI,VOC, CO

27.89	=Plant Production rate in Tons per hour
560	=MDI resin usage in pounds per hour
1.00%	=MDI resin usage as % of finished product
977	=Liquid phenolic resin usage in pounds per hour (100% solids)
1.75%	=Liquid phenolic resin usage as % of finished product (100% solids)
402	=Wax usage in pounds per hour
0.72%	=Wax usage as % of finished product

Press Testing Apr. 12, 1995- HCHO

28.27	=Plant Production rate in Tons per hour
560	=MDI resin usage in pounds per hour
0.99%	=MDI resin usage as % of finished product
977	=Liquid phenolic resin usage in pounds per hour (100% solids)
1.73%	=Liquid phenolic resin usage as % of finished product (100% solids)
402	=Wax usage in pounds per hour
0.71%	=Wax usage as % of finished product

Press Testing Apr. 13, 1995-Phenol

31.4	=Plant Production rate in Tons per hour
593	=MDI resin usage in pounds per hour
0.94%	=MDI resin usage as % of finished product
1034	=Liquid phenolic resin usage in pounds per hour (100% solids)
1.65%	=Liquid phenolic resin usage as % of finished product (100% solids)
427	=Wax usage in pounds per hour
0.68%	=Wax usage as % of finished product

Press Testing Apr. 13, 1995-TSP

30.89	=Plant Production rate in Tons per hour
593	=MDI resin usage in pounds per hour
0.96%	=MDI resin usage as % of finished product
1034	=Liquid phenolic resin usage in pounds per hour (100% solids)
1.67%	=Liquid phenolic resin usage as % of finished product (100% solids)
427	=Wax usage in pounds per hour
0.69%	=Wax usage as % of finished product

Press Testing Apr. 12, 1995- MDI,VOC, CO

DATA TIME: START= 09:50 END= 16:10 HOURS= 6.33

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)

7/16"

283	286	286	283
289	283	283	283
287	283	287	286
278	283	287	282
275	283	284	283
282	284	280	282
274	281	283	283
286	282	277	280
283	292	272	277
284	286	280	278
278	287	276	279
280	296	283	
281	284	286	
279	286	286	

282.66 lb=average untrimmed mat weight

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

7.0% =trim %

PLANT PRODUCTION RATE

6.33 hours during testing
112 pressloads during testing
1344 =no. of 8'x24' boards produced (pressloads x 12 boards per load)
353297 =lbs of finished product (boards produced x weight of finished board)
55784 =lbs of finished product per hour (lbs of finshed product / hours)
27.89 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE FROM TANK MEASUREMENTS

Note: common tanks supply wax and resin to both Line 1 and Line 2. Usage for one line is estimated by proportioning the total usage by the footage (3/8" basis) for each line)

MEASUREMENT SUMMARY:

From inventories taken 0955-2155

run time: 11.97 hrs

period	pressloads	MDI lbs	PHENOLIC 57% solids lbs	PHENOLIC 100% solids lbs	WAX 100% solids lbs
1	66	2308	7206	4107	1655
2	78	2268	6708	3824	1597
3	71	2128	6606	3765	1556
	215	6704	20520	11696	4808
lbs per hour		560		977	402

55784 =average lbs. per hour finished product produced during testing
560 =average lbs. per hour of MDI resin used during testing
1.00% = MDI resin used as % of finished product

977 =average lbs. per hour of phenolic resin (100% solids) used during testing
1.75% =Phenolic resin used as % of finished product

402 =average lbs. per hour of wax (100% solids) used during testing
0.72% =wax used as % of finished product

4

Press Testing Apr. 12, 1995- HCHO

DATA TIME START= 17:10 END= 22:00 HOURS= 4.83

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)

7/16"

282	272	292	282
293	275	295	278
290	276	291	285
287	278	288	286
291	279	277	284
290	286	282	288
290	281	279	285
289	286	278	289
279	285	274	290
288	293	277	299
279	292	283	

284.72 lb=average untrimmed mat weight

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

7.0% =trim %

4.83 hours during testing
86 pressloads during testing
1032 =no. of 8'x24' boards produced (pressloads x 12 boards per load)
273263 =lbs of finished product (boards produced x weight of finished board)
56537 =lbs of finished product per hour (lbs of finshed product / hours)
28.27 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE FROM TANK MEASUREMENTS

Note: common tanks supply wax and resin to both Line 1 and Line 2. Usage for one line is estimated by proportioning the total usage by the footage (3/8" basis) for each line)

MEASUREMENT SUMMARY:

From inventories taken 0955-2155

run time: 11.97 hrs

period	pressloads	MDI lbs	PHENOLIC 57% solids lbs	PHENOLIC 100% solids lbs	WAX 100% solids lbs
1	66	2308	7206	4107	1655
2	78	2268	6708	3824	1597
3	71	2128	6606	3765	1556
	215	6704	20520	11696	4808
lbs per hour		560		977	402

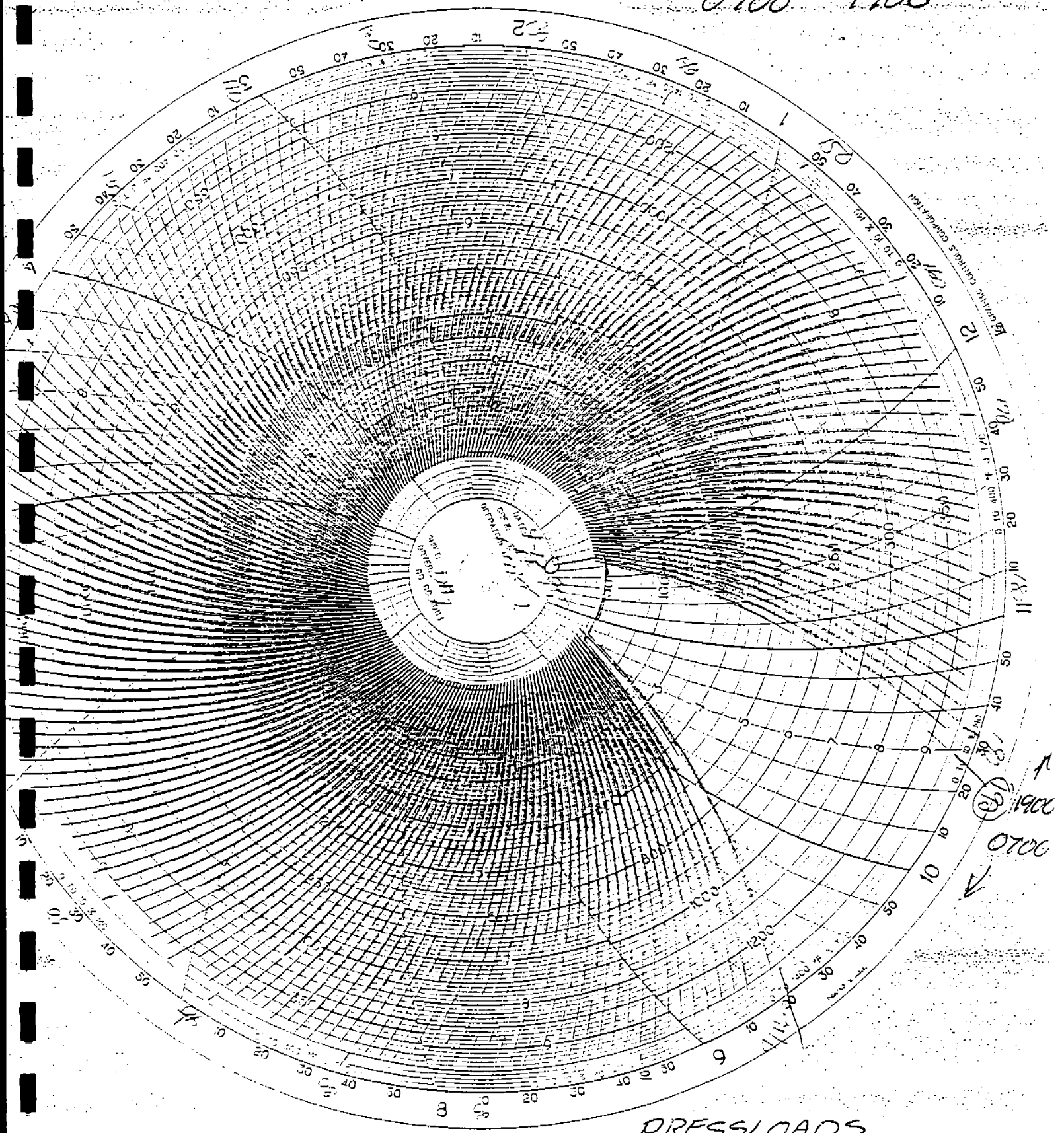
56537 =average lbs. per hour finished product produced during testing
560 =average lbs. per hour of MDI resin used during testing
0.99% = MDI resin used as % of finished product

977 =average lbs. per hour of phenolic resin (100% solids) used during testing
1.73% =Phenolic resin used as % of finished product

402 =average lbs. per hour of wax (100% solids) used during testing
0.71% =wax used as % of finished product

5

PRESS CHART
4-12-95
0700 - 1900

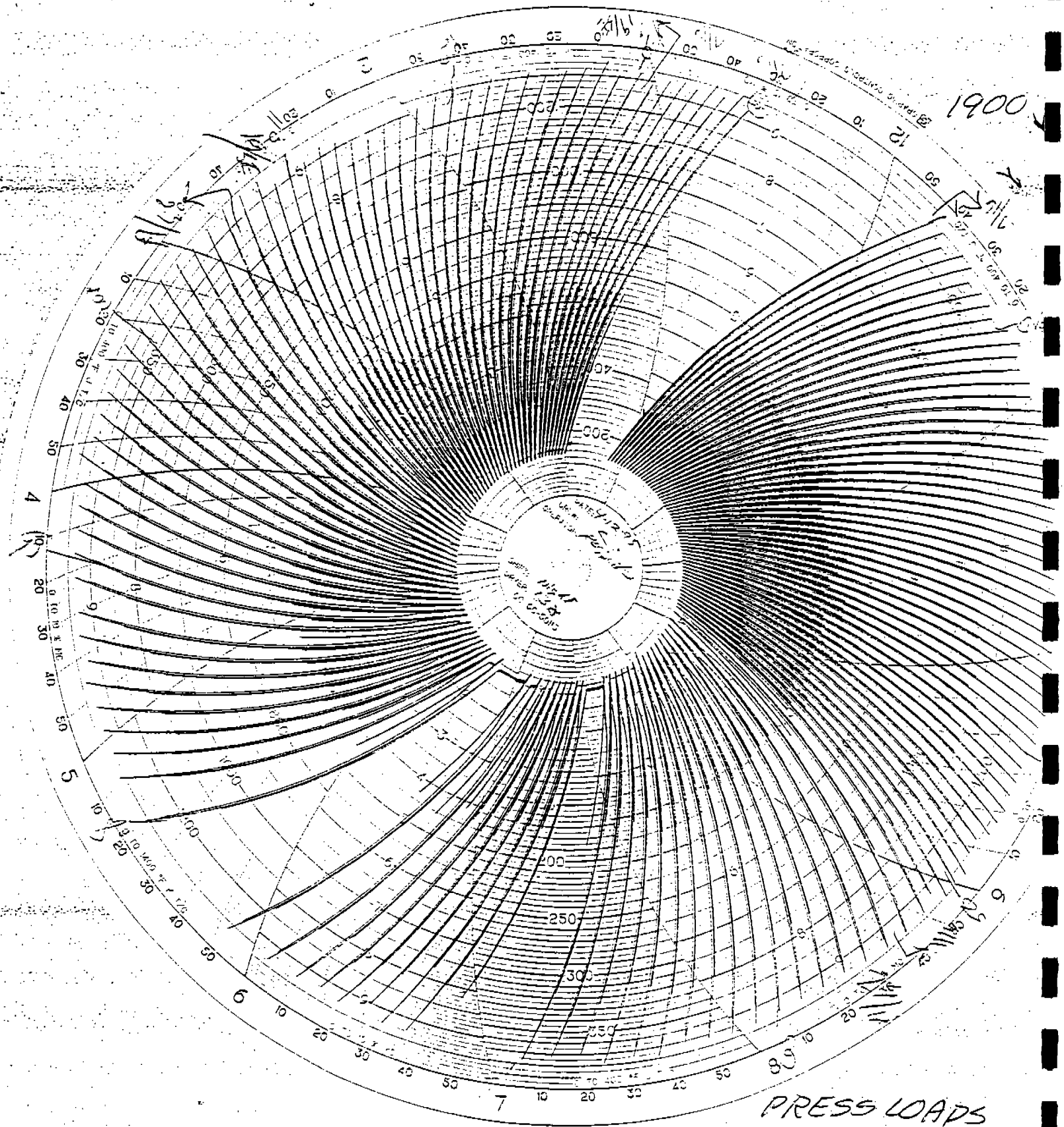


1900
0700

PRESS LOADS
0950 - 1610 = 112
1710 - 1900 = 33

6

PRESSCHART
4-12-95
1900 - 0700



7

LOUISIANA-PACIFIC CORPORATION
SAGOLA, MICHIGAN PRESS REPORT

OPERATOR Rackley DATE 1-12-05
SHIFT Day CREW A

BLOW OUT

F.L. RADIATORS	2	GREASE COLUMNS	6
HYD. COOLING FANS	2	FLUSH BLENDER	
PRS COOLING FANS	2	BAGHOUSE PRES.	
F.C.O.S.	5	HYD OIL TEMP	1250
FORMER DECK	-	INSP. PIT/RET CONVS	11:30
LOADER	2	CLEAN DECKLE CHAIN	5
UNLOADER	2	CLEAN BLENDERS	
PRESS	2	CLEAN TAIL PULLEYS	
FORMER FILTERS	4	TROUGH SUCTIONS	

LN SPD	FROM	TO	THICK	PRESS LDS
50	0830	1700	2	1250

DOWNTIME

FROM	TO	M	E	O	MINS.	REASON FOR DOWN TIME
0700	0710	✓			10	Start Down
0745	0800		✓		15	NO TRUCK Unloading Lights
0810	0817	✓			7	Dryer - Pull Felt Loose
					10	

M-MECHANICAL E-ELECTRICAL O-OPERATOR

TIME TO POSITION (SECONDS)

1	51	61	43	121	45	181	42
2	52	62	44	122	46	182	43
3	53	63	45	123	47	183	44
4	54	64	46	124	47	184	44
5	55	65	47	125	47	185	45
6	56	66	48	126	48	186	45
7	57	67	48	127	47	187	45
8	58	68	47	128	45	188	45
9	59	69	46	129	47	189	45
10	60	70	45	130	46	190	45
11	59	71	45	131	46	191	45
12	57	72	45	132	46	(192)	45
13	57	73	47	133	44	193	
14	57	74	46	134	45	194	
15	57	75	46	135	45	195	
16	57	76	46	136	44	196	
17	57	77	46	137	43	197	
18	57	78	46	138	43	198	
19	57	79	45	139	41	199	
20	50	80	45	140	41	200	
21	52	81	45	141	43	201	
22	52	82	44	142	43	202	
23	52	83	47	143	42	203	
24	52	84	45	144	42	204	
25	52	85	45	145	43	205	
26	52	86	44	146	43	206	
27	52	87	45	147	44	207	
28	52	88	44	148	44	208	
29	52	89	45	149	45	209	
30	52	90	45	150	45	210	
31	52	91	44	151	45	211	
32	52	92	44	152	46	212	
33	47	93	44	153	45	213	
34	52	94	43	154	45	214	
35	52	95	42	155	45	215	
36	52	96	43	156	45	216	
37	46	97	43	157	45	217	
38	45	98	43	158	45	218	
39	45	99	44	159	46	219	
40	45	100	43	160	45	220	
41	45	101	43	161	45	221	
42	45	102	43	162	45	222	
43	45	103	43	163	45	223	
44	45	104	43	164	45	224	
45	45	105	43	165	09	225	
46	45	106	43	166	03	225	
47	45	107	45	167	49	227	
48	45	108	45	168	52	229	
49	45	109	45	169	53	229	
50	45	110	45	170	51	230	
51	45	111	45	171	50	231	
52	45	112	46	172	50	232	
53	45	113	46	173	49	233	
54	45	114	46	174	49	234	
55	45	115	45	175	45	235	
56	45	116	45	176	45	236	
57	45	117	45	177	45	237	
58	45	118	45	178	47	238	
59	45	119	47	179	45	239	
60	45	120	47	180	45	240	

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LOUISIANA-PACIFIC CORPORATION
SAGOLA, MICHIGAN PRESS REPORT

OPERATOR Ross Kasso
SHIFT Night

DATE 4-12-95
CREW C

BLOW OUT

F.L. RADIATORS	11-5
HYD. COOLING FANS	11-5
PRS COOLING FANS	11-5
F.C.O.S.	11-5
FORMER DECK	11
LOADER	11-5
UNLOADER	11-5
PRESS	11-5
FORMER FILTERS	—

GREASE COLUMNS	11-5
FLUSH BLENDER	2:30
BAGHOUSE PRES.	7-5
HYD OIL TEMP	125
INSP. PIT/RET CONVS	3
CLEAN DECKLE CHAIN	11-5
CLEAN BLENDERS	—
CLEAN TAIL PULLEYS	4-12-95
TROUGH SUCTIONS	—

LN SPD	FROM	TO	THICK	PRESS LDS
89	7:00	10:00	7/16	54
51	12:00	1:00	3/16	32
88	1:00	5:48	7/16	24
89	5:48	7:00	7/16	?
				(1551)
				1581

DOWNTIME

FROM	TO	M	E	O	MINS.	REASON FOR DOWN TIME
11:45	12:05	✓			20	PL #7 (2) C.F. Live bottom was slipping and head pulley [illegible]
12:45	12:47	✓		✓	2	Stopped #3 #14 in loader alone =5
1:00	1:25			✓	25	Board on press side #5 [illegible]
1:30	1:50			✓	20	All 12 mats were forced off of screens in press
1:35	1:42			✓	7	Unloaded the press and the unloader in log
2:20	2:23	✓		✓	3	FCOS plug
6:15						Flushed S. Blender
					(57)	

M-MECHANICAL E-ELECTRICAL O-OPERATOR

TIME TO POSITION (SECONDS)

1	49	61	62	121	67	181					
2	48	62	62	122	57	182					
3	46	63	62	123	113	183					
4	48	64	60	124	116	184					
5	49	65	60	125	118	185					
6	49	66	60	126	57	186					
7	50	67	61	127	58	187					
8	50	68	59	128	58	188					
9	161	69	53	129	58	189					
10	57	70	57	130	58	190					
11	57	71	141	131	53	191					
12	53	72	51	132	118	192					
13	52	73	51	133	115	193					
14	52	74	53	134	116	194					
15	53	75	55	135	115	195					
16	52	76	57	136	52	196					
17	53	77	62	137	54	197					
18	52	78	61	138	52	198					
19	50	79	61	139		199					
20	116	80	63	140		200					
21	117	81	119	141		201					
22	115	82	120	142		202					
23	121	83	60	143		203					
24	116	84	60	144		204					
25	115	85	60	145		205					
26	114	86	60	146		206					
27	111	87	61	147		207					
28	111	88	61	148		208					
29	112	89	63	149		209					
30	114	90	62	150		210					
31	114	91	61	151		211					
32	114	92	106	152		212					
33	114	93	60	153		213					
34	115	94	60	154		214					
35	115	95	58	155		215					
36	115	96	58	156		216					
37	115	97	58	157		217					
38	115	98	57	158		218					
39	116	99	56	159		219					
40	116	100	116	160		220					
41	117	101	55	161		221					
42	117	102	54	162		222					
43	116	103	54	163		223					
44	117	104	50	164		224					
45	50	105	55	165		225					
46	50	106	55	166		226					
47	49	107	49	167		227					
48	51	108	48	168		228					
49	55	109	116	169		229					
50	50	110	47	170		230					
51	51	111	116	171		231					
52	51	112	47	172		232					
53	54	113	48	173		233					
54	50	114	46	174		234					
55	52	115	47	175		235					
56	53	116	49	176		236					
57	116	117	46	177		237					
58	116	118	47	178		238					
59	51	119	47	179		239					
60	52	120	48	180		240					

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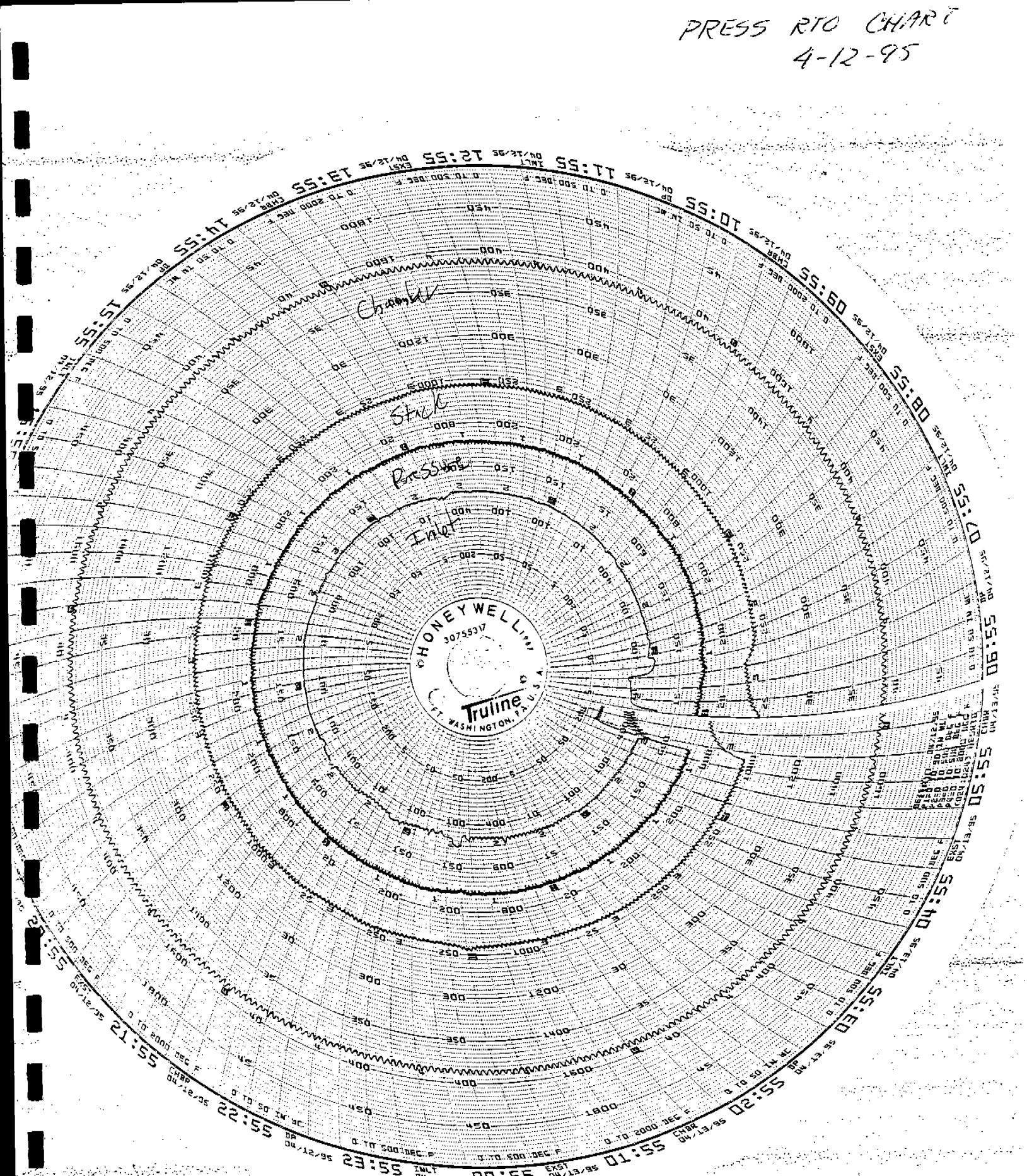
PRESS RTO CHART
4-12-95



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(1)

RTO TESTING readings every 10 minutes - moistures once per hour minumum

Fuel type NATURAL GAS Any meter conversion factors? _____

meter readings in Cu. ft. for nat. gas meter readings in gal. for propane

DATE: 4-12-95

By: JEFF ANDERSON

Sheet 1 of 3

TIME	BED TEMPERATURES #1	#2	#3	#4	#5	INLET PRES-SURE	BURNER TEMP. #1	#2	INLET TEMP	COMBUSTION CHAMBER TEMP	EXHAUST TEMP	PRESSURE DROP	GAS METER READING	
0955	380°	370°	379°	378°	376°	-3.3	1546°	1537°	115°	1543°	238°	17.9	9435600	
1005	379°	370°	379°	378°	375°	-3.1	1547°	1534°	115°	1542°	239°	17.7	9442000	1025
1015	384°	376°	379°	370°	376°	-3.3	1531°	1556°	115°	1554°	236°	17.9	9447800	1055
1025	382°	372°	379°	374°	376°	-3.1	1530°	1555°	118°	1552°	237°	17.7	9452600	1125
1035	378°	371°	381°	378°	376°	-3.2	1547°	1533°	117°	1537°	241°	17.8	9458400	1155
1045	383°	372°	379°	375°	378°	-3.1	1537°	1550°	115°	1552°	238°	17.6	9463100	1225
1055	378°	374°	382°	377°	376°	-3.2	1545°	1532°	118°	1539°	241°	17.8	9469500	1255
1105	377°	376°	383°	376°	376°	-3.2	1543°	1530°	118°	1533°	241°	17.9	9475800	1325
1115	382°	371°	381°	379°	380°	-3.2	1538°	1544°	118°	1550°	240°	17.9	9480600	1355
1125	379°	373°	382°	379°	379°	-3.2	1546°	1532°	118°	1540°	242°	17.7	9487500	1425
1135	377°	381°	383°	375°	377°	-3.3	1544°	1529°	119°	1534°	242°	17.8	9490600	1455
1145	379°	375°	384°	379°	378°	-3.4	1546°	1532°	118°	1535°	241°	18.1	9496400	1525
1155	376°	378°	385°	376°	378°	-3.1	1542°	1526°	118°	1532°	242°	18.0	9503300	1555
1205	384°	382°	384°	375°	378°	-3.3	1538°	1540°	119°	1530°	241°	17.9	9509100	1625
1215	379°	380°	385°	376°	377°	-3.2	1543°	1529°	120°	1535°	243°	18.0	9515400	1655
1225	378°	382°	386°	375°	377°	-3.2	1542°	1527°	119°	1530°	243°	17.7	9521000	1725
1235	385°	379°	384°	375°	380°	-3.5	1532°	1555°	118°	1546°	237°	18.0	9526000	1755
1245	385°	381°	384°	372°	379°	-3.0	1537°	1547°	120°	1539°	238°	17.6	9530700	1825
1255	384°	384°	385°	371°	378°	-3.4	1542°	1537°	119°	1531°	241°	17.9	9536600	1855
1305	386°	379°	384°	375°	379°	-3.3	1533°	1557°	119°	1551°	238°	17.8	9542900	1925
1315	379°	380°	386°	376°	378°	-3.2	1541°	1526°	114°	1529°	243°	17.9	9548700	1955
1325	385°	374°	383°	379°	381°	-3.2	1537°	1552°	118°	1552°	241°	17.6	9554600	2025
1335	382°	374°	384°	381°	381°	-3.4	1542°	1538°	117°	1545°	241°	17.9	9559900	2055
1345	383°	374°	385°	381°	380°	-3.1	1535°	1549°	120°	1551°	241°	17.6	9566200	2125
1355	386°	379°	385°	376°	381°	-3.1	1533°	1557°	121°	1547°	240°	17.9	9572500	2155
1405	380°	376°	386°	380°	380°	-3.1	1543°	1529°	119°	1533°	244°	17.9		2225
1415	386°	379°	384°	375°	381°	-3.0	1538°	1543	119°	1550°	243°	18.1		
1425	386°	385°	386°	371°	379°	-3.1	1540°	1545°	120°	1537	240°	17.5		
1435	380°	379°	385°	378°	379°	-3.0	1543°	1549°	117°	1533°	244°	17.9		
1445	384°	373°	385°	381°	381°	-3.2	1544°	1540°	115°	1546°	241°	17.9		

C.B. →

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5CHRTO.WK4

RTO TESTING readings every 10 minutes - moistures once per hour minumum

DATE: 4-12-95

Fuel type Natural Gas Any meter conversion factors? _____

By: Chuck Broeffle

meter readings in Cu. ft. for nat. gas meter readings in gal. for propane

Sheet 2 of 3

TIME	BED TEMPERATURES #1	#2	#3	#4	#5	INLET PRES-SURE	BURNER TEMP. #1	#2	INLET TEMP	COMBUSTION CHAMBER TEMP	EXHAUST TEMP	PRESSURE DROP	GAS METER READING
1455	384°	373°	384°	379°	380°	-3.1	1545°	1546°	119°	1540°	243°	17.9	
1505	387°	380°	384°	373°	379°	-3.2	1532°	1556°	118°	1549°	240°	17.9	
1515	385°	375°	385°	379°	390°	-3.1	1537°	1543°	120°	1552°	242°	18.0	
1525	387°	377°	385°	376°	381°	-2.9	1530°	1553°	130°	1555°	240°	17.9	
1535	387°	375°	385°	379°	381°	-3.1	1535°	1543°	121°	1551°	243°	17.6	
1545	382°	381°	388°	376°	379°	-3.3	1543°	1538°	121°	1536°	243°	17.1	
1555	385°	382°	387°	379°	380°	-3.1	1538°	1555°	120°	1548°	239°	17.9	
1605	384°	383°	386°	379°	380°	-3.3	1538°	1528°	122°	1548°	240°	17.9	
1615	389°	390°	379°	385°	383°	-3.0	1530°	1552°	121°	1551°	241°	17.9	
1625	384°	376°	388°	382°	381°	-3.0	1546°	1534°	123°	1543°	244°	17.9	
1635	381°	377°	389°	381°	381°	-3.2	1544°	1531°	121°	1531°	244°	18.0	
1645	386°	379°	382°	377°	382°	-3.1	1530°	1554°	122°	1552°	241°	17.9	
1655	385°	383°	386°	375°	381°	-3.3	1541°	1524°	121°	1531°	242°	17.9	
1705	382°	381°	388°	379°	381°	-3.1	1543°	1528°	122°	1534°	245°	17.9	
1715	384°	376°	383°	383°	381°	-3.2	1544°	1534°	122°	1544°	244°	18.0	
1725	387°	383°	388°	376°	382°	-3.6	1533°	1552°	122°	1551°	241°	18.0	
1735	381°	381°	389°	377°	381°	-3.2	1541°	1527°	119°	1530°	243°	17.6	
1745	384°	374°	386°	382°	382°	-3.0	1546°	1535°	120°	1546°	243°	17.7	
1755	389°	380°	385°	376°	383°	-3.2	1534°	1558°	120°	1554°	241°	17.9	
1805	384°	383°	386°	374°	381°	-3.2	1538°	1525°	120°	1530°	243°	17.6	
1815	383°	382°	386°	375°	381°	-3.1	1541°	1529°	123°	1535°	244°	18.1	
1825	385°	376°	385°	381°	382°	-3.0	1548°	1537°	118°	1548°	243°	17.9	
1835	389°	384°	384°	380°	381°	-3.2	1537°	1553°	117°	1544°	238°	17.9	
1845	381°	376°	385°	379°	379°	-3.3	1544°	1534°	118°	1542°	243°	18.1	
1855	386°	382°	385°	379°	379°	-3.0	1538°	1548°	119°	1547°	238°	17.8	
1905	388°	377°	383°	375°	381°	-3.0	1534°	1556°	118°	1556°	240°	17.8	
1915	387°	384°	384°	371°	374°	-3.2	1541°	1543°	119°	1535°	241°	17.6	
1925	380°	379°	386°	377°	379°	-3.2	1544°	1530°	118°	1538°	242°	18.0	
1935	382°	374°	385°	381°	379°	-3.4	1546°	1539°	119°	1552°	241°	18.1	
1945	386°	376°	384°	376°	380°	-3.0	1531°	1554°	118°	1557°	240°	17.9	

See Page 1

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P.M. 1

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(3)

RTO TESTING readings every 10 minutes - moistures once per hour minumum

DATE: 4 - 12 - 95

Fuel type Natural Gas Any meter conversion factors? _____

By: Mike Uren

meter readings in Cu. ft. for nat. gas meter readings in gal. for propane

Sheet 3 of 3

TIME	BED TEMPERATURES #1	#2	#3	#4	#5	INLET PRES-SURE	BURNER TEMP. #1	#2	INLET TEMP	COMBUSTION CHAMBER TEMP	EXHAUST TEMP	PRESSURE DROP	GAS METER READING
1955	387°	382°	384°	371°	377°	-3.1	1540°	1548°	117°	1538°	239°	17.7	
2005	380°	378°	386°	378°	378°	-3.4	1545°	1533°	118°	1539°	242°	18.0	
2015	386°	374°	384°	377°	379°	-3.2	1533°	1546°	119°	1553°	240°	17.8	
2025	385°	382°	385°	372°	379°	-3.1	1540°	1543°	118°	1536°	239°	17.7	
2035	380°	377°	386°	376°	378°	-3.1	1542°	1528°	117°	1535°	241°	17.9	
2045	382°	373°	384°	381°	379°	-3.1	1543°	1535°	118°	1545°	242°	17.7	
2055	387°	376°	384°	377°	379°	-3.0	1528°	1554°	117°	1553°	239°	17.9	
2105	385°	382°	384°	372°	378°	-3.0	1538°	1545°	117°	1533°	239°	17.5	
2115	380°	377°	385°	378°	378°	-3.2	1544°	1530°	116°	1533°	242°	18.0	
2125	381°	379°	385°	375°	376°	-3.2	1542°	1528°	116°	1532°	242°	17.9	
2135	379°	377°	385°	378°	376°	-3.5	1545°	1533°	113°	1539°	240°	18.0	
2145	379°	379°	385°	375°	376°	-3.1	1540°	1525°	117°	1530°	241°	17.8	
2155	385°	380°	382°	371°	377°	-3.1	1539°	1539°	118°	1531°	240°	17.8	
2205													
2215													
2225													

5 sec - Page 2

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5CHRTO.WK4

RESIN & WAX CONSUMPTION REPORT

Fiscal Month of:
Calander Month of:

Date: 4/12/95
Time period: 9:55am - 9:55pm

WAX

	Borgens (EW-58LV)	Borgens (EW-58)	Hercules (Paracol-2100)	Total
Beginning Inventory:	190,094		0	
Purchased:	0		0	
Ending Inventory:	181,804		0	
Usage (58% solids):	8,290	0	0	8,290
Usage (100% solids):	4,808	0	0	4,808

MDI

	ICI (Rubinate-1840)	ICI	ICI	Total
Beginning Inventory:	106,913			
Purchased:	0			
Ending Inventory:	100,209			
Usage (100% solids):	6,704	0	0	6,704

LIQUID PHENOL

	Borgens (OS-50)	Borgens (OS-707)	Neste (BB-602)	Total
Beginning Inventory:	0	204,923		
Purchased:	0	0		
Ending Inventory:	0	184,403		
Usage (57% solids):	0	20,520	0	20,520
Usage (100% solids):	0	11,696	0	11,696

Press Testing Apr. 13, 1995-Phenol

DATA TIME	START=	09:00	END=	09:10	HOURS=	0.17
DATA TIME	START=	09:45	END=	14:40	HOURS=	4.25
					total=	4.92

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)

7/16"

283	266	282	289
291	273	287	283
277	277	291	283
286	278	276	290
282	278	272	277
288	281	272	281
291	282	274	282
292	279	280	286
292	281	279	
286	273	282	
284	284	286	
287	292	289	

282.36 lb=average untrimmed mat weight

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

7.0% =trim %

4.92 hours during testing
98 pressloads during testing
1176 =no. of 8'x24' boards produced (pressloads x 12 boards per load)
308806 =lbs of finished product (boards produced x weight of finished board)
62808 =lbs of finished product per hour (lbs of finshed product / hours)
31.40 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE FROM TANK MEASUREMENTS

Note: common tanks supply wax and resin to both Line 1 and Line 2. Usage for one line is estimated by proportioning the total usage by the footage (3/8" basis) for each line)

MEASUREMENT SUMMARY:		PHENOLIC	PHENOLIC	WAX
From inventories taken 0810-2115		57%	100%	100%
run time 12.32 hrs	MDI	solids	solids	solids
	lbs	lbs	lbs	lbs
	7306	22354	12742	5264
lbs per hour	593		1034	427

62808 =average lbs. per hour finished product produced during testing
593 =average lbs. per hour of MDI resin used during testing
0.94% = MDI resin used as % of finished product

1034 =average lbs. per hour of phenolic resin (100% solids) used during testing
1.65% =Phenolic resin used as % of finished product

427 =average lbs. per hour of wax (100% solids) used during testing
0.68% =wax used as % of finished product

info copied to summary page

15

Press Testing Apr. 13, 1995-TSP

DATA TIME	START=	13:30	END=	14:40	HOURS=	1.17
DATA TIME	START=	17:00	END=	19:40	HOURS=	2.67
					total=	3.83

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)

7/16"

289	289	283
289	295	288
283	286	286
283	285	294
290	283	292
277	287	286
281	275	286
282	287	277
286	277	270
278	279	273
283	275	266
278	292	277

282.97 lb=average untrimmed mat weight

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

7.0% =trim %

3.83 hours during testing
75 pressloads during testing
900 =no. of 8'x24' boards produced (pressloads x 12 boards per load)
236844 =lbs of finished product (boards produced x weight of finished board)
61785 =lbs of finished product per hour (lbs of finshed product / hours)
30.89 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE FROM TANK MEASUREMENTS

Note: common tanks supply wax and resin to both Line 1 and Line 2. Usage for one line is estimated by proportioning the total usage by the footage (3/8" basis) for each line)

MEASUREMENT SUMMARY: From inventories taken 0810-2115 run time 12.32 hrs	MDI lbs	PHENOLIC 57% solids lbs	PHENOLIC 100% solids lbs	WAX 100% solids lbs
	7306	22354	12742	5264
lbs per hour	593		1034	427

61785 =average lbs. per hour finished product produced during testing
593 =average lbs. per hour of MDI resin used during testing
0.96% = MDI resin used as % of finished product

1034 =average lbs. per hour of phenolic resin (100% solids) used during testing
1.67% =Phenolic resin used as % of finished product

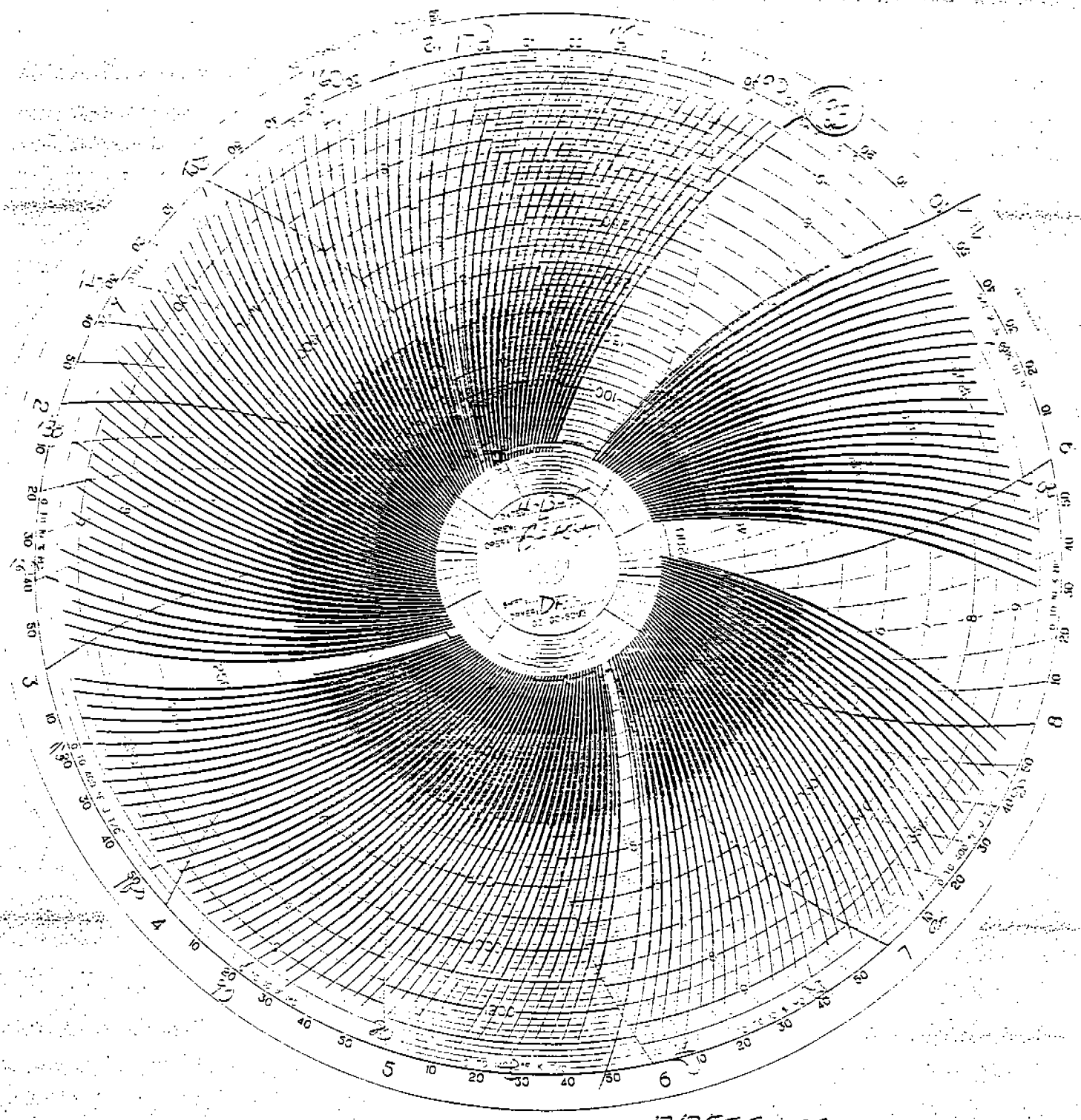
427 =average lbs. per hour of wax (100% solids) used during testing
0.69% =wax used as % of finished product

16

APRPRODA.WK4

05/03/95

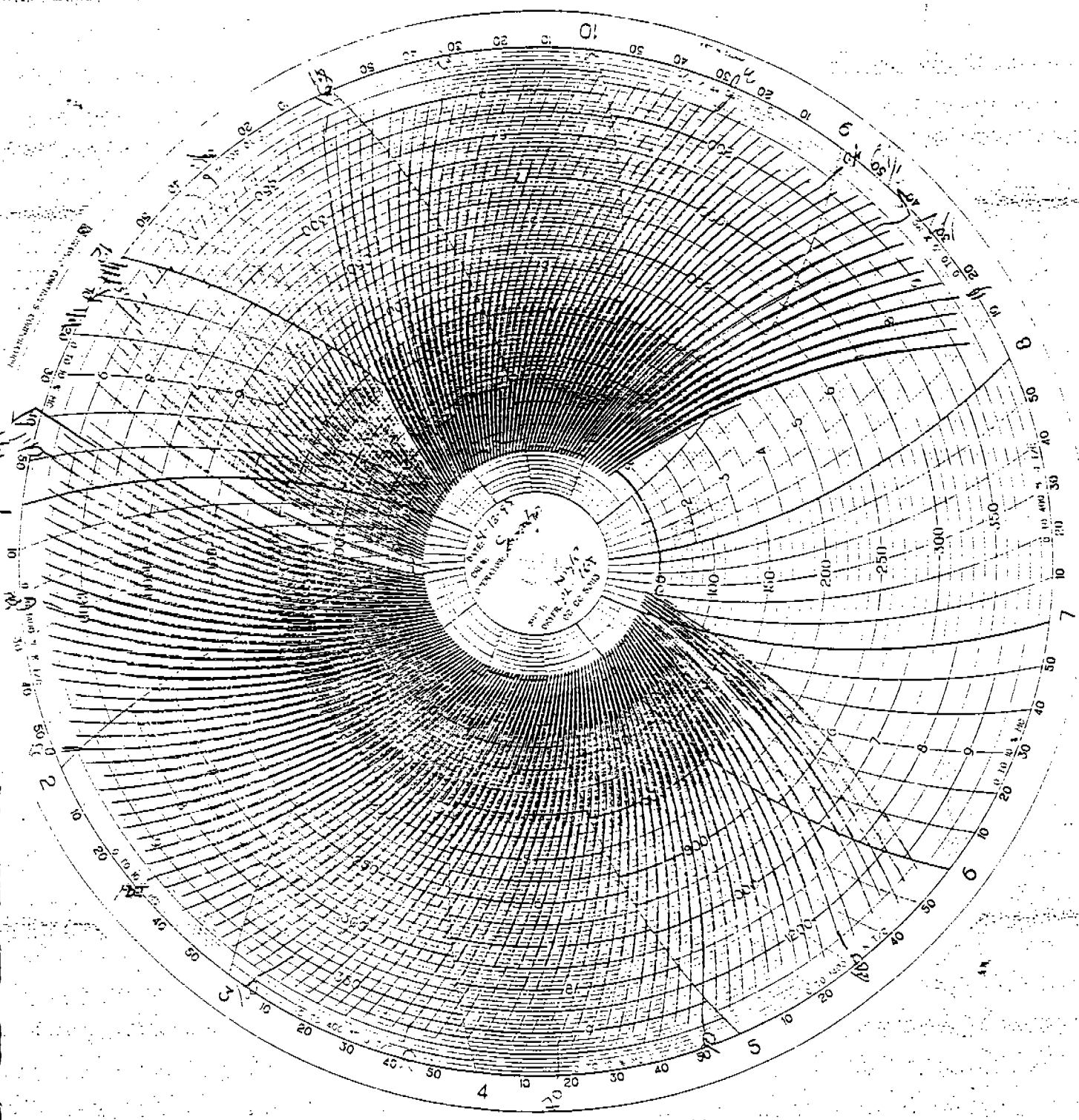
PRESS CHART
4-13-95
0700 - 1900



PRESS LOADS
0900 - 0910 = 3
0945 - 1440 = 95
1330 - 1440 = 23
1700 - 1900 = 39

17

PRESS CHART
4-13-95
1900 - 0700



PRESS LOADS
1900 - 1940 = 13

18

LOUISIANA-PACIFIC CORPORATION
SAGOLA, MICHIGAN PRESS REPORT

OPERATOR [illegible]
SHIFT Day
DATE 4-13-95
CREW 4

BLOW OUT

F.L. RADIATORS	2	GREASE COLUMNS	6
HYD. COOLING FANS	2	FLUSH BLENDER	
PRS COOLING FANS	2	BAGHOUSE PRES.	6.5
F.C.O.S.	5	HYD OIL TEMP	120-5
FORMER DECK	1	INSP. PIT/RET CONVS	11:30
LOADER	1	CLEAN DECKLE CHAIN	1
UNLOADER	1	CLEAN BLENDERS	
PRESS	1	CLEAN TAIL PULLEYS	
FORMER FILTERS	1	TROUGH SUCTIONS	

LN SPD	FROM	TO	THICK	PRESS LDS
28	9	10:25		5
32	10:25		7/16	1.52

DOWNTIME

FROM	TO	M	E	O	MINS.	REASON FOR DOWN TIME
7:30	7:37				37	[illegible]
[illegible]	[illegible]	/			1	[illegible]
[illegible]	[illegible]		/		21	[illegible]
[illegible]	[illegible]				3	[illegible]
2:17	2:23	/			6	[illegible]
[illegible]	[illegible]	/			1	[illegible]
[illegible]	[illegible]	/			[illegible]	[illegible]
[illegible]	[illegible]	/			[illegible]	[illegible]
					81	

M-MECHANICAL E-ELECTRICAL O-OPERATOR

19

TIME TO POSITION (SECONDS)

1	52	61	50	121	41	181	43
2	51	62	53	122	42	182	44
3	48	63	49	123	49	183	45
4	49	64	51	124	42	184	46
5	46	65	104	125	41	185	47
6	45	66	111	126	40	186	48
7	44	67	43	127	41	187	49
8	43	68	42	128	42	188	50
9	42	69	43	(129)	1-	189	51
10	41	70	43	130	40	190	52
11	41	71	42	131	40	191	53
12	41	72	45	132	40	192	54
13	41	73	44	133	1	(193)	55
14	45	74	42	134	41	194	
15	43	75	45	135	42	195	
16	41	76	39	136	41	196	
17	41	77	2-	137	41	197	
18	41	78	42	138	41	198	
19	42	79	42	139	41	199	
20	43	80	42	140	42	200	
21	42	81	42	141	43	201	
22	42	82	42	142	4	202	
23	42	83	42	143	45	203	
24	42	84	42	144	45	204	
25	43	85	45	145	4	205	
25	45	86	114	146	44	206	
27	45	87	42	147	1-	207	
28	45	88	44	148	42	208	
29	45	89	43	149	44	209	
30	46	90	45	150	44	210	
31	46	91	45	151	44	211	
32	46	92	47	152	44	212	
33	47	93	47	153	44	213	
34	47	94	45	154	45	214	
35	47	95	47	155	45	215	
36	48	96	45	156	46	216	
37	49	97	47	157	47	217	
38	50	98	43	158	47	218	
39	50	99	44	159	1/4	219	
40	48	100	44	160	47	220	
41	46	101	45	161	46	221	
42	47	102	43	162	47	222	
43	46	103	42	163	46	223	
44	45	104	42	164	45	224	
45	45	105	45	165	45	225	
46	45	106	45	166	44	226	
47	44	107	44	167	44	227	
48	43	108	45	168	43	229	
49	41	109	42	169	43	229	
50	41	110	42	170	43	230	
51	41	111	43	171	43	231	
52	41	112	43	172	43	232	
53	42	113	43	173	43	233	
54	41	114	43	174	43	234	
55	42	115	44	175	41	235	
56	42	116	43	176	41	236	
57	42	117	43	177	42	237	
58	42	118	42	178	42	238	
59	41	119	42	179	42	239	
60	42	120	42	180	42	240	

LOUISIANA-PACIFIC CORPORATION
SAGOLA, MICHIGAN PRESS REPORT

OPERATOR [illegible] DATE 11-13-95
SHIFT Night CREW C

BLOW OUT

F.L. RADIATORS	12-4
HYD. COOLING FANS	12
PRS COOLING FANS	12
F.C.O.S.	12-4
FORMER DECK	12
LOADER	12-4
UNLOADER	12-4
PRESS	12-4
FORMER FILTERS	—

GREASE COLUMNS	B
FLUSH BLENDER	11
BAGHOUSE PRES.	
HYD OIL TEMP	125
INSP. PIT/RET CONVS	3
CLEAN DECKLE CHAIN	12-4
CLEAN BLENDERS	—
CLEAN TAIL PULLEYS	4-1-4
TROUGH SUCTIONS	—

LN SPD	FROM	TO	THICK	PRESS LDS
93	7:00	9:35	7/16	44
85	9:25	5:23	1/2	98
13	5:23	5:30	11/4	7
93	5:30	7:00	7/16	19
				168

DOWNTIME

FROM	TO	M	E	O	MINS.	REASON FOR DOWN TIME
7:18	7:20			✓	2	Stacker Flite #11
10:00	12:12		✓		132	Left Rip hog saw motor was [illegible] Flushed s.blocks
12:26	12:28			✓	2	Dropped 42 #22 in boost chain #1
5:35	5:40			✓	5	No FL - takeover [illegible]
5:48	5:50			✓	2	Stacker Jam —
					(143)	

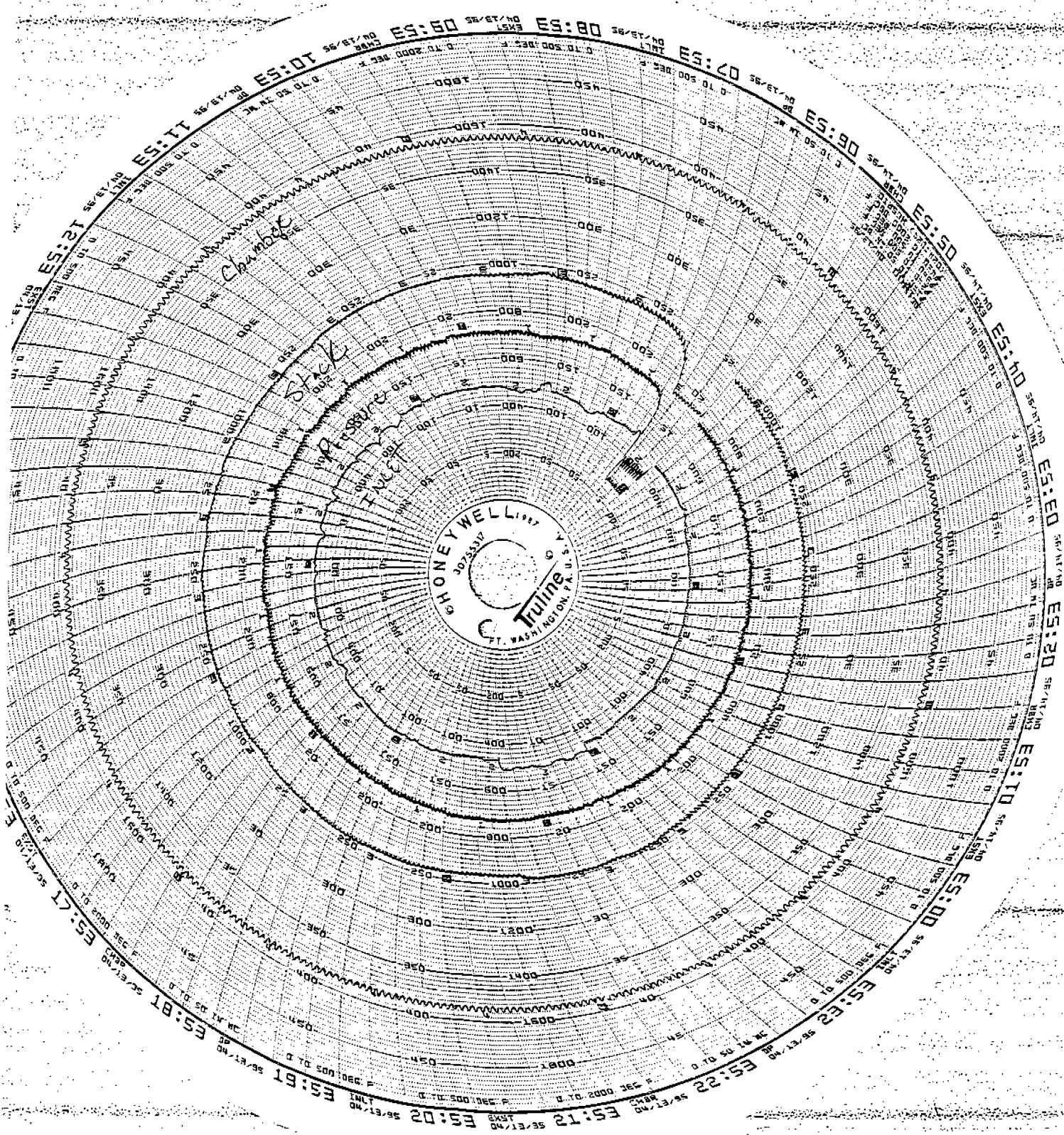
M-MECHANICAL E-ELECTRICAL O-OPERATOR

20

TIME TO POSITION (SECONDS)

1	42	51	43	121	44	181	
2	44	52	42	122	44	182	
3	43	53	43	123	45	183	
4	42	54	42	124	46	184	
5	41	55	43	125	49	185	
6	40	56	43	126	49	186	
7	40	57	44	127	51	187	
8	40	58	45	128	51	188	
9	39	59	44	129	51	189	
10	41	70	45	130	49	190	
11	44	71	46	131	49	191	
12	46	72	47	132	50	192	
13	47	73	46	133	50	193	
14	47	74	44	134	50	194	
15	48	75	45	135	50	195	
16	49	76	46	136	50	196	
17	50	77	46	137	50	197	
18	50	78	48	138	51	198	
19	49	79	49	139	52	199	
20	49	80	46	140	51	200	
21	50	81	45	141	57	201	
22	47	82	43	142	52	202	
23	[illegible]	83	42	143	49	203	
24	57	84	40	144	47	204	
25	50	85	44	145	45	205	
29	50	86	44	146	46	206	
27	50	87	44	147	50	207	
28	50	88	40	148	50	208	
29	48	89	44	149	51	209	
30	48	90	43	150	54	210	
31	45	91	47	151	54	211	
32	45	92	45	152	53	212	
33	42	93	45	153	52	213	
34	42	94	40	154	57	214	
35	42	95	45	155	51	215	
36	42	96	45	156	50	216	
37	41	97	44	157	51	217	
38	40	98	43	158	50	218	
39	40	99	48	159	48	219	
40	41	100	47	160	48	220	
41	42	101	44	161	49	221	
42	42	102	45	162	49	222	
43	42	103	46	163	49	223	
44	48	104	46	164	50	224	
45	50	105	45	165	51	225	
46	51	106	45	166	49	226	
47	51	107	46	167	52	227	
48	52	108	46	168	51	228	
49	51	109	45	169		229	
50	5	110	45	170		230	
51	5	111	45	171		231	
52	5	112	46	172		232	
53	5	113	46	173		233	
54	51	114	46	174		234	
55	52	115	46	175		235	
56	53	116	46	176		236	
57	48	117	45	177		237	
58	45	118	45	178		238	
59	44	119	44	179		239	
60	45	120	45	180		240	

PRESS RTO
CHART
4-13-95



21

RTO TESTING readings every 10 minutes - moistures once per hour minumum

DATE: 4-13-95

Fuel type NATURAL GAS Any meter conversion factors? _____

By: JEFF ANDERSON

meter readings in Cu. ft. for nat. gas meter readings in gal. for propane

Sheet 1 of 3

TIME	BED TEMPERATURES #1	#2	#3	#4	#5	INLET PRES-SURE	BURNER TEMP. #1	#2	INLET TEMP	COMBUSTION CHAMBER TEMP	EXHAUST TEMP	PRESSURE DROP	GAS METER READING
0830	380°	389	385°	366°	390	-3.1	1542°	1526°	115°	1530°	236°	18.0	16 11800
0840	382°	386°	[illegible]	366°	390°	-2.9	1536°	1546°	112°	1536°	233°	17.8	9696600
0850	381°	377°	383°	[illegible]	[illegible]	-3.0	1547°	[illegible]	114°	[illegible]	236°	17.7	9701900
0900	382°	381°	382°	370°	387°	-3.2	1528°	1548°	116°	1547°	236°	17.8	[illegible]
0910	[illegible]	383°	386°	[illegible]	[illegible]	-3.1	1544°	1531°	116°	1537°	238°	18.0	[illegible]
0920	[illegible]	[illegible]	[illegible]	372°	[illegible]	-3.4	1541°	[illegible]	118°	[illegible]	238°	17.8	9719300
0930	384°	382°	384°	370°	381°	-3.0	1535°	1537°	118°	[illegible]	236°	17.8	9721600
0940	385°	381°	386°	371°	384°	-3.2	[illegible]	[illegible]	[illegible]	[illegible]	238°	17.3	9728400
0950	381°	381°	380°	[illegible]	[illegible]	-3.2	1545°	1527°	115°	[illegible]	[illegible]	17.9	9736300
1000	384°	[illegible]	[illegible]	[illegible]	384°	[illegible]	1543°	[illegible]	116°	[illegible]	[illegible]	17.9	9741600
1010	384°	388°	381°	369°	385°	-3.4	1543°	1531°	112°	1532°	234°	17.8	
1020	378°	383°	388°	[illegible]	[illegible]	-3.1	[illegible]	1535°	114°	1533°	236°	17.8	
1030	[illegible]	[illegible]	381°	[illegible]	[illegible]	[illegible]	1535°	1526°	117°	[illegible]	236°	17.8	
1040	384°	382°	385°	[illegible]	[illegible]	[illegible]	1535°	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
1050	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1540°	1531°	117°	1527°	236°	[illegible]	
1100	385°	375°	381°	[illegible]	[illegible]	-3.4	1546°	[illegible]	118°	[illegible]	[illegible]	17.8	
1110	384°	385°	387°	371°	376°	-3.1	1534°	1546°	117°	1541°	235°	17.8	
1120	380°	384°	381°	[illegible]	375°	-3.1	1543°	1528°	118°	[illegible]	236°	17.6	
1130	386°	375°	388°	380°	377°	-3.3	1544°	1537°	119°	1548°	239°	17.9	
1140	382°	377°	388°	380°	377°	-3.2	1536°	1547°	119°	[illegible]	[illegible]	17.6	
1150	381°	385°	[illegible]	[illegible]	[illegible]	-3.1	1538°	1527°	118°	1527°	237°	17.5	
1200	380°	376°	[illegible]	381°	[illegible]	-3.2	1545°	1530°	120°	1540°	239°	17.3	
1210	386°	380°	388°	376°	377°	-3.0	1529°	1537°	120°	[illegible]	239°	17.6	
1220	383°	383°	391°	372°	375°	-3.5	1539°	1532°	120°	1538°	237°	17.1	
1230	379°	377°	390°	379°	376°	-3.4	1547°	1531°	119°	[illegible]	239°	17.4	
1240	382°	376°	387°	386°	376°	-3.5	1539°	1541°	118°	1536°	234°	17.9	
1250	380°	374°	389°	379°	376°	-3.1	1546°	1536°	111°	1546°	237°	17.9	
1300	379°	383°	387°	370°	370°	-3.2	1543°	1528°	116°	1533°	235°	17.8	
1310	381°	374°	387°	377°	374°	-3.1	1541°	1543°	117°	1554°	237°	17.7	
1320	383°	375°	387°	376°	375°	-3.2	1533°	1546°	113°	1554°	236°	17.3	

5CHRTO.WK4

RTO TESTING readings every 10 minutes - moistures once per hour minumum

Fuel type NATURAL GAS Any meter conversion factors? _____

meter readings in Cu. ft. for nat. gas meter readings in gal. for propane

DATE: 1-13-95

By: JEFF ANDERSON

Sheet 2 of 3

TIME	BED TEMPERATURES #1	#2	#3	#4	#5	INLET PRES-SURE	BURNER TEMP. #1	#2	INLET TEMP	COMBUSTION CHAMBER TEMP	EXHAUST TEMP	PRESSURE DROP	GAS METER READING	
1330	377°	380°	289°	372°	371°	-3.3	1541°	1526°	114°	1531°	235°	12.8	9747400	1355
1340	377°	377°	388°	372°	372°	-3.2	1542°	1527°	118°	1532°	236°	12.5	9752100	1425
1350	383°	375°	385°	376°	374°	-3.4	1537°	1542°	118°	[illegible]	237°	12.6	9758500	1455
1400	380°	382°	387°	370°	373°	-3.1	1541°	1545°	116°	1536°	236°	12.4	9763300	1535
1410	378°	376°	388°	375°	373°	-3.2	1546°	1531°	119°	1538°	235°	12.4	9771100	1555
1420	384°	379°	382°	374°	375°	-3.1	1531°	1552°	120°	1536	232°	12.6	9775000	1635
1430	385°	383°	382°	370°	375°	-3.1	1538°	1550°	119°	1545°	236°	12.4	9780300	1655
1440	383°	386°	389°	370°	373°	-3.0	1547°	1536°	121°	1531°	236°	12.2	9786100	1735
1450	378°	378°	390°	379°	379°	-3.2	1548°	1533°	111°	1538°	238°	12.6	9792500	1755
1500	385°	382°	387°	370°	375°	-3.0	1538°	1560°	117°	1541°	235°	12.2	9798400	1835
1510	381°	385°	389°	369°	371°	-3.2	1545°	1530°	118°	1535°	235°	12.1		
1520	381°	376°	382°	378°	370°	-3.3	1540°	1545°	118°	1553°	239°	12.2		
1530	385°	379°	382°	375°	370°	-2.9	1535°	1552°	114°	1560°	238°	12.3		
1540	381°	385°	389°	370°	372°	-3.2	1542°	1550°	113°	1536°	236°	12.0		
1550	376°	380°	389°	373°	371°	-3.1	1539°	1524°	118°	1524°	[illegible]	12.2		
1600	377°	382°	390°	374°	370°	-3.0	1542°	1527°	116°	1530°		12.3		
1610	381°	385°	389°	370°	372°	-3.1	1543°	1532°	116°	1533°		12.6		
1620	377°	380°	390°	376°	372°	-3.1	1542°	1530°	119°	1534°	238°	12.7		
1630	374°	376°	384°	380°	371°	-3.0	1545°	1535°	112°	1535°	237°	12.2		
1640	382°	375°	387°	379°	375°	-3.1	1540°	1545°	115°	1553°	240°	12.2		
1650	379°	383°	389°	378°	373°	-3.0	1541°	1526°	119°	1531°	238°	12.4		
1700	380°	375°	388°	380°	375°	-3.0	1545°	1536°	120°	1543°	240°	12.3		
1710	385°	385°	388°	377°	375°	-3.0	1540°	1537°	119°	1540°	237°	12.3		
1720	385°	385°	389°	378°	375°	-2.9	1537°	1537°	119°	1539°	237°	12.6		
1730	378°	378°	390°	379°	375°	-3.4	1544°	1541°	113°	1537°	240°	12.2		
1740	378°	382°	389°	375°	373°	-3.2	1541°	1538°	118°	1535°	238°	12.4		
1750	380°	385°	387°	377°	375°	-3.2	1552°	1557°	119°	1556°	238°	12.7		
1800	380°	385°	388°	378°	373°	-3.1	1544°	1529°	119°	1533°	234°	12.8		
1810	386°	384°	386°	378°	375°	-3.3	1536°	1538°	118°	1546°	236°	12.4		
1820	380°	385°	387°	377°	373°	-3.1	1547°	1535°	116°	1551°	240°	12.7		

5CHRTO.WK4

RTO TESTING readings every 10 minutes - moistures once per hour minumum

DATE: 4/13

Fuel type Natural Gas Any meter conversion factors? _____

By: Shaun Boothe / Mike Ucci

meter readings in Cu. ft. for nat. gas meter readings in gal. for propane

Sheet 3 of 3

TIME	BED TEMPERATURES #1	#2	#3	#4	#5	INLET PRES-SURE	BURNER TEMP. #1	#2	INLET TEMP	COMBUSTION CHAMBER TEMP	EXHAUST TEMP	PRESSURE DROP	GAS METER READING	
1830	328°	384°	382°	329°	323°	-3.1	1543°	1529°	112°	1533°	238°	12.8	7603100	1855
1840	326°	329°	385°	326°	320°	-3.0	1542°	1532°	117°	1545°	235°	12.6	9808500	1935
1850	381°	383°	384°	361°	320°	-2.1	1546°	1525°	118°	1536°	236°	12.3	7814300	1955
1900	382°	385°	385°	370°	324°	-3.4	1539°	1535°	118°	1528°	238°	12.6	9820200	2025
1910	380°	375°	385°	377°	327°	-3.2	1539°	1544°	118°	1554°	237°	12.5	9826100	2055
1920	382°	377°	385°	377°	327°	-3.2	1535°	1552°	117°	1556°	239°	12.5		
1930	382°	381°	385°	373°	326°	-3.0	1538°	1552°	118°	1553°	237°	12.7		
1940	376°	381°	388°	377°	324°	-3.2	1546°	1533°	117°	1538°	240°	12.7		
1950	380°	385°	387°	377°	324°	-3.3	1542°	1527°	120°	1531°	241°	12.6		
2000	383°	381°	385°	377°	325°	-3.0	1538°	1528°	120°	1551°	240°	12.6		
2010	378°	381°	388°	378°	325°	-3.3	1545°	1531°	119°	1532°	242°	12.8		
2020	381°	378°	385°	380°	328°	-3.5	1540°	1540°	117°	1547°	242°	12.8		
2030	386°	382°	385°	378°	328°	-3.6	1535°	1550°	117°	1541°	238°	12.7		
2040	381°	385°	386°	373°	325°	-3.2	1540°	1526°	119°	1531°	241°	12.9		
2050	378°	382°	386°	377°	326°	-3.2	1546°	1532°	119°	1537°	240°	12.9		
2100	381°	378°	384°	377°	328°	-3.2	1542°	1555°	119°	1552°	240°	12.8		
2110	382°	382°	385°	378°	326°	-3.6	1541°	1537°	117°	1533°	240°	12.9		

End of Testing

J-25

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5CHRTO.WK4

RESIN & WAX CONSUMPTION REPORT

Fiscal Month of:
Calander Month of:

Date: 4/13/95
Time period: 8:10am - 9:15pm

WAX

	Borgens (EW-58LV)	Borgens (EW-58)	Hercules (Paracol-2100)	Total
Beginning Inventory:	175,374		0	
Purchased:	0		0	
Ending Inventory:	166,498		0	
Usage (58% solids):	9,076	0	0	9,076
Usage (100% solids):	5,264	0	0	5,264

MDI

	ICI (Rubinate-1840)	ICI	ICI	Total
Beginning Inventory:	96,681			
Purchased:	0			
Ending Inventory:	88,375			
Usage (100% solids):	7,306	0	0	7,306

LIQUID PHENOL

	Borgens (OS-50)	Borgens (OS-707)	Neste (BB-602)	Total
Beginning Inventory:	0	216,557		
Purchased:	0	143,303		
Ending Inventory:	0	337,506		
Usage (57% solids):	0	22,354	0	22,354
Usage (100% solids):	0	12,742	0	12,742

estimate based upon meter totalizer usage during the first 2 periods.

4/13/95 L.P. Sagola

Before Weight Time

286 - 3:35 Pm
282
279
282
285
284
282
285
287
277
281
276
3386 lbs.

72 After trim weight
3,147.5 lbs

Dunnage
3386 - 3147.5 = 238.5 lbs.

$\frac{238.5 \text{ lbs}}{3386 \text{ lbs}}$ = 7% Dunnage

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APPENDIX K

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.

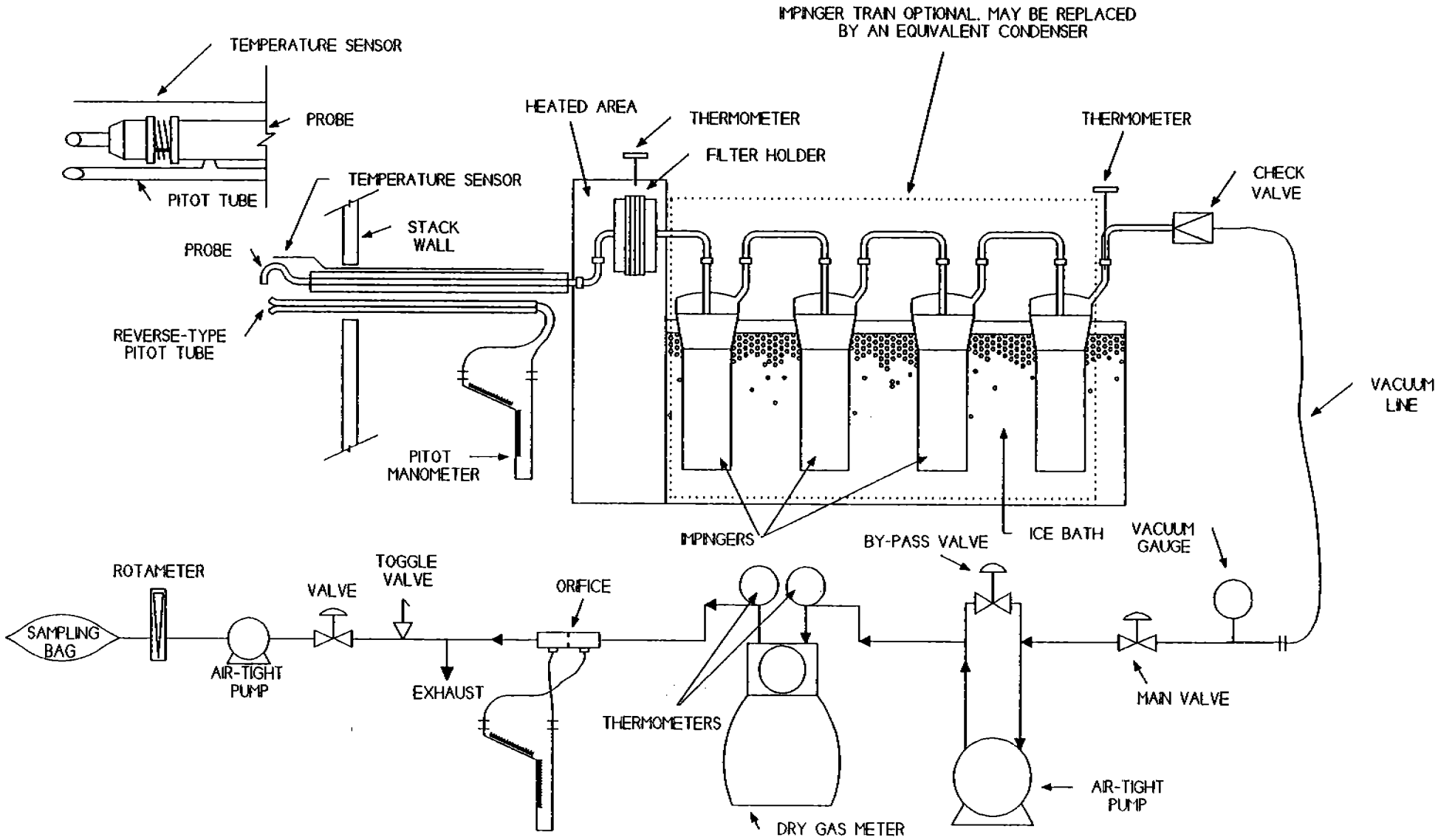
The sampling train consists of a heated glass-lined sampling probe equipped with a Type S pitot and a thermocouple. The probe is attached to a sampling module which houses the all-glass in line filter holder in a temperature controlled oven. The sampling module also houses the impinger case and a Drierite 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.

Interpoll Laboratories
(612) 786-6020

PARTICULATE SAMPLING TRAIN



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 ($(NH_4)_2SO_3$) 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 i 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 produ of a pollution-control technique.

The commenter suggests that EPA consider an alternative to $MeCl_2$ consistent with the Montreal Protocol.

The EPA investigated the effectiveness of a chloroform-ether extraction during the method development phase. The chloroform-ether was not as effective as the MeCl in removing organic materials; howeve 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 2.1.6.

4. Reagents

Unless otherwise indicated, all reagents must conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society. Where such specifications are not available, use the best available grade.

4.1 Sampling. Same as in Method 17, section 3.1, with the addition of deionized distilled water to conform to the American Society for Testing and Materials Specification D 1193–74, Type II and the omittance of section 3.1.4.

4.2 Sample Recovery. Same as in Method 17, section 3.2, with the following additions:

4.2.1 N_2 Gas. Zero N_2 gas at delivery pressures high enough to provide a flow of 20 liters/min for 1 hour through the sampling train.

4.2.2 Methylene Chloride. ACS grade. Blanks shall be run prior to use and only methylene chloride with low blank values (0.001 percent) shall be used.

4.2.3 Water. Same as in section 4.1.

4.3 Analysis. Same as in Method 17, section 3.3, with the following additions:

4.3.1 Methylene Chloride. Same as section 4.2.2.

4.3.2 Ammonium Hydroxide. Concentrated (14.8 M) NH_4OH.

4.3.3 Water. Same as in section 4.1.

4.3.4 Phenolphthalein. The pH indicator solution, 0.05 percent in 50 percent alcohol.

5. Procedure

5.1 Sampling. Same as in Method 17, section 4.1, with the following exceptions:

5.1.1 Place 100 ml of water in the first three impingers.

5.1.2 The use of silicone grease in train assembly is not recommended because it is very soluble in $MeCl_2$ which may result in sample contamination. Teflon tape or similar means may be used to provide leak-free connections between glassware.

5.2 Sample Recovery. Same as in Method 17, section 4.2 with the addition of a post-test N_2 purge and specific changes in handling of individual samples as described below.

5.2.1 Post-test N_2 Purge for Sources Emitting SO_2. (Note: This step is recommended, but is optional. With little or no SO_2 is present in the gas stream, i.e., the pH of the impinger solution is greater than 4.5, purging has been found to be unnecessary.) As soon as possible after the post-test leak check, detach the probe and filter from the impinger train. Leave the ice in the impinger box to prevent removal of moisture during the purge. If necessary, add more ice during the purge to maintain the gas temperature below 20 °C. With no flow of gas through the clean purge line and fittings, attach it to the input of the impinger train (see Figure 202–2). To avoid over- or under-pressurizing the impinger array, slowly commence the N_2 gas flow through the line while simultaneously opening the meter box pump valve(s). When using the gas cylinder pressure to push the purge gas through the sample train, adjust the flow rate to 20 liters/min through the rotameter. When pulling the purge gas through the sample train using the meter box vacuum pump, set the orifice pressure differential to ΔH_a and maintain an overflow rate through the rotameter of less than 2 liters/min. This will guarantee that the N_2 delivery system is operating at greater than ambient pressure and prevents the possibility of passing ambient air (rather than N_2) through the impingers. Continue the purge under these conditions for 1 hour, checking the rotameter and ΔH value(s) periodically. After 1 hour, simultaneously turn off the delivery and pumping systems.

5.2.2 Sample Handling.

5.2.2.1 Container Nos. 1, 2, and 3. If filter catch is to be determined, as detailed in Method 17, section 4.2.

5.2.2.2 Container No. 4 (Impinger Contents). Measure the liquid in the first three impingers to within 1 ml using a clean graduated cylinder or by weighing it to within 0.5 g using a balance. Record the volume or weight of liquid present to be used to calculate the moisture content of the effluent gas. Quantitatively transfer this liquid into a clean sample bottle (glass or plastic); rinse each impinger and the connecting glassware, including probe extension, twice with water, recover the rinse water, and add it to the same sample bottle. Mark the liquid level on the bottle.

5.2.2.3 Container No. 5 ($MeCl_2$ Rinse). Follow the water rinses of each impinger and the connecting glassware, including the probe extension with two rinses of $MeCl_2$; save the rinse products in a clean, glass sample jar. Mark the liquid level on the jar.

5.2.2.4 Container No. 6 (Water Blank). Once during each field test, place 500 ml of water in a separate sample container.

5.2.2.5 Container No. 7 ($MeCl_2$ Blank). Once during each field test, place in a separate glass sample jar a volume of $MeCl_2$ approximately equivalent to the volume used to conduct the $MeCl_2$ rinse of the impingers.

5.3 Analysis. Record the data required on a sheet such as the one shown in Figure 202–3. Handle each sample container as follows:

5.3.1 Container Nos. 1, 2, and 3. If filter catch is analyzed, as detailed in Method 17, section 4.3.

5.3.2 Container Nos. 4 and 5. Note the level of liquid in the containers and confirm on the analytical data sheet whether leakage occurred during transport. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results. Measure the liquid in Container No. 4 either volumetrically to ±1 ml or gravimetrically to ±0.5 g. Remove a 5-ml aliquot and set aside for later ion chromatographic (IC) analysis of sulfates. (Note: Do not use this aliquot to determine chlorides since the HCl will be evaporated during the first drying step; Section 8.2 details a procedure for this analysis.)

5.3.2.1 Extraction. Separate the organic fraction of the sample by adding the contents of Container No. 4 ($MeCl_2$) to the contents of Container No. 4 in a 1000-ml separatory funnel. After mixing, allow the aqueous and organic phases to fully separate, and drain off most of the organic/$MeCl_2$ phase. Then add 75 ml of $MeCl_2$ to the funnel, mix well, and drain off the lower organic phase. Repeat with another 75 ml of $MeCl_2$. This extraction should yield about 250 ml of organic extract. Each time, leave a small amount of the organic/$MeCl_2$ phase in the separatory funnel ensuring that no water is collected in the organic phase. Place the organic extract in a tared 350-ml weighing tin.

5.3.2.2 Organic Fraction Weight Determination (Organic Phase from Container Nos. 4 and 5). Evaporate the organic extract at room temperature and pressure in a laboratory hood. Following evaporation, desiccate the organic fraction for 24 hours in a desiccator containing anhydrous calcium sulfate. Weigh to a constant weight and report the results to the nearest 0.1 mg.

5.3.2.3 Inorganic Fraction Weight Determination. (Note: If NH_4Cl is to be counted as CPM, the inorganic fraction should be taken to near dryness (less than 1 ml liquid) in the oven and then allow to air dry at ambient temperature. If multiple acid emissions are suspected, the ammonia titration procedure in section 8.1 may be preferred.) Using a hot plate, or equivalent, evaporate the aqueous phase to approximately 50 ml; then, evaporate to dryness in a 105 °C oven. Redissovle the residue in 100 ml of water. Add five drops of phenolphthalein to this solution; then, add concentrated (14.8 M) NH_4OH until the sample turns pink. Any excess NH_4OH will be evaporated during the drying step. Evaporate the sample to dryness in a 105 °C oven, desiccate the sample for 24 hours, weigh to a constant weight, and record the results to the nearest 0.1 mg. (Note: The addition of NH_4OH is recommended, but is optional when little or no SO_2 is present in the gas stream, i.e., when the pH of the impinger solution is greater than 4.5, the addition of NH_4OH is not necessary.)

5.3.2.4 Analysis of Sulfate by IC to Determine Ammonium Ion (NH_4^+) Retained in the Sample. (Note: If NH_4OH is not added, omit this step.) Determine the amount of sulfate in the aliquot taken from Container No. 4 earlier as described in Method 5F (appendix A, 40 CFR part 60). Based on the IC SO_4^{-2} analysis of the aliquot, calculate the correction factor to subtract the NH_4^+ retained in the sample and to add the combined water removed by the acid-base reaction (see section 7.2).

5.3.3 Analysis of Water and $MeCl_2$ Blanks (Container Nos. 6 and 7). Analyze these sample blanks as described above in sections 5.3.2.3 and 5.3.2.2, respectively.

3.3.4 Analysis of Acetone Blank Container No. 81. Same as in Method 17, section 4.3.

6. Calibration

Same as in Method 17, section 5, except for the following:

6.1 IC Calibration. Same as Method 5F, section 5.

6.2 Audit Procedure. Concurrently, analyze the audit sample and a set of compliance samples in the same manner to evaluate the technique of the analyst and the standards preparation. The same analyst, analytical reagents, and analytical system shall be used both for compliance samples and the EPA audit sample. If this condition is met, auditing of subsequent compliance analyses for the same enforcement agency within 30 days is not required. An audit sample set may not be used to validate different sets of compliance samples under the jurisdiction of different enforcement agencies, unless prior arrangements are made with both enforcement agencies.

6.3 Audit Samples. Audit Sample Availability. Audit samples will be supplied only to enforcement agencies for compliance tests. The availability of audit samples may be obtained by writing:

Source Test Audit Coordinator (MD–77B), Quality Assurance Division, Atmospheric Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle, Park, NC 27711

or by calling the Source Test Audit Coordinator (STAC) at (919) 541–7834. The request for the audit sample must be made at least 30 days prior to the scheduled compliance sample analysis.

6.4 Audit Results. Calculate the audit sample concentration according to the calculation procedure described in the audit instructions included with the audit sample. Fill in the audit sample concentration and the analyst's name on the audit response form included with the audit instructions. Send one copy to the EPA Regional Office or the appropriate enforcement agency and a second copy to the STAC. The EPA Regional Office or the appropriate enforcement agency will report the results of the audit to the laboratory being audited. Include this response with the results of the compliance samples in relevant reports to the EPA Regional Office or the appropriate enforcement agency.

7. Calculations

Same as in Method 17, section 6, with the following additions:

7.1 Nomenclature. Same as in Method 17, section 6.1 with the following additions.

C_{cpm} = Concentration of the CPM in the stack gas, dry basis, corrected to standard conditions, g/dscm (g/dscf).

C_{so_4} = Concentration of SO_4^{-2} in the sample, mg/ml.

m_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_a = 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.

$$m_w = K\, C_{so_4}\, V_{ic} \qquad \text{Eq. 202–1}$$

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.

$$m_i = m_s \frac{V_{ic}}{V_{ic} - V_a} - m_a \qquad \text{Eq. 202–2}$$

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.

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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, 1976.

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, Department of Environmental Resources, Subpart C, Protection of Natural Resources, Article III, Air Resources). January 8, 1960.

7. Wisconsin Department of Natural Resources. *Air Management Operations Handbook, Revision 3*. January 11, 1988.

BILLING CODE 6560-50-M

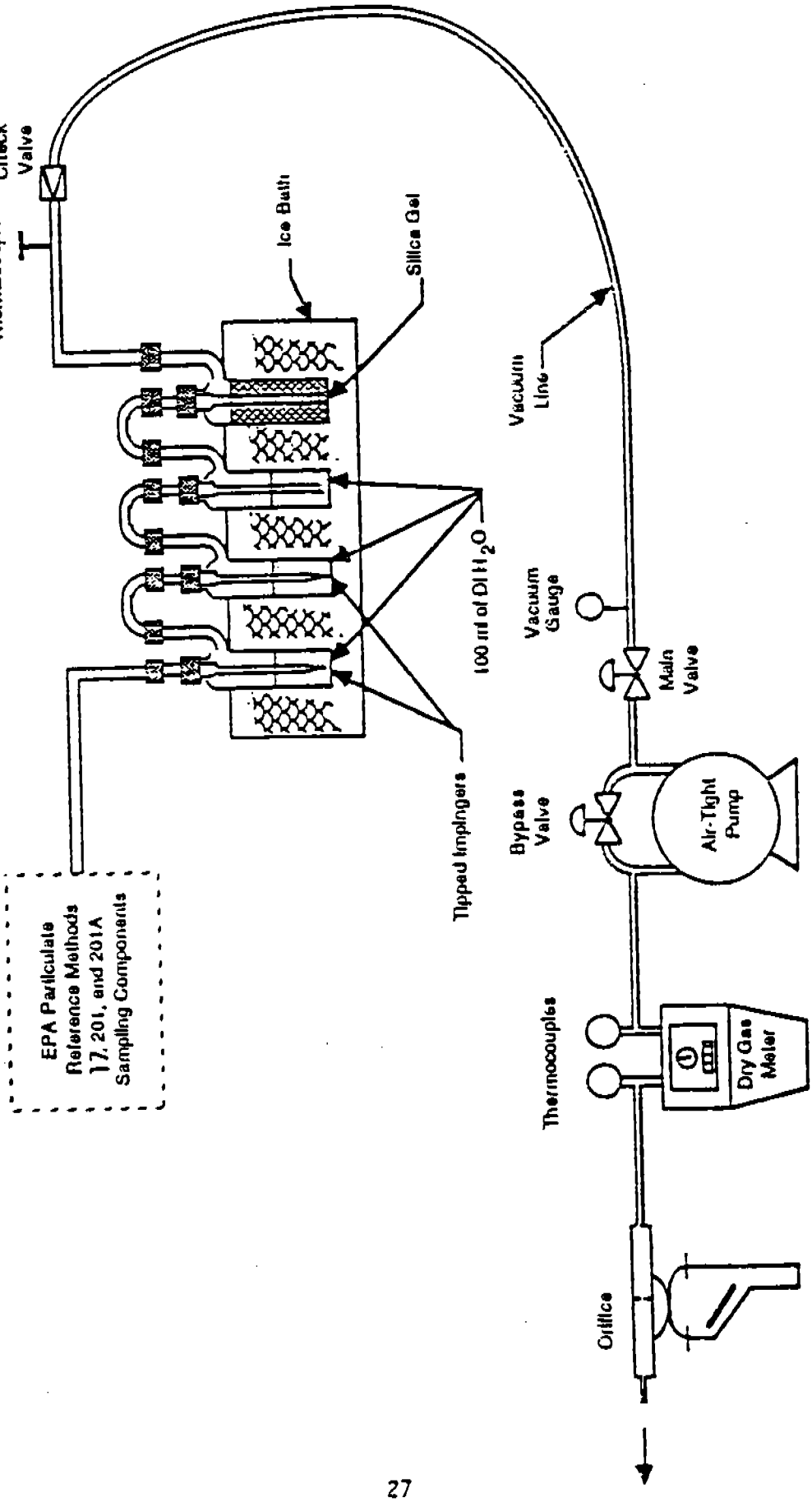

Figure 202-1. Schematic of condensible particulate sampling train.

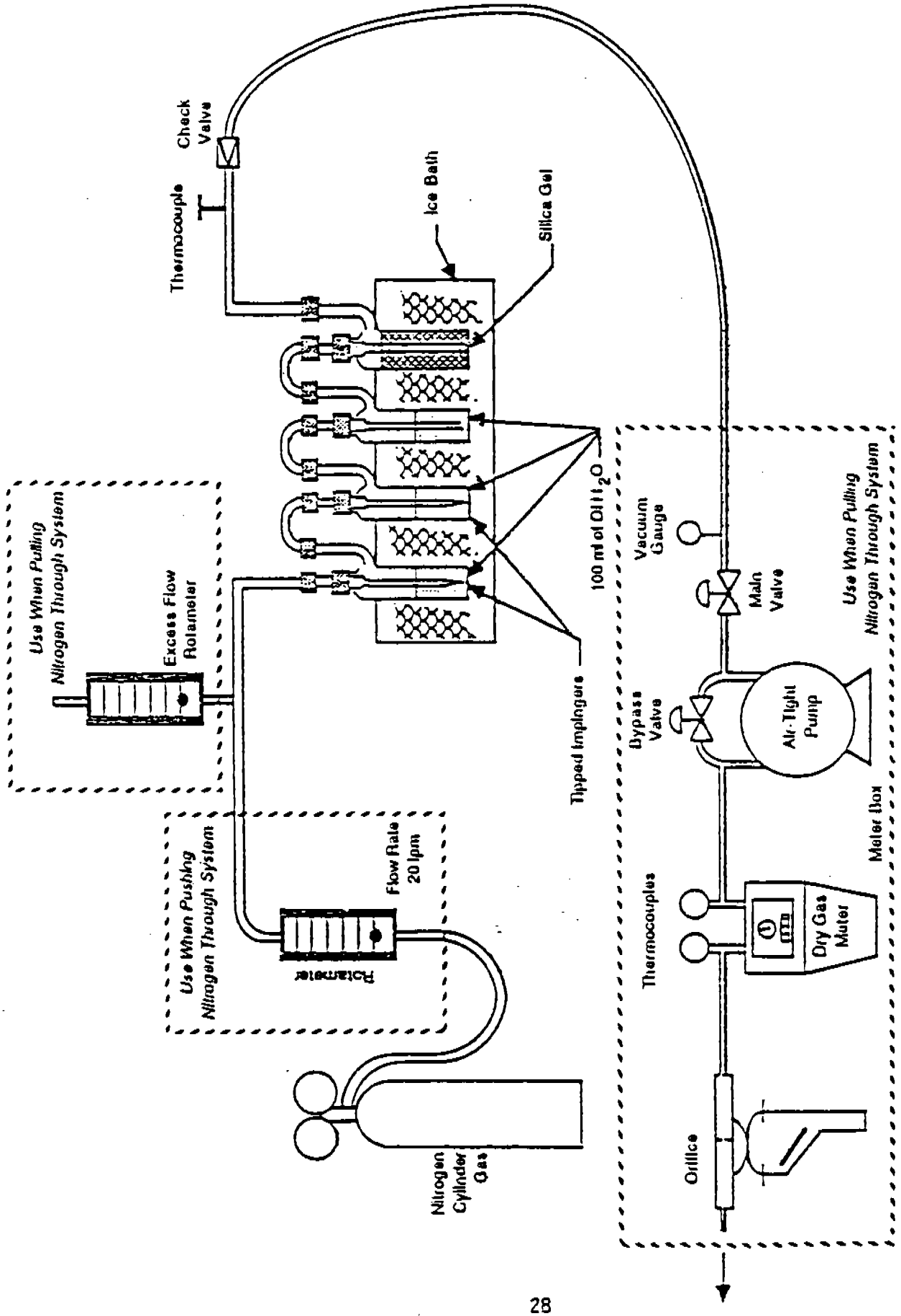

Figure 202-2. Schematic of post-test nitrogen purge system.

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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]

BILLING CODE 6560-60-M

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.

9. Bibliography

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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

for isokinetic sampling should be available in increments of 0.16 cm (1/16 in), e.g., 0.32 to 1.27 cm (1/8 to 1/2 in), or larger if higher volume sampling trains are used. Each nozzle shall be calibrated according to the procedures outlined in Section 8.1.

4.1.2 Probe Liner: Borosilicate glass or quartz shall be used for the probe liner. The tester should not allow the temperature in the probe to exceed 120 ± 14°C (248 ± 25°F).

4.1.3 Pitot Tube: The Pitot tube shall be Type S, as described in Section 2.1 of EPA Method 2, or any other appropriate device. The pitot tube shall be attached to the probe to allow constant monitoring of the stack gas velocity. The impact (high pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (see EPA Method 2, Figure 2-6b) during sampling. The Type S pitot tube assembly shall have a known coefficient, determined as outlined in Section 4 of EPA Method 2.

4.1.4 Differential Pressure Gauge: The differential pressure gauge shall be an inclined manometer or equivalent device as described in Section 2.2 of EPA Method 2. One manometer shall be used for velocity-head readings and the other for orifice differential pressure readings.

4.1.5 Impingers: The sampling train requires a minimum of four impingers, connected as shown in Figure 1, with ground glass (or equivalent) vacuum-tight fittings. For the first, third, and fourth impingers, use the Greenburg-Smith design, modified by replacing the tip with a 1.3-cm inside diameter (1/2 in) glass tube extending to 1.3 cm (1/2 in) from the bottom of the flask. For the second impinger, use a Greenburg-Smith impinger with the standard tip. Place a thermometer capable of measuring temperature to within 1°C (2°F) at the outlet of the fourth impinger for monitoring purposes.

4.1.6 Metering System: The necessary components are a vacuum gauge, leak-free pump, thermometers capable of measuring temperature within 3°C (5.4°F), dry-gas meter capable of measuring volume to within 1%, and related equipment as shown in Figure 1. At a minimum, the pump should be capable of 4 cfm free flow, and the dry gas meter should have a recording capacity of 0-999.9 cu ft with a resolution of 0.005 cu ft. Other metering systems may be used which are capable of maintaining sampling rates within 10% of isokinetic collection and of determining sample volumes to within 2%. The metering system may be used in conjunction with a pitot tube to enable checks of isokinetic sampling rates.

4.1.7 Barometer: The barometer may be mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in Hg). In many cases, the barometric reading may be obtained from a nearby National Weather Service Station, in which case the station value (which is the absolute barometric pressure) is requested and an adjustment for elevation differences between the weather station and sampling point is applied at a rate of minus 2.5 mm Hg (0.1 in Hg) per 30 m (100 ft) elevation increase (vice versa for elevation decrease).

4.1.8 Gas Density Determination Equipment: Temperature sensor and pressure gauge (as described in Sections 2.3 and 2.4 of EPA Method 2), and gas analyzer, if necessary (as described in EPA Method 3). The temperature sensor ideally should be permanently attached to the pitot tube or sampling probe in a fixed

configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor may be attached just prior to use in the field. Note, however, that if the temperature sensor is attached in the field, the sensor must be placed in an interference-free arrangement with respect to the Type S pitot tube openings (see EPA Method 2, Figure 2-7). As a second alternative, if a difference of no more than 1% in the average velocity measurement is to be introduced, the temperature gauge need not be attached to the probe or pitot tube.

4.2 Sample Recovery

4.2.1 Probe Liner: Probe nozzle and brushes; Teflon® bristle brushes with stainless steel wire handles are required. The probe brush shall have extensions of stainless steel, Teflon®, or inert material at least as long as the probe. The brushes shall be properly sized and shaped to brush out the probe liner, the probe nozzle, and the impingers.

4.2.2 Wash Bottles: Three wash bottles are required. Teflon® or glass wash bottles are recommended; polyethylene wash bottles should not be used because organic contaminants may be extracted by exposure to organic solvents used for sample recovery.

4.2.3 Graduated Cylinder and/or Balance: A graduated cylinder or balance is required to measure condensed water to the nearest 1 mL or 1 g. Graduated cylinders shall have divisions not >2 mL. Laboratory balances capable of weighing to ±0.5 g are required.

4.2.4 Amber Glass Storage Containers: One-liter wide-mouth amber flint glass bottles with Teflon®-lined caps are required to store impinger water samples. The bottles must be sealed with Teflon® tape.

4.2.5 Rubber Policeman and Funnel: A rubber policeman and funnel are required to aid in the transfer of materials into and out of containers in the field.

5.0 REAGENTS

Reagent grade chemicals or better grades shall be used in all tests. Unless otherwise indicated, all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.

5.1 Water: HPLC-grade water is used in preparation of DNPH reagent and in all other applications in the sampling train.

5.2 Silica Gel: Silica gel shall be indicating type, 6-16 mesh. If the silica gel has been used previously, dry at 175°C (350°F) for 2 h before using. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used.

5.3 Crushed Ice: Quantities ranging from 10-50 lb may be necessary during a sampling run, depending upon ambient temperature. Samples which have been taken must be stored and shipped cold; sufficient ice for this purpose must be allowed.

5.4 2,4-Dinitrophenylhydrazine Reagent: The 2,4-dinitrophenylhydrazine reagent must be prepared in the laboratory within five days of sampling use in the field. Preparation of DNPH can also be done in the field, with consideration of appropriate procedures required for safe handling of solvent in the field. When a container of prepared DNPH reagent is opened in the field, the contents of the opened container should be used within 48 hours. All laboratory glassware must be washed with detergent and water and rinsed with water, methanol, and methylene chloride prior to use.

NOTE: The glassware must not be rinsed with acetone or unacceptable levels of acetone contamination will be introduced. If field preparation of DNPH is performed, caution must be exercised in avoiding acetone contamination.

Reagent bottles for storage of cleaned DNPH derivatizing solution must be rinsed with acetonitrile and dried before use. Baked glassware is not essential for preparation of DNPH reagent.

NOTE: DNPH crystals or DNPH solution should be handled with plastic gloves at all times, with prompt and extensive use of running water in case of skin exposure.

5.4.1 Preparation of Aqueous Acidic DNPH: The following materials and reagents are required for preparation of the reagent.

5.4.1.1 Bottles/Caps: amber 1- or 4 L bottles with Teflon®-lined caps are required for storing cleaned DNPH solution. Additional 4-L bottles are required to collect waste organic solvents.

5.4.1.2 Large Glass Container: at least one large glass container (8 to 16 L) is required for mixing the aqueous acidic DNPH solution.

5.4.1.3 Stir Plate/Large Stir Bars/Stir Bar Retriever: a magnetic stir plate and large stir bar are required for the mixing of the aqueous acidic DNPH solution. A stir bar retriever is needed for removing the stir bar from the large container holding the DNPH solution.

5.4.1.4 Buchner Filter/Filter Flask/Filter Paper: a large filter flask (2-4 L) with a buchner filter, appropriate rubber stopper, filter paper, and connecting tubing are required for filtering the aqueous acidic DNPH solution prior to cleaning.

5.4.1.5 Separatory Funnels: at least one large separatory funnel (2 L) is required for cleaning the DNPH prior to use.

5.4.1.6 Beakers: beakers (150 mL, 250 mL, and 400 mL) are useful for holding/measuring organic liquids when cleaning the aqueous acidic DNPH solution and for weighing DNPH crystals.

5.4.1.7 Funnels: at least one large funnel is needed for pouring the aqueous acidic DNPH into the separatory funnel.

5.4.1.8 Graduated Cylinders: at least one large graduated cylinder (1 to 2 L) is required for measuring HPLC-grade water and acid when preparing the DNPH solution.

5.4.1.9 Top-Loading Balance: a one-place top loading balance is needed for weighing out the DNPH crystals used to prepare the aqueous acidic DNPH solution.

5.4.1.10 Spatulas: spatulas are needed for weighing out DNPH when preparing the aqueous DNPH solution.

5.4.1.11 HPLC-Grade Water: water (HPLC-grade) is required to mix the aqueous DNPH solution.

5.4.1.12 Hydrochloric Acid: reagent grade hydrochloric acid (approximately 12N) is required for acidifying the aqueous DNPH solution.

5.4.1.13 2,4-Dinitrophenylhydrazine: a supply of moist solid 2,4-dinitrophenylhydrazine (DNPH) is required for preparation of aqueous acidic DNPH solution. The quantity of water may vary from 10 to 30%. Reagent grade or equivalent is required.

5.4.1.14 Methylene Chloride: methylene chloride (suitable for residue and pesticide analysis, GC/MS, HPLC, GC, Spectrophotometry or equivalent) is required for cleaning the aqueous acidic DNPH solution, rinsing glassware, and recovery of sample trains.

5.4.1.15 Cyclohexane: cyclohexane (HPLC grade) is required for cleaning the aqueous acidic DNPH solution.

NOTE: Do not use spectroanalyzed grades of cyclohexane if this sampling methodology is extended to aldehydes and ketones with four or more carbon atoms.

5.4.1.16 Methanol: methanol (HPLC grade or equivalent) is required for rinsing glassware.

5.4.1.17 Acetonitrile: acetonitrile (HPLC grade or equivalent) is required for rinsing glassware.

5.4.1.18 Formaldehyde: Analytical grade or equivalent formaldehyde is required for preparation of standards. If other aldehydes or ketones are used, analytical grade or equivalent is required.

5.4.2 Preparation of Aqueous Acidic DNPH Derivatizing Reagent: Each batch of DNPH reagent should be prepared and purified within five days of sampling, according to the procedure described below.

5.4.2.1 Place an 8-L container under a fume hood on a magnetic stirrer. Add a large stir bar and fill the container half full of HPLC-grade water. Save the empty bottle from HPLC-grade water. Start the stirring bar and adjust the stir rate to be as fast as possible. Using a graduated cylinder, measure 1.4 mL of concentrated hydrochloric acid. Slowly pour the acid into the stirring water. Fumes may be generated and the water may become warm. Weigh the DNPH crystals on a one-place balance (see Table 1 for approximate amounts) and add to the stirring acid solution. Fill the 8 L container to the 8 L mark with HPLC water and stir overnight. If all of the DNPH crystals have dissolved overnight, add additional DNPH and stir for two more hours. Continue the process of adding DNPH with additional stirring until a saturated solution has been formed. Filter the DNPH solution using vacuum filtration. Gravity filtration may be used, but a

much longer time is required. Store the filtered solution in an amber bottle at room temperature.

TABLE 1. APPROXIMATE AMOUNT OF CRYSTALLINE DNPH USED TO PREPARE A SATURATED SOLUTION

Amount of Moisture in DNPH	Weight Required per 8 L of Solution
10 weight percent	31 g
15 weight percent	33 g
30 weight percent	40 g

Within five days of proposed use, place about 1.6 L of the DNPH reagent in a 2 L separatory funnel. Add approximately 200 mL of methylene chloride and stopper the funnel. Wrap the stopper of the funnel with paper towels to absorb any leakage. Invert and vent the funnel. Then shake vigorously for 3 minutes. Initially, the funnel should be vented frequently (every 10 - 15 sec). After the layers have separated, discard the lower (organic) layer.

Extract the DNPH a second time with methylene chloride and finally with cyclohexane. When the cyclohexane layer has separated from the DNPH reagent, the cyclohexane layer will be the top layer in the separatory funnel. Drain the lower layer (the cleaned extracted DNPH reagent solution) into an amber bottle that has been rinsed with acetonitrile and allowed to dry.

5.4.3 Quality Control: Take two aliquots of the extracted DNPH reagent. The size of the aliquots is dependent upon the exact sampling procedure used, but 100 mL is reasonably representative. To ensure that the background in the reagent is acceptable for field use, analyze one aliquot of the reagent according to the procedure of EPA Draft Method 8315. Save the other aliquot of aqueous acidic DNPH for use as a method blank when the analysis is performed.

5.4.4 Shipment to the Field: Tightly cap the bottle containing extracted DNPH reagent using a Teflon®-lined cap. Seal the bottle with Teflon® tape. After the bottle is labeled, the bottle may be placed in a friction-top can (paint can or equivalent) containing a 1 -2 inch layer of granulated charcoal and stored at ambient temperature until use.

If the DNPH reagent has passed the Quality Control criteria, the reagent may be packaged to meet necessary shipping requirements and sent to the sampling area. If the Quality Control criteria are not met, the reagent solution may be re-extracted or the solution may be re-prepared and the extraction sequence repeated.

If the DNPH reagent is not used in the field within five days of extraction, an aliquot may be taken and analyzed as described Draft Method 8315. If the reagent meets the Quality Control requirements, the reagent may be used. If the reagent does not meet Quality Control requirements, the reagent must be discarded and new reagent must be prepared and tested.

5.4.5 Calculation of Acceptable Levels of Impurities in DNPH Reagent: The acceptable impurity level (AIL, µg/mL) is calculated from the expected analyte level in the sampled gas (EAL, ppbv), the volume of air that will be sampled at standard conditions (SVOL, L), the formula weight of the analyte (FW, g/mol), and the volume of DNPH reagent that will be used in the impingers (RVOL, mL):

$$AIL = 0.1 \times [EAL \times SVOL \times FW/22.4 \times (FW + 180)/FW]/(RVOL \times 1000)$$

where 0.1 is the acceptable contaminant level, 22.4 is a factor relating ppbv to g/L, 180 is a factor relating the underivatized analyte to the derivatized analyte, and 1000 is a unit conversion factor.

5.4.6 Disposal of Excess DNPH Reagent: Excess DNPH reagent may be returned to the laboratory and recycled or treated as aqueous waste for disposal purposes. 2,4-Dinitrophenylhydrazine is a flammable solid when dry so water should not be evaporated from the solution of the reagent.

5.5 Field Spike Standard Preparation: To prepare a formaldehyde field spiking standard at 4.01 mg/mL, use a 500µL syringe to transfer 0.5 mL of 37% by weight of formaldehyde (401 mg/mL) to a 50 mL volumetric flask containing approximately 40 mL of methanol. Dilute to 50 mL with methanol.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 Because of the complexity of this method, field personnel should be trained in and experienced with the test procedures in order to obtain reliable results.

6.2 Laboratory Preparation:

6.2.1 All the components shall be maintained and calibrated according to the procedure described in APTD-0576, unless otherwise specified.

6.2.2 Weigh several 200- to 300-g portions of silica gel in airtight containers to the nearest 0.5 g. Record on each container the total weight of the silica gel plus containers. As an alternative to preweighing the silica gel, it may instead be weighed directly in the impinger or sampling holder just prior to train assembly.

6.3 Preliminary Field Determinations:

6.3.1 Select the sampling site and the minimum number of sampling points according to EPA Method 1 or other relevant criteria. Determine the stack pressure, temperature, and range of velocity heads using EPA Method 2. A leak-check of the pitot lines according to EPA Method 2, Section 3.1, must be performed. Determine the stack gas moisture content using EPA Approximation Method 4 or its alternatives to establish estimates of isokinetic sampling-rate settings. Determine the stack gas dry molecular weight, as described in EPA Method 2, Section 3.6. If integrated EPA Method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the sample run.

6.3.2 Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates below 28 L/min (1.0 cfm). During the run, do not change the nozzle.

Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see Section 2.2 of EPA Method 2).

6.3.3 Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, to reduce the length of the probe, consider sampling from opposite sides of the stack.

6.3.4 A minimum of 45 ft^3 of sample volume is required for the determination of the Destruction and Removal Efficiency (DRE) of formaldehyde from incineration systems (45ft^3 is equivalent to one hour of sampling at 0.75 dscf). Additional sample volume shall be collected as ecessitated by the capacity of the DNPH reagent and analytical detection limit constraints. To determine the minimum sample volume required, refer to sample calculations in Section 10.

6.3.5 Determine the total length of sampling time needed to obtain the identified minimum volume by comparing the anticipated average sampling rate with the volume requirement. Allocate the same time to all traverse points defined by EPA Method 1. To avoid timekeeping errors, the length of time sampled at each traverse point should be an integer or an integer plus 0.5 min.

6.3.6 In some circumstances (e.g., batch cycles) it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas-volume samples. In these cases, careful documentation must be maintained in order to allow accurate calculation of concentrations.

6.4 Preparation of Collection Train:

6.4.1 During preparation and assembly of the sampling train, keep all openings where contamination can occur covered with Teflon® film or aluminum foil until just prior to assembly or until sampling is about to begin.

6.4.2 Place 100 mL of cleaned DNPH solution in each of the first two impingers, and leave the third impinger empty. If additional capacity is required for high expected concentrations of formaldehyde in the stack gas, 200 mL of DNPH per impinger may be used or additional impingers may be used for sampling. Transfer approximately 200 to 300 g of pre-weighed silica gel from its container to the fourth impinger. Care should be taken to ensure that the silica gel is not entrained and carried out from the impinger during sampling. Place the silica gel container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

6.4.3 With a glass or quartz liner, install the selected nozzle using a Viton-A O-ring when stack temperatures are <260°C (500°F) and a woven glass-fiber gasket when temperatures are higher. See APTD-0576 (Rom, 1972) for details. Other connecting systems utilizing either 316 stainless steel or Teflon® ferrules may be used. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

6.4.4 Assemble the train as shown in Figure 1. During assembly, do not use any silicone grease on ground-glass joints upstream of the impingers. Use Teflon® tape, if required. A very light coating of silicone grease may be used on ground-glass joints downstream of the impingers, but the silicone grease should be limited to the outer portion (see APTD-0576) of the ground-glass joints to

minimize silicone grease contamination. If necessary, Teflon® tape may be used to seal leaks. Connect all temperature sensors to an appropriate potentiometer/display unit. Check all temperature sensors at ambient temperature.

6.4.5 Place crushed ice all around the impingers.

6.4.6 Turn on and set the probe heating system at the desired operating temperature. Allow time for the temperature to stabilize.

6.5 Leak-Check Procedures:

6.5.1 Pre-test Leak Check:

6.5.1.1 After the sampling train has been assembled, turn on and set the probe heating system at the desired operating temperature. Allow time for the temperature to stabilize. If a Viton-A O-ring or other leak-free connection is used in assembling the probe nozzle to the probe liner, leak-check the train at the sampling site by plugging the nozzle and pulling a 381-mm Hg (15 in Hg) vacuum.

NOTE: A lower vacuum may be used, provided that the lower vacuum is not exceeded during the test.

6.5.1.2 If an asbestos string is used, do not connect the probe to the train during the leak check. Instead, leak-check the train by first attaching a carbon-filled leak check impinger to the inlet and then plugging the inlet and pulling a 381-mm Hg (15 in Hg) vacuum. (A lower vacuum may be used if this lower vacuum is not exceeded during the test.) Then connect the probe to the train and leak-check at about 25 mm Hg (1 in Hg) vacuum. Alternatively, leak-check the probe with the rest of the sampling train in one step at 381 mm Hg (15 in Hg) vacuum. Leakage rates in excess of 4% of the average sampling rate or >0.00057 m^3/min (0.02 cfm), whichever is less, are acceptable.

6.5.1.3 The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with the fine-adjust valve fully open and coarse-adjust valve completely closed. Partially open the coarse-adjust valve and slowly close the fine-adjust valve until the desired vacuum is reached. Do not reverse direction of the fine-adjust valve, as liquid will back up into the train. If the desired vacuum is exceeded, either perform the leak check at this higher vacuum or end the leak check, as shown below, and start over.

6.5.1.4 When the leak check is completed, first slowly remove the plug from the inlet to the probe. When the vacuum drops to 127 mm (5 in) Hg or less, immediately close the coarse-adjust valve. Switch off the pumping system and reopen the fine-adjust valve. Do not reopen the fine-adjust valve until the coarse-adjust valve has been closed to prevent the liquid in the impingers from being forced backward into the sampling line and silica gel from being entrained backward into the third impinger.

6.5.2 Leak Checks During Sampling Runs:

6.5.2.1 If, during the sampling run, a component change (i.e., impinger) becomes

necessary, a leak check shall be conducted immediately after the interruption of sampling and before the change is made. The leak check shall be done according to the procedure described in Section 6.5.1, except that it shall be done at a vacuum greater than or equal to the maximum value recorded up to that point in the test. If the leakage rate is found to be no greater than 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable. If a higher leakage rate is obtained, the tester must void the sampling run.

NOTE: Any correction of the sample volume by calculation reduces the integrity of the pollutant concentration data generated and must be avoided.

6.5.2.2 Immediately after a component change and before sampling is re-initiated, a leak check similar to a pre-test leak check must also be conducted.

6.5.3 Post-test Leak Check:

6.5.3.1 A leak check is mandatory at the conclusion of each sampling run. The leak check shall be done with the same procedures as the pre-test leak check, except that the post-test leak check shall be conducted at a vacuum greater than or equal to the maximum value reached during the sampling run. If the leakage rate is found to be no greater than 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable. If, however, a higher leakage rate is obtained, the tester shall record the leakage rate and void the sampling run.

6.6 Sampling Train Operation:

6.6.1 During the sampling run, maintain an isokinetic sampling rate to within 10% of true isokinetic, below 28 L/min (1.0 cfm). Maintain a temperature around the probe of 120° ± 14°C (248° ± 25°F).

6.6.2 For each run, record the data on a data sheet such as the one shown in Figure 2. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak check, and when sampling is halted. Take other readings required by Figure 2 at least once at each sample point during each time increment and additional readings when significant adjustments (20% variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

6.6.3 Clean the stack access ports prior to the test run to eliminate the chance of sampling deposited material. To begin sampling, remove the nozzle cap, verify that the filter and probe heating systems are at the specified temperature, and verify that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point, with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs, which aid in the rapid adjustment of the isokinetic sampling rate without excessive computations, are available. These nomographs are designed for use when the Type S pitot tube coefficient is 0.84 ± 0.02 and the stack gas equivalent density (dry molecular weight) is equal to 29 ± 4. APTD-0576 details the procedure for using the nomographs. If the stack gas molecular weight and

the pitot tube coefficient are outside the above ranges, do not use the nomographs unless appropriate steps are taken to compensate for the deviations.

6.6.4 When the stack is under significant negative pressure (equivalent to the height of the impinger stem), take care to close the coarse-adjust valve before inserting the probe into the stack in order to prevent liquid from backing up through the train. If necessary, the pump may be turned on with the coarse-adjust valve closed.

6.6.5 When the probe is in position, block off the openings around the probe and stack access port to prevent unrepresentative dilution of the gas stream.

6.6.6 Traverse the stack cross section, as required by EPA Method 1, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the access port, in order to minimize the chance of extracting deposited material.

6.6.7 During the test run, make periodic adjustments to keep the temperature around the probe at the proper levels. Add more ice and, if necessary, salt, to maintain a temperature of <20°C (68°F) at the silica gel outlet. Also, periodically check the level and zero of the manometer.

6.6.8 A single train shall be used for the entire sampling run, except in cases where simultaneous sampling is required in two or more separate ducts or at two or more different locations within the same duct, or in cases where equipment failure necessitates a change of trains. An additional train or additional trains may also be used for sampling when the capacity of a single train is exceeded.

6.6.9 When two or more trains are used, separate analyses of components from each train shall be performed. If multiple trains have been used because the capacity of a single train would be exceeded, first impingers from each train may be combined, and second impingers from each train may be combined.

6.6.10 At the end of the sampling run, turn off the coarse-adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry gas meter reading, and conduct a post-test leak check. Also, leak check the pitot lines as described in EPA Method 2. The lines must pass this leak check in order to validate the velocity-head data.

6.6.11 Calculate percent isokineticity (see Method 2) to determine whether the run was valid or another test should be made.

7.0 SAMPLE RECOVERY

7.1 Preparation:

7.1.1 Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool. When the probe can be handled safely, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over the tip to prevent losing or gaining particulate matter. Do not cap the probe tip tightly while the sampling train is cooling because a vacuum will be created, drawing liquid from the impingers back through the sampling train.

7.1.2 Before moving the sampling train to the cleanup site, remove the probe from the sampling train and cap the open outlet, being careful not to lose any condensate that might be present. Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used, let any condensed water or liquid drain into the impingers. Cap off any open impinger inlets and outlets. Ground glass stoppers, Teflon® caps, or caps of other inert materials may be used to seal all openings.

7.1.3 Transfer the probe and impinger assembly to an area that is clean and protected from wind so that the chances of contaminating or losing the sample are minimized.

7.1.4 Inspect the train before and during disassembly, and note any abnormal conditions.

7.1.5 Save a portion of all washing solutions (methylene chloride, water) used for cleanup as a blank. Transfer 200 mL of each solution directly from the wash bottle being used and place each in a separate, pre-labeled sample container.

7.2 Sample Containers:

7.2.1 Container 1: Probe and Impinger Catches. Using a graduated cylinder, measure to the nearest mL, and record the volume of the solution in the first three impingers. Alternatively, the solution may be weighed to the nearest 0.5 g. Include any condensate in the probe in this determination. Transfer the impinger solution from the graduated cylinder into the amber flint glass bottle. Taking care that dust on the outside of the probe or other exterior surfaces does not get into the sample, clean all surfaces to which the sample is exposed (including the probe nozzle, probe fitting, probe liner, first impinger, and impinger connector) with methylene chloride. Use less than 500 mL for the entire wash (250 mL would be better, if possible). Add the washings to the sample container.

7.2.1.1 Carefully remove the probe nozzle and rinse the inside surface with methylene chloride from a wash bottle. Brush with a Teflon® bristle brush, and rinse until the rinse shows no visible particles or yellow color, after which make a final rinse of the inside surface. Brush and rinse the inside parts of the Swagelok® fitting with methylene chloride in a similar way.

7.2.1.2 Rinse the probe liner with methylene chloride. While squirting the methylene chloride into the upper end of the probe, tilt and rotate the probe so that all inside surfaces will be wetted with methylene chloride. Let the methylene chloride drain from the lower end into the sample container. The tester may use a funnel (glass or polyethylene) to aid in transferring the liquid washes to the container. Follow the rinse with a Teflon® brush. Hold the probe in an inclined position, and squirt methylene chloride into the upper end as the probe brush is being pushed with a twisting action through the probe. Hold the sample container underneath the lower end of the probe, and catch any methylene chloride, water, and particulate matter that is brushed from the probe. Run the brush through the probe three times or more. With stainless steel or other metal probes, run the brush through in the above prescribed manner at least six times since there may be small crevices in which particulate matter can be entrapped. Rinse the brush with methylene chloride or water, and quantitatively collect these washings in the sample container. After the brushings, make a final rinse

of the probe as described above.

NOTE: Two people should clean the probe in order to minimize sample losses. Between sampling runs, brushes must be kept clean and free from contamination.

7.2.1.3 Rinse the inside surface of each of the first three impingers (and connecting tubing) three separate times. Use a small portion of methylene chloride for each rinse, and brush each surface to which sample is exposed with a Teflon® bristle brush to ensure recovery of fine particulate matter. Water will be required for the recovery of the impingers in addition to the specified quantity of methylene chloride. There will be at least two phases in the impingers. This two-phase mixture does not pour well, and a significant amount of the impinger catch will be left on the walls. The use of water as a rinse makes the recovery quantitative. Make a final rinse of each surface and of the brush, using both methylene chloride and water.

7.2.1.4 After all methylene chloride and water washings and particulate matter have been collected in the sample container, tighten the lid so that solvent, water, and DNPH reagent will not leak out when the container is shipped to the laboratory. Mark the height of the fluid level to determine whether leakage occurs during transport. Seal the container with Teflon® tape. Label the container clearly to identify its contents.

7.2.1.5 If the first two impingers are to be analyzed separately to check for breakthrough, separate the contents and rinses of the two impingers into individual containers. Care must be taken to avoid physical carryover from the first impinger to the second. The formaldehyde hydrazone is a solid which floats and froths on top of the impinger solution. Any physical carryover of collected moisture into the second impinger will invalidate a breakthrough assessment.

7.2.2 Container 2: Sample Blank. Prepare a blank by using an amber flint glass container and adding a volume of DNPH reagent and methylene chloride equal to the total volume in Container 1. Process the blank in the same manner as Container 1.

7.2.3 Container 3: Silica Gel. Note the color of the indicating silica gel to determine whether it has been completely spent and make a notation of its condition. The impinger containing the silica gel may be used as a sample transport container with both ends sealed with tightly fitting caps or plugs. Ground-glass stoppers or Teflon® caps may be used. The silica gel impinger should then be labeled, covered with aluminum foil, and packaged on ice for transport to the laboratory. If the silica gel is removed from the impinger, the tester may use a funnel to pour the silica gel and a rubber policeman to remove the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that may adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use water or other liquids to transfer the silica gel. If a balance is available in the field, the spent silica gel (or silica gel plus impinger) may be weighed to the nearest 0.5 g.

7.2.4 Sample containers should be placed in a cooler, cooled by although not in contact with ice. Sample containers must be placed vertically and, since they are glass, protected from breakage curing shipment. Samples should be cooled during shipment so they will be received cold at the laboratory.

8.0 CALIBRATION

8.1 Probe Nozzle: Probe nozzles shall be calibrated before their initial use in the field. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in). Make measurements at three separate places across the diameter and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in). When the nozzles become nicked or corroded, they shall be replaced and calibrated before use. Each nozzle must be permanently and uniquely identified.

8.2 Pitot tube: The Type S pitot tube assembly shall be calibrated according to the procedure outlined in Section 4 of EPA Method 2, or assigned a nominal coefficient of 0.84 if it is not visibly nicked or corroded and if it meets design and intercomponent spacing specifications.

8.3 Metering system:

8.3.1 Before its initial use in the field, the metering system shall be calibrated according to the procedure outlined in APTD-0576. Instead of physically adjusting the dry-gas meter dial readings to correspond to the wet-test meter readings, calibration factors may be used to correct the gas meter dial readings mathematically to the proper values. Before calibrating the metering system, it is suggested that a leak check be conducted. For metering systems having diaphragm pumps, the normal leak check procedure will not detect leakages within the pump. For these cases, the following leak check procedure will apply: make a ten-minute calibration run at 0.00057 m^3/min (0.02 cfm). At the end of the run, take the difference of the measured wet-test and dry-gas meter volumes and divide the difference by 10 to get the leak rate. The leak rate should not exceed 0.00057 m^3/min (0.02 cfm).

8.3.2 After each field use, check the calibration of the metering system by performing three calibration runs at a single intermediate orifice setting (based on the previous field test). Set the vacuum at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet-test meter and the inlet of the metering system. Calculate the average value of the calibration factor. If the calibration has changed by more than 5%, recalibrate the meter over the full range of orifice settings, as outlined in APTD-0576.

8.3.3 Leak check of metering system: The portion of the sampling train from the pump to the orifice meter (see Figure 1) should be leak-checked prior to initial use and after each shipment. Leakage after the pump will result in less volume being recorded than is actually sampled. Use the following procedure: Close the main valve on the meter box. Insert a one-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13 - 18 cm (5 - 7 in) water column by blowing into the rubber tubing. Pinch off the tubing and observe the manometer for 1 min. A loss of pressure on the manometer indicates a leak in the meter box. Leaks must be corrected.

NOTE: If the dry-gas-meter coefficient values obtained before and after a test series differ by >5%, either the test series must be voided or calculations for test series must be performed using whichever meter coefficient value (i.e., before or after) gives the lower value of total sample volume.

8.4 Probe heater: The probe heating system must be calibrated before its initial use in the field according to the procedure outlined in APTD-0576. Probes constructed according to APTD-0581 need not be calibrated if the calibration curves in APTD-0576 are used.

8.5 Temperature gauges: Each thermocouple must be permanently and uniquely marked on the casting. All mercury-in-glass reference thermometers must conform to ASTM E-1 63C or 63F specifications. Thermocouples should be calibrated in the laboratory with and without the use of extension leads. If extension leads are used in the field, the thermocouple readings at ambient air temperatures, with and without the extension lead, must be noted and recorded. Correction is necessary if the use of an extension lead produces a change >1.5%.

8.5.1 Impinger and dry-gas meter thermocouples: For the thermocouples used to measure the temperature of the gas leaving the impinger train, three-point calibration at ice water, room air, and boiling water temperatures is necessary. Accept the thermocouples only if the readings at all three temperatures agree to ±2°C (3.6°F) with those of the absolute value of the reference thermometer.

8.5.2 Probe and stack thermocouple: For the thermocouples used to indicate the probe and stack temperatures, a three-point calibration at ice water, boiling water, and hot oil bath temperatures must be performed. Use of a point at room air temperature is recommended. The thermometer and thermocouple must agree to within 1.5% at each of the calibration points. A calibration curve (equation) may be constructed (calculated) and the data extrapolated to cover the entire temperature range suggested by the manufacturer.

8.6 Barometer: Adjust the barometer initially and before each test series to agree to within ±2.5 mm Hg (0.1 in Hg) of the mercury barometer or the corrected barometric pressure value reported by a nearby National Weather Service Station (same altitude above sea level).

8.7 Triple-beam balance: Calibrate the triple-beam balance before each test series, using Class S standard weights. The weights must be within ±0.5% of the standards, or the balance must be adjusted to meet these limits.

9.0 CALCULATIONS

Carry out calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after final calculation.

9.1 Calculation of Total Formaldehyde:

To determine the total formaldehyde in mg, use the following equation:

Total mg formaldehyde = C_d x V x DF x

([g/mole aldehyde]/[g/mole DNPH derivative]) x

10^{-3} mg/μg

where:

C_d = measured concentration of DNPH-formaldehyde derivative, μg/mL

V = organic extract volume, mL

DF = dilution factor

9.2 Formaldehyde concentration in stack gas:

Determine the formaldehyde concentration in the stack gas using the following equation:

C_f = K [total formaldehyde, mg] / $V_{m(std)}$

where:

K = 35.31 ft^3/m^3 if $V_{m(std)}$ is expressed in English units

= 1.00 m^3/m^3 if $V_{m(std)}$ is expressed in metric units

$V_{m(std)}$ = volume of gas sample as measured by dry gas meter, corrected to standard conditions, dscm (dscf)

9.3 Average Dry Gas Meter Temperature and Average Orifice Pressure Drop are obtained from the data sheet.

9.4 Dry Gas Volume: Calculate $V_{m(std)}$ and adjust for leakage, if necessary, using the equation in Section 6.3 of EPA Method 5.

9.5 Volume of Water Vapor and Moisture Content: Calculate the volume of water vapor and moisture content from equations 5-2 and 5-3 of EPA Method 5.

10.0 DETERMINATION OF VOLUME TO BE SAMPLED

To determine the minimum sample volume to be collected, use the following sequence of equations.

10.1 From prior analysis of the waste feed, the concentration of formaldehyde (FORM) introduced into the combustion system can be calculated. The degree of destruction and removal efficiency that is required is used to determine the maximum amount of FORM allowed to be present in the effluent. This amount may be expressed as:

Max $FORM_i$ Mass =

$$[\ (WF)\ (FORM_i\ conc)\ (100 - \%DRE)\ ]\ /\ 100$$

where:

WF = mass flow rate of waste feed per h, g/h (lb/h)

$FORM_i$ = concentration of FORM (wt %) introduced into the combustion process

DRE = percent Destruction and Removal Efficiency required

Max FORM = mass flow rate (g/h [lb/h]) of FORM emitted from the combustion source

10.2 The average discharge concentration of the FORM in the effluent gas is determined by comparing the Max FORM with the volumetric flow rate being exhausted from the source. Volumetric flow rate data are available as a result of preliminary EPA Method 1 - 4 determinations:

$$Max\ FORM_i\ conc = [Max\ FORM_i\ Mass\ ] / DV_{eff(std)}$$

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.

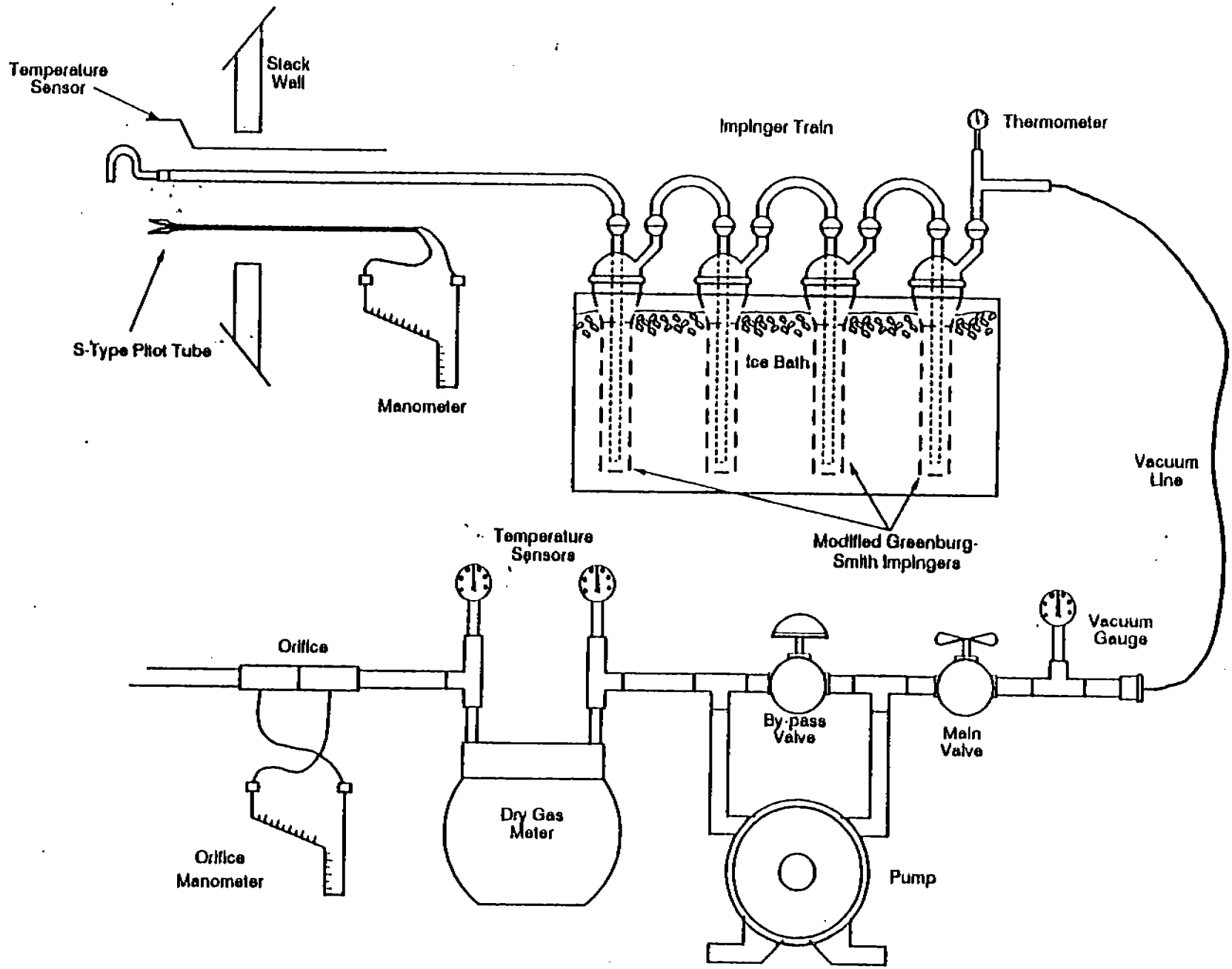
12.0 METHOD PERFORMANCE

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

3404345R

Plant _____

Location _____

Operator _____

Date _____

Run No. _____

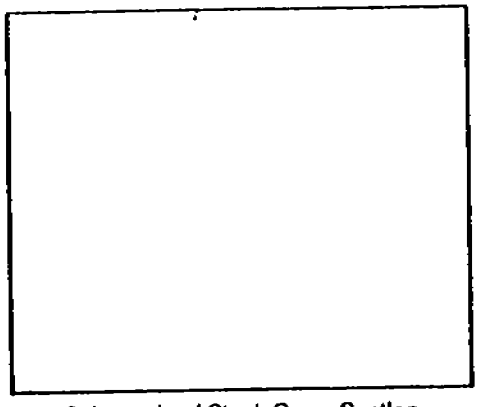
Sample Box No. _____

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										

Figure 2. Field Data Sheet

DRAFT

DCN No.: 93-275-065-55-07
Radian No.: 275-065-55
EPA NO.: 68-D1-0010

FIELD TEST OF A GENERIC METHOD FOR SAMPLING AND ANALYSIS OF ISOCYANATES

Interim Report
(Work Assignment 55)

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July 1993

DRAFT

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 policy implications.

DISCLAIMER

The information in this document has been funded wholly by the United States Environmental Protection Agency under EPA Contract Number 68-D1-0010 to Radian. It has been subjected to the Agency's peer and administrative review, and it has been approved for publication as an EPA document. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

ACKNOWLEDGEMENT

We wish to acknowledge the contributions of the following individuals to the success of this program: Mark Owens, Danny Harrison, Darrell Doerle and Jim Southerland

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

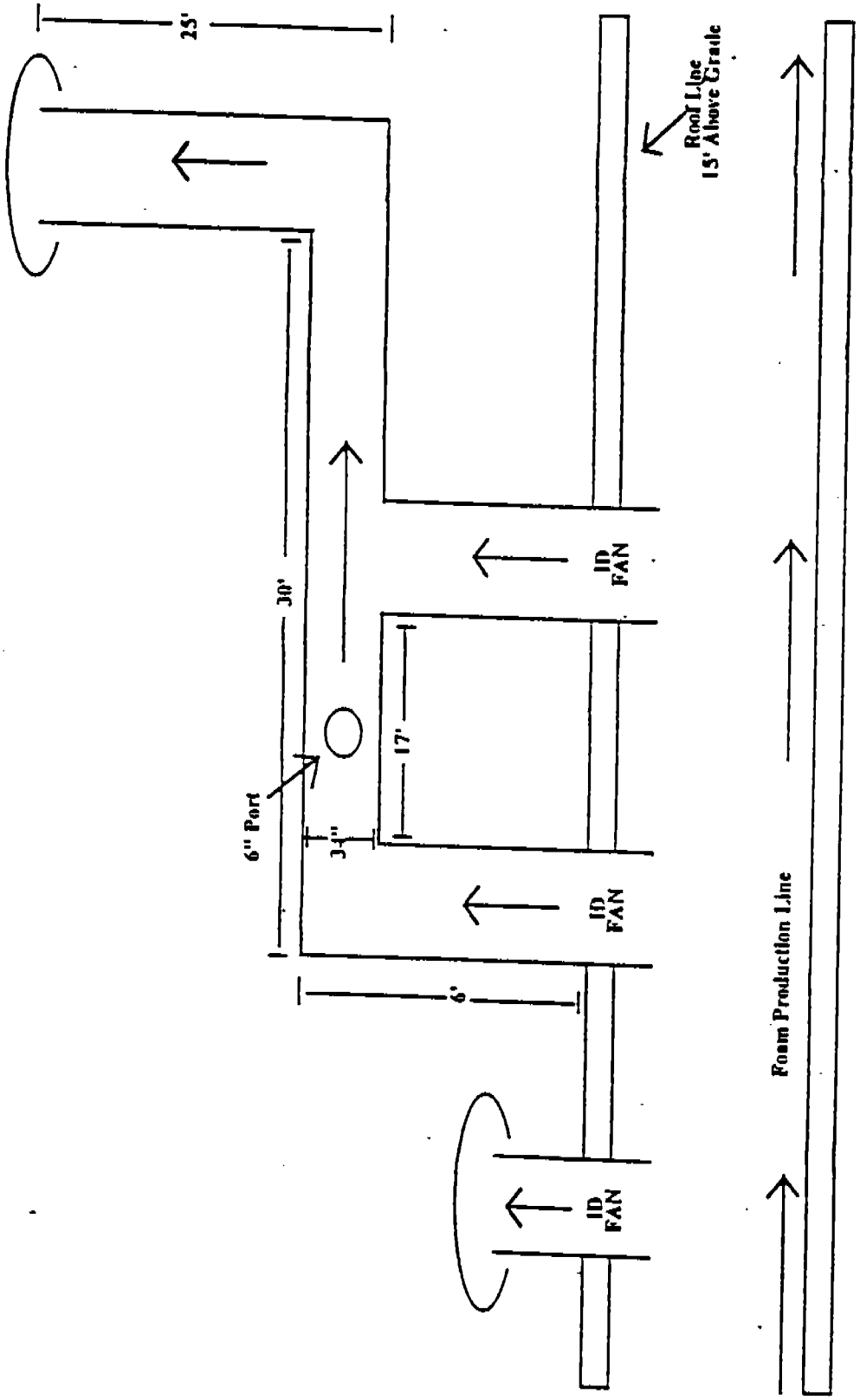


Figure 3-1. Sample Location

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

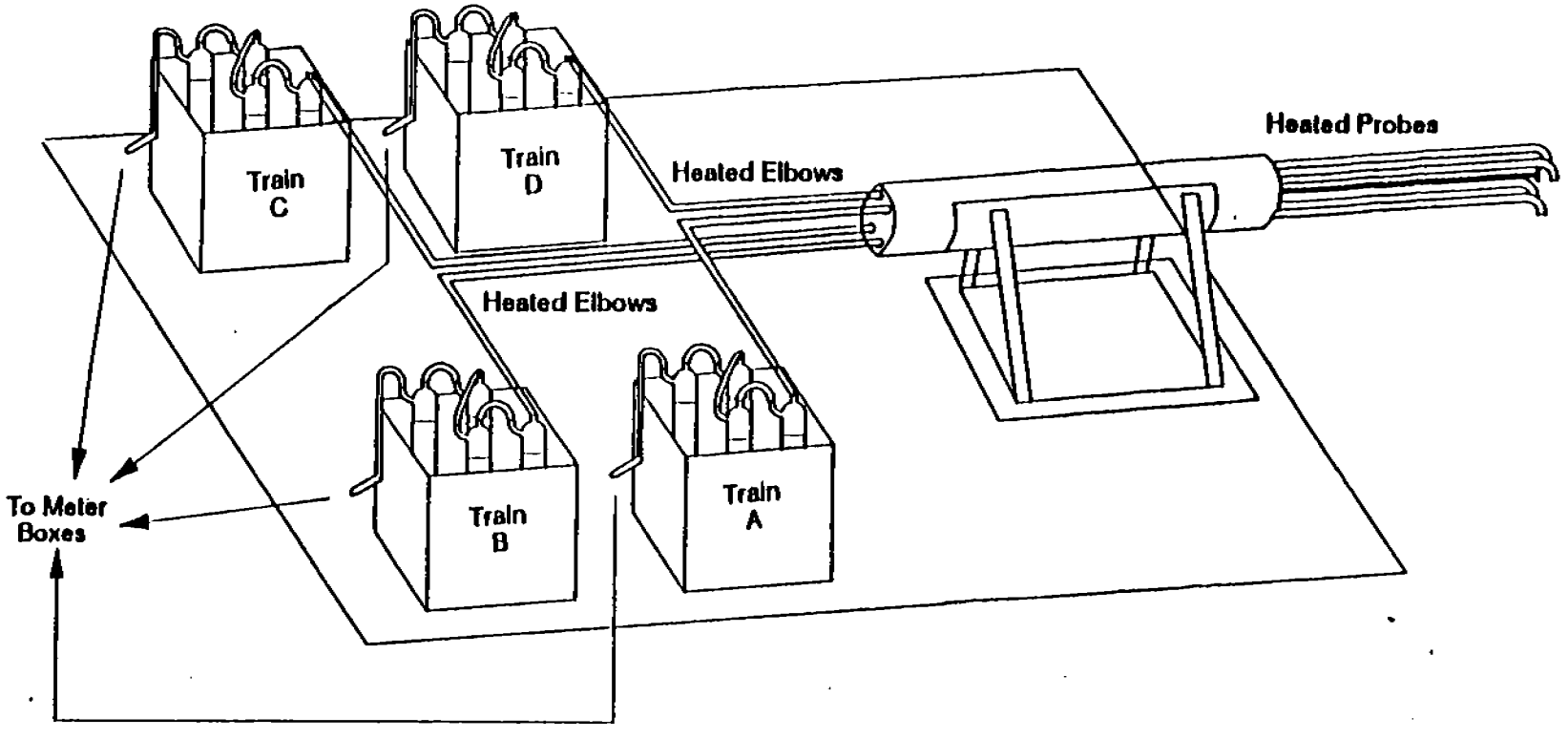


Figure 3-2. Schematic of Quad Train Setup

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

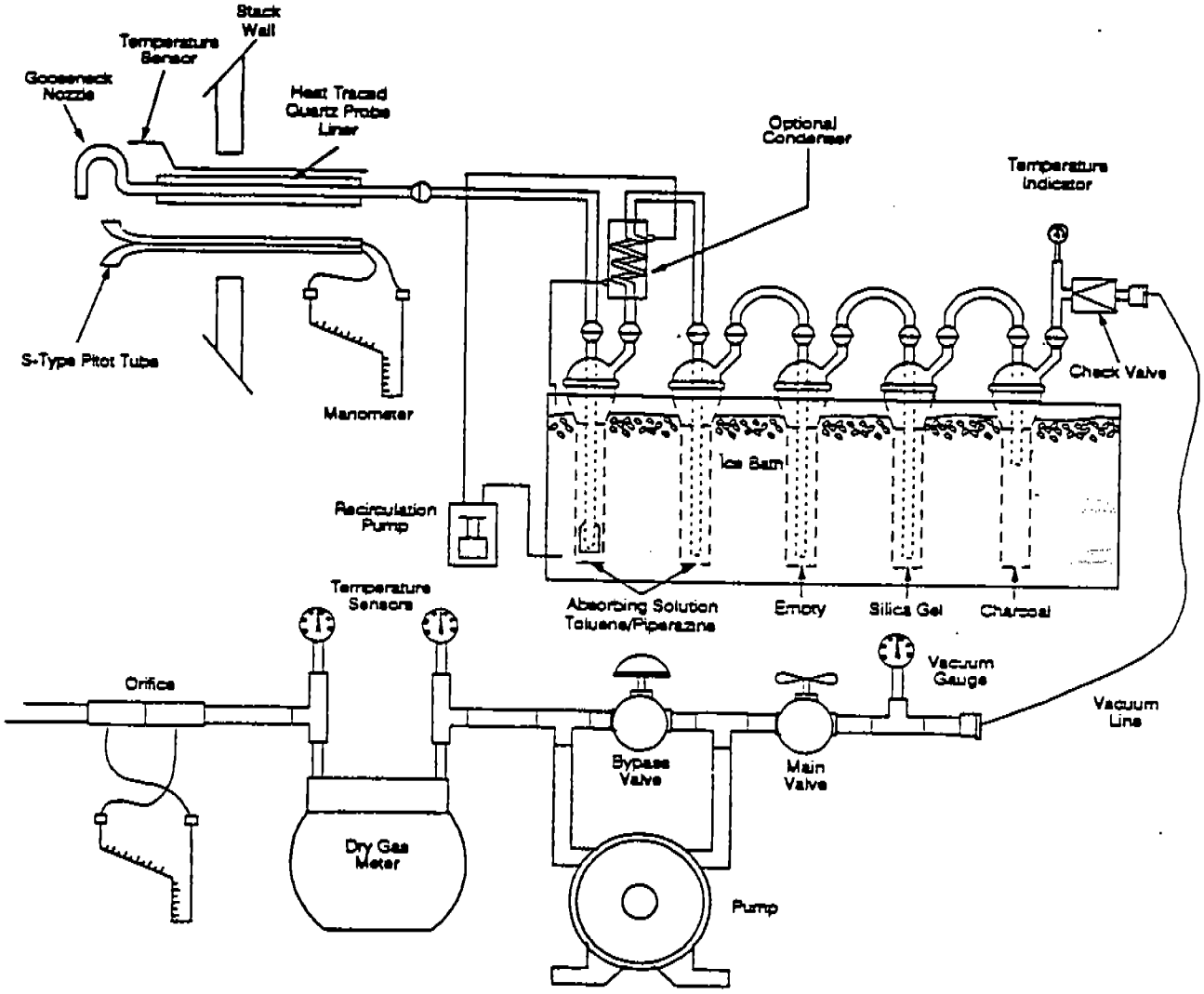


Figure 3-3. Sampling Train for Isocyanate

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.
- Temperatures 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.

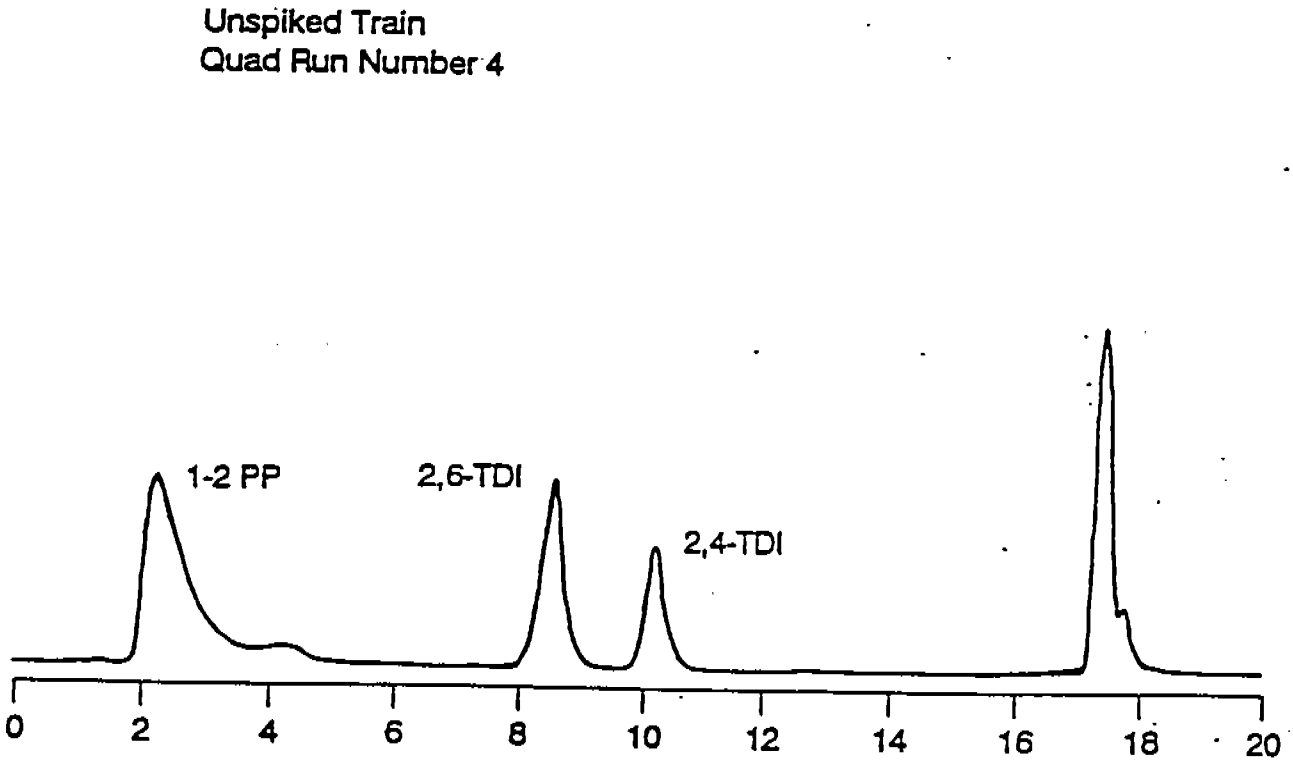


Figure 4-1. Chromatogram of Unspiked Train

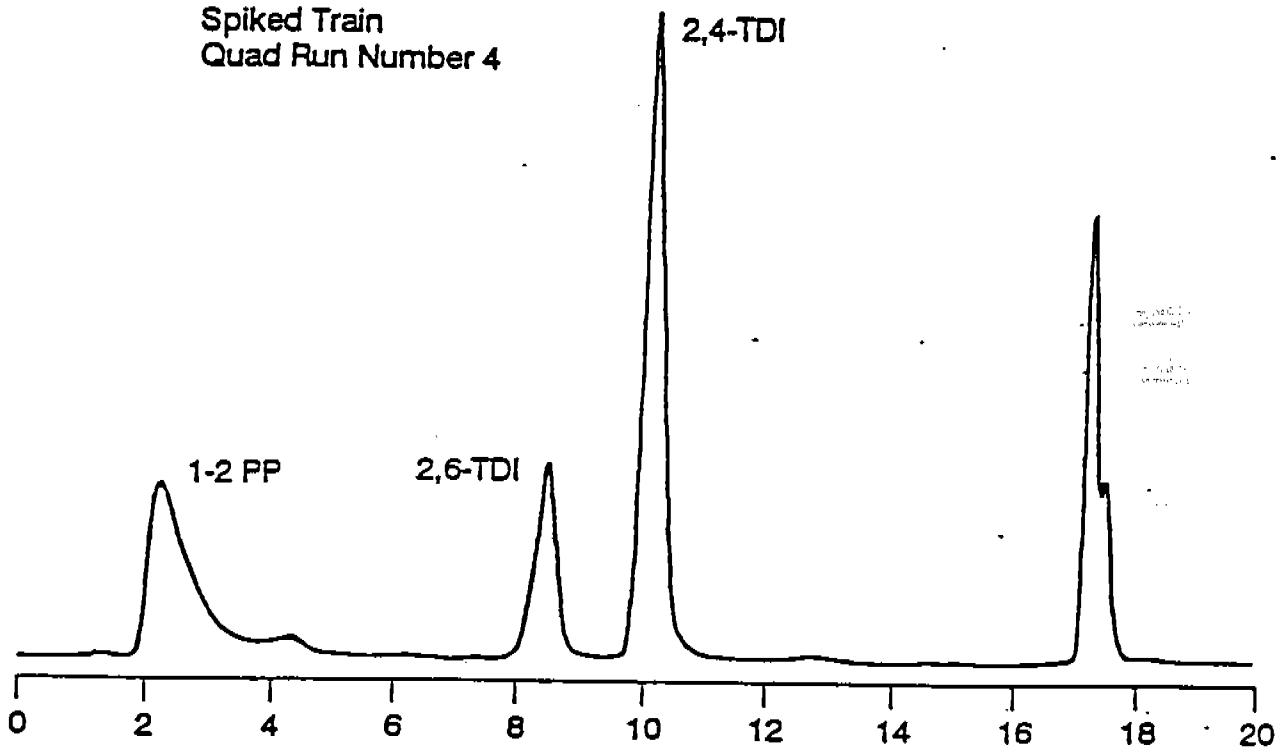


Figure 4-2. Chromatogram of Spiked Train

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).

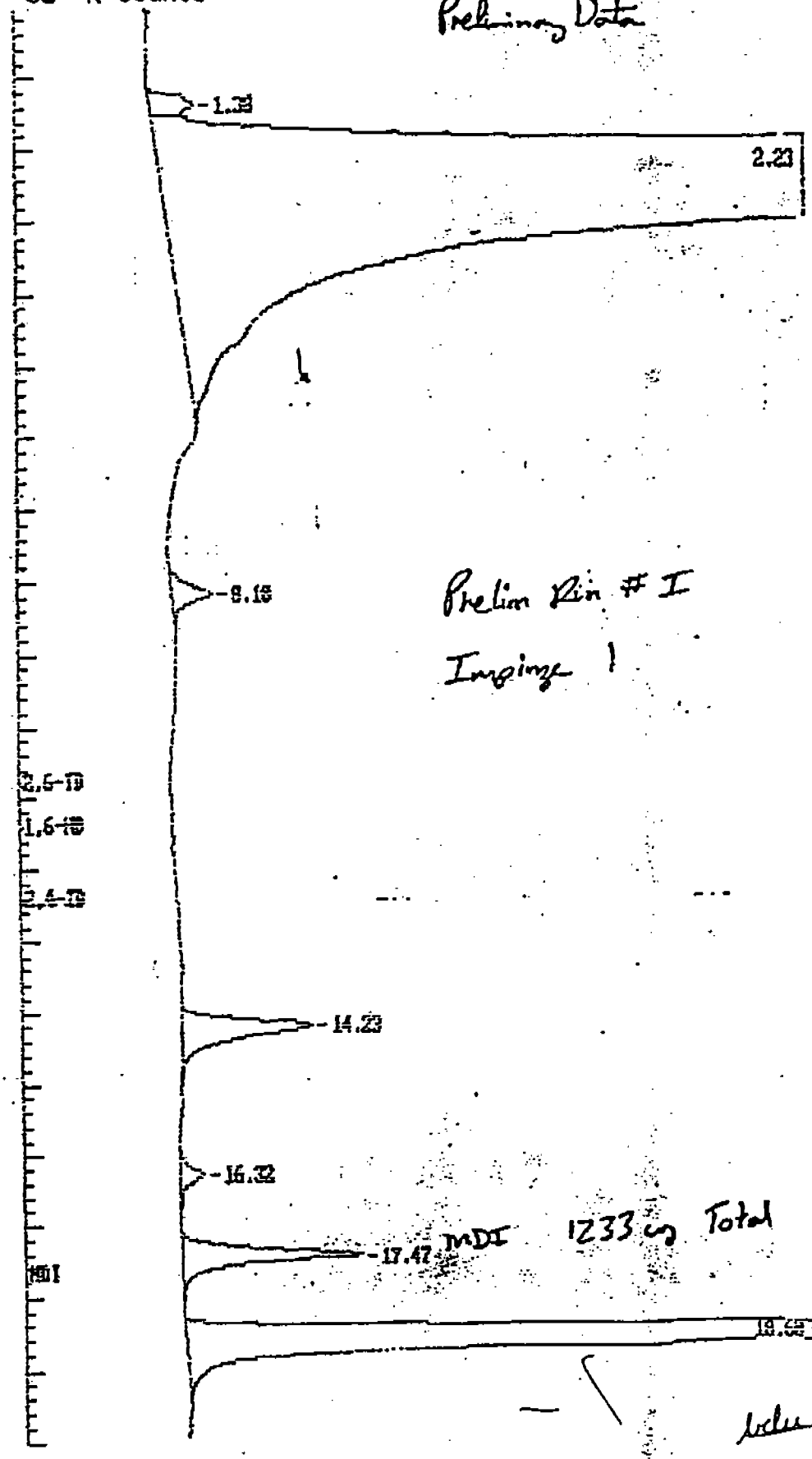
The total amount of 2,4-TDI (underivatized) collected in the unspiked and spiked trains is given in Table 4-1 and Table 4-2 respectively.

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.

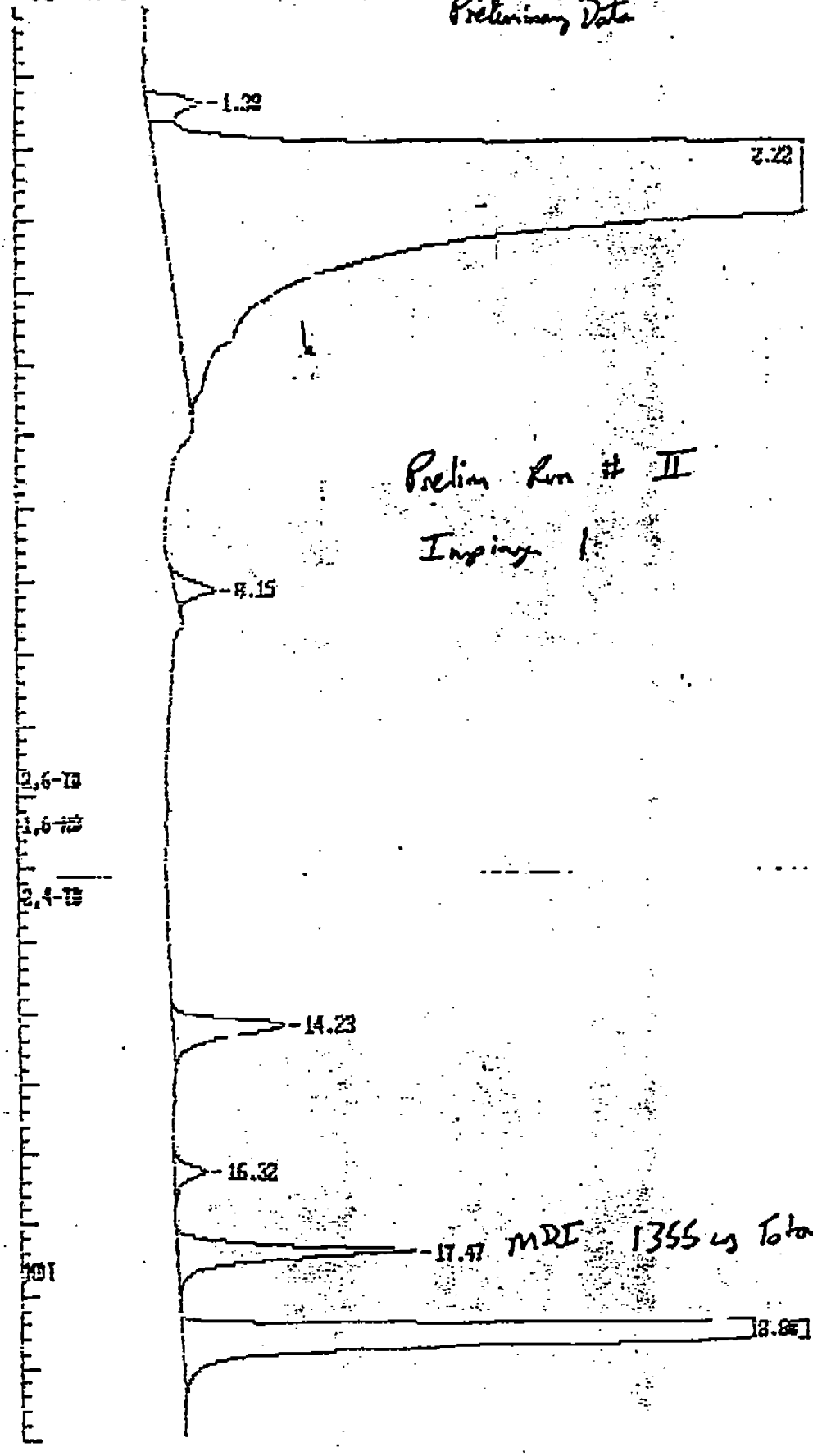
SENT BY:

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



Areas, times, and heights stored in: E:\S3253F7.ATB
Data File = E:\S3253F7.PTS Printed on 09-10-1993 at 13:01:05
Start time: 0.00 min. Stop time: 20.00 min. Offset: 0 cts
Full Range: 50 K-Counts

Preliminary Data



Prelim Run # II
Impinger 1

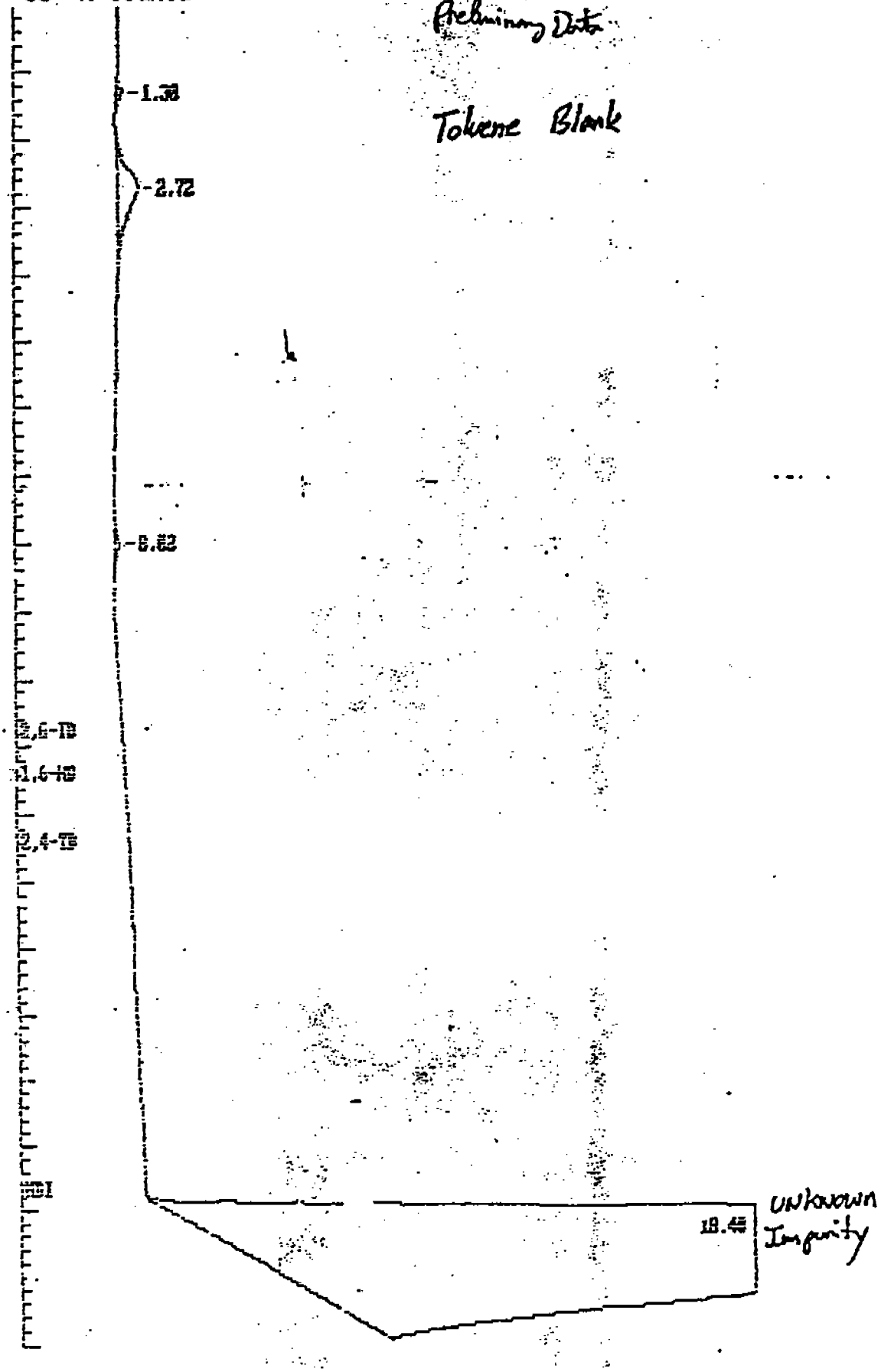
MDL = 1355 ug Total

SENT BY: [illegible]

Data File = E:\S3256F7.PTS Printed on 09-13-1993 at 14:43:55
Start time: 0.00 min. Stop time: 20.00 min. Offset: 0 cts
Full Range: 50 K-Counts

Preliminary Data

Toluene Blank



SENT BY:

Data File: C:\...

Start time: 0.00 min. Stop time: 20.00 min. Offset: 0 cts

Full Range: 50 K-Counts

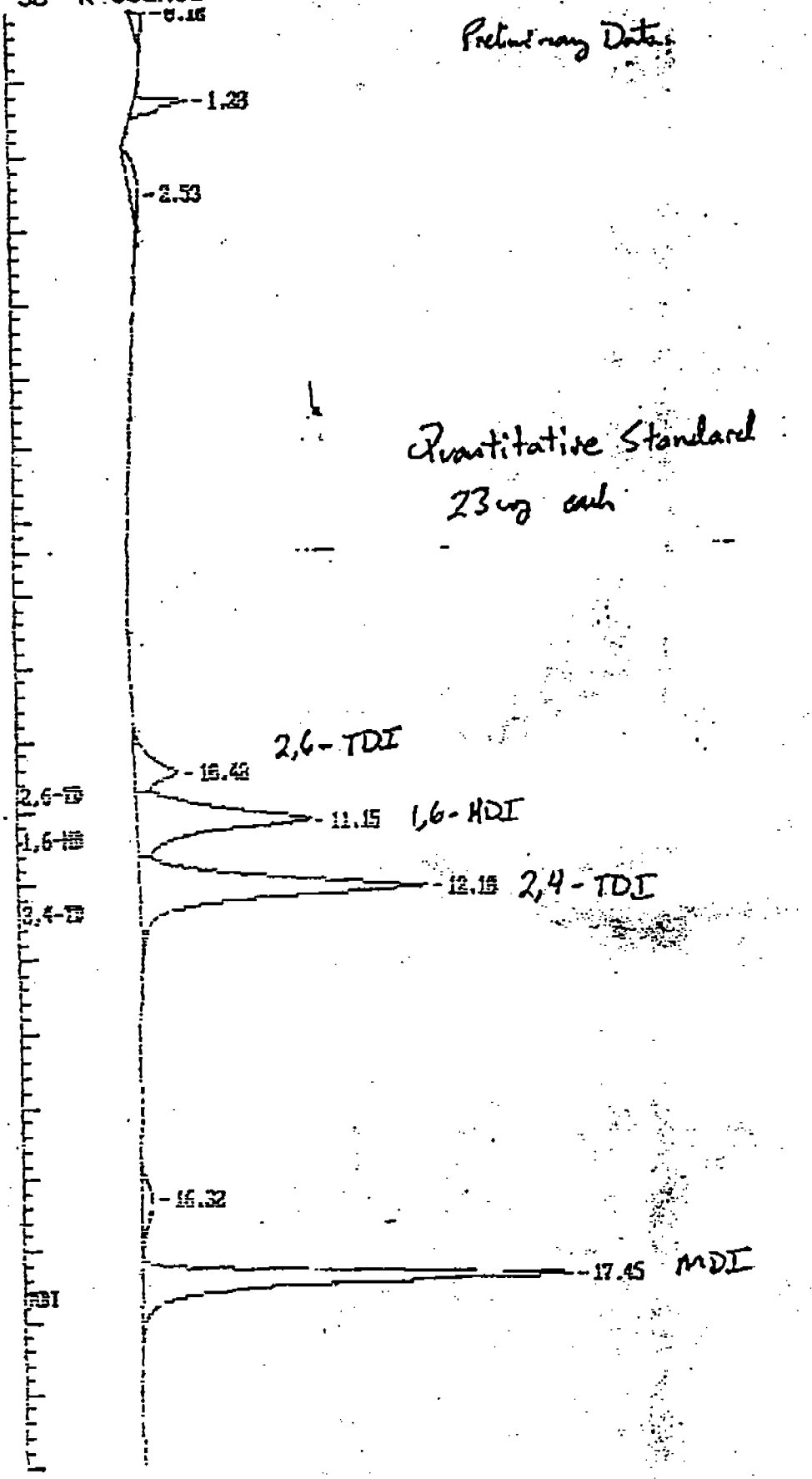


Table 4-1

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%	I-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				I-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%	I-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				I-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			I-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				I-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			I-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				I-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%										

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-9	544346	2.55			2000	5097.4	5114.2	29.07	1.21481	6212.9	6287.4			2-A-1
ARL-9	548157	2.57			2000	5132.9								
ARL-9	545954	2.56			2000	5112.4								
ARL-10	130306	0.62			100	61.8	61.4	29.07	1.21481	74.6				2-A-2
ARL-10	130940	0.62			100	62.1								
ARL-10	127140	0.60			100	60.3								
ARL-11	567669	2.66			2000	5314.9	5224.4	29.65	1.19105	6222.5	6269.9			2-B-1
ARL-11	563460	2.64			2000	5275.7								
ARL-11	542754	2.54			2000	5082.6								
ARL-12	83414	0.40			100	39.9	39.8	29.65	1.19105	47.4				2-B-2
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								
ARL-13	1287864	6.02			2000	12032.2	12045.3	28.67	1.23176	13215.1	13258.2	7827.81	89.16%	2-C-1
ARL-13	1288870	6.02			2000	12041.6								
ARL-13	1291043	6.03			2000	12061.9								
ARL-14	71522	0.34			100	34.4	35.0	28.67	1.23176	43.1				2-C-2
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								
ARL-16	103190	0.49			100	49.1	49.1	28.40	1.24347	61.1				2-D-2
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 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-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%										

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 ng	Total Train ug	Amount Spiked ug	Spike Recovery %	Train ID
ARL-25	198810	0.94			2000	1874.6	1831.7	30.60	1.15407	2113.9	2132.1			4-A-1
ARL-25	195931	0.92			2000	1847.7								
ARL-25	187888	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-B-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-B-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-B-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	1199464	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	93.3								
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	1589878	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	1183664	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-I	1194001	5.58	5.40641	3%	1	5.6								
ISO-SCF-32293-I	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-I	1201622	5.61	5.40641	4%	1	5.6								
ISO-SCF-32293-I	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
ARL-57	374801	1.76			2000	3516.0	3520.7	30.89	1.14324	4025.0	4086.0			8-A-1
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	1197542	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	5887.5	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				

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	25606	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%	89.18%	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	11825	12078	9694	9805	12233	12717	15471	15610	10450	9290	11197	10770	11982	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	4811	6287	6270	3466	3166	2132	2139	4947	5522	8042	7608	2558	2618	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%	54.38%

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			

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	407.50	144.07	3.40	-709.31	-394.53	471.48	-2.367	1.053
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 2.131	
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				
8	4086.0	4579.0	11197.0	10947.0	7827.81	250.00				-1088.31				

PHENOL

Phenol samples were collected using a Method 5 sampling train at 0.75 CFM using neutral-buffered absorbing reagent. The first impinger in each sampling was spiked with isotopically-labeled phenol (phenol-d_5) and 2-fluorophenol for sampling and recovery efficiency surrogates. The recovered samples were extracted and the extracts analyzed by GC/MS for phenol, phenol-d_5 and 2-fluorophenol as per EPA Method 8270. The recoveries of phenol-d_5 and 2-fluorophenol were used to adjust the measured phenol concentrations.

APPENDIX L

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

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

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

$$M_s = M_d\ (1 - B_{ws}) + 0.18\ B_{ws}$$

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

METHOD 5
CALCULATION EQUATIONS

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

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

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

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

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

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

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

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

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

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

Gas Chromatographic Method for Phenol in Air

PPM·DRY $= \frac{9.03 \times 10^{-3}\ m_r}{V_{std}}$

PP·WET = PPM·DRY (1-MC/100)

GR/DSCF $= 1.709 \times 10^{-3}$ (PPM·DRY)

mg/dscm = 3.913 (PPM·DRY)

$\dot{m}$ $= 8.5714 \times 10^{-3}$ (GR/DSCF) ($Q_{s,\,d}$)

where:

PPM·DRY = concentration of phenol in gas in parts per million by volume on a dry basis

PPM·WET = concentration of phenol in gas 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 phenol in gas on a grains per dry standard cubic foot basis (68 °F, 29.92 IN. HG.)

$\dot{m}$ = emission or mass rate of phenol in pounds per hour (LB/HR)

$Q_{s,\,d}$ = volumetric flow rate of stack gas in dry standard cubic feet per minute (DSCFM)

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

									Report No. 5-5194		
				LOUISIANA PACIFIC CORPORATION							
				Sagola, Michigan							
4/12/95					**MDI CALCULATIONS**						
Press RTO Inlet											
	TIME	**Vstd**		**Mass**	**Flow**		**Conc**		**Conc**		**Mass Rate**
RUN #	(HRS)	(DSCF)		(ug)	DSCFM		(mg/Nm3)		ppm		(LB/HR)
1	0955-1135	37.03		52.5	57058		0.050		0.0048		0.0107
2	1245-1400	37.41		84.5	57054		0.080		0.0077		0.017046
3	1455-1607	41.29		111	63006		0.095		0.0091		0.022404
Avg				**82.7**					**0.0072**		**0.016717**
4/12/95											
Press RTO Outlet											
	TIME	**Vstd**		**Mass**	**Flow**		**Conc**		**Conc**		**Mass Rate**
RUN #	(HRS)	(DSCF)		(ug)	DSCFM		(mg/Nm3)		ppm		(LB/HR)
1	0955-1135	30.92	<	2.5	78310	<	0.003	<	0.0003	<	0.000837
2	1245-1358	30.97	<	2.5	79384	<	0.003	<	0.0003	<	0.000848
3	1455-1605	31.04	<	2.5	79373	<	0.003	<	0.0003	<	0.000846
Avg			<	**2.5**				<	**0.000274**	<	**0.000844**

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: * an Excel spreadsheet:
G:\STACK\EXCEL\TEMPLATE\MDI.TEM

Derived by: Sheri J. Date: 4-27-95

Form S-511

Report No. 5-5194

LOUISIANA PACIFIC CORPORATION

Sagola, Michigan

Total HydroCarbons Calculations

PRESS RTO INLET

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
2	1	2.0	50	57060	5.44			0.0111224
	2	2.7	46	57055	5.04			0.0103063
	3	2.6	47	63010	5.68			0.0105195
						47.666667	5.38714	

PRESS RTO OUTLET

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)	(GR/DSCF)
3	1	2.8	1.6	79310	0.24			0.0003588
	2	1.8	1.4	79385	0.21			0.0003108
	3	2.1	1.5	79370	0.23			0.000334
						1.5	0.227552	

		Louisiana Pacific			Report No. 5-5194	
		Sagola, Michigan				
Press RTO Inlet						
		Carbon Monoxide				
		LB/HR Calculations				
RUN	**CO ppm**	**Flow**	**LB/DSCF**	**LB/HR**		
1	17	57784	1.23522E-06	4.28		
2	11	59136	7.9926E-07	2.84		
3	11	58674	7.9926E-07	2.81		
	13			**3.31**		
Press RTO Outlet						
		Carbon Monoxide				
		LB/HR Calculations				
RUN	**CO ppm**	**Flow**	**LB/DSCF**	**LB/HR**		
1	15	78360	1.0899E-06	5.12		
2	16	76947	1.16256E-06	5.37		
3	17	77077	1.23522E-06	5.71		
	16			**5.40**		

APPENDIX M

SAMPLING TRAIN CALIBRATION DATA

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job: 4P/SoCA Date: 4-12-95

Operator: E Hawkins Module No.: 2

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 28.24 in.Hg θ = .9962 ΔH@ 1.77 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(497.00)		
2.5	498.92	59	48
5.0	500.87	61	48
7.5	502.80	63	49
10	504.70	64	50
	V_m = 7.70	Avg(t_m) =	55.3 °F

Calculate Y_{cn} as follows:

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

$$Y_{cn} = \frac{1.786}{(\quad)(\quad)}\left[\frac{(\quad) + 460}{(\quad)}\right]^{0.5} \qquad 1.2716$$

$$Y_{cn} = .9945$$

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 Wheelabrator /SAGOLA Date 4-12-95

Operator BOB 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 ~~29.62~~ 29.24 in.Hg θ = 1.95 ΔH@ .9947 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(130.00)		
2.5	131.86	60	55
5.0	133.73	61	56
7.5	135.62	64	56
10	137.53	67	58
	V_m = 7.53	Avg(t_m) = 59.625	°F

Calculate Y_{cn} as follows:

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

$$Y_{cn} = \frac{1.786}{(.9947)\ (7.53)}\ [\frac{(59.625) + 460}{29.24}]^{0.5}$$

$$Y_{cn} = 1.022$$

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/SAGOLA Date 4-13-95

Operator BCS 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 28.35 in.Hg θ = 1.95 ΔH@ .9947 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(457.00)		
2.5	458.92	56	49
5.0	460.83	60	50
7.5	462.77	63	52
10	464.79	66	53
	V_m = 7.79	Avg(t_m) = 56.125	°F

Calculate Y_{cn} as follows:

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

$$Y_{cn} = \frac{1.786}{(\quad)(\quad)}\left[\frac{(\quad) + 460}{(\quad)}\right]^{0.5}$$

$$Y_{cn} = .9834$$

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: April 17, 1995

Meter Box No. : 2 (Rockwell Dry Test Meter Serial No. 964551)

Date of Last Calibration: March 29, 1995
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
April 11, 1995	5-5193	443.40	490.47	47.47	47.47
April 12, 1995	5-5194	505.10	1059.25	554.15	601.62

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: April 17, 1995

Meter Box No. : 7 (Rockwell Dry Test Meter Serial No. 965550)

Date of Last Calibration: April 26, 1994
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
July 06, 1994	4-3289	737.70	843.74	106.04	106.04
July 12, 1994	4-3366	853.90	991.80	137.90	243.94
August 16, 1994	4-3646	1002.80	1112.32	109.52	353.46
April 12, 1995	5-5194	1144.00	1718.92	574.92	1028.38

* Total volume through meter since last calibration.

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

Date 3-29-95
Bar. Press. 29.28 IN.HG
Wet Test Meter No. AL-20

Control Module No. 2
Serial No. DTM 964551
Technician E.TROWBRIDGE

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
Nominal	Actual	(ft^3)	(%)	(ΔP_w) (IN.WC.)	V_{di}	V_{df}	Wet Test t_w (°F)	Dry Test t_{di} (°F)	Dry Test t_{do} (°F)	θ (Min/Sec)	Y	ΔH@	
0.5	.5	2	99.85	0.01	412.500	414.534	66	85	71	4/57	1.0029	1.71	
1.2	1.2	3	99.91	0.025	404.000	407.060	66	84	69	4/47	.9885	1.71	
2.0	2.0	3	99.93	0.055	407.500	410.558	66	83	69	3/45	.9938	1.75	
3.3	3.3	5	100.00	0.09	415.000	420.132	66	92	72	4/54	.9958	1.75	
4.7	4.7	5	100.02	0.12	421.000	426.170	66	96	74	4/22	.9902	1.96	
	2	3	4	5	6	7	8	9	10	11/12 Avg	.9962	1.77	

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 3/30/95

*Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

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M-6

Date 4-26-94

Bar. Press. 28.36 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 6

Control Module No. 7
Serial No. DTM 964550
Wet Test Meter No. AL-20
Technician [signature]

ΔH (in. WC)		Gas Volume Wet Test Meter (ft^3)	* Cal. Index Y (%)	* Diff. Wet Test Meter ΔP_w (in. WC)	Gas Volume Dry test meter (ft^3)		Gas temperatures			Time θ min/sec	Meter Coeff. Y	Orifice Const. ΔH@	C_f
nominal	actual				V_{di}	V_{df}	Wet Test t_w (°F)	Dry Test t_{di} (°F)	Dry Test t_{do} (°F)				
0.6	.5	2	99.85	0.01	693,700	695,728	69	80	75	5/02	.9992	1.85	
1.2	1.2	3	99.91	0.025	690,500	693,555	69	79	75	4/58	.9928	1.92	
2.0	2.0	3	99.93	0.055	696,000	699,060	69	84	77	3/54	.9957	1.96	
3.3	3.3	5	100.00	0.09	700,000	705,124	69	89	78	5/06	.9938	1.98	
4.7	4.7	6	100.02	0.12	705,500	710,625	69	90	79	4/20	.9919	2.02	
8	8	6	8	8	4	7	6	8	10	11/15	.9941	1.95	

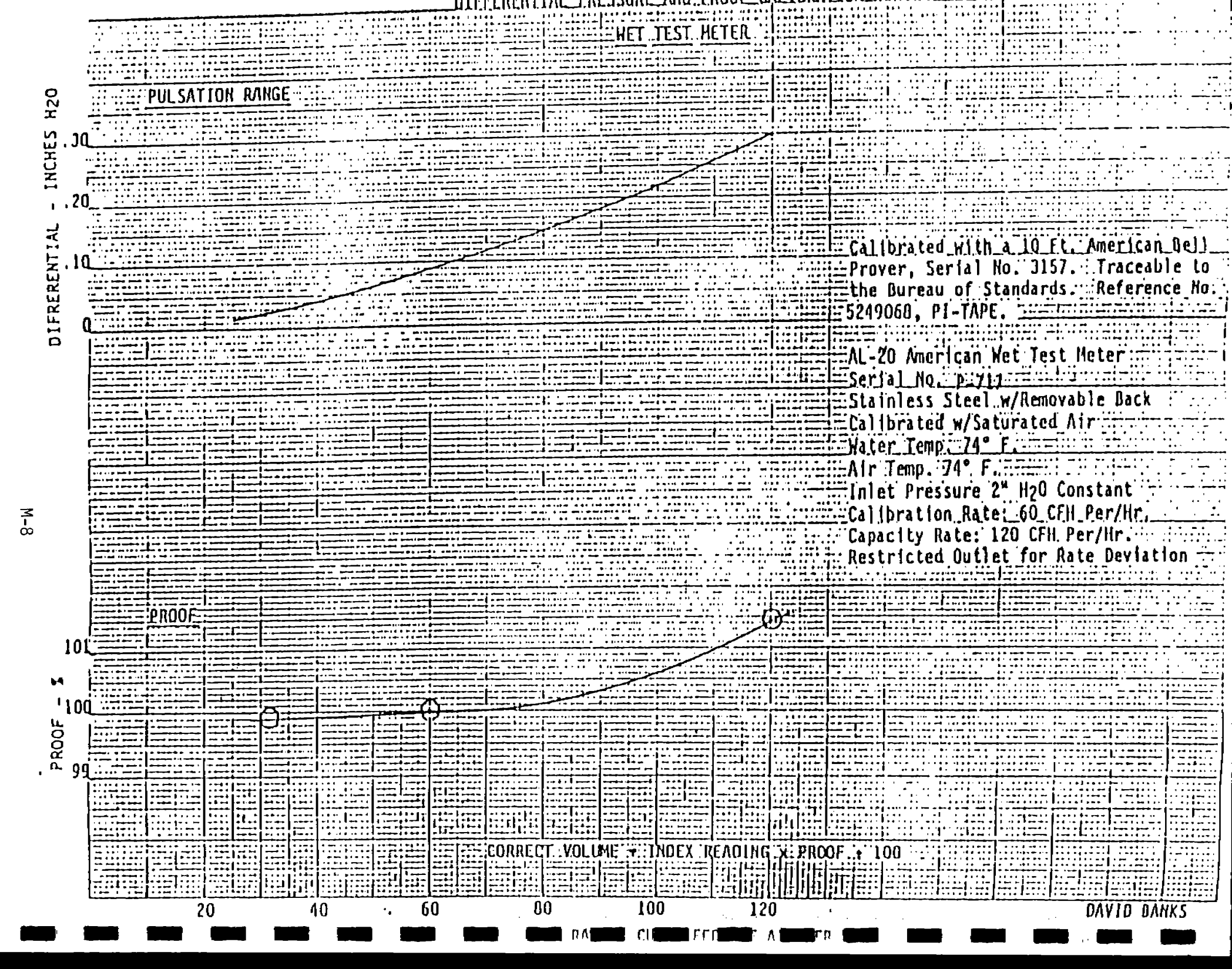
Positive leak check performed by [signature]
Meter was in tolerance ☒
Meter was not in tolerance ☐; readjusted linkage
Meter was not in tolerance ☐; changed dry test meters

Approved by [signature] Date 5/2/94

* Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

S0102RR 11/91

M-7


WET TEST METER
PULSATION RANGE
DIFFERENTIAL - INCHES H2O
.30
.20
.10
0
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
PROOF
101
100
99
PROOF - %
CORRECT VOLUME = INDEX READING X PROOF ÷ 100
20
40
60
80
100
120
DAVID BANKS
M-8

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 04-12-95 Nozzle Number glass
Technician: Ed Trowbridge

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.200
2	.199
3	.200
Average:	.200

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 04-12-95 Nozzle Number glass
Technician: Bob Aschenbach

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.189
2	.189
3	.189
Average:	.189

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 04-12-95
Technician: Bob Aschenbach

Nozzle Number glass

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.226
2	.227
3	.227
Average:	.227

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 04-12-95
Technician: Ed Trowbridge

Nozzle Number glass

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	.245
2	.245
3	.245
Average:	.245

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 04-13-95 Nozzle Number 9-4
Technician: Ed Trowbridge

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.247
2	.248
3	.247
Average:	.247

Interpoll Laboratories, Inc.
(612) 786-6020

Nozzle Calibration
Data Sheet

Date of Calibration: 04-13-95 Nozzle Number 5-3
Technician: Bob Aschenbach

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	.191
2	.192
3	.191
Average:	.191

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Temperature Measurement Device Calibration Sheet

Unit Under Test:
Vendor: OMEGA
Model: HH51
Range: 0 - 2400 °F
Date of Calibration: 4-3-95
Serial Number: T4TX0343
Thermocouple Type: K
Technician: EITRAUBRIDGE
PDT No.: 34

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100°F) ± 1 degree (for negative temperatures add ± 2 degrees). The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation	
			Δt (°F)	(%)
0	0	-6	6	1.30
100	100	94	6	1.07
200	200	198	2	.30
300	300	294	6	.79
400	400	394	6	.70
500	500	495	5	.52
600	600	597	3	.28
700	700	696	4	.34
800	800	799	1	.08
900	900	898	2	.15
1000	1000	999	1	.07
1100	1100	1097	3	.19
1200	1200	1199	1	.06
1300	1300	1297	3	.17
1400	1400	1400	0	0
1500	1500	1498	2	.10
1600	1600	1602	2	.10
1700	1700	1699	1	.05
1800	1800	1800	0	0
1900	1900	1899	1	.04
2000	2000	2000	0	0
2100	2100	2097	3	.12
		Averages:	2.636	.240

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	Serial Number	38
Range	0-2200 °F	Thermocouple Type	K
Date of Calibration	2-2-95	Technician	Scott Fuelsta
Method of Calibration:		PDT No.	38

☐ 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	.65
100	100	98	2	.36
200	200	200	0	0
300	300	298	2	.26
400	400	397	3	.35
500	500	498	2	.21
600	600	599	1	.09
700	700	698	2	.17
800	800	801	1	.08
900	900	900	0	0
1000	1000	1001	1	.07
1100	1100	1098	2	.13
1200	1200	1201	1	.06
1300	1300	1298	2	.11
1400	1400	1402	2	.11
1500	1500	1499	1	.05
1600	1600	1602	2	.10
1700	1700	1700	0	0
1800	1800	1802	2	.09
1900	1900	1899	1	.04
2000	2000	2001	1	.04
2100	2100	2099	1	.04
		Averages:	1.45	.14

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.

011995-G:\STACK\WP\FORMS\S-433

Interpoll Laboratories, Inc.
(612) 786-6020

S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 27-6

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" .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. 27-8

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" 0
9. W <.0625" .01

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .750 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

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

Date of Inspection: 1-7-94

Inspected by: E. Crawford

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:

E Thornhill

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. 31-8

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" 0
9. W <.0625" .01

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .750 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

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

Date of Inspection: 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. MM-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" .03
9. W <.0625" .025

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:

4-8-94

Inspected by:

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. MM5-S

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° 2
7. B_2 < 5° 2

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:

4-7-93

Inspected by:

CFR Title 40 Part 60 Appenidix A Method 2

S-348

4-7-93 G:\STACK\WP\FORMS\S-348

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date: 3-31-95
Technician: Bob A
Mercury Column Barometer No.: No 1 Lab
Aneroid Barometer No.: 10723029

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjusted Mercury Barometer Read	Initial Aneroid Barometer Read	Difference (P_{ba} - P_{bm})
29.33	77	.127	29.213	29.22	.01

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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ET 15

INTERPOLL LABORATORIES
(612)786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 1-11-95

Technician E Trowbridge

Mercury Column Barometer No. ULTIMETER MODEL 12

Aneroid Barometer No. SN -A1002005

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjsted Mercury Barometer Read	Initial Aneriod Barometer Read	Difference (P_{ba}-P_{bm})
28.86	72	.113	28.747	28.68	.067

Has this barometer shown any consistent problems with calibration? Yes/(No). If yes, explain. No

Has problem been alleviated? (Yes)/No. How?

*Note

Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20-30 minutes before calibrating. Aneriod barometer will be calibrated to the adjusted mercury barometer readings.

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