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

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

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RESULTS OF THE MARCH 18 - 21, 1996 EPA AND STATE AIR EMISSION COMPLIANCE TESTING AT THE LOUISIANA PACIFIC OSB PLANT IN HAYWARD, WISCONSIN

Submitted to:

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Report Number 6-7451
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ABBREVIATIONS

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

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

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

1 INTRODUCTION

During March 18 - 21, 1996, Interpoll Laboratories conducted EPA and State air emission compliance tests at the Louisiana Pacific OSB Plant in Hayward, Wisconsin on the following sources:

Source	Parameters
Line 2 Dryer RTO Stack	PM,NO_x,VE,CO,CH_2O,Benzene,THC's,Phenol,PAH's
Line 2 Core Dryer Duct	NO_x,CO,THC's
Line 2 Surface Dryer Duct	NO_x,CO,THC's
Line 2 Press Vent RTO Stack	PM,NO_x,VE,CO,THC's,CH_20
Line 2 Press Vent RTO Inlet	NO_x,CO,THC's
Line 2 Thermal Oil Heater	PM,NO_x,VE,CO,CH_2O,Benzene
Line 2 Dryer RTO Inlet	PM,NO_x

On-site testing was performed by Ed Trowbridge, Duane Van Hoever, Mark Kaehler, Bob Aschenbach, Ed Juers, Scott Fjelsta, Steve Kelker, Jim Lorenz, Lee Hansen, Mark Peterson, Sheryl Bergeron, and Ken Nuessmeier. Coordination between testing activities and plant operation was provided by Keith Selig of Louisiana-Pacific. The tests were witnessed by Jim Ross of the Wisconsin Department of Natural Resources.

Particulate determinations were performed in accordance with EPA Methods 1 - 5, CFR Title 40, Part 60, Appendix A (revised July 1, 1995). Preliminary volumetric flow rate determinations were used to select the appropriate nozzle diameter for isokinetic sample withdrawal. Interpoll Labs Model 3 M5 sampling trains which meet or exceed specifications in the above-cited reference were used to extract particulate samples by means of heated stainless steel probe. Wet catch samples were collected in the back half of the Method 5 sampling train at the stack test site and analyzed as per Wisconsin DNR protocol.

Oxides of nitrogen, carbon monoxide, oxygen, and carbon dioxide concentrations were determined in accordance with Methods 7E, 10, and 3A (Ibid). A slip stream of sample gas was withdrawn from the exhaust gas stream using a heated stainless steel probe equipped with a filter to remove interfering particulate material. The particulate-free gas was transported to the analyzers by means of a heat-traced probe and filter assembly. After passing

Benzene samples were collected in the accordance with EPA Method 18 (Section 7.4 - Absorption Tube Procedure) using 800/200 mg charcoal tubes. The samples were returned to the laboratory and analyzed by Modified NIOSH 1501.

Total gaseous hydrocarbon concentrations were determined instrumentally using a Ratfisch Model RS 55 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 using a Method 5 sampling train with a neutral buffered absorbing reagent followed by extraction with methylene chloride and direct analysis by GC/MS with no concentration (EPA Method 8270). The samples were field spiked with 5.33 mg of phenol d5.

Polyaromatic hydrocarbons sampling was conducted using the EPA Modified Method 5 sampling procedure as per EPA Method 010 SW 846. The four-part sample and field blank were extracted, concentrated to 1000 ul and cleaned up as required (column chromatography as per Interpoll Labs Method II-8904-2 or GPC) prior to final concentration and analysis. The samples were then further concentrated to 100 ul and analyzed in accordance with EPA Method 8270 by HRGC/LRMS using electron impact (EI) with total ion monitoring (TIM). Quantification was performed using the six standard M-8270 internal standards. Each XAD-2 resin cartridge was field spiked with 20 ug of d_{10}-fluoroanthene in order to document overall collection and analytical efficiency and recovery. Analytical accuracy and recovery for extraction and cleanup was documented using the six m-8270-recommended surrogate standards.

Integrated flue gas samples were extracted simultaneously with each of the above-referenced sample trains from the sampling train exhaust ports as part of the overall project quality assurance using a specially designed gas sampling system. Integrated flue gas samples were collected in 44-liter Tedlar bags. Prior to sampling, the Tedlar bags are leak checked at 15 IN.HG. vacuum with an in-line rotameter. Bags with any detectable inleakage are discarded. After sampling was complete, the bags were sealed and returned to the laboratory for Orsat analysis.

A summary and discussion of all of the important results of this compliance test is given in the following section. More detailed results of the various samplings are presented in Section 3, together with pertinent sampling parameters. Supplemental information such as field data sheets, laboratory results, procedures and calculation equations are presented in the appendices.

2 SUMMARY AND DISCUSSION

The results of the air emission compliance tests are presented in Tables 1 - 11. An overview of the results is presented in the table below:

PARAMETER		MEASURED
LINE 2 DRYER RTO STACK		
Particulate		
DRY + WET CATCH		
	(GR/DSCF)	0.0075
	(LB/HR)	4.5
DRY CATCH ONLY		
	(GR/DSCF)	0.0044
	(LB/HR)	2.7
Oxides of Nitrogen		
	(ppm,d)	16
	(LB/HR)	8.2
Opacity	(%)	0
Carbon Monoxide		
	(ppm,d)	225
	(LB/HR)	69
Formaldehyde		
	(ppm,d)	8.9
	(LB/HR)	3.0
Benzene		
	(ppm,d)	0.12
	(LB/HR)	0.12
TGNMO's		
	(ppmC,w)	31
	(LB/HR)	5.6
Phenol		
	(ppb,d)	< 177
	(10^{-3}LB/HR)	< 180
LINE 2 CORE DRYER DUCT		
Oxides of Nitrogen		
	(ppm,d)	23
	(LB/HR)	4.8
Carbon Monoxide		
	(ppm,d)	1035
	(LB/HR)	131
TGNMO's		
	(ppmC,w)	730
	(LB/HR)	53

PARAMETER		MEASURED
LINE 2 SURFACE DRYER DUCT		
Oxides of Nitrogen		
	(ppm,d)	31
	(LB/HR)	6.1
Carbon Monoxide		
	(ppm,d)	1973
	(LB/HR)	237
TGNMO's		
	(ppmC,w)	770
	(LB/HR)	56
LINE 2 PRESS VENT RTO STACK		
Particulate		
DRY + WET CATCH		
	(GR/DSCF)	0.0022
	(LB/HR)	1.3
DRY CATCH ONLY		
	(GR/DSCF)	0.0014
	(LB/HR)	0.84
Oxides of Nitrogen		
	(ppm,d)	20
	(LB/HR)	9.8
Opacity	(%)	0
Carbon Monoxide		
	(ppm,d)	22
	(LB/HR)	6.4
Formaldehyde		
	(ppm,d)	0.31
	(LB/HR)	0.10
TGNMO's		
	(ppmC,w)	8
	(LB/HR)	1.0
LINE 2 PRESS RTO INLET		
Oxides of Nitrogen		
	(ppm,d)	2.6
	(LB/HR)	1.4
Carbon Monoxide		
	(ppm,d)	11
	(LB/HR)	3.6
TGNMO's		
	(ppmC,w)	102
	(LB/HR)	15.1

PARAMETER	MEASURED
LINE 2 THERMAL OIL HEATER	
Particulate	
DRY + WET CATCH	
. . . . . (GR/DSCF)	0.045
. . . . . ($LB/10^6BTU$)	0.16
DRY CATCH ONLY	
. . . . . (GR/DSCF)	0.042
. . . . . ($LB/10^6BTU$)	0.15
Oxides of Nitrogen	
. . . . . (ppm,d)	62
. . . . . (LB/HR)	7.7
Opacity . . . . . (%)	0.25
Carbon Monoxide	
. . . . . (ppm,d)	218
. . . . . (LB/HR)	16.5
Formaldehyde	
. . . . . (ppm,d)	0.12
. . . . . (LB/HR)	0.0098
Benzene	
. . . . . (ppm,d)	≤ 0.22
. . . . . (LB/HR)	≤ 0.044
LINE 2 DRYER RTO INLET	
Particulate	
DRY + WET CATCH	
. . . . . (GR/DSCF)	0.040
. . . . . (LB/HR)	22
DRY CATCH ONLY	
. . . . . (GR/DSCF)	0.015
. . . . . (LB/HR)	8.0
Oxides of Nitrogen	
. . . . . (ppm,d)	9
. . . . . (LB/HR)	4.1

The PAH results are summarized in Table 11. Please note that water injection occurred during some of the testing. These test runs are designated in the following pages with an asterisk.

No difficulties were encountered in the field or in the laboratory evaluation of the samples. On the basis of these facts and a complete review of the data and results, it is our opinion that the concentrations and emission rates reported herein are accurate and closely reflect the actual values which existed at the time the tests were performed.

Table 1a Summary of the Results of the March 19, 1996 Particulate Emission Compliance Test of the Line 2 Dryer RTO Stack at the Louisiana Pacific Plant in Hayward, Wisconsin.

ITEM		Run 1	*Run 2	Run 3
Date of test		03-19-96	03-19-96	03-19-96
Time runs were done	(HRS)	1030/1140	1320/1429	1500/2037
Volumetric flow				
actual	(ACFM)	132280	137925	135372
standard	(DSCFM)	68859	70732	69238
Gas temperature	(DEG-F)	262	264	263
Moisture content	(%V/V)	25.85	26.73	27.04
Gas composition	(%V/V,dry)			
carbon dioxide		4.20	4.00	4.30
oxygen		15.80	16.10	15.80
nitrogen		80.00	79.90	79.90
Isokinetic variation	(%)	106.3	99.2	101.0
Particulate concentration				
actual	(GR/ACF)	.002670	.005603	.003322
standard	(GR/DSCF)	.005130	.0109	.006497
Part. emission rate	(LB/HR)	3.03	6.63	3.86

Note: Dry + Organic/Inorganic Wet Catch

* E-TUBE H_2O ON.

Table 1b Summary of the Results of the March 19, 1996 Particulate Emission Compliance Test of the Line 2 Dryer RTO Stack at the Louisiana Pacific Plant in Hayward, Wisconsin.

ITEM	Run 1	* Run 2	Run 3
Date of test	03-19-96	03-19-96	03-19-96
Time runs were done (HRS)	1030/1140	1320/1429	1500/2037
Volumetric flow			
actual (ACFM)	132280	137925	135372
standard (DSCFM)	68859	70732	69238
Gas temperature (DEG-F)	262	264	263
Moisture content (%V/V)	25.85	26.73	27.04
Gas composition (%V/V,dry)			
carbon dioxide	4.20	4.00	4.30
oxygen	15.80	16.10	15.80
nitrogen	80.00	79.90	79.90
Isokinetic variation (%)	106.3	99.2	101.0
Particulate concentration			
actual (GR/ACF)	.000840	.004241	.001709
standard (GR/DSCF)	.001614	.008273	.003342
Part. emission rate (LB/HR)	0.953	5.02	1.98

Note: Dry Catch Only

* E-TUBE H_2O ON.

Table 2a Summary of the Results of the March 20, 1996 Particulate Emission Compliance Test of the Line 2 Press Vent RTO Stack at the Louisiana Pacific Plant in Hayward, Wisconsin.

ITEM		Run 1	Run 2	Run 3
Date of test		03-20-96	03-20-96	03-20-96
Time runs were done	(HRS)	1012/1114	1135/1241	1305/1411
Volumetric flow				
actual	(ACFM)	95284	95834	95693
standard	(DSCFM)	69923	70293	69564
Gas temperature	(DEG-F)	233	233	233
Moisture content	(%V/V)	1.56	1.65	2.47
Gas composition	(%V/V,dry)			
carbon dioxide		0.03	0.03	0.03
oxygen		20.90	20.90	20.90
nitrogen		79.07	79.07	79.07
Isokinetic variation	(%)	100.0	100.0	100.5
Particulate concentration				
actual	(GR/ACF)	.003087	.000705	.001003
standard	(GR/DSCF)	.004209	.000961	.001380
Part. emission rate	(LB/HR)	2.52	0.579	0.823

Note: Dry + Organic/Inorganic Wet Catch

Table 2b Summary of the Results of the March 20, 1996 Particulate Emission Compliance Test of the Line 2 Press Vent RTO Stack at the Louisiana Pacific Plant in Hayward, Wisconsin.

ITEM		Run 1	Run 2	Run 3
Date of test		03-20-96	03-20-96	03-20-96
Time runs were done	(HRS)	1012/1114	1135/1241	1305/1411
Volumetric flow				
actual	(ACFM)	95284	95834	95693
standard	(DSCFM)	69923	70293	69564
Gas temperature	(DEG-F)	233	233	233
Moisture content	(%V/V)	1.56	1.65	2.47
Gas composition	(%V/V,dry)			
carbon dioxide		0.03	0.03	0.03
oxygen		20.90	20.90	20.90
nitrogen		79.07	79.07	79.07
Isokinetic variation	(%)	100.0	100.0	100.5
Particulate concentration				
actual	(GR/ACF)	.002202	.000201	.000677
standard	(GR/DSCF)	.003001	.000275	.000932
Part. emission rate	(LB/HR)	1.80	0.165	0.555

Note: Dry Catch Only

Table 3a Summary of the Results of the March 18, 1996 Particulate Emission Compliance Test of the Line 2 Thermal Oil Heater Stack at the Louisiana Pacific Plant in Hayward, Wisconsin.

ITEM		Run 1	Run 2	Run 3
Date of test		03-19-96	03-19-96	03-19-96
Time runs were done	(HRS)	1800/1903	1930/2032	2100/2202
Volumetric flow				
actual	(ACFM)	31644	31697	32275
standard	(DSCFM)	16834	16089	16292
Gas temperature	(DEG-F)	391	410	419
Moisture content	(%V/V)	10.50	12.69	12.27
Gas composition	(%V/V,dry)			
carbon dioxide		6.40	7.40	8.30
oxygen		13.60	12.50	11.60
nitrogen		80.00	80.10	80.10
Isokinetic variation	(%)	100.5	102.3	101.2
Particulate concentration				
actual	(GR/ACF)	.0223	.0234	.0242
standard	(GR/DSCF)	.0419	.0461	.0480
Part. emission rate	(LB/HR)	6.04	6.36	6.70
Emission factor	(LB/MMBTU)	0.164	0.157	0.148

Note: Dry + Organic/Inorganic Wet Catch

Table 3b Summary of the Results of the March 18, 1996 Particulate Emission Compliance Test of the Line 2 Thermal Oil Heater Stack at the Louisiana Pacific Plant in Hayward, Wisconsin.

ITEM		Run 1	Run 2	Run 3
Date of test		03-19-96	03-19-96	03-19-96
Time runs were done	(HRS)	1800/1903	1930/2032	2100/2202
Volumetric flow				
actual	(ACFM)	31644	31697	32275
standard	(DSCFM)	16834	16089	16292
Gas temperature	(DEG-F)	391	410	419
Moisture content	(%V/V)	10.50	12.69	12.27
Gas composition	(%V/V,dry)			
carbon dioxide		6.40	7.40	8.30
oxygen		13.60	12.50	11.60
nitrogen		80.00	80.10	80.10
Isokinetic variation	(%)	100.5	102.3	101.2
Particulate concentration				
actual	(GR/ACF)	.0210	.0204	.0237
standard	(GR/DSCF)	.0395	.0401	.0470
Part. emission rate	(LB/HR)	5.69	5.53	6.56
Emission factor	(LB/MMBTU)	0.155	0.137	0.145

Note: Dry Catch Only

Table 4a Summary of the Results of the March 18, 1996 Particulate Emission Compliance Test of the Line 2 Dryer RTO Inlet at the Louisiana Pacific Plant in Hayward, Wisconsin.

ITEM		Run 1	* Run 2	Run 3
Date of test		03-19-96	03-19-96	03-19-96
Time runs were done	(HRS)	1030/1133	1320/1421	1900/2032
Volumetric flow				
actual	(ACFM)	103347	106118	106293
standard	(DSCFM)	62517	62594	63759
Gas temperature	(DEG-F)	167	170	171
Moisture content	(%V/V)	25.05	26.57	25.14
Gas composition	(%V/V,dry)			
carbon dioxide		4.20	4.00	4.20
oxygen		15.90	16.20	15.90
nitrogen		79.90	79.80	79.90
Isokinetic variation	(%)	108.2	103.9	101.3
Particulate concentration				
actual	(GR/ACF)	.0179	.0208	.0335
standard	(GR/DSCF)	.0297	.0353	.0559
Part. emission rate	(LB/HR)	15.91	18.94	30.55

Note: Dry + Organic/Inorganic Wet Catch

* E-TUBE H_2O On.

Table 4b Summary of the Results of the March 18, 1996 Particulate Emission Compliance Test of the Line 2 Dryer RTO Inlet at the Louisiana Pacific Plant in Hayward, Wisconsin.

ITEM		Run 1	* Run 2	Run 3
Date of test		03-19-96	03-19-96	03-19-96
Time runs were done	(HRS)	1030/1133	1320/1421	1900/2032
Volumetric flow				
actual	(ACFM)	103347	106118	106293
standard	(DSCFM)	62517	62594	63759
Gas temperature	(DEG-F)	167	170	171
Moisture content	(%V/V)	25.05	26.57	25.14
Gas composition	(%V/V,dry)			
carbon dioxide		4.20	4.00	4.20
oxygen		15.90	16.20	15.90
nitrogen		79.90	79.80	79.90
Isokinetic variation	(%)	108.2	103.9	101.3
Particulate concentration				
actual	(GR/ACF)	.007612	.004437	.0144
standard	(GR/DSCF)	.0126	.007524	.0239
Part. emission rate	(LB/HR)	6.75	4.04	13.09

Note: Dry Catch Only

* E-TUBE H_2O ON.

Table 5a. Summary of the Results of the March 19 & 20, 1996 **Oxides of Nitrogen Determinations** at the Louisiana Pacific Plant in Hayward, Wisconsin.

Date	Time	Concentration (ppm,d)	Emission Rate (LB/HR)
(Line 2 Dryer RTO Stack)			
*3-19-96	1320-1420	15	7.7
3-20-96	1000-1100	13	6.9
3-20-96	1200-1300	20	10.1
Avg		16	8.2
(Line 2 Core Dryer Duct)			
*3-19-96	1320-1420	23	4.7
3-20-96	1000-1100	23	4.9
3-20-96	1200-1300	24	4.9
Avg		23	4.8
(Line 2 Surface Dryer Duct)			
*3-19-96	1320-1420	30	5.9
3-20-96	1000-1100	30	6.0
3-20-96	1200-1300	32	6.3
Avg		31	6.1
(Line 2 Press Vent RTO Stack)			
3-20-96	1650-1750	22	10.9
3-20-96	1815-1915	20	10.0
3-20-96	2015-2115	19	8.5
Avg		20	9.8

* E-TUBE H_2O ON

Table 5b. Summary of the Results of the March 18 - 20, 1996 **Oxides of Nitrogen Determinations** at the Louisiana Pacific Plant in Hayward, Wisconsin.

Date	Time	Concentration (ppm,d)	Emission Rate (LB/HR)
(Line 2 Press Vent RTO Inlet)			
3-20-96	1650-1750	2.1	1.1
3-20-96	1815-1915	2.7	1.5
3-20-96	2015-2115	3.1	1.7
Avg		2.6	1.4
(Line 2 Thermal Oil Heater Stack)			
3-18-96	1036-1136	61	7.6
3-18-96	1220-1320	63	7.6
3-18-96	1405-1505	63	8.0
Avg		62	7.7
(Line 2 Dryer RTO Inlet)			
3-19-96	1030-1133	9	3.7
*3-19-96	1320-1421	7	3.3
3-19-96	1900-2032	12	5.3
Avg		9	4.1

* E-TUBE H_2O ON

Table 6a. Summary of the Results of the March 19 & 20, 1996 **Carbon Monoxide Determinations** at the Louisiana Pacific Plant in Hayward, Wisconsin.

Date	Time	Concentration (ppm,d)	Emission Rate (LB/HR)
(Line 2 Dryer RTO Stack)			
3-19-96	1030-1140	258	77
*3-19-96	1320-1429	198	61
3-19-96	1500-2037	203	61
Avg		220	66
(Line 2 Dryer RTO Stack)			
*3-19-96	1320-1420	202	62
3-20-96	1000-1100	266	84
3-20-96	1200-1300	218	69
Avg		229	72
(Line 2 Core Dryer Duct)			
*3-19-96	1320-1420	693	86
3-20-96	1000-1100	1282	164
3-20-96	1200-1300	1131	142
Avg		1035	131
(Line 2 Surface Dryer Duct)			
*3-19-96	1320-1420	2328	277
3-20-96	1000-1100	2002	241
3-20-96	1200-1300	1588	193
Avg		1973	237
(Line 2 Press Vent RTO Stack)			
3-20-96	1012-1114	22	6.7
3-20-96	1135-1241	23	7.1
3-20-96	1305-1411	23	7.0
Avg		23	6.9
(Line 2 Press Vent RTO Stack)			
3-20-96	1650-1750	19	5.6
3-20-96	1815-1915	21	6.3
3-20-96	2015-2112	20	5.6
Avg		20	5.8

* E-TUBE H_2O ON

Table 6b. Summary of the Results of the March 18 - 20, 1996 **Carbon Monoxide Determinations** at the Louisiana Pacific Plant in Hayward, Wisconsin.

Date	Time	Concentration (ppm,d)	Emission Rate (LB/HR)
(Line 2 Press Vent RTO Inlet)			
3-20-96	1650-1750	11	3.7
3-20-96	1815-1915	8	2.7
3-20-96	2015-2115	13	4.4
Avg		11	3.6
(Line 2 Thermal Oil Heater Stack)			
3-18-96	1036-1136	156	11.9
3-18-96	1220-1320	289	21.4
3-18-96	1405-1505	210	16.2
Avg		218	16.5

Table 7. Summary of the Results of the March 19 & 20, 1996 **Total Hydrocarbons Determinations** at the Louisiana Pacific Plant in Hayward, Wisconsin.

Date	Time	Concentration (ppmC,w)	Emission Rate (LB/HR)
(Line 2 Dryer RTO Stack)**			
*3-19-96	1320-1420	29	5.2
3-20-96	1000-1100	35	6.3
3-20-96	1200-1300	29	5.2
Avg		31	5.6
(Line 2 Core Dryer Duct)			
*3-19-96	1320-1420	526	37
3-20-96	1000-1100	906	67
3-20-96	1200-1300	759	56
Avg		730	53
(Line 2 Surface Dryer Duct)			
NOT ON SURFACE ~~*~~3-19-96	1320-1420	692	49
3-20-96	1000-1100	802	58
3-20-96	1200-1300	817	59
Avg		770	56
(Line 2 Press Vent RTO Stack)			
3-20-96	1650-1750	4	0.5
3-20-96	1815-1915	18	2.4
3-20-96	2015-2112	2	0.2
Avg		8	1.0
(Line 2 Press Vent RTO Inlet)			
3-20-96	1650-1750	118	17.3
3-20-96	1815-1915	112	16.5
3-20-96	2015-2112	77	11.4
Avg		102	15.1

* E-TUBE H_2O ON

** **TGNMO = Total Gaseous Non-Methane Organics**

Table 8. Summary of the Results of the March 18 - 20, 1996 **Formaldehyde Determinations** at the Louisiana Pacific Plant in Hayward, Wisconsin.

Date	Time	Concentration (ppm,d)	Emission Rate (LB/HR)
(Line 2 Dryer RTO Stack)			
3-20-96	0830-1017	7.4	2.5
3-20-96	1100-1210	10.0	3.4
3-20-96	1245-1354	9.4	3.2
Avg		8.9	3.0
(Line 2 Press Vent RTO Stack)			
3-19-96	1030-1145	0.33	0.11
3-19-96	1222-1336	0.27	0.09
3-19-96	1440-1554	0.32	0.11
Avg		0.31	0.10
(Line 2 Thermal Oil Heater Stack)			
3-18-96	1036-1142	0.11	0.0090
3-18-96	1220-1323	0.15	0.012
3-18-96	1405-1510	0.10	0.0085
Avg		0.12	0.0098

Table 9. Summary of the Results of the March 18 & 21, 1996 **Benzene Determinations** at the Louisiana Pacific Plant in Hayward, Wisconsin.

Date	Time	Concentration (ppm,d)	Emission Rate (LB/HR)
(Line 2 Dryer RTO Stack)			
3-21-96	0816-0906	0.11	0.10
3-21-96	0939-1039	0.17	0.15
3-21-96	1135-1235	0.08	0.10
Avg		0.12	0.12
(Line 2 Thermal Oil Heater Stack)			
3-18-96	1800-1900	< 0.011	< 0.002
3-18-96	1930-2030	0.18	0.035
3-18-96	2100-2200	0.48	0.096
Avg		≤ 0.22	≤ 0.044

Table 10. Summary of the Results of the March 19, 1996 **Phenol Determinations** at the Louisiana Pacific Plant in Hayward, Wisconsin.

Date	Time	Concentration (ppb,d)	Emission Rate (10^{-3}LB/HR)
(Line 2 Dryer RTO Stack)			
3-19-96	1030-1138	< 175	< 176
*3-19-96	1320-1424	< 177	< 183
3-19-96	1500-2035	< 178	< 181
Avg		< 177	< 180

* E-TUBE H_2O ON

Table 11 Summary of the Results of the March 20 & 21, 1996 PAH Determinations of the Line 2 Dryer RTO Stack at the Louisiana Pacific Plant in Hayward, Wisconsin.

Item	RUN 1	* RUN 2	RUN 3
(Concentration ug/Nm³)			
Benzo-a-anthracene	.55<	.56<	.55<
Benzo-b-fluoranthene	.30<	.31<	.31<
Benzo-a-pyrene	.37<	.37<	.37<
Dibenzo-a,h-anthracene	.27<	.27<	.27<
Indeno,1,2,3-pyrene	.27<	.28<	.28<
Dibenzo-a,i-pyrene	6.1<	6.2<	6.2<
Dibenzo-a,h-acridine	4.6<	4.6<	4.6<
Dibenzo-a,j-acridine	.49<	.49<	.49<
7H-Dibenzo-c,g-carbazole	.37<	.37<	.37<
Dibenzo-a,h-pyrene	6.1<	6.2<	6.2<
(Emission Rate 10^{-8}g/sec)			
Benzo-a-anthracene	19<	19<	19<
Benzo-b-fluoranthene	10<	10<	10<
Benzo-a-pyrene	13<	13<	13<
Dibenzo-a,h-anthracene	9.2<	9.3<	9.3<
Indeno,1,2,3-pyrene	9.4<	9.5<	9.5<
Dibenzo-a,i-pyrene	209<	212<	212<
Dibenzo-a,h-acridine	157<	159<	159<
Dibenzo-a,j-acridine	17<	17<	17<
7H-Dibenzo-c,g-carbazole	13<	13<	13<
Dibenzo-a,h-pyrene	209<	212<	212<

* E-TUBE H_2O ON.

3 RESULTS

The results of all field and laboratory evaluations are presented in this section. Gas composition results (Orsat and moisture) are presented first followed by the computer printout of the gas composition, particulate, oxides of nitrogen, opacity, carbon monoxide, total hydrocarbons, formaldehyde, phenol, benzene, and PAH determinations . 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 program. Emission rates have been calculated using the product of the concentration times flow method.

3.1 Results of Orsat and Moisture Analyses

Test No. 1
Line 2 Dryer RTO Stack

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

Date of run	Run 1 03-19-96	Run 2 03-19-96	Run 3 03-19-96
Dry basis (orsat)			
carbon dioxide.....	4.20	4.00	4.30
oxygen.....	15.80	16.10	15.80
nitrogen.....	80.00	79.90	79.90
Wet basis (orsat)			
carbon dioxide.....	3.11	2.93	3.14
oxygen.....	11.72	11.80	11.53
nitrogen.....	59.32	58.54	58.29
water vapor.....	25.85	26.73	27.04
Dry molecular weight.....	29.30	29.28	29.32
Wet molecular weight.....	26.38	26.27	26.26
Specific gravity.....	0.911	0.907	0.907
Water mass flow.....(LB/HR)	67336	72399	71991
FO	1.214	1.200	1.186

Test No. 3
Line 2 Dryer RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-20-96	03-21-96	03-21-96
Dry basis (orsat)			
carbon dioxide.....	4.30	4.30	4.20
oxygen.....	15.70	15.80	15.90
nitrogen.....	80.00	79.90	79.90
Wet basis (orsat)			
carbon dioxide.....	3.18	3.22	3.14
oxygen.....	11.61	11.83	11.88
nitrogen.....	59.16	59.84	59.68
water vapor.....	26.05	25.11	25.31
Dry molecular weight.....	29.32	29.32	29.31
Wet molecular weight.....	26.37	26.48	26.45
Specific gravity.....	0.911	0.915	0.914
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.209	1.186	1.190

Test No. 4
Line 2 Dryer RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-20-96	03-20-96	03-20-96
Dry basis (orsat)			
carbon dioxide.....	4.00	4.10	4.20
oxygen.....	16.10	16.00	15.90
nitrogen.....	79.90	79.90	79.90
Wet basis (orsat)			
carbon dioxide.....	3.06	3.05	3.15
oxygen.....	12.31	11.90	11.93
nitrogen.....	61.10	59.42	59.97
water vapor.....	23.53	25.63	24.95
Dry molecular weight.....	29.28	29.30	29.31
Wet molecular weight.....	26.63	26.40	26.49
Specific gravity.....	0.920	0.912	0.915
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.200	1.195	1.190

Test No. 9
Line 2 Press Vent RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-19-96	03-19-96
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.69	20.71	20.63
nitrogen.....	78.29	78.35	78.06
water vapor.....	0.99	0.91	1.28
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.73	28.74	28.70
Specific gravity.....	0.993	0.993	0.991
Water mass flow.....(LB/HR)	0.00	0.00	0.00

Test No. 10
Line 2 Press Vent RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-20-96	03-20-96	03-20-96
Dry basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.90	20.90	20.90
nitrogen.....	79.07	79.07	79.07
Wet basis (orsat)			
carbon dioxide.....	0.03	0.03	0.03
oxygen.....	20.57	20.56	20.38
nitrogen.....	77.84	77.76	77.12
water vapor.....	1.56	1.65	2.47
Dry molecular weight.....	28.84	28.84	28.84
Wet molecular weight.....	28.67	28.66	28.57
Specific gravity.....	0.990	0.990	0.987
Water mass flow.....(LB/HR)	3101	3309	4938

Test No. 13
Line 2 Konus Stack

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

	Run 1	Run 2	Run 3
Date of run	03-18-96	03-18-96	03-18-96
Dry basis (orsat)			
carbon dioxide.....	5.40	6.20	6.30
oxygen.....	15.50	13.80	13.40
nitrogen.....	79.10	80.00	80.30
Wet basis (orsat)			
carbon dioxide.....	4.90	5.52	5.91
oxygen.....	14.07	12.28	12.57
nitrogen.....	71.78	71.19	75.32
water vapor.....	9.25	11.01	6.20
Dry molecular weight.....	29.48	29.54	29.54
Wet molecular weight.....	28.42	28.27	28.83
Specific gravity.....	0.982	0.977	0.996
Water mass flow.....(LB/HR)	0.00	0.00	0.00
FO	1.000	1.145	1.190

Test No. 14
Line 2 Konus Stack

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

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-19-96	03-19-96
Dry basis (orsat)			
carbon dioxide.....	6.40	7.40	8.30
oxygen.....	13.60	12.50	11.60
nitrogen.....	80.00	80.10	80.10
Wet basis (orsat)			
carbon dioxide.....	5.73	6.46	7.28
oxygen.....	12.17	10.91	10.18
nitrogen.....	71.60	69.93	70.27
water vapor.....	10.50	12.69	12.27
Dry molecular weight.....	29.57	29.68	29.79
Wet molecular weight.....	28.35	28.20	28.34
Specific gravity.....	0.979	0.974	0.979
Water mass flow.....(LB/HR)	5537	6560	6394
FO	1.141	1.135	1.120

Test No. 17
Line 2 Dryer RTO Inlet

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

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-19-96	03-19-96
Dry basis (orsat)			
carbon dioxide.....	4.20	4.00	4.20
oxygen.....	15.90	16.20	15.90
nitrogen.....	79.90	79.80	79.90
Wet basis (orsat)			
carbon dioxide.....	3.15	2.94	3.14
oxygen.....	11.92	11.89	11.90
nitrogen.....	59.89	58.59	59.81
water vapor.....	25.05	26.57	25.14
Dry molecular weight.....	29.31	29.29	29.31
Wet molecular weight.....	26.48	26.29	26.46
Specific gravity.....	0.915	0.908	0.914
Water mass flow.....(LB/HR)	58602	63546	60072
FO	1.190	1.175	1.190

3.2 Results of Particulate Loading Determinations

Test No. 1
Line 2 Dryer RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-19-96	03-19-96
Time run start/end.....(HRS)	1030/1140	1320/1429	1500/2037
Static pressure.....(IN.WC)	-0.65	-0.65	-0.65
Cross sectional area (SQ.FT)	36.23	36.23	36.23
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	311.0	304.0	315.0
desiccant.....(GRAMS)	7.0	15.0	8.0
total.....(GRAMS)	318.0	319.0	323.0
Total particulate material..			
.....collected(grams)	0.0143	0.0292	0.0173
Gas meter coefficient.....	1.0054	1.0054	1.0054
Barometric pressure..(IN.HG)	28.78	28.78	28.78
Avg. orif.pres.drop..(IN.WC)	1.57	1.46	1.45
Avg. gas meter temp..(DEF-F)	66.9	73.1	71.2
Volume through gas meter....			
at meter conditions...(CF)	44.22	42.89	42.60
standard conditions.(DSCF)	43.01	41.22	41.09
Total sampling time....(MIN)	64.00	64.00	64.00
Nozzle diameter.....(IN)	.247	.247	.247
Avg.stack gas temp ..(DEG-F)	262	264	263
Volumetric flow rate.....			
actual.....(ACFM)	132280	137925	135372
dry standard.....(DSCFM)	68859	70732	69238
Isokinetic variation.....(%)	106.3	99.2	101.0
Particulate concentration...			
actual.....(GR/ACF)	0.00267	0.00560	0.00332
dry standard.....(GR/DSCF)	0.00513	0.01093	0.00650
Particle mass rate...(LB/HR)	3.028	6.627	3.856

Test No. 10
Line 2 Press Vent RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-20-96	03-20-96	03-20-96
Time run start/end.....(HRS)	1012/1114	1135/1241	1305/1411
Static pressure.....(IN.WC)	-0.40	-0.40	-0.40
Cross sectional area (SQ.FT)	31.71	31.71	31.71
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	4.0	-2.0	9.0
desiccant.....(GRAMS)	11.0	18.0	15.0
total.....(GRAMS)	15.0	16.0	24.0
Total particulate material..			
.....collected(grams)	0.0122	0.0028	0.0040
Gas meter coefficient.....	0.9936	0.9936	0.9936
Barometric pressure..(IN.HG)	29.31	29.31	29.31
Avg. orif.pres.drop..(IN.WC)	1.81	1.85	1.84
Avg. gas meter temp..(DEF-F)	61.4	68.6	69.6
Volume through gas meter....			
at meter conditions...(CF)	45.19	46.04	45.89
standard conditions.(DSCF)	44.73	44.95	44.72
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.249	.249	.249
Avg.stack gas temp ..(DEG-F)	233	233	233
Volumetric flow rate.....			
actual.....(ACFM)	95284	95834	95693
dry standard.....(DSCFM)	69923	70293	69564
Isokinetic variation.....(%)	100.0	100.0	100.5
Particulate concentration...			
actual.....(GR/ACF)	0.00309	0.00070	0.00100
dry standard.....(GR/DSCF)	0.00421	0.00096	0.00138
Particle mass rate...(LB/HR)	2.523	0.579	0.823

Test No. 14
Line 2 Konus Stack

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

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-19-96	03-19-96
Time run start/end.....(HRS)	1800/1903	1930/2032	2100/2202
Static pressure.....(IN.WC)	-0.35	-0.35	-0.35
Cross sectional area (SQ.FT)	14.47	14.47	14.47
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	80.0	101.0	98.0
desiccant.....(GRAMS)	12.0	10.0	9.0
total.....(GRAMS)	92.0	111.0	107.0
Total particulate material..			
.....collected(grams)	0.1004	0.1076	0.1122
Gas meter coefficient.....	0.9964	0.9964	0.9964
Barometric pressure..(IN.HG)	28.69	28.69	28.69
Avg. orif.pres.drop..(IN.WC)	1.21	1.19	1.21
Avg. gas meter temp..(DEF-F)	50.6	66.1	71.8
Volume through gas meter....			
at meter conditions...(CF)	37.34	37.45	37.91
standard conditions.(DSCF)	36.99	36.01	36.06
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.311	.311	.311
Avg.stack gas temp ..(DEG-F)	391	410	419
Volumetric flow rate.....			
actual.....(ACFM)	31644	31697	32275
dry standard.....(DSCFM)	16834	16089	16292
Isokinetic variation.....(%)	100.5	102.3	101.2
Particulate concentration...			
actual.....(GR/ACF)	0.02227	0.02340	0.02423
dry standard.....(GR/DSCF)	0.04188	0.04611	0.04801
Particle mass rate...(LB/HR)	6.043	6.359	6.705
F-factor .....(DSCF/MMBTU)	9600	9600	9600
Emission factor...(LB/MMBTU)	0.164	0.157	0.148

6.36

156

Test No. 17
Line 2 Dryer RTO Inlet

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

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-19-96	03-19-96
Time run start/end.....(HRS)	1030/1133	1320/1421	1900/2032
Static pressure.....(IN.WC)	-1.50	-1.50	-1.50
Cross sectional area (SQ.FT)	22.87	22.87	22.87
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	243.0	243.0	225.0
desiccant.....(GRAMS)	2.0	12.0	10.0
total.....(GRAMS)	245.0	255.0	235.0
Total particulate material..			
.....collected(grams)	0.0665	0.0760	0.1195
Gas meter coefficient.....	1.0042	1.0042	1.0042
Barometric pressure..(IN.HG)	28.78	28.78	28.78
Avg. orif.pres.drop..(IN.WC)	1.09	1.02	1.02
Avg. gas meter temp..(DEF-F)	48.9	51.9	53.8
Volume through gas meter....			
at meter conditions...(CF)	34.41	33.27	33.16
standard conditions.(DSCF)	34.57	33.22	32.99
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.189	.189	.189
Avg.stack gas temp ..(DEG-F)	167	170	171
Volumetric flow rate.....			
actual.....(ACFM)	103347	106118	106293
dry standard.....(DSCFM)	62517	62594	63759
Isokinetic variation.....(%)	108.2	103.9	101.3
Particulate concentration...			
actual.....(GR/ACF)	0.01795	0.02081	0.03352
dry standard.....(GR/DSCF)	0.02968	0.03530	0.05590
Particle mass rate...(LB/HR)	15.906	18.939	30.547

105,253
188,870
62,957

3.3 Results of Oxides of Nitrogen Determinations

Test No. 6
Line 2 Dryer RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	3-19-96	3-20-96	3-20-96
Time run start/end (HRS)	1320-1420	1000-1100	1200-1300
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	26.7	25.0	25.0
Oxygen content (%V/V)	16.2	16.4	16.3
Volumetric flow rate (DSCFM)	70700	72250	72250
NO_x concentration (ppm,d)	15	13	20
NO_x emission rate (LB/HR)	7.7	6.9	10.1

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Test No. 7
Line 2 Core Dryer Duct

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

	Run 1	Run 2	Run 3
Date of run	3-19-96	3-20-96	3-20-96
Time run start/end (HRS)	1320-1420	1000-1100	1200-1300
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	24.7	25.4	26.9
Oxygen content (%V/V)	16.0	16.3	12.9
Volumetric flow rate (DSCFM)	28356	29359	28827
NO_x concentration (ppm,d)	23	23	24
NO_x emission rate (LB/HR)	4.7	4.9	4.9

Test No. 8
Line 2 Surface Dryer Duct

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

	Run 1	Run 2	Run 3
Date of run	3-19-96	3-20-96	3-20-96
Time run start/end (HRS)	1320-1420	1000-1100	1200-1300
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	28.6	28.7	28.3
Oxygen content (%V/V)	14.7	15.1	15.2
Volumetric flow rate (DSCFM)	27324	27592	27872
NO_x concentration (ppm,d)	30	30	32
NO_x emission rate (LB/HR)	5.9	6.0	6.3

Test No. 11
Line 2 Press Vent RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	3-20-96	3-20-96	3-20-96
Time run start/end (HRS)	1650-1750	1815-1915	2015-2115
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	2.2	1.7	2.0
Oxygen content (%V/V)	20.9	20.9	20.9
Volumetric flow rate (DSCFM)	67950	68965	64190
NO_x concentration (ppm,d)	22	20	19
NO_x emission rate (LB/HR)	10.9	10.0	8.5

Test No. 12
Line 2 Press RTO Inlet

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

	Run 1	Run 2	Run 3
Date of run	3-20-96	3-20-96	3-20-96
Time run start/end (HRS)	1650-1750	1815-1915	2015-2112
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	2.4	2.4	2.2
Oxygen content (%V/V)	20.9	20.9	20.9
Volumetric flow rate (DSCFM)	76340	77090	77445
NO_x concentration (ppm,d)	2.1	2.7	3.1
NO_x emission rate (LB/HR)	1.1	1.5	1.7

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Test No. 16
Line 2 Thermal Oil Heater Stack

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

	Run 1	Run 2	Run 3
Date of run	3-18-96	3-18-96	3-18-96
Time run start/end (HRS)	1036-1136	1220-1320	1405-1505
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	9.3	11.0	6.2
Oxygen content (%V/V)	15.3	13.8	13.4
Volumetric flow rate (DSCFM)	17550	16980	17670
NO_x concentration (ppm,d)	61	63	63
NO_x emission rate (LB/HR)	7.6	7.6	8.0

Test No. 17
Line 2 Dryer RTO Inlet

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

	Run 1A	Run 1B	Run 1C	Run 1D
Date of run.....	03-19-96	03-19-96	03-19-96	03-19-96
Time of run.....(HRS)	1034	1045	1059	1116
Flask number.....	19	20	21	22
Volume of flask.....(ML)	2069	2060	2068	2031
Data: time of sampling				
flask temperature..(DEG-F)	40.00	41.00	41.00	42.00
bar. press.....(IN.HG)	28.78	28.78	28.78	28.78
flask vacuum.....(IN.HG)	26.04	26.07	26.16	26.04
flask abs. press...(IN.HG)	2.74	2.71	2.62	2.74
Data: Time of Flask Opening				
flask temperature..(DEG-F)	64.00	65.00	65.00	65.00
lab. bar. press....(IN.HG)	29.33	29.33	29.33	29.33
flask static press.(IN.HG)	-0.37	-0.32	2.27	0.20
flask abs. press...(IN.HG)	28.96	29.01	31.60	29.53
Volume gas sampled....(DSML)	1795	1789	1981	1797
Moisture content.....(%V/V)	25.05	25.05	25.05	25.05
Oxygen content....(%V/V,DRY)	15.90	15.90	15.90	15.90
Nitrate in gas sample...(JG)	33.5	35.0	44.0	45.0
NO2 in gas sample.....(JG)	24.9	26.0	32.6	33.4
NOx Concentration				
(GR/DSCF).....	0.0061	0.0063	0.0072	0.0081
(MG/DSCM).....	14	15	16	19
(PPM-DRY).....	7	8	9	10
(PPM-WET).....	5	6	6	7
NOX Emission rate....(LB/HR)	3.24	3.40	3.86	4.35
NOx emission factor..... .....(LB/MMBTU)*	0.031	0.033	0.037	0.042

* F = 8710 DSCF/MMBTU

Test No. 17
Line 2 Dryer RTO Inlet

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

	Run 2A	Run 2B	Run 2C	Run 2D
Date of run.....	03-19-96	03-19-96	03-19-96	03-19-96
Time of run.....(HRS)	1325	1335	1350	1405
Flask number.....	23	24	31	32
Volume of flask.....(ML)	2056	2031	2009	2092
Data: time of sampling				
flask temperature..(DEG-F)	40.00	38.00	36.00	36.00
bar. press.....(IN.HG)	28.78	28.78	28.78	28.78
flask vacuum.....(IN.HG)	26.02	26.06	26.07	26.02
flask abs. press...(IN.HG)	2.76	2.72	2.71	2.76
Data: Time of Flask Opening				
flask temperature..(DEG-F)	66.00	64.00	67.00	66.00
lab. bar. press....(IN.HG)	29.33	29.33	29.33	29.33
flask static press.(IN.HG)	0.20	-0.58	1.47	-0.06
flask abs. press...(IN.HG)	29.53	28.75	30.80	29.27
Volume gas sampled....(DSML)	1814	1748	1854	1826
Moisture content.....(%V/V)	26.57	26.57	26.57	26.57
Oxygen content....(%V/V,DRY)	16.20	16.20	16.20	16.20
Nitrate in gas sample...(JG)	38.0	40.0	25.5	35.0
NO2 in gas sample.....(JG)	28.2	29.7	18.9	26.0
NOx Concentration				
(GR/DSCF).....	0.0068	0.0074	0.0045	0.0062
(MG/DSCM).....	16	17	10	14
(PPM-DRY).....	8	9	5	7
(PPM-WET).....	6	7	4	5
NOX Emission rate....(LB/HR)	3.64	3.98	2.39	3.33
NOx emission factor..... .....(LB/MMBTU)*	0.038	0.041	0.025	0.034

* F = 8710 DSCF/MMBTU

Test No. 17
Line 2 Dryer RTO Inlet

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

	Run 3A	Run 3B	Run 3C	Run 3D
Date of run.....	03-19-96	03-19-96	03-19-96	03-19-96
Time of run.....(HRS)	1936	1949	2000	2012
Flask number.....	33	34	35	36
Volume of flask.....(ML)	2088	2071	2071	2127
Data: time of sampling				
flask temperature..(DEG-F)	34.00	32.00	33.00	31.00
bar. press.....(IN.HG)	28.78	28.78	28.78	28.78
flask vacuum.....(IN.HG)	26.01	26.04	26.04	26.03
flask abs. press...(IN.HG)	2.77	2.74	2.74	2.75
Data: Time of Flask Opening				
flask temperature..(DEG-F)	67.00	67.00	66.00	66.00
lab. bar. press....(IN.HG)	29.33	29.33	29.33	29.33
flask static press.(IN.HG)	0.29	0.28	0.15	0.04
flask abs. press...(IN.HG)	29.62	29.61	29.48	29.37
Volume gas sampled....(DSML)	1841	1827	1822	1863
Moisture content.....(%V/V)	25.14	25.14	25.14	25.14
Oxygen content....(%V/V,DRY)	15.90	15.90	15.90	15.90
Nitrate in gas sample...(JG)	48.0	70.0	56.5	47.0
NO2 in gas sample.....(JG)	35.6	51.9	41.9	34.9
NOx Concentration				
(GR/DSCF).....	0.0085	0.0124	0.0101	0.0082
(MG/DSCM).....	19	28	23	19
(PPM-DRY).....	10	15	12	10
(PPM-WET).....	8	11	9	7
NOX Emission rate....(LB/HR)	4.62	6.79	5.49	4.47
NOx emission factor..... .....(LB/MMBTU)*	0.044	0.065	0.052	0.043

* F = 8710 DSCF/MMBTU

3.4 Results of Opacity Observations

Test No. 1
Line 2 Dryer RTO Stack

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

PERCENT OPACITY	OPTICAL DENSITY	RELATIVE FREQUENCY (%)
0	0.0000	100.00
5	0.0223	0.00
10	0.0458	0.00
15	0.0706	0.00
20	0.0969	0.00
25	0.1249	0.00
30	0.1549	0.00
35	0.1871	0.00
40	0.2219	0.00
45	0.2596	0.00
50	0.3010	0.00
55	0.3468	0.00
60	0.3979	0.00
65	0.4559	0.00
70	0.5229	0.00
75	0.6021	0.00
80	0.6690	0.00
85	0.8239	0.00
90	1.0000	0.00
95	1.3010	0.00
99	2.0000	0.00
Avg Opac 0.00	Avg OD 0.0000	Time average

Observer: Sheryl Bergeron
Cert. Date: 10-04-95
Date of Observation: 03-19-96
Time of Observation: 1030/1130

Test No. 10
Line 2 Press Vent RTO Stack

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

PERCENT OPACITY	OPTICAL DENSITY	RELATIVE FREQUENCY (%)
0	0.0000	100.00
5	0.0223	0.00
10	0.0458	0.00
15	0.0706	0.00
20	0.0969	0.00
25	0.1249	0.00
30	0.1549	0.00
35	0.1871	0.00
40	0.2219	0.00
45	0.2596	0.00
50	0.3010	0.00
55	0.3468	0.00
60	0.3979	0.00
65	0.4559	0.00
70	0.5229	0.00
75	0.6021	0.00
80	0.6690	0.00
85	0.8239	0.00
90	1.0000	0.00
95	1.3010	0.00
99	2.0000	0.00
Avg Opac 0.00	Avg OD 0.0000	Time average

Observer: Sheryl Bergeron
Cert. Date: 10-04-95
Date of Observation: 03-20-96
Time of Observation: 1014/1114

Test No. 14
Line 2 Thermal Oil Heater Stack

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

PERCENT OPACITY	OPTICAL DENSITY	RELATIVE FREQUENCY (%)
0	0.0000	96.25
5	0.0223	2.50
10	0.0458	1.25
15	0.0706	0.00
20	0.0969	0.00
25	0.1249	0.00
30	0.1549	0.00
35	0.1871	0.00
40	0.2219	0.00
45	0.2596	0.00
50	0.3010	0.00
55	0.3468	0.00
60	0.3979	0.00
65	0.4559	0.00
70	0.5229	0.00
75	0.6021	0.00
80	0.6690	0.00
85	0.8239	0.00
90	1.0000	0.00
95	1.3010	0.00
99	2.0000	0.00
Avg Opac 0.25	Avg OD 0.0011	Time average

Observer: Sheryl Bergeron
Cert. Date: 10-04-95
Date of Observation: 03-19-96
Time of Observation: 0758/0858

3.5 Results of Carbon Monoxide Determinations

Test No. 1
Line 2 Dryer RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-19-96	03-19-96
Time run start/end.....(HRS)	1030/1140	1320/1429	1500/2037
Total sampling time....(MIN)	64.0	64.0	64.0
Moisture content.....(%V/V)	25.85	26.73	26.27
O2 Concentration.....(%V/V)	15.80	16.10	15.80
Volumetric flow rate (DSCFM)	68840	70701	69223
CO concentration.....			
(GR/DSCF).....	0.1313	0.1008	0.1033
(MG/DSCM).....	300.57	230.67	236.50
(PPM-WET).....	191.31	145.07	149.67
(PPM-DRY).....	258.00	198.00	203.00
(PPM-DRY @ 7% O2).....	694.62	565.71	546.54
CO emission rate.....(LB/HR)	77.461	61.054	61.287

CO = Carbon monoxide

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

Test No. 6
Line 2 Dryer RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-20-96	03-20-96
Time run start/end.....(HRS)	1320-1420	1000-1100	1200-1300
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	26.70	25.00	25.00
O2 Concentration.....(%V/V)	16.30	16.50	16.30
Volumetric flow rate (DSCFM)	70700	72250	72250
CO concentration.....			
(GR/DSCF).....	0.1028	0.1354	0.1109
(MG/DSCM).....	235.33	309.89	253.97
(PPM-WET).....	148.07	199.50	163.50
(PPM-DRY).....	202.00	266.00	218.00
(PPM-DRY @ 7% O2).....	601.70	827.56	649.36
CO emission rate.....(LB/HR)	62.286	83.819	68.693

CO = Carbon monoxide

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

Test No. 7
Line 2 Core Dryer Duct

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

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-20-96	03-20-96
Time run start/end.....(HRS)	1320-1420	1000-1100	1200-1300
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	24.70	25.40	26.90
O2 Concentration.....(%V/V)	16.40	15.70	15.90
Volumetric flow rate (DSCFM)	28356	29359	28827
CO concentration.....			
(GR/DSCF).....	0.3526	0.6523	0.5755
(MG/DSCM).....	807.35	1493.	1317.
(PPM-WET).....	521.83	956.37	826.76
(PPM-DRY).....	693.00	1282.	1131.
(PPM-DRY @ 7% O2).....	2109.	3386.	3104.
CO emission rate.....(LB/HR)	85.704	164.154	142.195

CO = Carbon monoxide

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

Test No. 8
Line 2 Surface Dryer Duct

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

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-20-96	03-20-96
Time run start/end.....(HRS)	1320-1420	1000-1100	1200-1300
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	28.60	28.70	28.30
O2 Concentration.....(%V/V)	14.70	15.10	15.20
Volumetric flow rate (DSCFM)	27324	27592	27872
CO concentration.....			
(GR/DSCF).....	1.1846	1.0187	0.8081
(MG/DSCM).....	2712.	2332.	1850.
(PPM-WET).....	1662.	1427.	1138.
(PPM-DRY).....	2328.	2002.	1588.
(PPM-DRY @ 7% O2).....	5173.	4750.	3833.
CO emission rate.....(LB/HR)	277.427	240.918	193.037

CO = Carbon monoxide

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

Test No. 10
Line 2 Press Vent RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-20-96	03-20-96	03-20-96
Time run start/end.....(HRS)	1012/1114	1135/1241	1305/1411
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	1.60	1.70	2.50
O2 Concentration.....(%V/V)	20.90	20.90	20.90
Volumetric flow rate (DSCFM)	69920	70290	69560
CO concentration.....			
(GR/DSCF).....	0.0112	0.0117	0.0117
(MG/DSCM).....	25.63	26.79	26.79
(PPM-WET).....	21.65	22.61	22.43
(PPM-DRY).....	22.00	23.00	23.00
CO emission rate.....(LB/HR)	6.709	7.051	6.978

CO = Carbon monoxide

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

Test No. 11
Line 2 Press Vent RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-20-96	03-20-96	03-20-96
Time run start/end.....(HRS)	1650-1750	1815-1915	2015-2115
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	2.16	1.65	1.97
O2 Concentration.....(%V/V)	20.90	20.90	20.90
Volumetric flow rate (DSCFM)	67951	68965	64190
CO concentration.....			
(GR/DSCF).....	0.0097	0.0107	0.0102
(MG/DSCM).....	22.13	24.47	23.30
(PPM-WET).....	18.59	20.65	19.61
(PPM-DRY).....	19.00	21.00	20.00
CO emission rate.....(LB/HR)	5.631	6.316	5.599

CO = Carbon monoxide

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

Test No. 12
Line 2 Press Vent RTO Inlet

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

	Run 1	Run 2	Run 3
Date of run	03-20-96	03-20-96	03-20-96
Time run start/end.....(HRS)	1650-1750	1815-1915	2015-2115
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	2.41	2.35	2.18
O2 Concentration.....(%V/V)	20.90	20.90	20.90
Volumetric flow rate (DSCFM)	76341	77087	77444
CO concentration.....			
(GR/DSCF).....	0.0056	0.0041	0.0066
(MG/DSCM).....	12.82	9.32	15.15
(PPM-WET).....	10.73	7.81	12.72
(PPM-DRY).....	11.00	8.00	13.00
CO emission rate.....(LB/HR)	3.662	2.690	4.391

CO = Carbon monoxide

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

Test No. 16
Line 2 Thermal Oil Heater Stack

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

	Run 1	Run 2	Run 3
Date of run	03-18-96	03-18-96	03-18-96
Time run start/end.....(HRS)	1036-1136	1220-1320	1405-1505
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	9.30	11.00	6.20
O2 Concentration.....(%V/V)	15.30	13.80	13.40
Volumetric flow rate (DSCFM)	17550	16980	17670
CO concentration.....			
(GR/DSCF).....	0.0794	0.1471	0.1069
(MG/DSCM).....	181.74	336.69	244.65
(PPM-WET).....	141.49	257.21	196.98
(PPM-DRY).....	156.00	289.00	210.00
(PPM-DRY @ 7% O2).....	383.16	561.94	386.84
CO emission rate.....(LB/HR)	11.941	21.402	16.184

CO = Carbon monoxide

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

3.6 Results of Total Hydrocarbons Determinations

Interpoll Labs Report No. 6-7451
Louisiana Pacific Corporation
Hayward, Wisconsin

Test No. 6
Line 2 Dryer RTO Stack

Results of Total Hydrocarbons Determinations——————————Method25A

	Run 1	Run 2	Run 3
Date of run	3-19-96	3-20-96	3-20-96
Time run start/end (HRS)	1320-1420	1000-1100	1200-1300
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	26.7	25.0	25.0
Oxygen content (%V/V)	16.2	16.4	16.3
Volumetric flow rate (DSCFM)	70700	72250	72250
THC concentration (ppmC,w)	29	35	29
THC emission rate (LB/HR)	5.2	6.3	5.2

Test No. 7
Line 2 Core Dryer Duct

Results of Total Hydrocarbons Determinations——————————Method25A

	Run 1	Run 2	Run 3
Date of run	3-19-96	3-20-96	3-20-96
Time run start/end (HRS)	1320-1420	1000-1100	1200-1300
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	24.7	25.4	26.9
Oxygen content (%V/V)	16.0	16.3	12.9
Volumetric flow rate (DSCFM)	28356	29359	28827
THC concentration (ppmC,w)	526	906	759
THC emission rate (LB/HR)	37.0	66.6	55.9

Interpoll Labs Report No. 6-7451
Louisiana Pacific Corporation
Hayward, Wisconsin

Test No. 8
Line 2 Surface Dryer Duct

Results of Total Hydrocarbons Determinations——————————Method25A

	Run 1	Run 2	Run 3
Date of run	3-19-96	3-20-96	3-20-96
Time run start/end (HRS)	1320-1420	1000-1100	1200-1300
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	28.6	28.7	28.3
Oxygen content (%V/V)	14.7	15.1	15.2
Volumetric flow rate (DSCFM)	27324	27592	27872
THC concentration (ppmC,w)	692	802	817
THC emission rate (LB/HR)	49.5	58.0	59.3

Test No. 11
Line 2 Press Vent RTO Stack

Results of Total Hydrocarbons Determinations——————————Method25A

	Run 1	Run 2	Run 3
Date of run	3-20-96	3-20-96	3-20-96
Time run start/end (HRS)	1650-1750	1815-1915	2015-2115
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	2.2	1.7	2.0
Oxygen content (%V/V)	20.9	20.9	20.9
Volumetric flow rate (DSCFM)	67951	68965	64190
THC concentration (ppmC,w)	4	18	2
THC emission rate (LB/HR)	0.52	2.4	0.24

Test No. 12
Line 2 Press RTO Inlet

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

	Run 1	Run 2	Run 3
Date of run	3-20-96	3-20-96	3-20-96
Time run start/end (HRS)	1650-1750	1815-1915	2015-2112
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	2.4	2.4	2.2
Oxygen content (%V/V)	20.9	20.9	20.9
Volumetric flow rate (DSCFM)	76341	77087	77444
THC concentration (ppmC,w)	118	112	77
THC emission rate (LB/HR)	17.3	16.5	11.4

3.7 Results of Formaldehyde Determinations

Test No. 4
Line 2 Dryer RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-20-96	03-20-96	03-20-96
Time run start/end.....(HRS)	830/1017	1100/1210	1245/1354
Static pressure.....(IN.WC)	-0.65	-0.65	-0.65
Cross sectional area (SQ.FT)	36.23	36.23	36.23
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	306.0	354.0	345.0
desiccant.....(GRAMS)	20.0	19.0	17.0
total.....(GRAMS)	326.0	373.0	362.0
Formaldehyde in sample..(uG)	13000	18000	17000
Gas meter coefficient.....	1.0054	1.0054	1.0054
Barometric pressure..(IN.HG)	29.31	29.31	29.31
Avg. orif.pres.drop..(IN.WC)	2.05	2.21	2.21
Avg. gas meter temp..(DEF-F)	59.0	74.5	73.5
Volume through gas meter....			
at meter conditions...(CF)	49.63	52.17	52.41
standard conditions.(DSCF)	49.96	51.02	51.35
Total sampling time....(MIN)	64.00	64.00	64.00
Nozzle diameter.....(IN)	.269	.269	.269
Avg.stack gas temp ..(DEG-F)	261	262	263
Volumetric flow rate.....			
actual.....(ACFM)	133647	135918	137590
dry standard.....(DSCFM)	73163	72254	73736
Isokinetic variation.....(%)	98.0	101.3	99.9
CH2O concentration.....			
(GR/DSCF).....	0.0040	0.0055	0.0051
(MG/DSCM).....	9.24	12.53	11.76
(PPM-DRY).....	7.40	10.04	9.42
(PPM-WET).....	5.66	7.47	7.06
CH2O emission rate...(LB/HR)	2.52949	3.38868	3.24538

CH2O = Formaldehyde

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

Test No. 9
Line 2 Press Vent RTO Stack

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

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-19-96	03-19-96
Time run start/end.....(HRS)	1030/1145	1222/1336	1440/1554
Static pressure.....(IN.WC)	-0.35	-0.35	-0.35
Cross sectional area (SQ.FT)	31.71	31.71	31.71
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	1.0	3.0	1.0
desiccant.....(GRAMS)	10.0	7.0	14.0
total.....(GRAMS)	11.0	10.0	15.0
Formaldehyde in sample..(uG)	600	490	610
Gas meter coefficient.....	0.9936	0.9936	0.9936
Barometric pressure..(IN.HG)	28.78	28.78	28.78
Avg. orif.pres.drop..(IN.WC)	1.72	1.73	1.95
Avg. gas meter temp..(DEF-F)	61.4	72.6	72.8
Volume through gas meter....			
at meter conditions...(CF)	53.30	54.16	57.49
standard conditions.(DSCF)	51.79	51.52	54.70
Total sampling time....(MIN)	72.00	72.00	72.00
Nozzle diameter.....(IN)	.242	.242	.242
Avg.stack gas temp ..(DEG-F)	234	234	233
Volumetric flow rate.....			
actual.....(ACFM)	100333	99144	104368
dry standard.....(DSCFM)	72598	71842	75431
Isokinetic variation.....(%)	98.4	98.9	100.0
CH2O concentration.....			
(GR/DSCF).....	0.0002	0.0001	0.0002
(MG/DSCM).....	0.41	0.34	0.40
(PPM-DRY).....	0.33	0.27	0.32
(PPM-WET).....	0.33	0.27	0.31
CH2O emission rate...(LB/HR)	0.11168	0.09073	0.11176

CH2O = Formaldehyde

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

Test No. 13
Line 2 Konus Stack

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

	Run 1	Run 2	Run 3
Date of run	03-18-96	03-18-96	03-18-96
Time run start/end.....(HRS)	1036/1142	1220/1323	1405/1510
Static pressure.....(IN.WC)	-0.32	-0.32	-0.32
Cross sectional area (SQ.FT)	14.47	14.47	14.47
Pitot tube coefficient.....	.840	.840	.840
Water in sample gas			
condenser.....(ML)	0.0	0.0	0.0
impingers.....(GRAMS)	96.0	119.0	114.0
desiccant.....(GRAMS)	22.0	21.0	18.0
total.....(GRAMS)	118.0	140.0	132.0
Formaldehyde in sample..(uG)	210	280	190
Gas meter coefficient.....	0.9964	0.9964	1.7800
Barometric pressure..(IN.HG)	28.69	28.69	28.69
Avg. orif.pres.drop..(IN.WC)	2.69	2.55	2.51
Avg. gas meter temp..(DEF-F)	56.9	56.2	59.4
Volume through gas meter....			
at meter conditions...(CF)	55.56	54.27	53.97
standard conditions.(DSCF)	54.58	53.36	94.21
Total sampling time....(MIN)	60.00	60.00	60.00
Nozzle diameter.....(IN)	.370	.370	.370
Avg.stack gas temp ..(DEG-F)	391	394	406
Volumetric flow rate.....			
actual.....(ACFM)	32554	32213	32245
dry standard.....(DSCFM)	17552	16976	17666
Isokinetic variation.....(%)	100.5	101.6	172.3
CH2O concentration.....			
(GR/DSCF).....	0.0001	0.0001	0.0001
(MG/DSCM).....	0.14	0.19	0.13
(PPM-DRY).....	0.11	0.15	0.10
(PPM-WET).....	0.10	0.13	0.10
CH2O emission rate...(LB/HR)	0.00899	0.01186	0.00847

CH2O = Formaldehyde

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

3.8 Results of Phenol Determinations

Test No. 2
Line 2 Dryer RTO Stack

Results of Phenol Determinations

	Run 1	Run 2	Run 3
Date of run	03-19-96	03-19-96	03-19-96
Time run start/end.....(HRS)	1031/1138	1320/1424	1500/2035
Barometric pressure..(IN.HG)	28.78	28.78	28.78
Meter temperature....(DEG-F)	56.16	67.58	66.12
Meter correction coefficient	1.0023	1.0023	1.0023
Volume through gas meter....			
at meter conditions...(CF)	43.870	44.205	43.750
standard conditions (DSCF)	43.465	42.848	42.525
Total sampling time....(MIN)	60.0	60.0	60.0
Moisture content.....(%V/V)	26.10	26.20	26.94
Volumetric flow rate (DSCFM)	68840	70700	69220
Phenol in sample.....(uG)	840.00<	840.00<	840.00<
Phenol concentration.....			
(GR/10^3DSCF).....	0.2982<	0.3025<	0.3048<
(uG/DSCM).....	682.98<	692.80<	698.07<
(PPB-DRY).....	174.53<	177.04<	178.39<
(PPB-WET).....	128.98<	130.66<	130.33<
Phenol emis. rate(10^{-3}LB/HR)	175.947<	183.299<	180.827<

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

Analysis performed according to NIOSH Method 3502

3.9 Results of Benzene Determinations

Test No. 5
Line 2 Dryer RTO Stack

Results of Benzene Determinations——————————————Method18

	Run 1	Run 2	Run 3
Date of run	3-21-96	3-21-96	3-21-96
Time run start/end (HRS)	0816-0906	0939-1039	1135-1235
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	25.1	25.1	25.3
Oxygen content (%V/V)	15.8	15.8	15.8
Volumetric flow rate (DSCFM)	72800	72800	72800
Benzene concentration (ppm,d)	0.11	0.17	0.08
Benzene emission rate (LB/HR)	0.09	0.15	0.07

Interpoll Labs Report No. 6-7451
Louisiana Pacific Corporation
Hayward, Wisconsin

Test No. 15
Line 2 Thermal Oil Heater Stack

Results of Benzene Determinations——————————————Method18

	Run 1	Run 2	Run 3
Date of run	3-18-96	3-18-96	3-18-96
Time run start/end (HRS)	1800-1900	1930-2030	2100-2200
Total sampling time (MIN)	60	60	60
Moisture content (%V/V)	10.5	12.7	12.3
Oxygen content (%V/V)	13.6	12.5	11.6
Volumetric flow rate (DSCFM)	16830	16090	16290
Benzene concentration (ppm,d)	< 0.01	0.18	0.48
Benzene emission rate (LB/HR)	< 0.002	0.035	0.096

3.10 PAH Sampling Data

Test No. 3
Line 2 Dryer RTO Stack

Sampling Data for PAH Determinations--------SW846 Method 0010

	Run 1	Run 2	Run 3
Date of run	03-20-96	03-21-96	03-21-96
Time run start/end.....(HRS)	1440/1724	815/1050	1135/1409
Static pressure.....(IN.WC)	-0.65	-0.65	-0.65
Cross sectional area (SQ.FT)	36.23	36.23	36.23
Pitot tube coefficient.....	0.840	0.840	0.840
Water in sample gas			
condenser.....(ML)	830.0	749.0	761.0
impingers.....(GRAMS)	0.0	0.0	0.0
desiccant.....(GRAMS)	35.0	66.0	64.0
total.....(GRAMS)	865.0	815.0	825.0
Gas meter coefficient.....	1.0054	1.0054	1.0054
Barometric pressure..(IN.HG)	29.31	29.24	29.24
Avg. orif.pres.drop..(IN.WC)	2.24	2.19	2.23
Avg. gas meter temp..(DEF-F)	82.1	77.5	84.1
Volume through gas meter....			
at meter conditions...(CF)	119.86	117.96	119.58
standard conditions.(DSCF)	115.58	114.43	114.61
standard conditions..(NM^3)	3.273	3.240	3.245
Total sampling time....(MIN)	144.00	144.00	144.00
Nozzle diameter.....(IN)	.269	.269	.269
Avg.stack gas temp ..(DEG-F)	265	262	266
Volumetric flow rate.....			
actual.....(ACFM)	137976	136268	137323
dry standard.....(DSCFM)	72651	72797	72817
Isokinetic variation.....(%)	101.5	100.3	100.4

4 RESULTS OF FUEL ANALYSES

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

Date:	3/28/96
Client:	LOUISIANA-PACIFIC, HAYWARD
Laboratory Log Number:	7451-29-9998
Sample Collected:	3/19/96
Sample Received:	3/21/96
Source:	LINE 2 KONUS
Sample Identification:	TEST 14, WOOD/BARK

Proximate and Ultimate Analysis WT %

Proximate Analysis WT %

Parameter	Moisture & Ash Free	Moisture Free	As Received
Moisture, Total			42.26
Ash		2.96	1.71
Volatile Matter	78.68	76.36	44.09
Fixed Carbon (calculation)	21.32	20.69	11.95
Sulfur	0.01	0.01	0.01
Heating Value, BTU/LB.	8738	8480	4896

Ultimate Analysis WT %

Parameter	Moisture & Ash Free	Moisture Free	As Received
Moisture, Total			42.26
Ash		2.96	1.71
Carbon	50.78	49.27	28.45
Hydrogen	5.79	5.62	3.24
Nitrogen	0.06	0.05	0.03
Oxygen (calculated)	43.37	42.08	24.30
Sulfur	0.01	0.01	0.01

Respectfully submitted,

David J. Schneider, Manager
Chemistry Department

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APPENDIX A

RESULTS OF VOLUMETRIC FLOW RATE DETERMINATIONS

Test No. 7
Line 2 Core Dryer Duct

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

Date of Determination.....	03-19-96
Time of Determination.....(HRS)	1326
Barometric pressure.....(IN.HG)	28.87
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	42
Duct area.....(SQ.FT)	9.62
Direction of flow.....	UP
Static pressure.....(IN.WC)	-11
Avg. gas temp.....(DEG-F)	240
Moisture content.....(% V/V)	24.65
Avg. linear velocity.....(FT/SEC)	92.2
Gas density.....(LB/ACF)	.04883
Molecular weight.....(LB/LBMOLE)	29.39
Mass flow of gas.....(LB/HR)	155862
Volumetric flow rate.....	
actual.....(ACFM)	53197
dry standard.....(DSCFM)	28356

Test No. 7
Line 2 Core Dryer Duct

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

Date of Determination.....	03-20-96
Time of Determination.....(HRS)	1003
Barometric pressure.....(IN.HG)	29.31
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	42
Duct area.....(SQ.FT)	9.62
Direction of flow.....	UP
Static pressure.....(IN.WC)	-11.4
Avg. gas temp.....(DEG-F)	218
Moisture content.....(% V/V)	25.40
Avg. linear velocity.....(FT/SEC)	92.0
Gas density.....(LB/ACF)	.05105
Molecular weight.....(LB/LBMOLE)	29.43
Mass flow of gas.....(LB/HR)	162672
Volumetric flow rate.....	
actual.....(ACFM)	53106
dry standard.....(DSCFM)	29359

Test No. 7
Line 2 Core Dryer Duct

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

Date of Determination.....	03-20-96
Time of Determination.....(HRS)	1203
Barometric pressure.....(IN.HG)	29.31
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	42
Duct area.....(SQ.FT)	9.62
Direction of flow.....	UP
Static pressure.....(IN.WC)	-12.2
Avg. gas temp.....(DEG-F)	216
Moisture content.....(% V/V)	26.85
Avg. linear velocity.....(FT/SEC)	92.0
Gas density.....(LB/ACF)	.05081
Molecular weight.....(LB/LBMOLE)	29.45
Mass flow of gas.....(LB/HR)	161962
Volumetric flow rate.....	
actual.....(ACFM)	53130
dry standard.....(DSCFM)	28827

Test No. 8
Line 2 Surface Dryer Duct

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

Date of Determination.....	03-19-96
Time of Determination.....(HRS)	1343
Barometric pressure.....(IN.HG)	28.87
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	42
Duct area.....(SQ.FT)	9.62
Direction of flow.....	UP
Static pressure.....(IN.WC)	-12.2
Avg. gas temp.....(DEG-F)	251
Moisture content.....(% V/V)	28.58
Avg. linear velocity.....(FT/SEC)	95.5
Gas density.....(LB/ACF)	.04722
Molecular weight.....(LB/LBMOLE)	29.47
Mass flow of gas.....(LB/HR)	156123
Volumetric flow rate.....	
actual.....(ACFM)	55103
dry standard.....(DSCFM)	27324

Test No. 8
Line 2 Surface Dryer Duct

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

Date of Determination.....	03-20-96
Time of Determination.....(HRS)	1014
Barometric pressure.....(IN.HG)	29.31
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	42
Duct area.....(SQ.FT)	9.62
Direction of flow.....	UP
Static pressure.....(IN.WC)	-12
Avg. gas temp.....(DEG-F)	249
Moisture content.....(% V/V)	28.74
Avg. linear velocity.....(FT/SEC)	94.8
Gas density.....(LB/ACF)	.04803
Molecular weight.....(LB/LBMOLE)	29.42
Mass flow of gas.....(LB/HR)	157690
Volumetric flow rate.....	
actual.....(ACFM)	54722
dry standard.....(DSCFM)	27592

Test No. 8
Line 2 Surface Dryer Duct

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

Date of Determination.....	03-20-96
Time of Determination.....(HRS)	1211
Barometric pressure.....(IN.HG)	29.31
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	42
Duct area.....(SQ.FT)	9.62
Direction of flow.....	UP
Static pressure.....(IN.WC)	-11.8
Avg. gas temp.....(DEG-F)	212
Moisture content.....(% V/V)	28.31
Avg. linear velocity.....(FT/SEC)	90.2
Gas density.....(LB/ACF)	.05078
Molecular weight.....(LB/LBMOLE)	29.41
Mass flow of gas.....(LB/HR)	158581
Volumetric flow rate.....	
actual.....(ACFM)	52052
dry standard.....(DSCFM)	27872

Test No. 9
Line 2 Press Vent RTO Stack

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

Date of Determination.....	03-19-96
Time of Determination.....(HRS)	843
Barometric pressure.....(IN.HG)	28.78
Pitot tube coefficient.....	.84
Number of sampling ports.....	1
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	76.25
Duct area.....(SQ.FT)	31.71
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.35
Avg. gas temp.....(DEG-F)	233
Moisture content.....(% V/V)	0.00
Avg. linear velocity.....(FT/SEC)	52.1
Gas density.....(LB/ACF)	.05484
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	326197
Volumetric flow rate.....	
actual.....(ACFM)	99135
dry standard.....(DSCFM)	72589

Test No. 11
Line 2 Press Vent RTO Stack

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

Date of Determination.....	03-20-96
Time of Determination.....(HRS)	1651
Barometric pressure.....(IN.HG)	28.98
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	76.25
Duct area.....(SQ.FT)	31.71
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.57
Avg. gas temp.....(DEG-F)	233
Moisture content.....(% V/V)	2.16
Avg. linear velocity.....(FT/SEC)	49.5
Gas density.....(LB/ACF)	.05474
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	309566
Volumetric flow rate.....	
actual.....(ACFM)	94248
dry standard.....(DSCFM)	67951

Test No. 11
Line 2 Press Vent RTO Stack

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

Date of Determination.....	03-20-96
Time of Determination.....(HRS)	1815
Barometric pressure.....(IN.HG)	28.98
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	76.25
Duct area.....(SQ.FT)	31.71
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.49
Avg. gas temp.....(DEG-F)	234
Moisture content.....(% V/V)	1.65
Avg. linear velocity.....(FT/SEC)	50.1
Gas density.....(LB/ACF)	.05478
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	313156
Volumetric flow rate.....	
actual.....(ACFM)	95275
dry standard.....(DSCFM)	68965

Test No. 11
Line 2 Press Vent RTO Stack

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

Date of Determination.....	03-20-96
Time of Determination.....(HRS)	2015
Barometric pressure.....(IN.HG)	28.98
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	76.25
Duct area.....(SQ.FT)	31.71
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.43
Avg. gas temp.....(DEG-F)	228
Moisture content.....(% V/V)	1.97
Avg. linear velocity.....(FT/SEC)	46.3
Gas density.....(LB/ACF)	.05520
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	292075
Volumetric flow rate.....	
actual.....(ACFM)	88187
dry standard.....(DSCFM)	64190

Test No. 12
Line 2 Press Vent RTO Inlet

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

Date of Determination.....	03-20-96
Time of Determination.....(HRS)	1700
Barometric pressure.....(IN.HG)	29
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	58.5
Duct area.....(SQ.FT)	18.67
Direction of flow.....	UP
Static pressure.....(IN.WC)	-3.55
Avg. gas temp.....(DEG-F)	120
Moisture content.....(% V/V)	2.41
Avg. linear velocity.....(FT/SEC)	79.9
Gas density.....(LB/ACF)	.06490
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	348345
Volumetric flow rate.....	
actual.....(ACFM)	89461
dry standard.....(DSCFM)	76341

Test No. 12
Line 2 Press Vent RTO Inlet

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

Date of Determination.....	03-20-96
Time of Determination.....(HRS)	1820
Barometric pressure.....(IN.HG)	29
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	58.5
Duct area.....(SQ.FT)	18.67
Direction of flow.....	UP
Static pressure.....(IN.WC)	-4.2
Avg. gas temp.....(DEG-F)	122
Moisture content.....(% V/V)	2.35
Avg. linear velocity.....(FT/SEC)	81.0
Gas density.....(LB/ACF)	.06458
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	351612
Volumetric flow rate.....	
actual.....(ACFM)	90742
dry standard.....(DSCFM)	77087

Test No. 12
Line 2 Press Vent RTO Inlet

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

Date of Determination.....	03-20-96
Time of Determination.....(HRS)	2017
Barometric pressure.....(IN.HG)	29
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	58.5
Duct area.....(SQ.FT)	18.67
Direction of flow.....	UP
Static pressure.....(IN.WC)	-4.15
Avg. gas temp.....(DEG-F)	121
Moisture content.....(% V/V)	2.18
Avg. linear velocity.....(FT/SEC)	81.1
Gas density.....(LB/ACF)	.06474
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	352856
Volumetric flow rate.....	
actual.....(ACFM)	90836
dry standard.....(DSCFM)	77444

Test No. 13
Line 2 Konus Stack

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

Date of Determination.....	03-18-96
Time of Determination.....(HRS)	950
Barometric pressure.....(IN.HG)	28.69
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	51.5
Duct area.....(SQ.FT)	14.47
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.32
Avg. gas temp.....(DEG-F)	386
Moisture content.....(% V/V)	9.25
Avg. linear velocity.....(FT/SEC)	35.7
Gas density.....(LB/ACF)	.04413
Molecular weight.....(LB/LBMOLE)	29.48
Mass flow of gas.....(LB/HR)	82102
Volumetric flow rate.....	
actual.....(ACFM)	31005
dry standard.....(DSCFM)	16825

Test No. 14
Line 2 Konus Stack

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

Date of Determination.....	03-19-96
Time of Determination.....(HRS)	1730
Barometric pressure.....(IN.HG)	28.69
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	51.5
Duct area.....(SQ.FT)	14.47
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.35
Avg. gas temp.....(DEG-F)	407
Moisture content.....(% V/V)	10.50
Avg. linear velocity.....(FT/SEC)	34.6
Gas density.....(LB/ACF)	.04296
Molecular weight.....(LB/LBMOLE)	29.57
Mass flow of gas.....(LB/HR)	77372
Volumetric flow rate.....	
actual.....(ACFM)	30018
dry standard.....(DSCFM)	15675

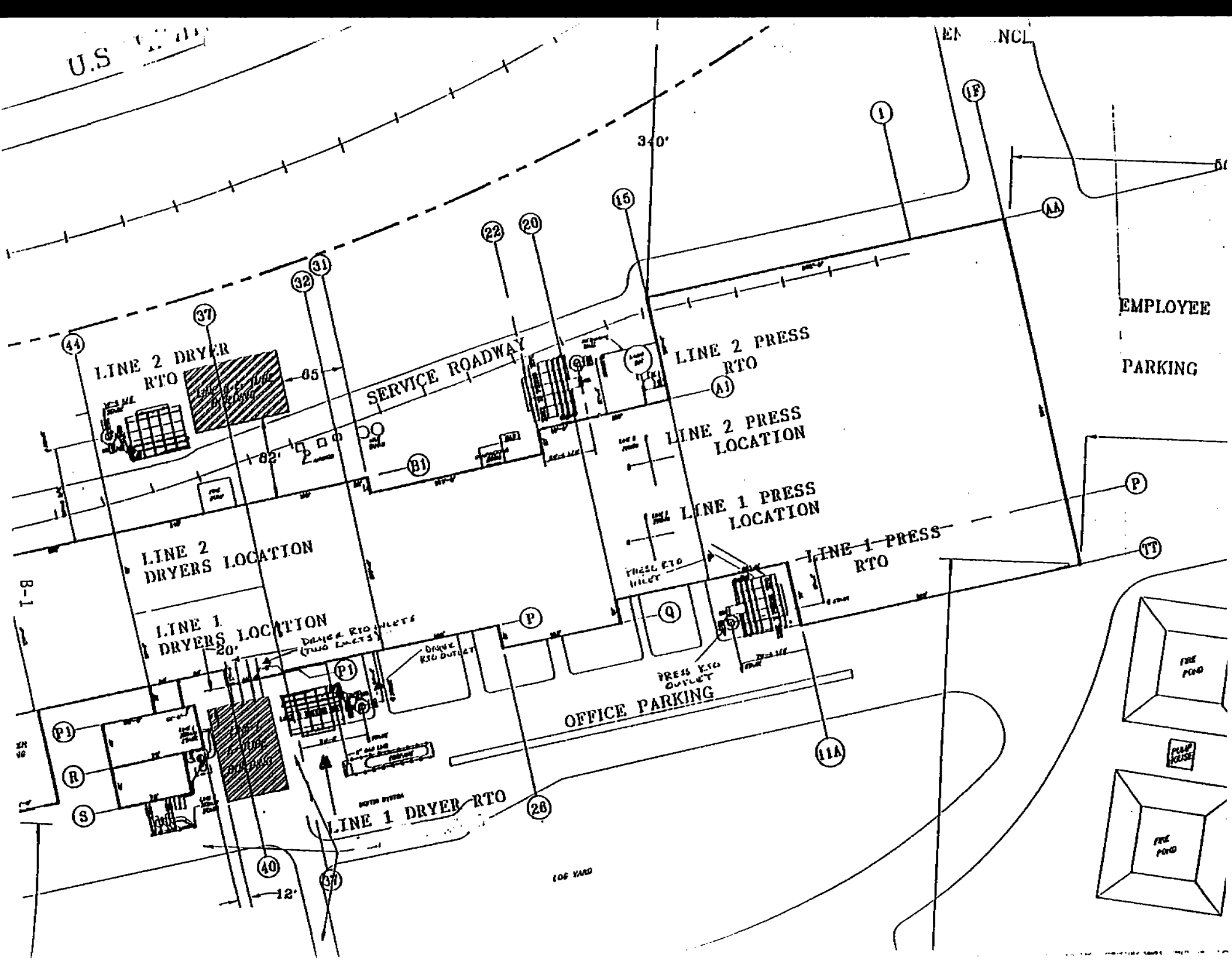
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Line 2 Dryer RTO Inlet

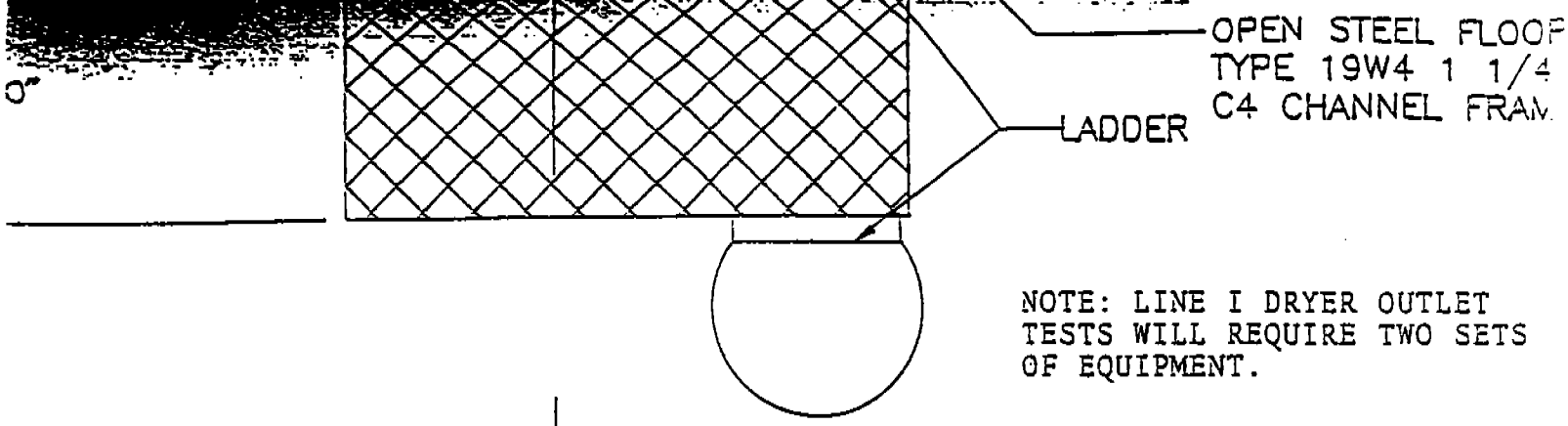
Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	03-19-96
Time of Determination.....(HRS)	829
Barometric pressure.....(IN.HG)	28.78
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	24
Shape of duct.....	Round
Stack diameter.....(IN)	64.75
Duct area.....(SQ.FT)	22.87
Direction of flow.....	HORIZONTAL
Static pressure.....(IN.WC)	-1.5
Avg. gas temp.....(DEG-F)	145
Moisture content.....(% V/V)	25.05
Avg. linear velocity.....(FT/SEC)	73.3
Gas density.....(LB/ACF)	.05750
Molecular weight.....(LB/LBMOLE)	29.31
Mass flow of gas.....(LB/HR)	346929
Volumetric flow rate.....	
actual.....(ACFM)	100566
dry standard.....(DSCFM)	63034

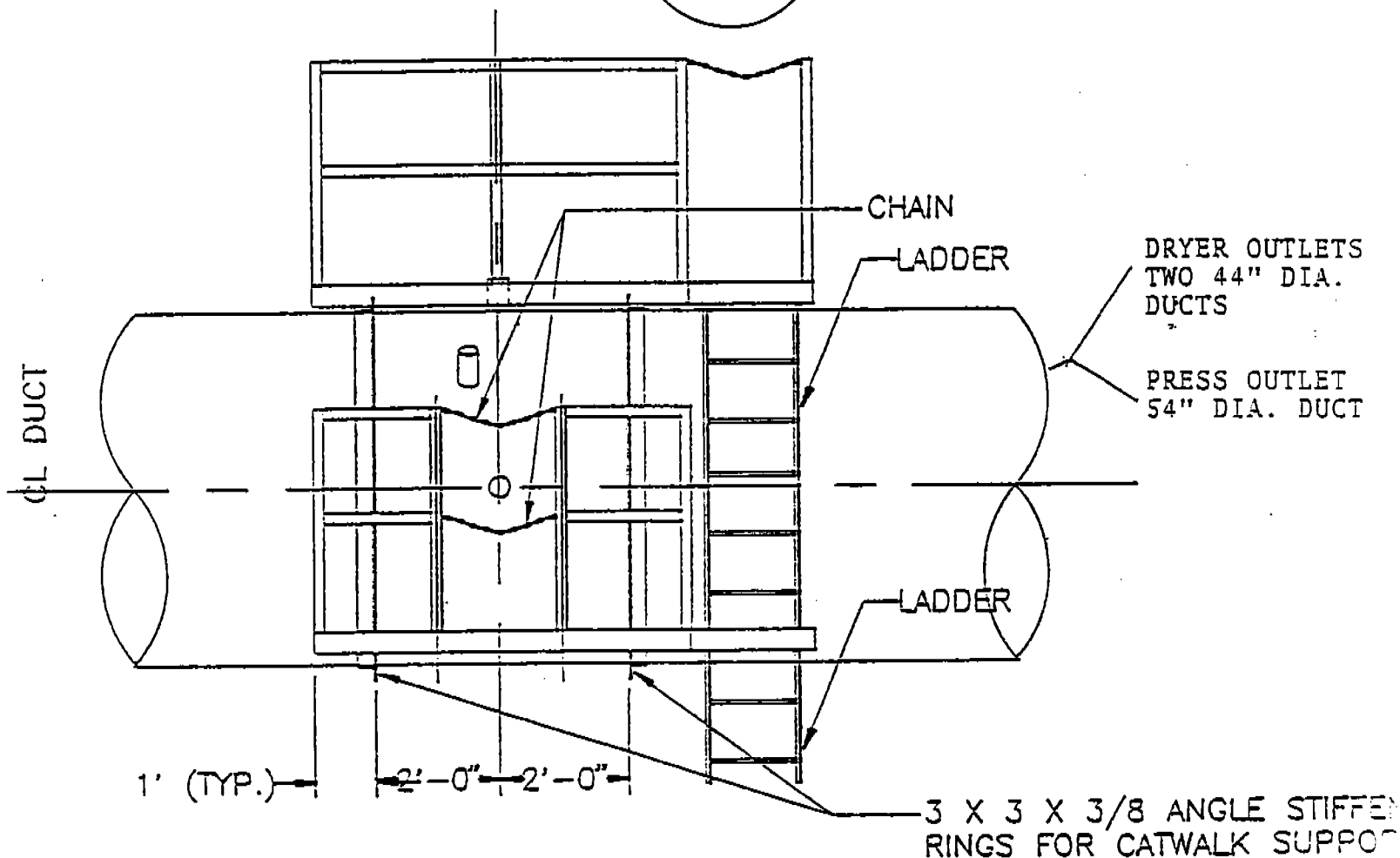
APPENDIX B

LOCATION OF TEST PORTS

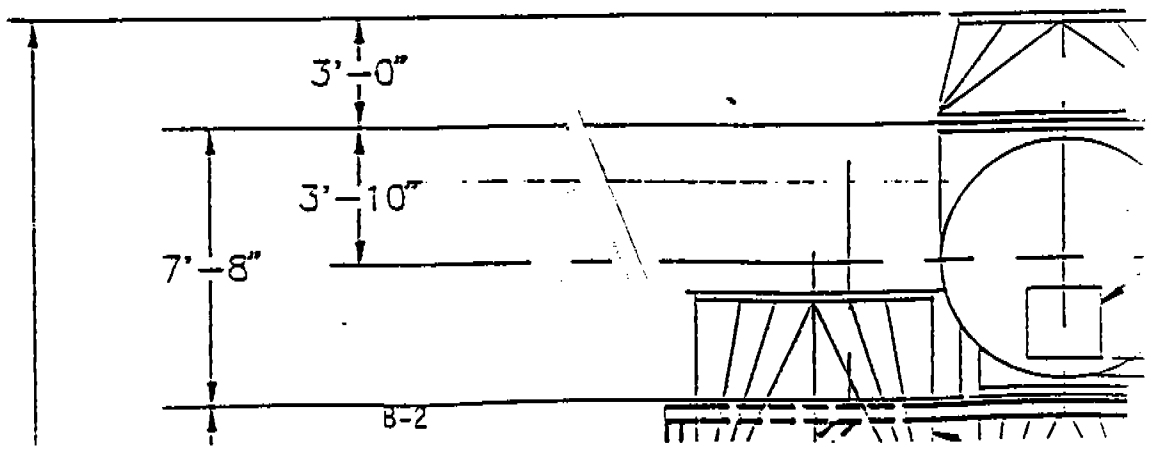

U.S
340'
EMPLOYEE
PARKING
LINE 2 DRYER
RTO
SERVICE ROADWAY
LINE 2 PRESS
RTO
LINE 2 PRESS
LOCATION
LINE 1 PRESS
LOCATION
LINE 1 PRESS
RTO
LINE 2
DRYERS LOCATION
LINE 1
DRYERS LOCATION
OFFICE PARKING
LINE 1 DRYER RTO
LOG YARD
FIRE POND
FIRE POND
PUMP HOUSE
82'
20'
12'
65
B-1

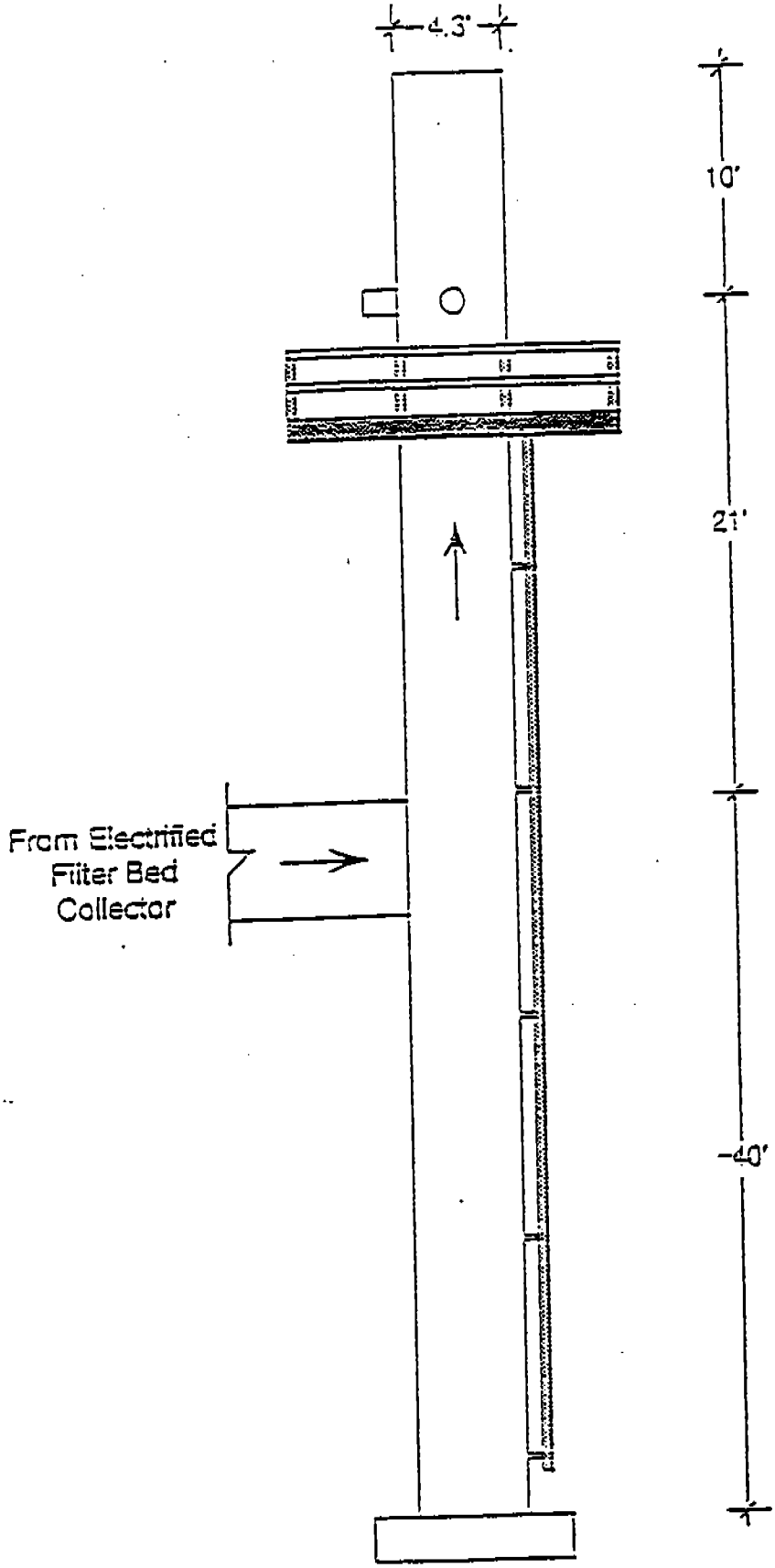


NOTE: LINE I DRYER OUTLET TESTS WILL REQUIRE TWO SETS OF EQUIPMENT.

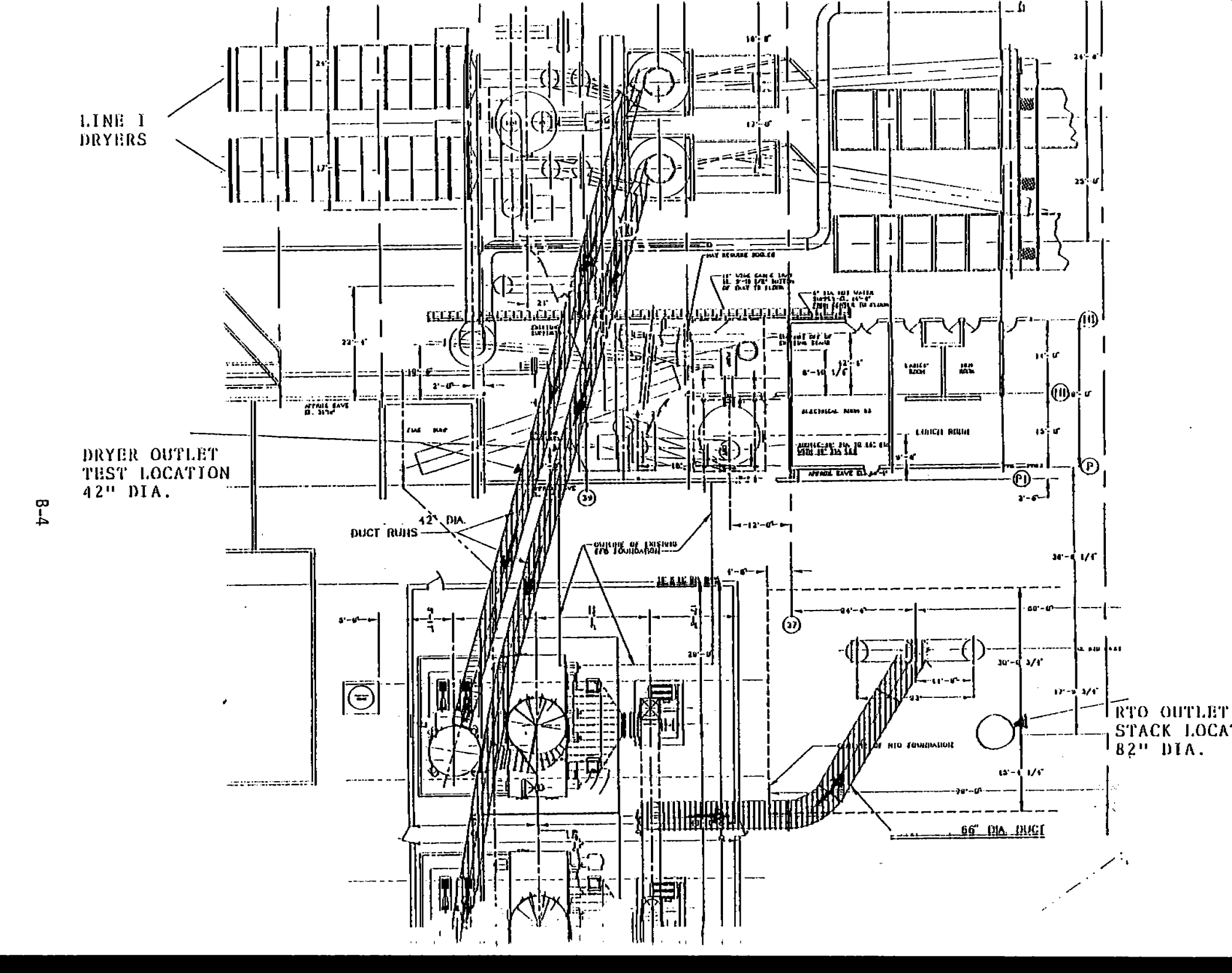


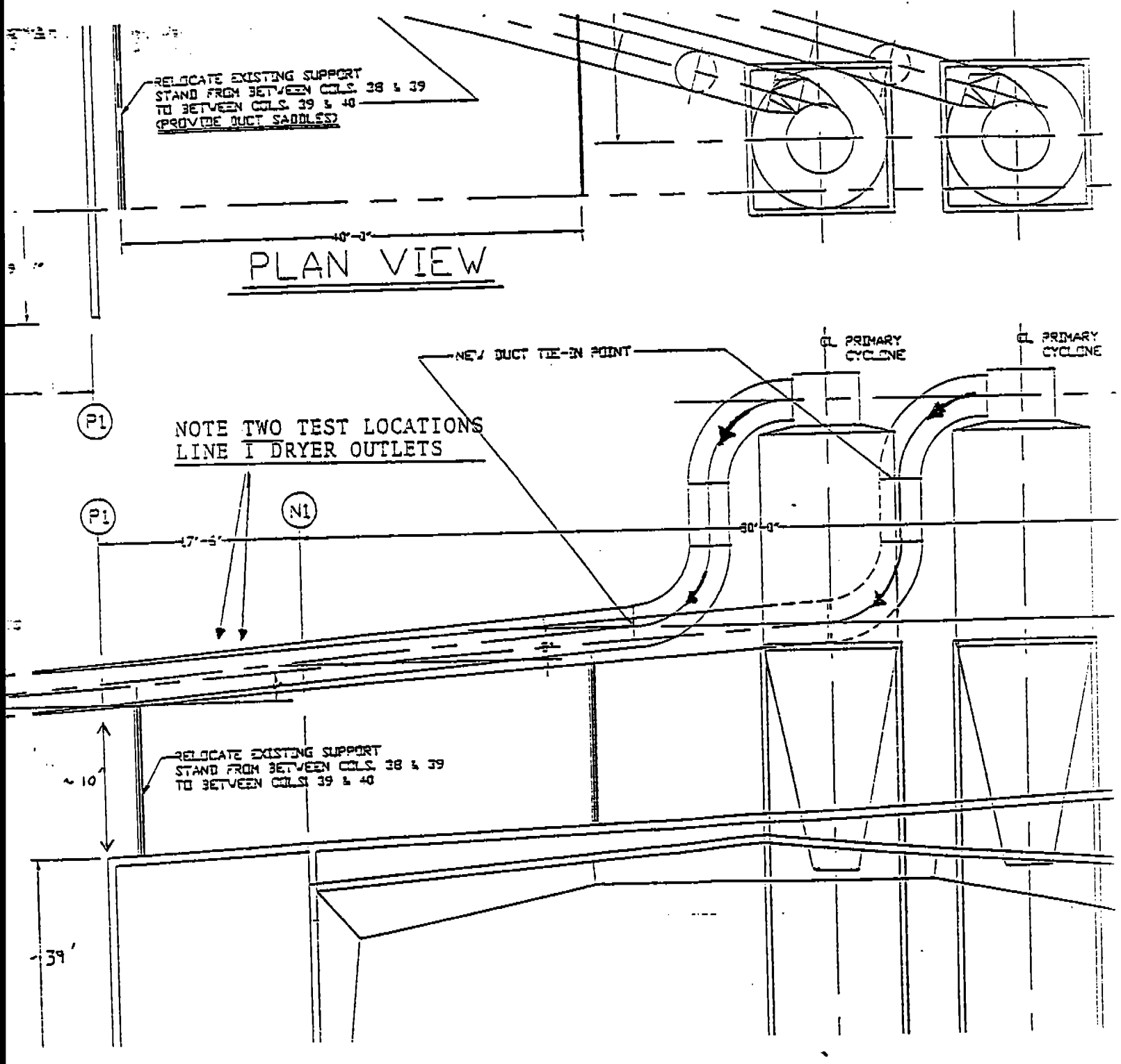
TYPICAL TEST PORT PLATFORM

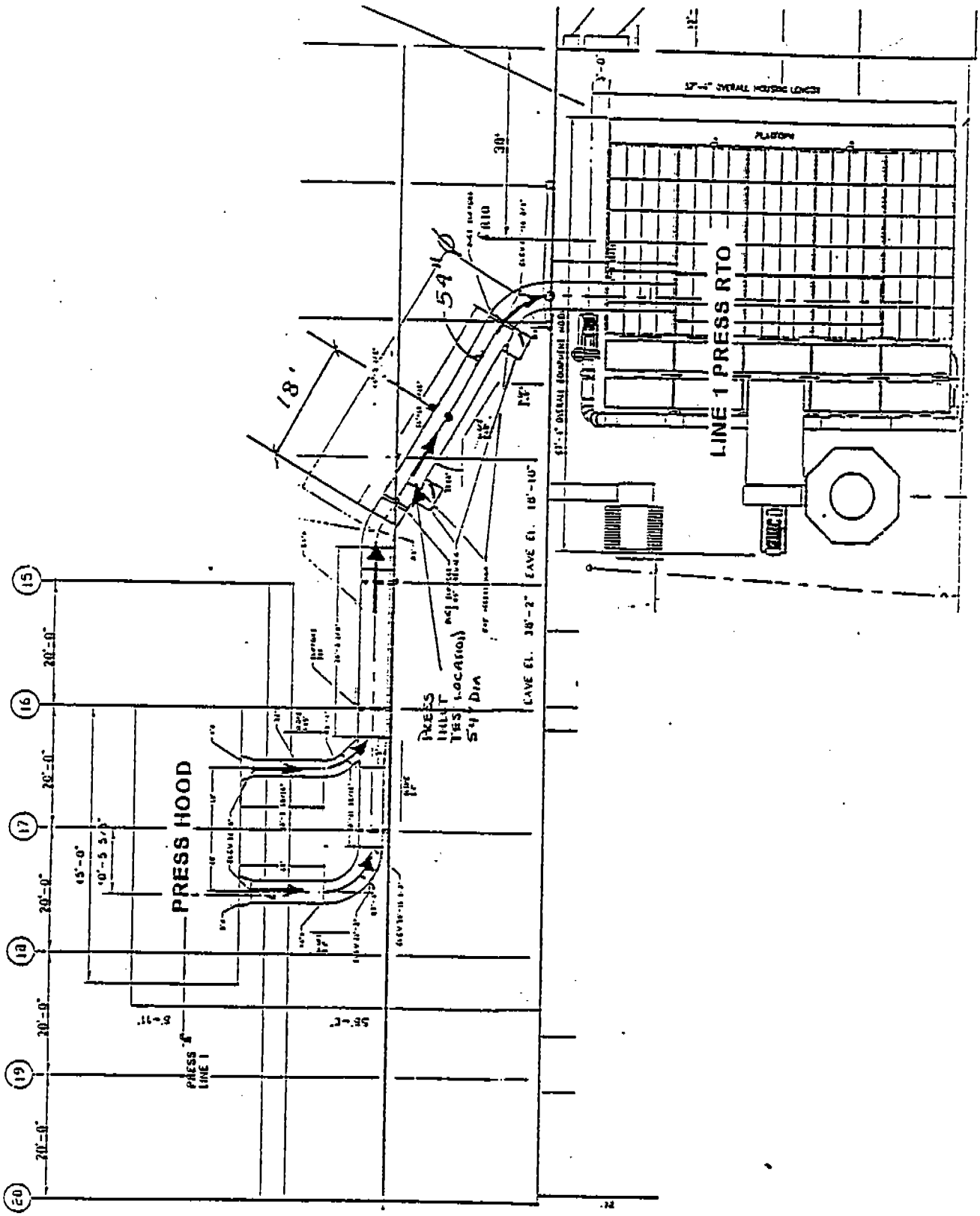




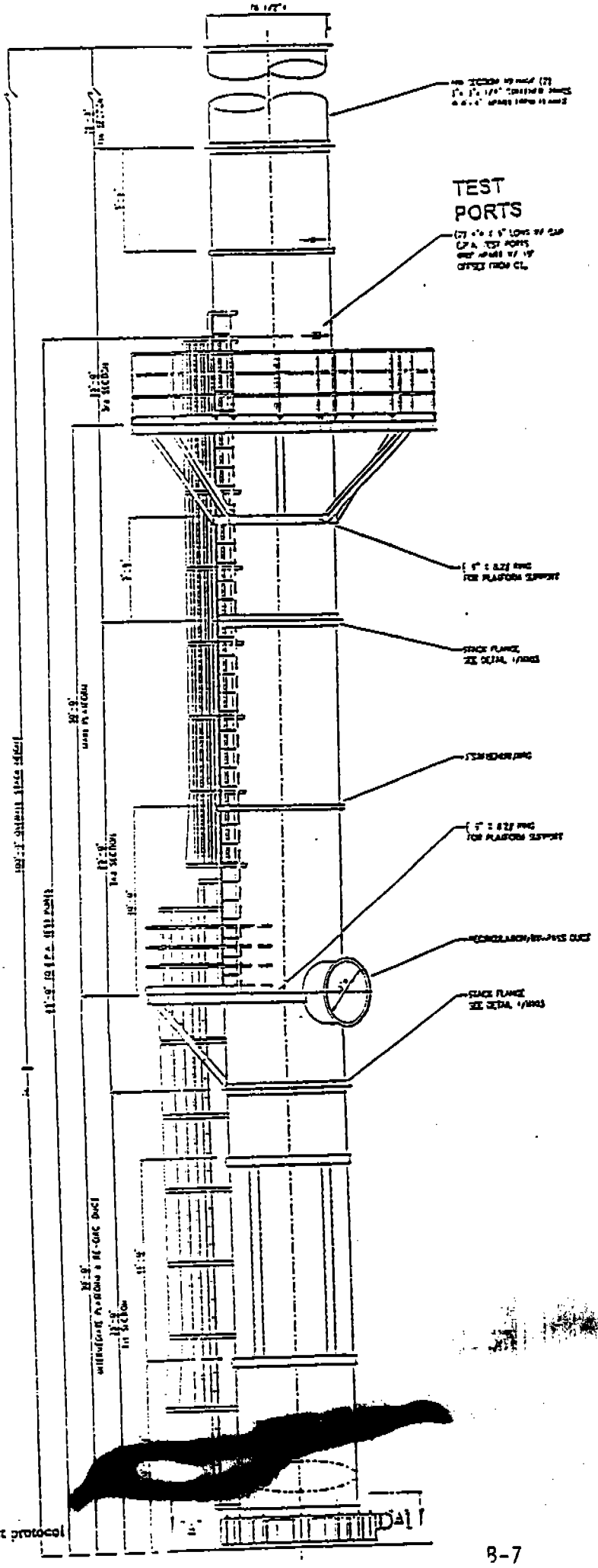
HAYWARD, WI
DRAWING 10
LINE 1
THERMAL OIL HEATER
STACK
ELEVATION


LINE 1
DRYERS
DRYER OUTLET
TEST LOCATION
42" DIA.
42" DIA.
DUCT RUNS
66" DIA. DUCT
RTO OUTLET
STACK LOCA
82" DIA.


RELOCATE EXISTING SUPPORT
STAND FROM BETWEEN COLS. 38 & 39
TO BETWEEN COLS. 39 & 40
(PROVIDE DUCT SADDLES)
40'-0"
PLAN VIEW
NEW DUCT TIE-IN POINT
℄ PRIMARY CYCLONE
℄ PRIMARY CYCLONE
P1
NOTE TWO TEST LOCATIONS
LINE 1 DRYER OUTLETS
P1
N1
47'-6"
30'-0"
RELOCATE EXISTING SUPPORT
STAND FROM BETWEEN COLS. 38 & 39
TO BETWEEN COLS. 39 & 40
~ 10'
39'

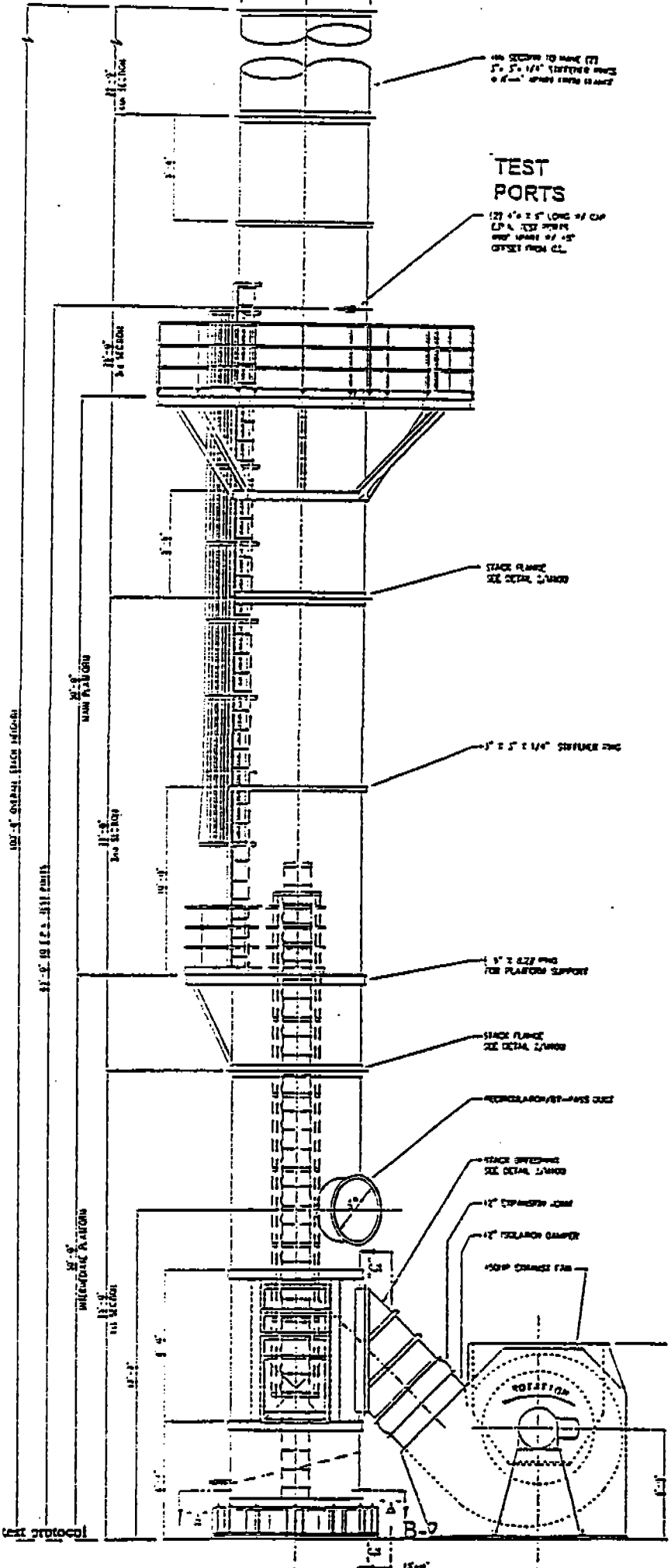


HAYWARD, W'
DRAWING
GAS FLOW FRO
LINE 1 PRESS
TO RTO
PLAN



HAYWARD, WI
DRAWING 7
PRESS RTO STACK
TYPICAL FOR BOTH LINES
ELEVATION

Hayward test protocol



HAYWARD, WI
DRAWING 2
DRYER RTO STACK
(TYPICAL FOR BOTH LINES)
ELEVATION

Hayward test protocol

APPENDIX C

FIELD DATA SHEETS

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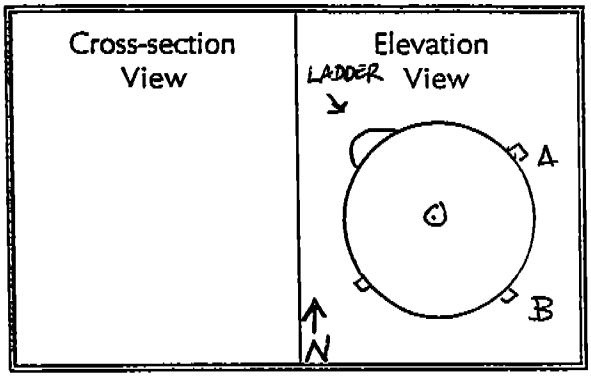
Line 2 Dryer RTO Stack 1
Line 2 Core Dryer Duct 35
Line 2 Surface Dryer Duct 45
Line 2 Press Vent RTO Stack 55
Line 2 Press RTO Inlet 75
Line 2 Thermal Oil Heater Stack 81
Line 2 Dryer RTO Inlet 98
VE Fiel Data Sheets 106
VE Observer Certification Sheet 112

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stack
Test 1 Run Date 3/19/96
Stack Dimen. 81.5 IN.
Dry Bulb ____ °F Wet bulb ____ °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.78 IN.HG
Static Pressure -.65 IN.WC
Operators D. Van Hoever + S. Kelker
Pitot No. V23-8 C_p .84
Particulate

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas
		Port Length: 6.25" IN.		Time Start:	HRS
A 1		2.61	8.86		
2		8.56	14.81		
3		15.81	22.06		
4		26.32	32.57		
5		55.18	61.43		
6		65.59	71.94		
7		72.94	78.19		
8		78.89	85.14		
B 1					
2					
3					
4					
5					
6					
7					
8					
Temp. Meas. Device & S/N: PDT #35				Time End:	HRS

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. Hayward Date 3/19/96 Test 1 Run 1
Source Line 2 Dryer RTO Stack No. of traverse points 16
Method 5 Filter holder: glass Filter type: glass fiber

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0 cfm at 9 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used:

Recovery solvent(s)

☒ acetone
☐ other(s)

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	511	200	311
Impinger No. 3			
Condenser			
Desiccant	1243	1236	7
Total			318

Integrated Gas Sampling Data:

Bag Pump No. 233 Box No. 25 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 IN.HG
Time start: 1035 (HRS) Time end: 1139 (HRS)
Sampling rate: 400 cc/min Operator: DHH

S/N of O_2 Analyzer used to monitor train outlet: 4

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EIC LA ATC S, IN
(612) 6020

EPA Method 5 Field Data Sheet

Job L.P. Hayward
Source Line 1 Dryer RTO STACK
Date 3/18/96 Test 1 Run 1

Operators DH + SK
Meter Box No. 6 ΔH@ 1.89 in.WC
Gasmeter Coeff. 1.0054

Nozzle No. 7-4
Nozzle Dia. ~~28.78~~ .247 in.
Bar. Press. 28.78 in.Hg

Pitot No. V23-8
C_p .84
H_2O 20 %

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	Inp.	Gas/In	Gas/Out	Oxygen (% v/v)
	1030	826.00			8.69	5	257	239	256	41	60	60	16.2
A 8	4	828.77	.76	1.54	1.43	6	257				59	59	15.9
7	8	831.53	.75	1.55	4.21	6	263				62	59	15.5
6	12	834.26	.79	1.62	6.93	6	257	241	253	42	64	59	15.9
5	16	836.97	.74	1.53	9.70	6	253				69	60	16.2
4	20	839.70	.76	1.59	2.47	6	256	242	254	43	70	60	16.1
3	24	842.51	.76	1.59	5.20	6	256				74	60	15.8
2	28	845.26	.73	1.53	7.77	6	260	240	253	44	75	60	15.7
1	32	847.80	.65	1.36	0.66	6	260				68	61	16.1
B 8	36	850.67	.82	1.71	3.53	6	272	246	254	42	71	62	16.2
7	40	853.45	.83	1.70	6.46	6	272				77	62	16.7
6	44	856.40	.86	1.76	9.41	7	265				80	64	16.5
5	48	859.17	.85	1.77	2.21	7	272				81	64	16.2
4	52	862.01	.77	1.60	4.98	7	272				82	64	16.3
3	56	864.88	.75	1.56	7.72	7	262				83	65	16.0
2	60	867.80	.72	1.52	0.12		262				84	65	16.1
1	64	870.22	.55	1.16									
	1140												
	θ =	V_m = 44.22		ΔH = 1.57							Avg. = 66.9		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. Hayward
Date 3/19/96 Test 1 Run 2
Source Line 2 Dryer RTO Stack
No. of traverse points 16
Method 5 Filter holder: glass
Filter type: glass fiber

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:

Recovery solvent(s)

☒ acetone
☐ other(s)

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	504	200	304
Impinger No. 3			
Condenser			
Desiccant	1379	1360	15
Total			319

Integrated Gas Sampling Data:

Bag Pump No. 23B
Box No. 25 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0
cc/min at 15 IN.HG
Time start: 1325
(HRS) Time end: 1429 (HRS)
Sampling rate: 400
cc/min Operator: DVH

S/N of O_2 Analyzer used to monitor train outlet: 4

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TERR[illegible]ATORIES, INC.
(612) [illegible]-6020

EPA Method 5 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stack
Date 3/19/96 Test 1 Run 2

Operators DHA & S.K
Meter Box No. 62 ΔH@ 1.87 in.WC
Gasmeter Coeff. 1.0054

Nozzle No. 7-4
Nozzle Dia. .247 in.
Bar. Press. 29.78 in.Hg

Pitot No. U23-8
C_p .84
H_2O 26 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)	
[illegible]	1205	872.91	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
B 8	4	875.61	.80	1.44	5.56	5	271	248	254	42	59	59	17.2	
7	8	878.33	.91	1.49	8.24	5	262				65	56	17.0	←ω=30
6	12	881.03	.87	1.54	0.96	5	262				73	57	17.1	←ω=28
5	16	883.78	.84	1.47	3.63	5	274	252	256	41	79	58	16.5	
4	20	886.44	.76	1.35	6.20	5	267				82	60	16.5	
3	24	888.97	.81	1.41	8.86	5	272	253	258	42	84	60	16.4	
2	28	891.51	.76	1.37	1.46	5	263				85	61	16.4	
1	32	893.99	.69	1.25	3.95	5	259	251	253	42	87	63	16.1	
A 8	36	896.74	.79	1.44	6.62	6	259				78	64	16.3	
7	40	899.49	.88	1.60	9.42	6	256	262	257	40	84	64	16.1	
6	44	902.21	.83	1.49	2.14	6	266				88	66	15.8	
5	48	904.97	.85	1.55	4.92	6	260	263	259	42	89	68	16.0	
4	52	907.78	.80	1.45	7.61	6	265				90	70	16.2	
3	56	910.51	.86	1.58	0.42	6	260	262	258	43	92	71	16.2	
2	60	913.41	.83	1.50	3.16	6	272				93	70	16.2	
1	64	915.80	.75	1.38	5.79		262				93	72	16.3	
	1469													
[illegible]	0 - 64	V_m - 42.89	[illegible]	ΔH - 1.46	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Avg. - 73.1	[illegible]	[illegible]	

C-5

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stack
Method 5 Filter holder: glass

Date 3/19/96 Test 1 Run 3
No. of traverse points 16
Filter type: glass fiber

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:

Recovery solvent(s)

☑ acetone
☐ other(s)

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	515	200	315
Impinger No. 3			
Condenser			
Desiccant	1433	1425	8
Total			323

Integrated Gas Sampling Data:

Bag Pump No. 23B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1500
Sampling rate: 400

Box No. 25 Bag No. 3
Size: 44 L
cc/min at 14 IN.HG
(HRS) Time end: 2037 (HRS)
cc/min Operator: DVH

S/N of O_2 Analyzer used to monitor train outlet: 4

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TERI (612) 6020

EPA Method 5 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stack
Date 3/19/96 Test 1 Run 3

Operators DUN & S.K
Meter Box No. 6 ΔH@ 1.89 in.WC
Gasmeter Coeff. 1.0054

Nozzle No. 7-4
Nozzle Dia. .247 in.
Bar. Press. 28.78 in.Hg

Pitot No. V23-8
C_p .84
H_2O 26 %

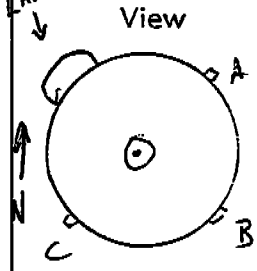
Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	1500	916.00											
A 8	4	918.67	.78	1.43	8.66	5	266	237	254	48	69	68	16.8
7	8	921.18	.71	1.29	1.17	5	269				69	68	16.1
6	12	923.82	.83	1.53	3.90	6	259	244	258	50	63	56	16.9
5	16	926.63	.83	1.47	6.57	6	273				66	57	16.3
4	20	929.21	.82	1.49	9.25	6	259	251	257	43	71	59	16.7
3	24	931.99	.84	1.53	1.97	6	263				73	60	16.2
2	28	934.59	.74	1.35	4.54	6	262	258	251	41	76	60	16.5
1	32	937.21	.8	1.47	7.22	6	258				78	63	16.2
B 8	36	940.00	.82	1.51	9.95	6	260	261	254	40	80	64	16.5
7	40	942.63	.80	1.46	2.64	6	268				82	65	16.3
6	44	945.45	.86	1.59	5.44	6	261	257	256	41	85	65	16.4
5	48	494.20	.88	1.63	8.28	6	262				87	67	16.8
4	52	950.86	.76	1.42	0.94	6	259	262	258	42	88	67	16.7
3	56	953.61	.80	1.47	3.65	6	272				89	67	16.6
2	60	956.30	.73	1.37	6.26	6	256	264	260	42	90	68	16.9
1	64	958.60	.58	1.08	8.59	5	265				90	70	16.7
	(2037)												
	0 - 64	V_m - 4260		ΔH - 1.45							Avg. - 71.2		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stack
Test 2 Run Date 3/19/96
Stack Dimen. 81.5 IN.
Dry Bulb ____ °F Wet bulb ____ °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.78 IN.HG
Static Pressure ____ IN.WC
Operators J. Ken Hoover & S. Kelker
Pitot No. P23-8 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
		Port Length:	6.25 IN.	Time Start:	HRS
B/A 1	1/6	13.58	19.83		
2	3/6	40.75	47		
3	5/6	67.91	74.16		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job C.P. Hayward
Date 3/19/96 Test 2 Run 1
Source Line 2 Dryer RTO Stack
No. of traverse points 3
Method Plenol Filter holder: Glass
Filter type: Glass fiber

Sample Train Leak Check:

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

Particulate Catch Data:

No. of filters used:

Recovery solvent(s)

_____ ☐acetone_____
_____ ☐other(s)_____

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

Condensate Data:

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

Integrated Gas Sampling Data:

Bag Pump No. Z3A
Box No. 28 Bag No. 1
Bag Material: 5-layer Aluminized Tedlar
Size: 44 L
Pretest leak check: 0
cc/min at 15 IN.HG
Time start: 1035
(HRS) Time end: 1137 (HRS)
Sampling rate: 400
cc/min Operator: DVH

S/N of O_2 Analyzer used to monitor train outlet: 7

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 4 and 6 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stack
Date 3/19/96 Test 2 Run 1
Wet Bulb
Dry Bulb

Operator(s) D. Van Hoever & S. Kelker
Meter Box No. 13 Gasmeter Coef. 1.0023
ΔH@ 1.82 in.WC Bar.Press 28.78 i
Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in.WC ☒
Post Test: 0 cfm at 6 in.WC ☒

Trav. Point No.	Sample Time (min)	Sample Volume (cf)	Orif. Meter (in.WC)	Vac. in.Hg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/ In	Gas/ Out	O_2 (%v/v)
	1031	315.18									
B 3	5	318.83	1.80	3.5	257	256	243	44	51	51	15.8
3	10	322.46	1.80	3.5	257				51	50	15.3
3	15	326.18	1.80	4	263	257	251	42	52	49	15.0
3	20	329.82	1.80	4	253				57	50	15.5
2	25	333.59	1.80	4	256	256	254	41	59	50	14.8
2	30	337.09	1.80	4					59	49	15.1
A 2	35	340.87	1.80	4		254	251	44	56	47	15.6
2	40	344.44	1.80	4	272	272			53	45	15
1	45	348.10	1.80	4		253	254	45	74	61	16.2
1	50	351.80	1.80	4					67	54	15.1
1	55	355.37	1.80	4		258	261	46	72	58	15.6
1	60	359.05	1.80	4	262				73	60	15.5
	1138										
	θ = 60	V_m = 43.87	ΔH = 1.80		$\bar{t}$ =				$\bar{t}_m$ = 56.16		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers	512	200	312
Condenser			
Desiccant	1425	1411	14
		Total	326

Preliminary Results of SO_2 Concentration Determination		
V_{std} =	43.465	DSCF
Moisture Gravimetric =	26.10	%v/v
Moisture Psychrometric =		%v/v
SO_2, DRY =		PPM
SO_2, WET =		PPM
LB/MMBtu =		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP Harwood
Source Line 2 Dryer RTO Stack
Method Phenol Filter holder: Glass

Date 12/19/96 Test 2 Run 2
No. of traverse points 3
Filter type: Glass fiber

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

Particulate Catch Data:
No. of filters used:

Recovery solvent(s)

_____
_____

☐acetone_____
☐other(s)_____

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

Condensate Data:

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

Integrated Gas Sampling Data:

Bag Pump No. 23A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1324
Sampling rate: 400 cc/min

Box No. 28 Bag No. 2
Size: 44 L
15 IN.HG
(HRS) Time end: 1423 (HRS)
Operator: DVH

S/N of O_2 Analyzer used to monitor train outlet: 7

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 4 and 6 Field Data Sheet

Job L.P. Hayward
Source ~~Line A~~ 2 Dryer RTO Stack
Date 3/19/96 Test 2 Run 2
Wet Bulb
Dry Bulb

Operator(s) D. VanHoover + S. Kelker
Meter Box No. 13 Gasmeter Coef. 1.0023
ΔH@ 1.82 in.WC Bar.Press 28.78

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in.WC ~~0~~
Post Test: 0 cfm at 7 in.WC ~~0~~

Trav. Point No.	Sample Time (min)	Sample Volume (cf)	Orif. Meter (in.WC)	Vac. in.Hg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/ In	Gas/ Out	O_2 (%v/v)
	1320	359.235									
B 3	5	363.92	1.80	5	276	253	246	41	57	57	17.0
3	10	366.57	1.80	5					62	57	17.1
3	15	370.17	1.80	5	262	251	250	41	70	56	16.9
3	20	373.73	1.80	5					70	56	16.4
2	25	377.45	1.80	5	272	248	252	41	73	59	16.7
2	30	381.18	1.80	5					74	61	16.5
A 2	35	384.91	1.80	5	259	250	256	42	76	62	16.7
2	40	388.60	1.80	5					75	64	16.1
1	45	392.35	1.80	5	260	258	257	48	79	65	16.2
1	50	396.04	1.80	5					81	66	16.4
1	55	399.75	1.80	5	265	259	256	43	82	68	16.5
1	60	403.44	1.80	5					83	69	16.5
	(1424)										
	θ = 60	V_m = 44.205	ΔH = 1.80		$\bar{t}$ =				$\bar{t}_m$ = 67.58		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers	499	200	299
Condenser			
Desiccant	1544	1570	24
		Total	323

Preliminary Results of SO_2 Concentration Determination		
V_{std} =	42.848	DSCF
Moisture Gravimetric =	26.20	%v/v
Moisture Psychrometric =		%v/v
SO_2, DRY =		PPM
SO_2, WET =		PPM
LB/MMBtu =		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP Hayward
Source Line 2 dryer
Method Phenol Filter holder: Glass

Date 3/19/96 Test 2 Run 3
No. of traverse points 3
Filter type: Glass fiber

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

Particulate Catch Data:
No. of filters used:

Recovery solvent(s)

☐ acetone
☐ other(s)

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

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

Integrated Gas Sampling Data:

Bag Pump No. 23A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: Ok
Time start: 1500
Sampling rate: 400

Box No. 28 Bag No. 3
Size: 44 L
cc/min at 15 IN.HG
(HRS) Time end: 2034 (HRS)
cc/min Operator: DVH

S/N of O_2 Analyzer used to monitor train outlet: 7

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INTERPOLE LABORATORIES, INC.
(612) 786-6020

EPA Method 4 and 6 Field Data Sheet

Job: LD Haycard
Source: Ato Line 2 Dryer RTO Stack
Date: 3/19/96 Test 2 Run 3
Wet Bulb: _____
Dry Bulb: _____

Operator(s): P. Van Hoever & S. Kelter
Meter Box No. 13 Gasmeter Coef. 1.0023
ΔH@ 1.92 in.WC Bar.Press 28.28 in
Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in.WC
Post Test: 0 cfm at 7 in.WC

Trav. Point No.	Sample Time (min)	Sample Volume (cf)	Orif. Meter (in.WC)	Vac. in.Hg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/ In	Gas/ Out	O_2 (%v/v)
	1500	404.00									
B3	5	407.65	1.80	5	266	257	251	51	69	69	16.0
3	10	411.30	1.80	5					55	58	16.0
3	15	414.87	1.80	5	273	258	250	46	61	55	15.4
3	20	418.46	1.80	5					65	57	15.4
2	25	422.17	1.80	5	263	261	254	42	69	59	15.4
2	30	425.80	1.80	5					72	60	15.7
A 2	35	429.47	1.80	5	268	257	254	41	73	60	15.1
2	40	433.15	1.80	5					75	61	15.-
1	45	436.79	1.80	5	261	257	258	44	77	63	15.4
1	50	440.46	1.80	5					78	64	15.3
1	55	444.01	1.80	5	272	256	259	44	78	64	15.3
1	60	447.75	1.80	5					80	65	15.3
	(2035)										
	θ = 60	V_m = 43.75	ΔH = 1.80		ξ =				$\bar{T}_m$ = 66.12		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers	526	200	326
Condenser			
Desiccant	1254	1243	11
		Total	333

Preliminary Results of SO_2 Concentration Determination		
V_{std} =	42.525	DSCF
Moisture Gravimetric =	26.94	%v/v
Moisture Psychrometric =		%v/v
SO_2, DRY =		PPM
SO_2, WET =		PPM
LB/MMBtu =		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO STACK
Test 3 Run Date
Stack Dimen. IN.
Dry Bulb °F Wet bulb °F
Manometer ☐ Reg. ☐Exp ☐Elec.
Barometric Pressure 29.31 / 29.24 IN.HG
Static Pressure -.65 IN.WC
Operators D. VanHoever & S. Kelker & T. Lorenz
Pitot No. V23-8 C_p .84
PAH's

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas
		Port Length: IN.		Time Start: HRS	
A 1					
2					
3					
4					
5					
6					
7					
8					
B 1					
2					
3					
4					
5					
6					
7					
8					
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

EPA Modified Method 5 Sample Log Sheet

Job L.P. Hayward Date 3/20/96 Test 3 Run 1
Source Line 2 Dryer RTO Stack No. Of Traverse Points 16
Cyclone ☐ Yes ☒ No Filter Holder MM5 Filter Type 4" Glass Fiber
Analytes PAH XAD - 2 Resin __ g Batch No. __
Field Recovery Spike Added ☒ Yes ☐ No Ref. EPA SW-846 Method 0010

Sample Train Leak Check:

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

Semivolatile Catch Data:

No. of filters used: __

Recovery solvent(s)
☒ $MeCl_2$ ~~* MeOH (50:50 v/v)~~
☒ Other(s) Acetone

No. of bottles for condensate trap catch 2
Samples recovered by RH

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Condensate Trap	493	0	493
Condensate Trap	337	0	337
Condensate Trap			
Impingers			
Desiccant	1518	1473	35
Total			865

Integrated Gas Sampling Data:

Bag Pump No. 233 Box No. 29 Bag No. 1
Bag Material: 4-layer Aluminized Tedlar Size: 44 L
Pretest Leak Check: 0 cc/min at 14 IN.HG
Time Start: 1445 (HRS) Time End: 1724 (HRS)
Sampling Rate: 140 cc/min O_2 Analyzer S/N 4

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pg 1 of 2

INTERPOLL LAB ATORIES, INC.
(612) [illegible]-6020

EPA Modified Method 5 Field Data Sheet

Job L.P Hayward
Source Line 2 Dryer RTO Stack
Date 3/20/96 Test 3 Run 1

Operators DuH SK + J.C
Meter Box No. 6 ΔH@ 1.89 in.WC
Gasmeter Coeff. 1.0054

Nozzle No. 6 glass
Nozzle Dia. .267 in.
Bar. Pres. 29.31 in.Hg

Pitot No. V23-8
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	XAD-2	Imp.	Meter (In/Out)		Oxygen (% v/v)
	1440	116.20					260	241	228	41	39	67	67	16.4
B 8	4.5	119.96	.90	2.40	0.03	7	271					76	65	16.6
8	9	123.71	.90	2.34	3.79	9	262	240	232	41	39	84	66	16.0
7	13.5	127.53	.90	2.38	7.59	10	262					85	67	15.4
7	18	131.37	.93	2.48	1.49	10	271	242	232	40	38	87	68	15.8
6	22.5	135.31	.94	2.48	5.40	11	267					88	69	15.6
6	27	139.06	.85	2.26	9.13	11	258	242	233	40	38	89	69	15.6
5	31.5	142.90	.88	2.38	2.96	11	259					90	70	15.3
5	36	146.71	.86	2.32	6.75	11	262	242	230	40	39	91	71	15.6
4	40.4	150.29	.73	1.97	0.24	11	256					91	72	15.7
4	45	153.97	.82	2.23	3.96	10	272	242	229	41	39	92	73	15.6
3	49.5	157.60	.80	2.13	7.60	10	272					92	74	15.5
3	54	161.20	.77	2.06	1.18	10	262	245	228	41	38	92	74	16.4
2	58.5	164.86	.82	2.22	4.90	10	270					95	74	15.8
2	63	168.55	.79	2.09	8.51	10	261	245	230	40	38	96	75	15.8
1	67.5	172.20	.75	2.04	2.08	10	253					97	76	15.4
1	72	175.82	.75	2.07	5.68	10	260	242	229	41	39	91	79	15.5
A 8	76.5	179.62	.90	2.46	9.60	11	262					94	79	15.7
8	81	183.42	.85	2.31	3.40	11	271	243	231	42	39	95	78	15.4
7	85.5	187.20	.86	2.31	7.21	11	264					96	79	15.5
7	90	190.93	.83	2.26	0.97	11	265	244	232	42	38	87	79	15.6
6	94.5	195.23	.90	2.45	4.89	10	265					90	79	15.4
6	99	198.91	.81	2.18	8.57	11	263	251	246	42	39	90	78	17.1
5	103.5	202.82	.85	2.31	2.37	11	260				?	90	77	16.0
5	108	206.55	.81	2.20	6.20	10	276					91	78	
	(Over)													
	θ =	V_m =		ΔH =								Avg. =		

C-17 stop/start. Leak check. (Change Cabinet ~4.7 cfm)

Pg 2 of 2

INTERPOLL LABORATORIES, INC.

(612) 786-6020

EPA Modified Method 5 Field Data Sheet

Job L.P. Hayward Operators DJH + SK + J.L Nozzle No. _____ Pitot No. _____

Source Line 2 Dryer RTO Stack Meter Box No. _____ ΔH@ _____ in.WC Nozzle Dia. _____ in. C_p _____

Date 3/20/96 Test 3 Run 1 Gasmeter Coeff. _____ Bar. Pres. _____ in.Hg 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)							Oxygen (% v/v)
							Stack	Probe	Oven	XAD-2	Imp.	Meter (In/Out)		
		206.55												
4	112.5	210.05	.84	2.23	9.81	10	276	252	249	41	39	91	78	16.4
4	117	213.69	.82	2.21	13.53	10	267					93	79	15.6
3	121.5	217.49	.81	2.21	17.23	11	260	252	250	41	40	93	79	15.4
3	126	220.86	.86	2.33	21.05	11	276					92	79	15.9
2	130.5	225.07	.79	2.11	24.69	11	265	249	246	41	39	91	80	15.6
2	135	228.79	.80	2.17	28.37	11	265					89	81	15.9
1	139.5	232.42	.76	2.04	1.95	10	271	246	242	40	38	89	80	16.6
1	144	236.06	.76	2.05	5.52	10	268					91	79	15.6
	(17:24)													
	0 - 144	V_m - 119.36		ΔH - 2.2								Avg. - 82.1		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Modified Method 5 Sample Log Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stk
Cyclone ☐ Yes ☒ No
Analytes P.M.H
Field Recovery Spike Added ☒ Yes ☐ No

Date 3/21/96
No. Of Traverse Points 16
Filter Holder MM5
XAD - 2 Resin ___ g

Test 3 Run 2
Filter Type 4" Glass Fiber
Batch No. ___
Ref. EPA SW-846 Method 0010

Sample Train Leak Check:

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

Semivolatile Catch Data:

No. of filters used: ___

Recovery solvent(s)

☐ $MeCl_2$ ~~* MeOH (50:50 v/v)~~
☒ Other(s) ACETONE

No. of bottles for condensate trap catch 2
Samples recovered by DMF

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Condensate Trap	749	0	749
Condensate Trap			
Condensate Trap			
Impingers			
Desiccant	1476	1410	66
Total			815

Integrated Gas Sampling Data:

Bag Pump No. 23B
Bag Material: 4-layer Aluminized Tedlar
Pretest Leak Check: 0 cc/min at
Time Start: 0820 (HRS)
Sampling Rate: 140 cc/min

Box No. 29

Bag No. 2
Size: 44 L
15 INHG
Time End: 1050 (HRS)
O_2 Analyzer S/N 4

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Modified Method 5 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO STACK
Date 3/21/96 Test 3 Run 3

Operators DH/SK
Meter Box No. 6 ΔH@ 1.89 in.WC
Gasmeter Coeff. 1.0054

Nozzle No. Glass
Nozzle Dia. .269 in.
Bar. Pres. 29.24 in.Hg

Pilot No. U23-6
C_p .84
H_2O 25 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F)							Oxygen (% v/v)
							Stack	Probe	Oven	XAD-2	Imp.	Meter (In/Out)		
	0815	236.40												
A 8	4.5	240.31	.90	2.46	0.31	11	254	254	251	40	39	52	52	16.6
8	9	243.96	.88	2.27	3.97	10	254					60	52	16.5
7	13.5	247.35	.84	2.16	7.55	10	262	258	254	41	40	62	54	16.2
7	18	251.20	.90	2.33	1.27	13	262					67	55	16.2
6	22.5	254.82	.85	2.21	4.91	12	262	257	256	41	40	69	57	16.0
6	27	258.41	.83	2.17	8.52	12	262					73	59	16.3
5	31.5	262.13	.86	2.29	2.24	12	252	258	261	42	41	75	59	17.0
5	36	265.83	.81	2.11	5.82	12	268					78	61	17.0
4	40.5	269.50	.77	2.06	9.36	12	263	249	257	42	41	81	64	17.4
4	45	272.97	.77	2.07	2.92	12	253					84	65	16.6
3	49.5	276.47	.77	2.03	6.46	12	269	254	253	44	42	85	65	16.1
3	54	279.94	.74	1.96	9.93	12	269					86	66	16.1
2	58.5	283.41	.73	1.98	3.42	12	253	256	254	41	40	88	70	16.2
2	63	286.92	.71	1.93	6.89	12	253					88	70	16.0
1	67.5	290.21	.67	1.79	0.21	12	269	258	256	42	41	89	72	15.9
1	72	293.61	.71	1.90	3.65	12	269					89	73	16.4
B 8	76.5	297.41	.83	2.22	7.36	13	269	258	257	44	43	86	73	16.3
8	81	301.10	.83	2.21	1.07	13	269					87	74	17.1
7	85.5	304.87	.88	2.37	4.91	13	262	253	256	44	43	89	74	17.3
7	90	308.61	.78	2.11	8.54	13	260					90	76	16.9
K 6	94.5	312.46	.89	2.42	2.42	14	260	256	257	44	43	91	77	16.8
6	99	316.60	.89	2.42	6.31	14	260					91	78	16.7
5	103.5	320.46	.86	2.35	0.14	13	258	262	258	42	41	85	79	17.2
5	108	324.31	.87	2.37	3.98	13	258					90	78	17.1
	(Over)													
	θ =	V_m =		ΔH =								Avg. =		

stop test leak check

change condensate (-26)

C-20

F, 20 2

INTERPOLL[illegible]ATORIES, INC.
(612) [illegible]-6020

EPA Modified Method 5 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stack
Date 3/21/96 Test 2 Run 2

Operators
Meter Box No. ΔH@ in.WC
Gasmeter Coeff.

Nozzle No.
Nozzle Dia. in.
Bar. Pres. in.Hg

Pitot No.
C_p
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)							Oxygen (% v/v)
							Stack	Probe	Oven	XAD-2	Imp.	Meter (In/Out)		
[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	112.5	327.87	.85	2.31	7.78	13	262	260	258	43	41	94	79	16.6
4	117	331.91	.84	2.29	1.57	13	262					95	80	16.6
3	121.5	335.66	.86	2.31	5.39	13	274	261	257	43	41	95	81	16.4
3	126	339.41	.82	2.21	9.11	13	274					96	82	16.2
2	130.5	343.32	.88	2.41	3.01	13	261	266	253	44	41	96	83	16.4
2	135	346.99	.82	2.25	6.79	13	261					97	83	16.4
1	139.5	350.80	.75	2.04	0.38	13	268					97	84	16.3
1	144	354.36	.75	2.04	3.98	13	268					97	84	16.3
	1050													
[illegible]	θ = 144	V_m =	[illegible]	ΔH = 2.19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Avg. = 77.5		[illegible]

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Modified Method 5 Sample Log Sheet

Job: Z.P. Hayward | Date: 3/21/96 | Test: 3 | Run: 3
Source: Lime 2 Dryer RTO Stack | No. Of Traverse Points: 18
Cyclone ☐ Yes ☒ No | Filter Holder: MM5 | Filter Type: 4" Glass Fiber
Analytes: PAH | XAD-2 Resin: __ g | Batch No.:
Field Recovery Spike Added: ☒ Yes ☐ No | Ref.: EPA SW-846 Method 0010

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0 cfm at 14 IN.HG (vac) ☒

Semivolatile Catch Data:

No. of filters used:

Recovery solvent(s)

~~☒MeCl₂ * ☒MeOH (50:50 v/v)~~
~~☒~~Other(s) Acetone

No. of bottles for condensate trap catch: 2
Samples recovered by: ~~Dick~~

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Condensate Trap	400	0	400
Condensate Trap	361	0	361
Condensate Trap			
Impingers		~~0~~	
Desiccant	1504	1440	64
Total			825

Integrated Gas Sampling Data:

Bag Pump No.: 233 | Box No.: 29 | Bag No.: 3
Bag Material: 4-layer Aluminized Tedlar | Size: 44 L
Pretest Leak Check: 0 cc/min at 15 IN.HG
Time Start: 1140 (HRS) | Time End: 1409 (HRS)
Sampling Rate: 140 cc/min | O_2 Analyzer S/N 4

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EPA Modified Method 5 Field

Job: L.P Hayward
Source: Line 2 Dryer RTO Stack
Date: 3/21/96 Test 3 Run 3

Operators: Don & S.K
Meter Box No. 6 ΔH@ 1.89 in.WC
Gasmeter Coeff. 1.0054

Nozzle No. .269 in.
Nozzle Dia. 29.24 in.Hg
Bar. Pres.

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	XAD-2	Imp.	Meter (In/Out)		Oxygen (% v/v)
	1135	354.72					256	256	237	40	40	76	75	16.4
B 8	4.5	358.58	.86	2.33	8.51	10	256					83	76	17.5
8	9	362.27	.83	2.24	2.22	10	269	258	249	41	40	89	75	16.8
7	13.5	366.11	.87	2.32	6.01	10	269					90	76	16.6
7	18	369.71	.83	2.22	9.73	10	267	261	258	41	40	91	76	16.5
6	22.5	373.44	.85	2.29	3.51	10	267					92	76	16.7
6	27	377.37	.87	2.37	7.33	11	273	267	262	43	41	92	76	16.5
5	31.5	381.16	.87	2.33	1.15	11	273					93	76	16.9
5	36	384.96	.89	2.38	5.00	12	274	264	261	43	41	93	77	16.3
4	40.5	388.77	.82	2.19	8.71	11	274					93	77	17.1
4	45	392.58	.82	2.19	2.41	11	273	262	257	42	41	93	77	16.1
3	49.5	396.32	.84	2.25	6.17	11	273					93	77	16.6
3	54	399.99	.85	2.28	9.94	11	256	260	257	42	40	94	77	16.4
2	58.5	403.60	.85	2.33	3.76	11	256					94	77	16.3
2	63	407.45	.81	2.22	7.50	11	270	264	258	41	40	94	77	16.2
1	67.5	411.21	.78	2.10	1.13	11	270					94	78	15.9
1	72	414.94	.75	2.02	4.69	11	270	264	258	42	40	81	75	16.1
A 8	76.5	418.91	.88	2.37	8.54	12	270					86	75	16.1
8	81	422.80	.89	2.36	2.37	12	270	261	256	42	40	90	75	
7	85.5	426.61	.88	2.37	6.20	12	263					93	76	
7	90	430.31	.85	2.30	9.99	12	263	261	257	43	40	94	78	
6	94.5	434.11	.90	2.40	3.87	12	274					93	76	
6	99	437.97	.86	2.30	7.67	12	274	261	257	43	42	94	76	
5	103.5	441.71	.85	2.33	1.48	12	256					95	77	
5	108	445.46	.84	2.30	5.28	12	256	264	258	43	42			
	Over													
	θ =	V_m =		ΔH =								Avg. =		

Stop Test Leak check Change out condensate

C-23

090994-G:\STACK\WP\

EPA Mod...

Job LP Hayward
Source Line 2 Dryer RTO Stack
Date 3/21/96 Test 3 Run 3

Operators
Meter Box No. ΔH@ in.WC
Gasmeter Coeff.

Nozzle Dia. in.
Bar. Pres. in.Hg
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	XAD-2	Imp.	Meter (In/Out)	
[redacted]			[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
					8.99	12	268	261	257	43	41	77	96
4	112.5	449.41	.81	2.19								95	79
4	117	453.99	.82	2.22	2.72	12	268					93	78
3	121.5	456.74	.78	2.15	6.40	12	256	262	258	44	41	93	78
3	126	460.31	.72	1.98	9.92	11	256					93	77
2	130.5	464.05	.78	2.15	3.57	12	254	264	256	45	43	94	78
2	135	467.63	.74	2.04	7.16	11	254					93	78
1	139.5	470.97	.71	1.91	0.63	11	271	260	257	45	43	93	78
1	144	474.30	.68	1.83	4.02	11	271						
	(1409)												
[redacted]	θ = 144	V_m = 119.34	[redacted]	ΔH = .223	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Avg. = 84.1	

C-24

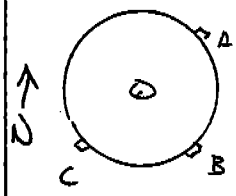
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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job L.P. Heyward
Source Line 2 Dryer RTO Stack
Test 4 Run Date 3/20/96
Stack Dimen. 81.5 IN.
Dry Bulb ____ °F Wet bulb ____ °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 23.31 IN.HG
Static Pressure -.65 IN.WC
Operators D. Hoover & S. Kelker & T. Lorenz
Pitot No. V23-8 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: 6.25 IN.		Time Start:	HRS
A 1					
2					
3					
4					
5					
6					
7					
8					
B 1					
2					
3					
4					
5					
6					
7					
8					
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 LG Hanover A
Source Line 2 RTO Dryer Stack
Method 0011 Filter holder: NA

Date 3/20/96 Test 4 Run 3E 1
No. of traverse points 16
Filter type: NA

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.00 cfm at 13 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	506	200	306
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1399	1379	20
Total			326

Integrated Gas Sampling Data:

Bag Pump No. 23B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: ~~SK 0830~~ 0830
Sampling rate: 400

Box No. 6 Bag No. E1
Size: 44 L
cc/min at 15 IN.HG
(HRS) Time end: 1017 (HRS)
cc/min Operator: SK

S/N of O_2 Analyzer used to monitor train outlet: 4

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(612) 3-66

EPA Method 5 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer 1
Date 3/20/96 Test 4 Run 1

Operators DVH & SK & J.C
Meter Box No. 6 ΔH@ 1.89 in.WC
Gasmeter Coeff. 1.0054

Nozzle No. Glass
Nozzle Dia. .269 in.
Bar. Press. 29.31 in.Hg

Pitot No. U23-0
C_p .84
H_2O 25 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	0830	959.71				9	260	248	253	39	54	54	16.1
A 8	4	962.975	.79	2.03	3.76	10	267	255	248	34	56	50	16.5
7	8	966.052	.85	2.16	5.93	10	259	245	252	34	58	51	15.5
6	12	969.075	.80	2.06	9.03	10	270	250	247	35	59	50	16.2
5	16	972.014	.75	1.90	2.01	9	270				62	51	15.3
4	20	974.960	.74	1.92	5.00	7	270	249	239	37	67	54	15.9
3	24	977.940	.75	1.91	8.00	8	267				67	54	15.9
2	28	980.950	.65	2.17	1.18	9	262	245	238	36	68	55	15.4
1	32	983.950	.80	2.08	4.31	9	262				66	54	16.0
B 8	36	987.260	.80	2.08	7.45	8	250	245	231	41	63	53	16.5
7	40	990.380	.85	2.24	0.70	9	260				66	55	16.1
6	44	993.890	.94	2.46	4.10	13	262	240	234	44	66	55	16.0
5	48	997.350	.85	2.21	7.33	13	252				66	55	15.7
4	52	1000.370	.70	1.84	0.14	10	252	250	237	42	69	57	16.8
3	56	1003.440	.75	1.98	3.33	9	264				72	57	16.3
2	60	1006.420	.76	1.96	6.34	9	260	248	228	41	75	54	15.7
1	64	1009.340	.69	1.81	9.33	8							
	(1017)												
	0 - 64	V_m - 49.63		ΔH -2.05							Avg. - 59		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP Hayward
Source Line 2 Outlet RTO Stack
Method 0011 Filter holder: NA

Date 3/20/96 Test 4 Run 2
No. of traverse points 16
Filter type: NA

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.00 cfm at 13 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: 1

Recovery solvent(s)
☐ acetone
☒ other(s) MeCl₂, D.I. H₂O

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	534	200	354
Impinger No. 3			
Condenser			
Desiccant	1473	1452	19
Total			373

Integrated Gas Sampling Data:

Bag Pump No. 73B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: ~~0730~~ 11:00
Sampling rate: 400

Box No. 6 Bag No. 7
Size: 44 L
cc/min at 15 IN.HG
(HRS) Time end: 12:10 PM (HRS)
cc/min Operator: SK

S/N of O_2 Analyzer used to monitor train outlet: 4

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(612) 56-66..

EPA Method 5 Field Data Sheet

Job: LP Hayward
Source: Line 2 Dryer RTO Stack
Date: 3/20/96 Test 4 Run 2

Operators: SK, MVH, JL
Meter Box No. 6 ΔH@ 1.89 in.WC
Gasmeter Coeff. 1.0054

Nozzle No. Glass
Nozzle Dia. .269 in.
Bar. Press. 29.31 in.Hg

Pitot No. Vee B
C_p .84
H_2O 16.25-24 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	1100	0 10.80		2.27	4.06	10	256	248	232	36	63	60	16.2
B 8	4	0 14.01	.85								66	61	16.2
7	8	17.53	.95	2.53	7.52	13	260						
6	12	20.93	.84	2.24	0.78	11	264	245	229	39	66	59	17.1
5	16	24.10	.83	2.20	4.00	11	267				74	59	17.4
4	20	27.34	.81	2.17	7.22	10	265	242	231	40	83	62	16.2
3	24	30.55	.82	2.20	0.48	10	268				88	63	16.0
2	28	33.60	.68	1.87	3.49	9	259	242	230	40	87	64	16.1
1	32	36.62	.72	1.96	6.57	9	264				88	64	15.9
A 8	36	39.95	.85	2.32	9.73	10	264	240	226	40	88	67	16.0
7	40	43.33	.82	2.26	3.25	10	256				89	65	15.6
6	44	46.46	.81	2.21	6.53	11	269	243	229	41	90	71	15.7
5	48	49.82	.84	2.33	9.91	11	257				90	71	16.2
4	52	53.08	.78	2.14	3.14	11	267	246	232	41	90	72	16.2
3	56	56.46	.83	2.31	6.51	11	256				90	72	16.2
2	60	59.65	.77	2.11	9.73	11	266	247	230	41	90	73	16.0
1	64	62.97	.79	2.19	3.00	11	260				89	73	16.0
	(1210)												
	0 - 64	V_m - 52.17		ΔH - 2.21							Avg. - 74.5		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. Hayward Date 3/20/96 Test 4 Run 3
Source Line 2 Dryer RTO Stack No. of traverse points 16
Method 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 13 IN. HG (vac) ☒

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

☐ acetone
☒ other(s) $MeCl_2$

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	545	200	345
Impinger No. 3			
Condenser			
Desiccant	1416	1399	17
Total			362

Integrated Gas Sampling Data:

Bag Pump No. 233 Box No. ~~235~~ 236 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 15 IN.HG
Time start: 1248 (HRS) Time end: 1354 (HRS)
Sampling rate: 400 cc/min Operator: DWH

S/N of O_2 Analyzer used to monitor train outlet: 4

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(612) 36-6626

EPA Method 5 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stack
Date 3-22-96 Test ___ Run 3

Operators DJH + SK + JL
Meter Box No. 1.89 ΔH@ ___ in.WC
Gasmeter Coeff. 1.0054

Nozzle No. Glass
Nozzle Dia. .269 in.
Bar. Press. 29.31 in.Hg

Pitot No. U23-8
C_p .84
H_2O 25 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	1045	63.29											
A 8	4	~~63.29~~ 66.57	.87	2.31	66.63	9	264	250	251	40	68	68	15.6
7	8	69.71	.84	2.23	9.90	10	255				72	68	15.5
6	12	72.97	.82	2.17	3.13	11	263	246	239	40	76	68	19.5
5	16	76.36	.85	2.25	6.42	12	265				79	68	16.1
4	20	79.63	.83	2.21	9.69	12	262	248	242	41	80	68	15.8
3	24	82.99	.82	2.20	2.95	12	256				81	68	15.8
2	28	86.23	.80	2.13	6.16	12	264	251	240	44	82	69	16.0
1	32	89.55	.84	2.23	9.45	12	268				82	69	16.0
B 8	36	92.82	.85	2.26	2.76	10	265	250	245	40	82	69	15.8
7	40	96.08	.90	2.39	6.16	10	266				80	69	16.2
6	44	99.41	.88	2.37	9.55	12	256	239	250	42	81	69	15.9
5	48	102.80	.89	2.34	2.92	12	272				80	69	16.3
4	52	106.16	.80	2.15	6.15	12	256	245	252	40	79	69	15.9
3	56	109.45	.78	2.06	9.30	11	269				78	69	16.4
2	60	112.60	.78	2.08	2.47	10	262	249	253	42	78	69	16.3
1	64	115.70	.78	2.06	5.63		268				80	69	16.8
	(1354)												
	0 - 64	V_m - 52.41		ΔTT -2.21							Avg. - 73.5		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

M18 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stack
Date 3/21/96 Test 5 Run 1

Operator(s) D. Van Hoever
Meter Box No. 65 Meter Coef. 1.0036
Barometric Pressure 29.24 IN.HG

Sample Train Leak Check:

Pretest: 0 cc/min at 15 IN.HG
Post test: 0 cc/min at 15 IN.HG

Trav. point No.	Sample Time (min)	Sample Volume (cf)	Sample Rate (cc/min)	Vac. (IN.HG)	Temperatures (°F)		
					Stack	Probe	Gasmeter
	0816	500.700					
	5	500.874	1000	5	254		60
	10	501.042	1000	6			64
	15	501.220	1000	6			67
	20	501.400	1000	6	260		68
	25	501.567	1000	6			72
	30	501.730	1000	6	262		76
	35	501.902	1000	6			78
	40	502.13	1000	6	253		79
	45	502.300	1000	6			81
	50	502.345	1000	8			84
	55						
	60						
	θ = 50	V_m = 1.645					t_m = 72.90

0906

Stop Test 1
Frozen up.

V_{STD} = 1.60

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

M18 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stack
Date 3/21/96 Test 5 Run 3

Operator(s) D. Van Hoever
Meter Box No. 6S Meter Coef. 1.0036
Barometric Pressure 29.24 IN.HG

Sample Train Leak Check:

Pretest: 0 cc/min at 15 IN.HG
Post test: 0 cc/min at 15 IN.HG

Trav. point No.	Sample Time (min)	Sample Volume (cf)	Sample Rate (cc/min)	Vac. (IN.HG)	Temperatures (°F)		
					Stack	Probe	Gasmeter
	0939	502.428					
	5	502.577	1000	6	269		88
	10	502.726	1000	8			92
	15	502.980	1000	8	260		94
	20	503.168	1000	8			94
	25	503.357	1000	8	260		96
	30	503.521	1000	9			97
	35	503.722	1000	10	260		99
	40	503.928	1000	10			100
	45	504.123	1000	10	274		102
	50	504.318	1000	10			102
	55	504.505	1000	10	261		102
	60	504.700	1000	10			104
	θ = 60 (1039)	V_m = 2.272					t_m = 97.5

V_{STD} = 2.11

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

M1&2 Field Data Sheet

Job L.P. Hayward
Source Line 2 Dryer RTO Stack
Date 3/21/96 Test 5 Run 3

Operator(s) D. Van Hoeven
Meter Box No. 65 Meter Coef 1.0036
Barometric Pressure 29.24 IN.HG

Sample Train Leak Check:

Pretest: 0 cc/min at 15 IN.HG
Post test: 0 cc/min at 15 IN.HG

Trav. point No.	Sample Time (min)	Sample Volume (cf)	Sample Rate (cc/min)	Vac. (IN.HG)	Temperatures (°F)		
					Stack	Probe	Gasmeter
	1135	504.757					
	5	504.961	1000	7	256		94
	10	505.182	1000	8	255		96
	15	505.372	1000	8	259		94
	20	505.560	1000	8			94
	25	505.751	1000	8	267		94
	30	505.948	1000	9			94
	35	506.140	1000	9			94
	40	506.333	1000	9	274		95
	45	506.522	1000	9			95
	50	506.714	1000	10	273		96
	55	506.913	1000	10			98
	60	507.109	1000	10	256		98
	θ = 60	V_m = 2.352					t_m = 95.17

(1235)

V_{STD} = 2.19

121693-G:\STACK\WP\FORMS\S-476

(612) 786-6020

EPA Method 2 Field Data Sheet

Drawing of Test Site

Cross-section View (↑up): B, A

Elevation View: B, A, ⊗ Flow ←Flow

Job: N.P. / Hayward, WI
Source: Core Dryer / Duct
Test: 2 Run 1 Date 3-19-96
Stack Dimen.: 42 IN.
Dry Bulb: 244 °F Wet bulb: °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 28.07 IN.HG
Static Pressure: -11.2 IN.WC
Operators: M. Kaehler & L. Hansen
Pitot No.: 31U-6 C_p: .84

* VOID RUN *

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 6.25 IN.		Time Start: 1041 HRS	
A-1	.044	1.94	2.09	1.02	
2	.146	6.10	12.35	1.80	
3	.296	12.36	18.61	1.77	
4	.704	29.39	35.64	2.10	
5	.854	35.65	41.90	1.98	9
6	.956	39.91	46.16	1.40	
B-1				1.35	244
2				1.50	
3				2.14	↓
4				2.11	
5				1.03	
6				1.38	

Time End: 1048 HRS

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

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

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3-19-96 Test ___ Run ___

VOID RUN

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: < 0.02 cfm at 16 in. Hg.

Nav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter ~~(inWC)~~ (CC)	VAC. inHg	Temperatures (°F) Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1030	270.017								
1-3	5	270.256	1000	2	243	NA	33	NA	NA	16.0
3	10	270.420	1000	2	250		38			15.9
3	15	270.590	1000	2	248		36			16.0
3	20	270.760	1000	2	246		37			16.0
2	25	270.918	1000	2	243		37			16.1
2	30	270.097	1000	2	245		38			15.9
2	35	271.260	1000	2	249		38			15.5
2	40	271.410	1000	2	243		36			15.9
1	45	271.593	1000	2	248		37			16.0
1	50	271.765	1000	2	244		37			16.0
1	55	271.940	1000	2	247		38			16.0
1	60	272.126	1000	2	245		38			16.1
	(1130)									
	θ= 60	V_m=2.111	(ΔH)ave=					$(t_m)_{ave}$ = 80.0		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
Desiccant	57.0462	44.5790	12.4672
Desiccant	45.5384	42.3937	3.1547
		Total	15.6219

Preliminary results of SO_2 concentration determination

V_{std}	=2.0002 DSCF
Moisture	=16.09 %v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

S-

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Hayward, WI
Source: Coke Dryer / Duct
Test 7 Run 2 Date 3-19-96
Stack Dimen. 42 IN.
Dry Bulb 240 °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.07 IN.HG
Static Pressure M. Kaehler / L. Hansen IN.WC
Operators -11.0
Pitot No. 31V-6 C_p .84

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 6.25 IN.		Time Start: 1326 HRS	
1				1.41	
2				1.95	
3				2.15	
4		Refer to Run No. 1		2.10	
5				1.93	
6		Test 7 for Pts		1.52	
1				1.04	240
2				1.67	
3				2.01	
4				2.17	
5				1.07	
6				1.45	

Temp. Meas. Device & S/N: PPT-31 / TC
Time End: 1333 HRS

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

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EPA Method 4 and 6 Field Data Sheet

Job L.P. / Hayward, WI
Source Line 2 Core Dryer / Duct
Date 3-19-96 Test 1 Run 2

Operator(s) M. Kuehler + L. Hansen
Meter Box No. TR2 Gasmeter coef. 1.0047
^H@ NA in.WC Bar. press 28.87 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.02 cfm at 16 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter ~~(inWC)~~ cc	VAC. inHg	Temperatures (°F) Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1320	272.150								
A-3	5	272.333	1000	2	243 ~~NA~~	NA	38	68	NA	15.7
3	10	272.515	1000	2	247		37	68		16.2
3	15	272.695	1000	2	241		37	68		16.1
3	20	272.885	1000	2	241		37	68		16.1
2	25	273.048	1000	2	243		38	68		16.2
2	30	273.237	1000	2	245		38	68		16.1
2	35	273.400	1000	2	245		38	68		16.3
2	40	273.585	1000	2	244		38	68		16.2
1	45	273.770	1000	2	248		39	68		16.2
1	50	273.921	1000	2	249		39	68		16.0
1	55	274.100	1000	2	243		39	68		15.9
1	60	274.263	1000	2	240	↓	39	68	↓	16.0
	(1420)									
	θ= 60	V_m= 2.113	(^H)$_{avg}$=					$(t_m)'_{avg}$ =	68	

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
Desiccant	48.2937	41.0445	7.2492
Desiccant	50.9984	44.0276	6.9708
		Total	14.2200

Preliminary results of SO_2 concentration determination	
V_{wstd} = 2.0476	DSCF
Moisture = 24.65	%v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

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EPA Method 2 Field Data Sheet

Job L.P. / Hayward, WI
Source Cone Dryer / Duct
Test 2 Run 3 Date 5-19-96
Stack Dimen. 42 IN.
Dry Bulb 227 °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.87 IN.HG
Static Pressure -11.2 IN.WC
Operators M. Laeveler & L. Hansen
Pitot No. 31V-6 C_p .84

VOID RUN

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: 6.25 IN.		Time Start: 1938 HRS	
1				1.25	
2				1.98	
3		Refer to Test 2		2.10	
4				2.00	
5		Run 1 for pts		1.95	
6				1.53	
1				1.25	227
2				1.30	
3				1.08	
4				2.05	
5				1.97	
6				1.50	

Temp. Meas. Device & S/N: TDJ-31 / TC
Time End: 1944 HRS

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

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(612) 786-6020

EPA Method 4 and 6 Field Data Sheet

Job L.P. / Hayward, WI
Source Core Dryer / Duct
Date 3-19-96 Test 7 Run 3
Wet Bulb
Dry Bulb 227

Operator(s) M. Kaehler + L. Hansen
Meter Box No. TR2 Gasmeter Coef. 1.0047
ΔH@ NA in.WC Bar.Press 28.07 in.Hg
Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in.WC ☒
Post Test: 0.02 cfm at 16 in.WC ☒

VOID RUN

Trav. Point No.	Sample Time (min)	Sample Volume (cf)	Orif. Meter (in.WC)	Vac. in.Hg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/ In	Gas/ Out	O_2 (%v/v)
	1935 ~~1500~~	274.295									
~~A-3~~ ~~2nd 60~~	5	274.449	1000	2	227	240	NA	~~37~~ 38	68	NA	16.1
-3	10	274.620	1000	2	227	244		38	68		15.8
3	15	274.768	1000	2	227	243		38	68		15.5
3	20	274.920	1000	2	227	246		38	68		15.6
2	25	275.050	1000	2	227	246		37	68		15.7
2	30	275.210	1000	2	227	241		37	68		15.6
2	35	~~275.390~~ ~~275.210~~	1000	2	227	240		37	68		15.5
2	40	275.563	1000	2	227	243		38	68		15
1	45	275.754	1000	2	227	245		39	68		15.8
1	50	275.922	1000	2	227	244		39	68		15.5
1	55	276.105	1000	2	227	248		39	68		15.4
1	60	276.277	1000	2	227	246	↓	38	68	↓	16.1
	(1035)										
	θ = 60	V_m = 1.992	ΔH =		$\bar{t}_s$ = 227				$\bar{t}_m$ = 68		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
	48.4031	45.3978	3.0053
Desiccant	80.7491	67.9834	12.7657
		Total	15.7710

Preliminary Results of SO_2 Concentration Determination		
V_{std} =	1.9304	DSCF
Moisture Gravimetric =	27.79	%v/v
Moisture Psychrometric =		%v/v
SO_2, DRY =		PPM
SO_2, WET =		PPM
LB/MMBtu =		

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EPA Method 2 Field Data Sheet

Job L.P. / Hayward, WI
Source Core Dryer / Duct
Test 2 Run 4 Date 3-20-96
Stack Dimen. 42 IN.
Dry Bulb 218 °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 29.31 IN.HG
Static Pressure -11.4 IN.WC
Operators M. Kaehler + L. Hansen
Pitot No. 31V-6 C_p .84

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 6.25 IN.		Time Start: 1003 HRS	
1				1.30	
2				1.83	
3				2.10	
4		Refer to Test 2		2.05	
5				1.90	
6		Run 1 for pts		1.48	218
1				1.85	
2				1.65	
3				2.07	
4				2.17	
5				1.55	
6				1.70	

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 1010 HRS

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

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INTERFULL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job L.P. / Hayward, WI
Source Line 2 Core Dryer / Steady
Date 3-20-96 Test 1 Run 4

Operator(s) M. Koehler + L. Hansen
Meter Box No. 1R2 Gasmeter coef. 1.0047
ΔH@ NA in.WC Bar. press 29.31 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: <0.02 cfm at 16 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen
					Probe	Oven	Impg.	Gas/In	Gas/Out	(%v/v)
	1000	276.375								
A-3	5	276.540	1000	2	247	NA	39	68	NA	15.8
3	10	276.606	1000	2	239		39	68		15.9
3	15	276.811	1000	2	231		38	68		15.7
3	20	276.985	1000	2	238		39	68		16.1
2	25	277.147	1000	2	235		39	68		16.0
2	30	277.320	1000	2	244		39	68		15.8
2	35	277.495	1000	2	241		39	68		15.9
2	40	277.670	1000	2	240		39	68		15.9
1	45	277.845	1000	2	239		38	68		16.0
1	50	278.020	1000	2	245		38	68		16.1
1	55	278.195	1000	2	244		39	68		15.7
1	60	278.370	1000	2	247		39	68		15.5
	(1100)									
	θ= 60	V_m=1.995	(ΔH)avg=1.000					$(t_m)_{avg.}$ = 68		

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers			
Condenser			
	55.0510	48.1337	6.9173
Desiccant	78.1664	70.8974	7.2690
		Total	14.1863

Preliminary results of SO_2 concentration determination	
$V_{m(std)}$	= 1.963 DSCF
Moisture	= 15.40 %v/v
SO_2, dry	= ppm
SO_2, wet	= ppm
LB/MMBtu	=

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EPA Method 2 Field Data Sheet

Job: L.P. / Hayward, WI
Source: Line 2 Core Dryer / Duct
Test 7 Run 5 Date 3-10-96
Stack Dimen. 42 IN.
Dry Bulb 216 °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 29.31 IN.HG
Static Pressure -12.2 IN.WC
Operators M. Kaehler + L. Hanson
Pitot No. 31V-6 C_p .84

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 6.25 IN.		Time Start: 1203 HRS	
A-1				1.29	
2				1.71	
3		Refer to Test 7		2.12	
4				2.15	
5		Run 1 for pts		2.00	
6				1.61	216
B-1				1.50	
2				1.95	
3				2.05	
4				2.12	
5				1.88	
6				1.60	
				~~1.95~~ MK	

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 1210 HRS

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

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EPA Method 4 and 6 Field Data Sheet

Job L.P. / Hayward, WI
Source Line 2 Core Dryer / Stack
Date 3-20-96 Test 2 Run 5

Operator(s) M. Kaehlert & L. Hansen
Meter Box No. TR2 Gasmeter coef. 1.0047
ΔH@ NA in.WC Bar. press 29.31 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.02 cfm at 16 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter ~~in WC~~ cc	VAC. inHg	Temperatures (°F) Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1200	278.398								
A-3	5	278.580	1000	2	243	NA	38	68	NA	16.1
3	10	278.755	1000	2	247	↓	38	68	↓	15.8
3	15	278.912	1000	2	240		39	68		16.0
3	20	279.090	1000	2	236		38	68		16.3
2	25	279.256	1000	2	236		38	68		16.4
2	30	279.415	1000	2	240		38	68		16.2
2	35	279.591	1000	2	233		38	68		16.1
2	40	279.755	1000	2	238		39	68		16.1
1	45	279.925	1000	2	235		39	68		16.0
1	50	280.094	1000	2	239		40	68		15.8
1	55	280.256	1000	2	244		40	68		15.7
1	60	280.408	1000	2	245	↓	40	68	↓	16.0
	(1300)									
	θ = 60	V_m = 2.010	(ΔH)avg = 1000					$(t_m)_{avg.}$ = 68		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
Desiccant	91.9243	76.5125	15.4118
		Total	15.4118

Preliminary results of SO_2 concentration determination	
V_{mstd}	= 1.977 DSCF
Moisture	= 26.05 %v/v
SO_2, dry	= ppm
SO_2, wet	= ppm
LB/MMBtu	=

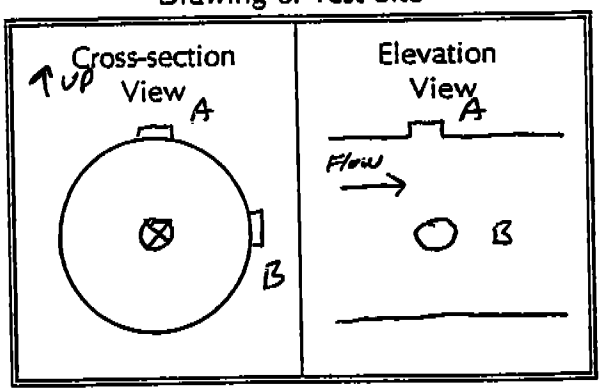
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EPA Method 2 Field Data Sheet

Job L.P. / Hayward, WI
Source Surface Face Dryer / Duct
Test 9 Run 1 Date 3-19-96
Stack Dimen. 42 IN.
Dry Bulb 34.4 °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.07 IN.HG
Static Pressure -12.2 IN.WC
Operators M. Knehlen + L. Hansen
Pitot No. 31V-6 C_p .84

VOID PW

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 6.65 IN.		Time Start: 1052 HRS	
A-1	.044	1.84	7.09	1.15	
2	.146	6.10	12.35	1.83	
3	.296	12.36	18.61	2.05	
4	.704	29.39	35.64	1.75	↑
5	.854	35.65	41.90	1.82	
B-6	.956	39.91	46.16	2.03	244
1				1.03	↓
2				1.67	
3				1.70	
4				1.95	
5				2.05	
6				1.90	

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 1100 HRS

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

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INTERPOLL LABORATORIES, INC.
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EPA Method 4 and 6 Field Data Sheet

Job LP/Hayward
Source Surface Dryer
Date 3-19-96 Test B Run 1
Wet Bulb _____
Dry Bulb _____

Operator(s) ET-LH
Meter Box No. 65 Gasmeter Coef. 1.0036
ΔH@ 0 in.WC Bar.Press 28.87 in.Hg
Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in.WC ~~X~~
Post Test: 0.02 cfm at 15 in.WC ~~X~~

VOID RUN

Trav. Point No.	Sample Time (min)	Sample Volume (cf)	Orif. Meter (in.WC)	Vac. in.Hg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/ In	Gas/ Out	O_2 (%v/v)
	1030	489.000									
	5	489.190	1000	2					82		
	10	489.380	1000	2					84		
	15	489.569	1000	2					86		
	20	489.760	1000	2					86		
	25	489.950	1000	2					86		
	30	490.140	1000	2					86		
	35	490.320	1000	2					86		
	40	490.505	1000	2					88		
	45	490.685	1000	2					90		
	50	490.872	1000	2					90		
	55	491.060	1000	2					90		
	60	491.238	1000	2					90		
	1130										
	θ = 60	V_m = 2.238	ΔH = 1000		$\bar{t}_s$ =				$\bar{t}_m$ = 87.0		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
Desiccant	51.6879	45.0996	6.5883
Desiccant	57.4545	44.3570	13.0975
		Total	19.6868

Preliminary Results of SO_2 Concentration Determination		
V_{std} =	2.0911	DSCF
Moisture Gravimetric =	30.72	%v/v
Moisture Psychrometric =		%v/v
SO_2, DRY =		PPM
SO_2, WET =		PPM
LB/MMBtu =		

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EPA Method 2 Field Data Sheet

Job: L.P. / Hayward, WI
Source: Surface Dryer / Stack
Test: 0 Run: 1 Date: 3-19-96
Stack Dimen.: 42 IN.
Dry Bulb: 25/ °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 28.87 IN.HG
Static Pressure: -12.2 IN.WC
Operators: M. Kaechler & L. Hansen
Pitot No.: 31V-6 C_p: .84

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 6.25 IN.		Time Start: 1343 HRS	
1				2.13	
2				1.90	
3		Refer to Test 0		1.83	
4				1.78	
5		Run 1 for Pts		1.80	
6				1.75	
1				1.30	251
2				1.80	
3				1.93	
4				1.85	
5				1.90	
6				1.94	

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 1350 HRS

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

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EPA Method 4 and 6 Field Data Sheet

Job LP/Hayward
Source Line 2 Surface Dryer
Date 3-19-96 Test 8 Run 2
Wet Bulb _____
Dry Bulb _____

Operator(s) ET - LH
Meter Box No. 65 Gasmeter Coef. 1.0036
ΔH@ — in.WC Bar.Press _____ in Hg
Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in.WC
Post Test 0.02 cfm at 15 in.WC

Trav. Point No.	Sample Time (min)	Sample Volume (cf)	Orif. Meter (in.WC)	Vac. in.Hg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/ In	Gas/ Out	O_2 (%v/v)
	1320	491.270									
	5	491.472	1000	2					90		
	10	491.674	1000	2					90		
	15	491.875	1000	2					92		
	20	492.076	1000	2					92		
	25	492.275	1000	2					92		
	30	492.472	1000	2					92		
	35	492.667	1000	2					92		
	40	492.860	1000	2					92		
	45	493.050	1000	2					92		
	50	493.240	1000	2					92		
	55	493.430	1000	2					92		
	60	493.620	1000	2					92		
	1420										
	θ = 60	V_m = 2.350	ΔH = 1000		$\bar{t}_s$ =				$\bar{t}_m$ = 91.7		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
Desiccant	58.9217	46.9424	11.9793
Desiccant	41.9550	35.4394	6.5156
		Total	18.4949

Preliminary Results of SO_2 Concentration Determination

V_{std} =	2.1771	DSCF
Moisture Gravimetric =	20.58	%v/v
Moisture Psychrometric =		%v/v
SO_2, DRY =		PPM
SO_2, WET =		PPM
LB/MMBtu =		

INTERPOLL LABORATORIES, INC.
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EPA Method 2 Field Data Sheet

Job: L.P. / Hayward, WI
Source: Line 2 Surface Dryer / Stack
Test: 8 Run 3 Date 3-19-96
Stack Dimen.: 42 IN.
Dry Bulb: 245 °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 28.87 IN.HG
Static Pressure: -12.0 IN.WC
Operators: M. Kaehler & L. Hanson
Pitot No.: 31V-6 C_p: .84

VOID RUN

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: 1449 HRS	
1				1.20	
2				1.85	
3				2.10	
4		Meter to	Test 8	1.70	
5				1.87	
6		Run 1 for	pts.	1.90	245
1				1.23	
2				1.75	
3				1.68	
4				1.99	
5				2.07	
6				1.83	

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 1957 HRS

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

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INTERFUEL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job LP/HAYWARD
Source UNIT 2 SURFACE DRYER
Date 3-20-96 Test 8 Run 3

Operator(s) ET
Meter Box No. 65 Gasmeter coef. 1.0036
^H@ 2 in.WC Bar. press 29.31 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0 cfm at ~~15~~ in. Hg.

VOID RUN.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F) Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1000	496.000								
	5	496.180	1000	2				60		
	10	496.365	1000	2				61		
	15	496.550	1000	2				62		
	20	496.738	1000	2				62		
	25	496.905	1000	2				62		
	30	497.145	1000	2				63		
	35	497.333	1000	2				63		
	40	497.515	1000	2				64		
	45	497.700	1000	2				66		
	50	497.890	1000	2				68		
	55	498.077	1000	2				68		
	60	498.265	1000	2				68		
	(1100)									
	θ= 60	Vm= 2.265	(^H)avg= 1000					(tm)avg.= 63.9		

Condensate Data:

Item	Weight(g) Final	Tare	Difference
Impingers			
Condenser			
Desiccant	96.4400	78.0992	18.3408
		Total	18.3408

Preliminary results of SO_2 concentration determination	
V_{std} =	22.13 DSCF
Moisture =	27.00 %v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

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EPA Method 2 Field Data Sheet

Job L.P. / Hayward, WI
Source Surface Dryer / Duct
Test B Run 4 Date 3-20-96
Stack Dimen. 4/L IN.
Dry Bulb 249 °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 29.31 IN.HG
Static Pressure -12.0 IN.WC
Operators M. Kuehler + L. Hansen
Pitot No. 31V-6 C_p .84

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 6.25 IN.		Time Start: 1014 HRS	
1				1.43	
2				2.20	
3				2.08	
4		Refer to Traverse B		1.83	
5				1.80	
6		Run 1 Run pts		1.70	249
1				1.20	
2				1.93	
3				1.91	
4				2.04	
5				2.10	
6				1.83	

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 1020 HRS

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 4 and 6 Field Data Sheet

Job LP/Hayward
Source LINE 2 Surface Dryer
Date 3-19-96 Test B Run 4
Wet Bulb ____
Dry Bulb ____

Operator(s) ET
Meter Box No. 6S Gasmeter Coef. 1.0036
ΔH@ — in.WC Bar.Press ____ in.Hg
Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in.WC ☒
Post Test: 0 cfm at 15 in.WC ☒

Trav. Point No.	Sample Time (min)	Sample Volume (cf)	Orif. Meter (in.WC)	Vac. in.Hg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/ In	Gas/ Out	O_2 (%v/v)
	~~935~~	493.640									
	5	493.840	1000	2					94		
	10	494.025	1000	2					94		
	15	494.218	1000	2					94		
	20	494.402	1000	2					94		
	25	494.585	1000	2					94		
	30	494.778	1000	2					94		
	35	494.965	1000	3					94		
	40	495.154	1000	3					95		
	45	495.350	1000	2					95		
	50	495.541	1000	2					96		
	55	495.740	1000	2					96		
	60	495.935	1000	2					96		
	(2035)										
	θ = 60	V_m = 2.295	ΔH = 1000 cc		$\bar{t}_s$ =				$\bar{t}_m$ = 94.7		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
	53.8894	49.3583	4.5311
Desiccant	87.8126	74.2342	13.5784
		Total	18.1095

Preliminary Results of SO_2 Concentration Determination		
V_{std} =	2.1146	DSCF
Moisture Gravimetric =	28.74	%v/v
Moisture Psychrometric =		%v/v
SO_2, DRY =		PPM
SO_2, WET =		PPM
LB/MMBtu =		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: L.P. / Hayward, WI
Source: Line 2 Surface Dryer / Duct
Test: 0 Run 5 Date 3-20-96
Stack Dimen.: 42 IN.
Dry Bulb: 212 °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 29.31 IN.HG
Static Pressure: -11.8 IN.WC
Operators: M. Kaehler + L. Hansen
Pitot No.: 31V-6 C_p .84

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 6.25 IN.		Time Start: 1211 HRS	
A-1				1.90	
2				2.13	
3		Refer to Test 6		1.92	
4				1.95	
5		Run 1 for pts.		2.00	
6				1.70	212
B-1				1.05	
2				1.75	
3				1.95	
4				1.91	
5				1.95	
6				1.00	

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 1217 HRS

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

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INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job LP/HAYWARD
Source KILN 2 SURFACE DRYER
Date 3-20-96 Test 8 Run 3

Operator(s) ET-
Meter Box No. 65 Gasmeter coef. 1.0036
ΔH@ 2 in.WC Bar. press 29.31 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0 cfm at 15 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F) Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1200	498.350								
	5	498.539	1000	2				82		
	10	498.730	1000	2				82		
	15	498.922	1000	2				82		
	20	499.102	1000	2				82		
	25	499.300	1000	2				82		
	30	499.490	1000	2				83		
	35	499.679	1000	2				83		-
	40	499.868	1000	2				83		
	45	500.057	1000	2				84		
	50	500.250	1000	2				86		
	55	500.435	1000	2				86		
	60	500.620	1000	2				86		
	(1300)									
	θ= 60	V_m=2.270	$(\Delta H)_{avg}$=1000					$(t_m)_{avg.}$=83.4		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
Desiccant	68.1773	50.0037	18.1736
		Total	18.1736

Preliminary results of SO_2 concentration determination

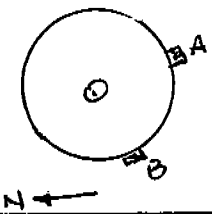
V_{std}	= 2.168 DSCF
Moisture	= 29.31 %v/v
SO_2, dry	= ppm
SO_2, wet	= ppm
LB/MMBtu	=

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job LP/Hayward
Source Line 2 Process Vent Stack (C C1250)
Test 9 Run 0 Date 3-19-96
Stack Dimen. 76.25 IN.
Dry Bulb 233 °F Wet bulb 143 °F
Manometer ~~X~~ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.78 IN.HG
Static Pressure -.35 IN.WC
Operators SF/KN
Pitot No. V22-8 C_p 0.84
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
		Port Length: 6.25 IN.		Time Start: 543 HRS	
A 1	.021	1.60	7.85	.35	
2	.067	5.11	11.35	.47	
3	.118	9.00	15.25	.55	
4	.177	13.50	19.75	.57	
5	.250	19.06	25.31	.61	
6	.356	27.14	33.40	.62	
7	.644	49.10	55.36	.71	
8	.750	57.19	63.44	.78	
9	.823	62.75	69.00	.78	
10	.882	67.25	73.50	.79	
11	.933	71.14	77.39	.75	
12	.979	74.65	80.90	.67	
B 1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Temp. Meas. Device & S/N:
Time End: 900 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/Hayward
Source Line 2 Press Vent
Method 0011 Filter holder: N/A

Date 3-19-96 Test 9 Run 1
No. of traverse points 24
Filter type: N/A

Sample Train Leak Check:

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

Particulate Catch Data:

No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) $MeCl_2$

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	474	475	1
Impinger No. 3			
Condenser			
Desiccant	1346	1336	10
Total			11

Integrated Gas Sampling Data:

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0.02
Time start: 1030
Sampling rate: 400

Box No. 14 Bag No. 1
Size: 44 L
cc/min at 16 IN.HG
(HRS) Time end: 1145 (HRS)
cc/min Operator: SF

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

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..NTEL.. ..L L. RA ES,
(612 6-6020

EPA Method 5 Field Data Sheet

Job LP/Hayward
Source Loc. 2 Preis Vent (EPO)
Date 3-19-96 Test 8 Run 1

Operators SF/KN
Meter Box No. 1Y ΔH@ 1.81 in.WC
Gasmeter Coeff. .9936

Nozzle No (Glass)
Nozzle Dia. .242 in.
Bar. Press. 25.78 in.Hg

Pitot No. V22-8
C_p 0.84
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)
	(1030)	926.79											
B 12	3	928.95	0.66	1.77	9.06	5	234	267	266	34	41	41	
11	6	931.29	0.76	1.95	1.39	6	234	249	258	34	50	41	
10	9	933.62	0.72	1.86	3.68	6	233	253	261	36	54	42	
9	12	936.95	0.75	1.95	6.02	6	233	256	263	36	57	44	
8	15	938.41	0.80	2.09	8.46	7	233	260	255	39	59	45	
7	18	940.87	0.74	1.94	0.81	6	233	260	259	39	59	45	
6	21	943.21	0.76	1.99	3.19	6.5	233	258	262	39	61	47	
5	24	945.36	0.61	1.61	5.33	5.5	233	261	264	39	63	48	
4	27	947.48	0.60	1.58	7.46	5	233	261	257	39	65	49	
3	30	949.53	0.56	1.48	9.53	5	233	259	261	39	67	50	
2	33	951.59	0.56	1.49	1.60	5	233	257	260	40	70	51	
1	36	953.49	0.45	1.21	3.47	4	230	256	262	40	71	51	
A 12	39	955.55	0.55	1.47	5.54	5	233	255	254	40	69	52	
11	42	957.71	0.64	1.70	7.75	5	236	249	252	39	76	54	
10	45	960.01	0.67	1.79	0.04	6	236	253	257	39	78	57	
9	48	962.29	0.67	1.81	2.34	6	235	247	250	39	79	55	
8	51	964.63	0.68	1.83	4.66	6	236	249	242	39	79	56	
7	54	966.87	0.59	1.59	6.82	5.5	236	252	240	39	82	57	
6	57	969.28	0.78	2.11	9.30	7	234	252	236	40	83	58	
5	60	971.62	0.69	1.87	1.65	6	236	247	236	40	84	61	
4	63	973.87	0.63	1.71	3.90	6	237	244	239	39	84	63	
3	66	975.94	0.54	1.47	5.99	5	237	241	235	41	85	63	
2	69	978.00	0.52	1.42	8.04	5	236	241	237	42	86	65	
1	72	980.09	0.55	1.50	0.16	5	235	240	234	42	86	66	
	(1145)												
	0 - 72	V_m - 53.30		1.72 ΔH -							Avg. - 61.9		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/Hayward
Source Line 2 Press Vent
Method 0011 Filter holder: N/A

Date 3-19-96 Test 9 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: 0.00 cfm at 8 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) MeCl2

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	479	476	3
Impinger No. 3			
Condenser			
Desiccant	1453	1446	7
Total			10

Integrated Gas Sampling Data:

Bag Pump No. 22B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0.000
Time start: 1222
Sampling rate: 400 cc/min

Box No. 14 Bag No. 2
Size: 44 L
16 IN.HG
(HRS) Time end: 1336 (HRS)
Operator: SF

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

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(612) 6-6020

EPA Method 5 Field Data Sheet

Job: LP/Haywood
Source: Line 2 Press Vent (RTO)
Date: 3-19-96 Test 9 Run 2

Operators: SF/KN
Meter Box No. 14 ΔH@ 1.51 in.WC
Gasmeter Coeff. .9936

Nozzle No. Glass
Nozzle Dia. .242 in.
Bar. Press. 28.78 in.Hg

Pilot No. V22-8
C_p 0.84
H_2O 1.9 %

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)
	(122)	980.61			2.68	4	235	229	231	35	62	61	
B 12	3	982.59	0.55	1.48	4.80	5	236	233	237	35	65	61	
11	6	984.73	0.58	1.56	6.97	5	238	238	234	35	69	60	
10	9	986.89	0.60	1.61	4.35	6	237	242	235	34	72	60	
9	12	989.28	0.72	1.94	1.69	6	236	245	232	35	73	60	
8	15	991.63	0.69	1.87	3.87	6	236	248	242	37	76	61	
7	18	993.87	0.60	1.63	6.30	6	235	249	241	37	77	61	
6	21	996.24	0.74	2.02	8.76	6	235	252	243	38	78	62	
5	24	998.73	0.75	2.05	1.08	6	235	247	243	38	79	62	
4	27	1001.00	0.67	1.83	3.19	5	233	242	236	37	79	63	
3	30	1003.15	0.55	1.51	5.27	5	232	239	235	38	80	63	
2	33	1005.26	0.53	1.46	7.27	4	232	238	233	38	82	64	
1	36	1007.26	0.49	1.35	9.55	6	233	238	237	39	80	65	
A 12	39	1009.54	0.64	1.76	1.86	6	232	246	239	41	84	66	
11	42	1011.85	0.65	1.79	4.37	6.5	233	243	235	41	85	66	
10	45	1014.33	0.77	2.13	6.95	7	234	241	234	40	86	67	
9	48	1016.88	0.81	2.24	9.49	6.5	234	247	240	37	86	67	
8	51	1019.48	0.78	2.16	1.98	6.5	234	244	231	36	87	69	
7	54	1021.89	0.75	2.08	4.30	6.5	233	242	234	37	87	70	
6	57	1024.27	0.65	1.81	6.54	6	233	244	237	37	87	70	
5	60	1026.55	0.60	1.67	8.74	5	233	245	236	37	87	70	
4	63	1028.79	0.58	1.62	0.85	5	232	247	240	38	87	71	
3	66	1030.89	0.53	1.46	2.83	4	232	252	240	38	88	71	
2	69	1032.87	0.47	1.31	4.78	4	231	250	241	39	88	71	
1	72	1034.77	0.45	1.24									
	(136)												
	0 - 72	V_m = 54.16		ΔH = 1.73							Avg. = 72.6		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/Hayward Date 3-19-96 Test 9 Run 3
Source Line 2 Press Vent (RTO) No. of traverse points 24
Method 0011 Filter holder: N/A Filter type: N/A

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.00 cfm at 9 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) MeCl2

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	481	480	1
Impinger No. 3			
Condenser			
Desiccant	1360	1346	14
Total			15

Integrated Gas Sampling Data:

Bag Pump No. 223 Box No. 14 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0.02 cc/min at 16 IN.HG
Time start: 1440 (HRS) Time end: 1554 (HRS)
Sampling rate: 400 cc/min Operator: SF

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

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(612 ..6-6020

EPA Method 5 Field Data Sheet

Job LP/Hayward
Source Line 2 Press Vent
Date 3-19-96 Test 9 Run 3

Operators SF/KN
Meter Box No. 1Y ΔH@ 1.51 in.WC
Gasmeter Coeff. 0.9936

Nozzle No. 6/655
Nozzle Dia. .242 in.
Bar. Press. 28.78 in.Hg

Pitot No. V22-8
C_p 0.84
H_2O 1.0 %

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)
[redacted]	(1440)	35.01	[redacted]	[redacted]	7.54	6	234	250	245	36	62	62	
A 12	3	37.48	0.78	2.18	0.12	7	233	252	241	36	63	62	
11	6	40.03	0.84	2.30	2.75	7	235	248	243	36	67	62	
10	9	42.64	0.87	2.38	5.34	7	232	245	243	37	68	62	
9	12	45.29	0.86	2.34	7.84	6	233	252	247	39	70	62	
8	15	47.79	0.78	2.15	0.40	6	234	255	246	39	73	62	
7	18	50.37	0.80	2.21	2.96	7	235	255	242	39	75	63	
6	21	52.95	0.81	2.24	5.38	6.5	233	249	237	41	76	63	
5	24	55.37	0.72	2.00	7.67	5.5	233	247	241	41	79	65	
4	27	57.62	0.64	1.78	9.99	5.5	234	252	240	41	80	65	
3	30	59.99	0.65	1.81	2.20	5	233	250	244	42	82	66	
2	33	62.14	0.59	1.65	4.24	5	233	243	236	40	83	66	
1	36	64.25	0.50	1.40	6.44	5	233	251	240	39	81	67	
B 12	39	66.39	0.58	1.63	8.77	6	232	255	234	39	83	68	
11	42	68.70	0.65	1.83	1.15	6	235	254	237	39	84	68	
10	45	71.08	0.68	1.91	3.69	7	235	249	241	40	84	69	
9	48	73.61	0.77	2.16	6.29	7	234	247	236	40	85	69	
8	51	76.24	0.81	2.28	8.44	5	233	241	233	41	85	70	
7	54	78.44	0.55	1.55	0.96	6.5	234	239	230	41	85	70	
6	57	80.90	0.75	2.11	3.45	6.5	233	237	230	42	86	70	
5	60	83.37	0.74	2.09	5.85	6	232	237	236	42	86	70	
4	63	85.87	0.68	1.92	8.20	6	231	242	240	41	88	71	
3	66	88.23	0.65	1.84	0.42	5	230	244	237	42	88	71	
2	69	90.38	0.58	1.65	2.49	5	231	247	235	42	88	72	
1	72	92.50	0.50	1.42									
	(1554)												
[redacted]	θ = 72	V_m = 57.49	[redacted]	ΔH = 1.95	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Avg. = 72.4		[redacted]

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job LP/Hayward
Source Line 2 Press Vent (RTO)
Test 10 Run 0 Date
Stack Dimen. 76.25 IN.
Dry Bulb °F Wet bulb °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 29.31 IN.HG
Static Pressure -.40 IN.WC
Operators SF/KN
Pitot No. V22-8 C_p 0.84
Preliminate

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas
		Port Length: 6.25 IN.		Time Start:	HRS
A 1	.021	1.60	7.85		
2	.067	5.11	11.35		
3	.118	9.00	15.25		
4	.177	13.50	19.75		
5	.250	19.06	25.31		
6	.356	27.14	33.40		
7	.644	49.10	55.36		
8	.750	57.19	63.44		
9	.823	62.75	69.00		
10	.882	67.25	73.50		
11	.933	71.14	77.39		
12	.979	74.65	80.90		
B 1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Temp. Meas. Device & S/N: PDT-#51 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/Hayward
Source Line 2 Press Vent
Method 5 Filter holder: Glass

Date 3-20-96 Test 10 Run 1
No. of traverse points 24
Filter type: 4" Glass fiber

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.00 cfm at 16 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used:

8330

Recovery solvent(s)

☒ Acetone
☐ other(s)

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	494	490	4
Impinger No. 3			
Condenser			
Desiccant	1412	1413	11
Total			15

Integrated Gas Sampling Data:

Bag Pump No. 22B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0.00
Time start: 1012
Sampling rate: 400

Box No. 16 Bag No. 1
Size: 44 L
cc/min at 16 IN.HG
(HRS) Time end: 1114 (HRS)
cc/min Operator: SF

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/Hayward
Source Line 2 Press Vent
Date 3-20-96 Test 10 Run 1

Operators SF/KN
Meter Box No. 1Y ΔH@ 1.81 in.WC
Gasmeter Coeff. .9936

Nozzle No. 10-Y
Nozzle Dia. .249 in.
Bar. Press. 29.31 in.Hg

Pitot No. V22-8
C_p 0.84
H_2O ~~1.0~~ 1.5 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F)						Oxygen (% v/v)
							Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	
	(1012)	107.59											
A 12	2.5	109.12	0.39	1.22	9.16	6	230	229	227	34	51	45	
11	5	111.95	0.59	1.74	1.66	8	235	226	231	35	57	49	
10	7.5	112.79	0.60	1.79	2.86	9	237	230	229	35	59	48	
9	10	114.72	0.65	1.95	4.81	10	233	233	235	36	61	48	
8	12.5	116.76	0.71	2.13	6.84	11	235	236	242	36	62	49	
7	15	118.59	0.53	1.59	5.60	9	237	236	245	36	62	50	
6	17.5	120.49	0.62	1.86	0.51	10	236	232	239	40	64	51	
5	20	122.40	0.65	1.95	2.47	11	236	234	237	41	65	51	
4	22.5	124.38	0.66	1.99	4.44	11	235	230	239	41	66	51	
3	25	126.22	0.53	1.60	6.21	9	237	231	242	40	67	52	
2	27.5	128.01	0.55	1.68	8.03	9	230	234	245	40	67	52	
1	30	129.52	0.53	1.62	9.82	9	228	233	245	41	68	53	
B 12	32.5	131.63	0.55	1.67	1.63	9	234	230	241	42	69	54	
11	35	133.61	0.67	2.05	3.65	11	228	229	243	42	72	55	
10	37.5	135.62	0.69	2.10	5.69	12	234	235	237	39	73	55	
9	40	137.81	0.80	2.44	7.89	14	234	237	232	39	74	56	
8	42.5	140.94	0.77	2.36	0.06	14	231	242	237	40	74	58	
7	45	142.09	0.72	2.21	2.15	13	234	240	237	40	74	58	
6	47.5	144.03	0.62	1.90	4.10	12	234	247	234	40	74	59	
5	50	145.97	0.58	1.79	5.99	9	232	245	231	40	75	59	
4	52.5	147.82	0.53	1.63	7.79	9	234	239	230	39	76	60	
3	55	149.54	0.52	1.60	9.58	8	234	236	229	39	76	60	
2	57.5	151.25	0.45	1.39	1.25	7	230	231	227	39	82	63	
1	60	152.78	0.35	1.10	2.74	6	228	233	228	40	83	64	
	(1114)												
	θ = 60	V_m = 45.19		ΔH = 1.81							Avg. =	60.9	

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/Hayward
Source Line 2 Press Vent (RTO)
Method 5 Filter holder: Glass

Date 3-20-96 Test 10 Run 2
No. of traverse points 24
Filter type: 4" Glass Fiber

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: 0.00 cfm at 15 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: 8331

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	451	453	-2
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1521	1503	18
Total			16

Integrated Gas Sampling Data:

Bag Pump No. 22B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0.00
Time start: 1135
Sampling rate: 400

Box No. 16 Bag No. 2
Size: 44 L
cc/min at 16 IN.HG
(HRS) Time end: 1241 (HRS)
cc/min Operator: SF

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job LP/Hayward
Source Line 2 Press Vent (RTO)
Date 3-20-96 Test 10 Run 2

Operators SF/KN
Meter Box No. 14 ΔH@ 1.87 in.WC
Gasmeter Coeff. .9936

Nozzle No. 10-4
Nozzle Dia. .249 in.
Bar. Press. 29.31 in.Hg

Pitot No. 622-8
C_p 0.84
H_2O 1.5 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
[illegible]	(1135)	153.08	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B 12	2.5	154.88	0.55	1.67	4.89	8	234	230	237	38	68	66	
11	5	156.30	0.60	1.84	6.81	9	234	233	242	38	67	64	
10	7.5	158.81	0.68	2.03	9.05	10	235	235	240	38	66	64	
9	10	161.95	0.78	2.38	1.02	14	236	242	235	39	67	62	
8	12.5	163.09	0.75	2.30	3.16	14	230	248	234	39	67	62	
7	15	165.20	0.74	2.26	5.28	13	233	248	230	38	67	61	
6	17.5	167.24	0.65	1.98	7.26	12	236	246	231	39	68	61	
5	20	169.17	0.56	1.71	9.11	10	233	246	233	39	69	61	
4	22.5	170.96	0.54	1.65	0.92	~~10~~ 8	234	240	239	40	71	61	
3	25	172.68	0.52	1.54	2.71	8	234	239	231	40	73	61	
2	27.5	174.39	0.47	1.45	4.41	7.5	231	238	232	40	75	62	
1	30	176.03	0.46	1.24	5.99	7	230	243	229	41	77	62	
A 12	32.5	177.71	0.44	1.37	7.65	7	230	245	227	40	77	62	
11	35	179.47	0.55	1.71	9.50	8	230	239	229	39	78	63	
10	37.5	181.51	0.67	2.08	1.54	12	231	236	231	39	79	63	
9	40	183.50	0.63	1.55	3.52	11	233	238	231	39	78	63	
8	42.5	185.54	0.67	2.07	5.56	12	235	233	227	40	79	63	
7	45	187.48	0.59	1.83	7.48	11	234	233	226	35	79	64	
6	47.5	189.49	0.67	2.08	9.52	12	233	237	229	36	80	64	
5	50	191.54	0.71	2.17	1.61	13	236	241	230	36	80	65	
4	52.5	193.59	0.64	1.98	3.61	11	235	244	229	36	79	66	
3	55	195.51	0.57	1.78	5.50	10	231	243	226	37	79	65	
2	57.5	197.35	0.52	1.62	7.31	9	230	247	231	37	80	66	
1	60	199.12	0.50	1.56	9.09	8	230	245	230	36	82	67	
	(1241)												
[illegible]	θ = 60	V_m = 46.09	[illegible]	ΔH = 1.85	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Avg. = 65.6		[illegible]

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP/Hayward
Source Unit 2 Boiler Vent (RTO)
Method 5 Filter holder: Glass

Date 3-20-96 Test 10 Run 3
No. of traverse points 24
Filter type: 4" Glass Fiber

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒ ✓
Post test: 0.00 cfm at 17 IN. HG (vac) ☒ ✓

Particulate Catch Data:
No. of filters used:

5473

Recovery solvent(s)

☒ acetone
☐ other(s)

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	507	498	9
Impinger No. 3			
Condenser			
Desiccant	1439	1424	15
Total			24

Integrated Gas Sampling Data:

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0.00
Time start: 1305
Sampling rate: 4.0

Box No. 16 Bag No. 3
Size: 44 L
cc/min at 16 IN.HG
(HRS) Time end: 1411 (HRS)
cc/min Operator: SF

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 LTV/Hayward
Source Line 2 Press Vent (RTO)
Date 3-20-96 Test 10 Run 3

Operators SF/KN
Meter Box No. 14 ΔH@ 1.81 in.WC
Gasmeter Coeff. .9936

Nozzle No. 10-4
Nozzle Dia. .245 in.
Bar. Press. 29.31 in.Hg

Pitot No. 122-8
C_p 0.84
H_2O 1.5 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1305)	199.44											
A 12	2.5	201.15	0.47	1.44	1.14	7	236	237	229	34	67	65	
11	5	203.01	0.60	1.84	3.05	9	233	241	230	34	70	65	
10	7.5	205.98	0.62	1.91	5.01	10	233	240	233	35	71	65	
9	10	207.99	0.67	2.06	7.04	11	234	245	233	35	72	64	
8	12.5	209.09	0.72	2.31	9.14	13	236	240	227	36	73	64	
7	15	210.87	0.51	1.57	6.91	8	235	235	228	36	72	63	
6	17.5	212.90	0.68	2.09	2.96	11	236	232	228	34	74	62	
5	20	215.04	0.73	2.24	5.07	13	234	234	229	34	75	63	
4	22.5	217.03	0.64	1.97	7.06	11	235	231	229	35	74	63	
3	25	219.86	0.53	1.64	8.87	8	233	236	232	35	75	63	
2	27.5	220.68	0.54	1.67	0.70	8	233	238	229	35	77	64	
1	30	222.39	0.48	1.49	2.43	8	230	241	227	35	78	64	
B 12	32.5	224.37	0.62	1.92	4.40	10	233	246	229	36	78	65	
11	35	226.39	0.68	2.12	6.47	12	230	241	229	36	79	64	
10	37.5	228.56	0.74	2.30	8.61	14	232	244	228	36	74	68	
9	40	230.71	0.78	2.41	0.82	15	234	240	231	36	73	66	
8	42.5	232.84	0.72	2.22	2.93	14	234	242	228	36	72	66	
7	45	234.93	0.64	1.91	4.88	11	235	238	227	36	72	66	
6	47.5	236.74	0.59	1.82	6.79	10	235	238	229	37	73	66	
5	50	238.58	0.55	1.70	8.64	9	235	239	226	37	74	66	
4	52.5	240.31	0.49	1.52	0.38	8	232	240	233	37	76	66	
3	55	242.08	0.50	1.56	2.15	8	230	242	234	37	78	66	
2	57.5	243.82	0.47	1.47	3.88	8	230	241	230	37	78	66	
1	60	245.33	0.37	1.16	5.41	6	228	247	227	38	79	67	
	(1411)												
	0 - 60	V_m - 45.89		1.84 ΔH -							Avg. - 69.6		

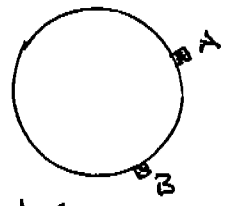
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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job LP/Hayward
Source Line 2 Press Vent (RTO)
Test 11 Run 1 Date 3-20-96
Stack Dimen. 76.25 IN.
Dry Bulb ____ °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.98 IN.HG
Static Pressure -.57 IN.WC
Operators SE/KN
Pitot No. V22-8 C_p 0.84

Drawing of Test Site

Cross-section View	Elevation View
	

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 6.25 IN.		Time Start:	HRS 1651
A 1	.021	1.60	7.85	.62	
2	.067	5.11	11.35	.62	
3	.118	9.00	15.25	.64	
4	.177	13.50	19.75	.59	
5	.250	19.06	25.31	.63	233
6	.356	27.14	33.40	.62	
7	.644	49.10	55.36	.64	
8	.750	57.19	63.44	.61	
9	.823	62.75	69.00	.60	
10	.882	67.25	73.50	.62	
11	.933	71.14	77.39	.41	
12	.979	74.65	80.90	.37	
B 1				.58	
2				.60	
3				.58	
4		MC = 1/6 = 18.8%		.59	
5		3/6 = 44.3%		.59	
6		5/6 = 69.8%		.62	
7				.60	
8				.56	233
9				.54	
10				.47	
11				.53	
12				.47	

Temp. Meas. Device & S/N: PDT = #51
Time End: 1659 HRS

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 4 and 6 Field Data Sheet

Job CD/Hayward
Source Line 2 Press Vent (RTO)
Date 3-20-96 Test 11 Run 1
Wet Bulb
Dry Bulb

Operator(s) SF/KN
Meter Box No. 14 Gasmeter Coef. .9936
ΔH@ 1.81 in.WC Bar.Press 28.98 in.Hg
Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in.WC ☒
Post Test: 0.00 cfm at 8 in.WC ☒

Trav. Point No.	Sample Time (min)	Sample Volume (cf)	Orif. Meter (in.WC)	Vac. in.Hg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/ In	Gas/ Out	O_2 (%v/v)
	(1650)	245.51									
3	5	249.15	1.81	2		251	242	37	59	93	
3	10	252.79	1.81	2		256	245	37	63	52	
3	15	256.48	1.81	2		256	245	37	70	54	
3	20	260.16	1.81	2		252	249	38	73	58	
2	25	263.84	1.81	2		247	253	38	75	56	
2	30	267.54	1.81	2		243	251	38	80	62	
2	35	271.24	1.81	2		245	252	38	82	63	
2	40	274.95	1.81	2		249	248	39	84	65	
1	45	277.68	1.81	2		245	249	36	84	65	
1	50	282.37	1.81	2		247	252	36	86	66	
1	55	286.13	1.81	2		253	257	36	87	68	
1	60	289.89	1.81						88	68	
	(176)										
	θ = 60	V_m = 44.38	ΔH = 1.81		$\bar{t}_s$ =				$\bar{t}_m$ = 69.63		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
Desiccant	1510	1496	
		Total	

Preliminary Results of SO_2 Concentration Determination	
V_{sd} = 42.76	DSCF
Moisture Gravimetric = 2.16	%v/v
Moisture Psychrometric =	%v/v
SO_2, DRY =	PPM
SO_2, WET =	PPM
LB/MMBtu =	

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job LP/Hayward
Source Line 2 Press Vent (RTO)
Test 11 Run 2 Date 3-20-96
Stack Dimen. 76.25 IN.
Dry Bulb °F Wet bulb °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.98 IN.HG
Static Pressure -.49 IN.WC
Operators SF/KN
Pitot No. V22-8 C_p 0.84

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 6.25 IN.		Time Start:	HRS 1815
A 1				.43	
2				.53	234
3				.55	
4				.55	
5				.56	
6				.58	
7				.62	
8				.60	
9				.58	
10				.48	
11				.51	
12				.58	
B 1				.51	
2				.70	
3				.63	
4				.52	
5				.61	234
6				.67	
7				.69	
8				.70	
9				.66	
10				.63	
11				.57	
12				.54	
Temp. Meas. Device & S/N: PIST-#51				Time End:	HRS

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 4 and 6 Field Data Sheet

Job LP/Hayward
Source Line 2 Press Vent (RTO)
Date 3-20-96 Test 11 Run 3
Wet Bulb
Dry Bulb

Operator(s) SF/KN
Meter Box No. 14 Gasmeter Coef. .9936
ΔH@ 1.81 in.WC Bar.Press 28.98 in.Hg
Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in.WC ☒
Post Test: 0.02 cfm at 10 in.WC ☒

Trav. Point No.	Sample Time (min)	Sample Volume (cf)	Orif. Meter (in.WC)	Vac. in.Hg	Temperatures (°F) Stack	Probe	Oven	Impg.	Gas/ In	Gas/ Out	O_2 (%v/v)
	(2015)	334.96									
3	5	338.73	1.81	2		237	244	37	67	73	
3	10	342.39	1.81	2		241	249	37	73	72	
3	15	346.18	1.81	2		238	252	37	78	74	
3	20	349.87	1.81	2		237	249	37	84	76	
2	25	353.64	1.81	2		242	256	38	90	78	
2	30	357.38	1.81	2		245	251	38	90	78	
2	35	361.17	1.81	2		243	247	39	90	81	
2	40	364.98	1.81	2		236	241	39	93	86	
1	45	368.69	1.81	2		240	242	40	93	87	
1	50	372.39	1.81	2		237	244	41	93	86	
1	55	376.15	1.81	2		238	242	41	94	87	
1	60	379.94	1.81	2		234	244	42	95	87	
	(2115)										
	θ = 60	V_m = 44.98	ΔH = 1.81		ξ =				ξ_m = 83.5		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
Desiccant	1528	1510	18
		Total	18

Preliminary Results of SO_2 Concentration Determination		
V_{std} =	42.23	DSCF
Moisture Gravimetric =	1.97	%v/v
Moisture Psychrometric =		%v/v
SO_2, DRY =		PPM
SO_2, WET =		PPM
LB/MMBtu =		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job L.P. / Hayward, WI
Source No. 2 Press RTO / Inlet
Test 12 Run 1 Date 3-20-96
Stack Dimen. 58.5 IN.
Dry Bulb 120 °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 29.00 IN.HG
Static Pressure -3.55 IN.WC
Operators M. Kaehler + L. Hansen
Pitot No. 32V-6 C_p .84

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 4 IN.		Time Start: 1700 HRS	
A-1	.044	2.58	6.57	1.31	
2	.146	8.54	12.54	1.62	
3	.296	17.32	21.32	1.89	
4	.704	41.18	45.18	1.91	
5	.854	49.96	53.96	1.90	
6	.956	55.93	59.93	1.40	120
B-1			~~7.80~~	1.80	
2				1.83	
3				2.00	
4				2.15	
5				2.17	
6				1.05	

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 1705 HRS

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

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EPA Method 4 and 6 Field Data Sheet

Job L.P. / Hayward, WI
Source No. 2 Press RTO / Inlet
Date 3-20-96 Test 12 Run 1

Operator(s) M. Kuehler & L. Hansen
Meter Box No. TM2 Gasmeter coef. 1.0047
^H@ NA in.WC Bar. press 29.00 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg. ✓
Posttest: 0.02 cfm at 16 in. Hg. ✓

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter ~~(inWG)~~ cc	VAC. inHg	Temperatures (°F) Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1650	280.438								
A-3	5	280.629	1,800	2	153	NA	NA	68	NA	20.9
3	10	280.820	1,000	2	150			68		
3	15	281.010	1,000	2	145			68		
3	20	281.200	1000	2	158			68		
2	25	281.387	1000	2	143			65		
2	30	281.573	1000	2	140			68		
2	35	281.762	1000	2	140			68		
2	40	281.947	1,000	2	135			68		
1	45	282.137	1000	2	138			68		
1	50	282.324	1000	2	139			68		
1	55	282.511	1000	2	143			68		
1	60	282.698	1,000	2	140			68		
	(1700)									
	θ= 60	V_m= 2.260	(^H)avg=					$(t_m)_{avg.}$ = 68		

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
Desiccant	42.4003	41.2453	1.1550
		Total	1.1550

Preliminary results of SO_2 concentration determination	
V_{std}	= 2.208 DSCF
Moisture =	2.41 %v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

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EPA Method 2 Field Data Sheet

Job L.P. / Hayward, WI
urce No. 2 Press RTO / Inlet
Test 12 Run 2 Date 3-20-96
Stack Dimen. 58.5 IN.
Dry Bulb 122 °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 29.00 IN.HG
Static Pressure -4.2 IN.WC
Operators M. Laehlert & L. Hansen
Pitot No. 31V-6 C_p .84

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas (°F)
		Port Length: 4 IN.		Time Start: 1920 HRS	
A-1				1.45	
2		Meter to Test 12		1.79	
3				1.90	
4		Run 1 for pts		2.12	
5				2.15	
6				1.03	
B-1				1.65	122
2				1.81	
3				2.10	
4				1.88	
5				1.90	
6				1.10	

EPA Method 4 and 6 Field Data Sheet

Job L.P. / Hayward, WI
Source No. 2 Press RTO / Inlet
Date 3-20-96 Test 12 Run 2

Operator(s) M. Kaehler + L. Hansen
Meter Box No. TR2 Gasmeter coef. 1.0047
ΔH@ NA in.WC Bar. press 29.00 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: <0.02 cfm at 15 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F) Probe	Oven	Impg.	Gas/In	Gas/Out	Oxygen (%v/v)
	1015	282.710								
A-3	5	282.900	1000	2	143	NA	NA	68	NA	20.9
3	10	283.085	1000	2	140			68		
3	15	283.267	1000	2	135			68		
3	20	283.448	1000	2	139			68		
2	25	283.630	1000	2	137			68		
2	30	283.789	1000	2	141			68		
2	35	283.970	1000	2	140			68		-
2	40	284.140	1000	2	143			68		
1	45	284.313	1000	2	141			68		
1	50	284.485	1000	2	140			68		
1	55	284.648	1000	2	140			68		
1	60	284.810	1000	2	139	↓	↓	68	↓	↓
	(1915)									
	θ=60	V_m=2.110	(ΔH)avg=					(tm)avg.=	68	

Condensate Data:

Item	Weight (g) Final	Tare	Difference
Impingers			
Condenser			
Desiccant	44.2677	43.2188	1.0489
		Total	1.0489

Preliminary results of SO_2 concentration determination	
V_{mstd} =	2.054 DSCF
Moisture =	2.35 %v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

283.630

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EPA Method 2 Field Data Sheet

Drawing of Test Site

Cross-section View	Elevation View

Job: L.P. / Hayward, WI
Source: No. 2 Press RTO / Inlet
Test: 12 Run 3 Date 3-20-96
Stack Dimen.: 59.5 IN.
Dry Bulb: 120 °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 29.00 IN.HG
Static Pressure: -4.15 IN.WC
Operators: M. Kaehler + L. Hanson
Pitot No.: 31V-6 C_p .84

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 IN.		Time Start: 2017 HRS	
A-1				1.30	
2		Refer to Test 12		1.53	
3				1.65	
4		Run 1 for Pts.		2.20	
5				2.20	
6				1.90	121
B-1				1.27	
2				1.65	
3				2.03	
4				1.97	
5				2.10	
6				2.00	

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 2023 HRS

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

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EPA Method 4 and 6 Field Data Sheet

Job L.P. / Hayward, WI
Source #6-2 Press Rtn / Inlet
Date 3-20-96 Test 12 Run 3

Operator(s) M. Koehler + L. Hansen
Meter Box No. IR2 Gasmeter coef. 1.0047
ΔH@ NA in.WC Bar. press 25.00 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: <0.02 cfm at 16 in. Hg.

Trav. Point No.	Samp. Time (min)	Sample Volume (cf)	Orif. Meter (inWC)	VAC. inHg	Temperatures (°F)					Oxygen
					Probe	Oven	Impg.	Gas/In	Gas/Out	(%v/v)
	2015	284.962								
A-3	5	285.020	1000	2	143	NA	NA	68	NA	20.9
3	10	285.190	1000	2	141			68		
3	15	285.356	1000	2	135			68		
3	20	285.522	1000	2	142			68		
2	25	285.688	1000	2	136			68		
2	30	285.861	1000	2	139			68		
2	35	286.015	1000	2	135			68		-
2	40	286.345	1000	2	139			68		
1	45	286.508	1000	2	143			68		
1	50	286.660	1000	2	140			68		
1	55	286.741	1000	2	140			68		
1	60	286.822	1000	2	143	↓	↓	66	↓	↓
	(2115)									
	θ= 60	V_m= 1.960	(ΔH)avg= 1000					$(t_m)_{avg.}$ = 68		

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impingers			
Condenser			
Desiccant	42.43.3036	42.4003	.9033
		Total	.9033

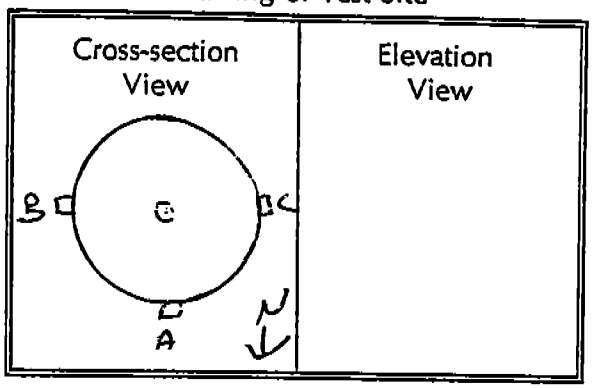
Preliminary results of SO_2 concentration determination	
V_{std} =	1.908 DSCF
Moisture =	2.18 %v/v
SO_2, dry =	ppm
SO_2, wet =	ppm
LB/MMBtu =	

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EPA Method 2 Field Data Sheet

Job: LP/ Hayward
Source: Line 2 Konus Stack
Test: 13 Run 0 Date: 3-19-96
Stack Dimen.: 51.5 IN.
Dry Bulb: °F Wet bulb: °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 28.69 IN.HG
Static Pressure: -.32 IN.WC
Operators: BA MP
Pitot No.: S-89 C_p .840
CH_2O

Drawing of Test Site



Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas
		Port Length: 3.5 IN.		Time Start: 0950 HRS	
A - 1	.021	1.08	4.58	.20	
2	.067	3.45	6.95	.31	
3	.118	6.08	9.58	.32	
4	.177	9.12	12.62	.31	
5	.250	12.88	16.38	.29	
6	.356	18.33	21.83	.25	389
7	.644	33.17	36.67	.20	
8	.750	39.63	42.13	.20	
9	.823	42.38	45.88	.21	
10	.852	45.42	48.92	.22	
11	.933	48.05	51.55	.24	
12	.979	50.42	53.92	.21	
B - 1				.19	
2				.26	
3	~	MC	8	.28	
4	~	O_2	14	.28	
5				.25	
6	~	FT/SEC	35.5	.21	
7	~	ACFM	30816	.19	382
8	~	DSCFM	16972	.19	
9				.20	
10				.24	
11				.26	
12				.25	

Temp. Meas. Device & S/N: PDT 33
Time End: HRS

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

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

Job CP/ HAYWARD
Source LINE 2 RONUS STACK
Method 0011 Filter holder: NA

Date 3-19-96 Test B Run 1
No. of traverse points 24
Filter type: NA

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: .00 cfm at 10 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: BK

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	652	556	96
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1482	1460	22
Total			118

Integrated Gas Sampling Data: TR7

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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EPA Method 5 Field Data Sheet

Job CP/ HAYWARD
Source UNIT 2 KOMO SMOKE
Date 3-19-96 Test 3 Run 1

Operators BA MP
Meter Box No. 15 ΔH@ 1.78 in.WC
Gasmeter Coeff. .9864

Nozzle No. Glass
Nozzle Dia. .370 in.
Bar. Press. 28.69 in.Hg

Pitot No. 316-59
C_p .84
H_2O 8 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1036)	(1010.50)											
B-12	2.5	1013.10	.29	2.98	1011.93	7	379	225	204	39	51	43	
11	5	1015.06	.27	2.73	1015.25	6	386	240	248	37	56	44	
10	7.5	1017.32	.27	2.74	1017.55	6	390	242	255	38	60	44	
9	10	1019.63	.23	2.34	1019.75	6	390	254	257	37	62	48	
8	12.5	1021.68	.22	2.26	1021.89	6	387	254	247	43	62	47	
7	15	1023.77	.20	2.04	1023.91	6	392	256	240	44	64	47	
6	17.5	1025.96	.24	2.44	1026.13	6	397	256	238	45	65	48	
5	20	1028.22	.27	2.75	1028.49	7	395	257	240	43	66	47	
4	22.5	1030.65	.31	3.15	1031.01	8	397	251	230	47	66	48	
3	25	1033.10	.31	3.16	1033.53	8	395	250	231	45	68	48	
2	27.5	1035.72	.27	2.78	1035.90	8	391	246	230	45	67	47	
1	30	1038.24	.29	2.97	1038.35	8	392	247	232	47	67	50	
A-12	32.5	1040.54	.25	2.57	1040.63	6	393	251	240	49	63	49	
11	35	1042.74	.23	2.35	1042.80	6	394	240	241	50	65	47	
10	37.5	1045.01	.25	2.55	1045.07	6.5	394	235	230	52	65	48	
9	40	1047.14	.22	2.26	1047.21	6	389	241	237	52	67	49	
8	42.5	1049.35	.24	2.47	1049.115	6	390	243	240	52	68	51	
7	45	1051.51	.21	2.17	1051.55	6	389	241	238	51	69	51	
6	47.5	1053.79	.26	2.69	1053.88	7	390	245	242	53	69	51	
5	50	1056.16	.30	3.09	1056.38	8	393	245	237	52	70	51	
4	52.5	1058.71	.31	3.18	1058.93	9	395	243	240	53	70	52	
3	55	1061.24	.31	3.20	1061.47	9	393	247	243	51	69	53	
2	57.5	1063.65	.27	2.79	1063.85	8	393	243	240	53	69	51	
1	60	1066.06	.27	2.79	1066.23	8	391	243	242	52	69	52	
	(1142)												
	0-60	V_m = 55.56		2.69 ΔH							Avg. 56.9		

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

Job CP / HAYWARD
Source LDVG 2 KONUS STACK
Method 0011 Filter holder: M

Date 3/5-96 Test 13 Run 2
No. of traverse points 24
Filter type: M

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

Particulate Catch Data:
No. of filters used: M

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

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	673	554	119
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1556	1535	21
Total			140

Integrated Gas Sampling Data: TR7

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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INTERPOL LABORATORIES, INC.
(612) -6020

EPA Method 5 Field Data Sheet

Job CP/Ha/WARD
Source CFE & Konus STACK
Date 3-19-96 Test 1-3 Run 2

Operators BA MP
Meter Box No. 1.5 ΔH@ 1.75 in.WC
Gasmeter Coeff. .9964

Nozzle No. Glass
Nozzle Dia. .370 in.
Bar. Press. 28.69 in.Hg

Pitot No. 31U-59
C_p .84
H_2O 7 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1220)	1064.40											
A-12	2.5	1068.61	.26	3.60	1068.68	5	399	230	231	51	47	47	
11	5	1070.67	.25	2.45	1070.89	5	399	231	231	45	49	47	
10	7.5	1072.88	.25	2.45	1073.09	6	395	230	227	41	54	46	
9	10	1075.05	.23	2.27	1075.22	5	397	229	232	42	55	49	
8	12.5	1077.07	.22	2.19	1077.32	5	395	232	240	40	58	49	
7	15	1079.26	.20	2.00	1079.32	5	395	235	240	39	60	48	
6	17.5	1081.50	.24	2.40	1081.51	5	394	233	230	39	61	47	
5	20	1083.68	.30	2.98	1083.96	7	398	236	236	41	63	47	
4	22.5	1086.13	.31	3.08	1086.45	7	399	235	230	40	64	48	
3	25	1088.62	.31	3.10	1088.94	8	396	234	227	42	65	48	
2	27.5	1090.95	.30	3.01	1091.40	7	395	235	230	40	65	51	
1	30	1093.58	.25	2.51	1093.79	7	395	236	231	41	65	50	
B-12	32.5	1095.96	.25	2.51	1096.04	6	395	235	234	44	61	48	
11	35	1098.20	.28	2.83	1098.42	6	386	245	234	46	65	49	
10	37.5	1100.50	.25	2.53	1100.68	6	389	245	240	45	66	50	
9	40	1102.67	.23	2.32	1102.85	5	391	244	246	47	66	50	
8	42.5	1104.86	.20	2.02	1104.88	5	390	243	250	47	67	50	
7	45	1106.80	.19	1.92	1106.85	4	391	250	240	49	68	50	
6	47.5	1108.89	.22	2.23	1108.98	5	391	247	243	47	68	50	
5	50	1111.00	.24	2.62	1111.28	6	395	245	246	45	69	51	
4	52.5	1113.45	.28	2.83	1113.68	7	395	243	241	47	70	52	
3	55	1115.84	.29	2.93	1116.12	7	394	248	240	47	70	52	
2	57.5	1118.28	.27	2.73	1118.45	6	394	255	248	49	70	53	
1	60	1120.67	.24	2.44	1120.71	6	391	251	247	45	70	52	
	(1323)												
	0-60	V_m - 54.27		2.55 ΔH -							Avg. 56.2		

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

Job CP/ HAYWARD
Source LINE 2 KONUS STACK
Method 0011 Filter holder: NT

Date 3-96 Test 13 Run 3
No. of traverse points 24
Filter type: NA

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

Particulate Catch Data:
No. of filters used:

NA

Recovery solvent(s)

☐ acetone
☒ other(s) MECL

No. of probe wash bottles:
Sample recovered by:

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	671	557	114
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1500	1482	18
Total			132

Integrated Gas Sampling Data: TR7

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 / HAYWARD
Source LEAR 2 KONUS STACK
Date 3-18-96 Test 13 Run 3

Operators BA MP
Meter Box No. 15 ΔH@ .9364 in.WC
Gasmeter Coeff. 1.75

Nozzle No. C16.55
Nozzle Dia. .370 in.
Bar. Press. 28.65 in.Hg

Pitot No. 31U-59
C_p .84
H_2O 18 %

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)
	(1405)	(1121.00)											
6-12	2.5	1123.31	.30	2.91	1123.41	7	408	226	229	51	51	50	
11	5	1125.56	.29	2.78	1125.72	7	408	236	235	48	57	50	
10	7.5	1127.94	.30	2.89	1128.17	7	409	251	232	46	62	50	
9	10	1130.07	.25	2.42	1130.38	6	408	258	238	46	64	49	
8	12.5	1132.50	.22	2.14	1132.46	6	408	260	235	43	65	50	
7	15	1134.40	.20	1.54	1134.44	5	409	261	237	45	66	50	
6	17.5	1136.39	.21	2.04	1136.48	5	409	263	246	51	67	50	
5	20	1138.71	.25	2.43	1138.70	6	409	263	246	53	68	49	
4	22.5	1140.75	.25	2.44	1140.82	6	408	260	235	50	68	49	
3	25	1143.10	.25	2.89	1143.31	7	409	258	238	47	69	51	
2	27.5	1145.37	.24	2.37	1145.50	7	410	258	237	48	69	51	
1	30	1147.64	.26	2.56	1147.78	7	406	254	242	47	69	51	
A-12	32.5	1149.92	.24	2.35	1149.97	6	405	253	250	49	65	50	
11	35	1152.19	.24	2.34	1152.14	6	405	235	235	52	67	52	
10	37.5	1154.27	.22	2.16	1154.24	5	403	236	245	51	69	52	
9	40	1156.38	.24	2.36	1156.43	6	403	239	240	49	69	52	
8	42.5	1158.50	.21	2.06	1158.45	5	404	247	245	48	70	53	
7	45	1160.42	.20	1.97	1160.45	5	402	246	243	50	71	53	
6	47.5	1162.55	.24	2.37	1162.65	6	404	247	240	52	70	55	
5	50	1164.95	.28	2.74	1165.05	8	410	250	233	51	71	54	
4	52.5	1167.56	.31	3.04	1167.54	9	409	253	247	47	71	55	
3	55	1170.07	.32	3.13	1170.06	9	412	261	249	47	71	54	
2	57.5	1172.52	.30	2.96	1172.52	8	403	263	241	49	72	54	
1	60	1174.97	.30	2.96	1174.58	8	403	261	245	45	72	55	
	(1510)												
	0-60	V_m = 53.97		ΔH = 2.5							Avg. = 59.4		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job LP / Hayward
Source Zone 2 Kenus STACK
Test 1 Run ○ Date 3-15-96
Stack Dimen. 51.5 IN.
Dry Bulb ____ °F Wet bulb ____ °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.60 IN.HG
Static Pressure -.35 IN.WC
Operators B Bachenberg & M Peterson
Pitot No. 27y-6p 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
		Port Length: 3.5 IN.		Time Start:	HRS
A-1				.17	
2				.25	
3				.27	
4				.28	
5				.27	
6				.22	
7				.20	421
8				.18	
9				.20	
10				.20	
11				.21	
12				.23	
B-1				.15	
2				.22	
3				.26	
4				.25	
5				.22	
6				.18	394
7				.17	
8		FT/SEC	34.49	.21	
9		ACFM	29938	.21	
10		DSCFM	15720	.23	
11				.23	
12				.24	

Temp. Meas. Device & S/N: PIT 33
Time End: HRS

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

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

Job CP / Hayward
Source Line 2 Kenus Stack
Method 5 Filter holder: Glass

Date 3-5-96 Test 14 Run 1
No. of traverse points 24
Filter type: 4" GFF

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

Particulate Catch Data:
No. of filters used:

(1) 8368

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	583	503	80
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1568	1556	12
Total			92

Integrated Gas Sampling Data:

Bag Pump No. 31B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0.0
Time start: 1800
Sampling rate: 4.00

Box No. 8 Bag No. 1
Size: 44 L
cc/min at 15 IN.HG
(HRS) Time end: 1903 (HRS)
cc/min Operator: GT

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/ Hayward
Source Coal 2 / Kiln 5 Main
Date 3-19-96 Test 1-1 Run 1

Operators SA MP
Meter Box No. 15 ΔH@ 1.75 in.WC
Gasmeter Coeff. .996.4

Nozzle No. 9-5
Nozzle Dia. .310 in.
Bar. Press. 28.69 in.Hg

Pitot No. 32-65
C_p .84
H_2O 10 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1800)	(175.40)											
B-12	2.5	177.27	.28	1.37	177.06	4	398	243	240	52	38	40	
11	5	178.79	.31	1.39	178.71	4	396				41	38	
10	7.5	180.62	.26	1.25	180.37	3	386	259	246	50	43	38	
9	10	182.01	.22	1.06	181.72	3	386				48	38	
8	12.5	183.37	.20	1.96	183.10	3	390	263	242	48	50	42	
7	15	184.62	.21	1.02	184.53	3	386				52	42	
6	17.5	186.00	.21	1.03	185.98	3	386	270	256	51	54	40	
5	20	187.42	.23	1.12	187.45	3	390				56	40	
4	22.5	189.02	.28	1.36	189.10	3	390	271	257	48	57	35	
3	25	190.67	.30	1.46	190.81	4	388				58	41	
2	27.5	192.35	.27	1.32	192.43	4	388	262	260	52	59	40	
1	30	193.86	.24	1.17	193.96	3.5	389				61	40	
A-12	32.5	195.36	.22	1.08	195.43	3	390	251	255	50	60	41	
11	35	196.84	.22	1.08	196.90	3	388				62	42	
10	37.5	198.35	.23	1.13	198.41	3	386	245	246	45	64	43	
9	40	199.83	.21	1.04	199.86	3	386				64	44	
8	42.5	201.24	.20	97	201.27	3	399	243	250	43	66	45	
7	45	202.62	.20	.98	202.68	3	395				66	47	
6	47.5	204.12	.22	1.09	204.16	3	393	250	254	45	67	45	
5	50	205.70	.26	1.28	205.77	4	397				67	45	
4	52.5	207.41	.29	1.42	207.47	4	396	257	249	47	69	47	
3	55	209.20	.31	1.52	209.23	5	399				70	46	
2	57.5	210.98	.30	1.48	210.96	5	397	254	265	45	70	47	
1	60	212.74	.29	1.43	212.67	5	395				71	48	
	(1903)												
	0 - 60	V_m - 37.34		1.21 ΔH -							Avg. -	50.6	

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job GP/ Haywood
Source Line 2 Rotary STK
Method 5 Filter holder: Class

Date 3-15-96 Test 14 Run 2
No. of traverse points 24
Filter type: 4" GFF

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

Particulate Catch Data:
No. of filters used:

(1) 8369

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	601	500	101
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1510	1500	10
Total			111

Integrated Gas Sampling Data:

Bag Pump No. 313
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0.0
Time start: 1930
Sampling rate: 400

Box No. 8 Bag No. 2
Size: 44 L
cc/min at 15 IN.HG
(HRS) Time end: 2032 (HRS)
cc/min Operator: SA

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/ Hayward
Source Liner Knuvs Small
Date 3-15-96 Test 14 Run 2

Operators SA MP
Meter Box No. 15 ΔH@ 1.75 in.WC
Gasmeter Coeff. .9964

Nozzle No. 9-5
Nozzle Dia. .311 in.
Bar. Press. 28.69 in.Hg

Pilot No. 27-6
C_p .84
H_2O 10 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1930)	(213.00)											
A-12	0	214.62	.24	1.17	214.53	3	393	230	240	47	62	52	
11	5	216.15	.23	1.13	216.04	3	397				67	52	
10	7.5	217.61	.25	1.22	217.62	3	405	232	231	47	71	53	
9	10	219.06	.21	1.03	219.07	3	410				72	54	
8	12.5	220.42	.20	.98	220.49	3	410	240	231	48	73	56	
7	15	221.84	.21	1.03	221.95	3	414				74	54	
6	17.5	223.38	.25	1.22	223.53	3.5	415	259	242	47	74	55	
5	20	225.11	.29	1.42	225.24	4	415				75	54	
4	22.5	226.92	.31	1.51	227.00	5	416	264	253	43	77	57	
3	25	228.75	.30	1.47	228.25	5	415				77	58	
2	27.5	230.59	.28	1.38	230.44	5	411	260	245	46	77	58	
1	30	232.23	.25	1.43	232.16	4	405				77	56	
B-12	30.5	233.82	.26	1.29	233.79	4	405	263	251	43	75	57	
11	35	235.36	.25	1.24	235.39	4	407				76	57	
10	37.5	236.79	.21	1.03	236.85	3	411	265	261	44	77	57	
9	40	238.17	.15	.94	238.25	3	406				77	58	
8	42.5	239.52	.18	.89	239.61	3	409	270	260	40	78	58	
7	45	240.80	.16	.79	240.89	3	411				78	59	
6	47.5	242.15	.18	.84	242.25	3	412	270	270	36	78	59	
5	50	243.71	.24	1.18	243.82	4	415				78	60	
4	52.5	245.41	.28	1.37	245.50	5	418	276	268	39	79	60	
3	55	247.12	.27	1.33	247.17	5	415				80	60	
2	57.5	248.71	.25	1.23	248.77	5	416	271	270	41	80	60	
1	60	250.45	.28	1.39	250.47	5	407				80	61	
	(1032)												
	θ - 60	V_m - 37.45		ΔH - 1.47							Avg. - 66.1		

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP / Hayward Date 3-15-96 Test 14 Run 3
Source Line 2 Kenics Stack No. of traverse points 24
Method 5 Filter holder: Glass Filter type: 4" 6FT

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: 0)

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1	593	495	98
Impinger No. 2			
Impinger No. 3			
Condenser			
Desiccant	1507	1568	9
Total			107

Integrated Gas Sampling Data:

Bag Pump No. 313 Box No. 5 Bag No. 3
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0.0 cc/min at 15 IN.HG
Time start: (HRS) Time end: (HRS)
Sampling rate: 400 cc/min Operator: SA

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 / Norwood
Source Duct 2 Ronus Stack
Date 3-15-96 Test 14 Run 3

Operators SA MD
Meter Box No. 15 ΔH@ 1.78 in.WC
Gasmeter Coeff. .996

Nozzle No. 9-5
Nozzle Dia. .311 in.
Bar. Press. 28.69 in.Hg

Pitot No. 37-69
C_p .84
H_2O 11 %

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)
	(2900)	(250.70)											
B-12	2.5	252.44	.30	1.44	252.42	3	420	227	231	42	68	64	
11	5	254.05	.28	1.33	254.08	3	423				71	63	
10	7.5	255.70	.28	1.35	255.75	3	415	253	235	45	73	63	
9	10	257.17	.22	1.06	257.23	3	415				76	63	
8	12.5	258.61	.20	.97	258.65	3	416	271	255	43	77	63	
7	15	259.91	.18	.87	259.99	3	419				77	63	
6	17.5	261.46	.22	1.07	261.48	3	415	274	261	46	77	63	
5	20	263.07	.26	1.25	263.10	3.5	420				78	64	
4	22.5	264.70	.28	1.35	264.78	4	422	275	265	43	79	65	
3	25	266.48	.30	1.45	266.52	4	418				80	64	
2	27.5	268.18	.25	1.21	268.11	4	421	273	270	40	80	64	
1	30	269.77	.25	1.22	269.70	4	415				80	65	
A-12	32.5	271.33	.23	1.13	271.24	3	405	254	263	43	77	65	
11	35	273.47	.22	1.07	273.24	3	412				80	65	
10	37.5	274.89	.22	1.08	274.24	3.5	415	258	270	39	80	66	
9	40	275.72	.21	1.02	275.7	3	420				81	66	
8	42.5	277.07	.18	.87	277.05	3	420	264	261	42	81	66	
7	45	278.45	.21	1.02	278.52	3	415				81	66	
6	47.5	279.90	.21	1.02	279.58	3	418	261	261	40	81	66	
5	50	281.57	.28	1.35	281.64	4	425				82	67	
4	52.5	283.39	.31	1.49	283.43	5	427	270	265	38	82	67	
3	55	285.00	.28	1.35	285.11	4	430				83	67	
2	57.5	286.78	.31	1.50	286.88	5	427	263	258	38	83	66	
1	60	288.61	.31	1.50	288.65	5	425				84	68	
	(200)												
	θ - 60	V_m - 37.91		ΔH 1.21							Avg. -	71.8	

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

18 Benzene Field Data Sheet

Job LP/HAYWARD
Source LINE 2 KONUS STACK
Date 3-19-96 Test 15 Run 1

Operator(s) BA MP
Meter Box No. 65 Meter Coef. 1.0136
Barometric Pressure 28.69 IN.HG

Sample Train Leak Check:
Pretest: 0.0 cc/min at 13 IN.HG
Post test: _____ cc/min at __ IN.HG

Trav. point No.	Sample Time (min)	Sample Volume (cf)	Sample Rate (cc/min)	Vac. (IN.HG)	Temperatures (°F)		
					Stack	Probe	Gasmeter
	(1400)	(482.168)					
	5	482.303	1000	2	388	—	40
	10	482.443	1000	2	386	—	40
	15	482.625	1000	2	388	—	41
	20	482.806	1000	4	386	—	41
	25	482.997	1000	4	390	—	41
	30	483.179	1000	5	388	—	42
	35	483.356	1000	6	390	—	42
	40	483.513	1000	6	388	—	47
	45	483.670	1000	8	397	—	52
	50	483.826	1000	9	393	—	55
	55	484.110	1000	9	397	—	55
	60	484.295	1000	7	397	—	57
	θ = 60	V_m = 2.127					t_m = 46

V_{std} = 2.136

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

18 Field Data Sheet

Job LP / HAYWARD
Source LINE 2 KONUS STACK
Date 3-[illegible]-96 Test 15 Run 2

Operator(s) RA MP
Meter Box No. 6S Meter Coef. 1.0036
Barometric Pressure 28.64 IN.HG

Sample Train Leak Check:

Pretest: 0.0 cc/min at 15 IN.HG
Post test: 0.0 cc/min at 15 IN.HG

Trav. point No.	Sample Time (min)	Sample Volume (cf)	Sample Rate (cc/min)	Vac. (IN.HG)	Temperatures (°F)		
					Stack	Probe	Gasmeter
	(1930)	(484.315)					
	5	484.510	1000	5	399	—	66
	10	484.705	1000	5	410	—	66
	15	484.900	1000	5	412	—	68
	20	485.095	1000	7	416	—	70
	25	485.282	1000	7	411	—	70
	30	485.470	1000	9	409	—	70
	35	485.650	1000	9	405	—	72
	40	485.822	1000	9	406	—	72
	45	486.010	1000	9	411	—	74
	50	486.203	1000	9	415	—	74
	55	486.387	1000	10	415	—	78
	60	486.573	1000	10	416	—	78
	θ = 60	V_m = 2.258					t_m = 71.5

V_{STD} = 2.155

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

18 Field Data Sheet

Job LP / HAYWARD
Source LINE 2 KONUS STACK
Date 3-19-96 Test 15 Run 1

Operator(s) GA MP
Meter Box No. 65 Meter Coef. 1.0036
Barometric Pressure 28.65 IN.HG

Sample Train Leak Check:

Pretest: 0.0 cc/min at 15 IN.HG
Post test: 0.0 cc/min at 15 IN.HG

Trav. point No.	Sample Time (min)	Sample Volume (cf)	Sample Rate (cc/min)	Vac. (IN.HG)	Temperatures (°F)		
					Stack	Probe	Gasmeter
	(2100)	(486.600)					
	5		1000	4	420	—	80
	10		1000	4	415	—	80
	15		1000	5	415	—	80
	20		1000	5	418	—	80
	25	487.605	1000	7	422	—	80
	30	487.810	1000	7	418	—	80
	35	488.003	1000	8	410	—	80
	40		1000	8	409	—	80
	45		1000	8	415	—	80
	50	488.559	1000	8	417	—	80
	55	488.760	1000	9	418	—	80
	60	488.950	1000	9	420	—	80
	θ = 60	V_m = 2.35					t_m = 80

Vstd = 2.211

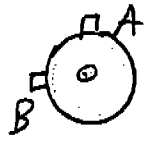
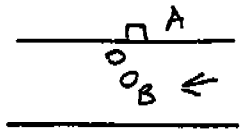
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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job L.P. Hayward
Source GM2 Dryer RTO / Inlet
Test 17 Run 0 Date 3-19-96
Stack Dimen. 64.75 IN.
Dry Bulb 145 °F Wet bulb 156 °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.78 IN.HG
Static Pressure -1.60 IN.WC
Operators E. Juers & J Lorenz
Pitot No. 29r-6 C_p .840
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: 8.5" IN.		Time Start: 0829 HRS	
A 1	.021	1.35	9.86	.91	
2	.067	4.34	12.84	1.20	
3	.118	7.64	16.14	1.32	
4	.177	11.46	19.96	1.30	
5	.250	16.19	24.69	1.10	
6	.356	23.05	31.55	1.20	
7	.644	41.70	50.20	1.35	
8	.750	48.56	57.06	1.50	
9	.823	53.29	61.79	1.50	
10	.882	57.11	65.61	1.40	
11	.933	60.41	68.91	1.55	
12	.979	63.39	71.89	1.40	
B 1				.73	
2				1.25	
3				1.25	
4				1.30	
5				1.30	
6				1.30	
7				1.40	
8				1.40	
9				1.40	
10				1.50	
11				1.50	
12				1.30	

Temp. Meas. Device & S/N: TDT 42 + 47 Time End: 0845 HRS

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job C.P. Hayward
Source Dine 2 Dryer RTO/Inlet
Method 5 Filter holder: MAE

Date 3-19-96 Test 17 Run 1
No. of traverse points 24
Filter type: 3-52 "6F

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: 1082

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	744	501	243
Impinger No. 3			
Condenser			
Desiccant	1451	1449	2
Total			245

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1030
Sampling rate: 400

Box No. 15 Bag No. 1
Size: 44 L
cc/min at 22 IN.HG
(HRS) Time end: 1132 (HRS)
cc/min Operator: ES

S/N of O_2 Analyzer used to monitor train outlet: 29A

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

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job: L.P. Hayward
Source: Line 2 Dryer RTO Inlet
Date: 3-19-96 Test 17 Run 1

Operators: EJ JL
Meter Box No. 10 ΔH@ 1.94 in.WC
Gasmeter Coeff. 1.0042

Nozzle No. S-3
Nozzle Dia. .189 in.
Bar. Press. 28.78 in.Hg

Pitot No. 29R-8
C_p .840
H_2O 20 %

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)
	(1030)	(241.40)											
A 12	2.5	242.92	1.50	1.23	2.88	5	165	231	271	~~35~~	41	40	17.0
11	5	244.39	1.60	1.28	4.39	5	165				41	40	16.7
10	7.5	245.88	1.60	1.28	5.90	5	166	227	272	34	42	40	16.5
9	10	247.35	1.50	1.20	7.35	5	167				47	40	16.3
8	12.5	248.84	1.50	1.21	8.82	5	167	230	269	35	48	40	16.5
7	15	250.29	1.40	1.13	0.24	5	166				50	40	16.4
6	17.5	251.74	1.35	1.09	1.64	5	166	231	266	35	53	40	16.4
5	20	253.06	1.10	.89	2.90	4	165				53	40	16.7
4	22.5	254.46	1.20	.97	4.22	4	168	227	270	36	54	40	16.7
3	25	255.65	1.20	.97	5.54	4.5	167				56	40	16.5
2	27.5	256.98	.92	.75	6.70	4	164	231	271	38	57	41	16.4
1	30	258.14	.67	.82	7.80	3.5	164				57	41	16.3
B 12	32.5	259.66	1.60	1.31	9.34	5.5	164	225	249	39	53	41	16.5
11	35	260.20	1.60	1.30	0.86	5.5	164				58	42	16.3
10	37.5	262.79	1.60	1.30	2.40	5.5	168	232	269	40	59	41	16.7
9	40	264.34	1.55	1.26	3.91	5.5	167				60	41	16.9
8	42.5	266.86	1.50	1.22	5.39	5.5	167	231	268	40	61	42	16.6
7	45	267.39	1.40	1.15	6.83	5.5	166				63	44	16.5
6	47.5	268.88	1.40	1.15	8.28	5	168	232	272	42	63	44	16.6
5	50	270.34	1.35	1.10	9.69	5	171				65	45	16.5
4	52.5	271.80	1.35	1.11	1.11	5	170	234	269	42	65	45	16.1
3	55	273.13	1.30	1.07	2.50	5	169				66	46	16.5
2	57.5	274.66	1.25	1.02	3.87	5	171	231	268	43	66	47	16.7
1	60	275.81	.85	.70	5.00	3.5	170				67	46	16.2
	(1133)												
	0 - 60	V_m = 34.41		ΔH = 1.09							Avg. = 48.9		

C-100

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job C.P. Hayward
Source Line 2 Dryer RTO Inlet
Method 5 Filter holder: MAC

Date 3-19-96 Test 17 Run 3
No. of traverse points 24
Filter type: 352 ° 6F

Sample Train Leak Check:
Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: .012 cfm at 6 IN. HG (vac) ☒

Particulate Catch Data:
No. of filters used: 1091

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

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	739	496	243
Impinger No. 3			
Condenser			
Desiccant	1409	1397	12
Total			255

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1320
Sampling rate: 400

Box No. 15 Bag No. 2
Size: 44 L
cc/min at 22 IN.HG
(HRS) Time end: 1421 (HRS)
cc/min Operator: ES

S/N of O_2 Analyzer used to monitor train outlet: 29A

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job: LP Hayward
Source: Line 2 Dryer RTO Inlet
Date: 3-19-96 Test: 17 Run: 2

Operators: EJ JL
Meter Box No.: 10 ΔH@ 1.94 in.WC
Gasmeter Coeff.: .60042

Nozzle No.: B3
Nozzle Dia.: .189 in.
Bar. Press.: 28.76 in.Hg

Pitot No.: 2948
C_p: .840
H_2O: 25 %

Traverse Point No.	Sampling Time (min)	Sample Vol. (cf)	Velocity Head (in.WC)	Orifice Meter (in.WC)	Des. Vol. (cf)	VAC. (in.Hg)	Temperatures (°F) Stack	Probe	Oven	Imp.	Gas/In	Gas/Out	Oxygen (% v/v)
	(1320)	276.10			7.57	5	171	234	268	35	41	41	17.0
A 12	2.5	277.64	1.65	1.20	9.04	5	171				42	40	17.0
11	5	279.19	1.70	1.22	0.60	5	172	231	272	41	44	39	17.2
10	7.5	280.72	1.70	1.21	1.93	5	172				48	39	17.1
9	10	282.18	1.60	1.14	3.31	5	170	232	271	42	51	38	17.0
8	12.5	283.61	1.50	1.08	4.68	5	168				53	37	17.0
7	15	284.95	1.45	1.05	5.98	4.5	169	229	272	44	53	38	17.0
6	17.5	286.30	1.30	.94	7.28	4.5	168				57	39	16.6
5	20	287.63	1.30	.94	8.56	4	171	234	272	44	59	40	16.5
4	22.5	288.96	1.25	.91	9.82	4	170				61	41	16.4
3	25	290.30	1.20	.87	0.90	3	170	235	270	44	62	41	16.6
2	27.5	291.37	.89	.65	1.89	3	169				62	42	16.4
1	30	292.36	.73	.53	3.34	5	169	229	259	45	59	44	16.3
B 12	32.5	293.71	1.60	1.17	4.80	5	169				63	45	16.5
11	35	295.17	1.60	1.17	6.26	5	169	231	262	45	66	46	16.2
10	37.5	296.68	1.60	1.18	7.71	5	170				66	47	16.3
9	40	298.10	1.55	1.14	9.13	5	169	232	268	45	67	48	16.3
8	42.5	299.57	1.60	1.17	0.56	5	170				68	48	16.3
7	45	301.04	1.50	1.11	1.96	5	169	229	270	46	68	49	16.4
6	47.5	302.60	1.45	1.08	3.34	5	169				69	49	16.4
5	50	303.88	1.40	1.04	4.73	5	170	230	268	46	69	50	16.4
4	52.5	305.30	1.40	1.04	6.11	5	170				70	50	16.3
3	55	306.75	1.40	1.04	7.47	5	169	228	269	45	71	50	16.3
2	57.5	308.10	1.35	1.01	8.64	3.5	171				71	51	16.3
1	60	309.37	.99	.73									
	(1421)												
	θ = 60	V_m = 33.27		ΔH = 1.02							Avg. = 51.9		

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. Haywood
Source Line 2 Dryer RTO/Inlet
Method 5 Filter holder: MACE

Date 3-19-96 Test 17 Run 3
No. of traverse points 24
Filter type: 3.52" GF

Sample Train Leak Check:

Pretest: ≤ 0.02 cfm at 15 IN.HG (vac) ☒
Post test: .01 cfm at 6 IN. HG (vac) ☒

Particulate Catch Data:

No. of filters used: 083

Recovery solvent(s)

☒ Acetone
☐ other(s)

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

Condensate Data:

Item	Weight (g)		
	Final	Tare	Difference
Impinger No. 1			
Impinger No. 2	721	496	225
Impinger No. 3			
Condenser			
Desiccant	1439	1429	10
Total			235

Integrated Gas Sampling Data:

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1900
Sampling rate: 400

Box No. 15 Bag No. 3
Size: 44 L
cc/min at 22 IN.HG
(HRS) Time end: 2032 (HRS)
cc/min Operator: EJ

S/N of O_2 Analyzer used to monitor train outlet: 29A

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Field Data Sheet

Job C.P. Hayward
Source Line 2 Dryer RTO/Inlet
Date 3-19-96 Test 17 Run 3

Operators EJT JL
Meter Box No. 10 ΔH@ 1.94 in.WC
Gasmeter Coeff. 1.0042

Nozzle No. B-3
Nozzle Dia. .189 in.
Bar. Press. 28.76 in.Hg

Pitot No. 24V-8
C_p .840
H_2O 25.5 %

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)
	(1900)	(309.70)											
A 12	2.5	311.20	1.60	1.15	1.14	5	172	228	271	38	58	56	16.7
11	5	313.05	1.64	1.20	2.62	5	171				60	55	16.7
10	7.5	314.96	1.70	1.24	4.12	5	174	231	271	33	47	47	16.5
9	10	316.04	1.65	1.18	5.58	5	172				49	46	16.5
8	12.5	317.50	1.55	1.11	6.99	5	169	230	270	35	50	47	16.6
7	15	318.94	1.45	1.04	8.36	5	171				52	47	16.7
6	17.5	320.45	1.40	1.01	9.71	4.5	170	229	266	35	53	47	16.6
5	20	321.71	1.30	.94	10.1	4	171				55	47	16.6
4	22.5	323.02	1.25	.78	2.20	4	172	234	269	36	56	46	16.6
3	25	324.24	1.20	.86	3.45	4	172				57	47	16.7
2	27.5	325.46	1.01	.73	4.60	3.5	170	231	271	36	58	47	16.8
1	30	326.46	.74	.54	5.59	3	168				59	47	16.7
B 12	32.5	327.84	1.60	1.16	7.05	5	169	236	268	35	56	46	17.0
11	35	329.30	1.60	1.16	8.49	5	168				59	46	17.1
10	37.5	330.73	1.65	1.19	9.96	5	173	232	270	36	61	47	17.1
9	40	332.18	1.60	1.16	1.41	5	174				63	47	16.6
8	42.5	333.61	1.50	1.09	2.82	5	172	230	273	36	64	49	16.7
7	45	334.99	1.50	1.09	4.23	5	173				65	48	16.6
6	47.5	336.33	1.45	1.05	5.62	5	173	228	269	36	66	50	16.5
5	50	337.80	1.40	1.02	6.99	5	172				66	49	16.5
4	52.5	339.23	1.40	1.02	8.36	5	172	229	271	37	66	49	16.6
3	55	340.60	1.35	.98	9.70	4.5	173				67	50	16.5
2	57.5	341.83	1.40	1.02	1.07	5	172	230	265	37	68	50	16.3
1	60	343.06	.91	.67	2.18	3	170				69	52	16.1
	(2032)	~~342.86~~											
	θ = 60	V_m = 33.36		ΔH = 1.02							Avg. = 53.8		

(33.16)

311.90 ~~311.99~~ leak check -312.10

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 7 Sampling Collection Field Data Sheet

Job: L.P. Hayward | Date: 3-19-96 | Bar Pressure: 28.78 IN.HG
Test Location: Dryer-RTO Inlet | Fuel Type: Nat. Gas | Sample Train No: Green
Technician: J. Lorenz | Pump No: 29A

No.	Test Run Point	Flask No.	Time (HRS)	Vacuum (IN.HG)	Flask Temp. (°F)	Leak Rate <0.4 IN.HG/MIN.	
1	17-1	19	10:[illegible]AM	26.04	40	☒ YES	☐ NO
2		20	10:45	26.07	41	☒ YES	☐ NO
3		21	10:59	26.16	41	☒ YES	☐ NO
4		22	11:16	26.04	42	☒ YES	☐ NO
5	17-2	23	13:25	26.02	40	☒ YES	☐ NO
6		24	1335	26.06	38	☒ YES	☐ NO
7		31	1350	2607	36	☒ YES	☐ NO
8		32	1405	26.02	36	☒ YES	☐ NO
9	17-3	33	1436	26.01	34	☒ YES	☐ NO
10		34	1449	26.04	32	☒ YES	☐ NO
11		35	2000	26.04	33	☒ YES	☐ NO
12		36	2012	26.03	31	☒ YES	☐ NO
13 Blank (Run 9)	17-0	49				☐ YES	☐ NO
14						☐ YES	☐ NO
15						☐ YES	☐ NO
16						☐ YES	☐ NO
17						☐ YES	☐ NO
18						☐ YES	☐ NO
19						☐ YES	☐ NO
20						☐ YES	☐ NO
21						☐ YES	☐ NO
22						☐ YES	☐ NO
23						☐ YES	☐ NO
24						☐ YES	☐ NO
25						☐ YES	☐ NO
26						☐ YES	☐ NO
27						☐ YES	☐ NO

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EPA

VISIBLE EMISSION OBSERVATION FORM 1

Form Number | Page | of

Continued on VEO Form Number

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

Company Name: Louisiana Pacific

Facility Name:

Street Address:

City: Hayward | State: WI | Zip:

Process: Line 2 KONUS | Unit # | Operating Mode

Control Equipment: EAB | Operating Mode

Describe Emission Point: tallest S-most cylindrical stack

Height of Emiss. Pt. Start ~100' End | Height of Emiss. Pt. Rel. to Observer Start ~100' End

Distance to Emiss. Pt. Start ~320' End | Direction to Emiss. Pt. (Degrees) Start 290° End

Vertical Angle to Obs. Pt. Start <18° End | Direction to Obs. Pt. (Degrees) Start 290° End

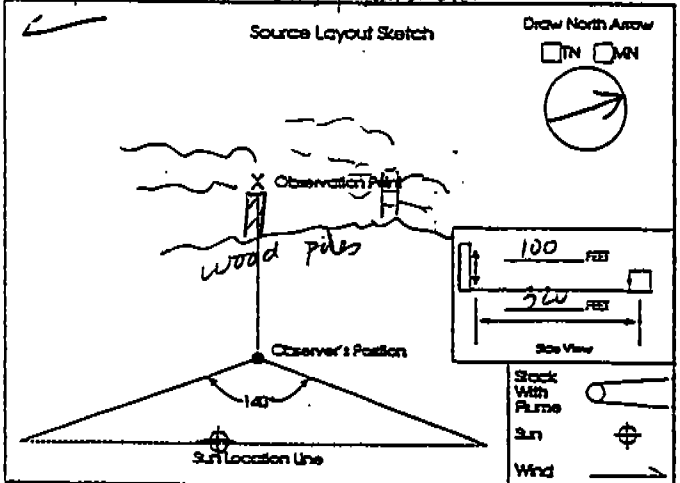
Distance and Direction to Observation Point from Emission Point: Start NA End

Describe Emissions: Start coming End | Emission Color: Start grey End | Water Droplet Plume: Attached ☐ Detached ☐ None ☒

Describe Plume Background: Start sky End | Background Color: Start blue/gray End | Sky Conditions: Start ptly cloudy End | Wind Speed: Start 5-10 mph End | Wind Direction: Start S/N End | Ambient Temp.: Start 26° F End | Wet Bulb Temp.: * | RH Percent: *

* temps too low to use sling psychrometer

Source Layout Sketch



Longitude | Latitude | Declination

Additional Information: Occasional interference of other plumes - Still able to read. Could not read on 3/18/96 during PM test due to poor weather/background conditions - snow, overcast

Observation Date: 3/19/96 | Time Zone: CST | Start Time: 0758 | End Time: Cont'd

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

Observer's Name (Print): Sheryl Bergeron

Observer's Signature: Sheryl Bergeron | Date: 3/19/96

Organization: Interpol Laboratories

Certified By: ETA | Date: 8/24/95

VEOF1.1

EPA

VISIBLE EMISSION OBSERVATION FORM 1

Form Number						Page	Of
Continued on VEO Form Number							

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

Company Name: Louisiana Pacific
Facility Name:
Street Address:
City: Hayward | State: WI | Zip:

Process: Line 2 KONUS | Unit #: | Operating Mode:
Control Equipment: EFB | Operating Mode:

Describe Emission Point:

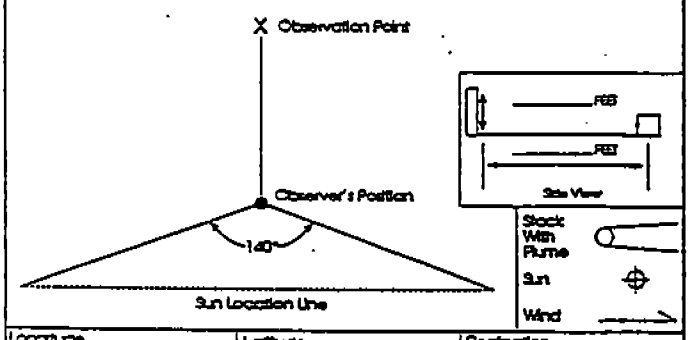
Height of Emiss. Pt. — Start: | End: Same | Height of Emiss. Pt. Rel. to Observer — Start: | End: Same
Distance to Emiss. Pt. — Start: | End: Same | Direction to Emiss. Pt. (Degrees) — Start: | End: Same

Vertical Angle to Obs. Pt. — Start: | End: Same | Direction to Obs. Pt. (Degrees) — Start: | End: Same
Distance and Direction to Observation Point from Emission Point — Start: | End: Same

Describe Emissions — Start: | End: Same
Emission Color — Start: | End: Same | Water Droplet Plume — Attached ☐ Detached ☐ None ☒

Describe Plume Background — Start: | End:
Background Color — Start: | End: Same | Sky Conditions — Start: | End: Same
Wind Speed — Start: | End: Same | Wind Direction — Start: | End: Same
Ambient Temp. — Start: | End: 28°F | Wet Bulb Temp. | RH Percent

Source Layout Sketch — Draw North Arrow ☐TN ☐MN



Longitude | Latitude | Declination

Additional Information:

Observation Date	Time Zone	Start Time	End Time
10/19/96	CST	cont'd	0858

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

Observer's Name (Print): Sheryl Bergeron
Observer's Signature: Sheryl Bergeron | Date: 3/19/96
Organization: Interpoll Labs
Certified By: ETA | Date: 10/4/95

VEOF1.1

EPA

VISIBLE EMISSION OBSERVATION FORM 1

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

Company Name: Louisiana Pacific
Facility Name:
Street Address:
City: Hayward | State: WI | Zip:

Process: Line 2 Dryer RTO Stack | Unit #: | Operating Mode:
Control Equipment: | Operating Mode:

Describe Emission Point: S+W most round stack

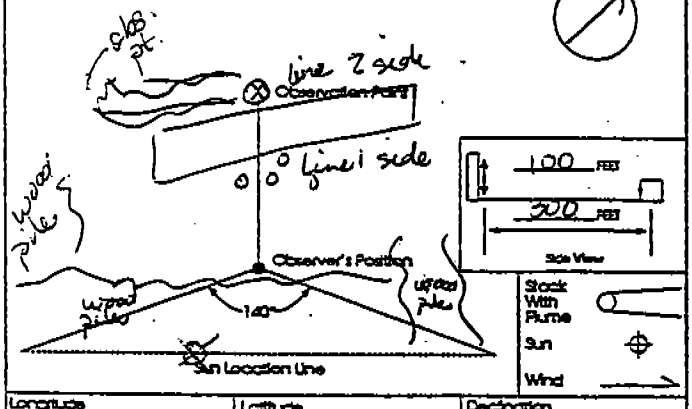
Height of Emiss. Pt. Start ~100' End ✓ | Height of Emiss. Pt. Rel. to Observer Start ~100' End ✓
Distance to Emiss. Pt. Start ~300' End ✓ | Direction to Emiss. Pt. (Degrees) Start 320° End ✓

Vertical Angle to Obs. Pt. Start <18° End ✓ | Direction to Obs. Pt. (Degrees) Start 300° End ✓
Distance and Direction to Observation Point from Emission Point: Start ~60° W of E.P. (~300' downwind) End ✓

Describe Emissions: Start looping steam plume End ✓
Emission Color: Start NONE/NA End ✓ | Water Droplet Plume: Attached ☒ Detached ☐ None ☐

Describe Plume Background: Start Sky End ✓
Background Color: Start blue/gray End ✓ | Sky Conditions: Start ptly cloudy End
Wind Speed: Start 8-15 mph End ✓ | Wind Direction: Start E/N End ✓
Ambient Temp. Start 30°F End ✓ | Wet Bulb Temp. * | RH Percent *
* too cold for sling psychrometer

Source Layout Sketch — Draw North Arrow ☐TN ☐MN



Longitude | Latitude | Declination

Additional Information:

VEOF1.1

Form Number: | Page: Of:
Continued on VEO Form Number:

Observation Date	Time Zone	Start Time	End Time
3/19/96	CST	1030	Cont'd

Min \ Sec	0	15	30	45	Comments
1	0	0	0	0	Used 2nd field position considering other plumes, direction of wind, sun position, & distance needed f/ E. point.
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print): Sheryl Bergeron
Observer's Signature: Sheryl Bergeron | Date: 3/19/96
Organization: Intertek Labs
Certified By: EPA | Date: 10/4/96

EPA

VISIBLE EMISSION OBSERVATION FORM 1

Form Number | Page | Of

Continued on VEO Form Number

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

Company Name: Louisiana Pacific

Facility Name:

Street Address:

City | State | Zip

Process: Line 2 Dryer RTO Stack | Unit # | Operating Mode

Control Equipment | Operating Mode

Describe Emission Point: Same

Height of Emiss. Pt.: Start ~100' End Same

Height of Emiss. Pt. Rel. to Observer: Start ~100' End Same

Distance to Emiss. Pt.: Start ~300' End Same

Direction to Emiss. Pt. (Degrees): Start 335° End Same

Vertical Angle to Obs. Pt.: Start < 18° End Same

Direction to Obs. Pt. (Degrees): Start 300° End Same

Distance and Direction to Observation Point from Emission Point: Start ~35° W + 308' End Same

Describe Emissions: Start Looping End Same

Emission Color: Start NA End NA

Water Droplet Plume: Attached ☒ Detached ☐ None ☐

Describe Plume Background: Start | End Same

Background Color: Start | End Same

Sky Conditions: Start | End Same

Wind Speed: Start | End Same

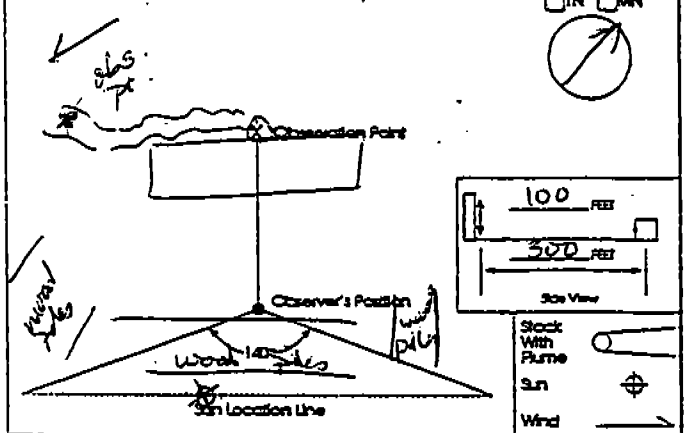
Wind Direction: Start | End Same

Ambient Temp.: Start | End 30°F

Wet Bulb Temp. | RH Percent

Source Layout Sketch

Draw North Arrow ☐TN ☐MN



Longitude | Latitude | Declination

Additional Information

Observation Date	Time Zone	Start Time	End Time
3/19/96	CST	cont'd	1130

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

Observer's Name (Print): Sherri Bergeron

Observer's Signature: Sherri Bergeron | Date 3/19/96

Organization: Intertoli Labs

Certified By: ETA | Date 10/4/95

VEOF1.1

EPA

VISIBLE EMISSION OBSERVATION FORM 1

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

Company Name: Louisiana-Pacific
Facility Name:
Street Address:
City: Hayward | State: WI | Zip:

Process: Line 2 Press Vent RTO Stack | Unit #: | Operating Mode:
Control Equipment: | Operating Mode:

Describe Emission Point: NE most round stack
Height of Emiss. Pt. Start: End: | Height of Emiss. Pt. Rel. to Observer Start: End:
Distance to Emiss. Pt. Start: End: | Direction to Emiss. Pt. (Degrees) Start: 293° End:

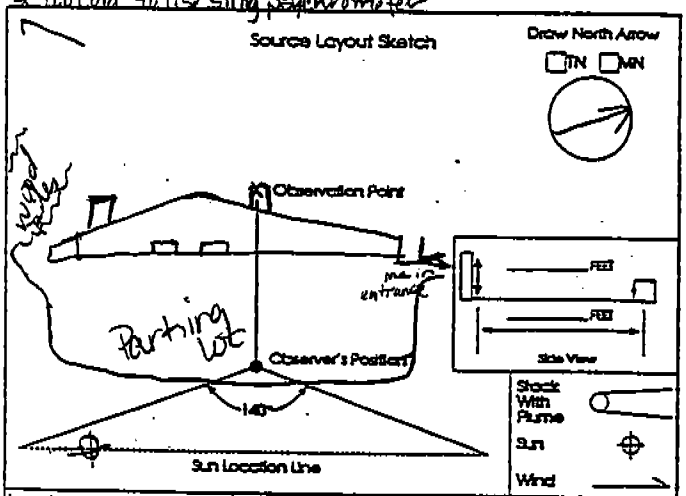
Vertical Angle to Obs. Pt. Start: < 18° End: | Direction to Obs. Pt. (Degrees) Start: SSW ↑ End:
Distance and Direction to Observation Point from Emission Point Start: NA End:

Describe Emissions Start: NONE End:
Emission Color Start: NA End: | Water Droplet Plume: Attached ☐ Detached ☐ None ☑

Describe Plume Background Start: sky End:
Background Color Start: blue End: | Sky Conditions Start: clear End:
Wind Speed Start: 10-20 mph End: | Wind Direction Start: E/NNE End:
Ambient Temp. Start: 18° F End: | Wet Bulb Temp.: * | RH Percent: *

* too cold to use sling psychrometer

Source Layout Sketch — Draw North Arrow ☐TN ☐MN



Longitude: | Latitude: | Declination:

Additional Information:

VEOF1.1

Form Number: | Page: of
Continued on VEO Form Number:

Observation Date: 3/20/96 | Time Zone: CST | Start Time: 1014 | End Time: Cont'd

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

Observer's Name (Print): Sheryl Bergeron
Observer's Signature: Sheryl Bergeron | Date: 3/20/96
Organization: Interpoll Labs
Certified by: ETA | Date: 10/4/95

EPA

VISIBLE EMISSION OBSERVATION FORM 1

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

Company Name: Louisiana - Pacific
Facility Name:
Street Address:
City: Hayward | State: WI | Zip:

Process: Line 2 Pressi Vent RTO Stack | Unit #: | Operating Mode:
Control Equipment: | Operating Mode:

Describe Emission Point: same

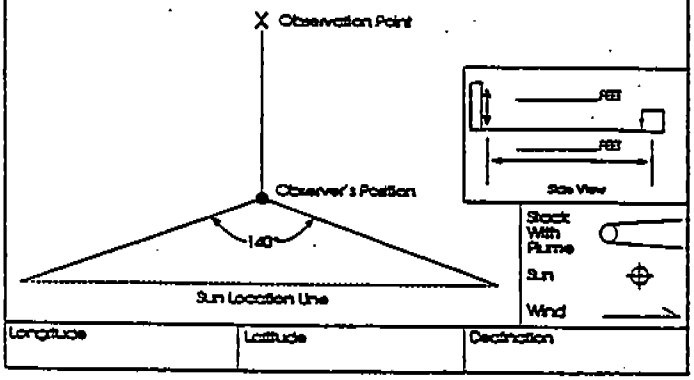
Height of Emiss. Pt. — Start: | End: same
Height of Emiss. Pt. Rel. to Observer — Start: | End: same
Distance to Emiss. Pt. — Start: | End: same
Direction to Emiss. Pt. (Degrees) — Start: | End: same

Vertical Angle to Obs. Pt. — Start: | End: same
Direction to Obs. Pt. (Degrees) — Start: | End: same
Distance and Direction to Observation Point from Emission Point — Start: | End: same

Describe Emissions — Start: none | End: none
Emission Color — Start: NA | End:
Water Droplet Plume — Attached ☐ Detached ☐ None ☒

Describe Plume Background — Start: sky | End: sky
Background Color — Start: blue | End: same
Sky Conditions — Start: clear | End: same
Wind Speed — Start: 20-30 mph | End: same
Wind Direction — Start: E/NNE | End: same
Ambient Temp. — Start: ✓ | End: 20°F
Wet Bulb Temp.:
RH Percent:

Source Layout Sketch — Draw North Arrow ☐TN ☐MN



Longitude | Latitude | Declination

Additional Information:

VEOF1.1

Form Number: | Page: of
Continued on VEO Form Number:

Observation Date: 3/20/96 | Time Zone: | Start Time: Continued | End Time: 1114

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

Observer's Name (Print): Sheryl Bergeron
Observer's Signature: Sheryl Bergeron | Date: 3/20/96
Organization: Interpoll Labs
Certified By: ETA | Date: 10/4/95

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Abraglia Bergeron

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

Thomas Lowe
President

250593
Certificate Number

Vice President
Location

David B. Savage, Jr.
Program Manager

October 4, 1995
Date of Issue

APPENDIX D

INTERPOLL LABORATORIES ANALYTICAL DATA

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: CP / HAYWARD
Team Leader: DVH
Date Submitted:
Test No.: 1
Date of Analysis:

Source: Line 2 Dryer RTO
Test Site: Stack
Date of Test: 3-19-92
No. of Runs Completed: 3
Technician: [illegible]

Test/ Run	Sample Log No. and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_0
1-1	1B1-12	1	0	4.2	20.0	4.2	15.8	
		2	0	4.2	20.0	4.2	15.8	
	☒B☐F	Avg				4.2	15.8	
1-2	13	1	0	4.0	20.1	4.0	16.1	
		2	0	4.0	20.1	4.0	16.1	
	☒B☐F	Avg				4.0	16.1	
1-3	14	1	0	4.3	20.1	4.3	15.8	
		2	0	4.3	20.1	4.3	15.8	
	☒B☐F	Avg				4.3	15.8	
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						

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

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

F = Flask (250 cc all glass)

B = Tedlar Bag (5 layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: LP HAYWARD
Team Leader: ~~[illegible]~~ DVH
Date Submitted: 3/19/96
Test No.: 2
Date of Analysis: 3-20-96

Source: LINE 2 DRYER RTO
Test Site: STACK
Date of Test: 3-19-96
No. of Runs Completed: 3
Technician: J BAIN VELLE

Test/ Run	Sample Log No. and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
2-1	7451	1	0	4.2	20.5	4.2	16.3	1.095
		2	0	4.2	20.5	4.2	~~16.3~~	1.095
	☐B☐F	Avg				4.2	16.3	
2-2	7451	1	0	4.1	20.6	4.1	16.5	1.073
		2	0	4.1	20.6	4.1	16.5	1.073
	☐B☐F	Avg				4.1	16.5	
2-3	7451	1	0	4.3	20.5	4.3	16.2	1.093
		2	0	4.3	20.5	4.3	16.2	1.093
	☐B☐F	Avg				4.3	16.2	
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						

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

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

F = Flask (250 cc all glass)

B = Tedlar Bag (5 layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: LP/HAYWARD / DUH
Team Leader:
Date Submitted:
Test No.: 3
Date of Analysis:

Source: LINE 2 Dryer RTO
Test Site: Stack
Date of Test: 3-20
No. of Runs Completed: 3
Technician: ET

Test/ Run	Sample Log No. and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_0
3-1	1451-38	1	0	4.3	20.0	4.3	15.7	
		2	0	4.3	20.0	4.3	15.7	
	☒B☐F	Avg				4.3	15.7	
3-2	39	1	0	4.3	20.1	4.3	15.8	
		2	0	4.3	20.1	4.3	15.8	
	☒B☐F	Avg				4.3	15.8	
3-3	40	1	0	4.2	20.1	4.2	15.9	
		2	0	4.2	20.1	4.2	15.9	
	☒B☐F	Avg				4.2	15.9	
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						

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

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

F = Flask (250 cc all glass)

B = Tedlar Bag (5 layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: LP/HAYWARD
Team Leader: SK
Date Submitted:
Test No.: 4
Date of Analysis:

Source: Line 2 DRYER RTO
Test Site: STACK
Date of Test: 3-20-96
No. of Runs Completed: 3
Technician: ET

Test/ Run	Sample Log No. and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
4-1	7451-46	1	0	4.0	20.1	4.0	16.1	
		2	0	4.0	20.1	4.0	16.1	
	☒B☐F	Avg				4.0	16.1	
4-2	47	1	0	4.1	20.1	4.1	16.0	
		2	0	4.1	20.1	4.1	16.0	
	☒B☐F	Avg				4.1	16.0	
4-3	48	1	0	4.2	20.1	4.2	15.9	
		2	0	4.2	20.1	4.2	15.9	
	☒B☐F	Avg				4.2	15.9	
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						

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

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

F = Flask (250 cc all glass)

B = Tedlar Bag (5 layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: LP/HAYWARD
Team Leader: SF ET
Date Submitted:
Test No.: 8
Date of Analysis:

Source: LINE 2 SURFACE DRYER
Test Site: DUCT
Date of Test: 3-19, 20-96
No. of Runs Completed: 3
Technician: ET

Test/ Run	Sample Log No. and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
8-1	7451-30	1	0	5.5	20.2	5.5	14.7	
		2	0	5.5	20.2	5.5	14.7	
	☐B☐F	Avg				5.5	14.7	
8-2	7451-31	1	0	5.1	20.2	5.1	15.1	
		2	0	5.1	20.2	5.1	15.1	
	☐B☐F	Avg				5.1	15.1	
8-3	7451-33	1	0	5.0	20.2	5.0	15.2	
		2	0	5.0	20.2	5.0	15.2	
	☐B☐F	Avg				5.0	15.2	
		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						
		1						
		2						
	☐B☐F	Avg						

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

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

F – Flask (250 cc all glass)

B – Tedlar Bag (5 layer)

EPA Method 3 Guidelines

Fuel Type	FO Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: LP/HAYWARD SF
Team Leader:
Date Submitted:
Test No.: 9
Date of Analysis:

Source: Prim Vent
Test Site: Stack
Date of Test: 3-19-96
No. of Runs Completed: 3
Technician: ET

Test/ Run	Sample Log No. and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
9-1	745/-70	1	0	.4	20.6	.4	20.2	
		2	0	.4	20.6	.4	20.2	
	☒B☐F	Avg				.4	20.2	
9-2	-71	1	0	.4	20.6	.4	20.2	
		2	0	.4	20.6	.4	20.2	
	☒B☐F	Avg				.4	20.2	
9-3	-72	1	0	.4	20.6	.4	20.2	
		2	0	.4	20.6	.4	20.2	
	☒B☐F	Avg				.4	20.2	
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						

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

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

F = Flask (250 cc all glass)

B = Tedlar Bag (5 layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: LP/HAYWARD
Team Leader: SE
Date Submitted:
Test No.: 10
Date of Analysis:

Source: LINER PRESS VENT RTO
Test Site: STACK
Date of Test: 3-19-96
No. of Runs Completed: 3
Technician: PT

Test/ Run	Sample Log No. and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_0
10-1	7451-77	1	0	.4	20.6	.4	20.2	
		2	0	.4	20.6	.4	20.2	
	☒B☐F	Avg				.4	20.2	
10-2	78	1	0	.4	20.6	.4	20.2	
		2	0	.4	20.6	.4	20.2	
	☒B☐F	Avg				.4	20.2	
10-3	79	1	0	.4	20.6	.4	20.2	
		2	0	.4	20.6	.4	20.2	
	☒B☐F	Avg				.4	20.2	
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						

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

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

F = Flask (250 cc all glass)

B = Tedlar Bag (5 layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: LP/HAYWARD
Team Leader: BA
Date Submitted:
Test No.: 14
Date of Analysis:

Source: LINE 2 KILN 3
Test Site: STACK
Date of Test:
No. of Runs Completed: 3
Technician: ET

Test/ Run	Sample Log No. and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
14-1	1451	1	0	6.4	20.0	6.4	13.6	
		2	0	6.4	20.0	6.4	13.6	
	☒B☐F	Avg				6.4	13.6	
14-2	1451	1	0	7.4	19.9	7.4	12.5	
		2	0	7.4	19.9	7.4	12.5	
	☒B☐F	Avg				7.4	12.5	
14-3	1451	1	0	8.3	19.4	8.3	11.6	
		2	0	8.3	19.9	8.3	11.6	
	☒B☐F	Avg				8.3	11.6	
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						

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

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

F = Flask (250 cc all glass)

B = Tedlar Bag (5 layer)

EPA Method 3 Guidelines

Fuel Type	Fo Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

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EPA Method 3 Data Reporting Sheet - Orsat Analysis

Job: LP/HA/WARD
Team Leader: EJ
Date Submitted:
Test No.: 17
Date of Analysis:

Source: Unit 2 Duct RTO
Test Site: Outlet
Date of Test: 3-13-96
No. of Runs Completed: 3
Technician: ET

Test/ Run	Sample Log No. and Type	No. of An.	Buret Readings (ml) Zero Pt.	After CO_2	After O_2	Conc. CO_2 %v/v Dry	Conc. O_2 %v/v Dry	F_o
17-1	2457-05	1	0	4.2	20.1	4.2	15.9	
		2	0	4.2	20.1	4.2	15.9	
	☒B☐F	Avg				4.2	15.9	
17-2	06	1	0	4.0	20.2	4.0	16.2	
		2	0	4.0	20.2	4.0	16.2	
	☒B☐F	Avg				4.0	16.2	
17-3	07	1	0	4.2	20.1	4.2	15.9	
		2	0	4.2	20.1	4.2	15.9	
	☒B☐F	Avg				4.2	15.9	
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						
		1						
		2						
	☐B☐F	Avg						

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

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

F = Flask (250 cc all glass)

B = Tedlar Bag (5 layer)

EPA Method 3 Guidelines

Fuel Type	F0 Range
Coal:	
Anthracite/Lignite	1.016-1.130
Bituminous	1.083-1.230
Oil:	
Distillate	1.260-1.413
Residual	1.210-1.370
Gas:	
Natural	1.600-1.836
Propane	1.434-1.586
Butane	1.405-1.553
Wood/Wood Bark	1.000-1.130

(612) 786-6020

EPA Method 10 NDIR Analysis

Job Name: 4P/HAWARD
Source: UNIT 2 Boiler Stack
Date of Analysis:
Technician: ET

NDIR Analyzer: ☒ Fugi ACS Model 3300
☐ Mon. Lab Model 8310
☐ Dasibi Model 3003
Range: 0 - 500 PPM
Flow rate: 1000 cc/min

Pretest Calibration				
	Concentration	Reading	Vendor	Cyl. No.
Zero Gas	0 PPM	0 PPM		
Upscale Gas	299 PPM	300 PPM		SG 150230
Upscale Gas	PPM	PPM		
Upscale Gas	PPM	PPM		

Sample Description Test/Run	Sample Log No.	CO Conc. (PPM, Dry)		
		Dilution Factor	Reading	Actual PPM
1-1	1451-12		258	258
2	13		198	198
3	14		203	203

Post-Test Calibration		
	Conc.	Reading
Zero Gas	0 PPM	0 PPM
Upscale Gas	299 PPM	300 PPM
Upscale Gas	PPM	PPM
Upscale Gas	PPM	PPM

Note 1: If sample dilution is required, the sample is diluted with CO-free gas prior to analysis.
Note 2: The Fugi ACS model 3300 has a rejection ratio for CO to CO_2 greater then 100,000: 1 and the Mon. Labs Model 8310 and Dasibi Model 3003 have rejection ratios greater then 200,000: 1 and thus CO_2 removal prior to analysis is not required.
Note 3: The analyzer must be zeroed and spanned immediately before and after sample analysis. Additional checks may be performed between sample analyses if required.

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EPA Method 10 NDIR Analysis

LP - Haywood
LINE 2 SURFACE DRYER
4-10-96
SJD

NDIR Analyzer: ☒ Fugi ACS Model 3300
☐ Mon. Lab Model 8310
☐ Dasibi Model 3003

Range: 0 - 1000 PPM
Flow rate: Low cc/min

alysis

	Pretest Calibration			
	Concentration	Reading	Vendor	Cyl. No.
Gas	0 PPM	0 PPM	TG	CC23572
cale Gas	300 PPM	300 PPM	TG	SG028T2
cale Gas	600 PPM	600 PPM	TG	HA39K
scale Gas	PPM	PPM		

Sample Description Test/Run	Sample Log No.	CO Conc. (PPM, Dry) Dilution Factor	Reading	Actual PPM
8-1	7451-30	8.82	264	2328
8-2	-31	8.82	227	2002
8-3	-32	8.82	180	1588

	Post-Test Calibration Conc.	Reading
	0 PPM	0 PPM
Zero Gas	300 PPM	301 PPM
Upscale Gas	600 PPM	607 PPM
Upscale Gas	PPM	PPM
Upscale Gas		

Note 1: If sample dilution is required, the sample is diluted with CO-free gas prior to analysis.
Note 2: The Fugi ACS model 3300 has a rejection ratio for CO to CO_2 greater then 100,000: 1 and the Mon. Labs Model 8310 and Dasibi Model 3003 have rejection ratios greater then 200,000: 1 and thus CO_2 removal prior to analysis is not required.
Note 3: The analyzer must be zeroed and spanned immediately before and after sample analysis. Additional checks may be performed between sample analyses if required.

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

EPA Method 10 NDIR Analysis

Job Name: LP/HAYWARD
Source: Line 2 Pressure RO Stack
Date of Analysis:
Technician: ET

NDIR Analyzer: ☒ Fugi ACS Model 3300
☐ Mon. Lab Model 8310
☐ Dasibi Model 3003
Range: 0 - 500 PPM
Flow rate: _____ cc/min

	Concentration	Pretest Calibration Reading	Vendor	Cyl. No.
Zero Gas	0 PPM	0 PPM		
Upscale Gas	150 PPM	150 PPM		SG9165035
Upscale Gas	PPM	PPM		
	PPM	PPM		

Sample Description Test/Run	Sample Log No.	Dilution Factor	CO Conc. (PPM, Dry) Reading	Actual PPM
10-1	7451-77		22	22
2	78		23	23
3	79		23	23

	Post-Test Calibration Conc.	Reading
Zero Gas	0 PPM	0 PPM
Upscale Gas	150 PPM	150 PPM
Upscale Gas	PPM	PPM
	PPM	PPM

Note 1: If sample dilution is required, the sample is diluted with CO-free gas prior to analysis.
Note 2: The Fugi ACS model 3300 has a rejection ratio for CO to CO_2 greater then 200,000: 1 and the Mon. Labs Model 8310 and Dasibi Model 3003 have rejection ratios greater then 100,000: 1 and thus CO_2 removal prior to analysis is not required.
Note 3: The analyzer must be zeroed and spanned immediately before and after sample analysis. Additional checks may be performed between sample analyses if required.

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Impinger Catch Data Reporting Sheet

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

Job: LP / Hayward
Date Submitted: 3-21-96
Date of Analysis: 3-25-96
Source/Site: Line 2 Dryer RTO / Stack
Test No.: 1
Technician: MPL/B.O.

	Solvent Phase	Aqueous Phase
Test: 1 Run: 0	Dish No: 748	Dish No: 105
Log No: 7451-08I	Dish + Sample Wt: 45.3864 g	Dish + Sample Wt: 38.1286 g
Color & Appearance:	Dish Tare Wt: 45.3864 g	Dish Tare Wt: 38.1285 g
	Fraction Wt: 0.0000 g	Fraction Wt: 0.0001 g
Comments:	Smpl Vol: 200 ml, Alqt: 200 ml, Factor: 1.000	Smpl Vol: 200 ml, Alqt: 100 ml, Factor: 2.000
	Sample Wt: 0.0000 g	Sample Wt: 0.0002 g
Test: 1 Run: 1	Dish No: 757	Dish No: 161
Log No: -09I	Dish + Sample Wt: 50.8084 g	Dish + Sample Wt: 49.1374 g
Color & Appearance:	Dish Tare Wt: 50.8069 g	Dish Tare Wt: 49.1357 g
	Fraction Wt: 0.0015 g	Fraction Wt: 0.0017 g
Comments:	Smpl Vol: 500 ml, Alqt: 500 ml, Factor 1.000	Smpl Vol: 500 ml, Alqt: 100 ml, Factor 5.000
	Sample Wt: 0.0015 g	Sample Wt: 0.0085 g
Test: 1 Run: 2	Dish No: 758	Dish No: 200
Log No: -10I	Dish + Sample Wt: 44.9320 g	Dish + Sample Wt: 44.9398 g
Color & Appearance:	Dish Tare Wt: 44.9288 g	Dish Tare Wt: 44.9390 g
	Fraction Wt: 0.0032 g	Fraction Wt: 0.0008 g
Comments:	Smpl Vol: 510 ml, Alqt: 510 ml, Factor 1.000	Smpl Vol: 510 ml, Alqt: 100 ml, Factor 5.100
	Sample Wt: 0.0032 g	Sample Wt: 0.0041 g
Test: 1 Run: 3	Dish No: 761	Dish No: 208
Log No: -11I	Dish + Sample Wt: 45.0252 g	Dish + Sample Wt: 52.7982 g
Color & Appearance:	Dish Tare Wt: 45.0217 g	Dish Tare Wt: 52.7972 g
	Fraction Wt: 0.0035 g	Fraction Wt: 0.0010 g
Comments:	Smpl Vol: 510 ml, Alqt: 510 ml, Factor 1.000	Smpl Vol: 510 ml, Alqt: 100 ml, Factor 5.100
	Sample Wt: 0.0035 g	Sample Wt: 0.0051 g

Note: Factor = Sample Volume/Aliquot Volume

Blank Solvent Wt. 0.0000 g

	RUN 0	RUN 1	RUN 2	RUN 3
Results of Solvent Phase g	0.0000	0.0015	0.0032	0.0035
Results of Aqueous Phase D-13g	0.0002	0.0083	0.0039	0.0049

INTERPOLL LABORATORIES, INC.
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Solvent Rinse Data Reporting Sheet

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

Job: LP/HAYWARD
Date Submitted:
Date of Analysis: 4-4-96
Source/Site: LINE 1 RTO DRYER STACK
Test No.: 1
Technician: SCH

Transport Leakage☐ None☒ _____ ml
Solvent: _____

Test: 1	Run: 0	Dish No: 859	
Log No: 7451-08P		Dish + Sample Wt: 45.0579	g
Volume of Solvent	210 ml	Dish Tare Wt: 45.0574	g
*Solvent Residue	ug/ml	Sample Wt: .0005	g
Test: 1	Run: 1	Dish No: 784	
Vol. of Solvent	140 ml	Dish + Sample Wt: 45.4013	g
Log Number -09P		Dish Tare Wt: 45.3992	g
Comments		Sample Wt: .0021	g
Test: 1	Run: 2	Dish No: 18	
Vol. of Solvent	120 ml	Dish + Sample Wt: 80.8345	g
Log Number -10P		Dish Tare Wt: 80.8184	g
Comments		Sample Wt: .0161	g
Test: 1	Run: 3	Dish No: 87	
Vol. of Solvent	100 ml	Dish + Sample Wt: 73.3607	g
Log Number -11P		Dish Tare Wt: 73.3595	g
Comments		Sample Wt: .0012	g

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

	log	RUN 0	RUN 1	RUN 2	RUN 3
Results of Solvent Rinse	D-14 g	.0005	.0018	.0158	.0010

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Filter Gravimetrics Reporting Sheet

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

Job: L2 / Hayward
Date Submitted:
Date of Analysis: 4-4-96
Source/Site: Line 2 Dryer RTO Stack
Test No.: 1
Technician: SLB

Test: 1 Run: 0	Filter No: 8457
Field Blank:	Filter Type: 4" G.F.
Log No: 7451-08F	Filter + Sample Wt: .9477 g
Color: WHITE	Filter Tare Wt: .9472 g
	Sample Wt: .0000 g
Test: 1 Run: 1	Filter No: 8344
Log No: -09F	Filter Type: 4" G.F.
Color: TAN LIGHT	Filter + Sample Wt: .9675 g
	Filter Tare Wt: .9648 SLB g
	Sample Wt: ~~.0007~~ .0027 g
Test: 1 Run: 2	Filter No: 8419
Log No: -10F	Filter Type: 4" G.F.
Color: LIGHT TAN	Filter + Sample Wt: .9583 g
	Filter Tare Wt: .9520 g
	Sample Wt: .0063 g
Test: 1 Run: 3	Filter No: 8418
Log No: -11F	Filter Type: 4" G.F.
Color: LIGHT TAN	Filter + Sample Wt: 0.9690 g
	Filter Tare Wt: .9611 g
	Sample Wt: .0079 g

Results of Filter Analysis g	RUN 0	RUN 1	RUN 2	RUN 3
	.0000	.0027 SLB ~~.0007~~	.0063	.0079

Total Mass g	RUN	RUN	RUN	RUN
		.0143	.0292	.0173

INTERPOLL LABORATORIES, INC.
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Impinger Catch Data Reporting Sheet

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

Job: LP/Hayward | Source/Site: Line 2 Press Vent RTO/Stack

Date Submitted: 3-22-96 | Test No.: 10

Date of Analysis: 3-27-96 | Technician: B.D.

	Solvent Phase	Aqueous Phase
Test: 10 Run: 0	Dish No: 4	Dish No: 324
Log No: 7451-73I	Dish + Sample Wt: 47.3788 g	Dish + Sample Wt: 46.2164 g
Color & Appearance:	Dish Tare Wt: 47.3788 g	Dish Tare Wt: 46.2163 g
	Fraction Wt: 0.0000 g	Fraction Wt: 0.0001 g
Comments:	Smpl Vol: 200 ml, Alqt: 200 ml, Factor: 1.000	Smpl Vol: 200 ml, Alqt: 100 ml, Factor: 2.000
	Sample Wt: 0.0000 g	Sample Wt: 0.0002 g
Test: 10 Run: 1	Dish No: 5	Dish No: 326
Log No: -74I	Dish + Sample Wt: 39.2384 g	Dish + Sample Wt: 43.4738 g
Color & Appearance:	Dish Tare Wt: 39.2357 g	Dish Tare Wt: 43.4733 g
	Fraction Wt: 0.0027 g	Fraction Wt: 0.0005 g
Comments:	Smpl Vol: 200 ml, Alqt: 200 ml, Factor 1.000	Smpl Vol: 200 ml, Alqt: 100 ml, Factor 2.000
	Sample Wt: 0.0027 g	Sample Wt: 0.0010 g
Test: 10 Run: 2	Dish No: 6	Dish No: 328
Log No: -75I	Dish + Sample Wt: 48.2724 g	Dish + Sample Wt: 41.9676 g
Color & Appearance:	Dish Tare Wt: 48.2710 g	Dish Tare Wt: 41.9672 g
	Fraction Wt: 0.0014 g	Fraction Wt: 0.0004 g
Comments:	Smpl Vol: 200 ml, Alqt: 200 ml, Factor 1.000	Smpl Vol: 200 ml, Alqt: 100 ml, Factor 2.000
	Sample Wt: 0.0014 g	Sample Wt: 0.0008 g
Test: 10 Run: 3	Dish No: 14	Dish No: 340
Log No: -76I	Dish + Sample Wt: 37.7620 g	Dish + Sample Wt: 47.9166 g
Color & Appearance:	Dish Tare Wt: 37.7613 g	Dish Tare Wt: 47.9162 g
	Fraction Wt: 0.0007 g	Fraction Wt: 0.0004 g
Comments:	Smpl Vol: 200 ml, Alqt: 200 ml, Factor 1.000	Smpl Vol: 200 ml, Alqt: 100 ml, Factor 2.000
	Sample Wt: 0.0007 g	Sample Wt: 0.0008 g

Note: Factor = Sample Volume/Aliquot Volume

Blank Solvent Wt. 0.0000 g

VOC

	RUN 0	RUN 1	RUN 2	RUN 3
Results of Solvent Phase g	0.0000	0.0027	0.0014	0.0007
Results of Aqueous Phase g	0.0002	0.0008	0.0006	0.0006

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INTERPOLL LABORATORIES, INC.
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Solvent Rinse Data Reporting Sheet

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

Job: LP / HAYWARD
Date Submitted:
Date of Analysis: 4-4-96
Source/Site: LINE 2 Press Vent (RTO) STACK
Test No.: 10
Technician: SLB

Transport Leakage ☐ None ☒ _____ ml
Solvent: _____

Test: 10 Run: 0	Dish No: 5
Log No: 74151-73P	Dish + Sample Wt: 37.9447 g
Volume of Solvent 70 ml	Dish Tare Wt: 37.9445 g
*Solvent Residue ug/ml	Sample Wt: .0002 g
Test: 10 Run: 1	Dish No: 61
Vol. of Solvent 60 ml	Dish + Sample Wt: 35.9965 g
Log Number -74P	Dish Tare Wt: 35.9881 g
Comments	Sample Wt: .0084 g
Test: 10 Run: 2	Dish No: 63
Vol. of Solvent 90 ml	Dish + Sample Wt: 50.4275 g
Log Number -75P	Dish Tare Wt: 50.4267 g
Comments	Sample Wt: .0008 g
Test: 10 Run: 3	Dish No: 837
Vol. of Solvent 90ml	Dish + Sample Wt: 35.4936 g
Log Number -76P	Dish Tare Wt: 35.4909 g
Comments	Sample Wt: .0027 g

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

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

	Vol	RUN 0	RUN 1	RUN 1	RUN 3
Results of Solvent Rinse	D-17g	.0002	.0082	.0005	.0024

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Filter Gravimetrics Reporting Sheet

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

Job: C. P. Hayward
Date Submitted:
Date of Analysis: 4-2-96
Source/Site: Line 2 Press Vent (RTO) Sta
Test No.: 10
Technician: EJ

Test: 10	Run: 0	Filter No:	8474
Field Blank:		Filter Type:	6F
Log No:	7451 - 73F	Filter + Sample Wt:	.9934 g
Color:	white	Filter Tare Wt:	.9932 g
		Sample Wt:	.0002 g
Test: 10	Run: 1	Filter No:	8330
Log No:	7451 - 74F	Filter Type:	6F
Color:	Light yellow	Filter + Sample Wt:	.9368 g
		Filter Tare Wt:	.9363 g
		Sample Wt:	.0005 g
Test: 10	Run: 2	Filter No:	8331
Log No:	7451 - 75F	Filter Type:	6F
Color:	Light yellow	Filter + Sample Wt:	.9345 g
		Filter Tare Wt:	.9342 g
		Sample Wt:	.0003 g
Test: 10	Run: 3	Filter No:	8473
Log No:	7451 - 76F	Filter Type:	6F
Color:	Light yellow	Filter + Sample Wt:	1.0012 g
		Filter Tare Wt:	1.0009 g
		Sample Wt:	.0003 g

Results of Filter Analysis	g	RUN 0	RUN 1	RUN 2	RUN 3
		.0002	.0005	.0003	.0003

Total Mass	g	RUN	RUN	RUN	RUN
			.0122	.0028	.0040

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Impinger Catch Data Reporting Sheet

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

Job: LP/Hayward
Date Submitted: 3-21-96
Date of Analysis: 3-25-96
Source/Site: Line 2 Konus / Stack
Test No.: 14
Technician: MRP/B.D.

	Solvent Phase	Aqueous Phase
Test: 14 Run: 0	Dish No: 502	Dish No: 851
Log No: 7451-22I	Dish + Sample Wt: 46.9008 g	Dish + Sample Wt: 42.3778 g
Color & Appearance:	Dish Tare Wt: 46.9008 g	Dish Tare Wt: 42.3777 g
	Fraction Wt: 0.0000 g	Fraction Wt: 0.0001 g
Comments:	Smpl Vol: 200 ml, Alqt: 200 ml, Factor: 1.000	Smpl Vol: 200 ml, Alqt: 100 ml, Factor: 2.000
	Sample Wt: 0.0000 g	Sample Wt: 0.0002 g
Test: 14 Run: 1	Dish No: 503	Dish No: 852
Log No: -23I	Dish + Sample Wt: 48.3159 g	Dish + Sample Wt: 47.4068 g
Color & Appearance:	Dish Tare Wt: 48.3121 g	Dish Tare Wt: 47.4060 g
	Fraction Wt: 0.0038 g	Fraction Wt: 0.0008 g
Comments:	Smpl Vol: 275 ml, Alqt: 275 ml, Factor 1.000	Smpl Vol: 275 ml, Alqt: 100 ml, Factor 2.750
	Sample Wt: 0.0038 g	Sample Wt: 0.0022 g
Test: 14 Run: 2	Dish No: 509	Dish No: 853
Log No: -24I	Dish + Sample Wt: 47.6221 g	Dish + Sample Wt: 47.4036 g
Color & Appearance:	Dish Tare Wt: 47.6208 g	Dish Tare Wt: 47.3993 g
	Fraction Wt: 0.0013 g	Fraction Wt: 0.0043 g
Comments:	Smpl Vol: 300 ml, Alqt: 300 ml, Factor 1.000	Smpl Vol: 300 ml, Alqt: 100 ml, Factor 3.000
	Sample Wt: 0.0013 g	Sample Wt: ~~0.00~~ 0.0129 g
Test: 14 Run: 3	Dish No: 518	Dish No: 854
Log No: -25I	Dish + Sample Wt: 48.1029 g	Dish + Sample Wt: 45.0514 g
Color & Appearance:	Dish Tare Wt: 48.1024 g	Dish Tare Wt: 45.0507 g
	Fraction Wt: 0.0005 g	Fraction Wt: 0.0007 g
Comments:	Smpl Vol: 300 ml, Alqt: 300 ml, Factor 1.000	Smpl Vol: 300 ml, Alqt: 100 ml, Factor 3.000
	Sample Wt: 0.0005 g	Sample Wt: 0.0021 g

Note: Factor = Sample Volume/Aliquot Volume

Blank Solvent Wt. 0.0000 g

	RUN 0	RUN 1	RUN 2	RUN 3
Results of Solvent Phase g	0.0000	0.0038	0.0013	0.0005
Results of Aqueous Phase D-19g	0.0002	0.0020	0.0127	0.0019

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Solvent Rinse Data Reporting Sheet

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

Job: LP HAYWARD
Source/Site: LINE 2 KONUS STACK
Date Submitted:
Test No.: 14
Date of Analysis: 4-4-96
Technician: SB

Transport Leakage ☐ None ☒ _____ ml
Solvent:

Test: 14	Run: 0	Dish No: 769	
Log No: 7451-22P		Dish + Sample Wt: 45.1919	g
Volume of Solvent	160 ml	Dish Tare Wt: 45.1912	g
*Solvent Residue	ug/ml	Sample Wt: .0007	g
Test: 14	Run: 1	Dish No: 33	
Vol. of Solvent	120 ml	Dish + Sample Wt: 47.9595	g
Log Number -23P		Dish Tare Wt: 47.9421	g
Comments		Sample Wt: .0174	g
Test: 14	Run: 2	Dish No: 35	
Vol. of Solvent	90 ml	Dish + Sample Wt: 51.1196	g
Log Number -24P		Dish Tare Wt: 51.0937	g
Comments		Sample Wt: .0259	g
Test: 14	Run: 3	Dish No: 855	
Vol. of Solvent	95ml	Dish + Sample Wt: 44.2763	g
Log Number -25P		Dish Tare Wt: 44.2655	g
Comments		Sample Wt: .0108	g

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

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

√SW

	RUN 0	RUN 1	RUN 2	RUN 3
Results of Solvent Rinse g	.0007	.0169	.0255	.0104

INTERPOL

Filter Gravi

Fiter Type: ☒ EPA Method 5 ☐ EPA M

Job: LP/HAMWARD

Date Submitted:

Date of Analysis: 4-4-96

Test:	14
Field Blank:	
Log No:	7451-22F
Color:	WHITE

Test:	14
Log No:	-23F
Color:	TAN

Test:	14
Log No:	-24F
Color:	LIGHT GREY

Test:	14
Log No:	-25F
Color:	GREY

VOV

Results of Filter Analysis	g

Total Mass	g

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Impinger Catch Data Reporting Sheet

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

Job: LP/Hayward — Source/Site: Line 2 Dryer RTO / Inlet
Date Submitted: 3-26-96 — Test No.: 17
Date of Analysis: 3-25-96 — Technician: MRL/B.D.

	Solvent Phase	Aqueous Phase
Test: 17 Run: 0	Dish No: 43	Dish No: 700
Log No: 7451-01I	Dish + Sample Wt: 47.3883 g	Dish + Sample Wt: 43.0549 g
Color & Appearance:	Dish Tare Wt: 47.3883 g	Dish Tare Wt: 43.0548 g
	Fraction Wt: 0.0000 g	Fraction Wt: 0.0001 g
Comments:	Smpl Vol: 200 ml, Alqt: 200 ml, Factor: 1.000	Smpl Vol: 200 ml, Alqt: 100 ml, Factor: 2.000
	Sample Wt: 0.0000 g	Sample Wt: 0.0002 g
Test: 17 Run: 1	Dish No: 41	Dish No: 702
Log No: -02I	Dish + Sample Wt: 45.3384 g	Dish + Sample Wt: 46.2270 g
Color & Appearance:	Dish Tare Wt: 45.3188 g	Dish Tare Wt: 46.2224 g
	Fraction Wt: 0.0196 g	Fraction Wt: ~~0.0146~~ 0.0046 g
Comments:	Smpl Vol: 410 ml, Alqt: 410 ml, Factor 1.000	Smpl Vol: 410 ml, Alqt: 100 ml, Factor 4.100
	Sample Wt: 0.0196 g	Sample Wt: 0.0189 g
Test: 17 Run: 2	Dish No: 32	Dish No: 850
Log No: -03I	Dish + Sample Wt: 57.8468 g	Dish + Sample Wt: 44.5683 g
Color & Appearance: light yellow tint	Dish Tare Wt: 57.8080 g	Dish Tare Wt: 44.5636 g
	Fraction Wt: 0.0388 g	Fraction Wt: 0.0047 g
Comments:	Smpl Vol: 450 ml, Alqt: 450 ml, Factor 1.000	Smpl Vol: 450 ml, Alqt: 100 ml, Factor 4.500
	Sample Wt: 0.0388 g	Sample Wt: 0.0212 g
Test: 17 Run: 3	Dish No: 45	Dish No: 867
Log No: -04I	Dish + Sample Wt: 48.1831 g	Dish + Sample Wt: 45.6129 g
Color & Appearance: light yellow tint, cloudy	Dish Tare Wt: 48.1516 g	Dish Tare Wt: 45.6042 g
	Fraction Wt: 0.0315 g	Fraction Wt: 0.0087 g
Comments:	Smpl Vol: 425 ml, Alqt: 425 ml, Factor 1.000	Smpl Vol: 425 ml, Alqt: 100 ml, Factor 4.250
	Sample Wt: 0.0315 g	Sample Wt: 0.0370 g

Note: Factor = Sample Volume/Aliquot Volume

Blank Solvent Wt. 0.0000 g

VSH

	RUN 0	RUN 1	RUN 2	RUN 3
Results of Solvent Phase g	0.0000	0.0196	0.0388	0.0315
Results of Aqueous Phase g	0.0002	D-~~02~~0187	0.0210	0.0368

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Solvent Rinse Data Reporting Sheet

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

Job	LP / HAYWARD	Source/Site	LINE 2 PAPER RTO INLET
Date Submitted		Test No.	17
Date of Analysis	4-4-96	Technician	SLB
Transport Leakage ☐	None ☒ ml	Solvent	

Test: 17	Run: 0	Dish No: 29	
Log No: 7451 - 01P		Dish + Sample Wt: 48.4995	g
Volume of Solvent	150 ml	Dish Tare Wt: 48.8894	g
*Solvent Residue	ug/ml	Sample Wt: .0001	g
Test: 17	Run: 1	Dish No: 764	
Vol. of Solvent	180 ml	Dish + Sample Wt: 46.3962	g
Log Number - 02P		Dish Tare Wt: 46.3791	g
Comments		Sample Wt: .0171	g
Test: 17	Run: 2	Dish No: 766	
Vol. of Solvent	165 ml	Dish + Sample Wt: 42.2570	g
Log Number -03P		Dish Tare Wt: 42.2413	g
Comments		Sample Wt: .0157	g
Test: 17	Run: 3	Dish No: 767	
Vol. of Solvent		Dish + Sample Wt: 42.4526	g
Log Number -04P	205 ml	Dish Tare Wt: 42.4092	g
Comments		Sample Wt: .0434	g

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

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

√SLB

	RUN 0	RUN 1	RUN 2	RUN 3
Results of Solvent Rinse D-23g	.0001	.0170	.0156	.0433

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Filter Gravimetrics Reporting Sheet

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

Job	L.P. Hayward	Source/Site	Line 2 Dryer RTO - Inlet
Date Submitted		Test No.	17
Date of Analysis	4-2-96	Technician	EJ

Test: 17	Run: 0	Filter No:	1080
Field Blank:		Filter Type:	6F
Log No: 7451 -01 F		Filter + Sample Wt:	.5450 g
Color: white		Filter Tare Wt:	.5447 g
		Sample Wt:	.0003 g
Test: 17	Run: 1	Filter No:	1082
Log No: 7451		Filter Type:	6F
Color: Brown		Filter + Sample Wt:	.5490 g
		Filter Tare Wt:	.5378 g
		Sample Wt:	.0112 g
Test: 17	Run: 2	Filter No:	1081
Log No: 7451 -03F		Filter Type:	6F
Color: Brown		Filter + Sample Wt:	.5461 g
		Filter Tare Wt:	.5455 g
		Sample Wt:	.0006 g
Test: 17	Run: 3	Filter No:	1083
Log No: 7451 -04 F		Filter Type:	6F
Color: Brown		Filter + Sample Wt:	.5544 g
		Filter Tare Wt:	.5465 g
		Sample Wt:	~~.0085~~ .0079 SL g

✓ SL

		RUN 0	RUN 1	RUN 2	RUN 3
Results of Filter Analysis	g	.0003	.0112	.0006	SL .0079 ~~.0085~~

		RUN	RUN	RUN	RUN
Total Mass	g		.0665	.0760	.1195

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Interpoll Laboratories
(612)786-6020

EPA Method 7A Recovery and Analysis Data Sheet (1)

**********SOURCE**********
Job L.P. Hayward
Source Dryer RTO/Inlet Unit 2
Date of Sampling 3-19-96
Test No(s) 17

**********RECOVERY**********
Date of Recovery 3-28-96
Recovered by E. Juers
Recovery volume 500 ml
Barometric at time 29.33 IN.HG.

**********ANALYTICAL**********
Date of Analysis 4/1/96
Analyst TAW
Eluent AS4A
Chromatograph: Dionex System 4000i

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$$C_{RS} = DF(C_{DS}) \qquad M_{NO_3} = (C_{RS} - \overline{C}_B)V_R \qquad \overline{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$$

where:

C_{RS} = concentration of nitrate in 500 ml recovered sample in ug/ml

DF = dilution factor

C_{DS} = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

M_{NO_3} = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

C_B = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

C_{B1}, C_{B2}, C_{B3} = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

V_R = recovery volume for samples and field blanks in ml

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Interpoll Laboratories
(612)786-6020

EPA Method 7A Recovery and Analysis Data Sheet (2)

	Sample Log ID No.	Flask No.	Test/ Run	Final Flask Conditions t_f (°F)	+	-	ΔP_g (IN.HG.)	Chrom Run No.	DF	Nitrate Concentration (ug/ml) Uncorr. for blank C_{RS}	Corr. for blank ($C_{RS} - C_B$)	Total nitrate in Sample (ug) ($M_{NO_3^-}$)
1	7451-85	19	17-1-A	64		-	.37		1	0.116	0.067	33.5
2	86	20	17-1 B	65		-	.32			0.119	0.070	35.0
3	87	21	C	65	+		2.27			0.137	0.088	44.0
4	88	22	D	65	+		.20			0.139	0.090	45.0
5	89	23	17-2-A	66	+		.20			0.125	0.076	38.0
6	90	24	B	64		-	.58			0.129	0.080	40.0
7	91	31	C	67	+		1.47			0.100	0.051	25.5
8	92	32	D	64		-	.06			0.119	0.070	35.0
9	93	33	17-3-A	67	+		.29			0.145	0.096	48.0
10	94	34	B	67	+		.28			0.189	0.140	70.0
11	95	35	C	66	+		.15			0.162	0.113	56.5
12	96	36	D'	66	+		.04			0.143	0.094	47.0
Blank → 13	97	49	17-0-A	65		-	.18			0.049		
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
Blank 1									1	CB1		
Blank 2									1	CB2		
Blank 3									1	CB3		

$\bar{C}_B$ = 0.049

S-340(2) R-9/85

D-26

Interpoll Laboratories
(612)786-6020

Data Reporting Sheet
(With Regulatory Limits)

CLIENT: ID020/LP Hayward

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:	1/1	1/2	1/3	
	I.C.S. →		→	
SAMPLE TYPE:				
LOG NO:	7451-12	-13	-14	

PARAMETER	UNITS	DET. LIMIT	REG. LIMIT	ANALYSIS DATE & INITIALS	METHOD				
Methane	ppmV	1.0	–	3/26/96 bwn	M25	3.8	2.0	2.9	

Footnotes:

In-House Comments:

Due Date: 4/3/96

Interpoll Laboratories
(612)786-6020

Data Reporting Sheet
(With Regulatory Limits)

CLIENT: ID020 / LP Hayward

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:	10/1	10/2	10/3	
SAMPLE TYPE:	I.G.S.	→	→	
LOG NO:	7451-77	-78	-79	

PARAMETER	UNITS	DET. LIMIT	REG. LIMIT	ANALYSIS DATE & INITIALS	METHOD				
Methane	ppmV	1.0	-	3/26/96 Smm	M-25	BDL	BDL	BDL	

Footnotes:

In-House Comments:

Dup 3/5/96

Interpoll Laboratories, Inc.
(612)786-6020

Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: 10020/LP Hayward

Sample Collected: 3-21

Sample Received: 3-22

Sample Log #: 7451-49

Sample Description: Char. Tube 5/0

			FRONT			BACK		
Parameter	Units	Analysis Date & Initials	Detection Limit Front	Analytical Result Front	Method Blank Front	Detection Limit Back	Analytical Result Back	Method Blank Back
Benzene	Total ug	MM 3-27-96	2.1	<2.1	<2.1	0.61	<0.61	<0.61
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
Dilution factor								

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SAMPLE RECEIVING

Footnotes:

In-House Comments: not opened prior to analysis

LCI-136

Due 4/3/96

Interpoll Laboratories, Inc.
(612)786-6020

Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: ID020/LP Hayward

Sample Collected: _____

Sample Received: _____

Sample Log #: 7451-50

Sample Description: Char. Tubs 5/1

Parameter	Units	Analysis Date & Initials	FRONT Detection Limit Front	FRONT Analytical Result Front	FRONT Method Blank Front	BACK Detection Limit Back	BACK Analytical Result Back	BACK Method Blank Back
Benzene	Total ug	MM	2.1	16	<2.1	0.61	1.0	<0.61
	Total ug	3.7.96						
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
Dilution factor								

REVIEWED 1996

Footnotes: _____

In-House Comments: _____

LCI-136

Interpoll Laboratories, Inc.
(612)786-6020

Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: 10020 / LP Hayward

Sample Collected: _____

Sample Received: _____

Sample Log #: 7451-51

Sample Description: Char. Tube 5/i

Parameter	Units	Analysis Date & Initials	FRONT Detection Limit Front	FRONT Analytical Result Front	FRONT Method Blank Front	BACK Detection Limit Back	BACK Analytical Result Back	BACK Method Blank Back
Benzene	Total ug	[illegible]	2.1	<2.1	<2.1	0.61	<0.61	<0.61
	Total ug	3-27-96						
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
Dilution factor								

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Footnotes: _____

In-House Comments: _____

LCI-136

Due 4/3/96

Interpoll Laboratories, Inc.
(612)786-6020

Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: 10020/ LP Hayward

Sample Collected: _____

Sample Received: _____

Sample Log #: 7451-52

Sample Description: Char. Tube 5/2

Parameter	Units	Analysis Date & Initials	FRONT Detection Limit Front	FRONT Analytical Result Front	FRONT Method Blank Front	BACK Detection Limit Back	BACK Analytical Result Back	BACK Method Blank Back
Benzene	Total ug	MP	2.1	27	<2.1	0.101	2.5	<0.61
	Total ug	3/27/96						
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
Dilution factor								

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Footnotes: _____

In-House Comments: _____

LCI-136

Interpoll Laboratories, Inc.
(612)786-6020

Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: 10020/LP Hayward

Sample Collected: _____

Sample Received: _____

Sample Log #: 7451-53

Sample Description: Char. Tube 5/2

Parameter	Units	Analysis Date & Initials	FRONT Detection Limit Front	FRONT Analytical Result Front	FRONT Method Blank Front	BACK Detection Limit Back	BACK Analytical Result Back	BACK Method Blank Back
Benzene	Total ug	3/31/96	2.1	3.7	<2.1	0.61	<0.61	<0.61
	Total ug	32996						
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
Dilution factor								

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Footnotes: _____

In-House Comments: _____

LCI-136

Due 4/3/96

Interpoll Laboratories, Inc.
(612)786-6020

Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: ID020/LP Hayward

Sample Collected: _____

Sample Received: _____

Sample Log #: 7451-54

Sample Description: Char. Tubes 5/3

Parameter	Units	Analysis Date & Initials	FRONT Detection Limit Front	FRONT Analytical Result Front	FRONT Method Blank Front	BACK Detection Limit Back	BACK Analytical Result Back	BACK Method Blank Back
Benzene	Total ug	MM 3/27/96	2.1	17	<2.1	0.61	1.2	<0.61
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
Dilution factor								

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APR 1 1996

Footnotes: _____

In-House Comments: _____

LCI-136

Interpoll Laboratories, Inc.
(612)786-6020

Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: 10020/LP Hayward

Sample Collected: _____

Sample Received: _____

Sample Log #: 7451-55

Sample Description: Char. Tube 5/3

Parameter	Units	Analysis Date & Initials	FRONT Detection Limit Front	FRONT Analytical Result Front	FRONT Method Blank Front	BACK Detection Limit Back	BACK Analytical Result Back	BACK Method Blank Back
Benzene	Total ug	MW 3/29/96	2.1	<2.1	<2.1	0.61	<0.61	<0.61
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
Dilution factor								

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Footnotes: _____

In-House Comments: _____

LCI-136

Due 4/2/96

Interpoll Laboratories, Inc.
(612)786-6020

Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: 1D020 / LP Hayward

Sample Collected: 3/9

Sample Received: 3-21

Sample Log #: 7451-19

Sample Description: 15/1

			FRONT			BACK		
Parameter	Units	Analysis Date & Initials	Detection Limit Front	Analytical Result Front	Method Blank Front	Detection Limit Back	Analytical Result Back	Method Blank Back
Benzene	Total ug	[illegible]	2.1	<2.1	<2.1	0.61	<0.61	<0.61
	Total ug	3/9/96						
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
Dilution factor								

Footnotes:

In-House Comments:

LCI-136

Date 4/3/96

Interpoll Laboratories, Inc.
(612)786-6020

Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: ID020 / LP Hayward

Sample Collected: _____

Sample Received: _____

Sample Log #: 7451 -20

Sample Description: 15/2

			FRONT			BACK		
Parameter	Units	Analysis Date & Initials	Detection Limit Front	Analytical Result Front	Method Blank Front	Detection Limit Back	Analytical Result Back	Method Blank Back
Benzene	Total ug	MN	2.1	35	<2.1	0.61	<0.61	<0.61
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug	996						
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
Dilution factor								

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Footnotes: _____

In-House Comments: _____

LCI-136

Due 4/2/96

Interpoll Laboratories, Inc.
(612)786-6020

Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: ID020 / LP Hayward

Sample Collected: _____

Sample Received: _____

Sample Log #: 7451 -21

Sample Description: 15/3

Parameter	Units	Analysis Date & Initials	FRONT Detection Limit Front	FRONT Analytical Result Front	FRONT Method Blank Front	BACK Detection Limit Back	BACK Analytical Result Back	BACK Method Blank Back
Benzene	Total ug	MN	0.1	98	<0.1	0.161	<0.161	<0.161
	Total ug	3/29/96						
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
	Total ug							
Dilution factor								

RECEIVED
1996

Footnotes: _____

In-House Comments: _____

LCI-136

INTERPOLL LABORATORIES INC.

Formaldehyde Results Using EPA Method 0011
For Dept. 20/LP Hayward
Collected 3/18, 19, 21/96

	Field Spike #3			Test: 4			Source: Line 2 Dryer RTO Stack
	Actual	Found	% Recovery	Run 0	Run 1	Run 2	Run 3
Log #		(7451-42)		(7451-41)	(7451-43)	(7451-44)	(7451-45)
Mass (ug)*	750	580	77.3	8.0	13000	18000	17000

	Field Spike #1			Test: 9			Source: Line 2 Press Vent RTO Stack
	Actual	Found	% Recovery	Run 0	Run 1	Run 2	Run 3
Log #		(7451-66)		(7451-65)	(7451-67)	(7451-68)	(7451-69)
Mass (ug)*	750	620	82.7	2.6	600	490	610

	Field Spike #2			Test: 13			Source: Line 2 Thermal Oil Heater Stack
	Actual	Found	% Recovery	Run 0	Run 1	Run 2	Run 3
Log #		(7451-81)		(7451-80)	(7451-82)	(7451-83)	(7451-84)
Mass (ug)*	750	230	30.7**	6.7	210	280	190

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

** = A portion of sample 7451-81 was lost during preparation at the laboratory.

Reviewed by:

David J. Schneider, Manager
Chemistry Department

INTERPOLL LABORATORIES INC.

Phenol Result By EPA Method 8270
For Dept. 20/ LP Hayward
Collected 3/19/96

	Test 2			Source: Line 2 Dryer RTO Stack
	Run 0	Run 1	Run 2	Run 3
Log #	7451-15	7451-16	7451-17	7451-18
Analysis Date	4/05/96	4/05/96	4/05/96	4/05/96
Phenol*	**< 840**	**< 840**	**< 840**	**< 840**
2-Fluorophenol**	84.3	8.6	18.0	25.8
D6-Phenol**	66.9	36.8	38.2	32.6
2,4,6-Tribromophenol***	51.2	57.9	58.4	66.7

* = Total mass of the specified compound in the sample in ug.

** = Percent recovery of the field surrogate. (60120 ug 2-Fluorophenol and 5006 ug Phenol-D6 was added to the impinger solution before sampling.)

*** = Percent recovery of the lab surrogates.

Reviewed by:

David J. Schneider, Manager
Chemistry Department

INTERPOLL LABORATORIES INC.

Polycyclic Organic Matter Results By EPA Method 8270
For Dept. 20/LP Hayward, Collected 3/20-21/96

	Test : 3			Source: Line 2 Dryer RTO Stack
	Run 0	Run 1	Run 2	Run 3
Log #	7451-34	7451-35	7451-36	7451-36
Compounds of Interest				
Benz(a)anthracene*	< 1.8	< 1.8	< 1.8	< 1.8
Benzo(b)fluoranthene*	< 0.99	< 0.99	< 0.99	< 0.99
Benzo(a)pyrene*	< 1.2	< 1.2	< 1.2	< 1.2
Dibenz(a,h)acridine*	< 15	< 15	< 15	< 15
Dibenz(a,j)acridine*	< 1.6	< 1.6	< 1.6	< 1.6
Dibenz(a,h)anthracene*	< 0.88	< 0.88	< 0.88	< 0.88
7H-Dibenzo(c,g)carbazole*	< 1.2	< 1.2	< 1.2	< 1.2
Dibenzo(a,h)pyrene*	< 20	< 20	< 20	< 20
Dibenzo(a,i)pyrene*	< 20	< 20	< 20	< 20
Indeno(1,2,3-cd)pyrene*	< 0.90	< 0.90	< 0.90	< 0.90
Field Surrogate Recovery				
D10-Fluoranthene**	51.2	61.3	67.5	65.9
Lab Surrogate Recovery				
D5-Nitrobenzene***	42.5	108	105	113
2-Fluorobiphenyl***	75.7	43.2	55.1	47.5
D14-Terphenyl***	63.2	71.5	63.7	60.4

* = Total mass of the specified compound in the sample in ug.

** = Percent recovery of the field surrogate.

*** = Percent recovery of the lab surrogates.

Reviewed by:

David J. Schneider, Manager
Chemistry Department

Interpoll Laboratories
(612) 786-6020

XAD-2 & VOST Trap Preparation Work Order Form

Project Name: LP/Hayward Order Date: 3-11-96
Date Required: 3-15-96 Delivery Date: 3-15-96

Number of XAD-2 Traps Required: 4

Number of VOST Tubes Required: _____ Tenax
_____ Tenax/Charcoal

XAD-2 TRAP HISTORY

XAD-2 Lot Number: 17212-6 Date of Spiking: 3-15-96
XAD-2 Lot Date: NA Technician: BD
XAD-2 Lot Technician: Alltech

Nature of Spiking Material	Spike Concentration	Spike Volume	Total Mass of Spike
D_{10}-Fluorathene #95078-9-1	4.0 µg/µl	5.0µl	20.0 µg

VOST TUBE HISTORY

Date of Thermal Disorption: _____ Technician: _____

Total Hydrocarbon Analysis: ____ ppm

SPECIAL REQUIREMENTS

**Please return this form with the samples.

LQA-10RR

Interpoll Laboratories
(612) 786-6020

IMPINGER CATCHES

Project Name: L.P/Hayward
Date Required: 3-15-96
Order Date: 3-11-96
Delivery Date: 3-15-96

Nature of Spiking Material	Spike Concentration	Spike Volume	Total Mass of Spike
D-6 Phenol #95079-26-A	5.006 mg/ml	1.0ml	5.006 mg
2-fluorophenol #95079-26-B	50.10 mg/ml	1.2ml	60.120 mg

SPECIAL REQUIREMENTS

**Please return this form with the samples.

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job L.P. Haywood Source Line 2 Dryer Site RTO STACK Log No. 7451
Field Engineer DVH Date of Test 3/19/96 Test No. 1 No. of Runs 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
4	**Probe Wash:** ☒ Acetone ☐ $MeCl_2$	☐DI Water ☐_____	☒EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
4	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☒EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
4	**Impingers:** ☒DI Water ☐3%H_2O_2 ☐1N NaOH ☐2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐_____	☐MN Protocol ☒WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		
3	**Integrated Gas:** ☒Tedlar Bag	☐_____	☒EPA M-3 ☐ METHANE	☒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
Duane Van Hoeven		3/19/96
	Chad / Interpoll	3/21/96 0800

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job L.P. Hayward Source Line 2 Dryer Site RTO STACK Log No. 7451
Field Engineer D.H. Date of Test 3/19/96 Test No. 1 No. of Runs 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
	Probe Wash: ☐ Acetone ☐ $MeCl_2$	☐DI Water ☐_____	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
	Filter: ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
4	**Impingers:** ☐DI Water ☐3%H_2O_2 ☐1N NaOH ☐2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☒ PHENOL ABSORBING SOLUTION	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☑Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		A+B Spiked bottles
	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
Duane Van Hueren		3/22/96
	Interpoll	3/21/96 0800

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job L.P. Hayward Source Line 2 Dryer RTO Site Stack Log No. 7451
Field Engineer DVH Date of Test 3/20, 21/96 Test No. 3 No. of Runs 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
4 SOLVENT RINSE	**Probe Wash:** ☒ Acetone ☒ $MeCl_2$	☐ DI Water ☐ _____	☐ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☒ .0010 PAHs		
4	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☐ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17 ☐ 0010		
3 CONDENSATE TRAP	**Impingers:** ☐ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☒ Water Catch	☐ MN Protocol ☐ WI Protocol ☐ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☒ 0010		
3	**Integrated Gas:** ☒ Tedlar Bag	☐ _____	☒ EPA M-3 ☐ _____	☐ EPA M-10		Bags for PAH Only
	Oxides of Nitrogen:		☐ EPA M-7A ☐ _____			
	Fuel Lab: ☐ Fuel Sample	☐ Aggregate	☐ Per S-0163			
	Particle Sizing:		☐ X-Ray Sdgraph ☐ _____	☐ Cascade Imp		
2	**Miscellaneous:**	☒ Resin Cartridge	☒ 0010			

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
Duane Van Hoven		3/22/96
	Interpoll	3/22/96 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job L.P. Hayward Source Line 2 Dryer RTO Site Stack Log No. 7451
Field Engineer Dust Date of Test 3/21/96 Test No. 4 No. of Runs 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
3	**Probe Wash:** ☐ Acetone ☒ $MeCl_2$	☒ DI Water ☐ _____	☐ EPA M-5 ☐ EPA M-29	☐ EPA M-201A ☒ 0011		
	Filter: ☐ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☐ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		
5	**Impingers:** ☐ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☒ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☐ _____	☐ MN Protocol ☐ WI Protocol ☐ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☒ 0011		3 Runs 1 blank 1 spike
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
Duane Van Hoorn	Interpoll 1000	3/22/96

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INTERPOLL LAB..ATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job L.P. Hayward Source Line 2 DRYER Site RTO Stack Log No. 7451
Field Engineer DeH Date of Test 3/21/96 Test No. 5 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		
	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		
4	**Miscellaneous:**	☒ Benzene	☒ Charcoal Tubes			

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
Duane Van Hoomissen		3/21/96
	Chad / Interpoll	3/22/96 1000

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job LP/HAYWARD Source SURFACE DRYER Site _____ Log No. 7451
Field Engineer ET Date of Test 3-19&20-96 Test No. 8 No. of Runs 4

No. Items	Sample Type		Analysis		Sequence No.	Comments
	Probe Wash: ☐ Acetone ☐ $MeCl_2$	☐DI Water ☐_____	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
	Filter: ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
	Impingers: ☐DI Water ☐3%H_2O_2 ☐1N NaOH ☐2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐_____	☐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 ☒ METHANE	☒EPA M-10	(30 - 33)	
	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 Trawicki/Interpoll	Interpoll	1315 3/21/96

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job LP/Hayward Source Line 2 Recirc Duct Site Stack Log No. 7457
Field Engineer Scott Fyksen Date of Test 3-17-96 (R2TO) 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 ☒0011		1 $MeCl_2$ Blank
	Filter: ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
5	**Impingers:** ☐DI Water ☐3%H_2O_2 ☐1N NaOH ☒2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐_____	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☒Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		3 samples 1 Blank 1 Spike
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
Scott Fyksen Interpoll Labs	Interpoll 1600	3-22-96

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job LP/Hayward Source Line 2 Press Vent (R10) Site Stack Log No. 7451
Field Engineer S. Tjelta Date of Test 3-20-96 Test No. 10 No. of Runs 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
4	**Probe Wash:** ☒ Acetone ☐ $MeCl_2$	☐DI Water ☐_____	☒EPA M-5 ☐EPA M-29	☐EPA M-201A ☐_____		
4	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☒EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
4	**Impingers:** ☒DI Water ☐3%H_2O_2 ☐1N NaOH ☐2,4-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐_____	☐MN Protocol ☒WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		
3	**Integrated Gas:** ☒Tedlar Bag	☐_____	☒EPA M-3 ☒ METHANE	☒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
Scott Tjelta Interpoll Labs	Chuck / Interpoll 1600	3-22-96

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: LPI/Hayward | Source: LINE 2 KONUS | Site: STACK | Log No.: 7415
Field Engineer: BA | Date of Test: 3-18-96 | Test No.: 13 | No. of Runs: 3

No. Items	Sample Type		Analysis		Sequence No.	Comments
5	**Probe Wash:** ☐ Acetone ☒ ~~MeCl₂~~	☐DI Water ☐_____	☐EPA M-5 ☐EPA M-29	☐EPA M-201A ☒ ~~0011~~		
—	**Filter:** ☐ 4" Glass ☐ SS Thimble	☐Pallflex ☐2.5" Glass	☐EPA M-5 ☐EPA M-29 ☐EPA M-201A	☐EPA M-17		
5	**Impingers:** ☐DI Water ☐3%H_2O_2 ☐1N NaOH ☒ ~~2,4~~-DNPH	☐H_2SO_4 ☐HNO_3/H_2O_2 ☐$KMnO_4/H_2SO_4$ ☐_____	☐MN Protocol ☐WI Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☒ ~~Formaldehyde~~ ☐EPA M-29 ☐EPA M-26 ☒ ~~CO11~~		
—	**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: ☐Bitumhous ☐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
INTERFACE LOSS	Interpoll 1600	3-22-96

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job CP / Hayward Source Lime Kiln Site Static Log No. _____
Field Engineer SA Date of Test 3-96 Test No. 14 No. of Runs _____

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 ☐ _____		3 Sample 1 Blank
4	**Filter:** ☒ 4" Glass ☐ SS Thimble	☐ Pallflex ☐ 2.5" Glass	☒ EPA M-5 ☐ EPA M-29 ☐ EPA M-201A	☐ EPA M-17		3 Sample 1 Blank
4	**Impingers:** ☒ DI Water ☐ 3% H_2O_2 ☐ 1N NaOH ☐ 2,4-DNPH	☐ H_2SO_4 ☐ HNO_3/H_2O_2 ☐ $KMnO_4/H_2SO_4$ ☐ _____	☐ MN Protocol ☒ WI Protocol ☐ EPA M-202 ☐ EPA M6,8 ☐ Acid Gases	☐ IA Protocol ☐ Formaldehyde ☐ EPA M-29 ☐ EPA M-26 ☐ _____		3 Sample 1 Blank
3	**Integrated Gas:** ☒ Tedlar Bag	☐ _____	☒ EPA M-3 ☐ _____	☐ EPA M-10		
1	**Oxides of Nitrogen:**		☐ EPA M-7A ☐ _____			
1	**Fuel Lab:** ☒ Fuel Sample	☐ Aggregate	☒ Per S-0163			
	Particle Sizing:		☐ X-Ray Sdgraph ☐ _____	☐ Cascade Imp		
12	**Miscellaneous:**	☒ Charcoal Silica Gel	☐ _____			9 Silica Gel 3 Charcoal

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]	[signature] / Interpoll	3/21/96 0800

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

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job: L.P. Hayward Source: Chs 2 Dyer RTO Site: Inlet Log No.: 7451
Field Engineer: E. Jurrs Date of Test: 3-19-96 Test No.: 17 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		
	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		
13	**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. Jurrs / Interpoll	Interpoll 0800	3-25-96

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

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

Job C.P. Hayward Source Line 2 Dryer RTO Site Inlet Log No. 7451
Field Engineer EJ Sues Date of Test 3-19-96 Test No. 17 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: 3" ☒ 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 ☒AW Protocol ☐EPA M-202 ☐EPA M6,8 ☐Acid Gases	☐IA Protocol ☐Formaldehyde ☐EPA M-29 ☐EPA M-26 ☐_____		
3	Integrated Gas: ☒Tedlar Bag	☐_____	☒EPA M-3 ☐_____	☐EPA M-10		
—	Oxides of Nitrogen:		☐EPA M-7A ☐_____			
—	Fuel Lab: ☐Fuel Sample	☐Aggregate	☐Per S-0163			
—	Particle Sizing:		☐X-Ray Sdgraph ☐_____	☐Cascade Imp		
—	Miscellaneous:	☐_____	☐_____			

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

Relinquished by/Affiliation	Accepted by/Affiliation	Date
E Sues / Interpoll	R. Zagar / Interpoll IDID	3-20-96

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Sample Chain of Custody

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

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

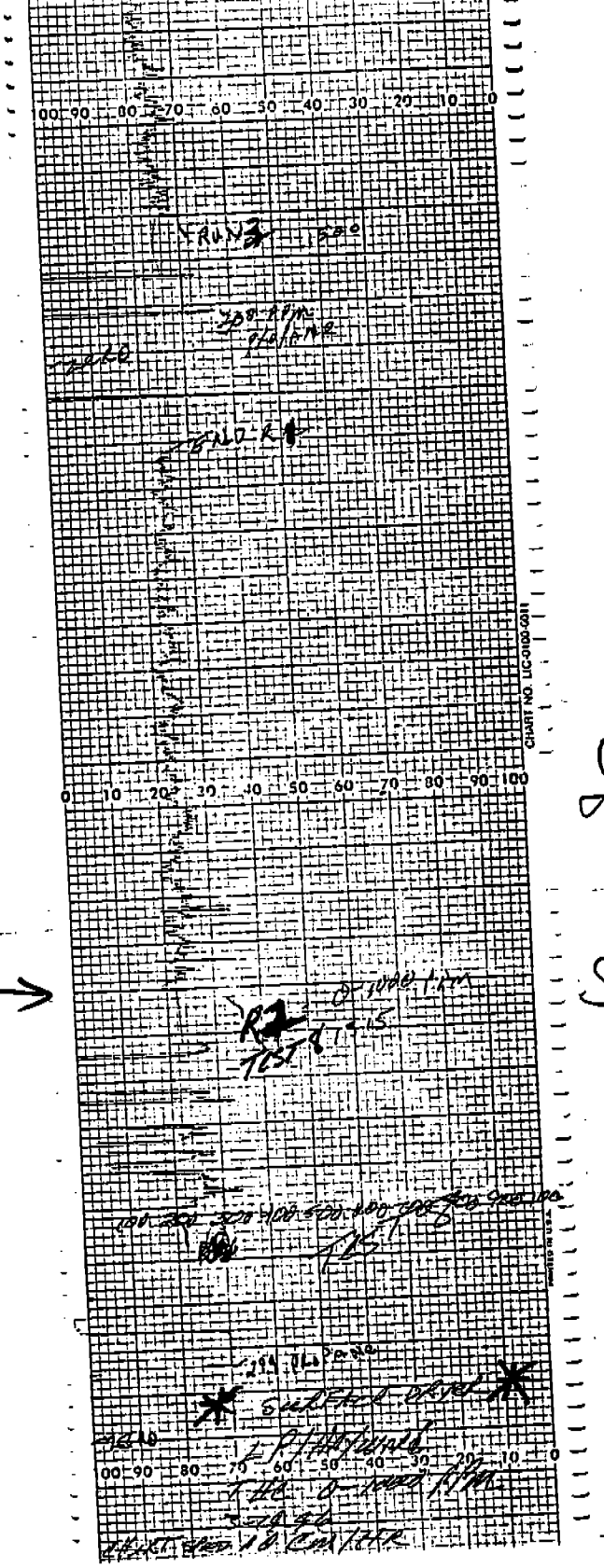
Fuel Type: Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite
Wood: ☒ Wood Waste ☐ Dust ☐ Bark
Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6
Misc: ☐ Natural Gas ☐ RDF ☐ _____

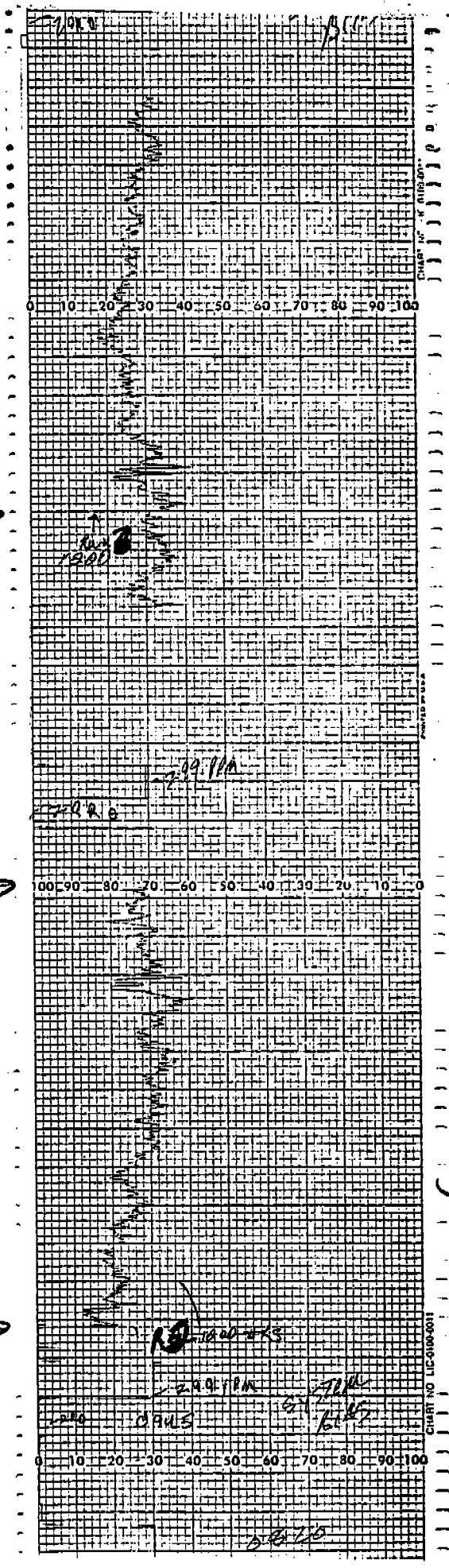
Relinquished by/Affiliation	Accepted by/Affiliation	Date
James Bauville INTERPOLLABS	Interpoll	3/20/96 1115

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

APPENDIX E

NO_x/CO/THC STRIPCHART


T8 R1
End
1420HRS
T8 R1
Start
1315HRS
3-19-96
LP-Hayward
THC's
Scale
0-1000

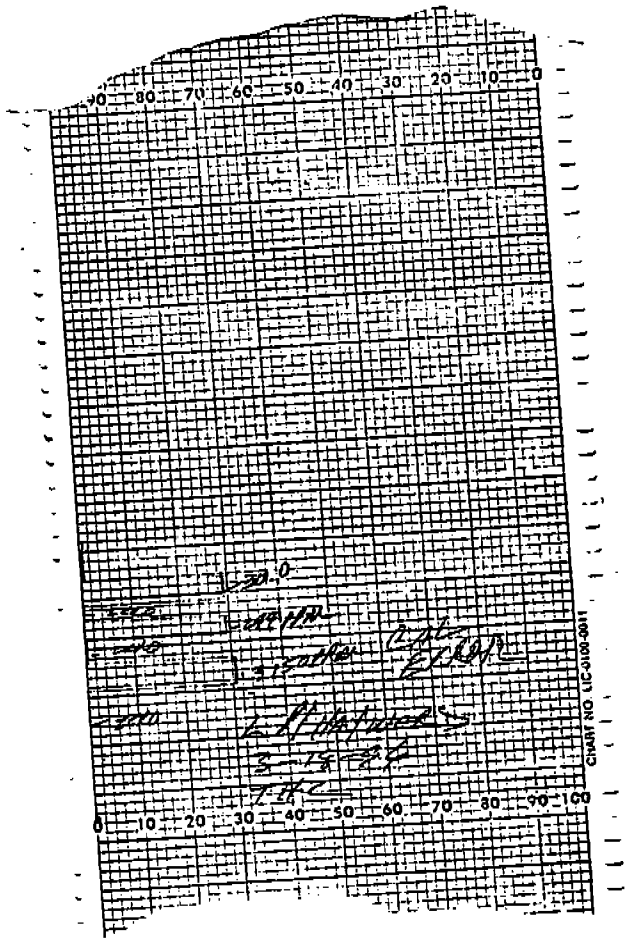


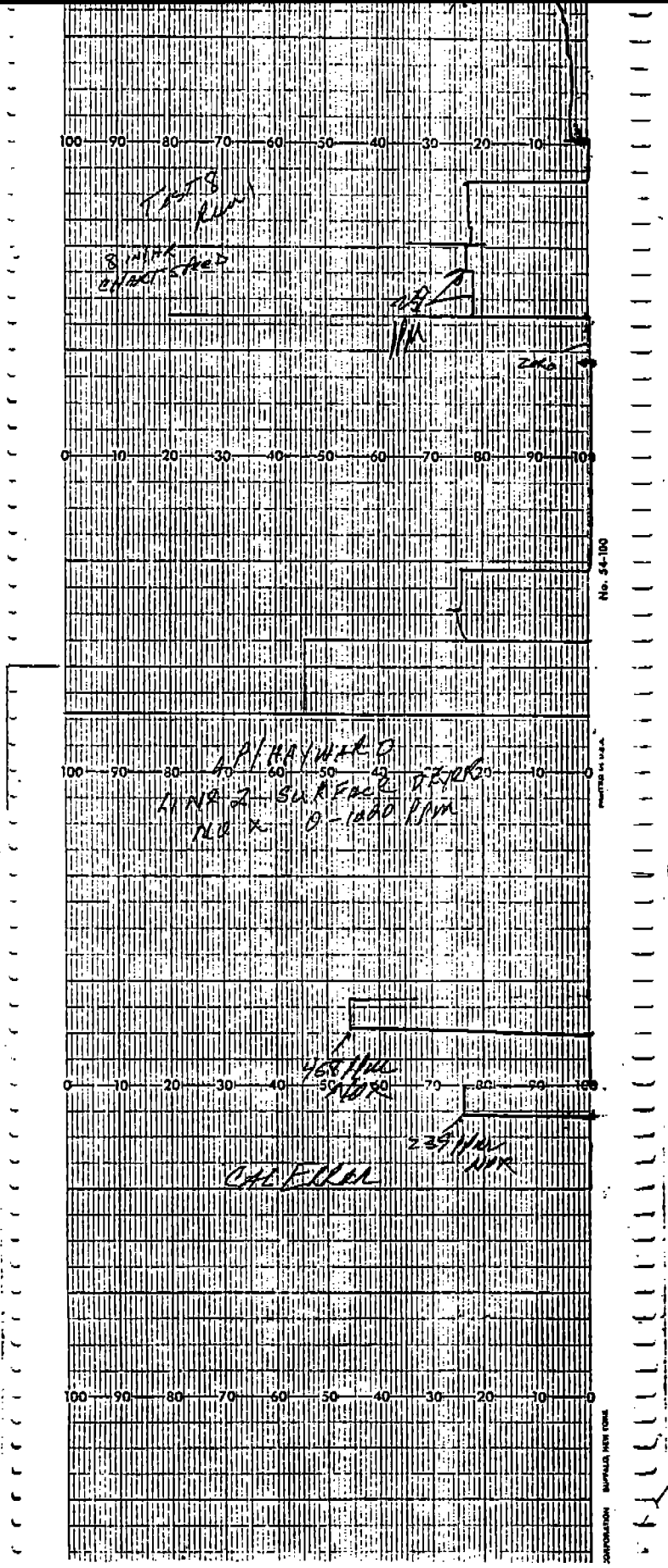
HP-Hayward THC's

3-20-96

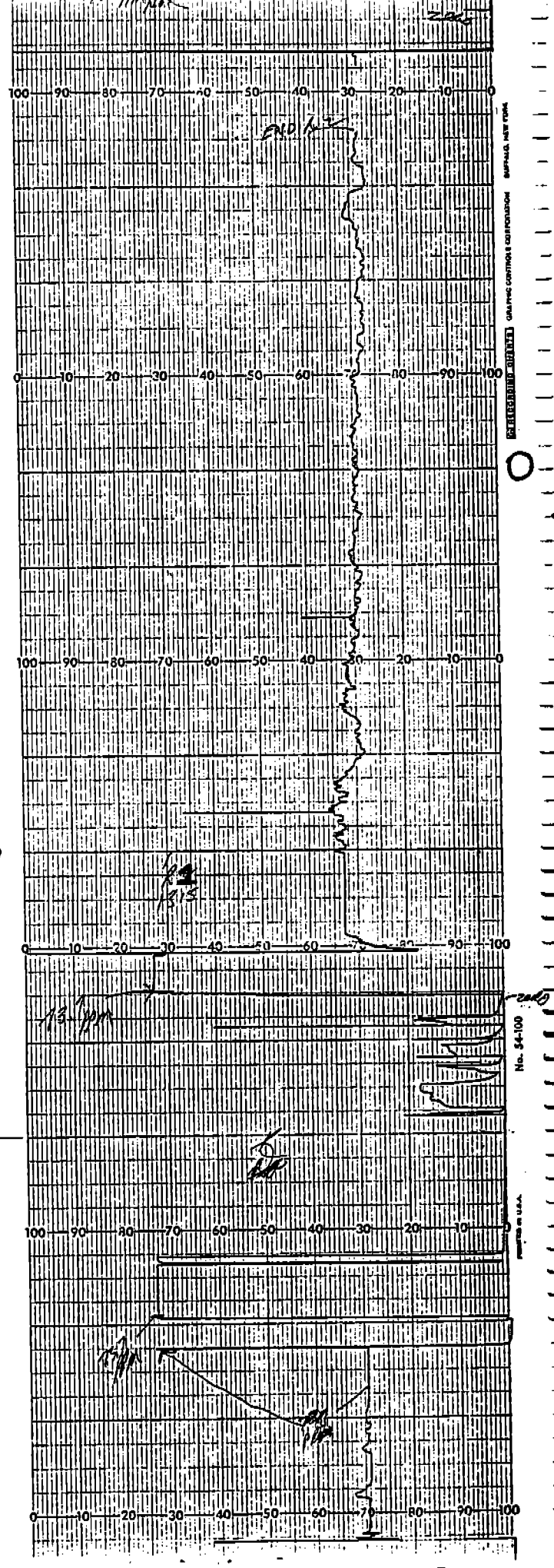
Line 2 Surface Dryer Duct

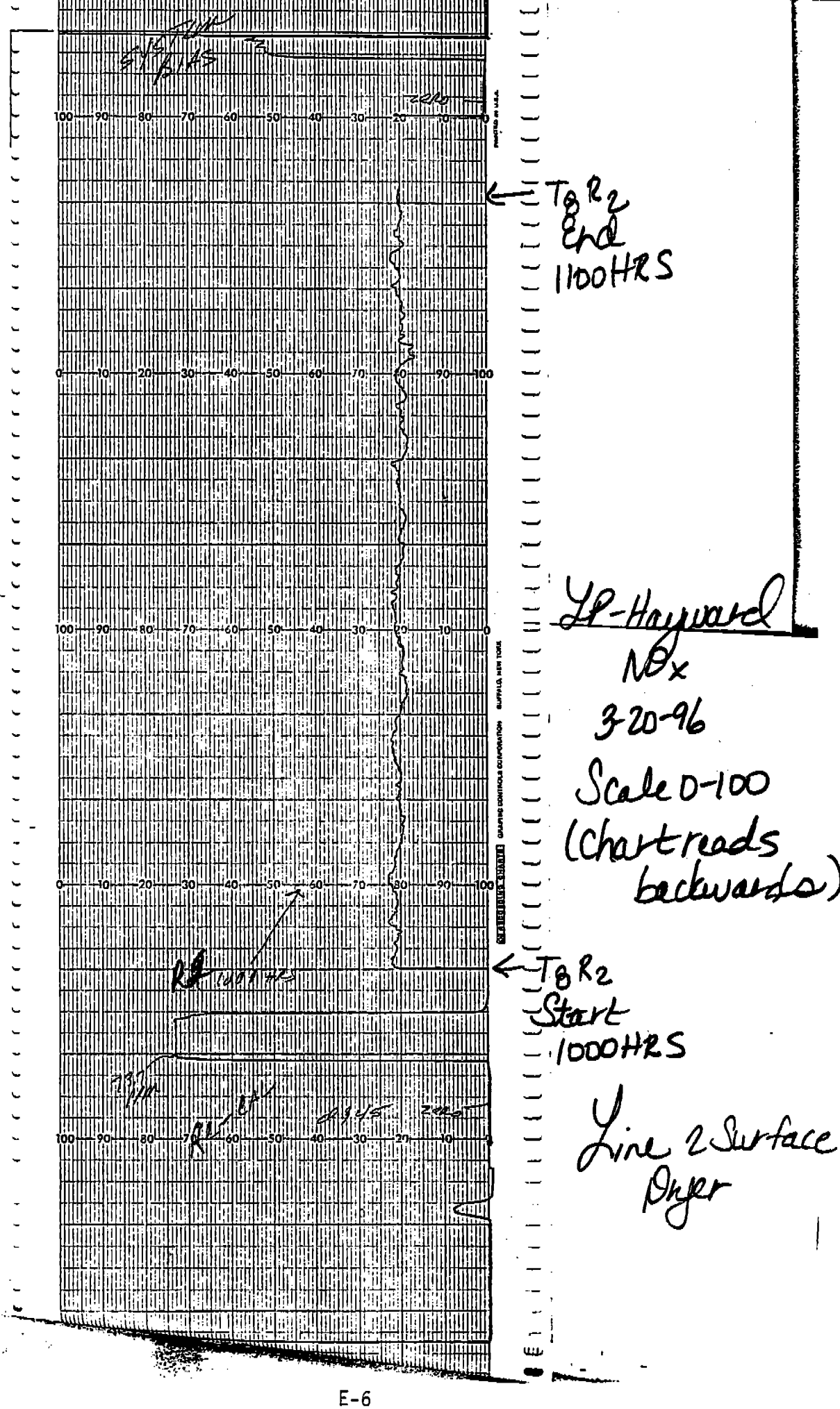
Scale 0-1000

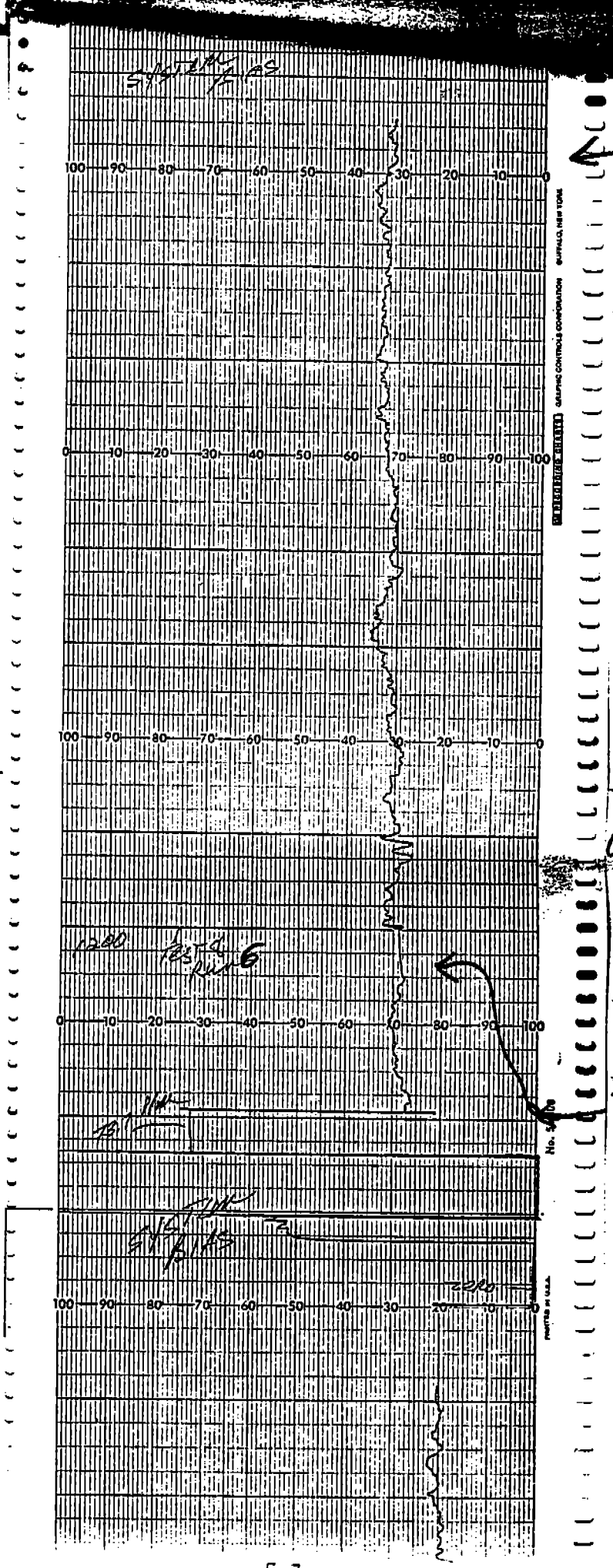

90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
CHART NO. LIC-0100-0011

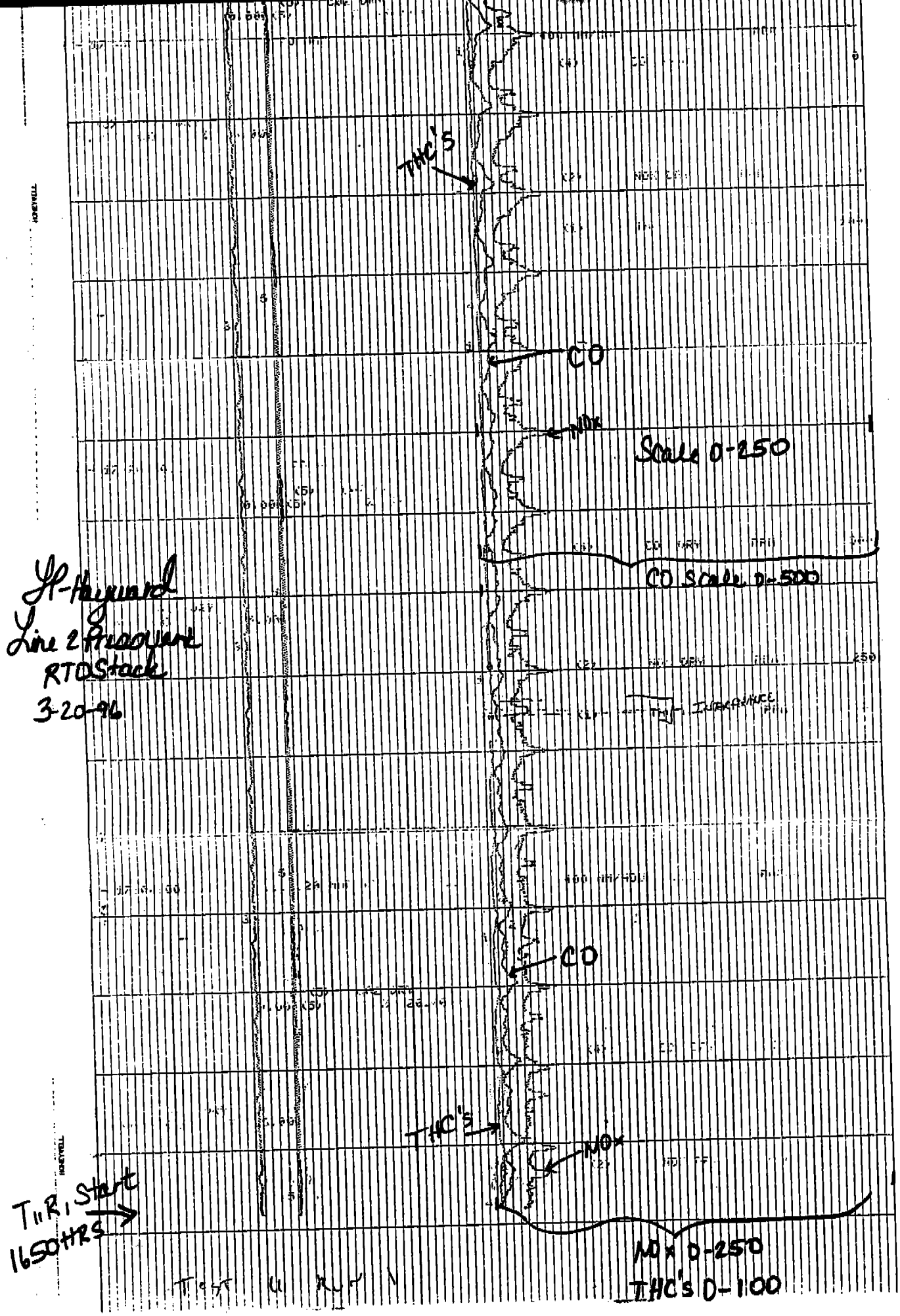


H-Hayward
NO_x


T&R, End 1420HRS
100
0
Scale 0-100 (Chart reads backwards)
YP-Hayward NOx
Scale 0-100
Line 2 Surface Dryer
T&R, Start 1315 HRS 3-19-96

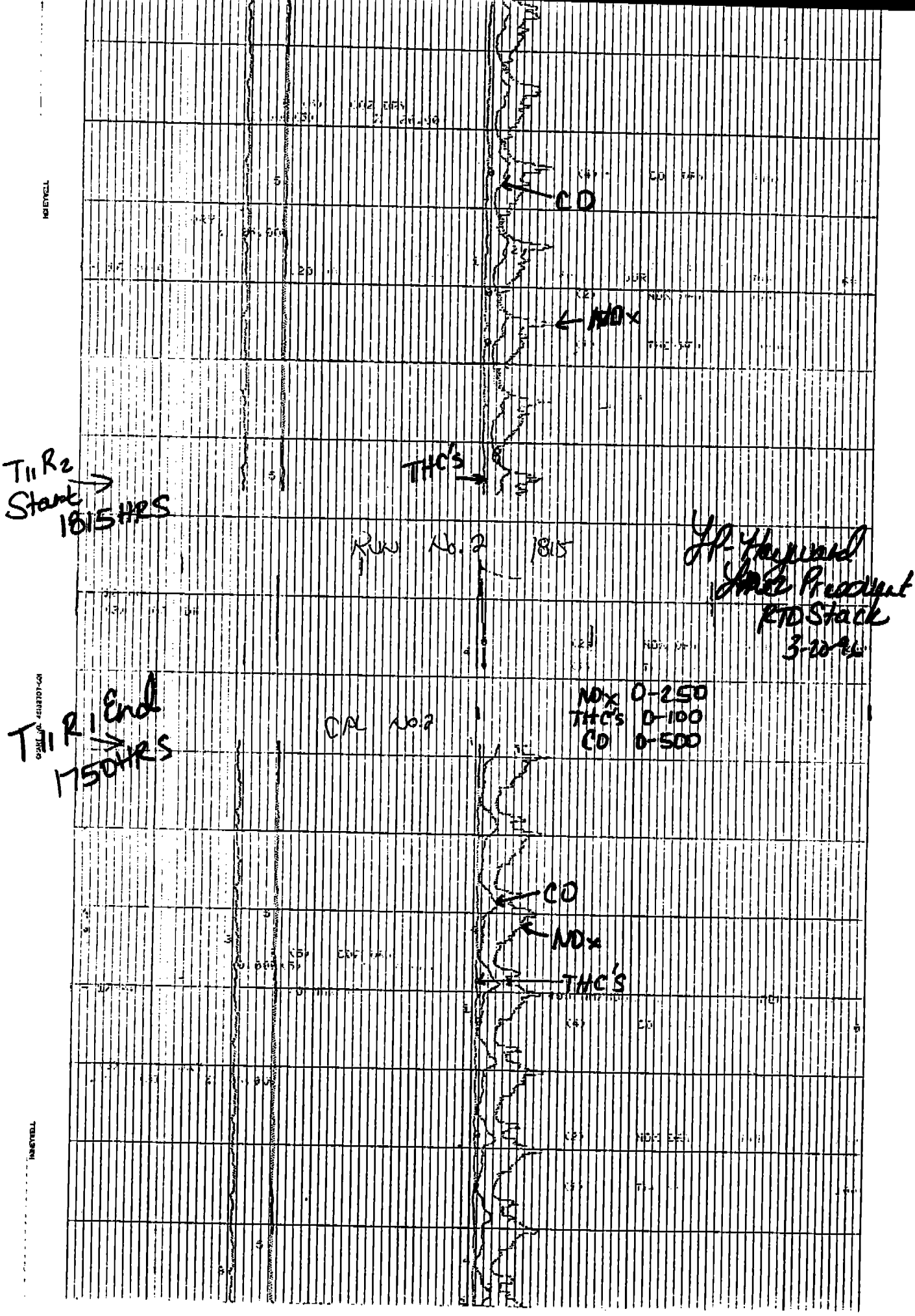

T8 R2
End
1100HRS
LP-Hayward
NOx
3-20-96
Scale 0-100
(Chart reads
backwards)
T8 R2
Start
1000HRS
Line 2 Surface
Dryer

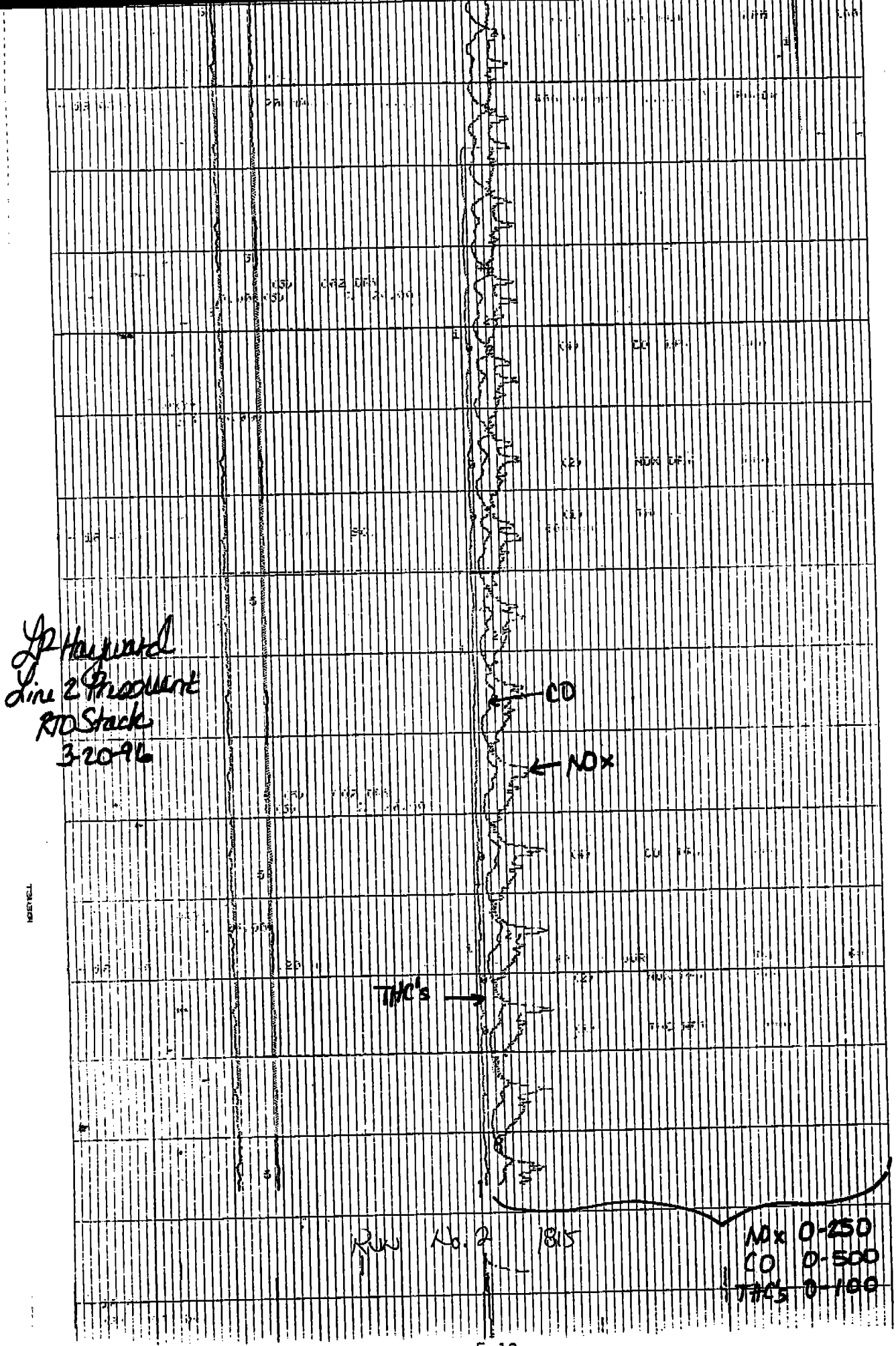

T8R3 End
1300HRS
Line 2
Surface
Dryer
LP-Hayward
NOx
3-20-96
T8R3
Start
1200HRS

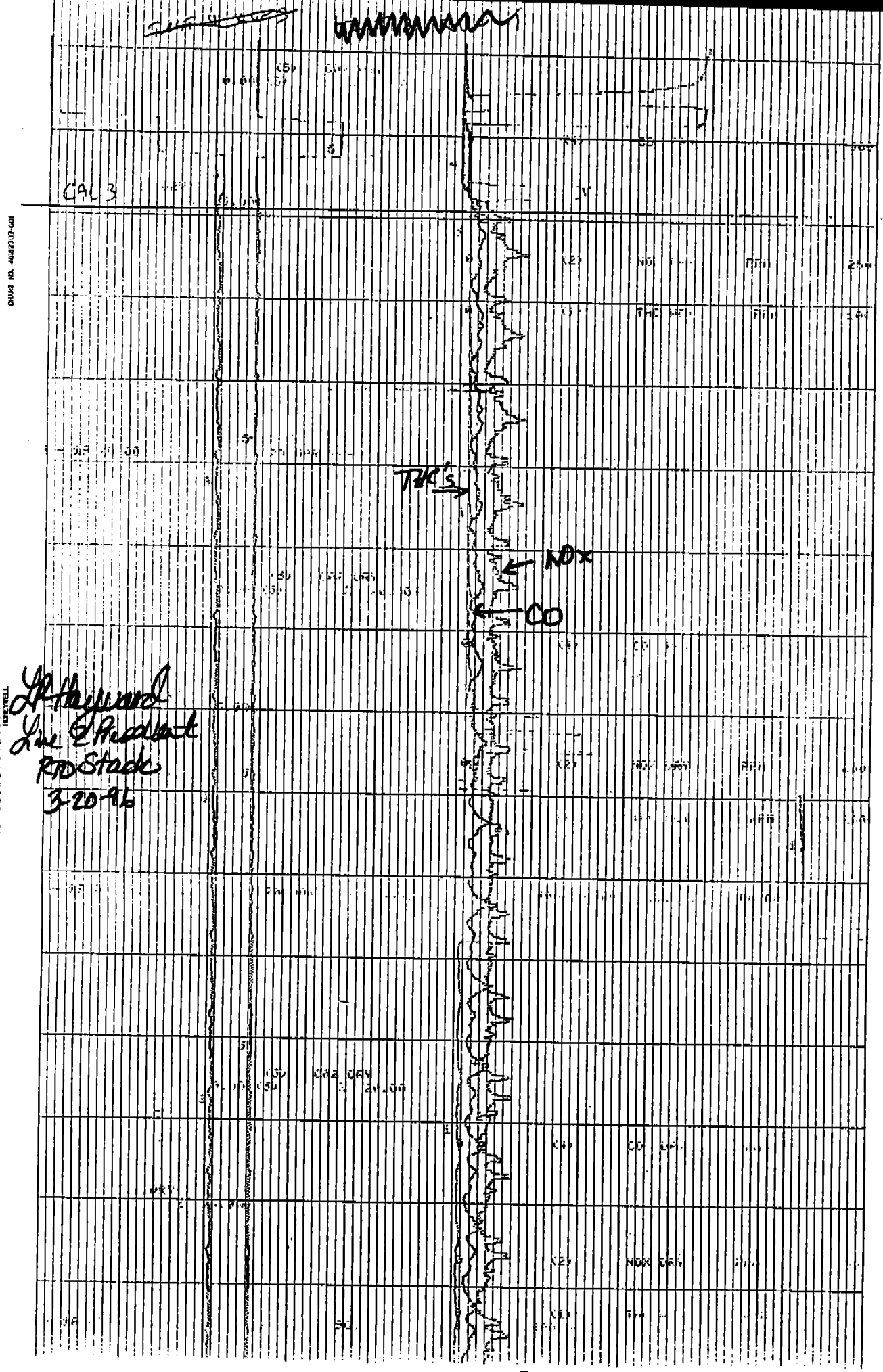


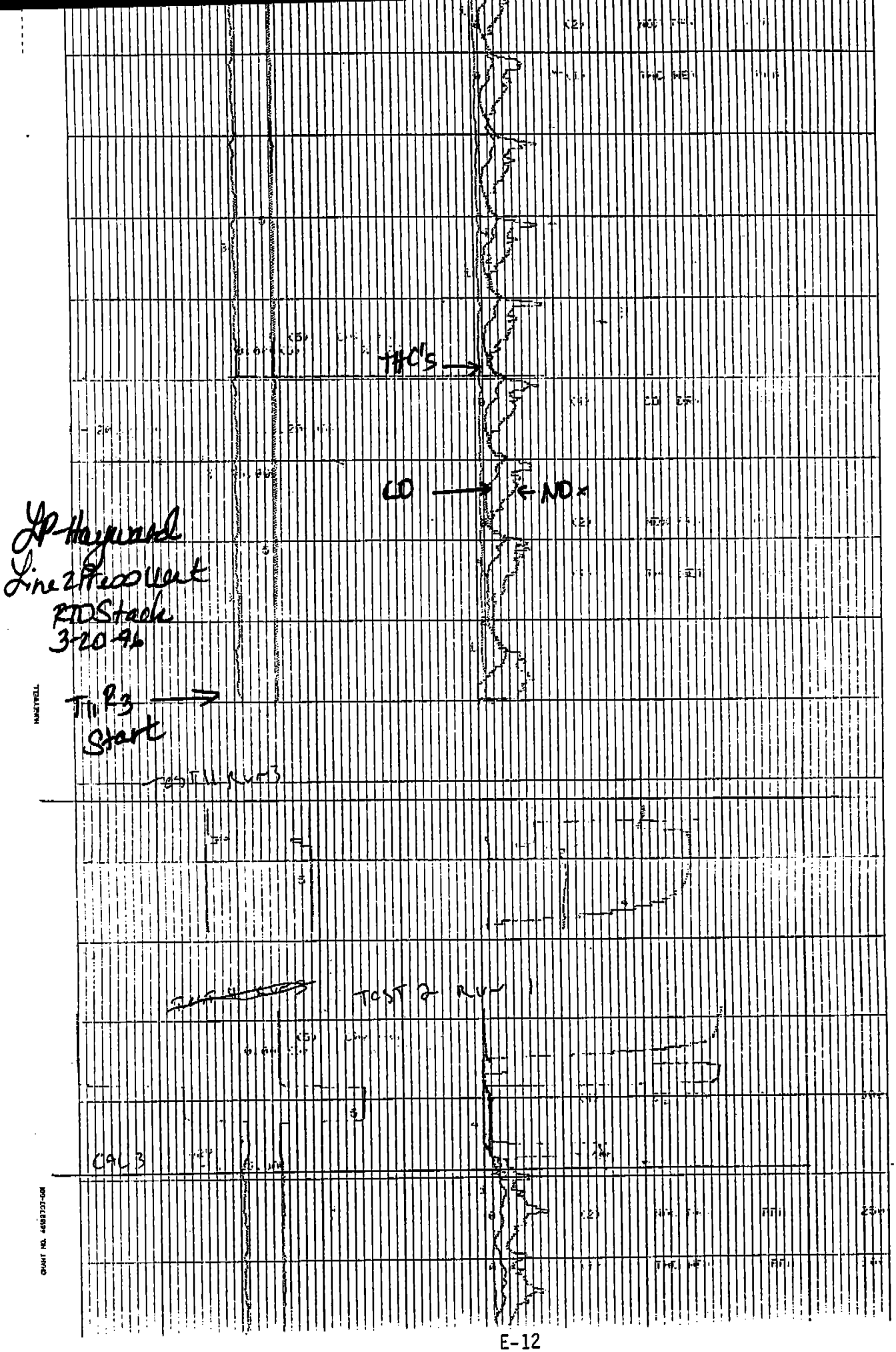
LL-Hayward
Line 2 Freeguard
RTO Stack
3-20-96

T1 R1 Start
1650 HRS

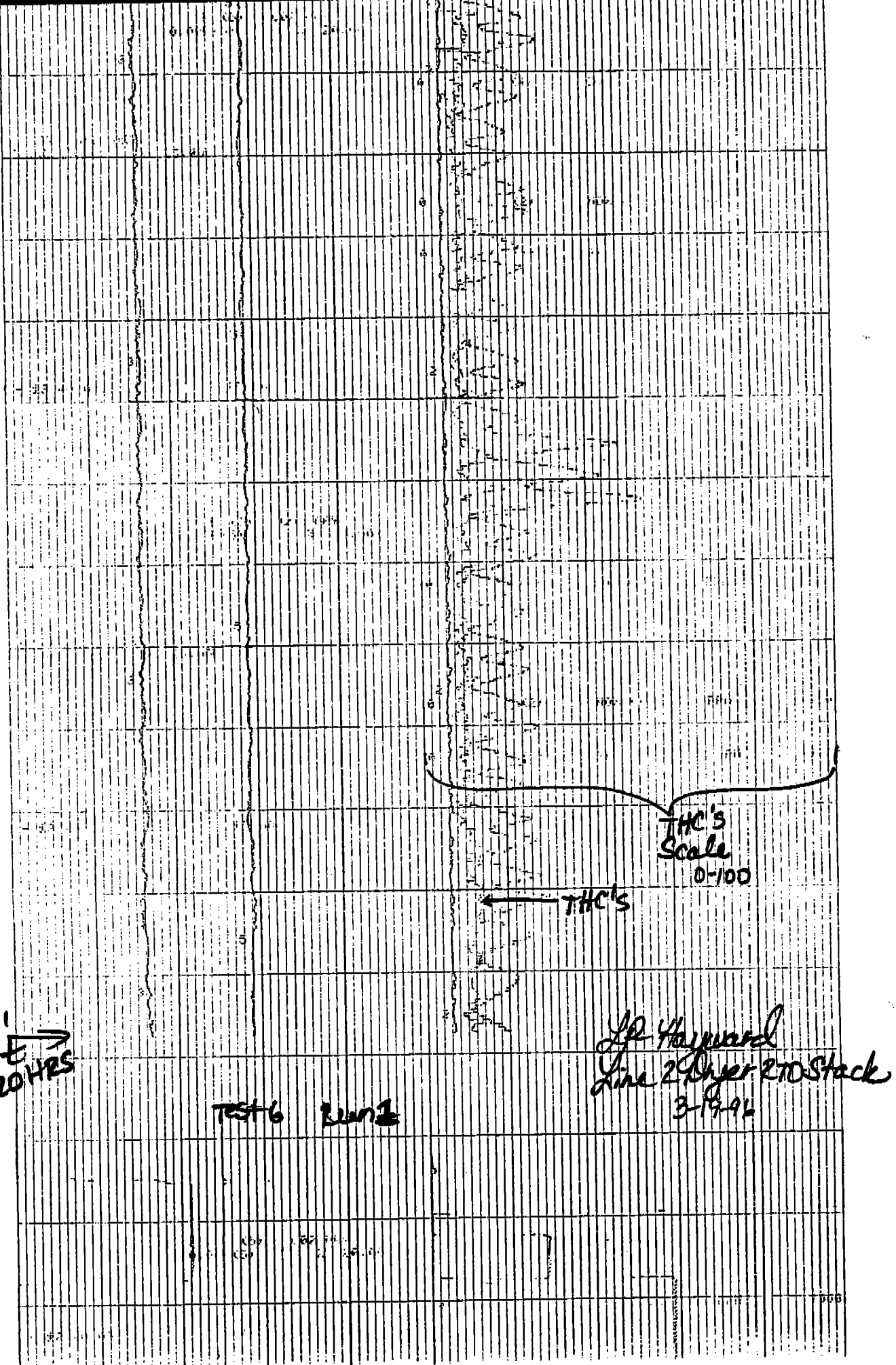

CO
NOx
THC's
T11 R2 Start 1815 HRS
RUN No. 2 1815
HP Heywood Stack Precount RTD Stack 3-20-92
NOx 0-250
THC's 0-100
CO 0-500
T11 R1 End 1750 HRS
CAL No. 2
CO
NOx
THC'S

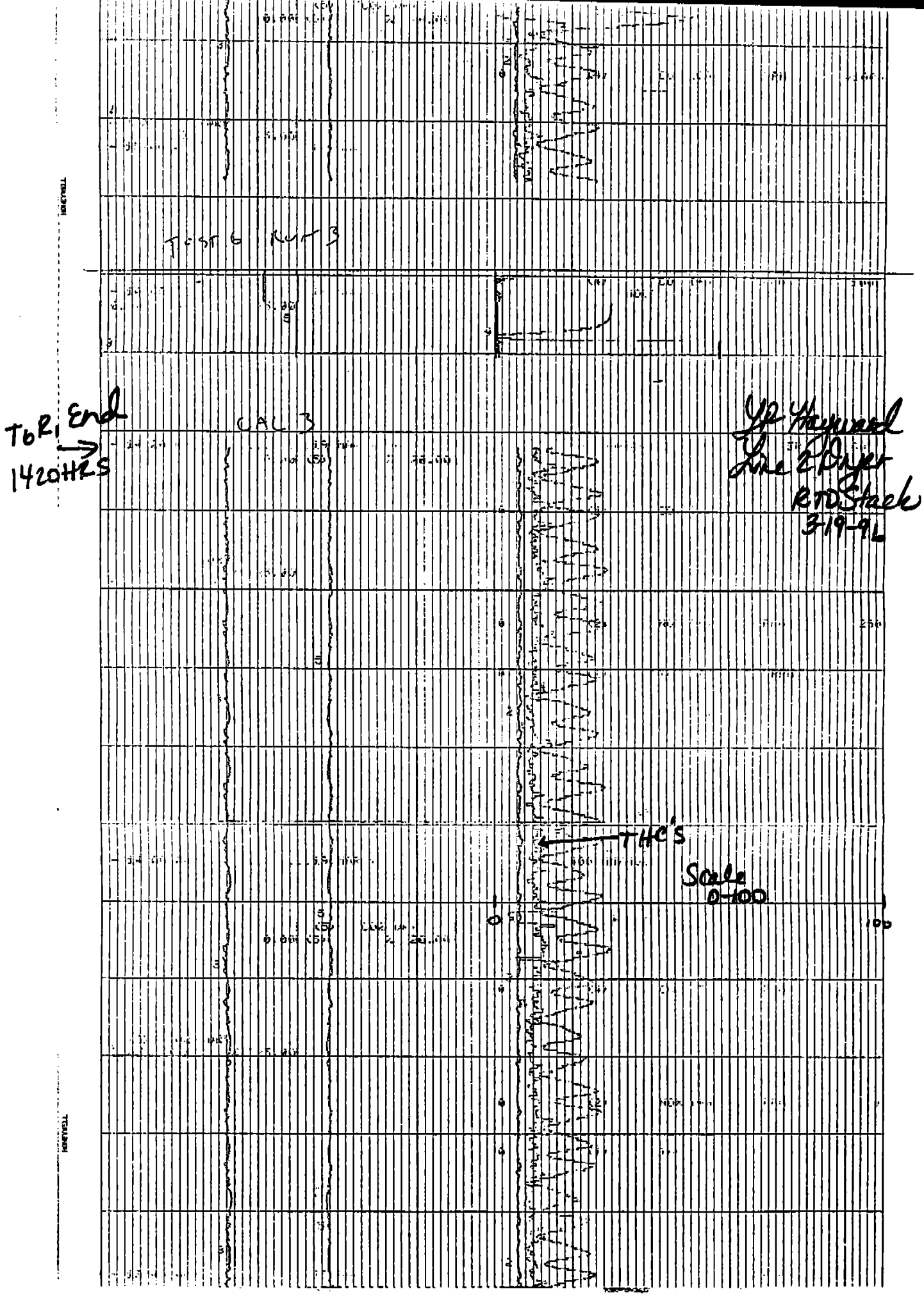

LP Hayward
Line 2 Precount
RTO Stack
3-20-96
CO
NOx
THC's
NOx 0-250
CO 0-500
THCs 0-100

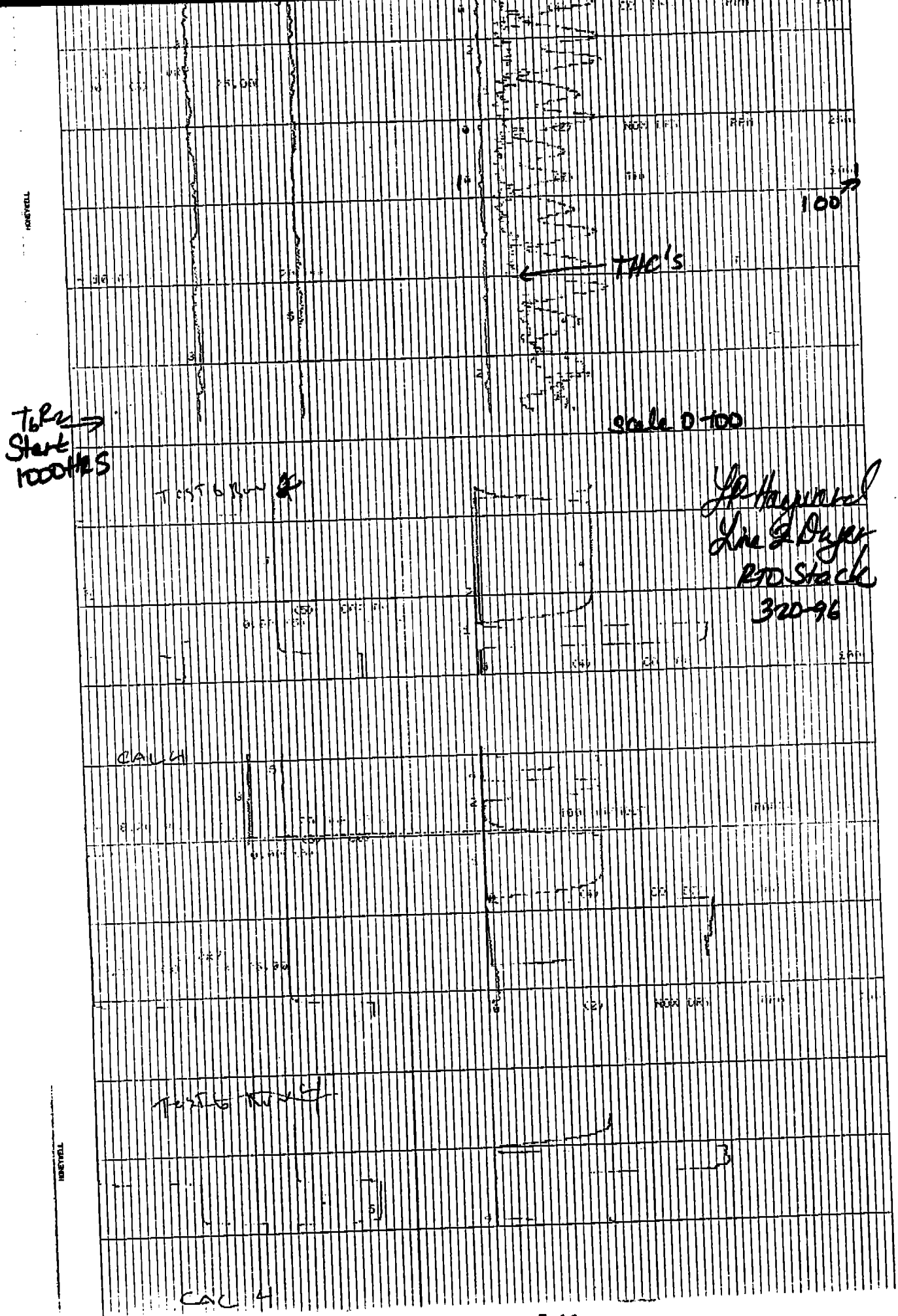

CAL 3
THC's
NOx
CO
LR Hayward
Line 2 Recorder
RTO Stack
3-20-96

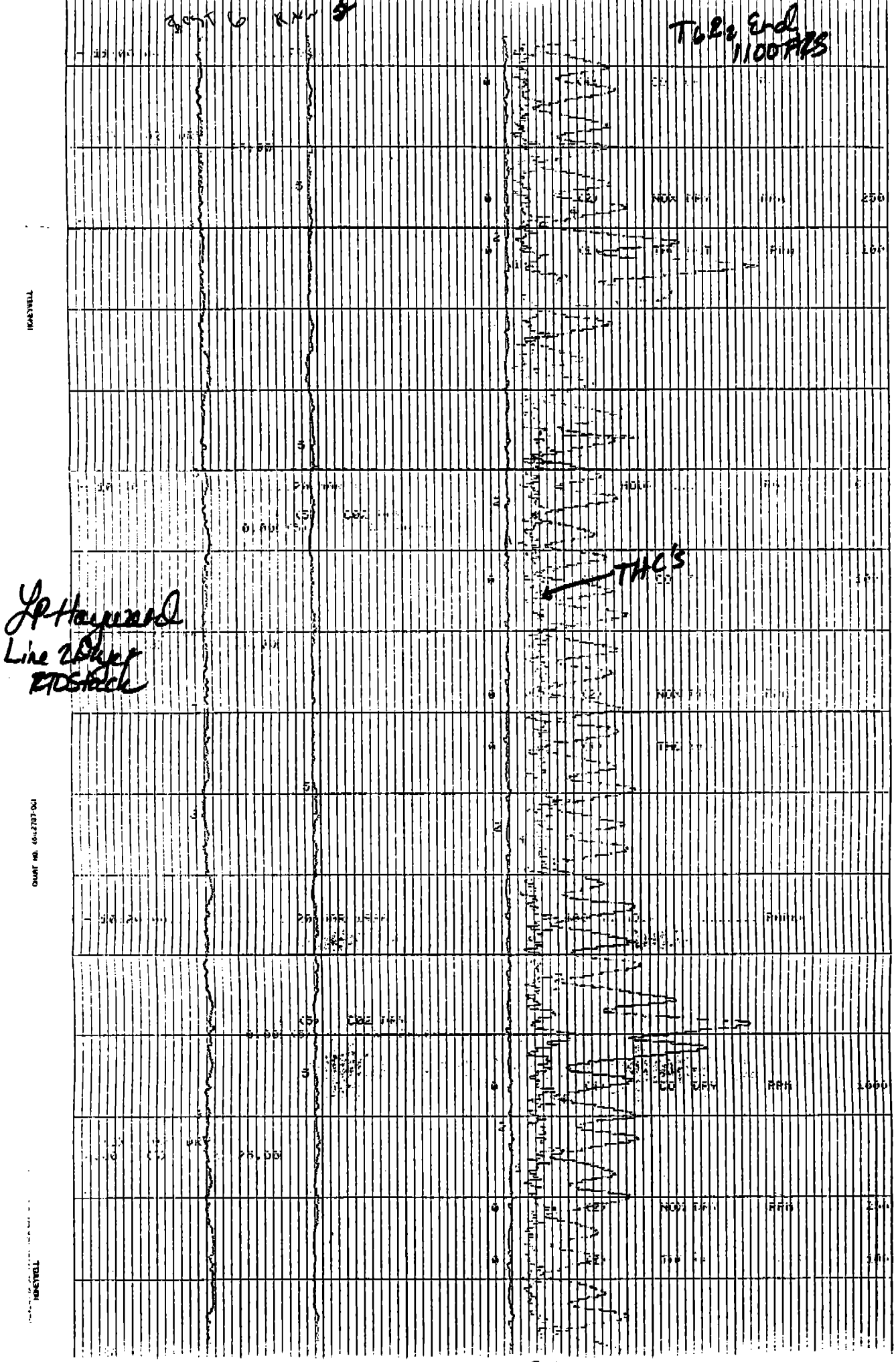

THC's
CO
NOx
LP Hayward
Line 2 Precombust
RTO Stack
3-20-96
Test Run 3
Start
Test Run 3
Test 2 Run 1
CAL 3
HONEYWELL

CO →
← NOx
THC's →


THC's
Scale
0-100
THC's
T6R1
Start
1320 HRS
TEST 6 Run 1
Lg Hayward
Line 2 Dryer RTO Stack
3-19-96

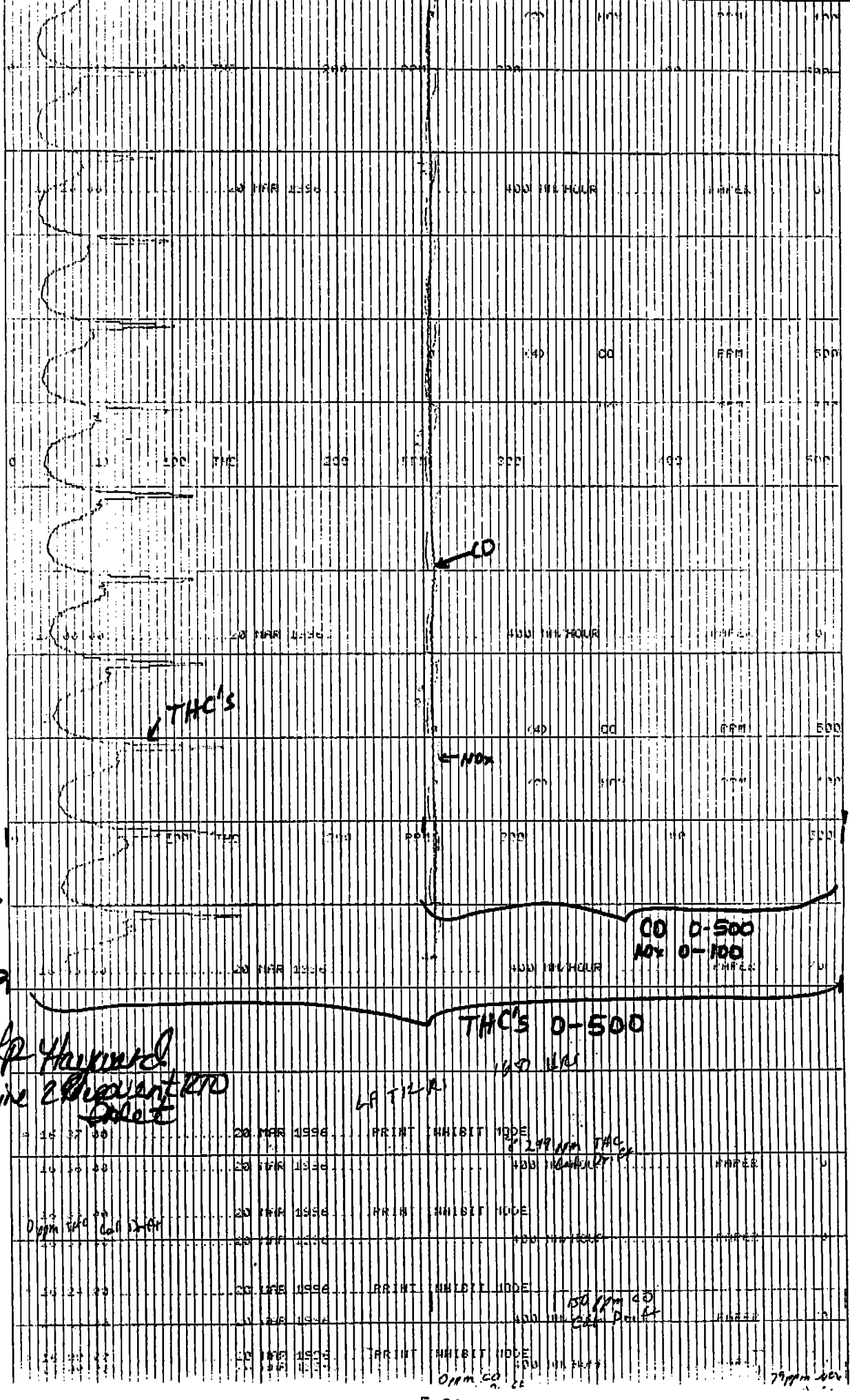

Test 6 Run 3
CAL 3
ToR End
1420HRS
GE Thermal
Line 2 Duct
RTD Stack
3-19-91
THC's
Scale
0-100
100
0

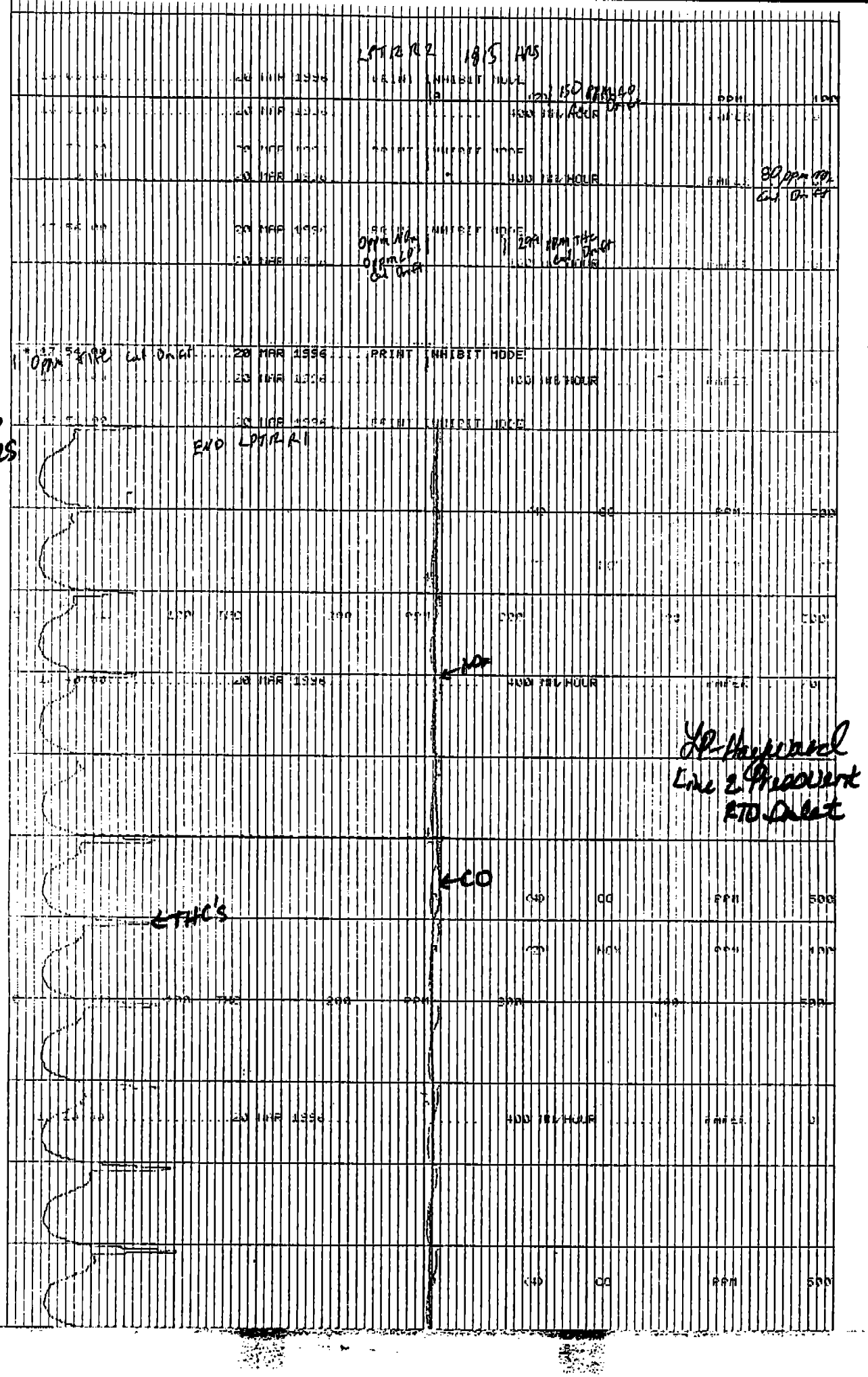

100
THC's
Scale 0-100
Start 1000 HRS
CAL H
CAL H

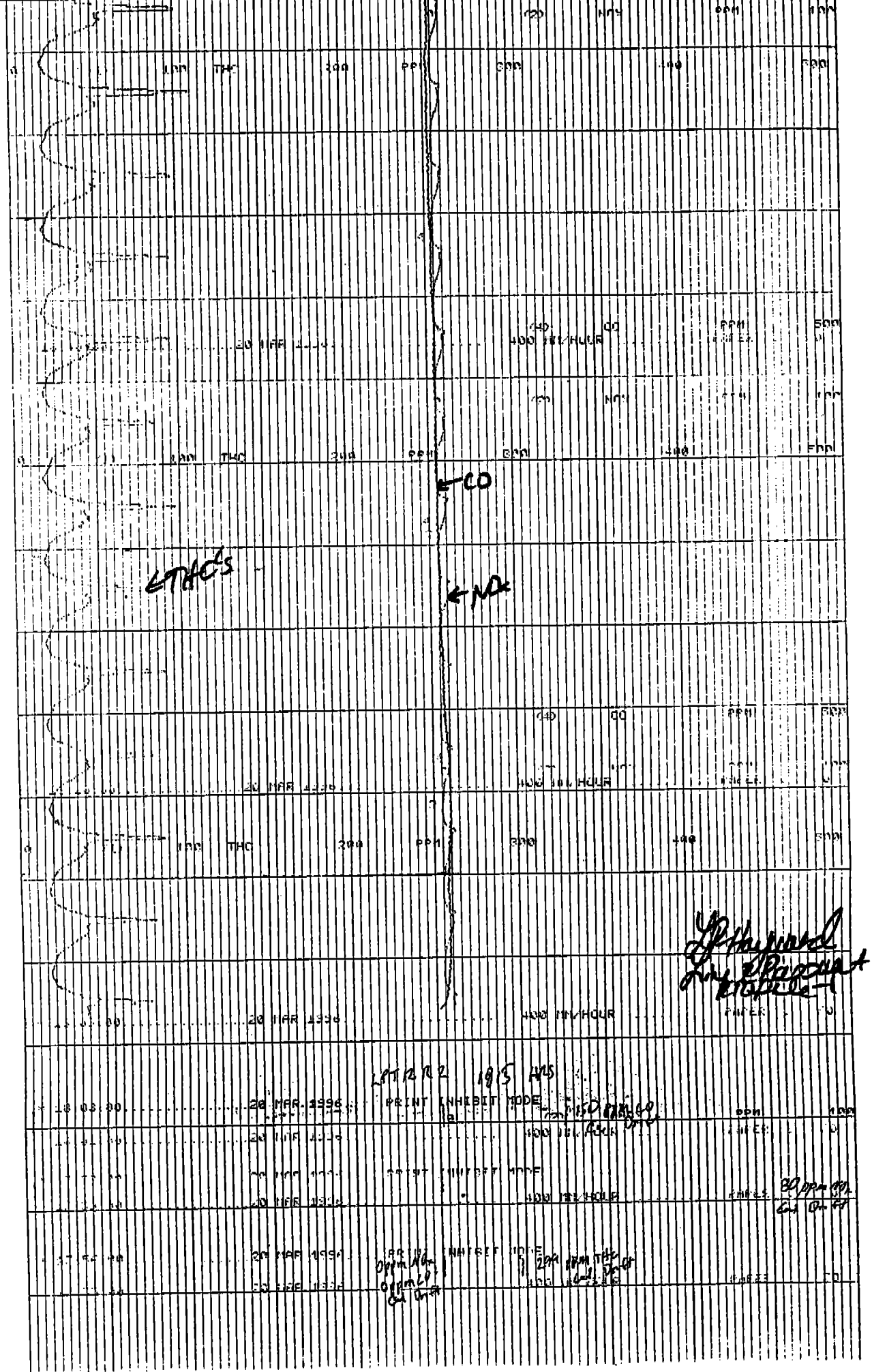

T62 & End 1100 PPS
THC's
LP Hayward
Line 20 Dyed
ETOS Stock
PPM
1000

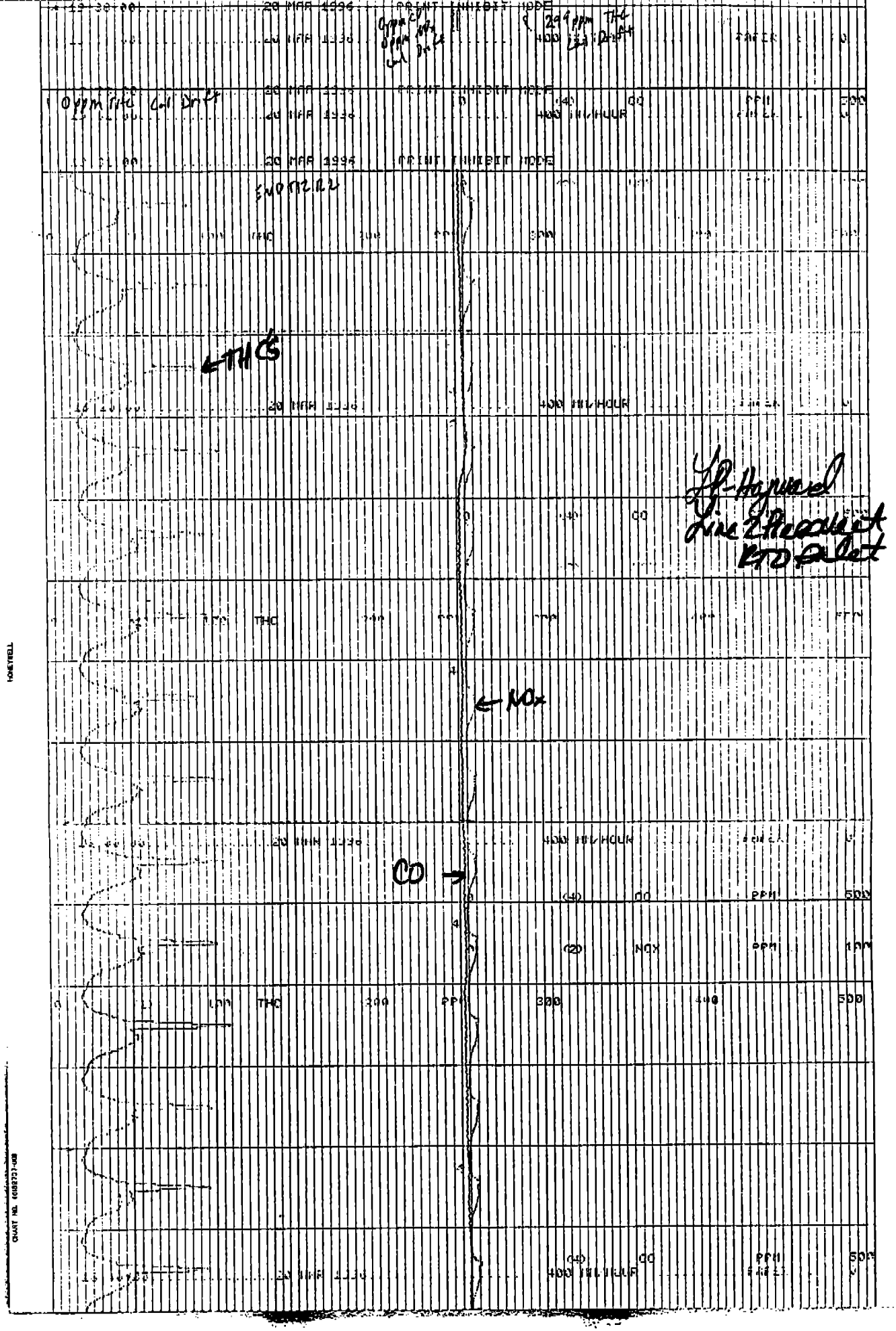
THC's
THC's
Scale 0-100
THC's
LAP - Hayward
Line 2 Dryer Stack
T6 F3 Start
1200 HRS
TICKET CUT 3

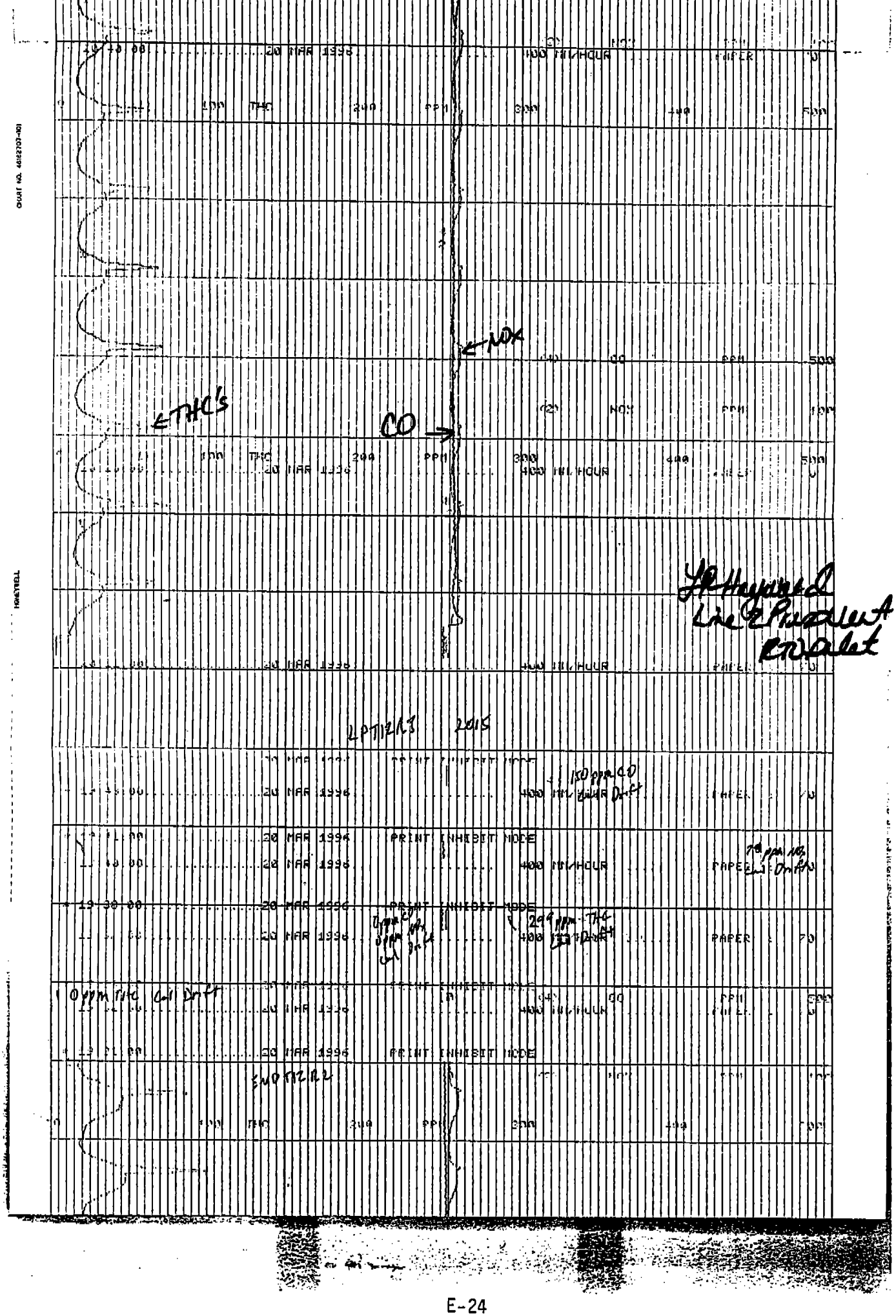
CAL 5
← T6R3 end
1300 HRS
THC's
Lt Hayward
Line 2 Dyer
RTD Track
3-20-96

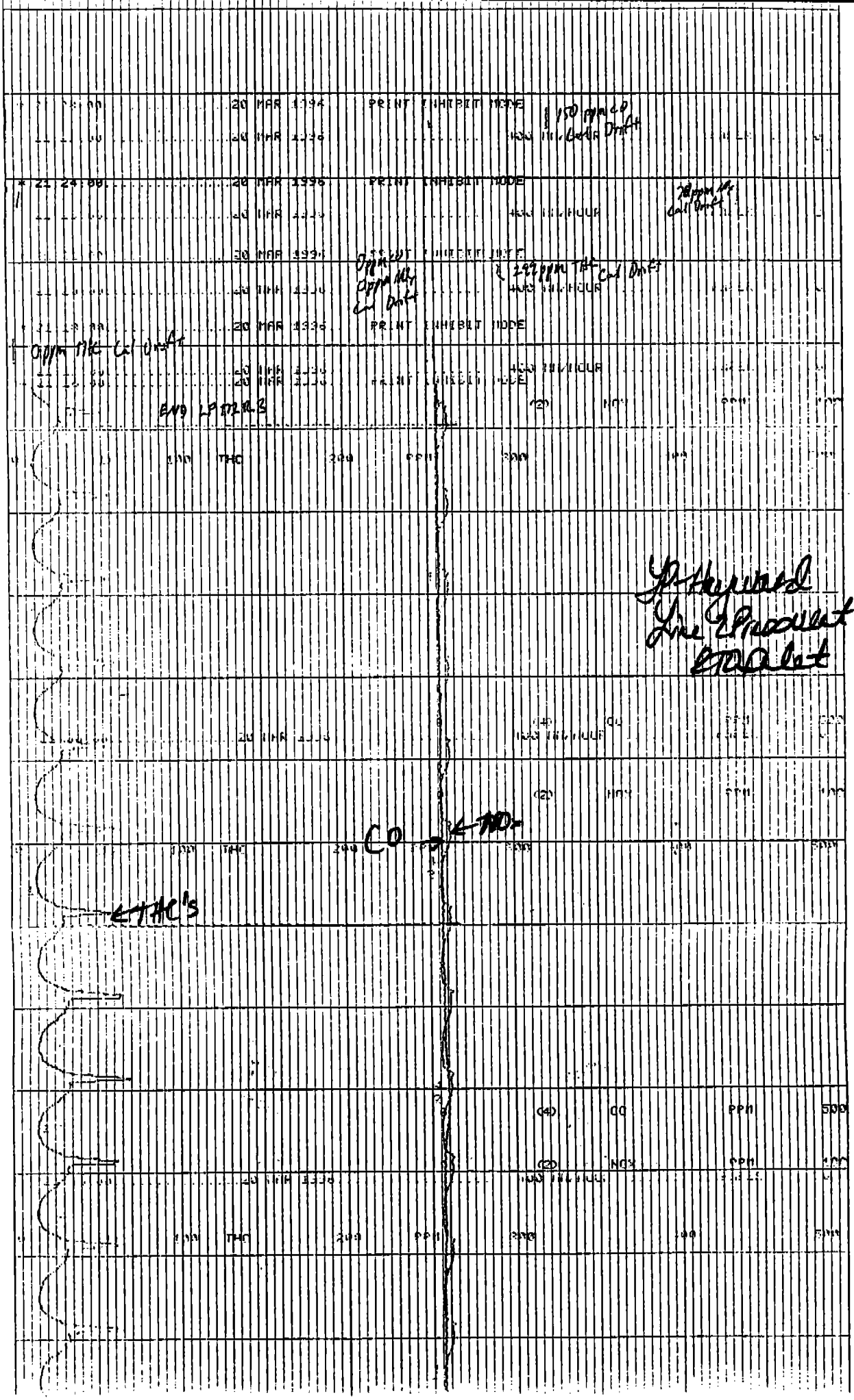

CO
THC's
NOx
CO 0-500
NOx 0-100
THC's 0-500
1650 HRS
Test Start
LA T12-R1
20 MAR 1996 PRINT EXHIBIT MODE
400 PPM HOUR
CHART NO. 40982703-001

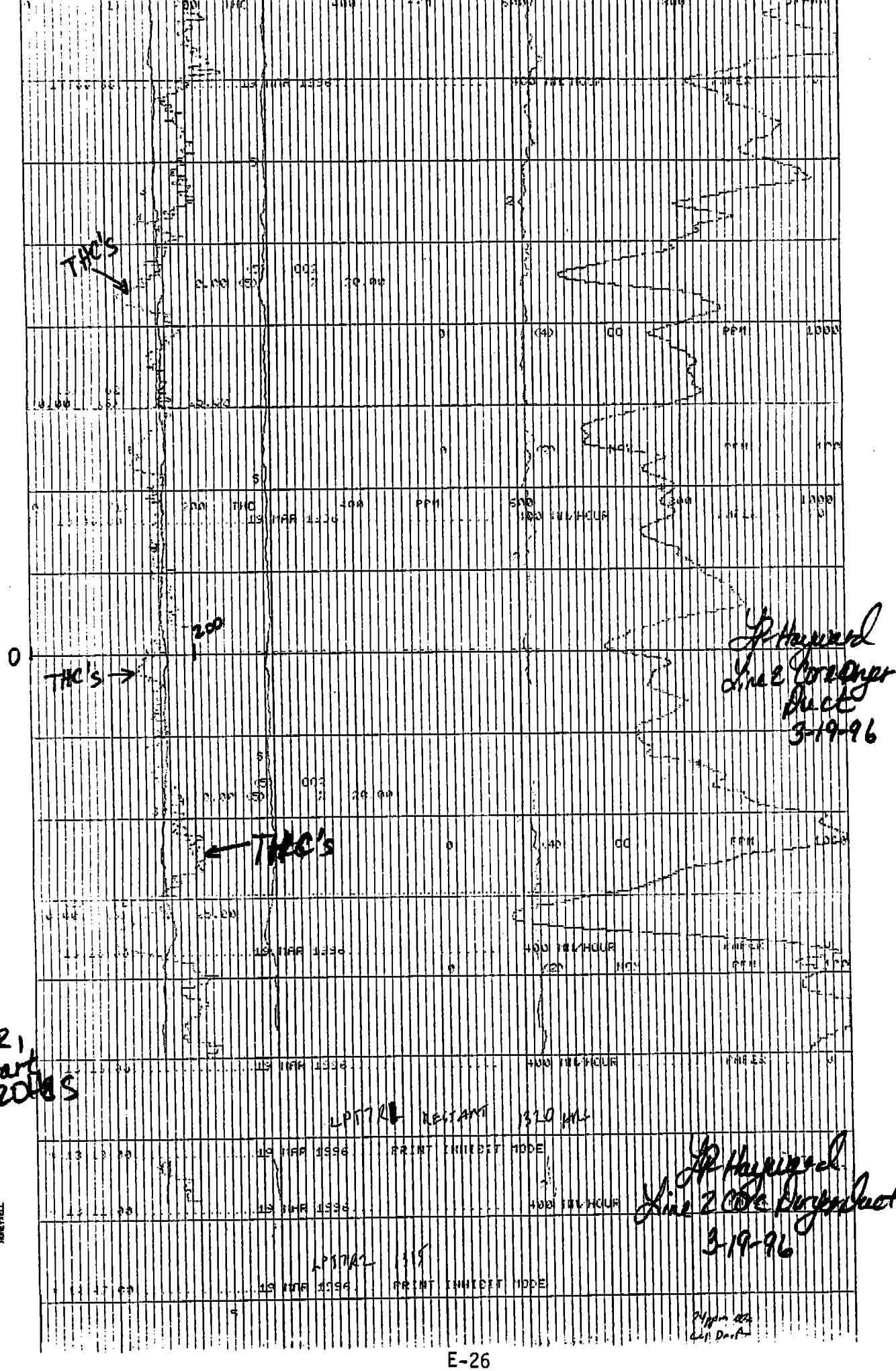

START 1815 HRS
END START
END
THC's
CO
HP-Hexane
Line 2 Propane
FID Detector


THC
PPM
CO
NOx
400 IN/HOUR
20 MAR 1996
PRINT INHIBIT MODE


20 MAR 1996
PRINT INHIBIT MODE
10ppm THC Cal Drift
299 ppm THC Drift
400 MILE/HOUR
PPM
THC
NOx
CO
500
300
100
HONEYWELL


20 MAR 1996
400 INL/HOUR
PAPER
THC
PPM
NOX
CO
←NOX
←THC's
CO →
PRINT INHIBIT MODE
Hayward Lic & Previous Exhalet
2015
150 ppm CO
Dr Ft
10 ppm NOx
Dr Ft
299 ppm THC
Dr Ft
10 ppm THC Cal Dr Ft


20 MAR 1996 PRINT EXHIBIT MODE
150 ppm CO Cal Drift
* 21 24:00
20 MAR 1996 PRINT EXHIBIT MODE
20ppm NO Cal Drift
20 MAR 1996 PRINT EXHIBIT MODE
299 ppm THC Cal Drift
20ppm NO Cal Drift
20 MAR 1996 PRINT EXHIBIT MODE
20ppm NO Cal Drift
END EXHIBIT MODE
HOUR
(2) NO PPM 100
100 THC 200 PPM 300
CO
NO
THC's
(4) CO PPM 500
(2) NOx PPM 100
100 THC 200 PPM 300



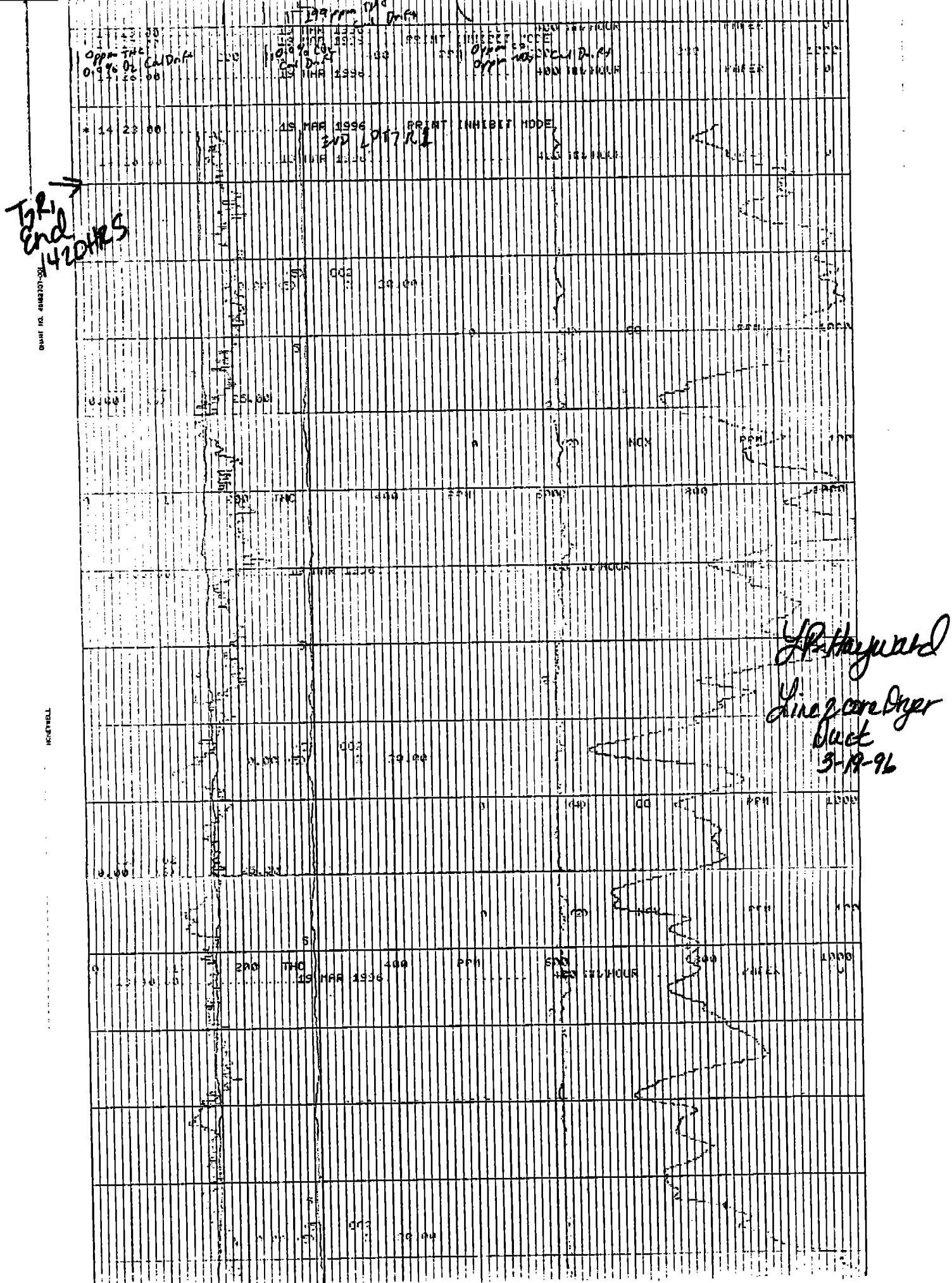
T2R1 Start B2048S

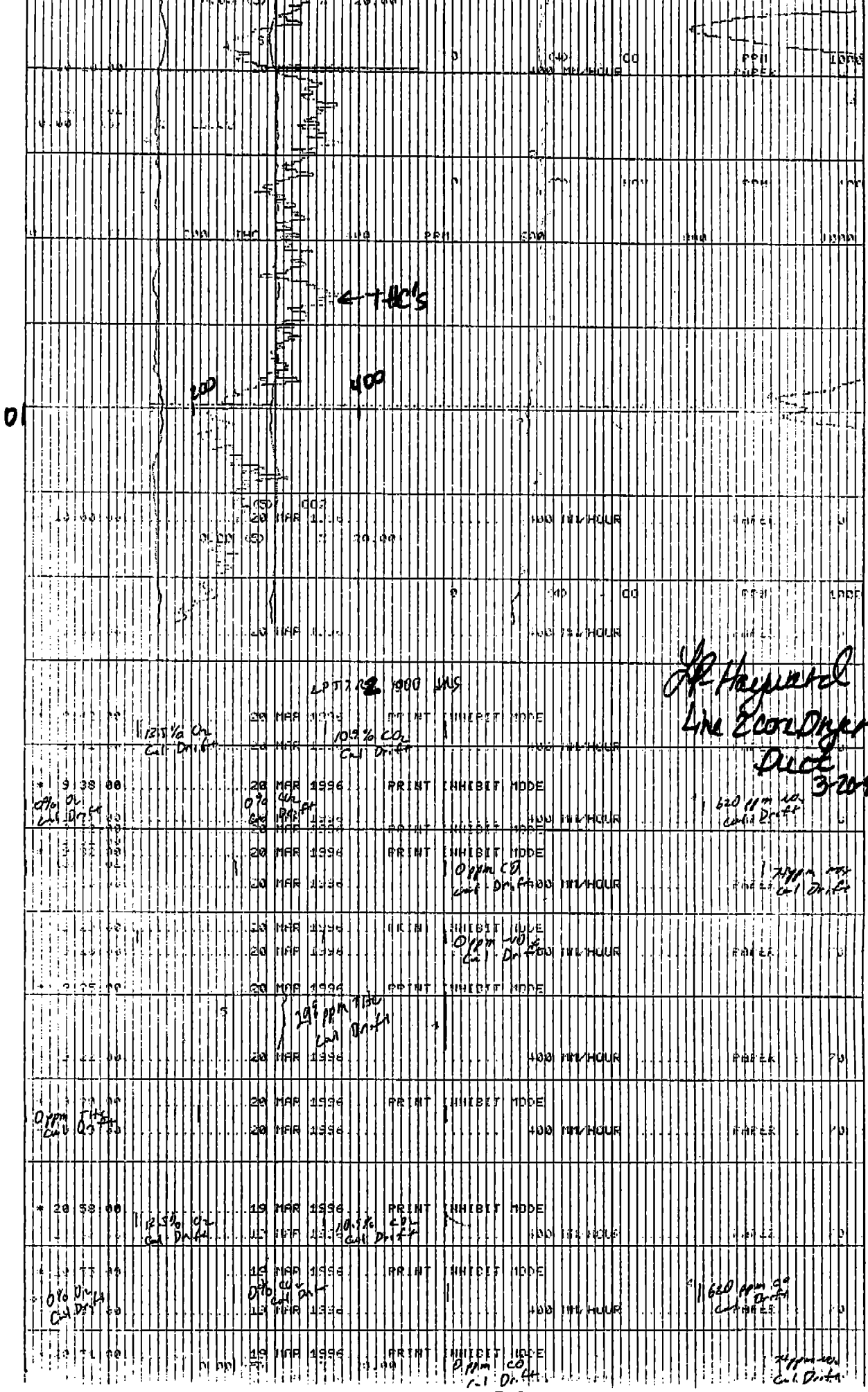
LPTTRL RESTART 1320 HRS

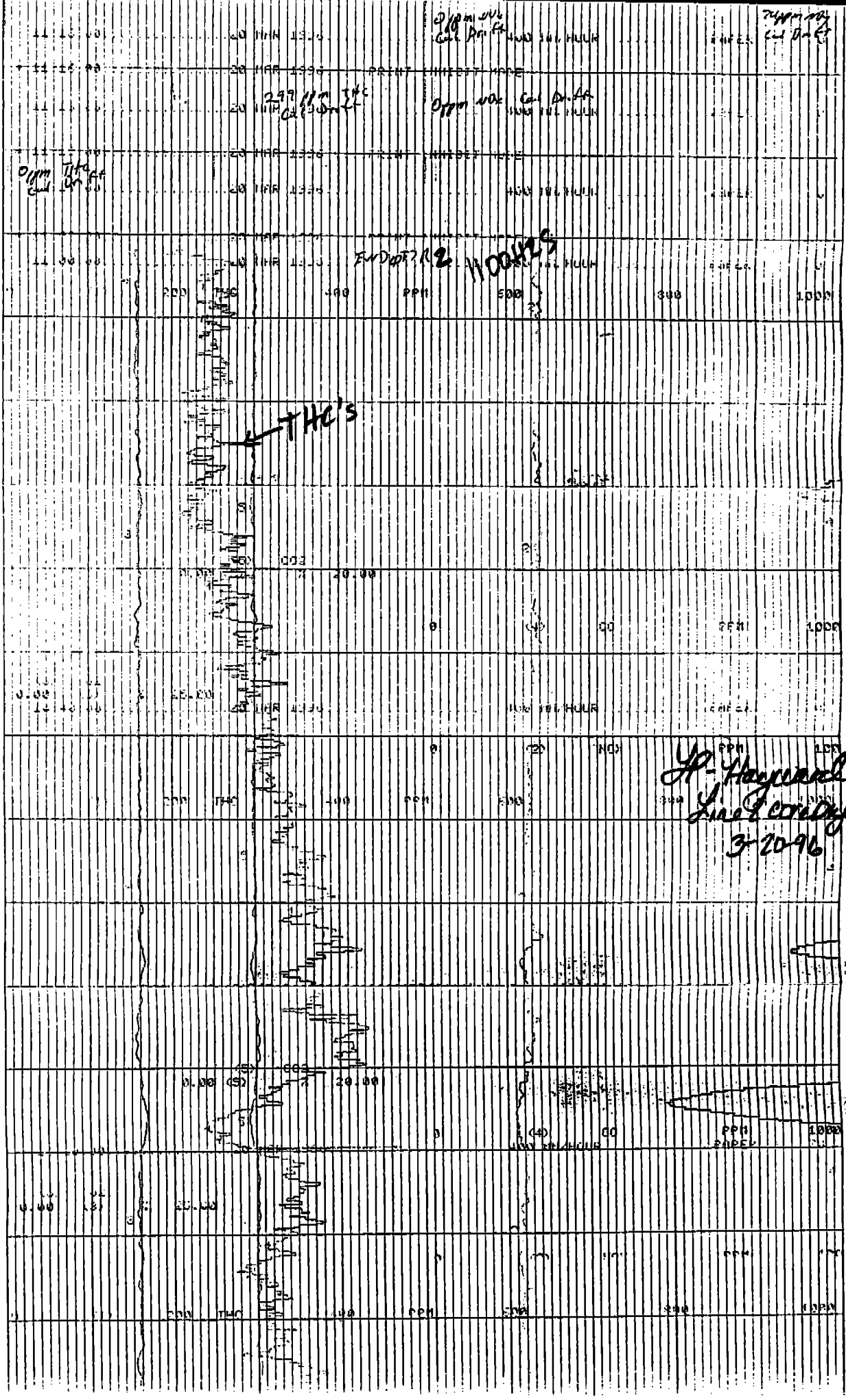
LPTTRL 1319

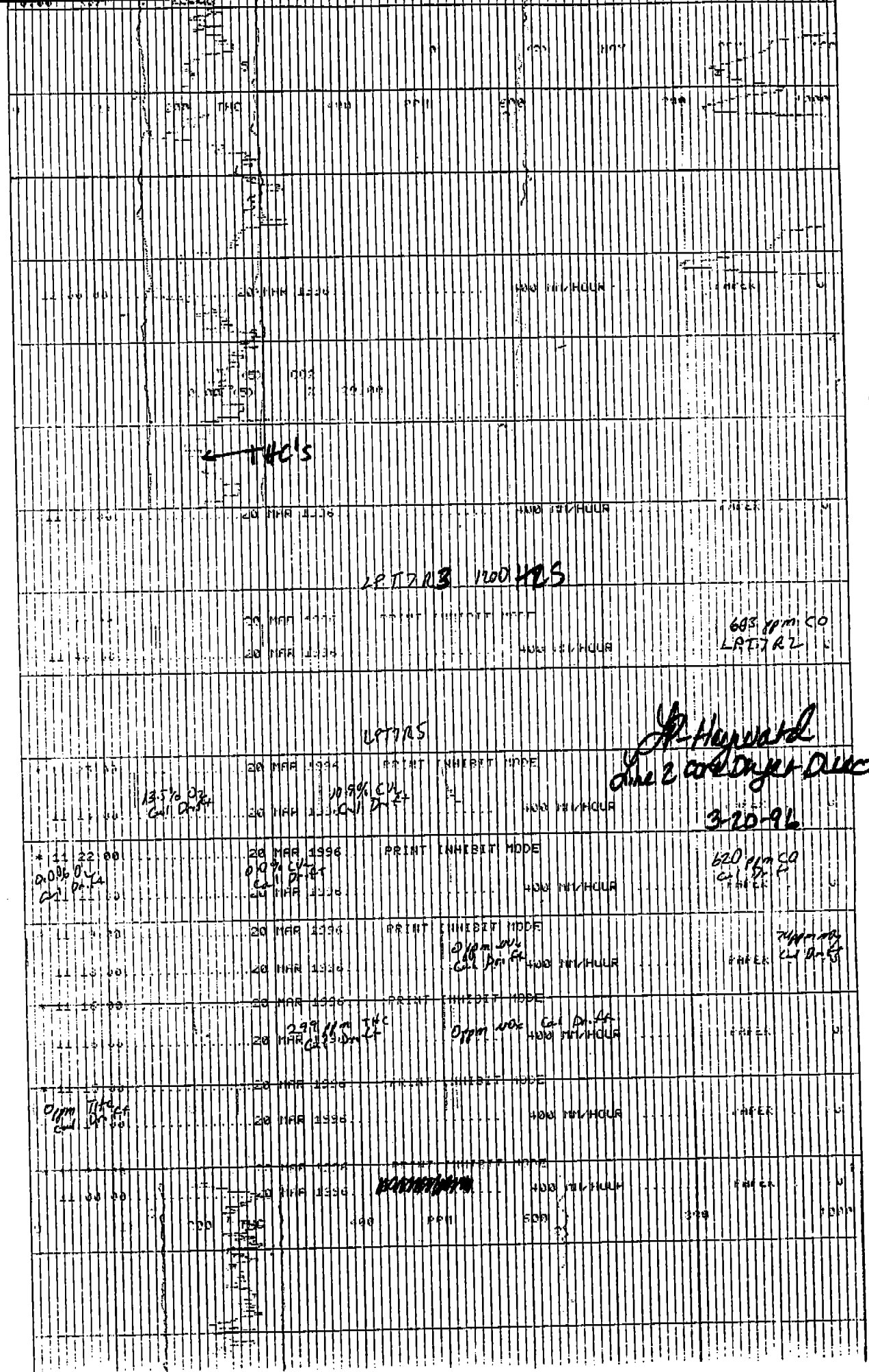
H. Hayward
Line 2 Coroner
Duct
3-19-96

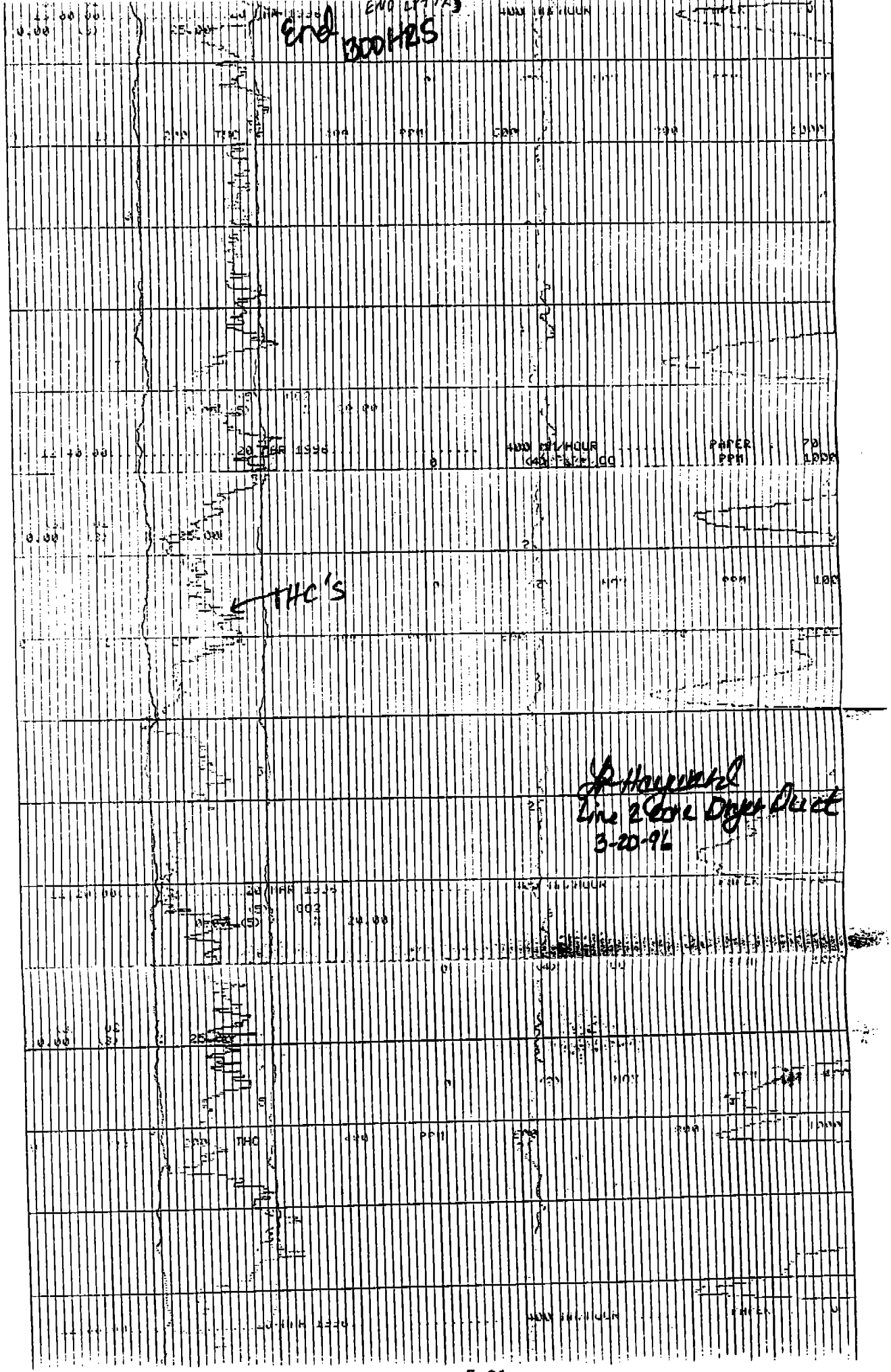
H. Hayward
Line 2 Code Dependent
3-19-96


19 MAR 1996 PRINT INHIBIT MODE
T2R1 End 420HRS
Line 2 core Dryer Duct 3-19-96
HCN
THC
CO
PPM
HOUR


← HCl's
200
400
CO
400 PPM/HOUR
20 MAR 1996
PRINT INHIBIT MODE
400 PPM/HOUR
12.5% O2 Cal Drift
10.5% CO2 Cal Drift
0% O2 Cal Drift
0% CO2 Cal Drift
0 PPM CO Cal Drift
620 PPM CO Cal Drift
Hayward
Line 2 Coal Dryer
Duct
3-2096


THC's
Hangar
Liner Condenser Duct
3-20-96


THC
PPM
400 MV/HOUR
20 MAR 1996
PRINT INHIBIT MODE
← THC's
LATIR3 1200 HCS
603 ppm CO
LATIR2
LATIR5
Hayward
Line 2 coal Dryer Duct
3-20-96
620 ppm CO
Cal Drift
Cal Drift
Cal Drift


End 300 H2S
THC's
R. Hayward
Line 2 Duct Dyer Duct
3-20-92
THC

APPENDIX F

NO_x AND CO DATALOGGER PRINTOUTS

Louisiana - Pacific/Hayward
Line 2 Dryer RTO Stack
Test 6 Run 1

DATE	TIME	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
3/19/96	1:21:00 PM	18.11	16.37	140.38	3.88
	1:22:00 PM	15.46	16.31	184.73	4.00
	1:23:00 PM	14.45	16.39	197.75	4.00
	1:24:00 PM	16.79	15.94	201.82	4.26
	1:25:00 PM	13.02	16.41	199.38	3.93
	1:26:00 PM	15.77	16.26	158.69	4.10
	1:27:00 PM	13.53	16.16	207.93	4.10
	1:28:00 PM	16.58	16.43	203.45	3.92
	1:29:00 PM	20.75	16.16	161.13	4.08
	1:30:00 PM	16.89	16.30	189.21	3.98
	1:31:00 PM	11.80	16.18	189.21	4.09
	1:32:00 PM	17.29	16.01	227.05	4.22
	1:33:00 PM	13.53	16.43	212.00	3.93
	1:34:00 PM	17.29	16.25	179.44	4.11
	1:35:00 PM	13.22	16.18	400.80	4.08
	1:36:00 PM	14.85	16.24	358.48	4.04
	1:37:00 PM	11.70	16.11	325.93	4.18
	1:38:00 PM	9.26	16.38	228.27	3.96
	1:39:00 PM	13.12	16.32	163.17	3.98
	1:40:00 PM	16.38	16.21	206.30	4.05
	1:41:00 PM	16.48	16.41	194.09	3.92
	1:42:00 PM	14.55	16.28	154.62	4.00
	1:43:00 PM	17.29	16.41	179.85	3.84
	1:44:00 PM	22.58	16.50	163.57	3.83
	1:45:00 PM	18.21	16.20	191.65	4.11
	1:46:00 PM	13.94	16.42	192.46	3.95
	1:47:00 PM	11.90	16.16	164.80	4.11
	1:48:00 PM	16.79	16.18	219.32	4.09
	1:49:00 PM	17.40	16.32	218.51	4.03
	1:50:00 PM	14.55	16.35	169.27	3.95
	1:51:00 PM	15.36	16.48	173.34	3.81
	1:52:00 PM	18.51	16.35	161.95	3.98
	1:53:00 PM	17.40	16.14	203.86	4.13
	1:54:00 PM	14.95	16.37	204.67	3.98
	1:55:00 PM	17.29	15.88	177.82	4.32
	1:56:00 PM	14.14	16.13	231.12	4.13
	1:57:00 PM	17.70	16.24	212.81	4.05
	1:58:00 PM	15.46	16.03	203.45	4.21
	1:59:00 PM	16.58	16.47	189.62	3.87
	2:00:00 PM	18.41	16.12	161.54	4.17
	2:01:00 PM	19.43	16.00	223.80	4.25
	2:02:00 PM	15.26	16.29	219.32	4.03
	2:03:00 PM	23.09	16.01	177.00	4.24
	2:04:00 PM	16.38	16.25	209.15	4.00
	2:05:00 PM	21.97	16.26	179.44	4.04
	2:06:00 PM	20.55	16.07	216.06	4.18
	2:07:00 PM	14.04	16.37	198.57	3.92
	2:08:00 PM	22.07	16.11	155.03	4.13
	2:09:00 PM	16.17	16.14	209.55	4.09
	2:10:00 PM	19.94	16.25	210.78	4.05
	2:11:00 PM	14.14	16.00	196.13	4.29
	2:12:00 PM	20.75	16.23	215.25	4.09
	2:13:00 PM	16.38	16.02	187.17	4.22
	2:14:00 PM	13.73	16.00	237.22	4.22
	2:15:00 PM	19.02	16.28	214.84	4.00
	2:16:00 PM	11.70	16.10	162.76	4.10
	2:17:00 PM	14.24	16.14	204.26	4.08
	2:18:00 PM	19.74	16.18	212.40	4.12
	2:19:00 PM	15.06	16.07	207.52	4.13
	2:20:00 PM	14.14	16.43	184.33	3.88
AVERAGES		16.30	16.20	202.10	4.10

Louisiana - Pacific/Hayward
Line 2 Dryer RTO Stack
Test 6 Run 2

DATE	TIME	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
3/20/96	10:01:58 AM	16.07	16.61	262.45	4.13
	10:02:58 AM	14.04	16.71	234.38	3.99
	10:03:58 AM	12.41	16.69	209.15	4.05
	10:04:58 AM	9.97	16.88	209.55	3.96
	10:05:58 AM	15.46	16.41	200.20	4.34
	10:06:58 AM	14.95	16.23	292.56	4.39
	10:07:58 AM	15.16	16.57	265.30	4.18
	10:08:58 AM	14.04	16.23	214.84	4.52
	10:09:58 AM	16.99	16.09	296.63	4.53
	10:10:58 AM	12.61	16.33	301.51	4.35
	10:11:58 AM	17.50	16.18	253.91	4.45
	10:12:58 AM	16.79	16.54	263.67	4.13
	10:13:58 AM	14.24	16.46	446.37	4.23
	10:14:58 AM	11.29	16.55	538.33	4.17
	10:15:58 AM	14.24	16.65	379.23	4.10
	10:16:58 AM	12.41	16.17	249.84	4.46
	10:17:58 AM	15.36	16.23	305.99	4.44
	10:18:58 AM	11.80	16.30	305.58	4.40
	10:19:58 AM	13.73	16.21	246.99	4.44
	10:20:58 AM	12.82	16.69	262.86	4.04
	10:21:58 AM	13.63	16.55	225.42	4.24
	10:22:58 AM	14.55	16.23	280.76	4.47
	10:23:58 AM	14.55	16.40	267.74	4.28
	10:24:58 AM	16.79	16.06	223.39	4.57
	10:25:58 AM	13.94	16.21	302.33	4.45
	10:26:58 AM	13.84	16.54	271.00	4.19
	10:27:58 AM	13.02	16.44	202.23	4.22
	10:28:58 AM	15.26	16.52	252.28	4.20
	10:29:58 AM	13.63	16.37	257.16	4.25
	10:30:58 AM	14.75	16.46	237.63	4.26
	10:31:58 AM	13.63	16.56	250.24	4.22
	10:32:58 AM	13.22	16.36	207.11	4.40
	10:33:58 AM	14.04	16.27	290.12	4.38
	10:34:58 AM	13.84	16.56	256.76	4.20
	10:35:58 AM	16.28	16.52	184.73	4.20
	10:36:58 AM	14.14	16.69	230.31	4.01
	10:37:58 AM	14.14	16.66	226.24	4.10
	10:38:58 AM	14.04	16.23	220.95	4.42
	10:39:58 AM	15.56	16.61	240.89	4.15
	10:40:58 AM	16.17	16.29	204.26	4.35
	10:41:58 AM	15.46	16.20	272.22	4.47
	10:42:58 AM	16.07	16.36	268.56	4.36
	10:43:58 AM	13.73	16.37	192.46	4.31
	10:44:58 AM	15.56	16.98	209.96	3.84
	10:45:58 AM	15.46	16.79	205.89	4.02
	10:46:58 AM	18.41	16.25	197.75	4.44
	10:47:58 AM	15.67	16.41	244.55	4.24
	10:48:58 AM	15.36	16.49	402.43	4.13
	10:49:58 AM	15.46	16.27	541.99	4.31
	10:50:58 AM	13.02	16.52	388.18	4.22
	10:51:58 AM	16.38	16.28	236.00	4.45
	10:52:58 AM	16.68	16.30	289.31	4.40
	10:53:58 AM	16.17	16.44	264.89	4.35
	10:54:58 AM	19.63	16.36	192.46	4.36
	10:55:58 AM	16.89	16.23	256.35	4.44
	10:56:58 AM	18.31	16.36	246.18	4.30
	10:57:58 AM	17.40	16.12	244.55	4.55
	10:58:58 AM	18.82	16.42	253.91	4.29
	10:59:58 AM	19.33	16.25	207.52	4.49
	11:00:58 AM	16.68	16.44	265.30	4.23
AVERAGES		15.02	16.42	265.86	4.28

Louisiana - Pacific/Hayward
Line 2 Dryer RTO Stack
Test 6 Run 3

DATE	TIME	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
3/20/96	12:01:58 PM	15.67	16.79	169.27	3.95
	12:02:58 PM	19.33	16.17	229.09	4.38
	12:03:58 PM	19.12	16.36	232.34	4.24
	12:04:58 PM	19.53	16.14	174.15	4.46
	12:05:58 PM	19.43	16.16	251.47	4.41
	12:06:58 PM	15.26	16.60	233.97	4.06
	12:07:58 PM	19.63	16.56	150.96	4.12
	12:08:58 PM	19.53	16.82	181.48	3.85
	12:09:58 PM	18.01	16.73	168.86	3.95
	12:10:58 PM	19.02	16.27	190.84	4.39
	12:11:58 PM	21.57	16.43	214.84	4.20
	12:12:58 PM	19.63	16.20	179.44	4.44
	12:13:58 PM	21.46	16.20	236.82	4.36
	12:14:58 PM	21.46	16.46	223.39	4.22
	12:15:58 PM	21.26	16.17	168.46	4.43
	12:16:58 PM	21.77	16.16	220.95	4.35
	12:17:58 PM	23.60	16.25	225.02	4.32
	12:18:58 PM	24.11	16.05	202.64	4.50
	12:19:58 PM	20.96	16.50	319.42	4.10
	12:20:58 PM	19.12	16.40	328.37	4.19
	12:21:58 PM	23.30	16.24	387.78	4.31
	12:22:58 PM	18.11	16.62	207.52	4.01
	12:23:58 PM	19.94	16.26	148.93	4.31
	12:24:58 PM	22.58	16.29	214.03	4.31
	12:25:58 PM	19.53	16.36	227.87	4.31
	12:26:58 PM	18.51	16.24	178.63	4.35
	12:27:58 PM	22.38	16.51	195.72	4.05
	12:28:58 PM	20.55	16.31	193.69	4.31
	12:29:58 PM	20.96	16.17	216.06	4.32
	12:30:58 PM	19.23	16.40	208.33	4.22
	12:31:58 PM	23.70	15.92	184.73	4.54
	12:32:58 PM	20.75	16.14	256.76	4.45
	12:33:58 PM	19.53	16.38	231.12	4.25
	12:34:58 PM	20.35	16.16	171.71	4.35
	12:35:58 PM	22.38	16.46	211.18	4.11
	12:36:58 PM	21.36	16.32	210.37	4.34
	12:37:58 PM	19.23	16.07	206.30	4.42
	12:38:58 PM	19.74	16.24	231.12	4.38
	12:39:58 PM	23.50	15.96	205.49	4.62
	12:40:58 PM	22.28	15.92	262.86	4.59
	12:41:58 PM	24.11	16.38	231.53	4.26
	12:42:58 PM	21.06	16.35	158.29	4.19
	12:43:58 PM	19.84	16.44	205.89	4.22
	12:44:58 PM	23.91	16.16	224.20	4.44
	12:45:58 PM	21.36	15.93	193.69	4.58
	12:46:58 PM	21.26	16.23	225.42	4.32
	12:47:58 PM	24.01	16.16	201.42	4.40
	12:48:58 PM	23.70	16.09	224.20	4.40
	12:49:58 PM	22.48	16.34	209.55	4.26
	12:50:58 PM	21.06	15.99	170.09	4.57
	12:51:58 PM	23.60	15.99	246.58	4.50
	12:52:58 PM	23.30	16.22	254.31	4.34
	12:53:58 PM	22.07	15.96	220.13	4.50
	12:54:58 PM	20.45	15.95	279.95	4.56
	12:55:58 PM	22.28	16.02	233.56	4.46
	12:56:58 PM	24.41	16.11	218.51	4.44
	12:57:58 PM	22.99	16.50	204.26	4.13
	12:58:58 PM	21.46	16.31	160.73	4.28
	12:59:58 PM	24.11	15.91	233.97	4.57
	1:00:58 PM	24.41	16.29	239.26	4.33
AVERAGES		21.15	16.26	216.46	4.32

INTERPOLL LABS
EXTRACTION CEM TR2

LP / HAYWARD WI
LINE 2 CORE DRYER / DUCT
TEST 7 / RUN 1

DATE	TIME	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
3/19/96	1:21:18 PM	22.01	16.56	201.46	4.06
	1:22:18 PM	23.20	16.41	428.59	4.51
	1:23:18 PM	23.46	16.16	623.58	4.77
	1:24:18 PM	23.46	15.88	912.15	4.94
	1:25:18 PM	22.79	16.05	955.04	4.80
	1:26:18 PM	23.24	16.27	796.19	4.60
	1:27:18 PM	22.92	16.33	691.86	4.55
	1:28:18 PM	22.17	16.58	580.45	4.32
	1:29:18 PM	21.77	16.66	496.14	4.28
	1:30:18 PM	22.04	16.40	536.99	4.51
	1:31:18 PM	22.08	16.49	559.62	4.39
	1:32:18 PM	22.10	16.46	528.12	4.44
	1:33:18 PM	21.75	16.74	476.28	4.20
	1:34:18 PM	21.77	16.43	483.85	4.52
	1:35:18 PM	22.78	16.15	697.23	4.74
	1:36:18 PM	22.56	16.30	715.38	4.60
	1:37:18 PM	22.19	16.39	631.80	4.50
	1:38:18 PM	22.46	16.55	551.80	4.37
	1:39:18 PM	23.47	16.44	539.27	4.48
	1:40:18 PM	22.20	16.46	565.23	4.48
	1:41:18 PM	21.71	16.55	552.62	4.39
	1:42:18 PM	22.96	16.70	515.67	4.19
	1:43:18 PM	22.87	16.78	366.83	4.19
	1:44:18 PM	21.93	16.45	464.49	4.52
	1:45:18 PM	22.01	16.31	634.16	4.57
	1:46:18 PM	21.69	16.39	633.83	4.53
	1:47:18 PM	21.71	16.54	599.27	4.41
	1:48:18 PM	22.21	16.38	577.84	4.59
	1:49:18 PM	22.49	16.37	692.58	4.47
	1:50:18 PM	22.09	16.95	442.92	4.04
	1:51:18 PM	23.20	16.44	432.26	4.50
	1:52:18 PM	22.95	16.35	607.47	4.61
	1:53:18 PM	22.10	16.31	693.96	4.57
	1:54:18 PM	22.35	16.10	697.97	4.85
	1:55:18 PM	22.78	16.04	905.16	4.91
	1:56:18 PM	23.86	16.17	792.61	4.76
	1:57:18 PM	24.59	16.09	838.34	4.83
	1:58:18 PM	23.72	16.21	768.54	4.68
	1:59:18 PM	24.16	16.30	678.19	4.67
	2:00:18 PM	25.94	15.90	770.72	5.05
	2:01:18 PM	24.65	15.95	991.66	4.88
	2:02:18 PM	24.71	16.12	887.35	4.63
	2:03:18 PM	23.95	16.17	935.61	4.39
	2:04:37 PM	23.99	16.27	772.26	4.68
	2:05:37 PM	24.29	16.22	782.43	4.69
	2:06:37 PM	23.54	16.49	651.01	4.44
	2:07:37 PM	24.55	16.44	527.31	4.49
	2:08:37 PM	23.66	16.24	638.80	4.77
	2:09:37 PM	25.01	16.07	823.29	4.82
	2:10:37 PM	24.03	16.15	797.81	4.81
	2:11:37 PM	24.09	16.01	894.98	4.93
	2:12:37 PM	24.99	15.99	957.33	4.90
	2:13:37 PM	24.66	16.02	952.19	4.90
	2:14:37 PM	24.74	16.04	925.26	4.92
	2:15:37 PM	24.42	16.10	930.95	4.80
	2:16:37 PM	24.53	16.26	757.21	4.70
	2:17:37 PM	24.28	16.15	613.60	4.80
	2:18:37 PM	23.97	16.23	828.82	4.68
	2:19:37 PM	24.15	16.36	692.75	4.60
	2:20:37 PM	24.78	16.33	640.83	4.66
AVERAGES		23.25	16.32	680.78	4.59

INTERPOLL LABS
EXTRACTION CEM TR2

LP / HAYWARD, WI
LINE 2 CORE DRYER / DUCT
TEST 7 / RUN 2

DATE	TIME	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
3/20/96	10:01:59 AM	21.24	15.48	1551.22	5.16
	10:02:59 AM	20.05	16.19	1242.55	4.68
	10:03:59 AM	20.00	16.39	891.47	4.59
	10:04:59 AM	20.75	16.24	867.22	4.74
	10:05:59 AM	22.62	15.61	1166.86	5.24
	10:06:59 AM	22.41	15.46	1512.61	5.25
	10:07:59 AM	22.37	15.63	1453.69	5.14
	10:08:59 AM	23.33	15.60	1421.18	5.22
	10:09:59 AM	23.61	15.24	1540.56	5.39
	10:10:59 AM	22.29	15.80	1443.15	5.06
	10:11:59 AM	22.91	15.67	1406.61	5.14
	10:12:59 AM	23.98	15.62	1360.69	5.21
	10:13:59 AM	22.89	15.65	1449.34	5.09
	10:14:59 AM	23.16	15.79	1299.00	5.10
	10:15:59 AM	23.55	15.63	1396.02	5.22
	10:16:59 AM	23.62	15.50	1480.59	5.26
	10:17:59 AM	24.03	15.58	1458.78	5.26
	10:18:59 AM	24.31	15.66	1460.69	5.13
	10:19:59 AM	22.86	16.23	1270.79	4.60
	10:20:59 AM	22.17	16.72	737.91	4.39
	10:21:59 AM	22.95	16.19	769.32	4.81
	10:22:59 AM	24.37	15.87	1139.36	5.04
	10:23:59 AM	25.60	15.40	1454.46	5.37
	10:24:59 AM	26.49	15.41	1595.48	5.31
	10:25:59 AM	25.00	15.70	1540.07	5.02
	10:26:59 AM	24.68	16.01	1264.11	4.87
	10:27:59 AM	23.85	16.34	1083.78	4.62
	10:28:59 AM	26.47	15.91	1039.75	5.05
	10:29:59 AM	25.89	15.85	1346.63	4.93
	10:30:59 AM	26.34	15.95	1177.44	5.01
	10:31:59 AM	26.26	15.74	1342.48	5.02
	10:32:59 AM	25.48	15.85	1291.54	5.02
	10:33:59 AM	25.16	15.99	1315.87	4.88
	10:34:59 AM	25.64	16.00	1172.15	4.91
	10:35:59 AM	25.79	15.94	1226.92	4.91
	10:36:59 AM	25.52	16.00	1166.95	4.89
	10:37:59 AM	26.92	15.79	1214.15	5.05
	10:38:59 AM	26.51	15.79	1332.60	5.09
	10:39:59 AM	26.49	15.96	1288.77	4.89
	10:40:59 AM	27.05	15.87	1214.63	4.96
	10:41:59 AM	28.05	15.85	1212.03	5.09
	10:42:59 AM	27.57	15.67	1417.03	5.15
	10:43:59 AM	27.10	15.78	1388.14	4.99
	10:44:59 AM	26.72	15.94	1191.36	4.90
	10:45:59 AM	27.69	15.87	1225.38	5.02
	10:46:59 AM	27.89	15.78	1270.14	5.06
	10:47:59 AM	28.05	15.92	1279.74	4.90
	10:48:59 AM	27.80	16.20	999.46	4.78
	10:50:03 AM	27.89	15.98	1036.82	4.92
	10:51:03 AM	27.04	15.86	1218.22	4.97
	10:52:03 AM	27.10	15.72	1277.22	5.10
	10:53:03 AM	27.90	15.84	1257.44	4.99
	10:54:03 AM	28.50	15.74	1236.28	5.15
	10:55:03 AM	27.78	15.47	1404.90	5.24
	10:56:03 AM	27.31	15.69	1400.91	5.13
	10:57:03 AM	27.91	15.70	1354.04	5.14
	10:58:03 AM	28.13	15.60	1363.48	5.20
	10:59:03 AM	27.48	15.83	1345.17	5.03
	11:00:03 AM	27.74	15.78	1351.43	4.99
AVERAGES		25.26	15.82	1281.39	5.02

INTERPOLL LABS
EXTRACTION CEM TR2

LP / HAYWARD, WI
LINE 2 CORE DRYER / DUCT
TEST 7 / RUN 3

DATE	TIME	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
3/20/96	12:01:49 PM	21.36	16.13	900.83	4.90
	12:02:49 PM	23.06	15.69	1255.72	5.29
	12:03:49 PM	23.34	15.78	1449.24	5.15
	12:04:49 PM	24.06	15.66	1447.63	5.24
	12:05:49 PM	23.93	15.85	1397.61	5.12
	12:06:49 PM	21.83	16.47	1162.67	4.53
	12:07:49 PM	22.61	16.36	750.33	4.71
	12:08:49 PM	22.74	16.47	772.65	4.64
	12:09:49 PM	23.13	16.30	783.20	4.76
	12:10:49 PM	25.13	15.86	1017.97	5.20
	12:11:49 PM	24.36	15.90	1297.78	5.05
	12:12:49 PM	24.84	15.93	1199.65	5.09
	12:13:49 PM	25.55	15.83	1205.69	5.16
	12:14:49 PM	25.44	15.95	1284.40	5.11
	12:15:49 PM	25.96	15.91	1211.17	5.09
	12:16:49 PM	26.80	15.87	1143.74	5.19
	12:17:49 PM	27.41	15.82	1205.85	5.22
	12:18:49 PM	26.41	15.91	1266.92	4.96
	12:19:49 PM	25.90	16.41	793.03	4.69
	12:20:49 PM	26.12	16.30	985.73	4.81
	12:21:49 PM	26.28	16.15	764.43	4.89
	12:22:49 PM	26.47	16.05	872.63	5.01
	12:23:49 PM	26.97	15.82	1103.61	5.19
	12:24:49 PM	28.13	15.56	1250.16	5.42
	12:25:49 PM	28.00	15.70	1343.30	5.24
	12:26:49 PM	26.53	16.03	1175.16	4.85
	12:27:49 PM	25.22	16.61	662.92	4.58
	12:28:49 PM	26.85	16.08	765.96	4.97
	12:29:49 PM	25.95	16.14	910.09	4.91
	12:30:49 PM	28.13	15.73	1031.67	5.32
	12:31:49 PM	29.19	15.49	1423.14	5.44
	12:32:49 PM	28.03	15.81	1366.90	5.11
	12:33:49 PM	27.83	16.04	1115.62	5.00
	12:34:49 PM	27.09	16.12	1019.66	4.83
	12:35:49 PM	26.84	16.49	772.32	4.69
	12:36:49 PM	27.34	15.97	870.45	5.07
	12:37:49 PM	27.91	15.82	1160.25	5.25
	12:38:49 PM	29.36	15.36	1458.02	5.54
	12:39:49 PM	30.75	15.40	1526.51	5.56
	12:40:49 PM	29.92	15.61	1525.78	5.27
	12:41:49 PM	28.82	16.02	1214.79	4.91
	12:42:49 PM	26.97	16.55	781.11	4.57
	12:43:49 PM	27.60	16.26	691.68	4.86
	12:44:49 PM	31.04	15.45	1158.16	5.54
	12:45:49 PM	30.09	15.70	1370.29	5.26
	12:46:49 PM	29.82	15.64	1297.30	5.29
	12:47:49 PM	28.40	15.88	1245.17	5.11
	12:48:49 PM	28.53	15.94	1137.05	5.10
	12:49:49 PM	29.09	15.82	1103.05	5.21
	12:50:49 PM	29.44	15.73	1215.44	5.24
	12:51:49 PM	29.23	15.77	1200.62	5.22
	12:52:49 PM	28.90	15.77	1213.75	5.21
	12:53:49 PM	29.80	15.82	1160.25	5.24
	12:54:49 PM	31.15	15.49	1330.33	5.48
	12:55:49 PM	31.39	15.39	1412.34	5.51
	12:56:49 PM	29.69	15.83	1320.34	5.16
	12:57:49 PM	29.23	16.06	1048.89	4.93
	12:58:49 PM	28.94	16.40	760.72	4.71
	12:59:49 PM	32.30	15.51	970.60	5.49
	1:00:49 PM	30.58	15.70	1335.69	5.27
AVERAGES		27.23	15.92	1121.27	5.09

Louisiana - Pacific/Hayward
Line 2 Konus Stack
Test 16 Run 1

DATE	TIME	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
3/18/96	10:37:57 AM	47.27	18.17	321.53	3.28
	10:38:57 AM	44.63	18.09	229.57	3.03
	10:39:57 AM	46.88	18.29	261.15	3.20
	10:40:57 AM	55.69	18.14	314.45	3.76
	10:41:57 AM	59.44	17.59	184.41	4.20
	10:42:57 AM	61.16	17.12	132.57	4.40
	10:43:57 AM	60.65	16.88	120.20	4.28
	10:44:57 AM	61.20	16.94	133.14	4.41
	10:45:57 AM	62.83	16.74	129.56	4.81
	10:46:57 AM	63.13	16.22	121.42	4.69
	10:47:57 AM	61.10	16.31	119.47	4.28
	10:48:57 AM	59.89	16.72	126.79	4.02
	10:49:57 AM	55.77	16.99	137.29	3.81
	10:50:57 AM	54.42	17.23	140.38	3.98
	10:51:57 AM	54.26	17.12	122.31	3.91
	10:52:57 AM	54.22	17.21	130.70	3.83
	10:53:57 AM	54.46	17.26	153.81	3.82
	10:54:57 AM	53.04	17.31	145.35	3.85
	10:55:57 AM	58.71	17.27	137.70	4.28
	10:56:57 AM	60.95	16.90	106.61	4.54
	10:57:57 AM	63.65	16.60	139.08	5.11
	10:58:57 AM	62.95	16.07	146.00	5.57
	10:59:57 AM	62.79	15.51	121.09	5.53
	11:00:57 AM	63.49	15.41	108.15	5.17
	11:01:57 AM	63.52	15.71	119.79	4.76
	11:02:57 AM	61.78	16.12	104.57	4.50
	11:03:57 AM	58.46	16.47	115.23	4.09
	11:04:57 AM	56.50	16.88	119.22	4.05
	11:05:57 AM	56.76	17.00	108.97	4.14
	11:06:57 AM	57.41	16.94	117.35	4.44
	11:07:57 AM	60.77	16.67	125.24	4.96
	11:08:57 AM	61.61	16.22	95.87	5.09
	11:09:57 AM	60.82	16.03	88.54	4.88
	11:10:57 AM	59.93	16.17	84.31	4.86
	11:11:57 AM	64.49	16.15	89.93	5.33
	11:12:57 AM	66.76	15.69	105.31	5.74
	11:13:57 AM	68.51	15.20	99.04	5.98
	11:14:57 AM	65.78	14.84	87.00	6.14
	11:15:57 AM	64.09	14.60	91.47	6.28
	11:16:57 AM	64.05	14.37	104.74	6.41
	11:17:57 AM	63.62	14.17	85.45	6.38
	11:18:57 AM	63.27	14.16	84.31	6.44
	11:19:57 AM	65.45	14.06	90.90	6.57
	11:20:57 AM	64.88	13.88	78.04	6.65
	11:21:57 AM	65.28	13.75	85.12	6.62
	11:22:57 AM	66.33	13.75	127.12	6.76
	11:23:57 AM	65.72	13.60	118.25	7.03
	11:24:57 AM	64.88	13.28	181.97	7.04
	11:25:57 AM	62.07	13.25	153.81	6.93
	11:26:57 AM	63.18	13.36	138.67	7.04
	11:27:57 AM	61.61	13.20	468.02	7.43
	11:28:57 AM	60.92	12.74	666.42	7.47
	11:29:57 AM	62.79	12.67	285.97	7.27
	11:30:57 AM	63.96	12.91	221.35	7.03
	11:31:57 AM	62.33	13.09	340.09	7.31
	11:32:57 AM	62.77	12.77	301.11	7.08
	11:33:57 AM	63.45	13.02	210.37	7.30
	11:34:57 AM	66.04	12.85	157.47	7.21
	11:35:57 AM	65.90	13.12	105.14	6.59
	11:36:57 AM	67.24	13.74	87.48	6.49
AVERAGES		60.92	15.51	157.11	5.37

Louisiana - Pacific/Hayward
Line2 Konus Stack
Test 16 Run 2

DATE	TIME	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
3/18/96	12:21:57 PM	63.33	14.84	92.77	5.52
	12:22:57 PM	67.33	14.60	127.28	5.49
	12:23:57 PM	65.38	14.63	101.32	5.56
	12:24:57 PM	64.97	14.47	108.64	5.50
	12:25:57 PM	64.08	14.49	101.16	5.49
	12:26:57 PM	62.04	14.52	174.15	5.80
	12:27:57 PM	57.68	14.17	644.61	6.15
	12:28:57 PM	59.16	13.83	577.39	5.98
	12:29:57 PM	62.09	14.01	153.81	5.93
	12:30:57 PM	62.12	13.94	194.09	6.31
	12:31:57 PM	57.61	13.50	502.69	6.28
	12:32:57 PM	61.70	13.51	284.34	6.19
	12:33:57 PM	63.49	13.62	99.85	6.39
	12:34:57 PM	62.68	13.50	109.86	6.34
	12:35:57 PM	64.58	13.58	106.36	6.22
	12:36:57 PM	64.58	13.74	108.72	5.99
	12:37:57 PM	63.20	13.95	90.25	5.75
	12:38:57 PM	63.62	14.34	75.20	5.18
	12:39:57 PM	63.74	14.78	91.88	5.26
	12:40:57 PM	65.52	14.74	105.39	5.44
	12:41:57 PM	64.59	14.61	96.84	5.60
	12:42:57 PM	63.26	14.47	108.07	5.85
	12:43:57 PM	62.91	14.24	107.67	5.76
	12:44:57 PM	62.61	14.32	91.96	5.68
	12:45:57 PM	62.57	14.36	100.51	5.73
	12:46:57 PM	62.93	14.14	122.72	6.08
	12:47:57 PM	64.89	13.76	150.55	6.33
	12:48:57 PM	66.84	13.76	99.69	6.02
	12:49:57 PM	63.11	13.98	171.39	6.12
	12:50:57 PM	56.14	13.67	953.86	6.39
	12:51:57 PM	56.86	13.51	642.66	6.07
	12:52:57 PM	61.59	13.81	288.66	6.12
	12:53:57 PM	63.57	13.69	136.72	6.21
	12:54:57 PM	62.35	13.68	107.18	6.09
	12:55:57 PM	61.72	13.80	96.60	6.04
	12:56:57 PM	63.73	14.00	126.71	5.59
	12:57:57 PM	65.38	14.46	169.11	5.43
	12:58:57 PM	62.62	14.49	170.49	5.81
	12:59:57 PM	58.98	13.96	358.32	6.28
	1:00:57 PM	60.22	13.61	239.10	6.46
	1:01:57 PM	61.66	13.39	170.49	6.31
	1:02:57 PM	61.65	13.62	123.05	6.18
	1:03:57 PM	60.57	13.70	115.97	6.04
	1:04:57 PM	62.07	13.80	91.47	6.18
	1:05:57 PM	61.13	13.55	235.19	6.45
	1:06:57 PM	60.93	13.33	311.77	6.37
	1:07:57 PM	62.04	13.46	107.59	6.36
	1:08:57 PM	65.02	13.44	78.78	6.31
	1:09:57 PM	65.10	13.73	68.44	5.96
	1:10:57 PM	63.65	13.78	65.51	6.28
	1:11:57 PM	63.90	13.44	91.39	6.54
	1:12:57 PM	64.74	13.14	221.60	6.95
	1:13:57 PM	66.59	12.70	231.04	7.12
	1:14:57 PM	64.67	12.34	528.08	7.28
	1:15:57 PM	62.19	12.29	1006.27	7.02
	1:16:57 PM	59.74	12.49	1283.45	6.80
	1:17:57 PM	59.99	12.68	970.22	6.92
	1:18:57 PM	60.82	12.35	1718.91	7.12
	1:19:57 PM	61.67	12.42	734.29	7.20
	1:20:57 PM	62.78	12.20	535.97	7.29
AVERAGES		**62.61**	**13.75**	**281.30**	**6.15**

Louisiana - Pacific/Hayward
Line 2 Konus Stack
Test 16 Run 3

DATE	TIME	NOX (ppm)	O2 (%)	CO (ppm)	CO2 (%)
3/18/96	2:06:57 PM	57.28	13.27	677.08	6.72
	2:07:57 PM	60.05	12.71	962.32	7.00
	2:08:57 PM	62.48	12.45	420.25	6.83
	2:09:57 PM	63.26	12.65	209.15	6.86
	2:10:57 PM	61.33	12.70	485.11	6.76
	2:11:57 PM	64.81	12.70	321.86	7.26
	2:12:57 PM	60.44	12.10	344.65	7.45
	2:13:57 PM	59.64	11.79	874.35	7.76
	2:14:57 PM	62.91	11.38	615.40	7.36
	2:15:57 PM	65.00	11.95	163.74	7.02
	2:16:57 PM	65.42	12.36	130.45	7.12
	2:17:57 PM	64.51	12.22	275.39	7.60
	2:18:57 PM	64.76	11.75	359.70	7.69
	2:19:57 PM	67.40	11.69	218.02	7.56
	2:20:57 PM	66.01	11.80	240.89	7.29
	2:21:57 PM	66.65	12.09	227.05	7.24
	2:22:57 PM	63.84	12.08	366.86	7.36
	2:23:57 PM	64.43	12.05	177.00	7.20
	2:24:57 PM	65.19	12.25	167.89	7.26
	2:25:57 PM	66.46	12.00	235.51	7.67
	2:26:57 PM	64.10	11.59	136.31	7.67
	2:27:57 PM	61.82	11.74	151.61	7.22
	2:28:57 PM	59.11	12.18	194.74	6.84
	2:29:57 PM	59.48	12.59	311.52	6.88
	2:30:57 PM	61.43	12.73	280.84	6.61
	2:31:57 PM	61.64	13.08	132.73	6.42
	2:32:57 PM	61.59	13.35	120.12	6.01
	2:33:57 PM	63.70	13.96	93.51	5.60
	2:34:57 PM	65.72	14.30	86.10	5.78
	2:35:57 PM	66.92	14.09	101.73	5.81
	2:36:57 PM	64.91	14.36	94.56	5.27
	2:37:57 PM	63.33	14.85	72.27	5.04
	2:38:57 PM	62.16	15.12	65.02	4.99
	2:39:57 PM	60.35	15.16	85.29	4.98
	2:40:57 PM	62.61	15.17	98.96	5.04
	2:41:57 PM	61.30	15.18	79.10	4.85
	2:42:57 PM	64.35	15.27	69.34	5.10
	2:43:57 PM	66.55	15.00	71.62	5.35
	2:44:57 PM	66.96	14.72	67.22	5.91
	2:45:57 PM	65.20	14.00	77.39	6.36
	2:46:57 PM	68.05	13.59	81.71	6.54
	2:47:57 PM	65.59	13.28	109.62	6.84
	2:48:57 PM	65.56	12.79	116.70	6.68
	2:49:57 PM	66.59	13.03	92.86	6.46
	2:50:57 PM	67.34	13.17	99.12	6.47
	2:51:57 PM	67.54	13.19	97.01	6.78
	2:52:57 PM	63.62	12.86	178.39	7.24
	2:53:57 PM	59.03	12.29	392.33	7.13
	2:54:57 PM	62.78	12.37	316.49	6.91
	2:55:47 PM	67.60	12.59	129.23	6.76
	2:56:47 PM	67.62	12.87	90.50	6.01
	2:57:47 PM	65.30	13.68	91.80	5.52
	2:58:47 PM	63.77	14.35	102.13	5.32
	2:59:47 PM	62.03	14.64	101.97	5.08
	3:00:47 PM	61.04	15.10	89.52	4.56
	3:01:47 PM	59.62	15.64	80.73	4.23
	3:02:47 PM	58.18	15.97	80.97	4.09
	3:03:47 PM	58.09	16.15	97.90	4.10
	3:04:47 PM	59.63	16.17	89.36	4.22
	3:05:47 PM	65.16	15.90	99.37	5.09
AVERAGES		63.49	13.37	206.67	6.31

APPENDIX G

MEASUREMENT SYSTEM PERFORMANCE SPECIFICATIONS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job: LG HAYWARD
Source: INC 2 DAYTON RTO STACK
Test: 6 Run Date: 3-19-96
Stack Dimen.: 81.5 IN.
Dry Bulb: °F Wet bulb: °F
Manometer: ☐ Reg. ☐Exp ☐Elec.
Barometric Pressure: IN.HG
Static Pressure: IN.WC
Operators: S-BAINVILLE
Pitot No.: C_p

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas
		Port Length: 6.25 IN.		Time Start:	HRS
1	16.7	13.6105	19.861		
2	50	40.75	47.00		
3	83.3	67.8895	74.139		

(612) 786-6020

Calibration Error Check

Job LP/HAMMOND

Test 6 Run 0 Date 3-14-96

Operator J. BATTVILLE

THC
~~SO_2~~ Calibration:

Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0	0	100	0 %
~~Mid~~ Low Level	27.9	29.03	1.1	100	1.1 %
~~High~~ Mid Level	286	270	16	1000	1.6 %
High Level	2960	3100	140	1000	1.4 %

NO_x Calibration:

Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	2	2	250	.01 %
Mid Level	145	145	0	250	0
High Level	240	240	0	250	0

O_2 Calibration:

Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0	0	25 %	0
Mid Level	13.1	13	.1	25 %	.40 %
High Level	21	21.0	0	25 %	0

CO_2 Calibration

Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0	0	20 %	0
Mid Level	10.5	10.4	.1	20 %	.5 %
High Level	16.8	16.8	0	20 %	0

CO Calibration

Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	1	1	1000	.1 %
Mid Level	294	293	1	1000	.1 %
High Level	600	600	0	1000	0 %

INTERPOLL LABORATORIES, INC
(612) 786-6020

System Bias Check

Job LB/HAYWARD Source LINE 2 PRIMARY STACK
Test 6 Run 0 Date 3-14-96 Site STACK
Operator S. BATTAGLIA

Instrument	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
			Cal. Err.	Sys. Bias			
THC	Zero Gas	0	0	1	1	100	1%
	Upscale	27.9	29	28	1	100	1%
NOX	Zero Gas	0	2	0	2	250	.01%
	Upscale	145	145	146	1	250	.01%
O2	Zero Gas	0	0	0	0	25%	0
	Upscale	13.1	13	13.1	.1	25%	.4%
CO2	Zero Gas	0	0	0	0	20%	0
	Upscale	10.4	10.4	10.5	.1	20%	.5%
CO	Zero Gas	0	1	0	1	1000	.1%
	Upscale	299	298	299	1	1000	.1%
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

THC Cal Drift Check

Job LP/MAYWOOD
Test 6 Run ____ Date 3-19-96
Operator 3-BAINVILLE
Source LINE 2 DRYER INTO STACK
Site STACK

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}	
1		Zero Gas	0	1	-1	0			10:
		Upscale	27.9	28	29		28.5		1145
2		Zero Gas	0	0	1	.5			13
		Upscale	27.9	28	30		29		1420
3		Zero Gas	0	0	0	0			19..
		Upscale	30	30	29		29.5		2040
4		Zero Gas	0	0	0	0			16 ..
		Upscale	30	30	29		29.5		1100
5		Zero Gas	0	0	1	.5			12
		Upscale	30	30	30		30		1300
6		Zero Gas	0						
		Upscale							
7		Zero Gas	0						
		Upscale							
8		Zero Gas	0						
		Upscale							
9		Zero Gas	0						
		Upscale							
10		Zero Gas	0						
		Upscale							
11		Zero Gas	0						
		Upscale							
12		Zero Gas	0						
		Upscale							

ACCW Low PPM. tank

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

NOx Cal Drift Check

Job LP MARYLAND
Test 6 Run _____ Date 3-19-96
Operator B. BATTAILLE

Source LINE 2 DRYER RTO STACK
Site STACK

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1 VOID		Zero Gas	0	6	2	1		
		Upscale	145	146	143		144.5	
2 Run1	16.3	Zero Gas	0	1.2	1.2	1.2		15.2
		Upscale	145	145	145		145	
3 VOID		Zero Gas	0	1.2	0	.61		
		Upscale	145	145	144		146.5	
4 Run2	15.0	Zero Gas	0	1	2.2	1.6		13.4
		Upscale	145	145	149		147	
5 Run3	21.2	Zero Gas	0	1	3	2		19.6
		Upscale	145	145	143		144	
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO Cal Drift Check

Job LP / MARYLAND
Test 12 Run _____ Date 3-19-96
Operator S. BOISVERT

Source LIME ROCK OXYGEN RTO EXH
Site STACK

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1 VOID	~~202.7~~	Zero Gas	0	0	1.6	.8		
		Upscale	299	299	302		300.5	
2 RUN1	202.1	Zero Gas	0	0	0	0		
		Upscale	299	300	299		299.5	201.8
3 VOID		Zero Gas	0	0	1	.5		
		Upscale	299	300	297		298.5	
4 RUN2	265.9	Zero Gas	0	0	0	0		
		Upscale	299	299	299		299	265.9
5 RUN3	216.5	Zero Gas	0	0	0	0		
		Upscale	299	299	294		296.5	218.3
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO_2 Cal Drift Check

Job: LP MAYNARD — Source: LINE 2 DRYER RTO STACK
Test: 6 Run: — Date: 3-19-96 — Site: STACK
Operator: J. BAINVILLE

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1 VOID		Zero Gas	0	0	0	0		
		Upscale	10.5	10.5	10.5		10.5	
2 RUN1	4.1	Zero Gas	0	0	0	0		4.1
		Upscale	10.5	10.5	10.4		10.45	
3 VOID		Zero Gas	0	0	0	0		
		Upscale	10.5	10.5	10.5		10.5	
4 RUN2	4.3	Zero Gas	0	0	0	0		4.3
		Upscale	10.5	10.5	10.5		10.5	
5 RUN3	4.3	Zero Gas	0	0	0	0		4.3
		Upscale	10.5	10.5	10.4		10.45	
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

091595-G:\STACK\WP\FORMS\S-559a

INTERPOLL LABORATORIES, INC
(612) 786-6020

02 Cal Drift Check

Job LP / HAYWARD
Test 6 Run _____ Date 3-14-96
Operator J. BATTVILLE

Source LINE 2 DRYER RTO STACK
Site STACK

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1 VOID		Zero Gas	0	0	0	0		
		Upscale	13.1	13.1	13.1		13.1	
~~2~~ RUN 1	16.2	Zero Gas	0	0	0	0		
		Upscale	13.1	13.1	12.9		13	16.3
3 VOID		Zero Gas	0	0	-.1	-.05		
		Upscale	13.1	13.1	13.1		13.1	
~~4~~ RUN 2	16.4	Zero Gas	0	0	1	.5		
		Upscale	13.1	13.1	13.1		13.1	16.5
~~5~~ RUN 3	16.3	Zero Gas	0	.1	0	.05		
		Upscale	13.1	13.1	13.1		13.1	16.3
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Calibration Error Check

Job L.P. / Hayward, WI

Test 7 Run 0 Date 3-19-96

Operator M. Lachlan

SO_2 Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	ø & ø			
Mid Level					
High Level					

NO_x Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0	0	500	0
Mid Level	239	240	1	500	.20
High Level	451.4	452	.6	500	.12

O_2 Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0.0	0	25.0	0
Mid Level	13.5	13.5	0.0	25.0	0
High Level	21.0	21.0	0.0	25.0	0

CO_2 Calibration Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0.0	0.0	20.0	0
Mid Level	10.9	10.9	0.0	20.0	0
High Level	17.0	17.0	0.0	20.0	0

CO Calibration Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0 & ø	0	1000	0
Mid Level	289	303	14	1000	1.4
High Level	620	623	3	1000	13

INTERPOLL LABORATORIES
EPA Method 25A
Calibration Error Check & Drift Determination

Job L.P. / Hayward, WI

Test 1 Run 0 Date 3-19-96
Operator M. Kuehlen

THC Calibration (Low Range): Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)	Difference (ppm)	Span Value (ppm)	Percent of Span
Zero gas	0	0.0	0	100	0
Low level	30	29.8	.2	100	.2
Mid level	299	301	2	1,000	.2
High level	3150	3025	125	10,000	1.25

THC Calibration (High Range): Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)	Difference (ppm)	Span Value (ppm)	Percent of Span
Zero gas	0				
Span					

O_2 Calibration: Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent of Span
Zero gas	0				
Mid level					
High level					

CO_2 Calibration: Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent of Span
Zero gas	0				
Mid level					
High level					

Must be within 2% of the span for each calibration gas S-420-14

INTERPOLL LABORATORIES, INC
(612) 786-6020

System Bias Check

Job L.P. / Hayward, WI Source Core Dryer
Test 7 Run 0 Date 3-19-96 Site Duct
Operator M. Kuehlow

Instrument	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
			Cal. Err.	Sys. Bias			
O_2	Zero Gas	0	0.0	0.0	0.0	25.0	0
	Upscale	13.5	13.5	13.5	0.0	25.0	0
CO_2	Zero Gas	0	0.0	0.0	0.0	20.0	0
	Upscale	10.9	10.9	10.9	0.0	20.0	0
NO_x	Zero Gas	0	0	0	0	500	0
	Upscale	239	236	236	0	500	0
CO	Zero Gas	0	0	0	0	1,000	0
	Upscale	620	~~619~~ 623	620	3	1,000	.3
THC	Zero Gas	0	0	.3	.3	1,000	.03
	Upscale	299	301	299	4	1,000	.4
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

NOx Cal Drift Check

Job K.P. / Hayward, WI Source Cone Dryer
Test 7 Run 1,2,3,4,5 Date 3-19-96 Site Duct
Operator M. Laehrer

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0				
		Upscale	239	239				
2 VOID	27.05	Zero Gas	0	0	4	2		
		Upscale	239	236	235		235.5	25.64
3		Zero Gas	0	4				
		Upscale	239	235				
4 Run1	23.25	Zero Gas	0	0	1	.5		
		Upscale	73.7	74	71		72.5	23.29
5		Zero Gas	0	1				
		Upscale	73.7	72				
6 VOID	25.95	Zero Gas	0	0	0	0		
		Upscale	73.7	72	76		74	25.84
7 Run2 3-20-96	25.26	Zero Gas	0	0	3	1.5		~~25.50~~ 23.30
		Upscale	73.7	76	77		76.5	
8 Run3	27.23	Zero Gas	0	3	4	3.5		
		Upscale	73.7	77	78		77.5	23.63
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

CO Cal Drift Check

Job: L.P. / Hayward, WI — Source: No. 2 Core Dryer
Test: 7 Run 1, 2, 3, 4, 5 Date: 3-19-96 — Site: Duct
Operator: M. Kaehler

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0				
		Upscale	620	621				
2 VOID	937.76	Zero Gas	0	2	0	1		
		Upscale	620	619	612		615.5	945.14
3 Run1	680.78	Zero Gas	0	0	-3	-1.5		
		Upscale	620	612	607		609.5	692.90
4		Zero Gas	0	-3				
		Upscale	620	607				
5		Zero Gas	0					
		Upscale	620	614				
6 VOID	1206.81	Zero Gas	0	0	-3	-1.5		
		Upscale	620	612	615		613.5	1218.13
X Run2 3-20-96	1201.35	Zero Gas	0	4	4	4		
		Upscale	620	624	620		622	1201.51
X Run3	1121.67	Zero Gas	0	4	3	3.5		
		Upscale	620	620	613		616.5	1130.53
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.

CO averages should be taken from I.G.S.... located on strip chart

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INTERPOLL LABORATORIES, INC
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CO_2 Cal Drift Check

Job E.P. / Hugwash, WI
Test 2 Run 1,2,3,4,5 Date 3-19-96
Operator M. Laehler

Source No. 2 Cone Dryer
Site DIST

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0.0				
		Upscale	10.9	10.9				
2 VOID	4.94	Zero Gas	0	0.0	0.2	0.1		4.93
		Upscale	10.9	10.8	10.8		10.8	
3 RUN1	4.59	Zero Gas	0	0.2	0.3	0.25		4.48
		Upscale	10.9	10.9	10.8		10.9	
4		Zero Gas	0	0.3				
		Upscale	10.9	11.1				
5		Zero Gas	0	-0.1				
		Upscale	10.9	10.8				
6 VOID	3.49	Zero Gas	0	0.0	0.0	0.0		3.49
		Upscale	10.9	10.9	10.9		10.9	
7 RUN2 3-20-96	5.02	Zero Gas	0	0.0	-0.1	-0.05		5.05
		Upscale	10.9	11.0	10.8		10.9	
8 RUN3	5.09	Zero Gas	0	0.0	0.0	0.0		5.11
		Upscale	10.9	10.8	10.9		10.85	
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

O_2 Cal Drift Check

Job L.P. / Hayward, WI
Test 7 Run 1,2,3,4,5 Date 3-19-96
Operator M. Kaeshler

Source No. 2 Core Dryer
Site Duct

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0.0				
		Upscale	13.5	13.5				
~~2~~ VOID	16.00	Zero Gas	0	0.0	0.0	0.0		
		Upscale	13.5	13.4	13.4		~~13.4~~ 0.0	16.72
~~3~~ RUN 1	16.32	Zero Gas	0	0.0	0.1	0.05		
		Upscale	13.5	13.4	13.5		~~13.45~~ 0.1	16.39
4		Zero Gas	0	0.1				
		Upscale	13.5	13.5				
5		Zero Gas	0	0.0				
		Upscale	13.5	13.5				
~~6~~ VOID	12.90	Zero Gas	0	0.0	-0.1	-0.05		
		Upscale	13.5	13.4	13.4		~~0.0~~ 13.4	13.00
~~7~~ RUN 2 3-20-96	15.92	Zero Gas	0	0.0	0.0	0.0		
		Upscale	13.5	13.6	13.6		~~0.0~~ 13.6	15.70
~~8~~ RUN 3	15.92	Zero Gas	0	0.0	0.0	0.0		
		Upscale	13.5	13.6	13.5		~~0.1~~ 13.5	15.86
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

INTERPOLL LABORATORIES, INC
(612) 786-6020

THC Cal Drift Check

Job L.P. / Hayward, WI
Test 2 Run 1, 2, 3, 4, 5 Date 3-19-96
Operator M. Kachian

Source No. 2 Cone Dryer
Site Duct

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1		Zero Gas	0	0				
		Upscale	299	301				
2		Zero Gas	0	.3	5.4			
		Upscale	299	300	291			
3		Zero Gas	0	.5	.3			
		Upscale	299	291	284			
4		Zero Gas	0	.3				
		Upscale	299	297				
5		Zero Gas	0	2.0				
		Upscale	299	301				
6 VOID		Zero Gas	0	.3	-.5			
		Upscale	299	300				
7 3-20-96		Zero Gas	0	.5	5			
		Upscale	299	305	298			
8		Zero Gas	0	1	2			
		Upscale	299	293	312			
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

NOX Cal Drift Check

Job LP-HAYWARD
Test 8 Run Date 3-19-96
Operator ET
Source LINE 2 SURFACE DRYER
Site DUCT

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1 VOID		Zero Gas	0	0	0			
		Upscale	239	240	240			
2 RUN1	29.9	Zero Gas	0	0	0			30.0
		Upscale	73.7	74	73			
3 VOID		Zero Gas	0	0	0			
		Upscale	73.7	73	74			
4 RUN2	30.3	Zero Gas	0	0	0			30.2
		Upscale	73.7	74	74			
5 Run3	31.9	Zero Gas	0	0	0			31.8
		Upscale	73.7	74	74.7			
6		Zero Gas	0	0	0			
		Upscale	73.7	74.7	76			
7		Zero Gas	0	0	0			
		Upscale	73.7	76	73			
8		Zero Gas	0	0	0			
		Upscale	73.7	73	73			
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

THC Cal Drift Check

Job LP/HAYWARD
Test 8 Run Date 3-19-96
Operator ET

Source LINE 2 SURFACE LAYER
Site DUCT

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0	0			
		Upscale	299	300	300			
2		Zero Gas	0	0	0			
		Upscale	294	300	300			
3		Zero Gas	0	10	0			
		Upscale	294	300	300			
4		Zero Gas	0	0	0			
		Upscale	299	300	300			
5		Zero Gas	0	0	0			
		Upscale	299	300	300			
6		Zero Gas	0	0	1			
		Upscale	299	300	300			
7		Zero Gas	0	1	0			
		Upscale	294	300	300			
8		Zero Gas	0	0	0			
		Upscale	299	300	300			
9		Zero Gas	0	0	0			
		Upscale	299	300	298			
10		Zero Gas	0	0	0			
		Upscale	299	298	299			
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

ALL System Bias Check

Job LP/HAYWARD Source LINE 2 SURFACE DRYER
Test 8 Run _____ Date 3-15-96 Site _____
Operator ET

Instrument	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		Diff. CE-SB (PPM)	Span Val. (PPM)	% of Span
			Cal. Err.	Sys. Bias			
	Zero Gas	0	0	0	0	1000	
NOX	Upscale	239	239	240	1	1000	
	Zero Gas	0	0	0		1000	
CO	Upscale	620	620	620		1000	
	Zero Gas	0	0	0	0	1000	0
THC	Upscale	299	300	300	0	1000	0
	Zero Gas	0	0	0	0	100	0
NOX	Upscale	73.7	74	74	0	100	0
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						
	Zero Gas	0					
	Upscale						

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

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(612) 786-6020

Calibration Error Check

Job UP/HAYWARD

Test 8 Run _____ Date 3-18-96

Operator EJ

SO_2 Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0				
Mid Level					
High Level					

NO_x Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0	0	1000	0
Mid Level	239	240	1	1000	.1
High Level	458	460	2	1000	.2

O_2 Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0				
Mid Level					
High Level					

CO_2 Calibration Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0				
Mid Level					
High Level					

CO Calibration Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0				
Mid Level					
High Level					

INTERPOLL LABORATORIES, INC
(612) 786-6020

EPA Method 25 A
Calibration Error Check & Drift Determination

Job LP/HAYWARD

Test 8 Run _____ Date 3-19-96

Operator ET

THC Calibration (Low Range): **Time (HRS)**_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0	0	0	1000	0
Low Level	30	29	1	100	1
Mid Level	299	300	1	1000	1
High Level	3150	3100	50	10,000	0.5

THC Calibration (High Range): **Time (HRS)**_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	0				
Span					

O_2 Calibration: **Time (HRS)**_____

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent of Span
Zero Gas	0				
Mid Level					
High Level					

CO_2 Calibration: **Time: (HRS)**_____

***	Cylinder Value (%)	Analyzer Response (%)	Difference (%)	Span Value (%)	Percent of Span
Zero Gas	0				
Mid Level					
High Level					

Must be within 2% of the span for each calibration gas.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 2 Field Data Sheet

Job LP/HAYWARD
Source LINE 2 PRESS VENT RTO STACK
Test 11 Run Date 3-20-96
Stack Dimen. 75.50 IN.
Dry Bulb ____ °F Wet bulb ____ °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.98 IN.HG
Static Pressure ____ IN.WC
Operators SB / KN
Pitot No. C_p .84

Drawing of Test Site

Cross-section View	Elevation View

Traverse Point No.	Fraction of Diameter	Distance From Stack Wall (IN.)	Distance From End of Port (IN.)	Velocity	Temp. of Gas
		Port Length: 6.25 IN.		Time Start:	HRS
1	.4 m	27.6	33.85		
2	1.2 m	58.8	65.05		
3	2 m	90.0	96.25		

INTERPOLL LABORATORIES, INC
(612) 786-6020

NOX Cal Drift Check

Job LP/HAYWARD Source LINE 2 PRESSURE RTO
Test 11 Run 1-3 Date 3-2096 Site STACK
Operator S. BAINVILLE

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}	
1	24.2	Zero Gas	0	0	3.36	1.68	[redacted]	22.4	1650
		Upscale	145	145	149.4	[redacted]	147.2		1750
2	22.5	Zero Gas	0	1.42	4	2.71	[redacted]	20.3	1815
		Upscale	145	146.7	146.5	[redacted]	146.6		1930
3	19.1	Zero Gas	0	2	0	1	[redacted]	18.5	2015
		Upscale	145	145	140	[redacted]	142.5		2115
4		Zero Gas	0				[redacted]		
		Upscale				[redacted]			
5		Zero Gas	0				[redacted]		
		Upscale				[redacted]			
6		Zero Gas	0				[redacted]		
		Upscale				[redacted]			
7		Zero Gas	0				[redacted]		
		Upscale				[redacted]			
8		Zero Gas	0				[redacted]		
		Upscale				[redacted]			
9		Zero Gas	0				[redacted]		
		Upscale				[redacted]			
10		Zero Gas	0				[redacted]		
		Upscale				[redacted]			
11		Zero Gas	0				[redacted]		
		Upscale				[redacted]			
12		Zero Gas	0				[redacted]		
		Upscale				[redacted]			

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

CO Cal Drift Check

Job LP HOT WIND
Test 11 Run 1-3 Date 3-20-96
Operator S. BAIN VALUE

Source LINER PRESS OUT RTD
Site STACK

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}
1	18.1	Zero Gas	0	0	-1	-.5		
		Upscale	299	299	296.4		297.7	18.6
2	21.3	Zero Gas	0	.5	0	.25		
		Upscale	299	296.4	292		294.2	21.4
3	19.6	Zero Gas	0	0	0	0		
		Upscale	299	299.5	295		297	19.7
4		Zero Gas	0					
		Upscale						
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

O2 Cal Drift Check

Job: L/MAY WAND
Test: 11 Run: 1-3 Date: 3-20-96
Operator: J BARNHARDT

Source: LINE 2 PRESS VENT RTU
Site: STACK

Run	C̄	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0	.03	.02		
		Upscale	13.1	13.1	13.26		13.18	
2		Zero Gas	0	.03	.2	.12		
		Upscale	13.1	13.19	13.19		13.19	
3		Zero Gas	0	.2	0	.1		
		Upscale	13.1	13.19	13.1		13.15	
4		Zero Gas	0					
		Upscale						
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

CO2 Cal Drift Check

Job: LP MAYWOOD
Test: 11 Run: 1-3 Date: 3-20-96
Operator: S. BARNWELL
Source: LINE 2 PRESS VENT RTO
Site: STACK

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0	.04	.02		
		Upscale	10.5	10.5	10.43		10.47	
2		Zero Gas	0	.04	.03	.04		
		Upscale	10.5	10.45	10.4		10.43	
3		Zero Gas	0	.03	0	.02		
		Upscale	10.5	10.45	10.4		10.43	
4		Zero Gas	0					
		Upscale						
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

THC Cal Drift Check

Job LP MAIN WASHD
Test 1 Run 1 - 3 Date 3-20-96
Operator S BASINGER

Source LINE 2 PRECIPITANT
Site STACK

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0	0	0		
		Upscale	30	30	29		29.5	
2		Zero Gas	0	0	1	.5		
		Upscale	30	29	29		29	
3		Zero Gas	0	0	0	0		
		Upscale	30	30	30		30	
4		Zero Gas	0					
		Upscale						
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC.
(6120 786-6020

EPA Method 6C/7E Response Time

Job LP MAYWOOD
Technician S. BATINVILLE
Source LIFT DRYER RTO STACK
System Flow Rate 1 l/mn
Date of Test 3-19-96

Moisture removal: Via Model MK-1 Condenser

	Response Time (secs)		
Analyzer Type	SO_2/NO_x	O_2	CO_2
Analyzer S/N			
Analyzer Range			
High Level Span Gas Conc. (PPM or %)			
Upscale 1			
Upscale 2			
Upscale 3			
Average			
Downscale 1			
Downscale 2			
Downscale 3			
Average			

System response time 60 seconds

1. Introduce gases at the 3-way valve on the probe. Use zero and stack gas for the upscale tests and high-level span gas and stack gas for the downscale tests. Alternatively, use zero and high-level gases for a more stringent test. Record the time in seconds from the moment of introduction until a stable response is achieved.
2. The response time test need only be conducted prior to the initial field use of the measurement system.
3. Attach a copy of the flow system schematic to this test.

INTERPOLL LABORATORIES, INC
(612) 786-6020

NOx Cal Drift Check

Job LP-Hayward
Test 12 Run 1-3 Date 3-20-96
Operator

Source Line 2 Pressvent RTO
Site Inlet

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1	2.1	Zero Gas	0	0	0	0		1.9
		Upscale	73.7	79	80		79.5	
2	2.7	Zero Gas	0	0	0	0		2.5
		Upscale	73.7	60	78		79	
3	3.1	Zero Gas	0	0	0	0		2.9
		Upscale	73.7	78	78		78	
4		Zero Gas	0					
		Upscale						
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

CO Cal Drift Check

Job LP-Hayward
Test 12 Run 1-3 Date 3-20-96
Operator

Source Line 2 Pressvent RTO
Site Inlet

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1	10.7	Zero Gas	0	0	0	0		10.7
		Upscale	150	150	150		150	
2	8.2	Zero Gas	0	0	0	0		8.2
		Upscale	150	150	150		150	
3	13.4	Zero Gas	0	0	0	0		13.4
		Upscale	150	150	150		150	
4		Zero Gas	0					
		Upscale						
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

THC's Cal Drift Check

Job LP-Hayward Source Line 2 Press Vent RTO
Test 12 Run 1-3 Date 3-20-96 Site Inlet
Operator

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1		Zero Gas	0	0	0	0		
		Upscale	295	299	299		299	
2		Zero Gas	0	0	0	0		
		Upscale	299	299	299		299	
3		Zero Gas	0	0	0	0		
		Upscale	295	299	299		295	
4		Zero Gas	0					
		Upscale						
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Calibration Error Check

Job: LP Hayward No 2 Konus

Test: 16 Run: _____ Date: 3/18/96

Operator: RR1 RA

SO_2 Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø				
Mid Level					
High Level					

NO_x Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0		200	
Mid Level	93.7	94.74		200	
High Level	148	147.85		200	

O_2 Calibration: Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0		25	
Mid Level	13.45	13.50		25	
High Level	20.8	20.77		25	

CO_2 Calibration Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	0		20	
Mid Level	10.95	11.00		20	
High Level	17.2	17.04	.16	20	

CO Calibration Time (HRS)_____

***	Cylinder Value (PPM)	Analyzer Response (PPM)	Difference (PPM)	Span Value (PPM)	Percent of Span
Zero Gas	ø	8.0		2000	
Mid Level	296	296.39		2000	
High Level	593	581		2000	

INTERPOLL LABORATORIES, INC.
(6120 786-6020

EPA Method 6C/7E Response Time

Job L.P. / Hayward, WI
Source Core Dryer / Duct
Date of Test 3-19-96

Technician Mark Gaebler
System Flow Rate 4000 DC/min

Moisture removal: Via Model MK-1 Condenser

	Response Time (secs)		
Analyzer Type	SO_2/NO_x	O_2	CO_2
Analyzer S/N			
Analyzer Range			
High Level Span Gas Conc. (PPM or %)	239	13.5	13.5
Upscale 1	45.3	50.1	50.7
Upscale 2	40.2	50.9	50.2
Upscale 3	47.9	43.9	44.5
Average	44.43	48.27	40.47
Downscale 1	48.4	47.5	48.3
Downscale 2	51.3	48.1	45.2
Downscale 3	53.3	44.2	49.7
Average	51.17	46.60	47.73

System response time 46.44 seconds 23.22 seconds

1. Introduce gases at the 3-way valve on the probe. Use zero and stack gas for the upscale tests and high-level span gas and stack gas for the downscale tests. Alternatively, use zero and high-level gases for a more stringent test. Record the time in seconds from the moment of introduction until a stable response is achieved.
2. The response time test need only be conducted prior to the initial field use of the measurement system.
3. Attach a copy of the flow system schematic to this test.

INTERPOLL LABORATORIES, INC
(612) 786-6020

NOx Cal Drift Check

Job LP/HAYWARD
Test ___ Run ___ Date 3-18-96
Operator R.R. / R.A.

Source No. 2 Kanus
Site STACK

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM) Initial	Analyzer Resp (PPM) Final	C_o	C_m	C_{gas}	
1	60.92	Zero Gas	0	0	0				0945
		Upscale	73.7	74.74	72.96			60.8	1145
2	62.6	Zero Gas	0	0	0				1220
		Upscale	73.7	72.96	74.36			62.6	1335
3	63.5	Zero Gas	0	0	0				1405
		Upscale	73.7	74.36	74.38			62.9	
4		Zero Gas	0						
		Upscale							
5		Zero Gas	0						
		Upscale							
6		Zero Gas	0						
		Upscale							
7		Zero Gas	0						
		Upscale							
8		Zero Gas	0						
		Upscale							
9		Zero Gas	0						
		Upscale							
10		Zero Gas	0						
		Upscale							
11		Zero Gas	0						
		Upscale							
12		Zero Gas	0						
		Upscale							

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

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO Cal Drift Check

Job LP/Hayward Source No. 2 ISONICS
Test 16 Run Date 3-10-96 Site STACK
Operator RR/RA

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1	157.1	Zero Gas	0	8.0	3.91			156.0
		Upscale	593	581	580			
2	281.3	Zero Gas	0	3.91	6.02			289.0
		Upscale	593	573	571			
3	206.7	Zero Gas	0	6.02	4.31			210.1
		Upscale	593	571	577			
4		Zero Gas	0					
		Upscale						
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

INTERPOLL LABORATORIES, INC
(612) 786-6020

CO_2 Cal Drift Check

Job LP-Hayward
Test 16 Run _____ Date 3/18/96
Operator KRTRA

Source No. 2 Konus
Site Stack

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_s	C_m	C_{gas}
				Initial	Final			
1	5.37	Zero Gas	0	0	.03			5.34
		Upscale	10.95	11.00	10.98			
2	6.15	Zero Gas	0	.03	.03			6.13
		Upscale	10.95	10.98	10.94			
3	6.31	Zero Gas	0	.03	.01			6.33
		Upscale	10.95	10.94	10.86			
4		Zero Gas	0					
		Upscale						
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

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INTERPOLL LABORATORIES, INC
(612) 786-6020

O2 Cal Drift Check

Job LP-Hayward
Test 16 Run _____ Date 3-18-96
Operator _____

Source No. 2 Kones
Site Stack

Run	$\bar{C}$	***	Cylinder Value (PPM)	Analyzer Resp (PPM)		C_o	C_m	C_{gas}
				Initial	Final			
1	15.5	Zero Gas	0	0	.40			15.3
		Upscale	13.45	13.50	13.83			
2	13.8	Zero Gas	0	.01	.05			13.8
		Upscale	13.45	13.48	13.45			
3	13.4	Zero Gas	0	.05	.23			13.4
		Upscale	13.45	13.45	13.52			
4		Zero Gas	0					
		Upscale						
5		Zero Gas	0					
		Upscale						
6		Zero Gas	0					
		Upscale						
7		Zero Gas	0					
		Upscale						
8		Zero Gas	0					
		Upscale						
9		Zero Gas	0					
		Upscale						
10		Zero Gas	0					
		Upscale						
11		Zero Gas	0					
		Upscale						
12		Zero Gas	0					
		Upscale						

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

APPENDIX H

GAS ANALYZER SPECIFICATIONS

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

Servomex

1420
Oxygen Analyser
Instruction Manual

Ref : 01420/001A/0

Order as part No. 01420001A

was (7982-2842)

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

1.3 Sampling System

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

1.4 Specification

Performance Specification (typical)

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

Outputs

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

Sample requirements

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

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

Physical Characteristics

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

Electrical

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

Environmental Limits

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

SPECIFICATIONS FOR ACS MODEL 3300 CO_2 NDIR

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

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

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

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

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

SPECIFICATIONS FOR ACS MODEL 3300 CO NDIR

Measuring principle	NDIR single beam method
Operating ranges	0 - 500 ppm 0 - 1000 ppm
Reproducibility	±0.5% of full scale
Stability	Zero drift; ±% of full scale/24H Span drift; ±% of full scale/24H
Noise	0.5% of full scale
Ambient temperature	-5 to 45°C
Ambient humidity	Less than 90% RH
Response time (90% of final reading)	Electrical system; 2 sec, 3 sec, 5 sec (selectable with connector) Response of actual gas; Within 15 sec (depending on cell length)
Indicator	100 linear division
Output signal	OUTPUT 1; DC 0 - 1 V OUTPUT 2; DC 0 - 10 mV or DC 0 - 100 mV or DC 0 - 1 V or DC 4 - 20 mA (Allowable load resistance 500Ω max.)
Linearity	Better than ±2% of full scale (when linearizer is used)
Power supply	AC 115 V ± 10%, 60 Hz

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

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

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:

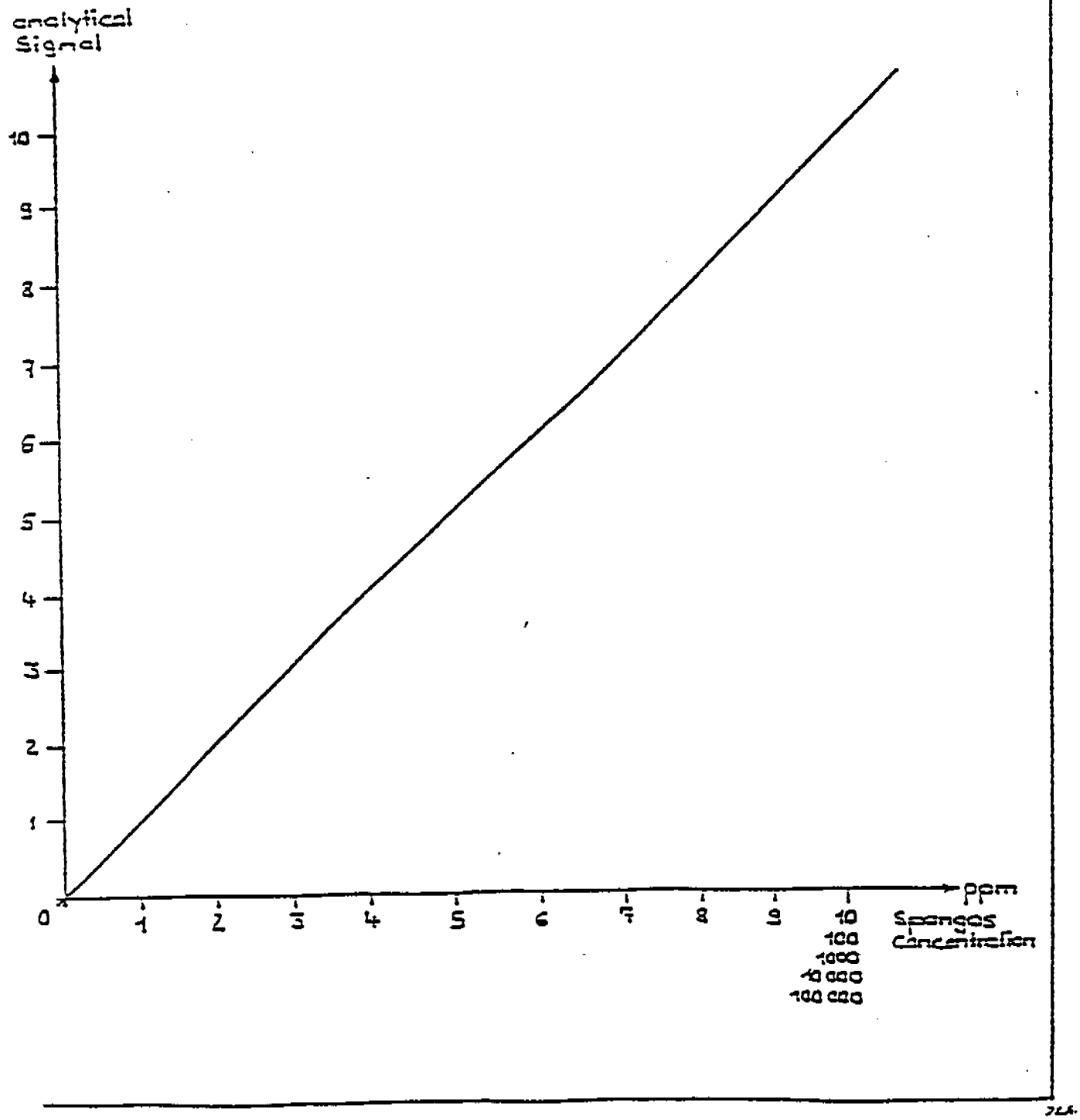
Temperature : 160 °C

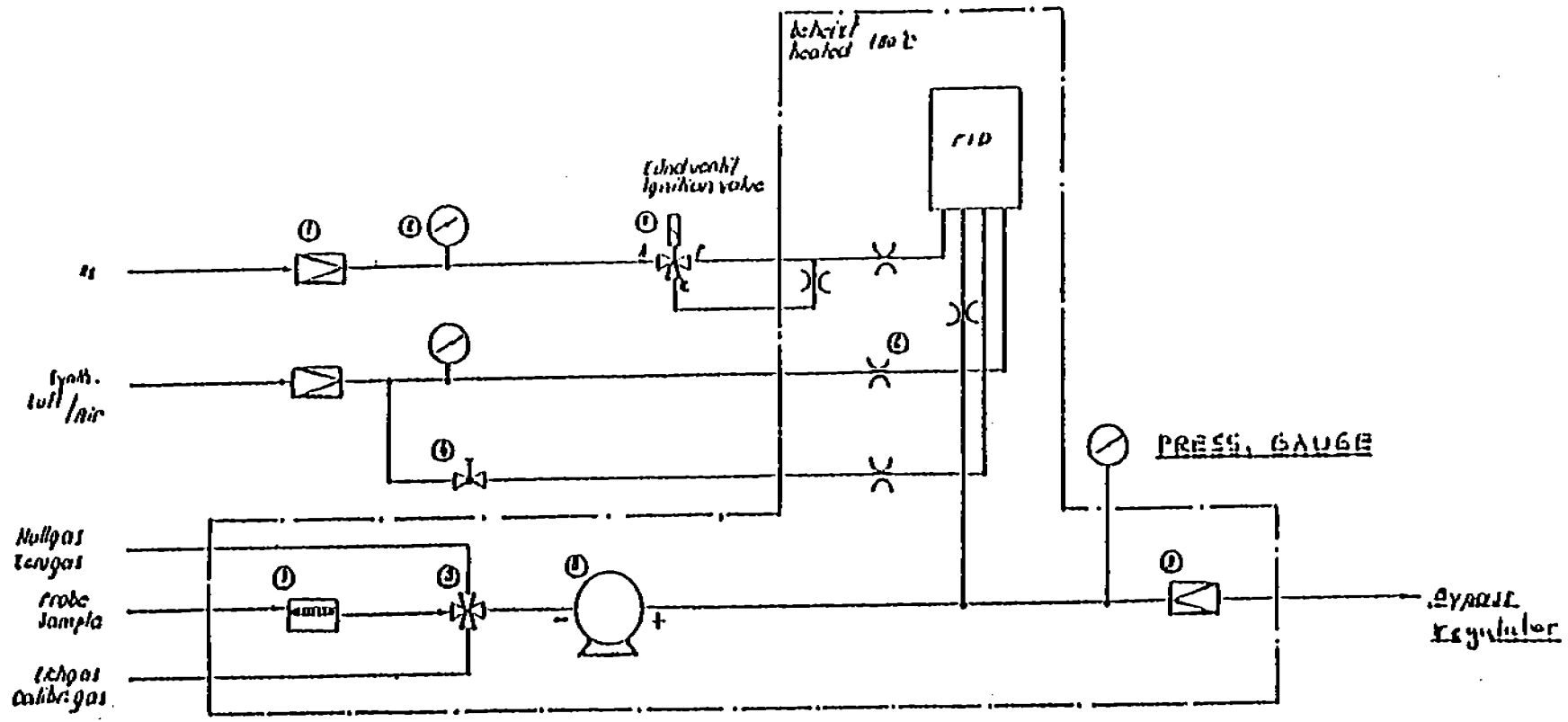
Zero Point : 3,90
Gain : 7,70

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

Span Gases : 300 ppm C_1
24000 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 Fest Druckregler
Const pressure regulator

Zündventil
Ignition valve

F-A angezogen
energized
R-A abgefallen
at rest

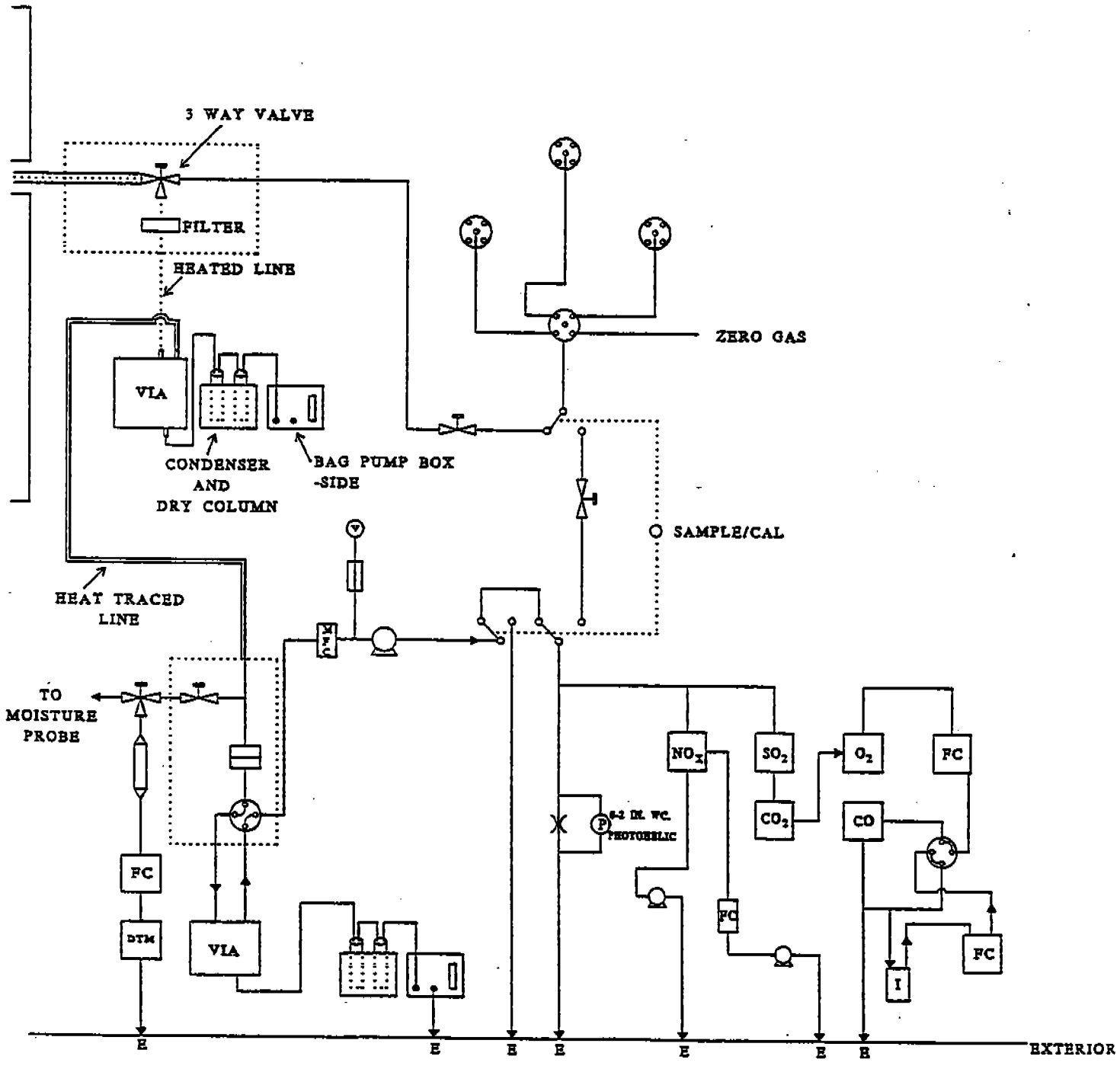
Handumschaltung
Manual switching

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

H-11

Interpoll Laboratories
(612) 786-6020

CEM TRAILER



E = EXHAUST
FC = FLOW CONTROL
I = IMPINGER (METHOD 10a)

CEMTRAIL

APPENDIX I

CALIBRATION GAS CERTIFICATION SHEETS

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

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-40607 CYLINDER #:CC46348 CYL. PRESSURE:2000PSIG
EXPIRATION DATE: 6/2/98 LAST ANALYSIS DATE:6/2/95
CUSTOMER: TWIN CITY OXYGEN P.O.# 17405

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1.
THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

STANDARD:		INSTRUMENT:BECKMAN NDIR	BECKMAN PARAMAGNETIC
SRM #:	1675B 2659A	MODEL #:880	755
CYL #:	CLM6413 CLM6737	SERIAL #:2000418	1001419
CONC.:	14.01% 20.72%	LAST CAL.:5/22/95	6/1/95

COMPONENT:CO2		COMPONENT: O2		COMPONENT:	
MEAN CONC:16.8%		MEAN CONC: 21.0%		MEAN CONC:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC.	
DATE:6/2/95	DATE:	DATE:6/2/95	DATE:	DATE:	DATE:
16.8%		21.0%			
16.8%		21.0%			
16.9%		21.1%			

BALANCE GAS:N2

REPLICATE DATA — COMPONENT:CO2

DATE: 6/2/95						DATE:		
Z	0	R	168.0	C	201.5	Z	R	C
R	168.5	Z	0	C	202.1	R	Z	C
Z	0	C	203.9	R	169.0	Z	C	R

REPLICATE DATA — COMPONENT:O2

DATE: 6/2/95						DATE:		
Z	0	R	210.0	C	212.8	Z	R	C
R	210.5	Z	0	C	213.0	R	Z	C
Z	0	C	214.9	R	211.0	Z	C	R

REPLICATE DATA — COMPONENT:

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

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Mary A. Savage APPROVED BY: Jina Rowe

"THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY, THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH ITS RENDERING OF THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE."

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

CERTIFICATE OF ANALYSIS EPA PROTOCOL MIXTURES

REFERENCE #:	88-44358	CYLINDER #:	CC117373	CYL. PRESSURE:	2000 PSIG	P. O./CODE #	20388
EXP. DATE:	11/30/98	LAST ANALYSIS DATE:	11/30/95	CUSTOMER:	TWIN CITY OXYGEN		

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1 THIS STANDARD SHOULD NOT BE USED WHEN ITS GAS PRESSURE IS BELOW 1.0 MEGAPASCALS (150 PSIG).

COMPONENT: CARBON MONOXIDE

STANDARD

SRM #: 1681B
CYL. #: CLM 4470
CONC: 975 PPM

INSTRUMENT: ROSEMOUNT NDIR
MODEL #: 880A
SERIAL #: 2000172
LAST CAL.: 11/8/95

MEAN CONC.: 600 PPM +/- 4.80 PPM

REPLICATE CONC.

DATE: 11/23/95		DATE: 11/30/95	
600	PPM	599	PPM
600	PPM	599	PPM
600	PPM	600	PPM

BALANCE GAS: NITROGEN

REPLICATE DATA						REPLICATE DATA						REPLICATE DATA					
DATE: 11/23/95																	
Z	0	R	975	C	600.0												
R	975	Z	0	C	600.0												
Z	0	C	600.6	R	976												
DATE	11/30/95																
Z	0	R	974	C	598.4												
R	974	Z	0	C	598.4												
Z	0	C	600.0	R	975												

Z= ZERO C=CANDIDATE R=REFERENCE

ANALYST: Mary A. Savage APPROVED BY: Jim Howe

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 THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE.
ASSAYED AT: NATIONAL SPECIALTY GASES, 630 UNITED DRIVE, DURHAM, NC 27713. (919)544-3772

I-2

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Certificate of Analysis for Standard Gas

Vendor: Air Products

Cylinder No.: SG 916 6051

Date of Preparation: ~~4-5-96~~ 12-11-95

Label: Nitric Oxide

Blend Specification: 240 ppm Balance N2

Results of Analysis of Standard Gas			
Date of Analysis	Run	NOx	
4-5-96	1	236.1781	
4-5-96	2	235.1613	
4-5-96	3	236.5035	
	4		
	5		
	6		
	Avg	235.6143	-1.82%

Analyst: [signature]

☑ Results are within 2% of the vendor tag value; use tag value.

☐ Results are not within 2% of the vendor tag value; conduct another set of triplicate analyses.

☐ All results within ± 2% of the average; relabel as above.

☐ All results not within ± 2% of the average; perform another set of triplicate analyses.

Date: April 5, 1996

Approved by: [signature]

012696-G:\STACK\WP\FORMS\S-425

INTERPOLL LABS

TANK CERT
TANK NUMBER SG9168051
4/5/96

4/5/96	11:32:00 AM			
0	236.768	0	0	0
4/5/96	11:32:06 AM			
0	237.175	0	0	0
4/5/96	11:32:12 AM			
0	237.175	0	0	0
4/5/96	11:32:18 AM			
0	237.175	0	0	0
4/5/96	11:32:24 AM			
0	236.768	0	0	0
4/5/96	11:32:30 AM			
0	236.361	0	0	0
4/5/96	11:32:36 AM			
0	236.361	0	0	0
4/6/96	11:32:42 AM			
0	236.768	0	0	0
4/5/96	11:32:48 AM			
0	235.141	0	0	0
4/5/96	11:32:54 AM			
0	235.954	0	0	0
4/5/96	11:33:00 AM			
0	235.548	0	0	0
4/5/96	11:33:06 AM			
0	235.548	0	0	0
4/5/96	11:33:12 AM			
0	236.768	0	0	0
4/5/96	11:33:18 AM			
0	235.141	0	0	0
4/5/96	11:33:24 AM			
0	235.548	0	0	0
4/5/96	11:33:30 AM			
0	235.954	0	0	0
4/5/96	11:33:36 AM			
0	235.954	0	0	0
4/5/96	11:33:42 AM			
0	235.954	0	0	0
4/6/96	11:33:48 AM			
0	235.548	0	0	0
4/5/96	11:33:54 AM			
0	235.954	0	0	0

236.17615

INTERPOLL LABS

TANK CERT
TANK NUMBER SG9168051
4/5/96

4/5/96	11:39:00 AM			
0	235.141	0	0	0
4/5/96	11:39:06 AM			
0	235.141	0	0	0
4/5/96	11:39:12 AM			
0	235.141	0	0	0
4/5/96	11:39:18 AM			
0	235.141	0	0	0
4/5/96	11:39:24 AM			
0	235.141	0	0	0
4/5/96	11:39:30 AM			
0	235.141	0	0	0
4/5/96	11:39:36 AM			
0	235.548	0	0	0
4/5/96	11:39:42 AM			
0	235.141	0	0	0
4/5/96	11:39:48 AM			
0	234.734	0	0	0
4/5/96	11:39:54 AM			
0	235.141	0	0	0
4/5/96	11:40:00 AM			
0	234.734	0	0	0
4/5/96	11:40:06 AM			
0	235.548	0	0	0
4/5/96	11:40:12 AM			
0	235.141	0	0	0
4/5/96	11:40:18 AM			
0	235.548	0	0	0
4/5/96	11:40:24 AM			
0	234.734	0	0	0
4/5/96	11:40:30 AM			
0	235.141	0	0	0
4/5/96	11:40:36 AM			
0	235.141	0	0	0
4/5/96	11:40:42 AM			
0	235.141	0	0	0
4/5/96	11:40:48 AM			
0	235.548	0	0	0
4/5/96	11:40:54 AM			
0	235.141	0	0	0

235.16135

INTERPOLL LABS

TANK CERT
TANK NUMBER SG9168051
4/5/96

4/5/96	11:46:01 AM			
0	235.954	0	0	0
4/5/96	11:46:07 AM			
0	235.954	0	0	0
4/5/96	11:46:13 AM			
0	236.361	0	0	0
4/5/96	11:46:19 AM			
0	235.954	0	0	0
4/5/96	11:46:25 AM			
0	236.361	0	0	0
4/5/96	11:46:31 AM			
0	236.361	0	0	0
4/5/96	11:46:37 AM			
0	235.954	0	0	0
4/5/96	11:46:43 AM			
0	235.548	0	0	0
4/5/96	11:46:49 AM			
0	236.361	0	0	0
4/5/96	11:46:55 AM			
0	236.361	0	0	0
4/5/96	11:47:01 AM			
0	237.175	0	0	0
4/5/96	11:47:07 AM			
0	236.768	0	0	0
4/5/96	11:47:13 AM			
0	236.768	0	0	0
4/5/96	11:47:19 AM			
0	236.768	0	0	0
4/5/96	11:47:25 AM			
0	237.175	0	0	0
4/5/96	11:47:31 AM			
0	236.768	0	0	0
4/5/96	11:47:37 AM			
0	237.175	0	0	0
4/5/96	11:47:43 AM			
0	236.768	0	0	0
4/5/96	11:47:49 AM			
0	236.768	0	0	0
4/5/96	11:47:55 AM			
0	236.768	0	0	0

236.5035

Air Products and Chemicals, Inc
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
AIR PRODUCTS & CHEMICALS, INC.
373 CANTERBURY ROAD
SHAKOPEE MN 55379

Notes:

PO: Rel:

Order No: CSS-320132-01
Batch No: 861-29294

Cylinder No: SG9168051BAL
Cylinder Pressure*: 2000 psig
Certification Date: 12/11/95
Expiration Date: 12/11/97

*** Certified Concentration ***		********* Reference Standards *********			********** Analytical Instrumentation **********			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
NITRIC OXIDE	240 ±1.0 PPM	SG9151438BAL	GMIS	244.8000 PPM	Rosemount 951a	0101877	11/20/95	CHEMILUMINESCENCE

Balance Gas: NITROGEN

Contaminent	
Nitrogen Dioxide	3.80 PPM

* Standard should not be used below 150 psig

I-7

Analyst: Joe Estafanous

Approved By: Richard Fry
Richard Fry

APPENDIX J

PROCEDURES

Particulate Loading and Emission Rates

The particulate emission rates were determined per EPA Methods 1 - 5, CFR Title 40, Part 60, Appendix A (revised July 1, 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 or stainless steel-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. In addition, the sampling module also houses the impinger case and a Drierite drying column. The sampling module is connected by means of an umbilical cord to the control module which 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 were collected as follows: The sample gas was drawn in through the sampling probe isokinetically and passed through a 4-inch diameter Gelman Type A/E glass fiber filter. The particulates were removed at this point and collected on the filter. The gases then passed through an ice-cooled impinger train and a desiccant-packed drying column which quantitatively absorb all moisture from the sample gas stream after which the sample gas passes through the pump and the dry test gas meter which integrates the sample gas flow throughout the course of the test. A calibrated orifice attached to the outlet of the gas meter provides instantaneous 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 site such that an isokinetic sampling condition prevails. Nomographs are used to aid in the rapid determination of the sampling rate.

Particulate Loading and Emission Rates

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

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

Condensible Organic Compounds Analysis

(State of Wisconsin - EPA Method 5)

Method II-8672-WI

Equipment: Separatory funnel - 500 cc with Teflon stopcock

Powder funnel - 75 mm ID with a glass wool plug

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

Reagents: Methylene chloride

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

SAMPLING

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

ANALYSIS

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

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

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

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

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

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

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

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

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

Calculation (if aliquot is taken):

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

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

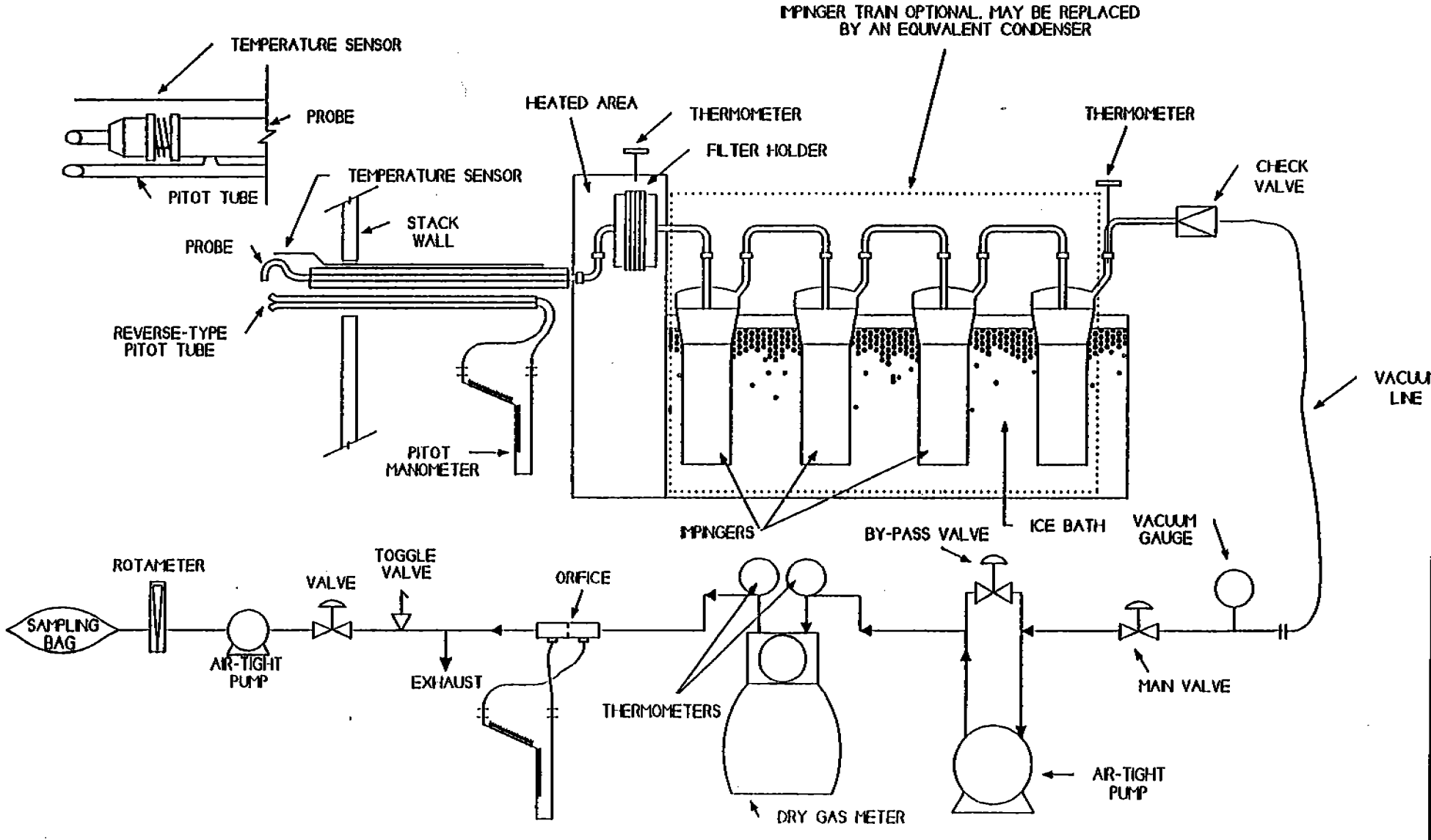
10. A field blank should be analyzed in an identical manner. If a field blank is not submitted, take an aliquot of Class I water equal in volume to the samples and analyze in a similar manner.

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

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

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PARTICULATE SAMPLING TRAIN



Method 3A——Determination of Oxygen and Carbon Dioxide Concentrations in Emissions From Stationary Sources (Instrumental Analyzer Procedure)

1. Applicability and Principle

1.1 **Applicability.** This method is applicable to the determination of oxygen (O_2) and carbon dioxide (CO_2) concentrations in emissions from stationary sources only when specified within the regulations.

1.2 **Principle.** A sample is continuously extracted from the effluent stream: a portion of the sample stream is conveyed to an instrumental analyzer(s) for determination of O_2 and CO_2 concentration(s). Performance specifications and test procedures are provided to ensure reliable data.

2. Range and Sensitivity

Same as Method 6C, Sections 2.1 and 2.2, except that the span of the monitoring system shall be selected such that the average O_2 or CO_2 concentration is not less than 20 percent of the span.

3. Definitions

3.1 **Measurement System.** The total equipment required for the determination of the O_2 or CO_2 concentration. The measurement system consists of the same major subsystems as defined in Method 6C, Sections 3.1.1, 3.1.2, and 3.1.3.

3.2 Span, Calibration Gas, Analyzer Calibration Error, Sampling System Bias, Zero Drift, Calibration Drift, Response Time, and Calibration Curve. Same as Method 6C, Sections 3.2 through 3.8, and 3.10.

3.3 **Interference Response.** The output response of the measurement system to a component in the sample gas, other than the gas component being measured.

4. Measurement System Performance Specifications

Same as Method 6C, Sections 4.1 through 4.4.

5. Apparatus and Reagents

5.1 **Measurement System.** Any measurement system for O_2 or CO_2 that meets the specifications of this method. A schematic of an acceptable measurement system is shown in Figure 6C-1 of Method 6C. The essential components of the measurement system are described below:

5.1.1 **Sample Probe.** A leak-free probe, of sufficient length to traverse the sample points.

5.1.2 **Sample Line.** Tubing, to transport the sample gas from the probe to the moisture removal system. A heated sample line is not required for systems that measure the O_2 or CO_2 concentration on a dry basis, or transport dry gases.

5.1.3 Sample Transport Line, Calibration Value Assembly, Moisture Removal System, Particulate Filter, Sample Pump, Sample Flow Rate Control, Sample Gas Manifold, and Data Recorder. Same as Method 6C, Sections 5.1.3 through 5.1.9, and 5.1.11, except that the requirements to use stainless steel, Teflon, and nonreactive glass filters do not apply.

5.1.4 **Gas Analyzer.** An analyzer to determine continuously the O_2 or CO_2 concentration in the sample gas stream. The analyzer shall meet the applicable performance specifications of Section 4. A means of controlling the analyzer flow rate and a device for determining proper sample flow rate (e.g., precision rotameter, pressure gauge downstream of all flow controls, etc.) shall be provided at the analyzer. The requirements for measuring and controlling the analyzer flow rate are not applicable if data are presented that demonstrate the analyzer is insensitive to flow variations over the range encountered during the test.

5.2 **Calibration Gases.** The calibration gases for CO_2 analyzers shall be CO_2 in N_2 or CO_2 in air. Alternatively, CO_2/SO_2, O_2/SO_2, or $O_2/CO_2/SO_2$ gas mixtures in N_2 may be used. Three calibration gases, as specified Section 5.3.1 through 5.3.3 of Method 6C, shall be used. For O_2 monitors that cannot analyze zero gas, a calibration gas concentration equivalent to less than 10 percent of the span may be used in place of zero gas.

6. Measurement System Performance Test Procedures

Perform the following procedures before measurement of emissions (Section 7).

6.1 **Calibration Concentration Verification.** Follow Section 6.1 of Method 6C, except if calibration gas analysis is required, use Method 3 and change the acceptance criteria for agreement among Method 3 results to 5 percent (or 0.2 percent by volume, whichever is greater).

6.2 **Interference Response.** Conduct an interference response test of the analyzer prior to its initial use in the field. Thereafter, recheck the measurement system if changes are made in the instrumentation that could alter the interference response (e.g., changes in the type of gas detector). Conduct the interference response in accordance with Section 5.4 of Method 20.

6.3 Measurement System Preparation, Analyzer Calibration Error, and Sampling System Bias Check. Follow Sections 6.2 through 6.4 of Method 6C.

7. Emission Test Procedure

7.1 **Selection of Sampling Site and Sampling Points.** Select a measurement site and sampling points using the same criteria that are applicable to tests performed using Method 3.

7.2 **Sample Collection.** Position the sampling probe at the first measurement point, and begin sampling at the same rate as used during the sampling system bias check. Maintain constant rate sampling (i.e., $\pm$ 10 percent) during the entire run. The sampling time per run shall be the same as for tests conducted using Method 3 plus twice the system response time. For each run, use only those measurements obtained after twice the response time of the measurement system has elapsed to determine the average effluent concentration.

7.3 **Zero and Calibration Drift Test.** Follow Section 7.4 of Method 6C.

8. Quality Control Procedures

The following quality control procedures are recommended when the results of this method are used for an emission rate correction factor, or excess air determination. The tester should select one of the following options for validating measurement results:

8.1 If both O_2 and CO_2 are measured using Method 3A, the procedures described in Section 4.4 of Method 3 should be followed to validate the O_2 and CO_2 measurement results.

8.2 If only O_2 is measured using Method 3A, measurements of the sample stream CO_2 concentration should be obtained at the sample by-pass vent discharge using an Orsat or Fyrite analyzer, or equivalent. Duplicate samples should be obtained concurrent with at least one run. Average the duplicate Orsat or Fyrite analysis results for each run. Use the average CO_2 values for comparison with the O_2 measurements in accordance with the procedures described in Section 4.4 of Method 3.

8.3 If only CO_2 is measured using Method 3A, concurrent measurements of the sample stream CO_2 concentration should be obtained using an Orsat or Fyrite analyzer as described in Section 8.2. For each run, differences greater than 0.5 percent between the Method 3A results and the average of the duplicate Fyrite analysis should be investigated.

9. Emission Calculation

For all CO_2 analyzers, and for O_2 analyzers that can be calibrated with zero gas, follow Section 8 of Method 6C, except express all concentrations as percent, rather than ppm.

For O_2 analyzers that use a low-level calibration gas in place of a zero gas, calculate the effluent gas concentration using Equation 3A-1.

$$C_{gas} = \frac{C_{ma} - C_{oa}}{C_m - C_o}\left(\overline{C} - C_m\right) + C_{ma} \quad Eq.\ 3A-1$$

Where:

C_{gas} = Effluent gas concentration, dry basis, percent.
C_{ma} = Actual concentration of the upscale calibration gas, percent.
C_{oa} = Actual concentration of the low-level calibration gas, percent.
C_m = Average of initial and final system calibration bias check responses for the upscale calibration gas, percent.
C_o = Average of initial and final system calibration bias check responses for the low-level gas, percent.
$\overline{C}$ = Average gas concentration indicated by the gas analyzer, dry basis, percent.

10. Bibliography

Same as bibliography of Method 6C.

Method 7E—Determination of Nitrogen Oxides Emissions From Stationary Sources (Instrumental Analyzer Procedure)

1. Applicability and Principle

1.1 **Applicability.** This method is applicable to the determination of nitrogen oxides (NO_x) concentrations in emissions from stationary sources only when specified within the regulations.

1.2 **Principle.** A gas simple is continuously extracted from a stack, and a portion of the sample is conveyed to an instrumental chemiluminescent analyzer for determination of NO_x concentration. Performance specifications and test procedures are provided to ensure reliable data.

2. Range and Sensitivity

Same as Method 6C, Sections 2.1 and 2.2.

3. Definitions

3.1 **Measurement System.** The total equipment required for the determination of NO_x concentration. The measurement system consists of the following major subsystems:

3.1.1 **Sample Interface, Gas Analyzer, and Data Recorder.** Same as Method 6C, Sections 3.1.1, 3.1.2, and 3.1.3.

3.1.2 **NO_2 to NO Converter.** A device that converts the nitrogen dioxide (NO_2) in the sample gas to nitrogen oxide (NO).

3.2 Span, Calibration Gas, Analyzer Calibration Error, Sampling System Bias, Zero Drift, Calibration Drift, and Response Time. Same as Method 6C, Sections 3.2 through 3.8.

3.3 **Interference Response.** The output response of the measurement system to a component in the sample gas, other than the gas component being measured.

4. Measurement System Performance Specifications

Same as Method 6C, Sections 4.1 through 4.4.

5. Apparatus and Reagents

5.1 **Measurement System.** Any measurement system for NO_x that meets the specifications of this method. A schematic of an acceptable measurement system is shown in Figure 6C-1 of Method 6C. The essential components of the measurement system are described below:

5.1.1 Sample Probe, Sample Line, Calibration Valve Assembly, Moisture Removal System, Particulate Filter, Sample Pump, Sample Flow Rate Control, Sample Gas Manifold, and Data Recorder. Same as Method 6C, Sections 5.1.1 through 5.1.9, and 5.1.11.

5.1.2 NO_2 to NO Converter. That portion of the system that converts the nitrogen dioxide (NO_2) in the sample gas to nitrogen oxide (NO). An NO_2 to NO converter is not necessary if data are presented to demonstrate that the NO_2 portion of the exhaust gas is less than 5 percent of the total NO_x concentration.

5.1.3 NO_x Analyzer. An analyzer based on the principles of chemiluminescence, to determine continuously the NO_x concentration in the sample gas stream. The analyzer shall meet the applicable performance specifications of Section 4. A means of controlling the analyzer flow rate and a device for determining proper sample flow rate (e.g., precision rotameter, pressure gauge downstream of all flow controls, etc.) shall be provided at the analyzer.

5.2 NO_x Calibration Gases. The calibration gases for the NO_x analyzer shall be NO in N_2. Three calibration gases, as specified in Sections 5.3.1 through 5.3.3. of Method 6C, shall be used. Ambient air may be used for the zero gas.

6. Measurement System Performance Test Procedures

Perform the following procedures before measurement of emissions (Section 7).

6.1 Calibration Gas Concentration Verification. Follow Section 6.1 of Method 6C, except if calibration gas analysis is required, use Method 7, and change all 5 percent performance values to 10 percent (or 10 PPM, whichever is greater).

6.2 Interference Response. Conduct an interference response test of the analyzer prior to its initial use in the field. Thereafter, recheck the measurement system if changes are made in the instrumentation that could alter the interference response (e.g., changes in the gas detector). Conduct the interference response in accordance with Section 5.4 of Method 20.

6.3 Measurement System Preparation, Analyzer Calibration Error, and Sample System Bias Check. Follow Sections 6.2 through 6.4 of Method 6C.

6.4 NO_2 to NO Conversion Efficiency. Unless data are presented to demonstrate that the NO_2 concentration within the sample stream is not greater than 5 percent of the NO_x concentration, conduct an NO_2 to NO conversion efficiency test in accordance with Section 5.6 of Method 20.

7. Emission Test Procedure

7.1 **Selection of Sampling Site and Sampling Points.** Select a measurement site and sampling points using the same criteria that are applicable to tests performed using Method 7.

7.2 **Sample Collection.** Position the sampling probe at the first measurement point, and begin sampling at the same rate as used during the system calibration drift test. Maintain constant rate sampling (i.e., ± 10 percent) during the entire run. The sampling time per run shall be the same as the total time required to perform a run using Method 7, plus twice the system response time. For each run, use only those measurements obtained after twice the response time of the measurement system has elapsed, to determine the average effluent concentration.

7.3 **Zero and Calibration Drift Test.** Follow Section 7.4 of Method 6C.

8. Emission Calculation

Follow Section 8 of Method 6C.

9. Bibliography

Same as bibliography of Method 6C.

Method 10—Determination of Carbon Monoxide Emissions From Stationary Sources

1. Principle and Applicability

1.1 **Principle.** An integrated or continuous gas sample is extracted from a sampling point and analyzed for carbon monoxide (CO) content using a Luft-type nondispersive infrared analyzer (NDIR) or equivalent.

1.2 **Applicability.** This method is applicable for the determination of carbon monoxide emissions from stationary sources only when specified by the test procedures for determining compliance with new source performance standards. The test procedure will indicate whether a continuous or an integrated sample is to be used.

2. Range and Sensitivity

2.1 **Range.** 0 to 1,000 PPM.

2.2 **Sensitivity.** Minimum detectable concentration is 20 PPM for a 0 to 1,000 PPM span.

3. Interferences

Any substance having a strong absorption of infrared energy will interfere to some extent. For example, discrimination ratios for water (H_2O) and carbon dioxide (CO_2) are 3.5 percent H_2O per 7 PPM CO and 10 percent CO_2 per 10 PPM CO, respectively, for devices measuring in the 1,500 to 3,000 PPM range. For devices measuring in the 0 to 100 PPM range, interference ratios can be as high as 3.5 percent H_2O per 25 PPM CO and 10 percent CO_2 per 50 PPM CO. The use of silica gel and ascarite traps will alleviate the major interference problems. The measured gas volume must be corrected if these traps are used.

4. Precision and Accuracy

4.1 **Precision.** The precision of most NDIR analyzers is approximately ± 2 percent of span.

4.2 **Accuracy.** The accuracy of most NDIR analyzers is approximately ± 5 percent of span after calibration.

5. Apparatus

5.1 **Continuous Sample** (Figure 10-1).

5.1.1 **Probe.** Stainless steel or sheathed Pyrex\1\ glass, equipped with a filter to remove particulate matter.

5.1.2 **Air-Cooled Condenser or Equivalent.** To remove any excess moisture.

5.2 **Integrated Sample** (Figure 10-2).

5.2.1 **Probe.** Stainless steel or sheathed Pyrex glass, equipped with a filter to remove particulate matter.

5.2.2 **Air-Cooled Condenser or Equivalent.** To remove any excess moisture.

5.2.3 **Valve.** Needle valve, or equivalent, to adjust flow rate.

5.2.4 **Pump.** Leak-free diaphragm type, or equivalent, to transport gas.

5.2.5 **Rate Meter.** Rotameter, or equivalent, to measure a flow range from 0 to 1.0 liter per min (0.035 cfm).

5.2.6 **Flexible Bag.** Tedlar, or equivalent, with a capacity of 60 to 90 liters (2 to 3 ft^3). Leak-test the bag in the laboratory before using by evacuating bag with a pump followed by a dry gas meter. When evacuation is complete, there should be no flow through the meter.

5.2.7 **Pitot Tube.** Type S, or equivalent, attached to the probe so that the sampling rate can be regulated proportional to the stack gas velocity when velocity is varying with the time or a sample traverse is conducted.

5.3 Analysis (Figure 10-3).

5.3.1 **Carbon Monoxide Analyzer.** Nondispersive infrared spectrometer, or equivalent. This instrument should be demonstrated, preferably by the manufacturer, to meet or exceed manufacturer's specifications and those described in this method.

5.3.2 **Drying Tube.** To contain approximately 200 g of silica gel.

5.3.3 **Calibration Gas.** Refer to section 6.1.

5.3.4 **Filter.** As recommended by NDIR manufacturer.

|_See_CFR_paper_publication_for_illustration_18A

5.3.5 CO_2 **Removal Tube.** To contain approximately 500 g of ascarite.

5.3.6 **Ice Water Bath.** For ascarite and silica gel tubes.

5.3.7 **Valve.** Needle valve, or equivalent, to adjust flow rate

5.3.8 **Rate Meter.** Rotameter or equivalent to measure gas flow rate of 0 to 1.0 liter per min (0.035 cfm) through NDIR.

5.3.9 **Recorder** (optional). To provide permanent record of NDIR readings.

6. Reagents

6.1 **Calibration Gases.** Known concentration of CO in nitrogen (N_2) for instrument span, prepurified grade of N_2 for zero, and two additional concentrations corresponding approximately to 60 percent and 30 percent span. The span concentration shall not exceed 1.5 times the applicable source performance standard. The calibration gases shall be certified by the manufacturer to be within ± 2 percent of the specified concentration.

|_See_CFR_paper_publication_for_illustration_19A

6.2 **Silica Gel.** Indicating type, 6 to 16 mesh, dried at 175°C (347°F) for 2 hours.

6.3 **Ascarite.** Commercially available.

7. Procedure

7.1 **Sampling.**

7.1.1 **Continuous Sampling.** Set up the equipment as shown in Figure 10-1 making sure all connections are leak free. Place the probe in the stack at a sampling point and purge the sampling line. Connect the analyzer and begin drawing sample into the analyzer. Allow 5 minutes for the system to stabilize, then record the analyzer reading as required by the test procedure. (See section 7.2 and 8). CO_2 content of the gas may be determined by using the Method 3 integrated sample procedure, or by weighing the ascarite CO_2 removal tube and computing CO_2 concentration from the gas volume sampled and the weight gain of the tube.

7.1.2 **Integrated Sampling.** Evacuate the flexible bag. Set up the equipment as shown in Figure 10-2 with the bag disconnected. Place the probe in the stack and purge the sampling line. Connect the bag, making sure that all connections are leak free. Sample at a rate proportional to the stack velocity. CO_2 content of the gas may be determined by using the Method 3 integrated sample procedures, or by weighing the ascarite CO_2 removal tube and computing CO_2 concentration from the gas volume sampled and the weight gain of the tube.

7.2 **CO Analysis.** Assemble the apparatus as shown in Figure 10-3, calibrate the instrument, and perform other required operations as described in section 8. Purge analyzer with N_2 prior to introduction of each sample. Direct the sample stream through the instrument for the test period, recording the readings. Check the zero and span again after the test to assure that any drift or malfunction is detected. Record the sample data on Table 10-1.

8. Calibration

Assemble the apparatus according to Figure 10-3. Generally an instrument requires a warm-up period before stability is obtained. Follow the manufacturer's instructions for specific procedure. Allow a minimum time of 1 hour for warm-up. During this time check the sample conditioning apparatus, i.e., filter, condenser, drying tube, and CO_2 removal tube, to ensure that each component is in good operating condition. Zero and calibrate the instrument according to the manufacturer's procedures using, respectively, nitrogen and the calibration gases.

Table 10-1—Field data

Comments

Location ———————————

Test ———————————

Date ———————————

Operator ———————————

Clock time	Rotameter setting, liters per minute (cubic feet per minute)

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9. Calculation

Calculate the concentration of carbon monoxide in the stack using Equation 10-1.

CCO stack = CCO NDIR(1-Fco2) Eq. 10-1

Where:

CCO stack = Concentration of CO in stack, PPM by volume (dry basis).
CCO NDIR = Concentration of CO measured by NDIR analyzer, PPM by volume (dry basis).
FCO 2 = Volume fraction of CO_2 in sample, i.e., percent CO_2 from Orsat analysis divided by 100.

10. Alternative Procedures

10.1 **Interference Trap.** The sample conditioning system described in Method 10A, sections 2.1.2 and 4.2, may be used as an alternative to the silica gel and ascarite traps.

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Agenda

A. Performance Specifications for NDIR Carbon Monoxide Analyzers

Range (minimum)	0—1000 PPM.
Output (minimum)	0—10mV.
Minimum detectable sensitivity	20 PPM.
Rise time, 90 percent (maximum)	30 seconds.
Fall time, 90 percent (maximum)	30 seconds.
Zero drift (maximum)	10% in 8 hours.
Span drift (maximum)	10% in 8 hours.
Precision (minimum)	± 2% of full scale.
Noise (maximum)	± 1% of full scale.
Linearity (maximum deviation)	2% of full scale.
Interference rejection ratio	CO_2—1000 to 1, H_2O—500 to 1.

B. Definitions of Performance Specifications.

Range——The minimum and maximum measurement limits.

Output——Electrical signal which is proportional to the measurement; intended for connection to readout or data processing devices. Usually expressed as millivolts or milliamps full scale at a given impedance.

Full scale——The maximum measuring limit for a given range.

Minimum detectable sensitivity——The smallest amount of input concentration that can be detected as the concentration approaches zero.

Accuracy——The degree of agreement between a measured value and the true value; usually expressed as ± percent of full scale.
Time to 90 percent response——The time interval from a step change in the input concentration at the instrument inlet to a reading of 90 percent of the ultimate recorded concentration.
Rise Time (90 percent)——The interval between initial response time and time to 90 percent response after a step increase in the inlet concentration.
Fall Time (90 percent)——The interval between initial response time and time to 90 percent response after a step decrease in the inlet concentration.
Zero Drift——The change in instrument output over a stated time period, usually 24 hours, of unadjusted continuous operation when the input concentration is zero; usually expressed as percent full scale.
Span Drift——The change in instrument output over a stated time period, usually 24 hours, of unadjusted continuous operation when the input concentration is a stated upscale value; usually expressed as percent full scale.
Precision——The degree of agreement between repeated measurements of the same concentration, expressed as the average deviation of the single results from the mean.
Noise——Spontaneous deviations from a mean output not caused by input concentration changes.
Linearity——The maximum deviation between an actual instrument reading and the reading predicted by a straight line drawn between upper and lower calibration points.

Method 10A—Determination of Carbon Monoxide Emissions in Certifying Continuous Emission Monitoring Systems at Petroleum Refineries

1. Applicability and Principle

1.1 **Applicability.** This method applies to the measurement of carbon monoxide (CO) at petroleum refineries. This method serves as the reference method in the relative accuracy test for nondispersive infrared (NDIR) CO continuous emission monitoring systems (CEMS's) that are required to be installed in petroleum refineries on fluid catalytic cracking unit catalyst regenerators [40 CFR Part 60.105(a)(2)].

1.2 **Principle.** An integrated gas sample is extracted from the stack, passed through an alkaline permanganate solution to remove sulfur and nitrogen oxides, and collected in a Tedlar bag. The CO concentration in the sample is measured spectrophotometrically using the reaction of CO with p-sulfaminobenzoic acid.

1.3. **Range and Sensitivity.**

1.3.1 **Range.** Approximately 3 to 1800 PPM CO. Samples having concentrations below 400 PPM are analyzed at 425 nm, and samples having concentrations above 400 PPM are analyzed at 600 nm.

1.3.2 **Sensitivity.** The detection limit is 3 PPM based on three times the standard deviation of the mean reagent blank values.

7.4 Adsorption Tube Procedure (Alternative Procedure). It is suggested that the tester refer to the National Institute of Occupational Safety and Health (NIOSH) method for the particular organics to be sampled. The principal interferent will be water vapor. If water vapor is present at concentrations above 3 percent, silica gel should be used in front of the charcoal. Where more than one compound is present in the emissions, then develop relative adsorptive capacity information.

7.4.1 Additional Apparatus. In addition to the equipment listed in the NIOSH method for the particular organic(s) to be sampled, the following items (or equivalent) are suggested.

7.4.1.1 Probe (Optional). Borosilicate glass or stainless steel, approximately 6-mm ID, with a heating system if water condensation is a problem, and a filter (either in-stack or out-stack heated to stack temperature) to remove particulate matter. In most instances, a plug of glass wool is a satisfactory filter.

7.4.1.2 Flexible Tubing. To connect probe to adsorption tubes. Use a material that exhibits minimal sample adsorption.

7.4.1.3 Leakless Sample Pump. Flow controlled, constant rate pump, with a set of limiting (sonic) orifices to provide pumping rates from approximately 10 to 100 cc/min.

7.4.1.4 Bubble-Tube Flowmeter. Volume accuracy within ± 1 percent, to calibrate pump.

7.4.1.5 Stopwatch. To time sampling and pump rate calibration.

7.4.1.6 Adsorption Tubes. Similar to ones specified by NIOSH, except the amounts of adsorbent per primary/backup sections are 800/200 mg for charcoal tubes and 1040/260 mg for silica gel tubes. As an alternative, the tubes may contain a porous polymer adsorbent such as Tenax GC or XAD-2.

7.4.1.7 Barometer. Accurate to 5 mm Hg, to measure atmospheric pressure during sampling and pump calibration.

7.4.1.8 Rotameter. 0 to 100 cc/min, to detect changes in flow rate during sampling.

7.4.2 Sampling and Analysis. It is suggested that the tester follow the sampling and analysis portion of the respective NIOSH method section entitled "Procedure." Calibrate the pump and limiting orifice flow rate through adsorption tubes with the bubble tube flowmeter before sampling. The sample system can be operated as a "recirculating loop" for this operation. Record the ambient temperature and barometric pressure. Then, during sampling, use the ro-

tameter to verify that the pump and orifice sampling rate remains constant.

Use a sample probe, if required, to obtain the sample at the centroid of the duct, or at a point no closer to the walls than 1 m. Minimize the length of flexible tubing between the probe and adsorption tubes. Several adsorption tubes can be connected in series, if the extra adsorptive capacity is needed. Provide the gas sample to the sample system at a pressure sufficient for the limiting orifice to function as a sonic orifice. Record the total time and sample flow rate (or the number of pump strokes), the barometric pressure, and ambient temperature. Obtain a total sample volume commensurate with the expected concentration(s) of the volatile organic(s) present, and recommended sample loading factors (weight sample per weight adsorption media). Laboratory tests prior to actual sampling may be necessary to predetermine this volume. When more than one organic is present in the emissions, then develop relative adsorptive capacity information. If water vapor is present in the sample at concentrations above 2 to 3 percent, the adsorptive capacity may be severely reduced. Operate the gas chromatograph according to the manufacture's instructions. After establishing optimum conditions, verify and document these conditions during all operations. Analyze the audit samples (see Section 7.4.4.3), then the emission samples. Repeat the analysis of each sample until the relative deviation of two consecutive injections does not exceed 5 percent.

7.4.3 Standards and Calibration. The standards can be prepared according to the respective NIOSH method. Use a minimum of three different standards; select the concentrations to bracket the expected average sample concentration. Perform the calibration before and after each day's sample analyses. Prepare the calibration curve by using the least squares method.

7.4.4 Quality Assurance.

7.4.4.1 Determination of Desorption Efficiency. During the testing program, determine the desorption efficiency in the expected sample concentration range for each batch of adsorption media to be used. Use an internal standard. A minimum desorption efficiency of 50 percent shall be obtained. Repeat the desorption determination until the relative deviation of two consecutive determinations does not exceed 5 percent. Use the average desorption efficiency of these two consecutive determinations for the correction specified in Section 7.4.4.5. If the desorption efficiency of the compound(s) of interest is questionable under actual sampling conditions, use of the Method of Standard Additions may be helpful to determine this value.

7.4.4.2 Determination of Sample Collection Efficiency. For the source samples, analyze the primary and backup portions of the adsorption tubes separately. If the backup portion exceeds 10 percent of the total amount (primary and backup), repeat the sampling with a larger sampling portion.

7.4.4.3 Analysis Audit. Immediately before the sample analyses, analyze the two audits in accordance with Section 7.4.2. The analysis audit shall agree with the audit concentration within 10 percent.

7.4.4.4 Pump Leak Checks and Volume Flow Rate Checks. Perform both of these checks immediately after sampling with all sampling train components in place. Perform all leak checks according to the manufacturer's instructions, and record the results. Use the bubble-tube flowmeter to measure the pump volume flow rate with the orifice used in the test sampling, and the result. If it has changed by more than 5 but less than 20 percent, calculate an average flow rate for the test. If the flow rate has changed by more than 20 percent, recalibrate the pump and repeat the sampling.

7.4.4.5 Calculations. All calculations can be performed according to the respective NIOSH method. Correct all sample volumes to standard conditions. If a sample dilution system has been used, multiply the results by the appropriate dilution ratio. Correct all results by dividing by the desorption efficiency (decimal value). Report results as ppm by volume, dry basis.

7.5 Reporting of Results. At the completion of the field analysis portion of the study, ensure that the data sheets shown in Figure 18-11 have been completed. Summarize this data on the data sheets shown in Figure 18-15.

8. *Bibliography*

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Method 18—Measurement of Gaseous Organic Compound Emissions by Gas Chromatography

Introduction

This method should not be attempted by persons unfamiliar with the performance characteristics of gas chromatography, nor by those persons who are unfamiliar with source sampling. Particular care should be exercised in the area of safety concerning choice of equipment and operation in potentially explosive atmospheres.

1. *Applicability and Principle*

1.1 Applicability. This method applies to the analysis of approximately 90 percent of the total gaseous organics emitted from an industrial source. It does not include techniques to identify and measure trace amounts of organic compounds, such as those found in building air and fugitive emission sources.

This method will not determine compounds that (1) are polymeric (high molecular weight), (2) can polymerize before analysis, or (3) have very low vapor pressures at stack or instrument conditions.

1.2 Principle.

The major organic components of a gas mixture are separated by gas chromatography (GC) and individually quantified by flame ionization, photoionization, electron capture, or other appropriate detection principles.

The retention times of each separated component are compared with those of known compounds under identical conditions. Therefore, the analyst confirms the identity and approximate concentrations of the organic emission components beforehand. With this information, the analyst then prepares or purchases commercially available standard mixtures to calibrate the GC under conditions identical to those of the samples. The analyst also determines the need for sample dilution to avoid detector saturation, gas stream filtration to eliminate particulate matter, and prevention of moisture condensation.

2. *Range and Sensitivity*

2.1 Range. The range of this method is from about 1 part per million (ppm) to the upper limit governed by GC detector saturation or column overloading. The upper limit can be extended by diluting the stack gases with an inert gas or by using smaller gas sampling loops.

2.2 Sensitivity. The sensitivity limit for a compound is defined as the minimum detectable concentration of that compound, or the concentration that produces a signal-to-noise ratio of three to one. The minimum detectable concentration is determined during the presurvey calibration for each compound.

3. *Precision and Accuracy*

Gas chromatographic techniques typically provide a precision of 5 to 10 percent relative standard deviation (RSD), but an experienced GC operator with a reliable instrument can readily achieve 5 percent RSD. For this method, the following combined GC/operator values are required.

(a) Precision. Duplicate analyses are within 5 percent of their mean value.

(b) Accuracy. Analysis results of prepared audit samples are within 10 percent of preparation values.

4. *Interferences*

Resolution interferences that may occur can be eliminated by appropriate GC column and detector choice or by shifting the retention times through changes in the column flow rate and the use of temperature programming.

The analytical system is demonstrated to be essentially free from contaminants by periodically analyzing blanks that consist of hydrocarbon-free air or nitrogen.

Sample cross-contamination that occurs when high-level and low-level samples or standards are analyzed alternately, is best

Method 25A-Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer

1. Applicability and Principle

1.1 **Applicability.** This method applies to the measurement of total gaseous organic concentration of vapors consisting primarily of alkanes, alkenes, and/or arenes (aromatic hydrocarbons). The concentration is expressed in terms of propane (or other appropriate organic calibration gas) or in terms of carbon.

1.2 **Principle.** A gas sample is extracted from the source through a heated sample line, if necessary, and glass fiber filter to a flame ionization analyzer (FIA). Results are reported as volume concentration equivalents of the calibration gas or as carbon equivalents.

2. Definitions

2.1 **Measurement Systems.** The total equipment required for the determination of the gas concentration. The system consists of the following major subsystems:

2.1.1 **Sample Interface.** That portion of the system that is used for one or more of the following: sample acquisition, sample transportation, sample conditioning, or protection of the analyzer from the effects of the stack effluent.

2.1.2 **Organic Analyzer.** That portion of the system that senses organic concentration and generates an output proportional to the gas concentration.

2.2 **Span Value.** The upper limit of a gas concentration measurement range that is specified for affected source categories in the applicable part of the regulations. The span value is established in the applicable regulation and is usually 1.5 to 2.5 times the applicable emission limit. If no span value is provided, use a span value equivalent to 1.5 to 2.5 times the expected concentration. For convenience, the span value should correspond to 100 percent of the recorder scale.

2.3 **Calibration Gas.** A known concentration of a gas in an appropriate diluent gas.

2.4 **Zero Drift.** The difference in the measurement system response to a zero level calibration gas before and after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.5 **Calibration drift.** The difference in the measurement system response to a midlevel calibration gas before and after a stated period of operation during which no unscheduled maintenance, repair or adjustment took place.

2.6 **Response Time.** The time interval from a step change in pollutant concentration at the inlet to the emission measurement system to the time at which 95 percent of the corresponding final value is reached as displayed on the recorder.

2.7 **Calibration Error.** The difference between the gas concentration indicated by the measurement system and the known concentration of the calibration gas.

3. Apparatus

A schematic of an acceptable measurement system is shown in Figure 25A-1. The essential components of the measurement system are described below:

3.1 **Organic Concentration Analyzer.** A flame ionization analyzer (FIA) capable of meeting or exceeding the specifications in this method.

3.2 **Sample Probe.** Stainless steel, or equivalent, three-hole rake type. Sample holes shall be 4 mm in diameter or smaller and located at 16.7, 50, and 83.3 percent of the equivalent stack diameter. Alternatively, a single opening probe may be used so that a gas sample is collected from the centrally located 10 percent area of the stack cross-section.

3.3 **Sample Line.** Stainless steel or Teflon * tubing to transport the sample gas to the analyzer. The sample line should be heated, if necessary, to prevent condensation in the line.

3.4 **Calibration Valve Assembly.** A three way valve assembly to direct the zero and calibration gases to the analyzers is recommended. Other methods, such as quick-connect lines, to route calibration gas to the analyzers are applicable.

3.5 **Particulate Filter.** An in-stack or an out-of-stack glass fiber filter is recommended if exhaust gas particulate loading is significant. An out-of-stack filter should be heated to prevent any condensation.

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* Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

3.6 **Recorder.** A strip-chart recorder, analog computer, or digital recorder for recording measurement data. The minimum data recording requirement is one measurement value per minute, Note: This method is often applied in highly explosive areas. Caution and care should be exercised in choice of equipment and installation.

4. Calibration and Other Gases.

Gases used for calibrations, fuel, and combustion air (if required) are contained in compressed gas cylinders. Preparation of calibration gases shall be done according to the procedure in Protocol No. 1, listed in Citation 2 of Bibliography. Additionally, the manufacturer of the cylinder should provide a recommended shelf life for each calibration gas cylinder over which the concentration does not change more than ± 2 percent from the certified value. For calibration gas values not generally available (i.e., organics between 1 and 10 percent by volume), alternative methods for preparing calibration gas mixtures, such as dilution systems, may be used with prior approval of the Administrator.

Calibration gases usually consist of propane in air or nitrogen and are determined in terms of the span value. Organic compounds other than propane can be used following the above guidelines and making the appropriate corrections for response factor.

4.1 **Fuel.** A 40 percent H_2/60 percent N_2 gas mixture is recommended to avoid an oxygen synergism effect that reportedly occurs when oxygen concentration varies significantly from a mean value.

4.2 **Zero Gas.** High purity air with less than 0.1 parts per million by volume (PPMv) of organic material (propane or carbon equivalent) or less than 0.1 percent of the span value, whichever is greater.

4.3 **Low-level Calibration Gas.** An organic calibration gas with a concentration equivalent to 25 to 35 percent of the applicable span value.

4.4 **Mid-level Calibration Gas.** An organic calibration gas with a concentration equivalent to 45 to 55 percent of the applicable span value.

4.5 **High-level Calibration Gas.** An organic calibration gas with a concentration equivalent to 80 to 90 percent of the applicable span value.

5. Measurement System Performance Specifications

5.1 **Zero Drift.** Less than ± 3 percent of the span value.

5.2 **Calibration Drift.** Less than ± 3 percent of span value.

5.3 **Calibration Error.** Less than ± 5 percent of the calibration gas value.

6. Pretest Preparations

6.1 **Selection of Sampling Site.** The location of the sampling site is generally specified by the applicable regulation or purpose of the test; i.e., exhaust stack, inlet line, etc. The sample port shall be located at least 1.5 meters or 2 equivalent diameters upstream of the gas discharge to the atmosphere.

6.2 **Location of Sample Probe.** Install the sample probe so that the probe is centrally located in the stack, pipe, or duct and is sealed tightly at the stack port connection.

6.3 **Measurement System Preparation.** Prior to the emission test, assemble the measurement system following the manufacturer's written instructions in preparing the sample interface and the organic analyzer. Make the system operable.

FIA equipment can be calibrated for almost any range of total organics concentrations. For high concentrations of organics (> 1.0 percent by volume as propane) modifications to most commonly available analyzers are necessary. One accepted method of equipment modification is to decrease the size of the sample to the analyzer through the use of a smaller diameter sample capillary. Direct and continuous measurement of organic concentration is a necessary consideration when determining any modification design.

6.4 **Calibration Error Test.** Immediately prior to the test series, (within 2 hours of the start of the test) introduce zero gas and high-level calibration gas at the calibration valve assembly. Adjust the analyzer output to the appropriate levels, if necessary. Calculate the predicted response for the low-level and mid-level gases based on a linear response line between the zero and high-level responses. Then introduce low-level and mid-level calibration gases successively to the measurement system. Record the analyzer responses for low-level and mid-level calibration gases and determine the differences between the measurement system responses and the predicted responses. These differences must be less than 5 percent of the respective calibration gas value. If not, the measurement system is not acceptable and must be replaced or repaired prior to testing. No adjustments to the measurement system shall be conducted after the calibration and before the drift check (Section 7.3). If adjustments are necessary before the completion of the test series, perform the drift checks prior to the required adjustments and repeat the calibration following the adjustments. If multiple electronic ranges are to be used, each additional range must be checked with a mid-level calibration gas to verify the multiplication factor.

6.5 **Response Time Test.** Introduce Zero gas into the measurement system at the calibration valve assembly. When the system output has stabilized, switch quickly to the high-level calibration gas. Record the time from the concentration change to the measurement system response equivalent to 95 percent of the step change. Repeat the test three times and average the results.

7. Emission Measurement Test Procedure

7.1 **Organic Measurement.** Begin sampling at the start of the test period, recording time and any required process information as appropriate. In particular, note on the recording chart periods of process interruption or cyclic operation.

7.2 **Drift Determination.** Immediately following the completion of the test period and hourly during the test period, reintroduce the zero and mid-level calibration gases, one at a time, to the measurement system at the calibration valve assembly. (Make no adjustments to the measurement system until after both the zero and calibration drift checks are made.) Record the analyzer response. If the drift values exceed the specified limits, invalidate the test results preceding the check and repeat the test following corrections to the measurement system. Alternatively, recalibrate the test measurement system as in Section 6.4 and report the results using both sets of calibration data (i.e., data determined prior to the test period and data determined following the test period).

8. Organic Concentration calculations

Determine the average organic concentration in terms of PPMv as propane or other calibration gas. The average shall be determined by the integration of the output recording over the period specified in the applicable regulation. If results are required in terms of PPMv as carbon, adjust measured concentrations using Equation 25A-1.

$C_c = K C_{meas}$ Eq. 25A-1

Where:

C_c = Organic concentration as carbon, PPMv.
C_{meas} = Organic concentration as measured, PPMv.
K = Carbon equivalent correction factor.
K = 2 for ethane.
K = 3 for propane.
K = 4 for butane.
K = Appropriate response factor for other organic calibration gases.

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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.

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SAMPLING FOR FORMALDEHYDE EMISSIONS FROM STATIONARY SOURCES

1.0 SCOPE AND APPLICATION

1.1 This method is applicable to the determination of-Destruction and Removal Efficiency (DRE) of formaldehyde, CAS Registry number 50-00-0, and possibly other aldehydes and ketones from stationary sources as specified in the regulations. The methodology has been applied specifically to formaldehyde; however, many laboratories have extended the application to other aldehydes and ketones. Compounds derivatized with 2,4-dinitrophenylhydrazine can be detected as low as 6.4×10^{-8} lbs/cu ft (1.8 ppbv) in stack gas over a 1 h sampling period, sampling approximately 45 cu ft.

2.0 SUMMARY OF METHOD

2.1 Gaseous and particulate pollutants are withdrawn isokinetically from an emission source and are collected in aqueous acidic 2,4-dinitrophenylhydrazine. Formaldehyde present in the emissions reacts with the 2,4-dinitrophenylhydrazine to form the formaldehyde dinitrophenylhydrazone derivative. The dinitrophenylhydrazone derivative is extracted, solvent-exchanged, concentrated, and then analyzed by high performance liquid chromatography.

3.0 INTERFERENCES

3.1 A decomposition product of 2,4-dinitrophenylhydrazine, 2,4-dinitroaniline, can be an analytical interferent if concentrations are high. 2,4-dinitroaniline can coelute with the 2,4-dinitrophenylhydrazone of formaldehyde under high performance liquid chromatography conditions which may be used for the analysis. High concentrations of highly oxygenated compounds, especially acetone, that have the same retention time or nearly the same retention time as the dinitrophenylhydrazone of formaldehyde and that also absorb at 360 nm will interfere with the analysis.

Formaldehyde, acetone, and 2,4-dinitroaniline contamination of the aqueous acidic 2,4-dinitrophenylhydrazine (DNPH) reagent is frequently encountered. The reagent must be prepared within five days of use in the field and must be stored in an uncontaminated environment both before and after sampling in order to minimize blank problems. Some level of acetone contamination is unavoidable, because acetone is ubiquitous in laboratory and field operations. However, the acetone contamination must be minimized.

4.0 APPARATUS AND MATERIALS

4.1 A schematic of the sampling train is shown in Figure 1. This sampling train configuration is adapted from EPA Method 5 procedures. The sampling train consists of the following components: Probe Nozzle, Pitot Tube, Differential Pressure Gauge, Metering System, Barometer, and Gas Density Determination Equipment.

4.1.1 Probe Nozzle: Quartz or glass with sharp, tapered (30° angle) leading edge. The taper shall be on the outside to preserve a constant inner diameter. The nozzle shall be buttonhook or elbow design. A range of nozzle sizes suitable

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

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

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

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

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

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

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

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

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

4.2 Sample Recovery

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

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

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

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

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

5.0 REAGENTS

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

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

5.2 Silica Gel: Silica gel shall be indicating type, 6-16 mesh. If the silica gel has been used previously, dry at 175°C (350°F) for 2 h before using. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used.

5.3 Crushed Ice: Quantities ranging from 10-50 lb may be necessary during a sampling run, depending upon ambient temperature. Samples which have been taken must be stored and shipped cold; sufficient ice for this purpose must be allowed.

5.4 2,4-Dinitrophenylhydrazine Reagent: The 2,4-dinitrophenylhydrazine reagent must be prepared in the laboratory within five days of sampling use in the field. Preparation of DNPH can also be done in the field, with consideration of appropriate procedures required for safe handling of solvent in the field. When a container of prepared DNPH reagent is opened in the field, the contents of the opened container should be used within 48 hours. All laboratory glassware must be washed with detergent and water and rinsed with water, methanol, and methylene chloride prior to use.

NOTE: The glassware must not be rinsed with acetone or unacceptable levels of acetone contamination will be introduced. If field preparation of DNPH is performed, caution must be exercised in avoiding acetone contamination.

Reagent bottles for storage of cleaned DNPH derivatizing solution must be rinsed with acetonitrile and dried before use. Baked glassware is not essential for preparation of DNPH reagent.

NOTE: DNPH crystals or DNPH solution should be handled with plastic gloves at all times, with prompt and extensive use of running water in case of skin exposure.

5.4.1 Preparation of Aqueous Acidic DNPH: The following materials and reagents are required for preparation of the reagent.

5.4.1.1 Bottles/Caps: amber 1- or 4 L bottles with Teflon®-lined caps are required for storing cleaned DNPH solution. Additional 4-L bottles are required to collect waste organic solvents.

5.4.1.2 Large Glass Container: at least one large glass container (8 to 16 L) is required for mixing the aqueous acidic DNPH solution.

5.4.1.3 Stir Plate/Large Stir Bars/Stir Bar Retriever: a magnetic stir plate and large stir bar are required for the mixing of the aqueous acidic DNPH solution. A stir bar retriever is needed for removing the stir bar from the large container holding the DNPH solution.

5.4.1.4 Buchner Filter/Filter Flask/Filter Paper: a large filter flask (2-4 L) with a buchner filter, appropriate rubber stopper, filter paper, and connecting tubing are required for filtering the aqueous acidic DNPH solution prior to cleaning.

5.4.1.5 Separatory Funnels: at least one large separatory funnel (2 L) is required for cleaning the DNPH prior to use.

5.4.1.6 Beakers: beakers (150 mL, 250 mL, and 400 mL) are useful for holding/measuring organic liquids when cleaning the aqueous acidic DNPH solution and for weighing DNPH crystals.

5.4.1.7 Funnels: at least one large funnel is needed for pouring the aqueous acidic DNPH into the separatory funnel.

5.4.1.8 Graduated Cylinders: at least one large graduated cylinder (1 to 2 L) is required for measuring HPLC-grade water and acid when preparing the DNPH solution.

5.4.1.9 Top-Loading Balance: a one-place top loading balance is needed for weighing out the DNPH crystals used to prepare the aqueous acidic DNPH solution.

5.4.1.10 Spatulas: spatulas are needed for weighing out DNPH when preparing the aqueous DNPH solution.

5.4.1.11 HPLC-Grade Water: water (HPLC-grade) is required to mix the aqueous DNPH solution.

5.4.1.12 Hydrochloric Acid: reagent grade hydrochloric acid (approximately 12N) is required for acidifying the aqueous DNPH solution.

5.4.1.13 2,4-Dinitrophenylhydrazine: a supply of moist solid 2,4-dinitrophenylhydrazine (DNPH) is required for preparation of aqueous acidic DNPH solution. The quantity of water may vary from 10 to 30%. Reagent grade or equivalent is required.

5.4.1.14 Methylene Chloride: methylene chloride (suitable for residue and pesticide analysis, GC/MS, HPLC, GC, Spectrophotometry or equivalent) is required for cleaning the aqueous acidic DNPH solution, rinsing glassware, and recovery of sample trains.

5.4.1.15 Cyclohexane: cyclohexane (HPLC grade) is required for cleaning the aqueous acidic DNPH solution.

NOTE: Do not use spectroanalyzed grades of cyclohexane if this sampling methodology is extended to aldehydes and ketones with four or more carbon atoms.

5.4.1.16 Methanol: methanol (HPLC grade or equivalent) is required for rinsing glassware.

5.4.1.17 Acetonitrile: acetonitrile (HPLC grade or equivalent) is required for rinsing glassware.

5.4.1.18 Formaldehyde: Analytical grade or equivalent formaldehyde is required for preparation of standards. If other aldehydes or ketones are used, analytical grade or equivalent is required.

5.4.2 Preparation of Aqueous Acidic DNPH Derivatizing Reagent: Each batch of DNPH reagent should be prepared and purified within five days of sampling, according to the procedure described below.

5.4.2.1 Place an 8-L container under a fume hood on a magnetic stirrer. Add a large stir bar and fill the container half full of HPLC-grade water. Save the empty bottle from HPLC-grade water. Start the stirring bar and adjust the stir rate to be as fast as possible. Using a graduated cylinder, measure 1.4 mL of concentrated hydrochloric acid. Slowly pour the acid into the stirring water. Fumes may be generated and the water may become warm. Weigh the DNPH crystals on a one-place balance (see Table 1 for approximate amounts) and add to the stirring acid solution. Fill the 8 L container to the 8 L mark with HPLC water and stir overnight. If all of the DNPH crystals have dissolved overnight, add additional DNPH and stir for two more hours. Continue the process of adding DNPH with additional stirring until a saturated solution has been formed. Filter the DNPH solution using vacuum filtration. Gravity filtration may be used, but a

much longer time is required. Store the filtered solution in an amber bottle at room temperature.

TABLE 1. APPROXIMATE AMOUNT OF CRYSTALLINE DNPH USED TO PREPARE A SATURATED SOLUTION

Amount of Moisture in DNPH	Weight Required per 8 L of Solution
10 weight percent	31 g
15 weight percent	33 g
30 weight percent	40 g

Within five days of proposed use, place about 1.6 L of the DNPH reagent in a 2 L separatory funnel. Add approximately 200 mL of methylene chloride and stopper the funnel. Wrap the stopper of the funnel with paper towels to absorb any leakage. Invert and vent the funnel. Then shake vigorously for 3 minutes. Initially, the funnel should be vented frequently (every 10 - 15 sec). After the layers have separated, discard the lower (organic) layer.

Extract the DNPH a second time with methylene chloride and finally with cyclohexane. When the cyclohexane layer has separated from the DNPH reagent, the cyclohexane layer will be the top layer in the separatory funnel. Drain the lower layer (the cleaned extracted DNPH reagent solution) into an amber bottle that has been rinsed with acetonitrile and allowed to dry.

5.4.3 Quality Control: Take two aliquots of the extracted DNPH reagent. The size of the aliquots is dependent upon the exact sampling procedure used, but 100 mL is reasonably representative. To ensure that the background in the reagent is acceptable for field use, analyze one aliquot of the reagent according to the procedure of EPA Draft Method 8315. Save the other aliquot of aqueous acidic DNPH for use as a method blank when the analysis is performed.

5.4.4 Shipment to the Field: Tightly cap the bottle containing extracted DNPH reagent using a Teflon®-lined cap. Seal the bottle with Teflon® tape. After the bottle is labeled, the bottle may be placed in a friction-top can (paint can or equivalent) containing a 1 -2 inch layer of granulated charcoal and stored at ambient temperature until use.

If the DNPH reagent has passed the Quality Control criteria, the reagent may be packaged to meet necessary shipping requirements and sent to the sampling area. If the Quality Control criteria are not met, the reagent solution may be re-extracted or the solution may be re-prepared and the extraction sequence repeated.

If the DNPH reagent is not used in the field within five days of extraction, an aliquot may be taken and analyzed as described Draft Method 8315. If the reagent meets the Quality Control requirements, the reagent may be used. If the reagent does not meet Quality Control requirements, the reagent must be discarded and new reagent must be prepared and tested.

5.4.5 Calculation of Acceptable Levels of Impurities in DNPH Reagent: The acceptable impurity level (AIL, µg/mL) is calculated from the expected analyte level in the sampled gas (EAL, ppbv), the volume of air that will be sampled at standard conditions (SVOL, L), the formula weight of the analyte (FW, g/mol), and the volume of DNPH reagent that will be used in the impingers (RVOL, mL):

$$AIL = 0.1 \times [EAL \times SVOL \times FW/22.4 \times (FW + 180)/FW]/(RVOL \times 1000).$$

where 0.1 is the acceptable contaminant level, 22.4 is a factor relating ppbv to g/L, 180 is a factor relating the underivatized analyte to the derivatized analyte, and 1000 is a unit conversion factor.

5.4.6 Disposal of Excess DNPH Reagent: Excess DNPH reagent may be returned to the laboratory and recycled or treated as aqueous waste for disposal purposes. 2,4-Dinitrophenylhydrazine is a flammable solid when dry so water should not be evaporated from the solution of the reagent.

5.5 Field Spike Standard Preparation: To prepare a formaldehyde field spiking standard at 4.01 mg/mL, use a 500µL syringe to transfer 0.5 mL of 37% by weight of formaldehyde (401 mg/mL) to a 50 mL volumetric flask containing approximately 40 mL of methanol. Dilute to 50 mL with methanol.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 Because of the complexity of this method, field personnel should be trained in and experienced with the test procedures in order to obtain reliable results.

6.2 Laboratory Preparation:

6.2.1 All the components shall be maintained and calibrated according to the procedure described in APTD-0576, unless otherwise specified.

6.2.2 Weigh several 200- to 300-g portions of silica gel in airtight containers to the nearest 0.5 g. Record on each container the total weight of the silica gel plus containers. As an alternative to preweighing the silica gel, it may instead be weighed directly in the impinger or sampling holder just prior to train assembly.

6.3 Preliminary Field Determinations:

6.3.1 Select the sampling site and the minimum number of sampling points according to EPA Method 1 or other relevant criteria. Determine the stack pressure, temperature, and range of velocity heads using EPA Method 2. A leak-check of the pitot lines according to EPA Method 2, Section 3.1, must be performed. Determine the stack gas moisture content using EPA Approximation Method 4 or its alternatives to establish estimates of isokinetic sampling-rate settings. Determine the stack gas dry molecular weight, as described in EPA Method 2, Section 3.6. If integrated EPA Method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the sample run.

6.3.2 Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates below 28 L/min (1.0 cfm). During the run, do not change the nozzle.

Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see Section 2.2 of EPA Method 2).

6.3.3 Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, to reduce the length of the probe, consider sampling from opposite sides of the stack.

6.3.4 A minimum of 45 ft^3 of sample volume is required for the determination of the Destruction and Removal Efficiency (DRE) of formaldehyde from incineration systems (45ft^3 is equivalent to one hour of sampling at 0.75 dscf). Additional sample volume shall be collected as ecessitated by the capacity of the DNPH reagent and analytical detection limit constraints. To determine the minimum sample volume required, refer to sample calculations in Section 10.

6.3.5 Determine the total length of sampling time needed to obtain the identified minimum volume by comparing the anticipated average sampling rate with the volume requirement. Allocate the same time to all traverse points defined by EPA Method 1. To avoid timekeeping errors, the length of time sampled at each traverse point should be an integer or an integer plus 0.5 min.

6.3.6 In some circumstances (e.g., batch cycles) it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas-volume samples. In these cases, careful documentation must be maintained in order to allow accurate calculation of concentrations.

6.4 Preparation of Collection Train:

6.4.1 During preparation and assembly of the sampling train, keep all openings where contamination can occur covered with Teflon® film or aluminum foil until just prior to assembly or until sampling is about to begin.

6.4.2 Place 100 mL of cleaned DNPH solution in each of the first two impingers, and leave the third impinger empty. If additional capacity is required for high expected concentrations of formaldehyde in the stack gas, 200 mL of DNPH per impinger may be used or additional impingers may be used for sampling. Transfer approximately 200 to 300 g of pre-weighed silica gel from its container to the fourth impinger. Care should be taken to ensure that the silica gel is not entrained and carried out from the impinger during sampling. Place the silica gel container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

6.4.3 With a glass or quartz liner, install the selected nozzle using a Viton-A O-ring when stack temperatures are <260°C (500°F) and a woven glass-fiber gasket when temperatures are higher. See APTD-0576 (Rom, 1972) for details. Other connecting systems utilizing either 316 stainless steel or Teflon® ferrules may be used. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

6.4.4 Assemble the train as shown in Figure 1. During assembly, do not use any silicone grease on ground-glass joints upstream of the impingers. Use Teflon® tape, if required. A very light coating of silicone grease may be used on ground-glass joints downstream of the impingers, but the silicone grease should be limited to the outer portion (see APTD-0576) of the ground-glass joints to

necessary, a leak check shall be conducted immediately after the interruption of sampling and before the change is made. The leak check shall be done according to the procedure described in Section 6.5.1, except that it shall be done at a vacuum greater than or equal to the maximum value recorded up to that point in the test. If the leakage rate is found to be no greater than 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable. If a higher leakage rate is obtained, the tester must void the sampling run.

NOTE: Any correction of the sample volume by calculation reduces the integrity of the pollutant concentration data generated and must be avoided.

6.5.2.2 Immediately after a component change and before sampling is re-initiated, a leak check similar to a pre-test leak check must also be conducted.

6.5.3 Post-test Leak Check:

6.5.3.1 A leak check is mandatory at the conclusion of each sampling run. The leak check shall be done with the same procedures as the pre-test leak check, except that the post-test leak check shall be conducted at a vacuum greater than or equal to the maximum value reached during the sampling run. If the leakage rate is found to be no greater than 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable. If, however, a higher leakage rate is obtained, the tester shall record the leakage rate and void the sampling run.

6.6 Sampling Train Operation:

6.6.1 During the sampling run, maintain an isokinetic sampling rate to within 10% of true isokinetic, below 28 L/min (1.0 cfm). Maintain a temperature around the probe of 120° ± 14°C (248° ± 25°F).

6.6.2 For each run, record the data on a data sheet such as the one shown in Figure 2. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak check, and when sampling is halted. Take other readings required by Figure 2 at least once at each sample point during each time increment and additional readings when significant adjustments (20% variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

6.6.3 Clean the stack access ports prior to the test run to eliminate the chance of sampling deposited material. To begin sampling, remove the nozzle cap, verify that the filter and probe heating systems are at the specified temperature, and verify that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point, with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs, which aid in the rapid adjustment of the isokinetic sampling rate without excessive computations, are available. These nomographs are designed for use when the Type S pitot tube coefficient is 0.84 ± 0.02 and the stack gas equivalent density (dry molecular weight) is equal to 29 ± 4. APTD-0576 details the procedure for using the nomographs. If the stack gas molecular weight and

minimize silicone grease contamination. If necessary, Teflon® tape may be used to seal leaks. Connect all temperature sensors to an appropriate potentiometer/display unit. Check all temperature sensors at ambient temperature.

6.4.5 Place crushed ice all around the impingers.

6.4.6 Turn on and set the probe heating system at the desired operating temperature. Allow time for the temperature to stabilize.

6.5 Leak-Check Procedures:

6.5.1 Pre-test Leak Check:

6.5.1.1 After the sampling train has been assembled, turn on and set the probe heating system at the desired operating temperature. Allow time for the temperature to stabilize. If a Viton-A O-ring or other leak-free connection is used in assembling the probe nozzle to the probe liner, leak-check the train at the sampling site by plugging the nozzle and pulling a 381-mm Hg (15 in Hg) vacuum.

NOTE: A lower vacuum may be used, provided that the lower vacuum is not exceeded during the test.

6.5.1.2 If an asbestos string is used, do not connect the probe to the train during the leak check. Instead, leak-check the train by first attaching a carbon-filled leak check impinger to the inlet and then plugging the inlet and pulling a 381-mm Hg (15 in Hg) vacuum. (A lower vacuum may be used if this lower vacuum is not exceeded during the test.) Then connect the probe to the train and leak-check at about 25 mm Hg (1 in Hg) vacuum. Alternatively, leak-check the probe with the rest of the sampling train in one step at 381 mm Hg (15 in Hg) vacuum. Leakage rates in excess of 4% of the average sampling rate or >0.00057 m^3/min (0.02 cfm), whichever is less, are acceptable.

6.5.1.3 The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with the fine-adjust valve fully open and coarse-adjust valve completely closed. Partially open the coarse-adjust valve and slowly close the fine-adjust valve until the desired vacuum is reached. Do not reverse direction of the fine-adjust valve, as liquid will back up into the train. If the desired vacuum is exceeded, either perform the leak check at this higher vacuum or end the leak check, as shown below, and start over.

6.5.1.4 When the leak check is completed, first slowly remove the plug from the inlet to the probe. When the vacuum drops to 127 mm (5 in) Hg or less, immediately close the coarse-adjust valve. Switch off the pumping system and reopen the fine-adjust valve. Do not reopen the fine-adjust valve until the coarse-adjust valve has been closed to prevent the liquid in the impingers from being forced backward into the sampling line and silica gel from being entrained backward into the third impinger.

6.5.2 Leak Checks During Sampling Runs:

6.5.2.1 If, during the sampling run, a component change (i.e., impinger) becomes

the pitot tube coefficient are outside the above ranges, do not use the nomographs unless appropriate steps are taken to compensate for the deviations.

6.6.4 When the stack is under significant negative pressure (equivalent to the height of the impinger stem), take care to close the coarse-adjust valve before inserting the probe into the stack in order to prevent liquid from backing up through the train. If necessary, the pump may be turned on with the coarse-adjust valve closed.

6.6.5 When the probe is in position, block off the openings around the probe and stack access port to prevent unrepresentative dilution of the gas stream.

6.6.6 Traverse the stack cross section, as required by EPA Method 1, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the access port, in order to minimize the chance of extracting deposited material.

6.6.7 During the test run, make periodic adjustments to keep the temperature around the probe at the proper levels. Add more ice and, if necessary, salt, to maintain a temperature of <20°C (68°F) at the silica gel outlet. Also, periodically check the level and zero of the manometer.

6.6.8 A single train shall be used for the entire sampling run, except in cases where simultaneous sampling is required in two or more separate ducts or at two or more different locations within the same duct, or in cases where equipment failure necessitates a change of trains. An additional train or additional trains may also be used for sampling when the capacity of a single train is exceeded.

6.6.9 When two or more trains are used, separate analyses of components from each train shall be performed. If multiple trains have been used because the capacity of a single train would be exceeded, first impingers from each train may be combined, and second impingers from each train may be combined.

6.6.10 At the end of the sampling run, turn off the coarse-adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry gas meter reading, and conduct a post-test leak check. Also, leak check the pitot lines as described in EPA Method 2. The lines must pass this leak check in order to validate the velocity-head data.

6.6.11 Calculate percent isokineticity (see Method 2) to determine whether the run was valid or another test should be made.

7.0 SAMPLE RECOVERY

7.1 Preparation:

7.1.1 Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool. When the probe can be handled safely, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over the tip to prevent losing or gaining particulate matter. Do not cap the probe tip tightly while the sampling train is cooling because a vacuum will be created, drawing liquid from the impingers back through the sampling train.

7.1.2 Before moving the sampling train to the cleanup site, remove the probe from the sampling train and cap the open outlet, being careful not to lose any condensate that might be present. Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used, let any condensed water or liquid drain into the impingers. Cap off any open impinger inlets and outlets. Ground glass stoppers, Teflon® caps, or caps of other inert materials may be used to seal all openings.

7.1.3 Transfer the probe and impinger assembly to an area that is clean and protected from wind so that the chances of contaminating or losing the sample are minimized.

7.1.4 Inspect the train before and during disassembly, and note any abnormal conditions.

7.1.5 Save a portion of all washing solutions (methylene chloride, water) used for cleanup as a blank. Transfer 200 mL of each solution directly from the wash bottle being used and place each in a separate, pre-labeled sample container.

7.2 Sample Containers:

7.2.1 Container 1: Probe and Impinger Catches. Using a graduated cylinder, measure to the nearest mL, and record the volume of the solution in the first three impingers. Alternatively, the solution may be weighed to the nearest 0.5 g. Include any condensate in the probe in this determination. Transfer the impinger solution from the graduated cylinder into the amber flint glass bottle. Taking care that dust on the outside of the probe or other exterior surfaces does not get into the sample, clean all surfaces to which the sample is exposed (including the probe nozzle, probe fitting, probe liner, first impinger, and impinger connector) with methylene chloride. Use less than 500 mL for the entire wash (250 mL would be better, if possible). Add the washings to the sample container.

7.2.1.1 Carefully remove the probe nozzle and rinse the inside surface with methylene chloride from a wash bottle. Brush with a Teflon® bristle brush, and rinse until the rinse shows no visible particles or yellow color, after which make a final rinse of the inside surface. Brush and rinse the inside parts of the Swagelok® fitting with methylene chloride in a similar way.

7.2.1.2 Rinse the probe liner with methylene chloride. While squirting the methylene chloride into the upper end of the probe, tilt and rotate the probe so that all inside surfaces will be wetted with methylene chloride. Let the methylene chloride drain from the lower end into the sample container. The tester may use a funnel (glass or polyethylene) to aid in transferring the liquid washes to the container. Follow the rinse with a Teflon® brush. Hold the probe in an inclined position, and squirt methylene chloride into the upper end as the probe brush is being pushed with a twisting action through the probe. Hold the sample container underneath the lower end of the probe, and catch any methylene chloride, water, and particulate matter that is brushed from the probe. Run the brush through the probe three times or more. With stainless steel or other metal probes, run the brush through in the above prescribed manner at least six times since there may be small crevices in which particulate matter can be entrapped. Rinse the brush with methylene chloride or water, and quantitatively collect these washings in the sample container. After the brushings, make a final rinse

of the probe as described above.

NOTE: Two people should clean the probe in order to minimize sample losses. Between sampling runs, brushes must be kept clean and free from contamination.

7.2.1.3 Rinse the inside surface of each of the first three impingers (and connecting tubing) three separate times. Use a small portion of methylene chloride for each rinse, and brush each surface to which sample is exposed with a Teflon® bristle brush to ensure recovery of fine particulate matter. Water will be required for the recovery of the impingers in addition to the specified quantity of methylene chloride. There will be at least two phases in the impingers. This two-phase mixture does not pour well, and a significant amount of the impinger catch will be left on the walls. The use of water as a rinse makes the recovery quantitative. Make a final rinse of each surface and of the brush, using both methylene chloride and water.

7.2.1.4 After all methylene chloride and water washings and particulate matter have been collected in the sample container, tighten the lid so that solvent, water, and DNPH reagent will not leak out when the container is shipped to the laboratory. Mark the height of the fluid level to determine whether leakage occurs during transport. Seal the container with Teflon® tape. Label the container clearly to identify its contents.

7.2.1.5 If the first two impingers are to be analyzed separately to check for breakthrough, separate the contents and rinses of the two impingers into individual containers. Care must be taken to avoid physical carryover from the first impinger to the second. The formaldehyde hydrazone is a solid which floats and froths on top of the impinger solution. Any physical carryover of collected moisture into the second impinger will invalidate a breakthrough assessment.

7.2.2 Container 2: Sample Blank. Prepare a blank by using an amber flint glass container and adding a volume of DNPH reagent and methylene chloride equal to the total volume in Container 1. Process the blank in the same manner as Container 1.

7.2.3 Container 3: Silica Gel. Note the color of the indicating silica gel to determine whether it has been completely spent and make a notation of its condition. The impinger containing the silica gel may be used as a sample transport container with both ends sealed with tightly fitting caps or plugs. Ground-glass stoppers or Teflon® caps may be used. The silica gel impinger should then be labeled, covered with aluminum foil, and packaged on ice for transport to the laboratory. If the silica gel is removed from the impinger, the tester may use a funnel to pour the silica gel and a rubber policeman to remove the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that may adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use water or other liquids to transfer the silica gel. If a balance is available in the field, the spent silica gel (or silica gel plus impinger) may be weighed to the nearest 0.5 g.

7.2.4 Sample containers should be placed in a cooler, cooled by although not in contact with ice. Sample containers must be placed vertically and, since they are glass, protected from breakage during 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 $FORM_1$ Mass =

$$[\ (WF)\ (FORM_1\ conc)\ (100 - XDRE)\ ]\ /\ 100$$

where:

WF = mass flow rate of waste feed per h, g/h (lb/h)

$FORM_1$ = concentration of FORM (wt %) introduced into the combustion process

DRE = percent Destruction and Removal Efficiency required

Max FORM = mass flow rate (g/h [lb/h]) of FORM emitted from the combustion source

10.2 The average discharge concentration of the FORM in the effluent gas is determined by comparing the Max FORM with the volumetric flow rate being exhausted from the source. Volumetric flow rate data are available as a result of preliminary EPA Method 1 - 4 determinations:

$$\text{Max } FORM_1 \text{ conc} = [\text{Max } FORM_1 \text{ Mass }] / DV_{eff(std)}$$

where:

$DV_{eff(std)}$ = volumetric flow rate of exhaust gas, dscm (dscf)

$FORM_1$ 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.

$$[LDL_{FORM} \times 10] / [FORM_{1\ conc}] = V_{tbc}$$

where:

LDL_{FORM} = detectable amount of FORM in entire sampling train

V_{tbc} = minimum dry standard volume to be collected at dry-gas meter

10.4 The following analytical detection limits and DNPH Reagent Capacity (based on a total volume of 200 mL in two impingers) must also be considered in determining a volume to be sampled.

Table 2. Instrument Detection Limits and Reagent Capacity for Formaldehyde Analysis[1]

Analyte	Detection Limit, ppbv[2]	Reagent Capacity, ppmv
formaldehyde	1.8	66
acetaldehyde	1.7	70
acrolein	1.5	75
acetone/propionaldehyde	1.5	75
butyraldehyde	1.5	79
methyl ethyl ketone	1.5	79
valeraldehyde	1.5	84
isovaleraldehyde	1.4	84
hexaldehyde	1.3	88
benzaldehyde	1.4	84
o-/m-/p-tolualdehyde	1.3	89
dimethylbenzaldehyde	1.2	93

[1] Oxygenated compounds in addition to formaldehyde are included for comparison with formaldehyde; extension of the methodology to other compounds is possible.

[2] Detection limits are determined in solvent. These values therefore represent the optimum capability of the methodology.

11.0 QUALITY CONTROL

11.1 Sampling: See EPA Manual 600/4-77-027b for Method 5 quality control.

11.2 Analysis: The quality assurance program required for this method includes the analysis of field and method blanks, procedure validations, and analysis of field spikes. The assessment of combustion data and positive identification and quantitation of formaldehyde are dependent on the integrity of the samples received and the precision and accuracy of the analytical methodology. Quality Assurance procedures for this method are designed to monitor the performance of the analytical methodology and to provide the required information to take corrective action if problems are observed in laboratory operations or in field sampling activities.

11.2.1 Field Blanks: Field blanks must be submitted with the samples collected at each sampling site. The field blanks include the sample bottles containing aliquots of sample recovery solvents, methylene chloride and water, and unused DNPH reagent. At a minimum, one complete sampling train will be assembled in the field staging area, taken to the sampling area, and leak-checked at the beginning and end of the testing (or for the same total number of times as the actual sampling train). The probe of the blank train must be heated during the sample test. The train will be recovered as if it were an actual test sample. No gaseous sample will be passed through the Blank sampling train.

11.2.2 Method Blanks: A method blank must be prepared for each set of analytical operations, to evaluate contamination and artifacts that can be derived from glassware, reagents, and sample handling in the laboratory.

11.2.3 Field Spike: A field spike is performed by introducing 200 µL of the Field Spike Standard into an impinger containing 200 mL of DNPH solution. Standard impinger recovery procedures are followed and the field spike sample is returned to the laboratory for analysis. The field spike is used as a check on field handling and recovery procedures. An aliquot of the field spike standard is retained in the laboratory for derivatization and comparative analysis.

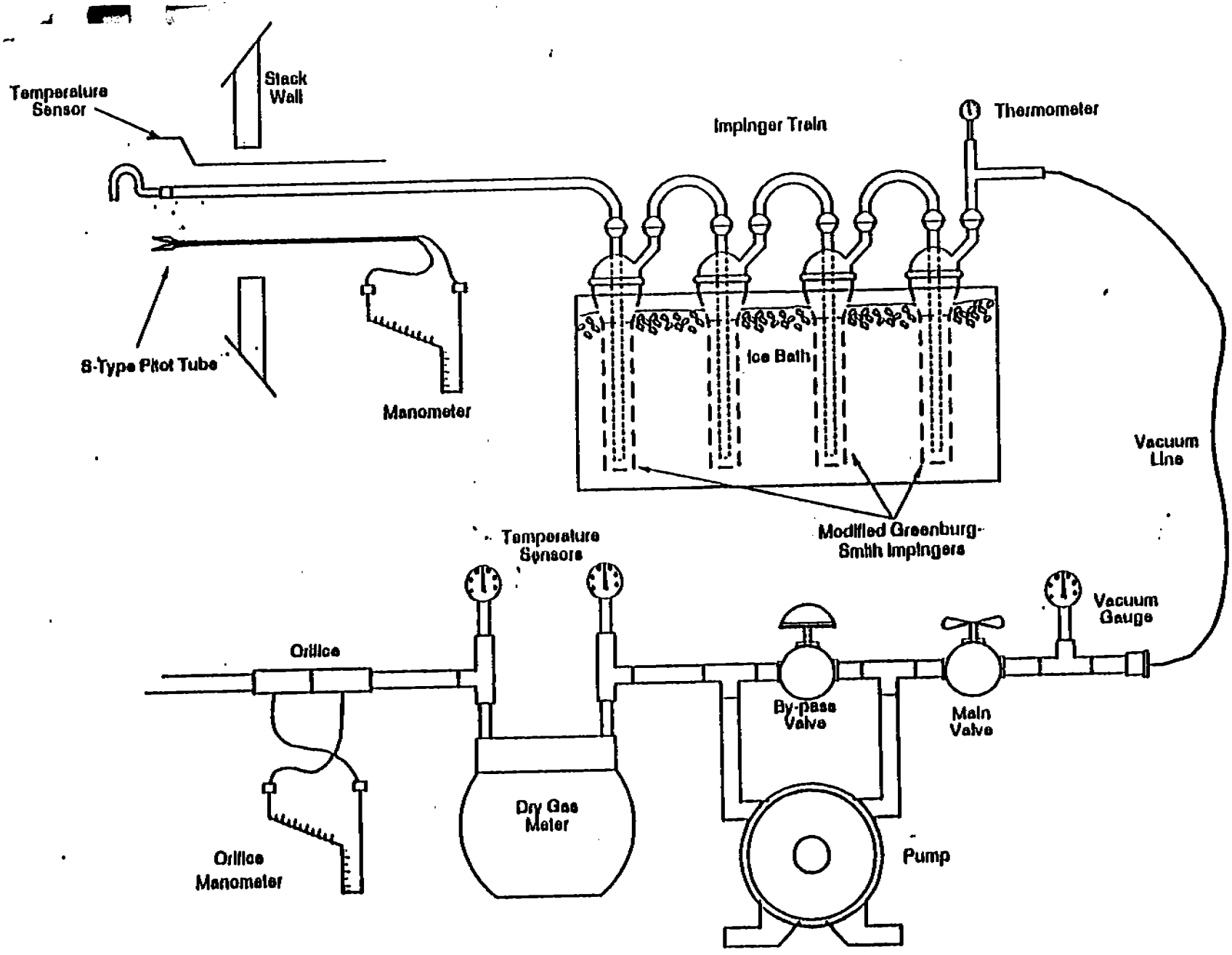
12.0 METHOD PERFORMANCE

12.1 Method performance evaluation: The following expected method performance parameters for precision, accuracy, and detection limits are provided in Table 3.

Table 3. Expected Method Performance for Formaldehyde

Parameter	Precision	[1]Accuracy[2]	Detection Limit[3]
Matrix: Dual trains	±15% RPD	±20%	1.5×10^{-7} lb/ft^3 (1.8 ppbv)

[1] Relative percent difference limit for dual trains.
[2] Limit for field spike recoveries.
[3] The lower reporting limit having less than 1% probability of false positive detection.



Formaldehyde Sampling Train

Plant _____

Location _____

Operator _____

Date _____

Run No. _____

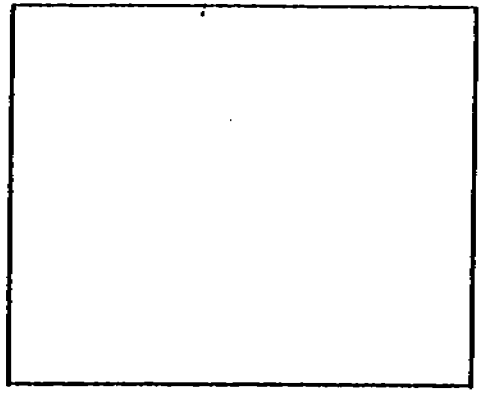
Sample Box No. _____

Meter Box No. _____

Meter H@ _____

C Factor _____

Pitot Tube Coefficient C_p _____



Schematic of Stack Cross Section

Ambient Temperature _____

Barometric Pressure _____

Assumed Moisture % _____

Probe Length, m(ft) _____

Nozzle Identification No. _____

Average Calibrated Nozzle Diameter, cm (in) _____

Probe Heating Setting _____

Leak Rate, m^3/min. (cfm) _____

Probe Liner Material _____

Static Pressure, mm Hg (in. Hg) _____

Filter No. _____

Traverse Point Number	Sampling Time (θ) Min.	Vacuum mm Hg (in. Hg)	Stack Temperature (T_s) °C (°F)	Velocity Head (P_s) mm (in) H_2O	Pressure Differential Across Orifice Meter mm (H_2O) (in H_2O)	Gas Sample Volume m^3 (ft^3)	Gas Sample Temp. at Dry Gas Meter		Filter Holder Temperature °C(°F)	Temperature of Gas Leaving Last Impinger °C(°F)
							Inlet °C(°F)	Outlet °C(°F)		
Total							Avg.	Avg.		
Average										

3404346R

Figure 2. Field Data Sheet

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COLLECTION OF SEMIVOLATILE COMPOUNDS

EPA METHOD 0010

(Interpoll Method II-8788 - Version 1.0)

EPA Method SW846 USEPA Office of Solid Waste and Emergency Response 3rd Ed., November 1986: Test Methods for Evaluating Solid Waste Volume 2: Field Manual Physical/Chemical Methods Method 0010.

MODIFIED METHOD 5 SAMPLING TRAIN

1.0 SCOPE AND APPLICATION

1.1 This method is applicable to the determination of Destruction and Removal Efficiency (DRE) of semivolatile Principal Organic Hazardous Compounds (POHCs) from incineration systems (PHS, 1967). This method also may be used to determine particulate emission rates from stationary sources as per EPA Method 5 (see References at end of this method).

2.0 SUMMARY OF METHOD

2.1 Gaseous and particulate pollutants are withdrawn from an emission source at an isokinetic sampling rate and are collected in a multicomponent sampling train. Principal components of the train include a high-efficiency glass- or quartz-fiber filter and a packed bed of porous polymeric adsorbent resin. The filter is used to collect organic-laden particulate materials and the porous polymeric resin to adsorb semivolatile organic species. Semivolatile species are defined as compounds with boiling points >100°C.

2.2 Comprehensive chemical analyses of the collected sample are conducted to determine the concentration and identity of the organic materials.

3.0 INTERFERENCES

3.1 Oxides of nitrogen (NO_x) are possible interferents in the determination of certain water-soluble compounds such as dioxane, phenol, and urethane; reaction of these compounds with NO_x in the presence of moisture will reduce their concentration. Other possibilities that could result in positive or negative bias are (1) stability of the compounds in methylene chloride, (2) the formation of water-soluble organic salts on the resin in the presence of moisture, and (3) the solvent extraction efficiency of water-soluble compounds from aqueous media. Use of two or more ions per compound for qualitative and quantitative analysis can overcome interference at one mass. These concerns should be addressed on a compound-by-compound basis before using this method.

4.0 APPARATUS AND MATERIALS

4.1 Sampling train:

4.1.1 A schematic of the sampling train used in this method is shown in Figure 1. This sampling train configuration is adapted from EPA Method 5 procedures, and, as such, the majority of the required equipment

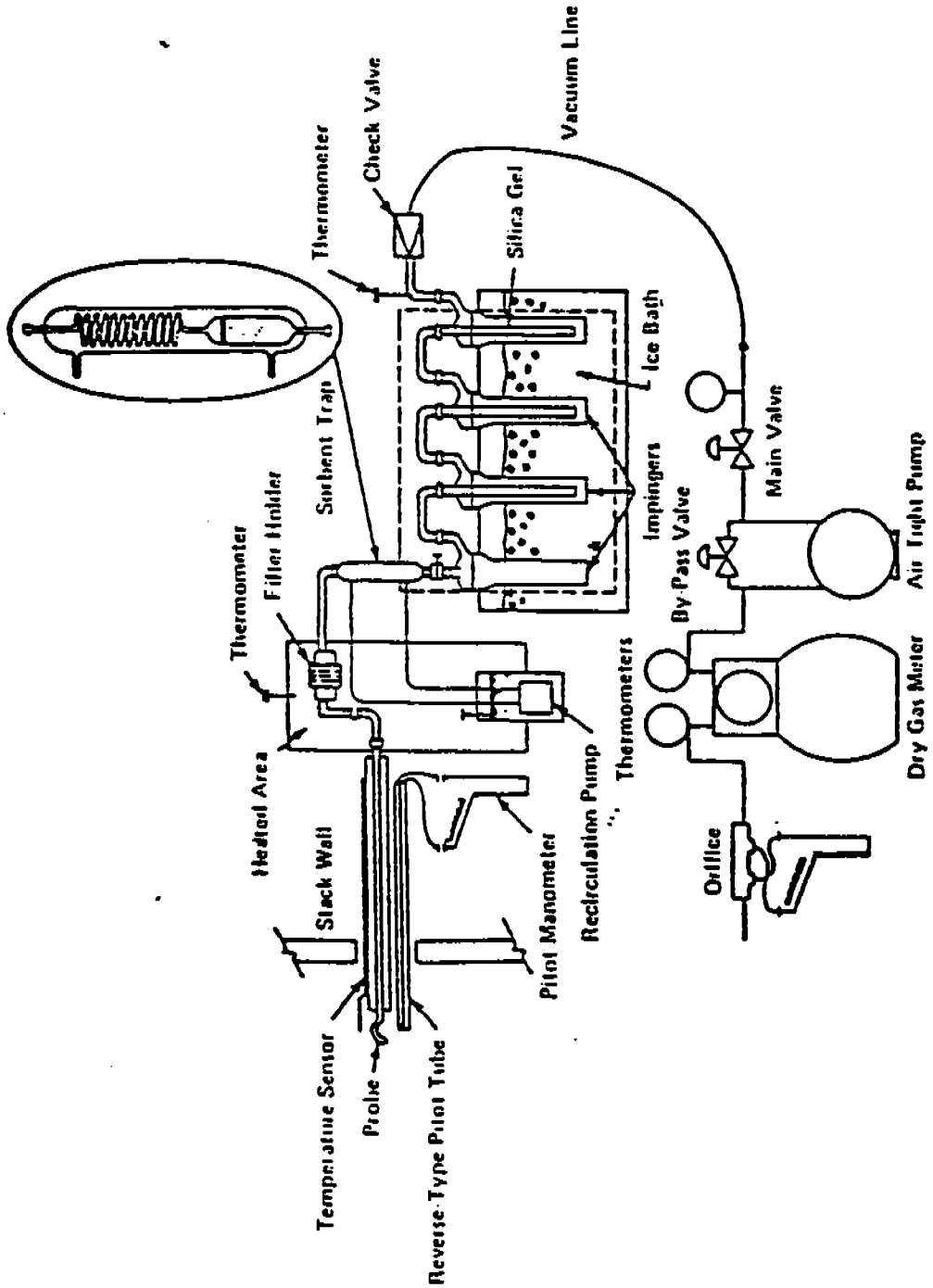


Figure 1. Modified Method 5 Sampling Train.

is identical to that used in EPA Method 5 determinations. The new components required are a condenser coil and a sorbent module, which are used to collect semivolatile organic materials that pass through the glass- or quartz-fiber filter in the gas phase.

4.1.2 Construction details for the basic train components are given in APTD-0581 (see Martin, 1971, in Section 13.0, References); commercial models of this equipment are also available. Specifications for the sorbent module are provided in the following subsections. Additionally, the following subsections list changes to APTD-0581 and identify allowable train configuration modifications.

4.1.3 Basic operating and maintenance procedures for the sampling train are described in APTD-0576 (see Rom, 1972, in Section 13.0, References). As correct usage is important in obtaining valid results, all users should refer to APTD-0576 and adopt the operating and maintenance procedures outlined therein unless otherwise specified. The sampling train consists of the components detailed below.

4.1.3.1 Probe nozzle: Stainless steel (316) or glass with sharp, tapered (30° angle) leading edge. The taper shall be on the outside to preserve a constant I.D. The nozzle shall be buttonhook or elbow design and constructed from seamless tubing (if made of stainless steel). Other construction materials may be considered for particular applications. A range of nozzle sizes suitable for isokinetic sampling should be available in increments of 0.16 cm (1/16 in.), e.g., 0.32-1.27 cm (1/8-1/2 in.), or larger if higher volume sampling trains are used. Each nozzle shall be calibrated according to the procedures outlined in Paragraph 9.1.

4.1.3.2 Probe liner: Borosilicate or quartz-glass tubing with a heating system capable of maintaining a gas temperature of 120 ± 14°C (248 ± 25°F) at the exit end during sampling. (The tester may opt to operate the equipment at a temperature lower than that specified.) Because the actual temperature at the outlet of the probe is not usually monitored during sampling, probes constructed according to APTD-0581 and utilizing the calibration curves of APTD-0576 (or calibrated according to the procedure outlined in APTD-0576) are considered acceptable. Either borosilicate or quartz-glass probe liners may be used for stack temperatures up to about 480°C (900°F). Quartz liners shall be used for temperatures between 480 and 900°C (900 and 1650°F). (The softening temperature for borosilicate is 820°C (1508°F), and for quartz 1500°C (2732°F).) Water-cooling of the stainless steel sheath will be necessary at temperatures approaching and exceeding 500°C.

4.1.3.3 Pitot tube: Type S, as described in Section 2.1 of EPA Method 2, or other appropriate devices (Vollaro, 1976). 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.

4.1.3.4 Differential pressure gauge: Inclined manometer or equivalent device as described in Section 2.2 of EPA Method 2. One manometer shall be used for velocity-head (ΔP) readings and the other for orifice differential pressure (ΔH) readings.

4.1.3.5 Filter holder: Borosilicate glass, with a glass frit filter support and a sealing gasket. The sealing gasket should be made of materials that will not introduce organic material into the gas stream at the temperature at which the filter holder will be maintained. The gasket shall be constructed of Teflon or materials of equal or better characteristics. The holder design shall provide a positive seal against leakage at any point along the filter circumference. The holder shall be attached immediately to the outlet of the cyclone or cyclone bypass.

4.1.3.6 Filter heating system: Any heating system capable of maintaining a temperature of 120 ± 14°C (248 ± 25°F) around the filter holder during sampling. Other temperatures may be appropriate for particular applications. Alternatively, the tester may opt to operate the equipment at temperatures other than that specified. A temperature gauge capable of measuring temperature to within 3°C (5.4°F) shall be installed so that the temperature around the filter holder can be regulated and monitored during sampling. Heating systems other than the one shown in APTD-0581 may be used.

4.1.3.7 Organic sampling module: This unit consists of three sections, including a gas-conditioning section, a sorbent trap, and a condensate knockout trap. The gas-conditioning system shall be capable of conditioning the gas leaving the back half of the filter holder to a temperature not exceeding 20°C (68°F). The sorbent trap shall be sized to contain approximately 20 g of porous polymeric resin (Rohm and Haas XAD-2 or equivalent) and shall be jacketed to maintain the internal gas temperature at 17 ± 3°C (62.5 ± 5.4°F). The most commonly used coolant is ice water from the impinger ice-water bath, constantly circulated through the outer jacket, using rubber or plastic tubing and a peristaltic pump. The sorbent trap should be outfitted with a glass well or depression, appropriately sized to accommodate a small thermocouple in the trap for monitoring the gas entry temperature. The condensate knockout trap shall be of sufficient size to collect the condensate following gas conditioning. The organic module components shall be oriented to direct the flow of condensate formed vertically downward from the conditioning section, through the adsorbent media, and into the condensate knockout trap. The knockout trap is usually similar in appearance to an empty impinger directly underneath the sorbent module; it may be oversized but should have a shortened center stem (at a minimum, one-half the length of the normal impinger stems) to collect a large volume of condensate without bubbling and overflowing into the impinger train. All surfaces of the organic module wetted by the gas sample shall be fabricated of borosilicate glass, Teflon, or other inert materials. Commercial versions of the

complete organic module are not currently available, but may be assembled from commercially available laboratory glassware and a custom-fabricated sorbent trap. Details of two acceptable designs are shown in Figures 2 and 3 (the thermocouple well is shown in Figure 2).

4.1.3.8 Impinger train: To determine the stack-gas moisture content, four 500-mL impingers, connected in series with leak-free ground-glass joints, follow the knockout trap. The first, third, and fourth impingers shall be of the Greenburg-Smith design, modified by replacing the tip with a 1.3-cm (1/2-in.) I.D. glass tube extending about 1.3 cm (1/2 in.) from the bottom of the outer cylinder. The second impinger shall be of the Greenburg-Smith design with the standard tip. The first and second impingers shall contain known quantities of water or appropriate trapping solution. The third shall be empty or charged with a caustic solution, should the stack gas contain hydrochloric acid (HCl). The fourth shall contain a known weight of silica gel or equivalent desiccant.

4.1.3.9 Metering system: The necessary components are a vacuum gauge, leak-free pump, thermometers capable of measuring temperature to 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 capable of maintaining sampling rates within 10% of isokineticity and of determining sample volumes to within 2% may be used. The metering system must be used in conjunction with a pitot tube to enable checks of isokinetic sampling rates. Sampling trains using metering systems designed for flow rates higher than those described in APTD-0581 and APTD-0576 may be used, provided that the specifications of this method are met.

4.1.3.10 Barometer: 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).

4.1.3.11 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.

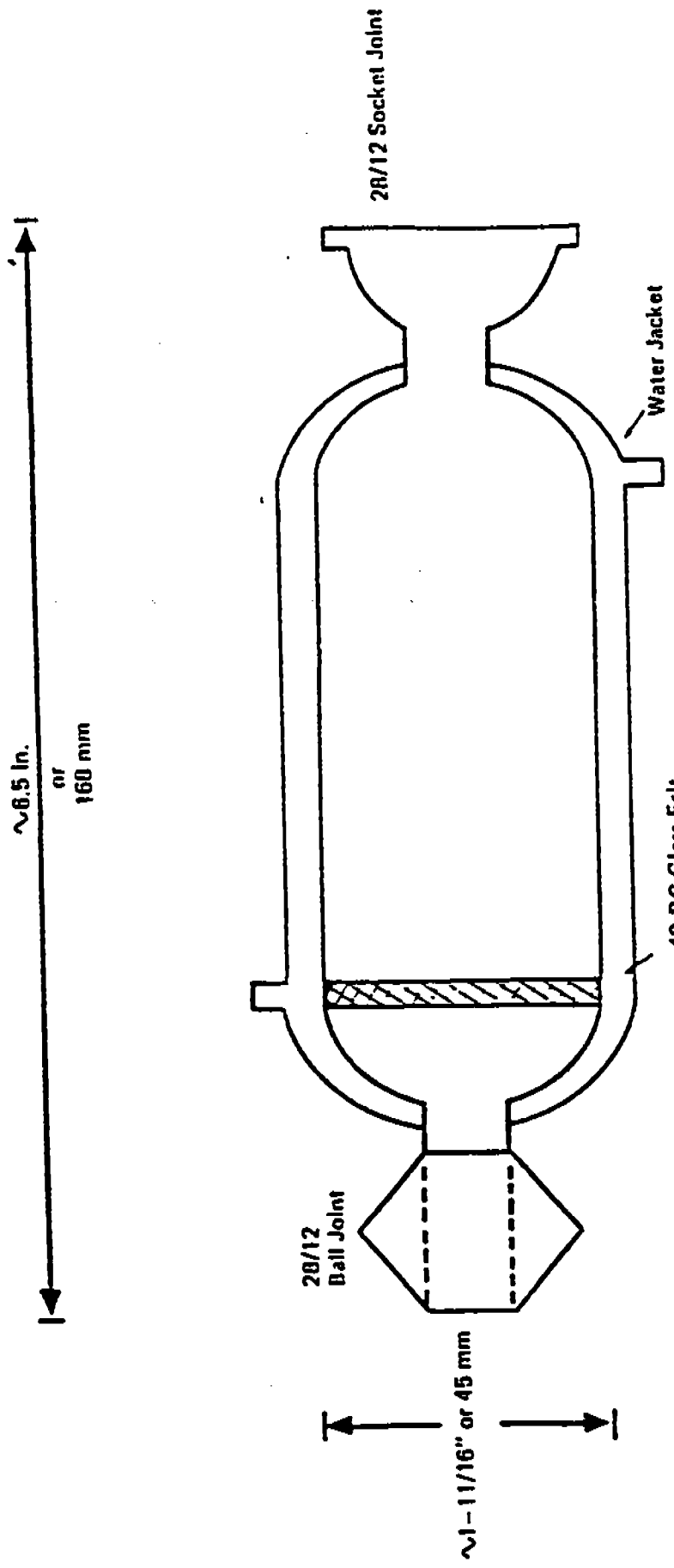


Figure 2. Adsorbent Sampling System.

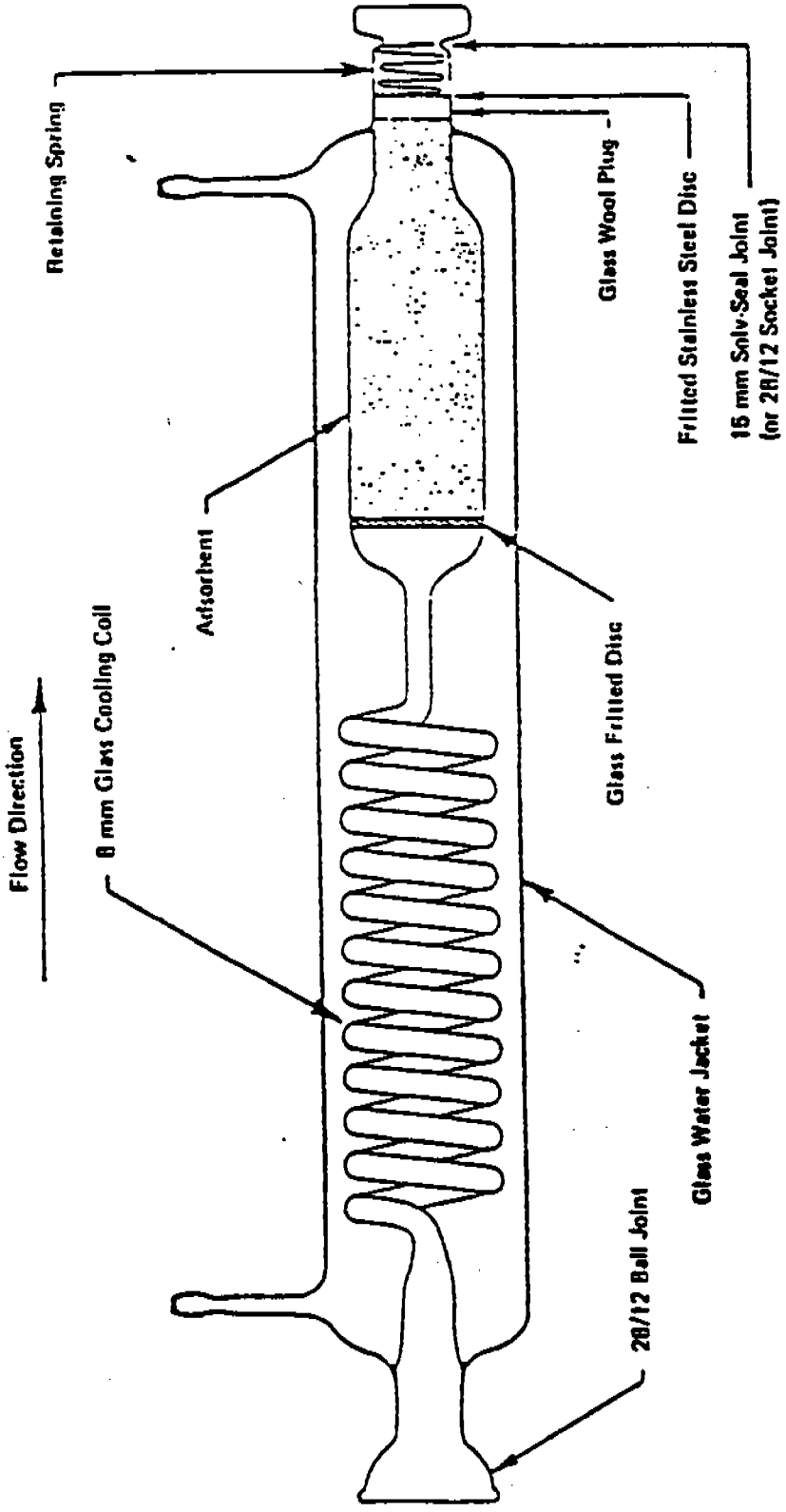


Figure 3. Adsorbent Sampling System.

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.

4.1.3.12 Calibration/field-preparation record: A permanently bound laboratory notebook, in which duplicate copies of data may be made as they are being recorded, is required for documenting and recording calibrations and preparation procedures (i.e., filter and silica gel tare weights, clean XAD-2, quality assurance/quality control check results, dry-gas meter, and thermocouple calibrations, etc.). The duplicate copies should be detachable and should be stored separately in the test program archives.

4.2 Sample Recovery:

4.2.1 Probe liner: Probe nozzle and organic module conditioning section brushes; nylon 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 organic module conditioning section.

4.2.2 Wash bottles: Three. 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 Glass sample storage containers: Chemically resistant, borosilicate amber and clear glass bottles, 500-mL or 1,000-mL. Bottles should be tinted to prevent action of light on sample. Screw-cap liners shall be either Teflon or constructed so as to be leak-free and resistant to chemical attack by organic recovery solvents. Narrow-mouth glass bottles have been found to exhibit less tendency toward leakage.

4.2.4 Petri dishes: Glass, sealed around the circumference with wide (1-in.) Teflon tape, for storage and transport of filter samples.

4.2.5 Graduated cylinder and/or balances: To measure condensed water to the nearest 1 mL or 1 g. Graduated cylinders shall have subdivisions not >2 mL. Laboratory triple-beam balances capable of weighing to ±0.5 g or better are required.

4.2.6 Plastic storage containers: Screw-cap polypropylene or polyethylene containers to store silica gel.

4.2.7 Funnel and rubber policeman: To aid in transfer of silica gel to container (not necessary if silica gel is weighed in field).

4.2.8 Funnels: Glass, to aid in sample recovery.

4.3 Filters: Glass- or quartz-fiber filters, without organic binder, exhibiting at least 99.95% efficiency (<0.05% penetration) on 0.3-um dioctyl phthalate smoke particles. The filter efficiency test shall be conducted in accordance with ASTM standard method D2986-71. Test data from the supplier's quality control program are sufficient for this purpose. In sources containing SO_2 or SO_3, the filter material must be of a type that is unreactive to SO_2 or SO_3. Reeve Angel 934 AH or Schleicher and Schwell #3 filters work well under these conditions.

4.4 Crushed ice: Quantities ranging from 10-50 lb may be necessary during a sampling run, depending on ambient air temperature.

4.5 Stopcock grease: Solvent-insoluble, heat-stable silicone grease. Use of silicone grease upstream of the module is not permitted, and amounts used on components located downstream of the organic module shall be minimized. Silicone grease usage is not necessary if screw-on connectors and Teflon sleeves or ground-glass joints are used.

4.6 Glass wool: Used to plug the unfritted end of the sorbent module. The glass-wool fiber should be solvent-extracted with methylene chloride in a Soxhlet extractor for 12 hr and air-dried prior to use.

5.0 REAGENTS

5.1 Adsorbent resin: Porous polymeric resin (XAD-2 or equivalent) is recommended. These resins shall be cleaned prior to their use for sample collection. Appendix A of this method should be consulted to determine appropriate precleaning procedure. For best results, resin used should not exhibit a blank of higher than 4 mg/kg of total chromatographable organics (TCO) (see Appendix B) prior to use. Once cleaned, resin should be stored in an airtight, wide-mouth amber glass container with a Teflon-lined cap or placed in one of the glass sorbent modules tightly sealed with Teflon film and elastic bands. The resin should be used within 4 wk of the preparation.

5.2 Silica gel: Indicating type, 6-16 mesh. If previously used, dry at 175°C (350°F) for 2 hr before using. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used, subject to the approval of the Administrator.

5.3 Impinger solutions: Distilled organic-free water (Type II) shall be used, unless sampling is intended to quantify a particular inorganic gaseous species. If sampling is intended to quantify the concentration of additional species, the impinger solution of choice shall be subject to Administrator approval. This water should be prescreened for any compounds of interest. One hundred mL will be added to the specified impinger; the third impinger in the train may be charged with a basic solution (1 N sodium hydroxide or sodium acetate) to protect the sampling pump from acidic gases. Sodium acetate should be used when large sample volumes are anticipated because sodium hydroxide will react with carbon dioxide in aqueous media to form sodium carbonate, which may possibly plug the impinger.

5.4 Sample recovery reagents:

5.4.1 Methylene chloride: Distilled-in-glass grade is required for sample recovery and cleanup (see Note to 5.4.2 below).

5.4.2 Methyl alcohol: Distilled-in-glass grade is required for sample recovery and cleanup.

NOTE: Organic solvents from metal containers may have a high residue blank and should not be used. Sometimes suppliers transfer solvents from metal to glass bottles; thus blanks shall be run prior to field use and only solvents with low blank value (<0.001%) shall be used.

5.4.3 Water: Water (Type II) shall be used for rinsing the organic module and condenser component.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 Because of 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.

6.2.3 Check filters visually against light for irregularities and flaws or pinhole leaks. Label the shipping containers (glass Petri dishes) and keep the filters in these containers at all times except during sampling and weighing.

6.2.4 Desiccate the filters at 20 ± 5.6°C (68 ± 10°F) and ambient pressure for at least 24 hr, and weigh at intervals of at least 6 hr to a constant weight (i.e., <0.5-mg change from previous weighing), recording results to the nearest 0.1 mg. During each weighing the filter must not be exposed for more than a 2-min period to the laboratory atmosphere and relative humidity above 50%. Alternatively (unless otherwise specified by the Administrator), the filters may be oven-dried at 105°C (220°F) for 2-3 hr, desiccated for 2 hr, and weighed.

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 as specified by the Administrator. Determine the stack pressure, temperature, and range of velocity heads using EPA Method 2. It is recommended that a leak-check of the pitot lines (see EPA Method 2, Section 3.1) 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. 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 3 dscm (105.9 dscf) of sample volume is required for the determination of the Destruction and Removal Efficiency (DRE) of POHCs from incineration systems. Additional sample volume shall be collected as necessitated by analytical detection limit constraints. To determine the minimum sample volume required, refer to sample calculations in Section 10.0.

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 one-half 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-sample volumes. In these cases, the Administrator's approval must first be obtained.

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 Fill the sorbent trap section of the organic module with approximately 20 g of clean adsorbent resin. While filling, ensure that the trap packs uniformly, to eliminate the possibility of channeling. When freshly cleaned, many adsorbent resins carry a static charge, which will cause clinging to trap walls. This may be minimized by filling the trap in the presence of an antistatic device. Commercial antistatic devices include Model-204 and Model-210 manufactured by the 3M Company, St. Paul, Minnesota.

6.4.3 If an impinger train is used to collect moisture, place 100 mL of water in each of the first two impingers, leave the third impinger empty (or charge with caustic solution, as necessary), and transfer approximately 200-300 g of preweighed silica gel from its container to the fourth impinger. More silica gel may be used, but care should be taken to ensure that it is not entrained and carried out from the impinger during sampling. Place the 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.

6.4.4 Using a tweezer or clean disposable surgical gloves, place a labeled (identified) and weighed filter in the filter holder. Be sure that the filter is properly centered and the gasket properly placed to prevent the sample gas stream from circumventing the filter. Check the filter for tears after assembly is completed.

6.4.5 When glass liners are used, 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. When metal liners are used, install the nozzle as above, or by a leak-free direct mechanical connection. 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.

6.4.6 Set up the train as in Figure 1. During assembly, do not use any silicone grease on ground-glass joints that are located upstream of the organic module. A very light coating of silicone grease may be used on all ground-glass joints that are located downstream of the organic module, but it should be limited to the outer portion (see APTD-0576) of the ground-glass joints to minimize silicone-grease contamination. Subject to the approval of the Administrator, a glass cyclone may be used between the probe and the filter holder when the total particulate catch is expected to exceed 100 mg or when water droplets are present in the stack. The organic module condenser must be maintained at a temperature of 17 ± 3°C. Connect all temperature sensors to an appropriate potentiometer/display unit. Check all temperature sensors at ambient temperature.

6.4.7 Place crushed ice around the impingers and the organic module condensate knockout.

6.4.8 Turn on the sorbent module and condenser coil coolant recirculating pump and begin monitoring the sorbent module gas entry temperature. Ensure proper sorbent module gas entry temperature before proceeding and again before any sampling is initiated. It is extremely important that the XAD-2 resin temperature never exceed 50°C (122°F), because thermal decomposition will occur. During testing, the XAD-2 temperature must not exceed 20°C (68°F) for efficient capture of the semivolatile species of interest.

6.4.9 Turn on and set the filter and probe heating systems at the desired operating temperatures. Allow time for the temperatures to stabilize.

6.5 Leak-check procedures

6.5.1 Pre-test leak-check:

6.5.1.1 Because the number of additional intercomponent connections in the Semi-VOST train (over the M5 Train) increases the possibility of leakage, a pre-test leak-check is required.

6.5.1.2 After the sampling train has been assembled, turn on and set the filter and probe heating systems at the desired operating temperatures. Allow time for the temperatures 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 it is not exceeded during the test.)

6.5.1.3 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 (shown in Figure 4) to the inlet of the filter holder (cyclone, if applicable) and then plugging the inlet and pulling a 381-mm Hg (15-in. Hg) vacuum. (Again, a lower vacuum may be used, provided that it 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 unacceptable.

6.5.1.4 The following leak-check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with 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; this will cause water to back up into the organic module. If the desired vacuum is exceeded, either leak-check at this higher vacuum or end the leak-check, as shown below, and start over.

CROSS SECTIONAL VIEW

Leak Testing Apparatus

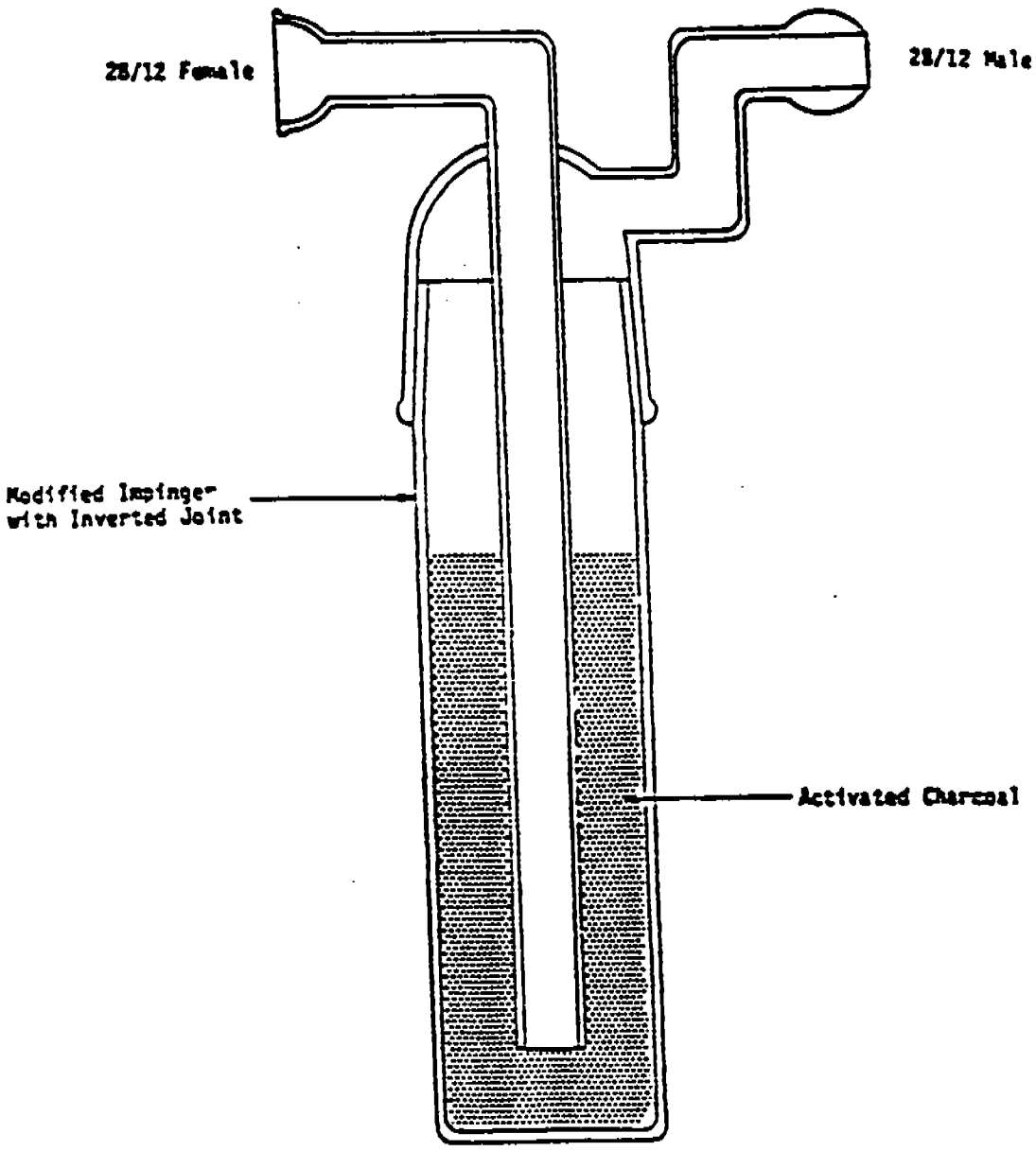


Figure 4. Leak-check impinger.

6.5.1.5 When the leak-check is completed, first slowly remove the plug from the inlet to the probe, filter holder, or cyclone (if applicable). 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. This prevents the water in the impingers from being forced backward into the organic module and silica gel from being entrained backward into the third impinger.

6.5.2 Leak-checks during sampling run:

6.5.2.1 If, during the sampling run, a component (e.g., filter assembly, impinger, or sorbent trap) change 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 outlined in Paragraph 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, and no correction will need to be applied to the total volume of dry gas metered. If a higher leakage rate is obtained, the tester shall void the sampling run. (It should be noted that any "correction" of the sample volume by calculation by calculation reduces the integrity of the pollutant concentrations data generated and must be avoided.)

6.5.2.2 Immediately after a component change, and before sampling is reinitiated, 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 those with the pre-test leak-check, except that it 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, and no correction need be applied to the total volume of dry gas metered. If, however, a higher leakage rate is obtained, the tester shall either record the leakage rate, correct the sample volume (as shown in the calculation section of this method), and consider the data obtained of questionable reliability, or 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, unless otherwise specified by the Administrator. Maintain a temperature around the filter of 120 ± 14°C (248 ± 25°F) and a gas temperature entering the sorbent trap at a maximum of 20°C (68°F).

6.6.2 For each run, record the data required on a data sheet such as the one shown in Figure 5. 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 5 at least once at each sample point during each time increment and additional readings when significant changes (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 $\pm$ 0.02 and the stack-gas equivalent density (dry molecular weight) is equal to 29 $\pm$ 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 (Shigehara, 1974) 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, to prevent water from backing into the organic module. 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 or as specified by the Administrator, 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 filter holder and the organic module at the proper levels; add more ice and, if necessary, salt to maintain a temperature of <20°C (68°F) at the condenser/silica gel outlet. Also, periodically check the level and zero of the manometer.

Plant _____
Location _____
Operator _____
Date _____
Run No. _____
Sample Box No. _____
Meter Box No. _____
Meter ΔH _____
C Factor _____
Pitot Tube Coefficient C_p _____

Schematic of Stack Cross Section

Ambient Temperature _____
Barometric Pressure _____
Assumed Moisture % _____
Probe Length, m (ft) _____
Nozzle Identification No. _____
Average Calibrated Nozzle Diameter, cm (in) _____
Probe Heater 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 (ΔP_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 Inlet °C(°F)	Gas Sample Temp. at Dry Gas Meter Outlet °C(°F)	Filter Holder Temperature °C(°F)	Temperature of Gas Entering Sorbet Trap °C(°F)	Temperature of Gas Leaving Condenser or Last Impinger
Total							Avg.	Avg.			
Average											

Figure 5. Particulate field data.

6.6.8 If the pressure drop across the filter or sorbent trap becomes too high, making isokinetic sampling difficult to maintain, the filter/sorbent trap may be replaced in the midst of a sample run. Using another complete filter holder/sorbent trap assembly is recommended, rather than attempting to change the filter and resin themselves. After a new filter/sorbent trap assembly is installed, conduct a leak-check. The total particulate weight shall include the summation of all filter assembly catches.

6.6.9 A single train shall be used for the entire sample 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. In all other situations, the use of two or more trains will be subject to the approval of the Administrator.

6.6.10 Note that when two or more trains are used, separate analysis of the front-half (if applicable) organic-module and impinger (if applicable) catches from each train shall be performed, unless identical nozzle sizes were used on all trains. In that case, the front-half catches from the individual trains may be combined (as may the impinger catches), and one analysis of front-half catch and one analysis of impinger catch may be performed.

6.6.11 At the end of the sample 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.

6.6.12 Calculate percent isokineticity (see Section 10.8) to determine whether the run was valid or another test run 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 safely handled, 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 down because this will create a vacuum in the filter holder, drawing water from the impingers into the sorbent module.

7.1.2 Before moving the sample train to the cleanup site, remove the probe from the sample train and cap the open outlet, being careful not to lose any condensate that might be present. Cap the filter inlet.

Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used between the organic module and the filter holder, disconnect the line at the filter holder and let any condensed water or liquid drain into the organic module.

7.1.3 Cap the filter-holder outlet and the inlet to the organic module. Separate the sorbent trap section of the organic module from the condensate knockout trap and the gas-conditioning section. Cap all organic module openings. Disconnect the organic-module knockout trap from the impinger train inlet and cap both of these openings. Ground-glass stoppers, Teflon caps, or caps of other inert materials may be used to seal all openings.

7.1.4 Transfer the probe, the filter, the organic-module components, and the impinger/condenser assembly to the cleanup area. This area should be clean and protected from the weather to minimize sample contamination or loss.

7.1.5 Save a portion of all washing solutions (methanol/methylene chloride, Type II 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, prelabeled glass sample container.

7.1.6 Inspect the train prior to and during disassembly and note any abnormal conditions.

7.2 Sample containers:

7.2.1 Container no. 1: Carefully remove the filter from the filter holder and place it in its identified Petri dish container. Use a pair or pairs of tweezers to handle the filter. If it is necessary to fold the filter, ensure that the particulate cake is inside the fold. Carefully transfer to the Petri dish any particulate matter or filter fibers that adhere to the filter-holder gasket, using a dry nylon bristle brush or sharp-edged blade, or both. Label the container and seal with 1-in.-wide Teflon tape around the circumference of the lid.

7.2.2 Container no. 2: Taking care that dust on the outside of the probe or other exterior surfaces does not get into the sample, quantitatively recover particulate matter or any condensate from the probe nozzle, probe fitting, probe liner, and front half of the filter holder by washing these components first with methanol/methylene chloride (1:1 v/v) into a glass container. Distilled water may also be used. Retain a water and solvent blank and analyze in the same manner as with the samples. Perform rinses as follows:

7.2.2.1 Carefully remove the probe nozzle and clean the inside surface by rinsing with the solvent mixture (1:1 v/v methanol/-methylene chloride) from a wash bottle and brushing with a nylon bristle brush. Brush until the rinse shows no visible particles; then make a final rinse of the inside surface with the solvent mix. Brush and rinse the inside parts of the Swagelok fitting with the solvent mix in a similar way until no visible particles remain.

7.2.2.2 Have two people rinse the probe liner with the solvent mix by tilting and rotating the probe while squirting solvent into its upper end so that all inside surfaces will be wetted with solvent. Let the solvent drain from the lower end into the sample container. A glass funnel may be used to aid in transferring liquid washes to the container.

7.2.2.3 Follow the solvent rinse with a probe brush. Hold the probe in an inclined position and squirt solvent into the upper end while pushing the probe brush through the probe with a twisting action; place a sample container underneath the lower end of the probe and catch any solvent and particulate matter that is brushed from the probe. Run the brush through the probe three times or more until no visible particulate matter is carried out with the solvent or until none remains in the probe liner on visual inspection. With stainless steel or other metal probes, run the brush through in the above-prescribed manner at least six times (metal probes have small crevices in which particulate matter can be entrapped). Rinse the brush with solvent and quantitatively collect these washings in the sample container. After the brushing, make a final solvent rinse of the probe as described above.

7.2.2.4 It is recommended that two people work together to clean the probe to minimize sample losses. Between sampling runs, keep brushes clean and protected from contamination.

7.2.2.5 Clean the inside of the front half of the filter holder and cyclone/cyclone flask, if used, by rubbing the surfaces with a nylon bristle brush and rinsing with methanol/methylene chloride (1:1 v/v) mixture. Rinse each surface three times or more if needed to remove visible particulate. Make a final rinse of the brush and filter holder. Carefully rinse out the glass cyclone and cyclone flask (if applicable). Brush and rinse any particulate material adhering to the inner surfaces of these components into the front-half rinse sample. After all solvent washings and particulate matter have been collected in the sample container, tighten the lid on the sample container so that solvent will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether leakage occurs during transport. Label the container to identify its contents.

7.2.3 Container no. 3: The sorbent trap section of the organic module may be used as a sample transport container, or the spent resin may be transferred to a separate glass bottle for shipment. If the sorbent trap itself is used as the transport container, both ends should be sealed with tightly fitting caps or plugs. Ground-glass stoppers or Teflon caps may be used. The sorbent trap should then be labeled, covered with aluminum foil, and packaged on ice for transport to the laboratory. If a separate bottle is used, the spent resin should be quantitatively transferred from the trap into the clean bottle. Resin that adheres to the walls of the trap should be recovered using a rubber policeman or spatula and added to this bottle.

7.2.4 Container no. 4: Measure the volume of condensate collected in the condensate knockout section of the organic module to within ±1 mL by using a graduated cylinder or by weighing to within ±0.5 g using a triple-beam balance. Record the volume or weight of liquid present and note any discoloration or film in the liquid catch. Transfer this liquid to a prelabeled glass sample container. Inspect the back half of the filter housing and the gas-conditioning section of the organic module. If condensate is observed, transfer it to a graduated or weighing bottle and measure the volume, as described above. Add this material to the condensate knockout-trap catch.

7.2.5 Container no. 5: All sampling train components located between the high-efficiency glass- or quartz-fiber filter and the first wet impinger or the final condenser system (including the heated Teflon line connecting the filter outlet to the condenser) should be thoroughly rinsed with methanol/methylene chloride (1:1 v/v) and the rinsings combined. This rinse shall be separated from the condensate. If the spent resin is transferred from the sorbent trap to a separate sample container for transport, the sorbent trap shall be thoroughly rinsed until all sample-wetted surfaces appear clean. Visible films should be removed by brushing. Whenever train components are brushed, the brush should be subsequently rinsed with solvent mixture and the rinsings added to this container.

7.2.6 Container no. 6: Note the color of the indicating silica gel to determine if it has been completely spent and make a notation of its condition. Transfer the silica gel from the fourth impinger to its original container and seal. A funnel may make it easier to pour the silica gel without spilling. A rubber policeman may be used as an aid in removing the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that may adhere strongly to the impinger wall. Because the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, weigh the container and its contents to 0.5 g or better.

7.3 Impinger water:

7.3.1 Make a notation of any color or film in the liquid catch. Measure the liquid in the first three impingers to within ±1 mL by using a graduated cylinder or by weighing it to within ±0.5 g by using a balance (if one is available). Record the volume or weight of liquid present. This information is required to calculate the moisture content of the effluent gas.

7.3.2 Discard the liquid after measuring and recording the volume or weight, unless analysis of the impinger catch is required (see Paragraph 4.1.3.7). Amber glass containers should be used for storage of impinger catch, if required.

7.3.3 If a different type of condenser is used, measure the amount of moisture condensed either volumetrically or gravimetrically.

7.4 Sample preparation for shipment: Prior to shipment, recheck all sample containers to ensure that the caps are well secured. Seal the lids of all containers around the circumference with Teflon tape. Ship all liquid samples upright on ice and all particulate filters with the particulate catch facing upward. The particulate filters should be shipped unrefrigerated.

8.0 ANALYSIS

8.1 Sample preparation:

8.1.1 General: The preparation steps for all samples will result in a finite volume of concentrated solvent. The final sample volume (usually in the 1- to 10-mL range) is then subjected to analysis by GC/MS. All samples should be inspected and the appearance documented. All samples are to be spiked with surrogate standards as received from the field prior to any sample manipulations. The spike should be at a level equivalent to 10 times the MDL when the solvent is reduced in volume to the desired level (i.e., 10 mL). The spiking compounds should be the stable isotopically labeled analog of the compounds of interest or a compound that would exhibit properties similar to the compounds of interest, be easily chromatographed, and not interfere with the analysis of the compounds of interest. Suggested surrogate spiking compounds are: deuterated naphthalene, chrysene, phenol, nitrobenzene, chlorobenzene, toluene, and carbon-13-labeled pentachlorophenol.

8.1.2 Condensate: The "condensate" is the moisture collected in the first impinger following the XAD-2 module. Spike the condensate with the surrogate standards. The volume is measured and recorded and then transferred to a separatory funnel. The pH is to be adjusted to pH 2 with 6 N sulfuric acid, if necessary. The sample container and graduated cylinder are sequentially rinsed with three successive 10-mL aliquots of the extraction solvent and added to the separatory funnel. The ratio of solvent to aqueous sample should be maintained at 1:3. Extract the sample by vigorously shaking the separatory funnel for 5 min. After complete separation of the phases, remove the solvent and transfer to a Kuderna-Danish concentrator (K-D), filtering through a bed of precleaned, dry sodium sulfate. Repeat the extraction step two additional times. Adjust the pH to 11 with 6 N sodium hydroxide and reextract combining the acid and base extracts. Rinse the sodium sulfate into the K-D with fresh solvent and discard the desiccant. Add Teflon boiling chips and concentrate to 10 mL by reducing the volume to slightly less than 10 mL and then bringing to volume with fresh solvent. In order to achieve the necessary detection limit, the sample volume can be further reduced to 1 mL by using a micro column K-D or nitrogen blow-down. Should the sample start to exhibit precipitation, the concentration step should be stopped and the sample redissolved with fresh solvent taking the volume to some finite amount. After adding a standard (for the purpose of quantitation by GC/MS), the sample is ready for analysis, as discussed in Paragraph 8.2.

8.1.3 Impinger: Spike the sample with the surrogate standards; measure and record the volume and transfer to a separatory funnel. Proceed as described in Paragraph 8.1.2.

8.1.4 XAD-2: Spike the resin directly with the surrogate standards. Transfer the resin to the all-glass thimbles by the following procedure (care should be taken so as not to contaminate the thimble by touching it with anything other than tweezers or other solvent-rinsed mechanical holding devices). Suspend the XAD-2 module directly over the thimble. The glass frit of the module (see Figure 2) should be in the up position. The thimble is contained in a clean beaker, which will serve to catch the solvent rinses. Using a Teflon squeeze bottle, flush the XAD-2 into the thimble. Thoroughly rinse the glass module with solvent into the beaker containing the thimble. Add the XAD-2 glass-wool plug to the thimble. Cover the XAD-2 in the thimble with a precleaned glass-wool plug sufficient to prevent the resin from floating into the solvent reservoir of the extractor. If the resin is wet, effective extraction can be accomplished by loosely packing the resin in the thimble. If a question arises concerning the completeness of the extraction, a second extraction, without a spike, is advised. The thimble is placed in the extractor and the rinse solvent contained in the beaker is added to the solvent reservoir. Additional solvent is added to make the reservoir approximately two-thirds full. Add Teflon boiling chips and assemble the apparatus. Adjust the heat source to cause the extractor to cycle 5-6 times per hr. Extract the resin for 16 hr. Transfer the solvent and three 10-mL rinses of the reservoir to a K-D and concentrate as described in Paragraph 8.1.2.

8.1.5 Particulate filter (and cyclone catch): If particulate loading is to be determined, weigh the filter (and cyclone catch, if applicable). The particulate filter (and cyclone catch, if applicable) is transferred to the glass thimble and extracted simultaneously with the XAD-2 resin.

8.1.6 Train solvent rinses: All train rinses (i.e., probe, impinger, filter housing) using the extraction solvent and methanol are returned to the laboratory as a single sample. If the rinses are contained in more than one container, the intended spike is divided equally among the containers proportioned from a single syringe volume. Transfer the rinse to a separatory funnel and add a sufficient amount of organic-free water so that the methylene chloride becomes immiscible and its volume no longer increases with the addition of more water. The extraction and concentration steps are then performed as described in Paragraph 8.1.2.

8.2 Sample analysis:

8.2.1 The primary analytical tool for the measurement of emissions from hazardous waste incinerators is GC/MS using fused-silica capillary GC columns, as described in Method 8270 in Chapter Four of this manual. Because of the nature of GC/MS instrumentation and the cost associated

with sample analysis, prescreening of the sample extracts by gas chromatography/flame ionization detection (GC/FID) or with electron capture (GC/ECD) is encouraged. Information regarding the complexity and concentration level of a sample prior to GC/MS analysis can be of enormous help. This information can be obtained by using either capillary columns or less expensive packed columns. However, the FID screen should be performed with a column similar to that used with the GC/MS. Keep in mind that GC/FID has a slightly lower detection limit than GC/MS and, therefore, that the concentration of the sample can be adjusted either up or down prior to analysis by GC/MS.

8.2.2 The mass spectrometer will be operated in a full scan (40-450) mode for most of the analyses. The range for which data are acquired in a GC/MS run will be sufficiently broad to encompass the major ions, as listed in Chapter Four, Method 8270, for each of the designated POHCs in an incinerator effluent analysis.

8.2.3 For most purposes, electron ionization (EI) spectra will be collected because a majority of the POHCs give reasonable EI spectra. Also, EI spectra are compatible with the NBS Library of Mass Spectra and other mass spectral references, which aid in the identification process for other components in the incinerator process streams.

8.2.4 To clarify some identifications, chemical ionization (CI) spectra using either positive ions or negative ions will be used to elucidate molecular-weight information and simplify the fragmentation patterns of some compounds. In no case, however, should CI spectra alone be used for compound identification. Refer to Chapter Four, Method 8270, for complete descriptions of GC conditions, MS conditions, and quantitative and quantitative identification.

9.0 CALIBRATION

9.1 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 nozzles become nicked, dented, or corroded, they shall be reshaped, sharpened, and recalibrated before use. Each nozzle shall be permanently and uniquely identified.

9.2 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, dented, or corroded and if it meets design and intercomponent spacing specifications.

9.3 Metering system:

9.3.1 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 is suggested: Make a 10-min 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).

9.3.2 After each field use, the calibration of the metering system shall be checked by performing three calibration runs at a single intermediate orifice setting (based on the previous field test). The vacuum shall be set 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.

9.3.3 Leak-check of metering system: That 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. The following procedure is suggested (see Figure 6): 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, if present, 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 shall be voided or calculations for test series shall be performed using whichever meter coefficient value (i.e., before or after) gives the lower value of total sample volume.

9.4 Probe heater: The probe-heating system shall 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.

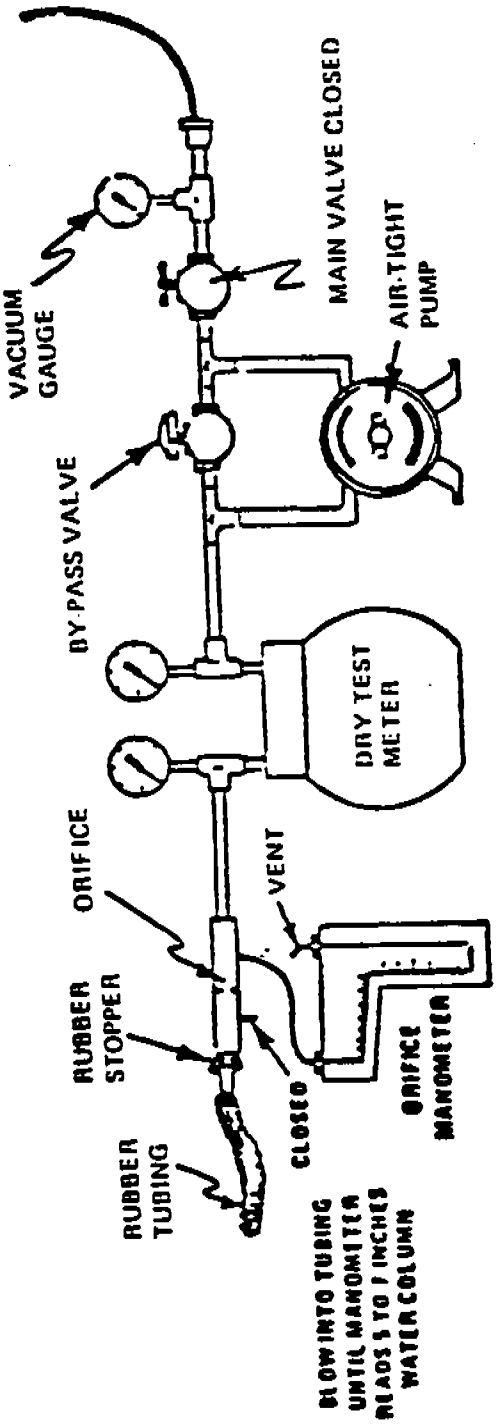


Figure 6. Leak-check of meter box.

9.5 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%.

9.5.1 Impinger, organic module, and dry-gas meter thermocouples: For the thermocouples used to measure the temperature of the gas leaving the impinger train and the XAD-2 resin bed, 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.

9.5.2 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; it is recommended that room-air temperature be added, and that the thermometer and the thermocouple 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.

9.6 Barometer: Adjust the barometer initially and before each test series to agree to within ±25 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).

9.7 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.

10.0 CALCULATIONS

10.1 Carry out calculations. Round off figures after the final calculation to the correct number of significant figures.

10.2 Nomenclature:

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

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

C_d = Type S pitot tube coefficient (nominally 0.84 ± 0.02), dimensionless.

I = Percent of isokinetic sampling.

L_a = Maximum acceptable leakage rate for a leak-check, either pre-test or following a component change; equal to 0.00057 m^3/min (0.02 cfm) or 4% of the average sampling rate, whichever is less.

L_i = Individual leakage rate observed during the leak-check conducted prior to the "i^{th}" component change (i = 1, 2, 3...n) m^3/min (cfm).

L_p = Leakage rate observed during the post-test leak-check, m^3/min (cfm).

M_d = Stack-gas dry molecular weight, g/g-mole (lb/lb-mole).

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

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

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

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

R = Ideal gas constant, 0.06236 mm Hg-m^3/K-g-mole (21.85 in. Hg-ft^3/°R-lb-mole).

T_m = Absolute average dry-gas meter temperature (see Figure 6), K (°R).

T_s = Absolute average stack-gas temperature (see Figure 6), K (°R).

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

V_{lc} = Total volume of liquid collected in the organic module condensate knockout trap, the impingers, and silica gel, mL.

V_m = Volume of gas sample as measured by dry-gas meter, dscm (dscf).

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

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

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

W_a = Weight of residue in acetone wash, mg.

γ = Dry-gas-meter calibration factor, dimensionless.

ΔH = Average pressure differential across the orifice meter (see Figure 2), mm H_2O (in. H_2O).

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

θ = Total sampling time, min.

θ_1 = Sampling time interval from the beginning of a run until the first component change, min.

θ_i = Sampling time interval between two successive component changes, beginning with the interval between the first and second changes, min.

θ_p = Sampling time interval from the final (n^{th}) component change until the end of the sampling run, min.

13.6 = Specific gravity of mercury.

60 = sec/min.

100 = Conversion to percent.

10.3 Average dry-gas-meter temperature and average orifice pressure drop: See data sheet (Figure 5, above).

10.4 Dry-gas volume: Correct the sample measured by the dry-gas meter to standard conditions (20°C, 760 mm Hg [68°F, 29.92 in. Hg]) by using Equation 1:

$$V_{m(std)} = V_m \gamma \frac{T_{std}}{T_m} \frac{P_{bar} + \Delta H/13.6}{P_{std}} = K_1 V_m \gamma \frac{P_{bar} + \Delta H/13.6}{T_m} \qquad (1)$$

where:

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

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

a. Case I (no component changes made during sampling run): Replace V_m in Equation 1 with the expression:

$$V_m - (L_p - L_a)$$

b. Case II (one or more component changes made during the sampling run): Replace V_m in Equation 1 by the expression:

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

and substitute only for those leakage rates (L_1 or L_p) that exceed L_a.

10.5 Volume of water vapor:

$$V_{w(std)} = V_{lc} \frac{P_w}{M_w} \frac{RT_{std}}{P_{std}} = K_2 V_{lc} \qquad (2)$$

where:

K_2 = 0.001333 m^3/mL for metric units, or
K_2 = 0.04707 ft^3/mL for English units.

10.6 Moisture content:

$$B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}} \qquad (3)$$

NOTE: In saturated or water-droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made, one from the impinger analysis (Equation 3) and a second from the assumption of saturated conditions. The lower of the two values of B_w shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the Note to Section 1.2 of Method 4. For the purposes of this method, the average stack-gas temperature from Figure 6 may be used to make this determination, provided that the accuracy of the in-stack temperature sensor is ±1°C (2°F).

10.7 Conversion factors:

From	To	Multiply by
scf	m^3	0.02832
g/ft^3	gr/ft^3	15.43
g/ft^3	lb/ft^3	2.205×10^{-3}
g/ft^3	g/m^3	35.31

10.8 Isokinetic variation:

10.8.1 Calculation from raw data:

$$I = \frac{100\ T_s[K_3 F_{1c} + (V_m/T_m)\ (P_{bar} + \Delta H/13.6)]}{60\theta V_s P_s A_n} \qquad (4)$$

where:

K_3 = 0.003454 mm Hg-m^3/mL-K for metric units, or
K_3 = 0.002669 in. Hg-ft^3/mL-°R for English units.

10.8.2 Calculation for intermediate values:

$$I = \frac{T_s V_{m(std)} P_{std} 100}{T_{std} V_s \theta A_n P_s 60(1-B_{ws})} \qquad (5)$$

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

where:

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

10.8.3 Acceptable results: If 90% $\leq$ I $\leq$ 110%, the results are acceptable. If the results are low in comparison with the standard and I is beyond the acceptable range, or if I is less than 90%, the Administrator may opt to accept the results.

10.9 To determine the minimum sample volume that shall be collected, the following sequence of calculations shall be used.

10.9.1 From prior analysis of the waste feed, the concentration of POHCs 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 POHC allowed to be present in the effluent. This may be expressed as:

$$\frac{(WF)\ (POHC_i\ conc)}{100} \quad \frac{(100-\%DRE)}{100} = \text{Max } POHC_i \text{ Mass} \qquad (6)$$

where:

WF = mass flow rate of waste feed per hr, g/hr (lb/hr).

$POHC_i$ = concentration of Principal Organic Hazardous Compound (wt %) introduced into the combustion process.

DRE = percent Destruction and Removal Efficiency required.

Max POHC = mass flow rate (g/hr [lb/hr]) of POHC emitted from the combustion source.

10.9.2 The average discharge concentration of the POHC in the effluent gas is determined by comparing the Max POHC with the volumetric flow rate being exhausted from the source. Volumetric flow rate data are available as a result of preliminary Method 1-4 determinations:

$$\frac{\text{Max POHC}_i \text{ Mass}}{DV_{eff(std)}} = \text{Max POHC}_i \text{ conc} \qquad (7)$$

where:

$DV_{eff(std)}$ = volumetric flow rate of exhaust gas, dscm (dscf).

$POHC_i$ conc = anticipated concentration of the POHC in the exhaust gas stream, g/dscm (lb/dscf).

10.9.3 In making this calculation, it is recommended that a safety margin of at least ten be included:

$$\frac{LDL_{POHC} \times 10}{POHC_i \text{ conc}} = V_{TBC} \qquad (8)$$

where:

LDL_{POHC} = detectable amount of POHC in entire sampling train.
NOTE: The whole extract from an XAD-2 cartridge is seldom if ever, injected at once. Therefore, if aliquoting factors are involved, the LDL_{POHC} is not the same as the analytical (or column) detection limit.

V_{TBC} = minimum dry standard volume to be collected at dry-gas meter.

10.10 Concentration of any given POHC in the gaseous emissions of a combustion process:

1) Multiply the concentration of the POHC as determined in Method 8270 by the final concentration volume, typically 10 mL.

C_{POHC} (ug/mL) x sample volume (mL) = amount (ug) of POHC in sample (9)

where:

C_{POHC} = concentration of POHC as analyzed by Method 8270.

2) Sum the amount of POHC found in all samples associated with a single train.

Total (ug) = XAD-2 (ug) + condensate (ug) + rinses (ug) + impinger (ug) (10)

3) Divide the total ug found by the volume of stack gas sampled (m^3).

(Total ug)/(train sample volume) = concentration of POHC (ug/m^3) (11)

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 study includes the analysis of field and method blanks, procedure validations, incorporation of stable labeled surrogate compounds, quantitation versus stable labeled internal standards, capillary column performance checks, and external performance tests. The surrogate spiking compounds selected for a particular analysis are used as primary indicators of the quality of the analytical data for a wide range of compounds and a variety of sample matrices. The assessment of combustion data, positive identification, and quantitation of the selected compounds are dependent on the integrity of the samples received and the precision and accuracy of the analytical methods employed. The quality assurance procedures for this method are designed to monitor the performance of the analytical method 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, unused filters, and resin cartridges. 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 test train). The filter housing and probe of the blank train will 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 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 Refer to Method 8270 for additional quality control considerations.

12.0 METHOD PERFORMANCE

12.1 Method performance evaluation: Evaluation of analytical procedures for a selected series of compounds must include the sample-preparation procedures and each associated analytical determination. The analytical procedures should be challenged by the test compounds spiked at appropriate levels and carried through the procedures.

12.2 Method detection limit: The overall method detection limits (lower and upper) must be determined on a compound-by-compound basis because different compounds may exhibit different collection, retention, and extraction efficiencies as well as instrumental minimum detection limit (MDL). The method detection limit must be quoted relative to a given sample volume. The upper limits for the method must be determined relative to compound retention volumes (breakthrough).

12.3 Method precision and bias: The overall method precision and bias must be determined on a compound-by-compound basis at a given concentration level. The method precision value would include a combined variability due to sampling, sample preparation, and instrumental analysis. The method bias would be dependent upon the collection, retention, and extraction efficiency of the train components. From evaluation studies to date using a dynamic spiking system, method biases of -13% and -16% have been determined for toluene and 1,1,2,2-tetrachloroethane, respectively. A precision of 19.9% was calculated from a field test data set representing seven degrees of freedom which resulted from a series of paired, unspiked Semivolatile Organic Sampling trains (Semi-VOST) sampling emissions from a hazardous waste incinerator.

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PREPARATION OF XAD-2 SORBENT RESIN

1.0 SCOPE AND APPLICATION

1.1 XAD-2 resin as supplied by the manufacturer is impregnated with a bicarbonate solution to inhibit microbial growth during storage. Both the salt solution and any residual extractable monomer and polymer species must be removed before use. The resin is prepared by a series of water and organic extractions, followed by careful drying.

2.0 EXTRACTION

2.1 Method 1: The procedure may be carried out in a giant Soxhlet extractor. An all-glass thimble containing an extra-coarse frit is used for extraction of XAD-2. The frit is recessed 10-15 mm above a crenellated ring at the bottom of the thimble to facilitate drainage. The resin must be carefully retained in the extractor cup with a glass-wool plug and stainless steel screen because it floats on methylene chloride. This process involves sequential extraction in the following order.

Solvent	Procedure
Water	Initial rinse: Place resin in a beaker, rinse once with Type II water, and discard. Fill with water a second time, let stand overnight, and discard.
Water	Extract with H_2O for 8 hr.
Methyl alcohol	Extract for 22 hr.
Methylene chloride	Extract for 22 hr.
Methylene chloride (fresh)	Extract for 22 hr.

2.2 Method 2:

2.2.1 As an alternative to Soxhlet extraction, a continuous extractor has been fabricated for the extraction sequence. This extractor has been found to be acceptable. The particular canister used for the apparatus shown in Figure A-1 contains about 500 g of finished XAD-2. Any size may be constructed; the choice is dependent on the needs of the sampling programs. The XAD-2 is held under light spring tension between a pair of coarse and fine screens. Spacers under the bottom screen allow for even distribution of clean solvent. The three-necked flask should be of sufficient size (3-liter in this case) to hold solvent

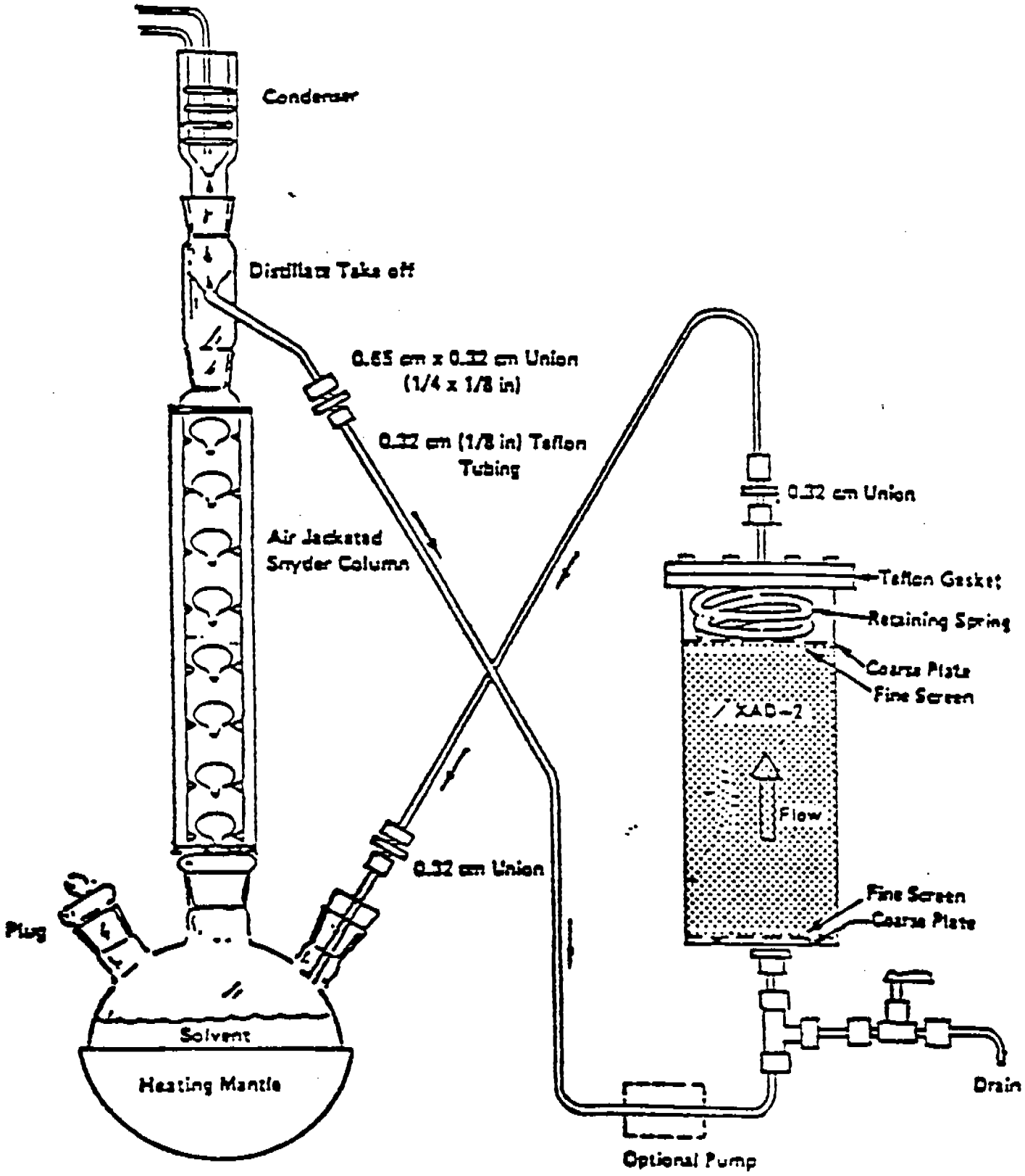


Figure A-1. XAD-2 cleanup extraction apparatus.

equal to twice the dead volume of the XAD-2 canister. Solvent is refluxed through the Snyder column, and the distillate is continuously cycled up through the XAD-2 for extraction and returned to the flask. The flow is maintained upward through the XAD-2 to allow maximum solvent contact and prevent channeling. A valve at the bottom of the canister allows removal of solvent from the canister between changes.

2.2.2 Experience has shown that it is very difficult to cycle sufficient water in this mode. Therefore the aqueous rinse is accomplished by simply flushing the canister with about 20 liters of distilled water. A small pump may be useful for pumping the water through the canister. The water extraction should be carried out at the rate of about 20-40 mL/min.

2.2.3 After draining the water, subsequent methyl alcohol and methylene chloride extractions are carried out using the refluxing apparatus. An overnight or 10- to 20-hr period is normally sufficient for each extraction.

2.2.4 All materials of construction are glass, Teflon, or stainless steel. Pumps, if used, should not contain extractable materials. Pumps are not used with methanol and methylene chloride.

3.0 DRYING

3.1 After evaluation of several methods of removing residual solvent, a fluidized-bed technique has proved to be the fastest and most reliable drying method.

3.2 A simple column with suitable retainers, as shown in Figure A-2, will serve as a satisfactory column. A 10.2-cm (4-in.) Pyrex pipe 0.6 m (2 ft) long will hold all of the XAD-2 from the extractor shown in Figure A-1 or the Soxhlet extractor, with sufficient space for fluidizing the bed while generating a minimum resin load at the exit of the column.

3.3 Method 1: The gas used to remove the solvent is the key to preserving the cleanliness of the XAD-2. Liquid nitrogen from a standard commercial liquid nitrogen cylinder has routinely proved to be a reliable source of large volumes of gas free from organic contaminants. The liquid nitrogen cylinder is connected to the column by a length of precleaned 0.95-cm (3/8-in.) copper tubing, coiled to pass through a heat source. As nitrogen is bled from the cylinder, it is vaporized in the heat source and passes through the column. A convenient heat source is a water bath heated from a steam line. The final nitrogen temperature should only be warm to the touch and not over 40°C. Experience has shown that about 500 g of XAD-2 may be dried overnight by consuming a full 160-liter cylinder of liquid nitrogen.

3.4 Method 2: As a second choice, high-purity tank nitrogen may be used to dry the XAD-2. The high-purity nitrogen must first be passed through a bed

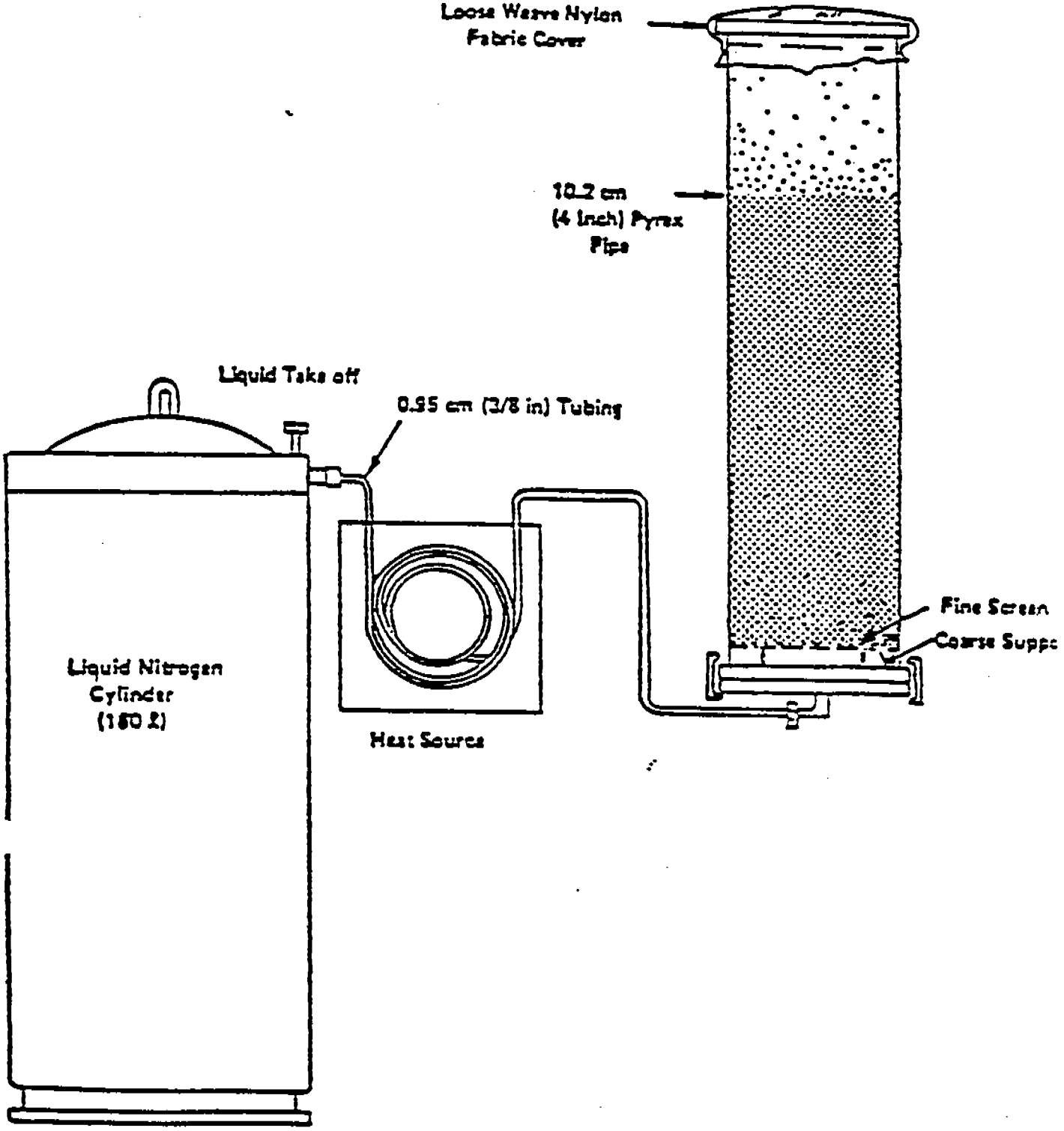


Figure A-2. XAD-2 fluidized-bed drying apparatus.

of activated charcoal approximately 150 mL in volume. With either type of drying method, the rate of flow should gently agitate the bed. Excessive fluidization may cause the particles to break up.

4.0 QUALITY CONTROL PROCEDURES

4.1 For both Methods 1 and 2, the quality control results must be reported for the batch. The batch must be reextracted if the residual extractable organics are >20 ug/mL by TCO analysis or the gravimetric residue is >0.5 mg/20 g XAD-2 extracted. (See also section 5.1, Method 0010.)

4.2 Four control procedures are used with the final XAD-2 to check for (1) residual methylene chloride, (2) extractable organics (TCO), (3) specific compounds of interest as determined by GC/MS, as described in Section 4.5 below, and (4) residue (GRAV).

4.3 Procedure for residual methylene chloride:

4.3.1 Description: A 1±0.1-g sample of dried resin is weighed into a small vial, 3 mL of toluene are added, and the vial is capped and well shaken. Five uL of toluene (now containing extracted methylene chloride) are injected into a gas chromatograph, and the resulting integrated area is compared with a reference standard. The reference solution consists of 2.5 uL of methylene chloride in 100 mL of toluene, simulating 100 ug of residual methylene chloride on the resin. The acceptable maximum content is 1,000 ug/g resin.

4.3.2 Experimental: The gas chromatograph conditions are as follows:

6-ft x 1/8-in. stainless steel column containing 10% OV-101 on 100/120 Supelcoport;

Helium carrier at 30 mL/min;

FID operated on 4 x 10^{-11} A/mV;

Injection port temperature: 250°C;

Detector temperature: 305°C;

Program: 30°C(4 min) 40°C/min 250°C (hold); and

Program terminated at 1,000 sec.

4.4 Procedure for residual extractable organics:

4.4.1 Description: A 20±0.1-g sample of cleaned, dried resin is weighed into a precleaned alundum or cellulose thimble which is plugged with cleaned glass wool. (Note that 20 g of resin will fill a thimble, and the

TOTAL CHROMATOGRAPHABLE ORGANIC MATERIAL ANALYSIS

1.0 SCOPE AND APPLICATION

1.1 In this procedure, gas chromatography is used to determine the quantity of lower boiling hydrocarbons (boiling points between 90° and 300°C) in the concentrates of all organic solvent rinses, XAD-2 resin and LC fractions - when Method 1 is used (see References, Method 0010) - encountered in Level 1 environmental sample analyses. Data obtained using this procedure serve a twofold purpose. First, the total quantity of the lower boiling hydrocarbons in the sample is determined. Then whenever the hydrocarbon concentrations in the original concentrates exceed 75 ug/m^3, the chromatography results are reexamined to determine the amounts of individual species.

The extent of compound identification is limited to representing all materials as normal alkanes based upon comparison of boiling points. Thus the method is not qualitative. In a similar manner, the analysis is semiquantitative; calibrations are prepared using only one hydrocarbon. They are replicated but samples routinely are not.

1.2 Application: This procedure applies solely to the Level 1 C7-C16 gas chromatographic analysis of concentrates of organic extracts, neat liquids, and of LC fractions. Throughout the procedure, it is assumed the analyst has been given a properly prepared sample.

1.3 Sensitivity: The sensitivity of this procedure, defined as the slope of a plot of response versus concentration, is dependent on the instrument and must be verified regularly. TRW experience indicates the nominal range is of the order of 77 uV·V·sec·uL/ng of n-heptane and 79 uV·sec·ul/ng of n-hexadecane. The instrument is capable of perhaps one hundredfold greater sensitivity. The level specified here is sufficient for Level 1 analysis.

1.4 Detection limit: The detection limit of this procedure as written is 1.3 ng/uL for a 1 uL injection of n-decane. This limit is arbitrarily based on defining the minimum detectable response as 100 uv·sec. This is an easier operational definition than defining the minimum detection limit to be that amount of material which yields a signal twice the noise level.

1.5 Range: The range of the procedure will be concentrations of 1.3 ng/uL and greater.

1.6 Limitations

1.6.1 Reporting limitations: It should be noted that a typical environmental sample will contain compounds which: (a) will not elute in the specified boiling ranges and thus will not be reported, and/or (b)

resin will float out unless well plugged.) The thimble containing the resin is extracted for 24 hr with 200-mL of pesticide- grade methylene chloride (Burdick and Jackson pesticide-grade or equivalent purity). The 200-mL extract is reduced in volume to 10-mL using a Kuderna-Danish concentrator and/or a nitrogen evaporation stream. Five uL of that solution are analyzed by gas chromatography using the TCO analysis procedure. The concentrated solution should not contain >20 ug/mL of TCO extracted from the XAD-2. This is equivalent to 10 ug/g of TCO in the XAD-2 and would correspond to 1.3 mg of TCO in the extract of the 130-g XAD-2 module. Care should be taken to correct the TCO data for a solvent blank prepared (200 mL reduced to 10 mL) in a similar manner.

4.4.2 Experimental: Use the TCO analysis conditions described in the revised Level 1 manual (EPA 600/7-78-201).

4.5 GC/MS Screen: The extract, as prepared in paragraph 4.4.1, is subjected to GC/MS analysis for each of the individual compounds of interest. The GC/MS procedure is described in Chapter Four, Method 8270. The extract is screened at the MDL of each compound. The presence of any compound at a concentration >25 ug/mL in the concentrated extract will require the XAD-2 to be recleaned by repeating the methylene chloride step.

4.6 Methodology for residual gravimetric determination: After the TCO value and GC/MS data are obtained for the resin batch by the above procedures, dry the remainder of the extract in a tared vessel. There must be <0.5 mg residue registered or the batch of resin will have to be extracted with fresh methylene chloride again until it meets this criterion. This level corresponds to 25 ug/g in the XAD-2, or about 3.25 mg in a resin charge of 130 g.

will not elute from the column at all and thus will not be reported. Consequently, the organic content of the sample as reported is a lower bound and should be regarded as such.

1.6.2 Calibration limitations: Quantitation is based on calibration with n-decane. Data should therefore be reported as, e.g., mg C8/m^3 as n-decane. Since response varies linearly with carbon number (over a wide range the assumption may involve a 20% error), it is clear that heptane (C7) detected in a sample and quantitated as decane will be overestimated. Likewise, hexadecane (C16) quantitated as decane will be underestimated. From previous data, it is estimated the error involved is on the order of 6-7%.

1.6.3 Detection limitations: The sensitivity of the flame ionization detector varies from compound to compound. However, n-alkanes have a greater response than other classes. Consequently, using an n-alkane as a calibrant and assuming equal responses of all other compounds tends to give low reported values.

2.0 SUMMARY OF METHOD

2.1 A mL aliquot of all 10-mL concentrates is disbursed for GC-TCO analysis. With boiling point-retention time and response-amount calibration curves, the data (peak retention times and peak areas) are interpreted by first summing peak areas in the ranges obtained from the boiling point-retention time calibration. Then, with the response-amount calibration curve, the area sums are converted to amounts of material in the reported boiling point ranges.

2.2 After the instrument is set up, the boiling point-retention time calibration is effected by injecting a mixture of n-C7 through n-C16 hydrocarbons and operating the standard temperature program. Response-quantity calibrations are accomplished by injecting n-decane in n-pentane standards and performing the standard temperature program.

2.3 Definitions

2.3.1 GC: Gas chromatography or gas chromatograph.

2.3.2 C7-C16 n-alkanes: Heptane through hexadecane.

2.3.3 GCA temperature program: 4 min isothermal at 60°C, 10°C/min from 60° to 220°C.

2.3.4 TRW temperature program: 5 min isothermal at room temperature, then program from 30°C to 250°C at 15°C/min.

3.0 INTERFERENCES

Not applicable.

4.0 APPARATUS AND MATERIALS

4.1 Gas chromatograph: This procedure is intended for use on a Varian 1860 gas chromatograph, equipped with dual flame ionization detectors and a linear temperature programmer. Any equivalent instrument can be used provided that electrometer settings, etc., be changed appropriately.

4.2 Gases:

4.2.1 Helium: Minimum quality is reactor grade. A 4A or 13X molecular sieve drying tube is required. A filter must be placed between the trap and the instrument. The trap should be recharged after every third tank of helium.

4.2.2 Air: Zero grade is satisfactory.

4.2.3 Hydrogen: Zero grade.

4.3 Syringe: Syringes are Hamilton 701N, 10 uL, or equivalent.

4.4 Septa: Septa will be of such quality as to produce very low bleed during the temperature program. An appropriate septum is Supelco Microsep 138, which is Teflon-backed. If septum bleed cannot be reduced to a negligible level, it will be necessary to install septum swingers on the instrument.

4.5 Recorder: The recorder of this procedure must be capable of not less than 1 mV full-scale display, a 1-sec time constant and 0.5 in. per min chart rate.

4.6 Integrator: An integrator is required. Peak area measurement by hand is satisfactory but too time-consuming. If manual integration is required, the method of "height times width at half height" is used.

4.7 Columns:

4.7.1 Preferred column: 6 ft x 1/8 in. O.D. stainless steel column of 10% OV-101 on 100/120 mesh Supelcoport.

4.7.2 Alternate column: 6 ft x 1/8 in. O.D. stainless steel column of 10% OV-1 (or other silicon phase) on 100/120 mesh Supelcoport.

4.8 Syringe cleaner: Hamilton syringe cleaner or equivalent connected to a suitable vacuum source.

5.0 REAGENTS

5.1 Pentane: "Distilled-in-Glass" (reg. trademark) or "Nanograde" (reg. trademark) for standards and for syringe cleaning.

5.2 Methylene chloride: "Distilled-in-Glass" (reg. trademark) or "Nanograde" (reg. trademark) for syringe cleaning.

6.0 SAMPLING HANDLING AND PRESERVATION

6.1 The extracts are concentrated in a Kuderna-Danish evaporator to a volume less than 10 mL. The concentrate is then quantitatively transferred to a 10-mL volumetric flask and diluted to volume. A 1-mL aliquot is taken for both this analysis and possible subsequent GC/MS analysis and set aside in the sample bank. For each GC-TCO analysis, obtain the sample sufficiently in advance to allow it to warm to room temperature. For example, after one analysis is started, return that sample to the sample bank and take the next sample.

7.0 PROCEDURES

7.1 Setup and checkout: Each day, the operator will verify the following:

7.1.1 That supplies of carrier gas, air and hydrogen are sufficient, i.e., that each tank contains > 100 psig.

7.1.2 That, after replacement of any gas cylinder, all connections leading to the chromatograph have been leak-checked.

7.1.3 That the carrier gas flow rate is 30 ± 2 mL/min, the hydrogen flow rate is 30 ± 2 mL/min, and the air flow rate is 300 ± 20 mL/min.

7.1.4 That the electrometer is functioning properly.

7.1.5 That the recorder and integrator are functioning properly.

7.1.6 That the septa have been leak-checked (leak-checking is effected by placing the soap bubble flow meter inlet tube over the injection port adaptors), and that no septum will be used for more than 20 injections.

7.1.7 That the list of samples to be run is ready.

7.2 Retention time calibration:

7.2.1 To obtain the temperature ranges for reporting the results of the analyses, the chromatograph is given a normal boiling point-retention time calibration. The n-alkanes, their boiling points, and data reporting ranges are given in the table below:

	NBP, °C	Reporting Range, °C	Report As
n-heptane	98	90-110	C7
n-octane	126	110-140	C8
n-nonane	151	140-160	C9
n-decane	174	160-180	C10
n-undecane	194	180-200	C11
n-dodecane	214	200-220	C12
n-tridecane	234	220-240	C13
n-tetradecane	252	240-260	C14
n-pentadecane	270	260-280	C15
n-hexadecane	288	280-300	C16

7.2.2 Preparation of standards: Preparing a mixture of the C7-C16 alkanes is required. There are two approaches: (1) use of a standards kit (e.g., Polyscience Kit) containing bottles of mixtures of selected n-alkanes which may be combined to produce a C7-C16 standard; or (2) use of bottles of the individual C7-C16 alkanes from which accurately known volumes may be taken and combined to give a C7-C16 mixture.

7.2.3 Procedure for retention time calibration: This calibration is performed at the start of an analytical program; the mixture is chromatographed at the start of each day. To attain the required retention time precision, both the carrier gas flow rate and the temperature program specifications must be observed. Details of the procedure depend on the instrument being used. The general procedure is as follows:

7.2.3.1 Set the programmer upper limit at 250°C. If this setting does not produce a column temperature of 250°C, find the correct setting.

7.2.3.2 Set the programmer lower limit at 30°C.

7.2.3.3 Verify that the instrument and samples are at room temperature.

7.2.3.4 Inject 1 uL of the n-alkane mixture.

7.2.3.5 Start the integrator and recorder.

7.2.3.6 Allow the instrument to run isothermally at room temperature for five min.

7.2.3.7 Shut the oven door.

7.2.3.8 Change the mode to Automatic and start the temperature program.

7.2.3.9 Repeat Steps 1-9 a sufficient number of times so that the relative standard deviation of the retention times for each peak is <5%.

7.3 Response calibration:

7.3.1 For the purposes of a Level 1 analysis, response-quantity calibration with n-decane is adequate. A 10-uL volume of n-decane is injected into a tared 10 mL volumetric flask. The weight injected is obtained and the flask is diluted to the mark with n-pentane. This standard contains about 730 ng n-decane per uL n-pentane. The exact concentration depends on temperature, so that a weight is required. Two serial tenfold dilutions are made from this standard, giving standards at about 730, 73, and 7.3 ng n-decane per uL n-pentane, respectively.

7.3.2 Procedure for response calibration: This calibration is performed at the start of an analytical program and monthly thereafter. The most concentrated standard is injected once each day. Any change in calibration necessitates a full calibration with new standards. Standards are stored in the refrigerator locker and are made up monthly.

7.3.2.1 Verify that the instrument is set up properly.

7.3.2.2 Set electrometer at 1×10^{-10} A/mV.

7.3.2.3 Inject 1 uL of the highest concentration standard.

7.3.2.4 Run standard temperature program as specified above.

7.3.2.5 Clean syringe.

7.3.2.6 Make repeated injections of all three standards until the relative standard deviations of the areas of each standard are ≤5%.

7.4 Sample analysis procedure:

7.4.1 The following apparatus is required:

7.4.1.1 Gas chromatograph set up and working.

7.4.1.2 Recorder, integrator working.

7.4.1.3 Syringe and syringe cleaning apparatus.

7.4.1.4 Parameters: Electrometer setting is 1×10^{-10} A/mV; recorder is set at 0.5 in./min and 1 mV full-scale.

7.4.2 Steps in the procedure are:

7.4.2.1 Label chromatogram with the data, sample number, etc.

7.4.2.2 Inject sample.

7.4.2.3 Start integrator and recorder.

7.4.2.4 After isothermal operation for 5 min, begin temperature program.

7.4.2.5 Clean syringe.

7.4.2.6 Return sample; obtain new sample.

7.4.2.7 When analysis is finished, allow instrument to cool. Turn chromatogram and integrator output and data sheet over to data analyst.

7.5 Syringe cleaning procedure:

7.5.1 Remove plunger from syringe.

7.5.2 Insert syringe into cleaner; turn on aspirator.

7.5.3 Fill pipet with pentane; run pentane through syringe.

7.5.4 Repeat with methylene chloride from a separate pipet.

7.5.5 Flush plunger with pentane followed by methylene chloride.

7.5.6 Repeat with methylene chloride.

7.6 Sample analysis decision criterion: The data from the TCO analyses of organic extract and rinse concentrates are first used to calculate the total concentration of C7-C16 hydrocarbon-equivalents (Paragraph 7.7.3) in the sample with respect to the volume of air actually sampled, i.e., ug/m^3. On this basis, a decision is made both on whether to calculate the quantity of each n-alkane equivalent present and on which analytical procedural pathway will be followed. If the total organic content is great enough to warrant continuing the analysis -- >500 ug/m^3 -- a TCO of less than 75 ug/m^3 will require only LC fractionation and gravimetric determinations and IR spectra to be obtained on each fraction. If the TCO is greater than 75 ug/m^3, then the first seven LC fractions of each sample will be reanalyzed using this same gas chromatographic technique.

7.7 Calculations:

7.7.1 Boiling Point - Retention Time Calibration: The required data for this calibration are on the chromatogram and on the data sheet. The data reduction is performed as follows:

7.7.1.1 Average the retention times and calculate relative standard deviations for each n-hydrocarbon.

7.7.1.2 Plot average retention times as abscissae versus normal boiling points as ordinates.

7.7.1.3 Draw in calibration curve.

7.7.1.4 Locate and record retention times corresonding to boiling ranges 90-100, 110-140, 140-160, 160-180, 180-200, 200-220, 220-240, 240-260, 260-280, 280-300°C.

7.7.2 Response-amount calibration: The required data for this calibration are on the chromatogram and on the data sheet. The data reduction is performed as follows:

7.7.2.1 Average the area responses of each standard and calculate relative standard deviations.

7.7.2.2 Plot response (uv·sec) as ordinate versus ng/uL as abscissa.

7.7.2.3 Draw in the curve. Perform least squares regression and obtain slope (uV·sec·uL/ng).

7.7.3 Total C7-C16 hydrocarbons analysis: The required data for this calculation are on the chromatogram and on the data sheet. The data reduction is performed as follows:

7.7.3.1 Sum the areas of all peaks within the retention time range of interest.

7.7.3.2 Convert this area (uV·sec) to ng/uL by dividing by the weight response for n-decane (uV·sec.uL/ng).

7.7.3.3 Multiply this weight by the total concentrate volume (10 mL) to get the weight of the C7-C16 hydrocarbons in the sample.

7.7.3.4 Using the volume of gas sampled or the total weight of sample acquired, convert the result of Step 7.7.3.3 above to ug/m^3.

7.7.3.5 If the value of total C7-C16 hydrocarbons from Step 7.7.3.4 above exceeds 75 ug/m^3, calculate individual hydrocarbon concentrations in accordance with the instructions in Paragraph 7.7.5.5 below.

7.7.4 Individual C7-C16 n-Alkane Equivalent Analysis: The required data from the analyses are on the chromatogram and on the data sheet. The data reduction is performed as follows:

7.7.4.1 Sum the areas of peaks in the proper retention time ranges.

7.7.4.2 Convert areas (uV·sec) to ng/uL by dividing by the proper weight response (uV·sec·uL/ng).

7.7.4.3 Multiply each weight by total concentrate volume (10 mL) to get weight of species in each range of the sample.

7.7.4.4 Using the volume of gas sampled on the total weight of sample acquired, convert the result of Step 7.7.4.3 above to ug/m^3.

8.0 QUALITY CONTROL

8.1 Appropriate QC is found in the pertinent procedures throughout the method.

9.0 METHOD PERFORMANCE

9.1 Even relatively comprehensive error propagation analysis is beyond the scope of this procedure. With reasonable care, peak area reproducibility of a standard should be of the order of 1% RSD. The relative standard deviation of the sum of all peaks in a fairly complex waste might be of the order of 5-10%. Accuracy is more difficult to assess. With good analytical technique, accuracy and precision should be of the order of 10-20%.

10.0 REFERENCES

1. Emissions Assessment of Conventional Stationary Combustion Systems: Methods and Procedure Manual for Sampling and Analysis, Interagency Energy/Environmental R&D Program, Industrial Environmental Research Laboratory, Research Triangle Park, NC 27711, EPA-600/7-79-029a, January 1979.

APPENDIX K

CALCULATION EQUATIONS

METHOD 2
CALCULATION EQUATIONS

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

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

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

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

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

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

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

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

SYMBOLS

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

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

METHOD 3
CALCULATION EQUATIONS

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

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

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

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

METHOD 5
CALCULATION EQUATIONS

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

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

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

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

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

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

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

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

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

CALCULATION EQUATIONS

METHOD 7

$$V_{m(std)} = 17.64\ (V_f - 25)\ [\frac{P_f}{T_f} - \frac{P_i}{T_i}]$$

$$C_s = 6.243\ x\ 10^{-5}\ \frac{M}{V_{m(std)}}$$

$$E = \frac{2090\ C_s F}{20.9 - \overline{B}'_{O_2}}$$

$$C_s\ (GR/DSCF) = 7000\ C_s$$

$$C_s\ (MG/DSCM) = 1.60186\ x\ 10^7\ C_s$$

$$C_s\ (ppm\text{-}dry) = 8.37552\ x\ 10^6\ C_s$$

$$C_s\ (ppm\text{-}3\%\ O_2) = 8.37552\ x\ 10^6\ C_s\ \{1 + [\frac{\overline{B}'_{O_2} - 3}{20.9 - B'_{O_2}}]\}$$

$$C_s\ (ppm\text{-}wet) = 8.37552\ x\ 10^6\ C_s\ (1 - \frac{MC}{100})$$

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SYMBOLS

$\bar{B}\ O_2$	=	Average oxygen content in flue gas, % v/v
C_s	=	Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, LB/DSCF
C_s (GR/DSCF)	=	Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, GR/DSCF
C_s (MG/DSCM)	=	Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, MG/DSCM
E	=	Emission factor, LB/10^6BTU
F	=	F-Factor for given fuel type, DSCF/10^4BTU
M	=	Mass of nitrogen oxides as nitrogen dioxide in gas sample, ug
MC	=	Moisture content of flue gas, %
P_f	=	Final absolute pressure in flask, IN. HG
P_i	=	Initial absolute pressure in flask, IN. HG
C_s (ppm-dry)	=	Concentration of nitrogen oxides in flue gas, dry basis, (v/v), ppm
C_s (ppm-3% O_2)	=	Concentration of nitrogen oxides in flue gas, dry basis, corrected to 3% O_2, (v/v) ppm
C_s (ppm-wet)	=	Concentration of nitrogen oxides in flue gas, wet basis, (v/v), ppm
T_f	=	Final absolute temperature in flask, °R
T_i	=	Initial absolute temperature in flask, °R
V_f	=	Volume of flask and valve, cc
$V_{m(std)}$	=	Sample volume at standard conditions, dry basis, cc

CALCULATION EQUATIONS

METHOD 10

$$CO\text{-}PPM\text{-}DRY = CO_{CO_2} - free, dry, avg\ (1 - CO_2, d/100)$$

$$CO\text{-}PPM\text{-}WET = CO\text{-}PPM\text{-}DRY\ (1 - MC/100)$$

$$GR/DSCF = 5.0885\ X\ 10^{-4}\ (CO\text{-}PPM\text{-}DRY)$$

$$mg/dscm = 1.165\ (CO\text{-}PPM\text{-}DRY)$$

$$\dot{m} = 8.5714\ x\ 10^{-3}\ (GR/DSCF)\ (Q_{s,d})$$

$$E = \frac{2.9857\ x\ 10^{-3}\ F_d\ (GR/DSCF)}{20.9 - O_{2,d}}$$

where:

$CO_{CO_2} - free, dry, avg$

= average of two determinations of carbon monoxide on a dry, CO_2 - free integrated flue gas sample reported in ppm by volume

$CO_{2,d}$ = carbon dioxide concentration of flue gas on a dry percent by volume basis

$O_{2,d}$ = oxygen concentration of flue gas on a dry percent by volume basis

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MC	=	moisture content of flue gas on a percent by volume basis
CO·PPM·DRY	=	carbon monoxide concentration in ppm by volume on a dry basis
CO·PPM·WET	=	carbon monoxide concentration in ppm by volume on a wet or actual basis
GR/DSCF	=	concentration of carbon monoxide in flue gas on a grains per dry standard cubic foot basis (68 °F, 29.92 IN. HG.)
mg/dscm	=	concentration of carbon monoxide in flue gas on a milligrams per dry standard cubic meter basis (60 °F, 29.92 IN. HG.)
$\dot{m}$	=	emissions or mass rate of carbon monoxide on a LB/HR basis
$Q_{s,d}$	=	volumetric flow rate of flue gas in dry standard cubic feet per minute
E	=	emission factor of carbon monoxide in pounds of carbon monoxide emitted per million BTU heat input (LB/MMBTU)
F_d	=	F-Factor of respective fuel in dry standard cubic feet of exhaust gas at 0% oxygen per million BTU of heat input (DSCF/MMBTU)

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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)

INTERPOLL LABORATORIES, INC

Concentration Calculation Equations for Benzene

1. Structure:



C_6H_6

2. Molecular weight:

78.11 g/g-mole

3. Mass/volume Concentration:

$$Cug/Nm3 = \frac{35.314\ m}{Vstd}$$

where m = Total mass of Benzene 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:

$$C_6H_6\ Cppmv = \left(\frac{mg}{Nm^3}\right) \times \left(\frac{24.054\ mL}{78.11\ mg}\right) = ppmV$$

$$C_6H_6\ Cppmv = 0.3080 \left(C_6H_6\ Cmg/Nm3\right)$$

$$Cppmv = 3.08 \times 10^{-} \cdot Cug/Nm^3$$

5. Notes:

Use Excel spreadsheet

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Derived by: D. DESPEN | Date: 9-10-90

Form S-511

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

CALCULATION EQUATIONS

Gas Chromatographic Method for Phenol in Air

PPM·DRY $= \frac{9.03 \times 10^{-3}\ m_t}{V_{std}}$

PP·WET = PPM·DRY (1-MC/100)

GR/DSCF $= 1.709 \times 10^{-5}$ (PPM·DRY)

mg/dscm = 3.913 (PPM·DRY)

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.)

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 OF PAH EMISSION RATES

in g/sec and 10^{-6}g/sec

$\dot{m}$ (g/sec)

$$= \quad 4.716 \times 10^{-10}\ C_s\ (ug/m^3)\ \ Q_{s,d}\ (DSCFM)$$

$\dot{m}$ (10^{-3}g/sec)

$$= \quad 4.716 \times 10^{-7}\ \ Ca\ (ug/m^3)\ \ Q_{s,d}\ (DSCFM)$$

$\dot{m}$ (10^{-6}g/sec)

$$= \quad 4.716 \times 10^{-4}\ \ Cs\ (ug/m^3)\ \ Q_{s,d}\ (DSCFM)$$

where:

Q_s = ug/dsm^3

$Q_{s,d}$ = DSCF/MIN

Report No. 6-7451

LOUISIANA PACIFIC CORPORATION
Hayward, Wisconsin

Total HydroCarbons Calculations

LINE 2 DRYER RTO STACK

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)
6	1	26.7	29	70700	5.23		
	2	25.0	35	72250	6.30		
	3	25.0	29	72250	5.22		
						31	5.582

LINE 2 CORE DRYER DUCT

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)
7	1	24.7	526	28356	37.01		
	2	25.4	906	29359	66.63		
	3	26.90	759	28827	55.93		
						730.33333	53.18858

LINE 2 SURFACE DRYER DUCT

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)
8	1	28.6	692	27324	49.48		
	2	28.7	802	27592	57.99		
	3	28.3	817	27872	59.34		
						770.33333	55.60698

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Hayward, Wisconsin

Total HydroCarbons Calculations

LINE 2 PRESS VENT RTO STACK

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)
11	1	2.16	4	67951	0.52		
	2	1.65	18	68965	2.36		
	3	1.97	2	64190	0.24		
						8	1.040766

LINE 1 PRESS RTO INLET

TEST #	RUN	MC%	CONC (ppmC,w)	GASFLOW (DSCFM)	MASSRATE (LB/HR)	AVERAGE (ppmC,w)	AVERAGE (LB/HR)
12	1	2.41	118	76341	17.25		
	2	2.35	112	77087	16.52		
	3	2.18	77	77444	11.39		
						102.33333	15.05335

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LOUISIANA PACIFIC CORPORATION
Hayward, Wisconsin

BENZENE

TEST 5 **LINE 2 DRYER RTO STACK**

RUN	Vstd (DSCF)	MASS (ug)	CONC (ug/Nm3)	CONC (ppmv)	CONC (GR/DSCF)	FLOW (DSCFM)	E-RATE (LB/HR)
1	1.6	16	353	0.108767	0.00015432	72800	0.096297
2	2.11	33	552	0.170110	0.00024136	72800	0.150606
3	2.19	17	274	0.084431	0.00011979	72800	0.074751
AVG				**0.121103**			**0.10722**

TEST 15 **Line 2 Thermal Oil Heater Stack**

RUN	Vstd (DSCF)		MASS (ug)		CONC (ug/Nm3)		CONC (ppmv)		CONC (GR/DSCF)	FLOW (DSCFM)		E-RATE (LB/HR)
1	2.136	<	2.1	<	35	<	0.010693	<	1.5172E-05	16830	<	0.002189
2	2.155		35		574		0.176652		0.00025064	16090		0.034567
3	2.211		98		1565		0.482098		0.00068402	16290		0.095508
						≤	**0.223148**				≤	**0.04409**

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		HAYWARD, WI				
	Oxides of Nitrogen Calculations					
LINE 2 DRYER RTO STACK						
TEST 6		LB/HR Calculations				
RUN	NOx ppm	Flow	LB/DSCF	LB/HR		
1	15.2	70700	1.81E-06	7.70		
2	13.4	72250	1.6E-06	6.94		
3	19.6	72250	2.34E-06	10.14		
AVG	**16.1**			**8.26**		
LINE 2 CORE DRYER DUCT						
TEST 7		LB/HR Calculations				
RUN	NOx ppm	Flow	LB/DSCF	LB/HR		
1	23.3	28356	2.78E-06	4.733057		
2	23.3	29359	2.78E-06	4.900473		
3	23.6	28827	2.82E-06	4.873627		
AVG	**23.4**			**4.8**		
LINE 2 SURFACE DRYER DUCT						
TEST 8		LB/HR Calculations				
RUN	NOx ppm	Flow	LB/DSCF	LB/HR		
1	30	27324	3.58E-06	5.872275		
2	30.2	27592	3.61E-06	5.969404		
3	31.8	27872	3.8E-06	6.34945		
AVG	**30.7**			**6.1**		
LINE 2 PRESS VENT RTO STACK						
TEST 11		LB/HR Calculations				
RUN	NOx ppm	Flow	LB/DSCF	LB/HR		
1	22.4	67951	2.67E-06	10.90397		
2	20.3	68965	2.42E-06	10.02918		
3	18.5	64190	2.21E-06	8.507069		
AVG	**20.4**			**9.8**		
LINE 2 PRESS RTO INLET						
TEST 12		LB/HR Calculations				
RUN	NOx ppm	Flow	LB/DSCF	LB/HR		
1	2.1	76341	2.51E-07	1.148466		
2	2.7	77087	3.22E-07	1.491028		
3	3.1	77444	3.7E-07	1.719849		
AVG	**2.6**			**1.5**		
LINE 2 THERMAL OIL HEATER STACK						
TEST 16		LB/HR Calculations				
RUN	NOx ppm	Flow	LB/DSCF	LB/HR		
1	60.8	17550	7.26E-06	7.644015		
2	62.6	16980	7.47E-06	7.614701		
3	62.9	17670	7.51E-06	7.962108		
AVG	**62.1**			**7.7**		

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	Hayward, Wisconsin								
TEST 6	LINE 2 DRYER RTO STACK								
	Gas Concentration Correction Calculations								
		NOx Calculations							
	Cbar				*Cma*				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	16.3	1.2	1.2	1.20	145	145	145	145.00	15.2
2	15.0	2.2	1.0	1.60	145	149	145	147.00	13.4
3	21.2	3.0	1.0	2.00	145	143	145	144.00	19.6
Avg									16.1
		CO Calculations							
	Cbar				*Cma*				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	202.1	0	0	0.00	299	299	300	299.50	201.8
2	265.9	0	0	0.00	299	299	299	299.00	265.9
3	216.5	0	0	0.00	299	294	299	296.50	218.3
Avg									228.
		CO2 Calculations							
	Cbar				*Cma*				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	4.1	0	0	0.00	10.5	10.4	10.5	10.45	4.1
2	4.3	0	0	0.00	10.5	10.5	10.5	10.50	4.3
3	4.3	0	0	0.00	10.5	10.4	10.5	10.45	4.3
Avg									4.2
		O2 Calculations							
	Cbar				*Cma*				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	16.2	0	0	0.00	13.1	12.9	13.1	13.00	16.3
2	16.4	1	0	0.50	13.1	13.1	13.1	13.10	16.5
3	16.3	0	0.1	0.05	13.1	13.1	13.1	13.10	16.3
Avg									16.4

TEST 7	LINE 2 CORE DRYER DUCT								
	Gas Concentration Correction Calculations								
		NOx Calculations							
	Cbar				*Cma*				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	23.3	1	0	0.50	73.7	71	74	72.50	23.3
2	25.26	3	0	1.50	73.7	77	76	76.50	23.3
3	27.23	4	3	3.50	73.7	78	77	77.50	23.6
Avg									23.4
		CO Calculations							
	Cbar				*Cma*				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	680.78	-3	0	-1.50	620	607	612	609.50	692.3
2	1281.38	4	4	4.00	620	620	624	622.00	1281.5
3	1121.27	3	4	3.50	620	613	620	616.50	1130.5
Avg									1034.8
		CO2 Calculations							
	Cbar				*Cma*				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	4.59	0.3	0.2	0.25	10.9	10.8	10.8	10.80	4.5
2	5.02	-0.1	0	-0.05	10.9	10.8	11	10.90	5.0
3	5.09	0	0	0.00	10.9	10.9	10.8	10.85	5.1
Avg									4.9
		O2 Calculations							
	Cbar				*Cma*				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	16.32	0.1	0	0.05	13.5	13.5	13.4	13.45	16.4
2	15.82	0	0	0.00	13.5	13.6	13.6	13.60	15.7
3	15.92	0	0	0.00	13.5	13.5	13.6	13.55	15.9
Avg									16.0

TEST 8	LINE 2 SURFACE DRYER DUCT								
	Gas Concentration Correction Calculations								
		NOx Calculations							
	Cbar				Cma				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	Co	(Upscale)	(Final)	(Initial)	Cm	Cgas
1	29.9	0	0	0.00	73.7	73	74	73.50	30.0
2	30.3	0	0	0.00	73.7	74	74	74.00	30.2
3	31.9	0	0	0.00	73.7	74	74	74.00	31.8
Avg									30.6
TEST 11	LINE 2 PRESS VENT RTO STACK								
	Gas Concentration Correction Calculations								
		NOx Calculations							
	Cbar				Cma				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	Co	(Upscale)	(Final)	(Initial)	Cm	Cgas
1	24.2	3.36	0	1.68	145	149.4	145	147.20	22.4
2	22.5	4	1.42	2.71	145	146.5	141.7	144.10	20.3
3	19.1	0	2	1.00	145	140	145	142.50	18.5
Avg									20.4
		CO Calculations							
	Cbar				Cma				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	Co	(Upscale)	(Final)	(Initial)	Cm	Cgas
1	18.1	-1	0	-0.50	299	296.4	299	297.70	18.6
2	21.3	0	0.5	0.25	299	292	296.4	294.20	21.4
3	19.6	0	0	0.00	299	295	299.5	297.25	19.7
Avg									19.9
TEST 12	LINE 2 PRESS RTO INLET								
	Gas Concentration Correction Calculations								
		NOx Calculations							
	Cbar				Cma				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	Co	(Upscale)	(Final)	(Initial)	Cm	Cgas
1	2.1	0	0	0.00	73.7	80	79	79.50	1.9
2	2.7	0	0	0.00	73.7	78	80	79.00	2.5
3	3.1	0	0	0.00	73.7	78	78	78.00	2.9
Avg									2.5
		CO Calculations							
	Cbar				Cma				
	OUR CONC	ZERO	ZERO		CONC	Upscale	Upscale		
RUN #	(ppm,d)	(Final)	(Initial)	Co	(Upscale)	(Final)	(Initial)	Cm	Cgas
1	10.7	0	0	0.00	150	150	150	150.00	10.7
2	8.2	0	0	0.00	150	150	150	150.00	8.2
3	13.4	0	0	0.00	150	150	150	150.00	13.4
Avg									10.8

TEST 16	**LINE 2 THERMAL OIL HEATER STACK**								
	Gas Concentration Correction Calculations								
		NOx Calculations							
	Cbar				*Cma*				
	OUR CONC	**ZERO**	**ZERO**		**CONC**	**Upscale**	**Upscale**		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	60.9	0	0	0.00	73.7	72.96	74.74	73.85	60.8
2	62.6	0	0	0.00	73.7	74.36	72.96	73.66	62.6
3	63.5	0	0	0.00	73.7	74.38	74.36	74.37	62.9
Avg									62.1
		CO Calculations							
	Cbar				*Cma*				
	OUR CONC	**ZERO**	**ZERO**		**CONC**	**Upscale**	**Upscale**		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	157.1	3.91	8	5.96	593	580	581	580.50	156.0
2	281.3	6.02	3.91	4.97	593	571	573	572.00	289.0
3	206.7	4.31	6.02	5.17	593	577	571	574.00	210.1
Avg									218.4
		CO2 Calculations							
	Cbar				*Cma*				
	OUR CONC	**ZERO**	**ZERO**		**CONC**	**Upscale**	**Upscale**		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	5.37	0.03	0	0.02	10.95	10.98	11.00	10.99	5.34
2	6.15	0.03	0.03	0.03	10.95	10.94	10.98	10.96	6.13
3	6.31	0.01	0.03	0.02	10.95	10.86	10.94	10.90	6.33
Avg									5.93
		O2 Calculations							
	Cbar				*Cma*				
	OUR CONC	**ZERO**	**ZERO**		**CONC**	**Upscale**	**Upscale**		
RUN #	(ppm,d)	(Final)	(Initial)	*Co*	(Upscale)	(Final)	(Initial)	*Cm*	*Cgas*
1	15.5	0.40	0.00	0.20	13.45	13.83	13.50	13.67	15.3
2	13.8	0.05	0.01	0.03	13.45	13.45	13.48	13.47	13.8
3	13.4	0.23	0.05	0.14	13.45	13.52	13.45	13.49	13.4
Avg									14.1

APPENDIX L

OPERATIONAL DATA

HAYWARD LINE 2 THERMAL OIL , DRYER & PRESS TESTS

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HAYWARD TESTING MARCH 18th - 21st
Test schedule

Line 2 Thermal Oil Stack

	POLLUTANT	RUN #1	RUN #2	RUN #3
3-18	FORM./NOX/CO CO2/O2	1036-1142	1220-1323	1405-1510
3-18	BENZ./PM/VE	1800-1903	1930-2032	2100-2202

Line 2 Dryer RTO Stack & Inlet

	POLLUTANT	RUN #1	RUN #2	RUN #3
3-19	PM/METH./CO/VE PHENOL/NOX	1030-1140 (E-TUBE H2O OFF)	1320-1429 (E-TUBE H2O ON)	1500-2037

Line 2 Press Vent RTO Stack

	POLLUTANT	RUN #1	RUN #2	RUN #3
3-19	FORMALDEHYDE	1030-1145	1222-1336	1440-1554

Line 2 Dryer RTO Stack

	POLLUTANT	RUN #1	RUN #2	RUN #3
3-20	FORMALDEHYDE	0830-1017	1100-1210	1245-1354

Line 2 Dryer RTO Stack

	POLLUTANT	RUN #1	RUN #2	RUN #3
3-20	POM	1440-1724 (E-TUBE H2O ON)		
3-21	POM		0815-1050 (E-TUBE H2O ON)	1135-1408 (E-TUBE H2O OFF)

Line 2 Dryer RTO Stack & Core/Surf. Dryer Duct

	POLLUTANT	RUN #1	RUN #2	RUN #3
3-19	NOX/CO/CO2/THC M2	1320-1420 (E-TUBE H2O ON)		
3-20	NOX/CO/CO2/THC M2		1000-1100 (E-TUBE H2O OFF)	1200-1300 (E-TUBE H2O OFF)

Line 2 Press Vent RTO Stack/ RTO Inlet

	POLLUTANT	RUN #1	RUN #2	RUN #3
3-20	PM/METH./CO/VE	1012-1114	1135-1241	1305-1411
3-20	NOX/CO/CO2/THC M2/O2	1650-1750	1815-1930	2015-2115

Line 2 Dryer RTO Stack

	POLLUTANT	RUN #1	RUN #2	RUN #3
3-21	BENZENE	0816-0906	0939-1038	1135-1235

APPROXIMATE TEST TIMES ONLY - SEE INTERPOLL SHEETS FOR EXACT TIMES.

HAYWARD LINE 2 TESTING MARCH 18 - 21, 1996
Line 2 process data summary

LINE 2 THERMAL OIL HEATER MARCH 18, 1996 - FORMALDEHYDE,NOX,CO,CO2,O2

20.04 =Production rate in Tons per hour
1.09 =K3 estimated Tons per hour of fuel burned based on fuel measurement
19.61 =K3 estimated mmBTU per hour input based on fuel measurement
1.03 =K4 estimated Tons per hour of fuel burned based on fuel measurement
18.49 =K4 estimated mmBTU per hour input based on fuel measurement
2.12 =Total tons of dry bark per hour input
38.11 =Total mmBTU per hour input

LINE 2 THERMAL OIL HEATER MARCH 18, 1996 - BENZENE,PM,VE

19.43 =Production rate in Tons per hour
1.06 =K3 estimated Tons per hour of fuel burned based on fuel measurement
19.02 =K3 estimated mmBTU per hour input based on fuel measurement
1.02 =K4 estimated Tons per hour of fuel burned based on fuel measurement
18.35 =K4 estimated mmBTU per hour input based on fuel measurement
2.08 =Total tons of dry bark per hour input
37.37 =Total mmBTU per hour input

LINE 2 DRYER RTO STACK & INLET MARCH 19, 1996 - PM,METH.,CO,VE,PHENOL,NOX

20.50 =PressProduction rate in Tons per hour
49,675 = Production rate of both dryers in pounds per hour
2.09 =Surface fuel burned in tons per hour
2.26 =Core fuel burned in tons per hour
4.34 =Total fuel (both dryers) burned in tons per hour
49.98% =average incoming moisture percent (both dryers)
5.59% =average dry moisture percent (both dryers)
1,479 =average inlet temperature (both dryers)

LINE 2 DRYER RTO STACK MARCH 20, 1996 - FORMALDEHYDE

21.03 =PressProduction rate in Tons per hour
52,161 = Production rate of both dryers in pounds per hour
2.37 =Surface fuel burned in tons per hour
2.68 =Core fuel burned in tons per hour
5.05 =Total fuel (both dryers) burned in tons per hour
46.95% =average incoming moisture percent (both dryers)
5.55% =average dry moisture percent (both dryers)
1,452 =average inlet temperature (both dryers)

LINE 2 DRYER RTO STACK MARCH 20-21, 1996 - POM

20.96 =PressProduction rate in Tons per hour
51,952 = Production rate of both dryers in pounds per hour
2.34 =Surface fuel burned in tons per hour
2.67 =Core fuel burned in tons per hour
5.01 =Total fuel (both dryers) burned in tons per hour
47.34% =average incoming moisture percent (both dryers)
5.65% =average dry moisture percent (both dryers)
1,474 =average inlet temperature (both dryers)

LINE 2 DRYER RTO STACK &CORE/SRF. DUCT MARCH 19-20, 1996
NOX,CO,CO2,THC,M2

20.34 =PressProduction rate in Tons per hour
50,630 = Production rate of both dryers in pounds per hour
2.37 =Surface fuel burned in tons per hour
2.61 =Core fuel burned in tons per hour
4.98 =Total fuel (both dryers) burned in tons per hour
48.50% =average incoming moisture percent (both dryers)
5.53% =average dry moisture percent (both dryers)
1,496 =average inlet temperature (both dryers)

LINE 2 DRYER RTO STACK MARCH 21, 1996 - BENZENE

20.01 =PressProduction rate in Tons per hour
50,148 = Production rate of both dryers in pounds per hour
2.39 =Surface fuel burned in tons per hour
2.67 =Core fuel burned in tons per hour
5.06 =Total fuel (both dryers) burned in tons per hour
46.63% =average incoming moisture percent (both dryers)
5.86% =average dry moisture percent (both dryers)
1,458 =average inlet temperature (both dryers)

LINE 2 PRESS VENT RTO STACK MARCH 19, 1996 - FORMALDEHYDE

20.15 =Plant Production rate in Tons per hour
505.33 =MDI resin usage in pounds per hour
1.25% =MDI resin usage as % of finished product
913.00 =Liquid phenolic resin usage in pounds per hour (100% solids)
2.27% =Liquid phenolic resin usage as % of finished product (100% solids)
271.00 =Wax usage in pounds per hour
0.67% =Wax usage as % of finished product

LINE 2 PRESS VENT RTO STACK/RTO INLET MARCH 20, 1996
PM,METHANE,CO,VE

19.81 =Plant Production rate in Tons per hour
468.50 =MDI resin usage in pounds per hour
1.18% =MDI resin usage as % of finished product
888.00 =Liquid phenolic resin usage in pounds per hour (100% solids)
2.24% =Liquid phenolic resin usage as % of finished product (100% solids)
277.00 =Wax usage in pounds per hour
0.70% =Wax usage as % of finished product

LINE 2 PRESS VENT RTO STACK/RTO INLET MARCH 20, 1996
NOX,CO,CO2,THC,M2,O2

20.46 =Plant Production rate in Tons per hour
453.00 =MDI resin usage in pounds per hour
1.11% =MDI resin usage as % of finished product
877.67 =Liquid phenolic resin usage in pounds per hour (100% solids)
2.14% =Liquid phenolic resin usage as % of finished product (100% solids)
311.00 =Wax usage in pounds per hour
0.76% =Wax usage as % of finished product

HAYWARD LINE 2 MARCH 18, 1996
THERMAL OIL STACK - FORMALDEHYDE/NOX/CO/CO2/O2
DATA TIME: START= 10:30 END= 15:15 HOURS= 4.75

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

	7/16"
per/peice	47.78
per/ 8' x 16'	191.12

PLANT PRODUCTION RATE

4.75	=hours during testing
83	=pressloads
996	=no. of 8'x16' boards produced (pressloads x 8 boards per load)
190,360	=lbs of finished product (boards produced x weight of finished board)
40,076	=lbs of finished product per hour (lbs of finshed product / hours)
20.04	=tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY BARK INPUT

	K3
12.3	=K3 fuel calibration in pounds per count
1,398	=K3 counts during testing hours
17,195	=K3 lbs of wet fuel burned during testing
4.75	=hours during testing
39.80%	=average moisture content of fuel
10,352	=total pounds of dry fuel burned during testing (wet pounds x (1- moisture content))
2,179.29	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
1.09	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9,000	=estimated BTU content per pound of dry fuel,
19.61	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

	K4
13.4	=K4 fuel calibration in pounds per count
1,210	=K4 counts during testing hours
16,214	=K4 lbs of wet fuel burned during testing
4.75	=hours during testing
39.80%	=average moisture content of fuel
9,761	=total pounds of dry fuel burned during testing (wet pounds x (1- moisture content))
2,054.91	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
1.03	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9,000	=estimated BTU content per pound of dry fuel,
18.49	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

FUEL BURNING RATE ESTIMATED TEMPERATURE DIFFERENTIAL

	K3
451.80	=average incoming oil temperature on degrees f.
491.90	=average outgoinging oil temperature on degrees f.
60	=temperature differential at 100% capacity in degrees f
40.1	=actual temperature differential
23.9	=maximum mmbtu input at 100% capacity
15.97	=estimated mmbtu input per hour (actual temp. diff. / max temp. diff.) x max mmbtu input
9,000	=estimated BTU content per pound of dry fuel,
0.89	=estimated tons of dry fuel burned per hour during testing (btu input / btu content of dry fuel/2000)

	K4
455.60	=average incoming oil temperature on degrees f.
490.60	=average outgoinging oil temperature on degrees f.
60	=temperature differential at 100% capacity in degrees f
35.0	=actual temperature differential
23.9	=maximum mmbtu input at 100% capacity
13.94	=estimated mmbtu input per hour (actual temp. diff. / max temp. diff.) x max mmbtu input
9,000	=estimated BTU content per pound of dry fuel,
0.77	=estimated tons of dry fuel burned per hour during testing (btu input / btu content of dry fuel/2000)

HAYWARD LINE 2 MARCH 18, 1996
THERMAL OIL STACK - BENZENE/PM/VE
DATA TIME START= 18:00 END= 22:15 HOURS= 4.25

BOARD WEIGHTS - LBS
average weights determined by taking bundle weights divided by peices
per unit over the testing period.
7/16"
per/peice 47.78
per/ 8' x 16' 191.12

PLANT PRODUCTION RATE

4.25 =hours during testing
72 =pressloads
864 =no. of 8'x16' boards produced (pressloads x 8 boards per load)
165,131 =lbs of finished product (boards produced x weight of finished board)
38,854 =lbs of finished product per hour (lbs of finshed product / hours)
19.43 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY BARK INPUT

K3
12.3 =K3 fuel calibration in pounds per count
1,221 =K3 counts during testing hours
15,018 =K3 lbs of wet fuel burned during testing
4.25 =hours during testing
40.18% =average moisture content of fuel
8,984 =total pounds of dry fuel burned during testing (wet pounds x (1- moisture content))
2,113.87 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
1.06 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9,000 =estimated BTU content per pound of dry fuel,
19.02 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

K4
13.4 =K4 fuel calibration in pounds per count
1,081 =K4 counts during testing hours
14,485 =K4 lbs of wet fuel burned during testing
4.25 =hours during testing
40.18% =average moisture content of fuel
8,665 =total pounds of dry fuel burned during testing (wet pounds x (1- moisture content))
2,038.86 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
1.02 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9,000 =estimated BTU content per pound of dry fuel,
18.35 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

FUEL BURNING RATE ESTIMATED TEMPERATURE DIFFERENTIAL

K3
461.14 =average incoming oil temperature on degrees f.
500.53 =average outgoinging oil temperature on degrees f.
60 =temperature differential at 100% capacity in degrees f
39.4 =actual temperature differential
23.9 =maximum mmbtu input at 100% capacity
15.69 =estimated mmbtu input per hour (actual temp. diff. / max temp. diff.) x max mmbtu input
9,000 =estimated BTU content per pound of dry fuel,
0.87 =estimated tons of dry fuel burned per hour during testing (btu input / btu content of dry fuel/2000)

K4
463.26 =average incoming oil temperature on degrees f.
501.91 =average outgoinging oil temperature on degrees f.
60 =temperature differential at 100% capacity in degrees f
38.6 =actual temperature differential
23.9 =maximum mmbtu input at 100% capacity
15.39 =estimated mmbtu input per hour (actual temp. diff. / max temp. diff.) x max mmbtu input
9,000 =estimated BTU content per pound of dry fuel,
0.86 =estimated tons of dry fuel burned per hour during testing (btu input / btu content of dry fuel/2000)

PRESS REPORT - LINE 1 (6) DATE: 3-18-96

OPERATOR Holverson SHIFT: 1st CREW: B-II

THICKNESS 1/4 7/16" PRESS LCS: 16 1/4" 16 7/16

OVERALL TIMER: 157 DECOMPRESSION TIME: 15

PRESS TEMP: 215° TOTAL REJECTS:

LOG COUNT: 906

LINE SPEED	THICK	FROM	TO
52	1/4 S.B	7:00	8:10
59	7/16	8:10	12:40
53	7/16	12:40	1:10
59	7/16	1:10	7:00

F.C.O.S. HYD. RADIATOR: ✓ TIME

PRESS BLOWN DOWN: ✓

SPINNER HEADS FLUSHED: ✓ TIME

SURFACE BLENDER HOSED: ✓ TIME

FORMER HYD RADIATOR: ✓ TIME

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
8:00	:07	7				Changed F.C.O.S. Hydr. hose
8:19	:20	1				Delay at saws - Board chang
12:20	:34		14			Bad contact in F.C.O.S. beam c
3:50	:52		2			Unloader occupied limit back
3:56	:58	2				Manual Unload
4:08	:12		4			Changed out Unloader occupie
4:26	:28	2				Stalled @ conv.
4:50	5:21	31				BS. Former rake-back jamme
						in doffing roles.

DOWNTIME CODE: M - MECHANICAL (63) E - ELECTRICAL O - OPERATOR

LOUISIANA-PACIFIC CORPORATION

PRESS REPORT - LINE 1 Q

OPERATOR D. SLATER SHIFT: PM DATE: 3-18-96 CREW: A

THICKNESS 7/16 PRESS LDS: 2017/16

OVERALL TIMER: 157 DECOMPRESSION TIME: 1/5

PRESS TEMP: 215 TOTAL REJECTS: =

LOG COUNT: 1357

LINE SPEED	THICK.	FROM	TO
59	7/16	7:00	
43	8/16	6:39	

F.C.O.S. HYD. RADIATOR: 5:20 TIME

PRESS BLOWN DOWN: 5:20

SPINNER HEADS FLUSHED: = TIME

SURFACE BLENDER HOSED: = TIME

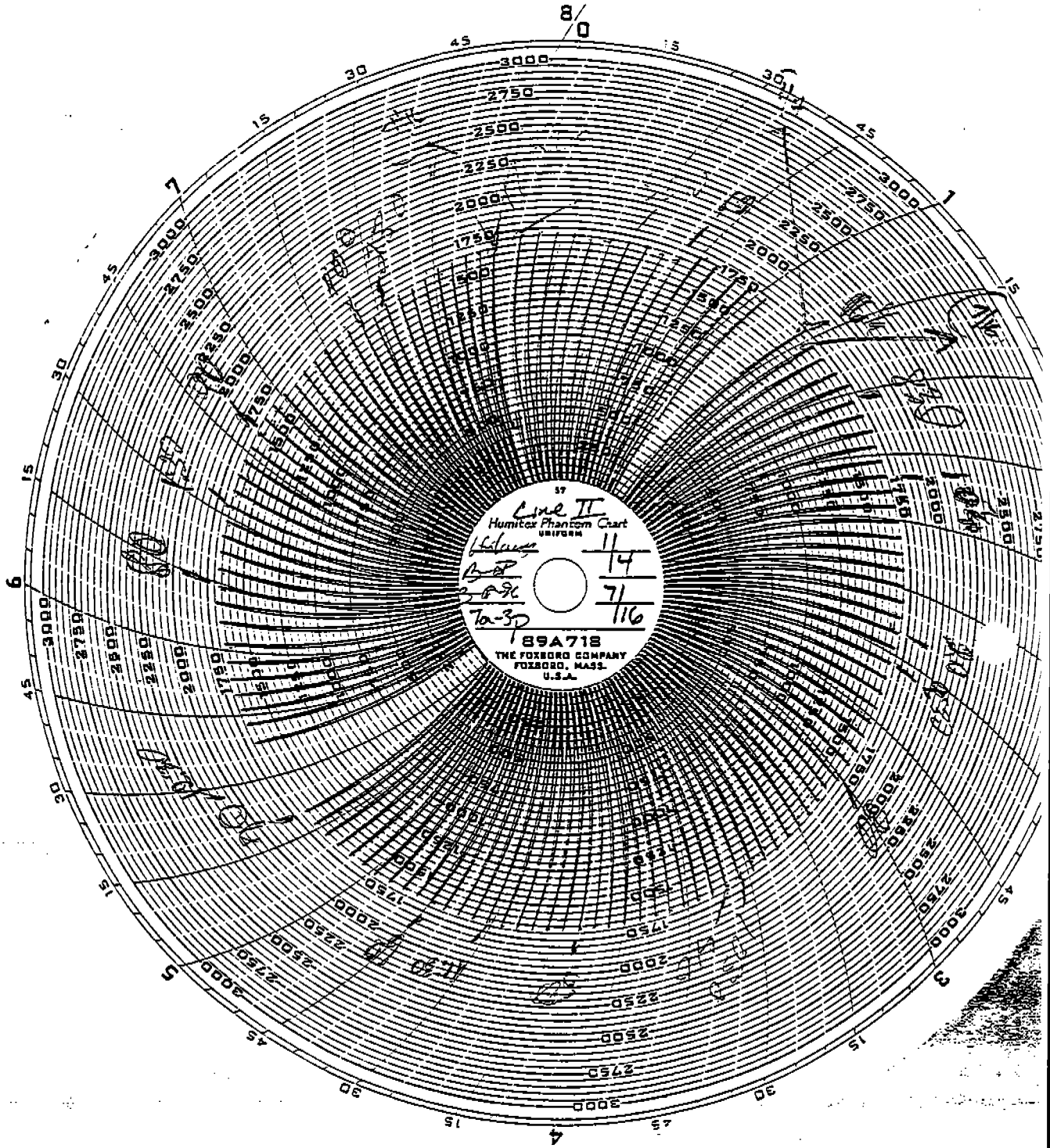
FORMER HYD RADIATOR: = TIME

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
8:43	8:46				3	STAKERS JAMED
2:25	2:27				2	STACKERS JAMED
6:35	6:39				4	DRYER BAGHOUSE PLUGED

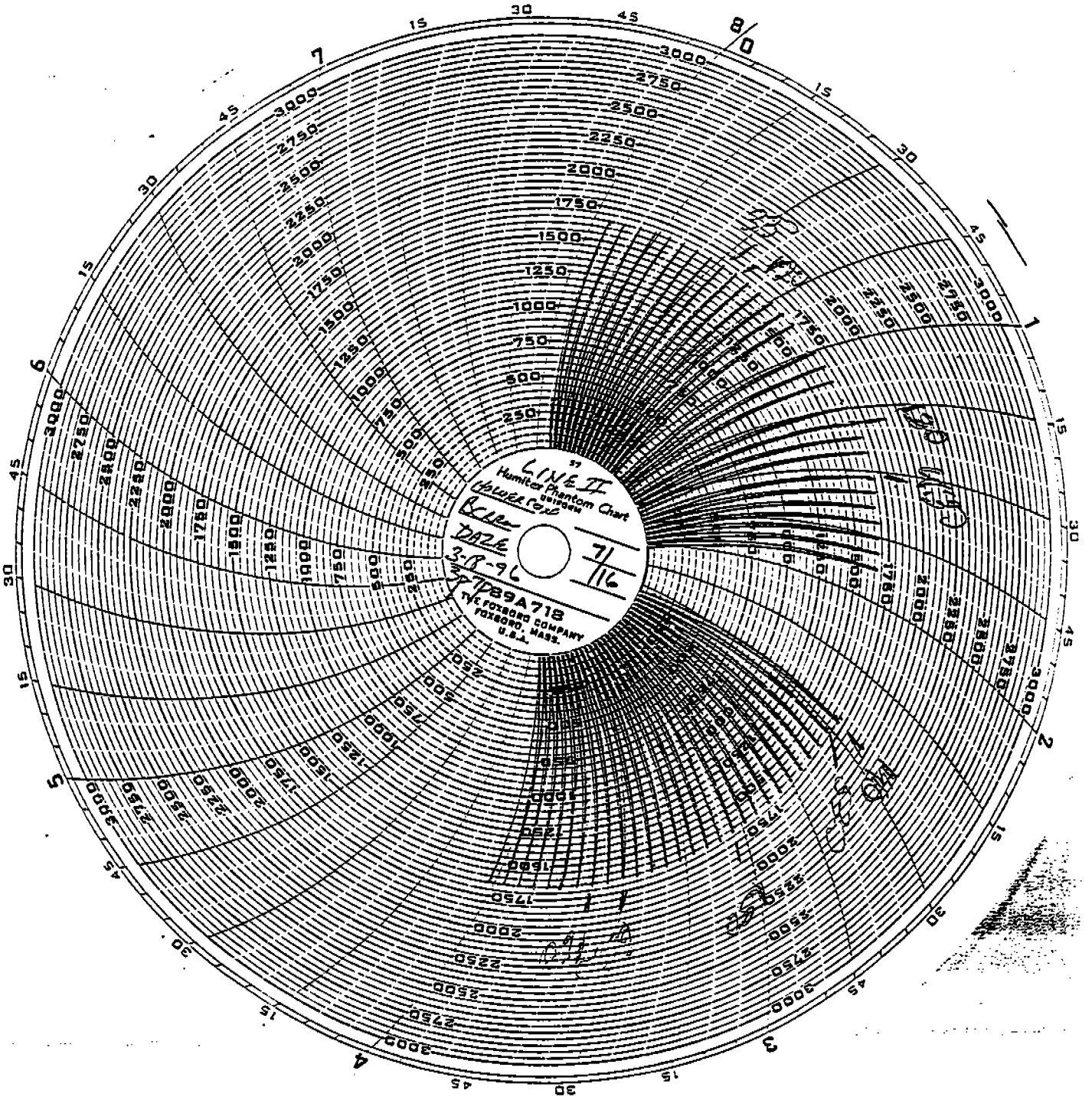
DOWNTIME CODE: M - MECHANICAL (9) E - ELECTRICAL O - OPERATOR

7

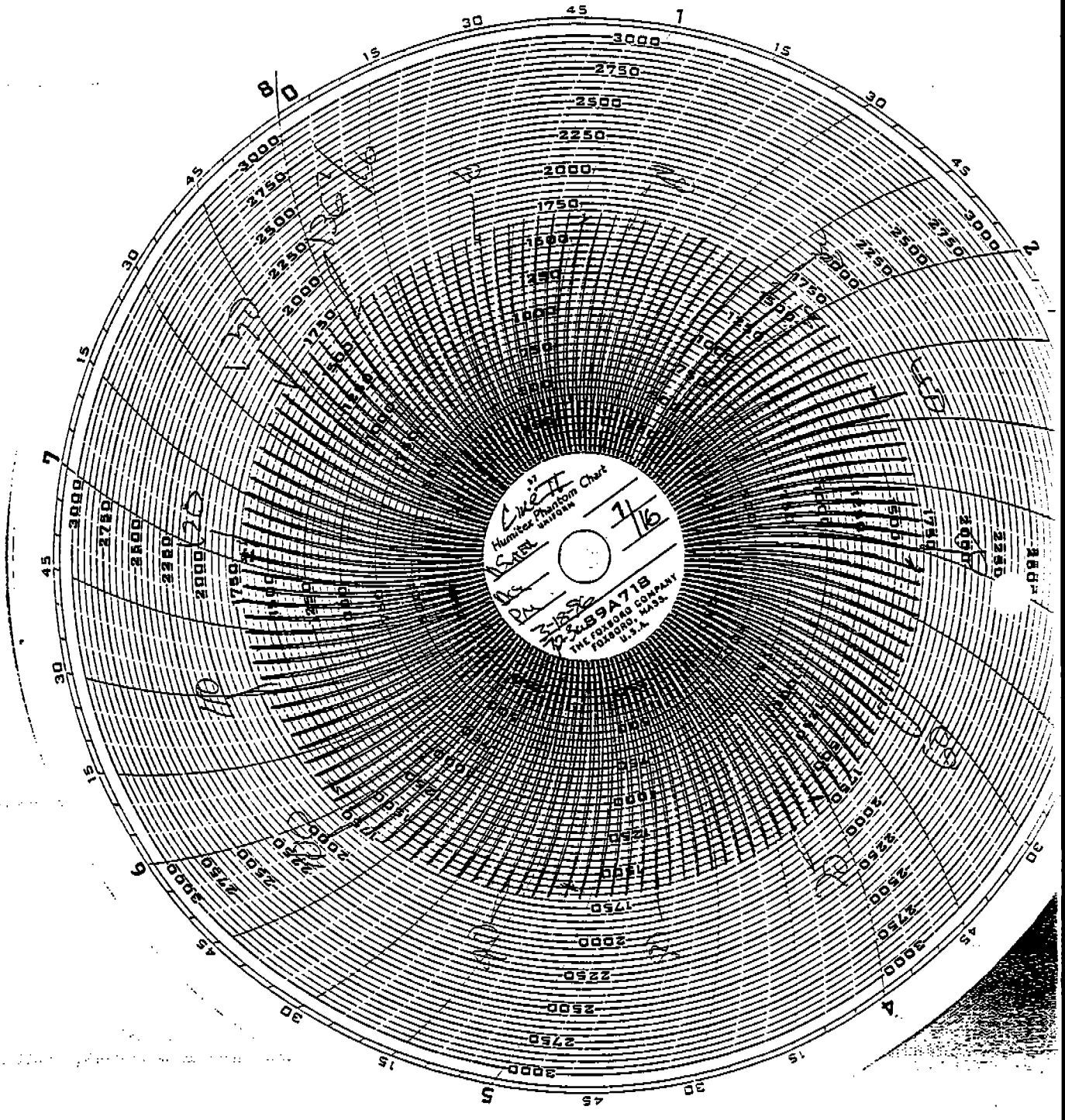
PRESS CHAR
3/18/96
0700 - 150



LINE II
PRESS CHART
3/18/96
1500 - 1900



LINE #
PRESS C
3/18/96
1900 - C



DATE: 3-18-96
SHIFT/CREW: 1-B
OPERATOR: Jim W

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
2		31 1/2 called from 7019	64	4338 lbs	39 5/8
4	4326 called from 731	37 called from 744	66		39 1/2
6		36 1/4	68	4227 lbs	39 1/4
			70		39 1/8
2		39 3/4	72	4204 called from 456	39 3/8
4	4293 lbs	39 1/2	74		39 5/8
6		39 5/8	76	4361 lbs	39 5/8
8	4362 lbs	39 3/4	78		39 3/4
10		39 3/4	80	43.6 lbs	39 5/8
12	4386 lbs called from 952	39 7/8	82		39 1/2
14		39 5/8	84	4351 lbs	39 1/2
16	4325 lbs	39 3/8			
18		39 1/2			
20	4351 lbs	39 1/2			
22		39 1/2			
24	4335 lbs	39 5/8			
26		39 1/2			
28	4331 lbs	39 1/2			
30		39 1/2			
32	4401 called from 204	39 5/8			
34		39 1/2			
36	4395 lbs	39 1/4			
38		39 1/4			
40	4354 lbs	39 1/4			
42		39 call			
44	4197 lbs	39 1/8			
46		39 1/2			
48	4233 lbs	39 5/8			
50		39 1/2			
52	4246 lbs	39 1/2			
54		39 3/8			
56	4228 lbs	39 3/8			
58		39 1/2			
60	4304 lbs	39 5/8			
62		39 1/2			

DATE: _____

SHIFT/CREW: _____

OPERATOR: _____

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
1/16 71	(coiled)	39 3/8			
72	#4292	39 3/8			
73		39 3/8			
74		39 1/2			
75		39 1/2			
76	#4405	39 3/4			
77		39 3/4			
78		39 3/4			
79		40			
80	#4514	39 1/2			
81		39 3/4			
82		39 5/8			
83		39 3/8			
84	#4511	39 1/2			
85		39 3/4			
86		40			
87		39 5/8			
88	#4555	39 5/8			
89		39 1/2			
90		39 1/2			
91		39 1/2			
92	#4624	40			
93		39 3/4			
94		39 3/4			
95		39 3/4			
96	#4448	39 3/4			
97		39 1/2			
98		39 1/2			
99		39 1/2			
100	#4366	39 3/4			
101		39 3/4			
102		39 1/2			
103		39 1/2			
104		39 5/8			

HAYWARD LINE 2 DRYER RTO STACK & INLET MARCH 19th 1996
PM/METH./CO/VE/PHENOL/NOX
DATA TIME: START= 10:30 END= 20:37 HOURS= 10.12

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

	1/2"
per/peice	54.34
per/ 8' x 16'	217.34

PLANT PRODUCTION RATE

10.12	=hours during testing
159	=pressloads
1,908	=no. of 8'x16' boards produced (pressloads x 12 boards per load)
414,692	=lbs of finished product (boards produced x weight of finished board)
40,991	=lbs of finished product per hour (lbs of finshed product / hours)
20.50	=tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY DRY FUEL INPUT

SURFACE

10	=SURFACE fuel calibration in pounds per count
4,222	=SURFACE counts during testing hours
42,220	=SURFACE lbs of fuel burned during testing
10.12	=hours during testing
4,173	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.09	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,600	=estimated BTU content per pound of dry fuel,
35.9	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,506	=average inlet temperature
49.98	=average incoming moisture percent
5.34	=average dry moisture percent

CORE

10	=CORE fuel calibration in pounds per count
4,563	=CORE counts during testing hours
45,630	=CORE lbs of fuel burned during testing
10.12	=hours during testing
4,510	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.26	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,600	=estimated BTU content per pound of dry fuel,
38.8	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,451	=average inlet temperature
49.98	=average incoming moisture percent
5.83	=average dry moisture percent

DRYER THROUGHPUT RATE

8,684	=Total pounds of fuel burned per hour in Core and Surface Dryer
40,991	=lbs of finished product per hour (lbs of finshed product / hours)
49,675	=Pounds of material produced by the dryer per hour (dry basis, assumming fuel balances)
2,756	= weight of trim per hour at 6.3% of finished product
5,928	=weight of screened fines per hour (total fuel - trim)
11.93%	=resulting loss to fines as percentage of dryer throughput

PRESS REPORT - LINE 1 ② DATE: 3-19-96

OPERATOR Hudson SHIFT: 1st CREW: VB - LT

THICKNESS 7/16 PRESS LDS: 13 7/16 15 6 1/2

OVERALL TIMER: 157 | 174 DECOMPRESSION TIME: 15 | 18

PRESS TEMP: 205 TOTAL REJECTS:

LINE SPEED	TENTS	FROM	TO
43	1/4	7:00	8:00
45	1/2	8:00	8:30
50	1/2	8:30	8:45
55	1/2	8:45	7:00

LOG COUNT: 1346

F.C.O.S. HYD. RADIATOR: ✓ TIME

PRESS BLOWN DOWN: ✓

SPINNER HEADS FLUSHED: ✓ TIME

SURFACE BLENDER HOSED: ✓ TIME

FORMER HYD RADIATOR: ✓ TIME

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
7:01	:04	3				Stacker Jam
9:20	10:05	45				No Surface Infeed
11:51	1:54	3				Pulse Baghouse
2:32	:35	3				" "
6:01	:05	4				" " "

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

50

14

LOUISIANA-PACIFIC CORPORATION

PRESS REPORT - LINE 1 ⑤ DATE: 3-19-96

OPERATOR D. Slater SHIFT: PM CREW: D

THICKNESS 1/2 7/16 PRESS LOS: 43 1/2 157 7/16

OVERALL TIMER: 174 - 157 DECOMPRESSION TIME: 18 - 15

PRESS TEMP: 215 TOTAL REJECTS: =

LOG COUNT: 1435

LINE SPEED	THKNS.	FROM	TO
54	1/2	7:00	
59	7/16	9:37	

F.C.O.S. HYD. RADIATOR: 7:00 TIME

PRESS BLOWN DOWN: 7:00

SPINNER HEADS FLUSHED: = TIME

SURFACE BLENDER HOSED: = TIME

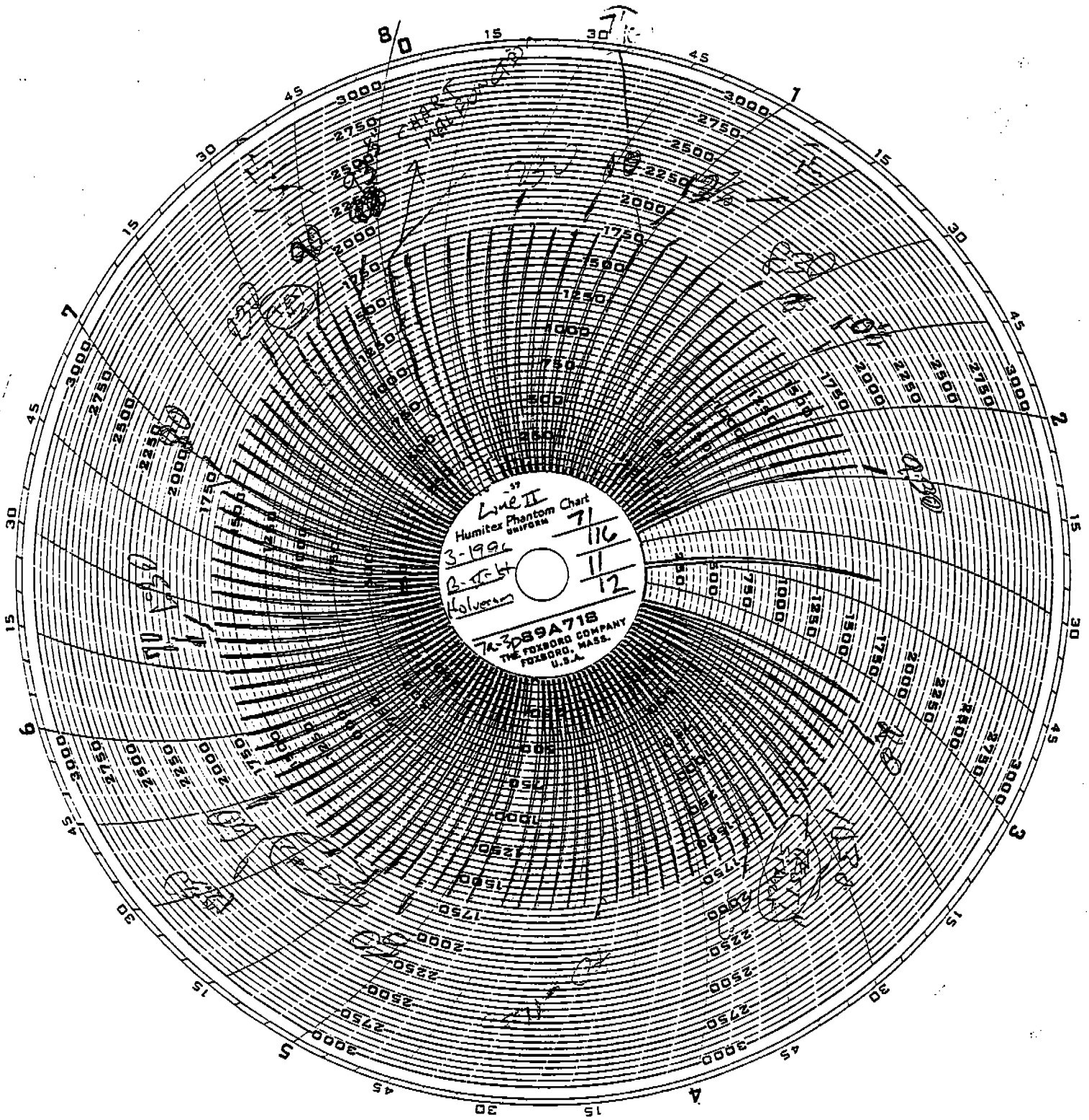
FORMER HYD RADIATOR: = TIME

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
10:13	10:17				4	BLUE TUBE PLUGGED

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

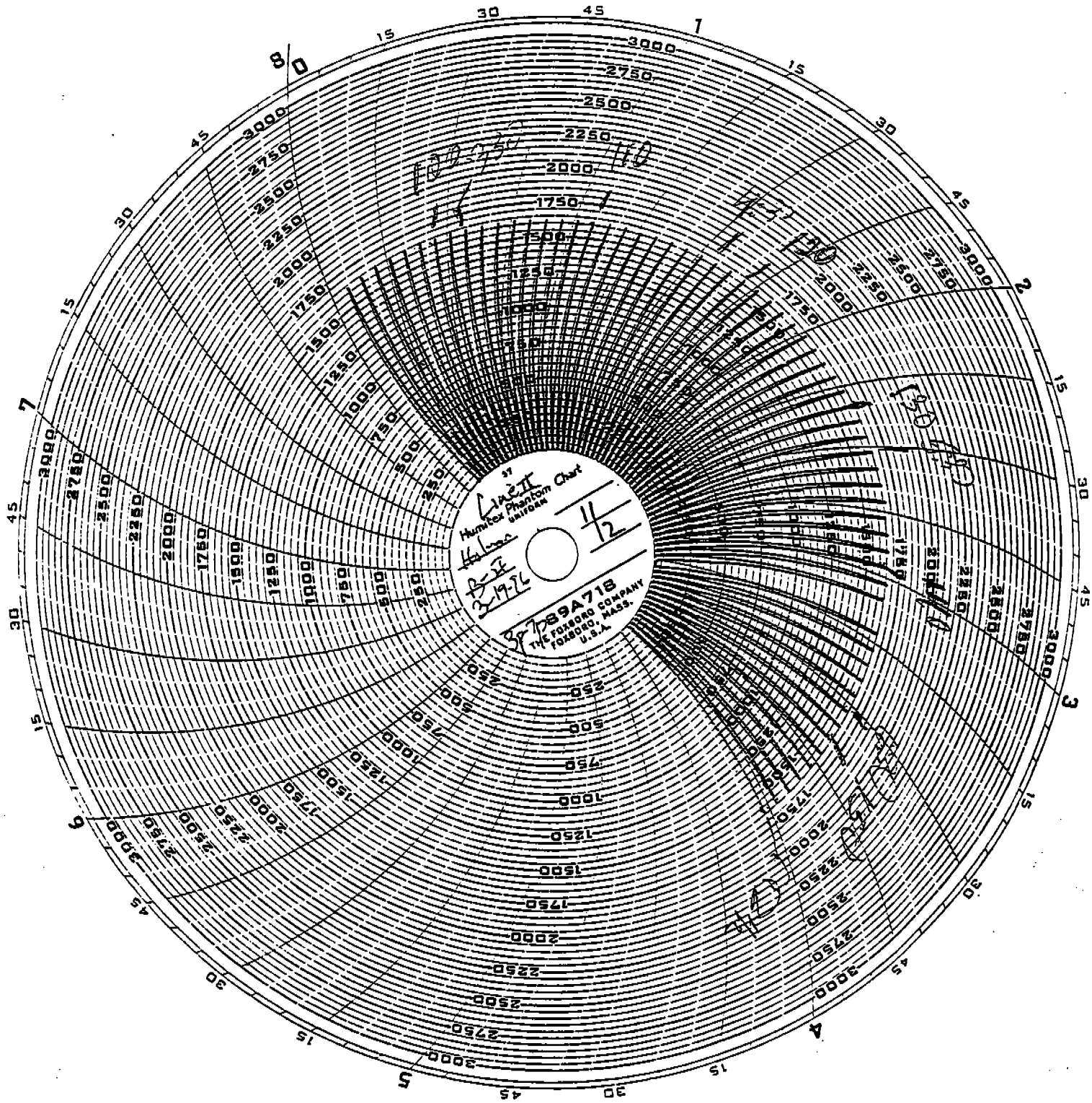
15

LINE II
PRESS CHART
3/19/96
0700-1500

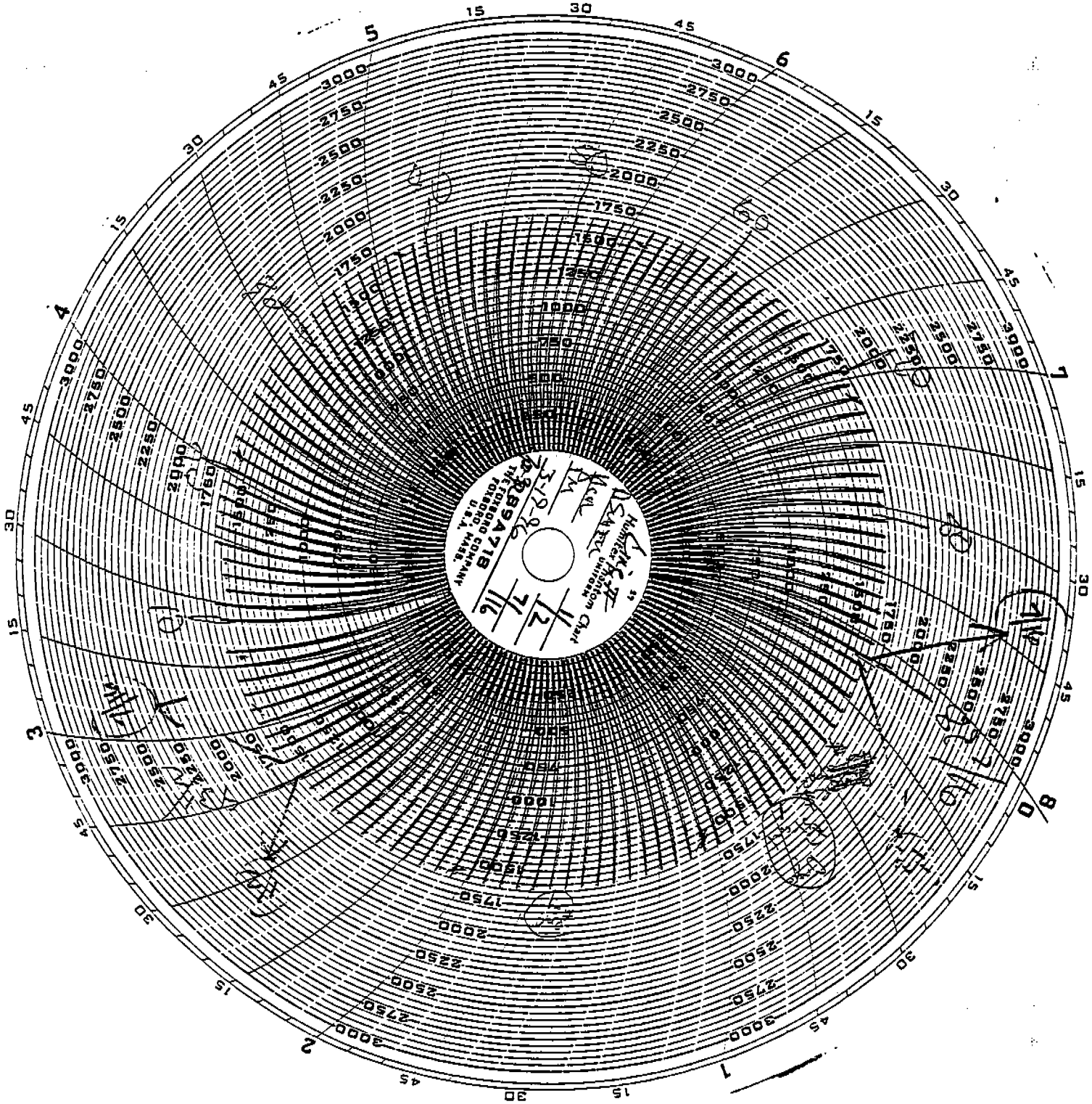


16

LINE II
PRESS CHART
3/19/96
1500-1900



LINE II
PRESS CHART
3/19/96
0700-1500



15 min

Dryer DATA
fuel calibration lb/coun face core

#4 Dryer

date 3/19/96
by Smith
page 1 of

TIME	FACE						CORE						DRY BIN LEVEL		EVERY HOUR FLAKE MOISTURE		
	OUT. SET POINT	FEED RATE	INLET TEMP	OUTLET TEMP	FUEL COUNT	WET BIN LEVEL	OUT. SET POINT	FEED RATE	INLET TEMP	OUTLET TEMP	FUEL COUNT	WET BIN LEVEL	FACE	CORE	IN	FACE OUT	CORE OUT
10:30	250	70	1483	249	990	75%	218	62	1337	217	1232	75%	60%	75%	48.2	5.9	7.2
10:45	250	71	1512	250	1100	70%	222	62	1426	218	1362	70%	55%	70%		5.3	6.4
11:00	250	71	1556	250	1215	70%	224	62	1449	224	1475	75%	60%	70%		5.4	7.8
11:15	250	71	1555	249	1327	70%	224	62	1497	223	1600	75%	60%	75%		5.1	5.4
11:30	248	71	1605	244	1443	70%	222	60	1412	220	1715	80%	65%	80%	45.0	5.2	5.5
11:45	248	71	1555	244	1560	65%	222	60	1455	221	1834	80%	60%	80%		5.1	5.8
12:00	248	71	1567	245	1677	70%	222	60	1495	222	1957	75%	70%	85%		5.0	5.1
12:15	248	69	1560	247	1804	80%	222	58	1488	219	9097	80%	70%	90%		5.2	5.8
12:30	248	69	1552	245	1911	76%	222	58	1451	222	2210	75%	80%	90%	49.2	5.2	5.5
12:45	248	69	1565	243	2028	85%	222	58	1449	220	2335	85%	80%	90%		5.5	5.6
1:00	248	69	1510	241	2136	70%	222	57	1371	221	2445	90%	70%	70%		5.6	5.2
1:15	248	69	1515	246	2254	75%	222	57	1369	220	2568	90%	80%	80%		5.2	5.2
1:30	250	69	1504	242	2369	70%	222	57	1367	221	2686	80%	80%	80%	48.6	5.7	5.7
1:45	250	69	1469	248	2483	70%	222	57	1360	220	2808	70%	80%	75%		5.2	5.5
2:00	250	69	1473	249	2597	60%	222	57	1406	221	2927	70%	80%	75%		5.1	5.3
2:15	250	69	1482	247	2718	70%	222	59	1425	221	3058	100%	80%	70%		5.3	5.8
2:30	250	69	1456	238	2832	90%	222	59	1412	219	3180	100%	60%	70%	49.8	6.4	5.3
2:45	250	69	1453	240	2955	90%	222	61	1405	217	3309	90%	80%	70%		5.8	5.6
3:00	250	69	1455	240	3075	100%	222	59	1408	209	3441	90%	80%	70%		5.5	6.0
3:15	250	69	1471	247	3184	100%	222	59	1403	218	3559	100%	80%	70%		5.3	5.4
3:30	250	69	1478	249	3299	90%	222	59	1427	217	3683	90%	80%	65%	53.8	5.1	5.8
3:45	250	69	1422	248	3421	90%	222	61	1398	218	3818	90%	80%	65%		5.3	6.0
4:00	250	69	1487	242	3533	90%	222	61	1422	208	3940	90%	80%	60%		5.4	6.2
4:15	250	69	1508	249	3659	100%	222	62	1496	220	4080	100%	80%	70%		5.0	5.6
4:30	250	69	1525	245	3780	100%	222	62	1489	214	4213	100%	75%	70%	50.4	5.5	5.7
4:45	250	69	1468	246	3893	100%	220	62	1474	213	4343	100%	70%	65%		5.7	5.8
5:00	250	68	1492	248	4006	100%	220	62	1493	218	4470	100%	70%	70%		5.0	5.0
5:15																	
5:30	250	69	1516	243	4261	80%	220	63	1547	219	4737	80%	75%	75%	53.2	5.3	5.6
5:45	250	69	1544	247	4512	90%	220	63	1571	219	4865	80%	75%	75%		5.4	5.8
6:00																	
6:15																	
6:30																	
6:45																	
7:00																	
7:15																	

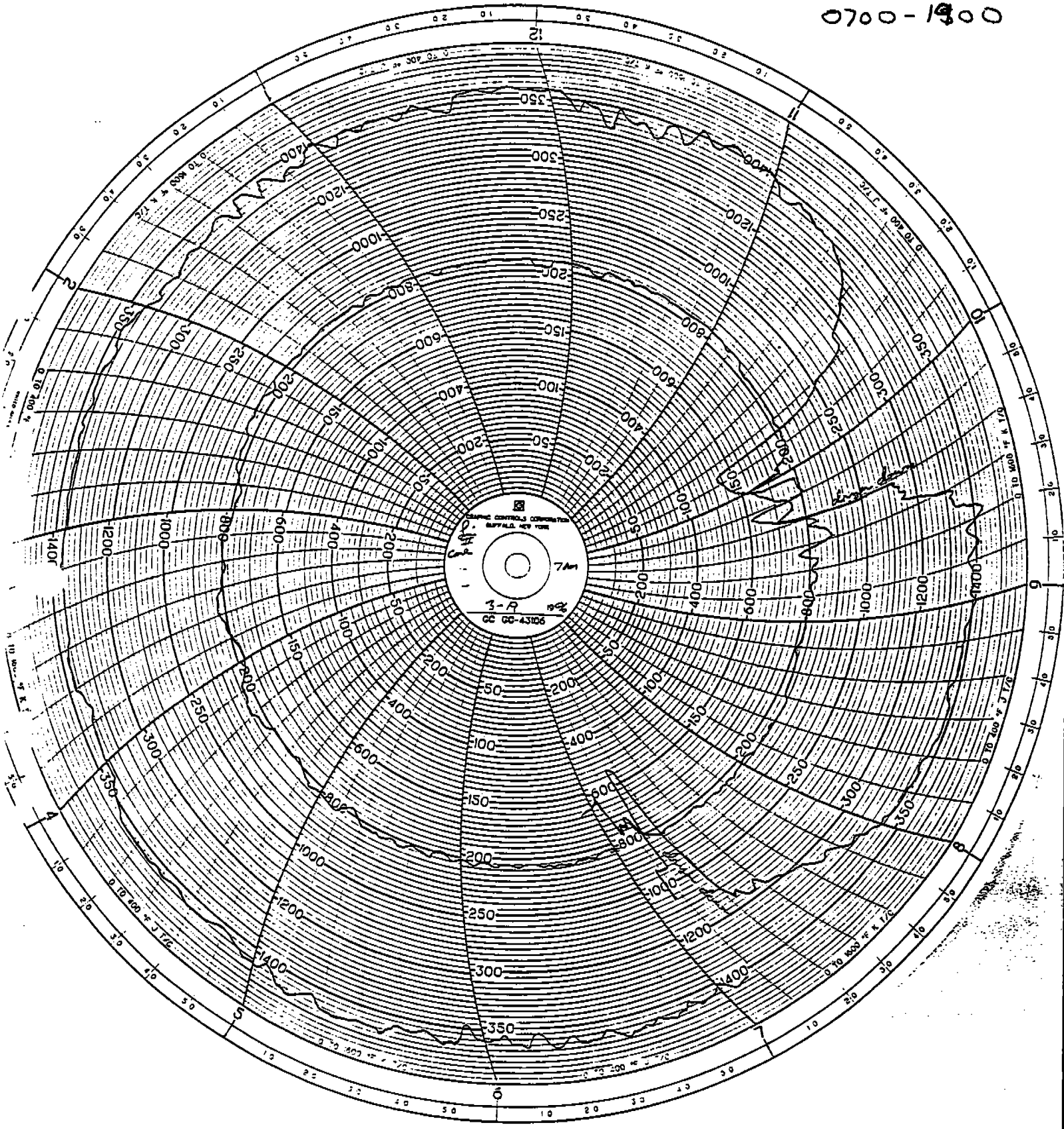
Dryer DATA
fuel calibration lb/coun face core

L II Onyx

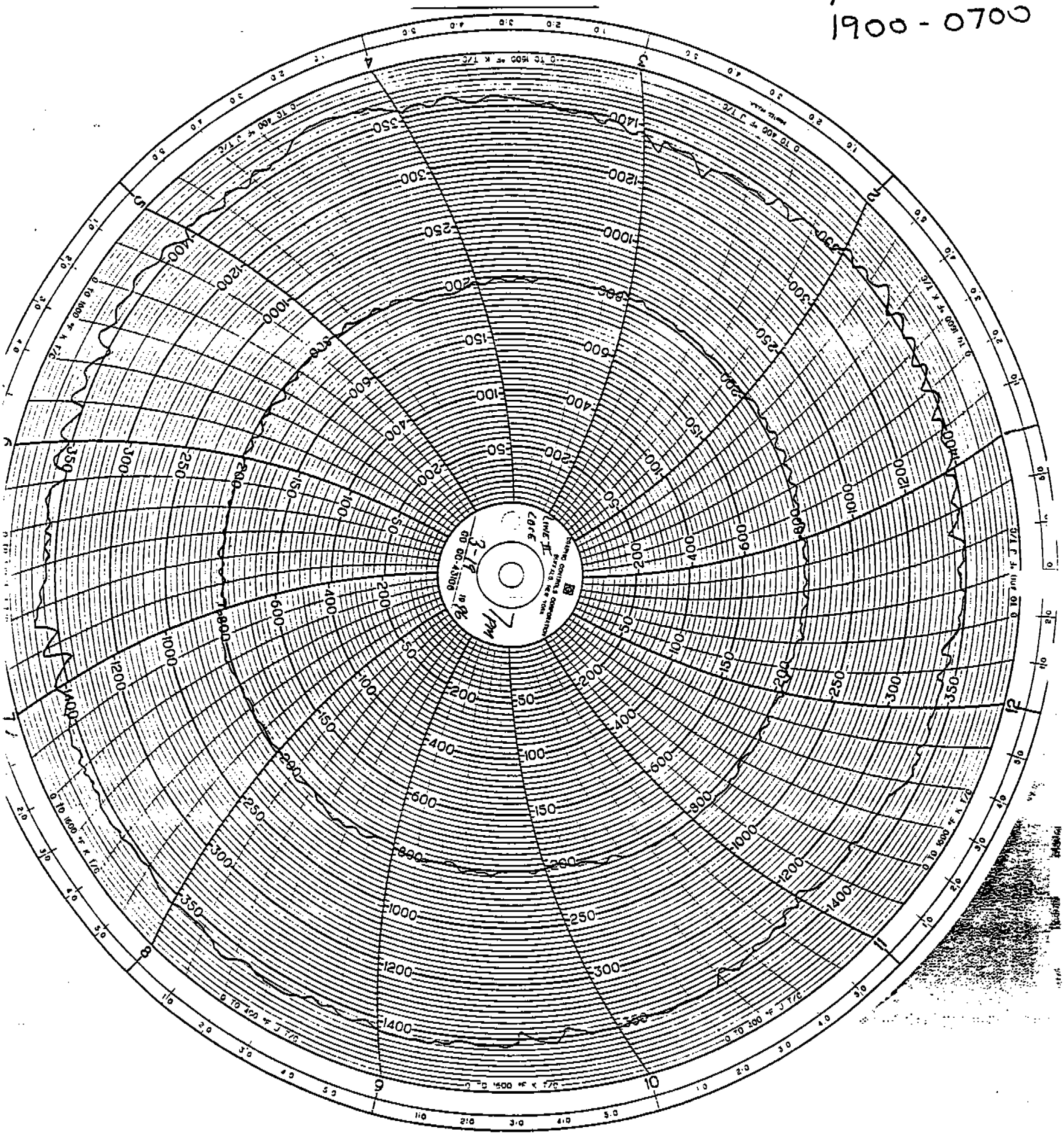
date 3/19/96
by Smith
page 2 of

TIME	FACE OUT. SET POINT	FACE FEED RATE	FACE INLET TEMP	FACE OUTLET TEMP	FACE FUEL COUNT	FACE WET BIN LEVEL	CORE OUT. SET POINT	CORE FEED RATE	CORE INLET TEMP	CORE OUTLET TEMP	CORE FUEL COUNT	CORE WET BIN LEVEL	DRY BIN LEVEL FACE	DRY BIN LEVEL CORE	EVERY HOUR FLAKE MOISTURE IN	EVERY HOUR FLAKE MOISTURE FACE	EVERY HOUR FLAKE MOISTURE CORE
7:30	250	70	1529	246	237	100%	220	63	1513	215	2620	100%	75%	80%	5026	5.1	5.5
7:45	250	69	1531	238	358	100%	220	63	1480	215	393	100%	75%	80%		5.8	6.0
8:00	250	69	1539	239	480	100%	220	63	1501	213	330	100%	70%	80%	[illegible]	5.8	6.0
8:15	250	69	1526	241	594	90%	220	63	1525	218	659	90%	70%	80%		5.2	5.9
8:30	250	70	1524	247	724	100%	220	63	1526	217	501	100%	70%	80%	4822	4.9	5.8
8:45	250	71	1479	248	840	100%	220	63	1501	213	630	100%	70%	75%		4.8	6.0
9:00	250	71	1531	243	962	100%	220	63	1517	213	1064	100%	70%	80%		5.4	6.1
9:15																	
9:30																	
9:45																	
10:00																	

LINE II
CORE DRYER
3/19/96
0700-1900

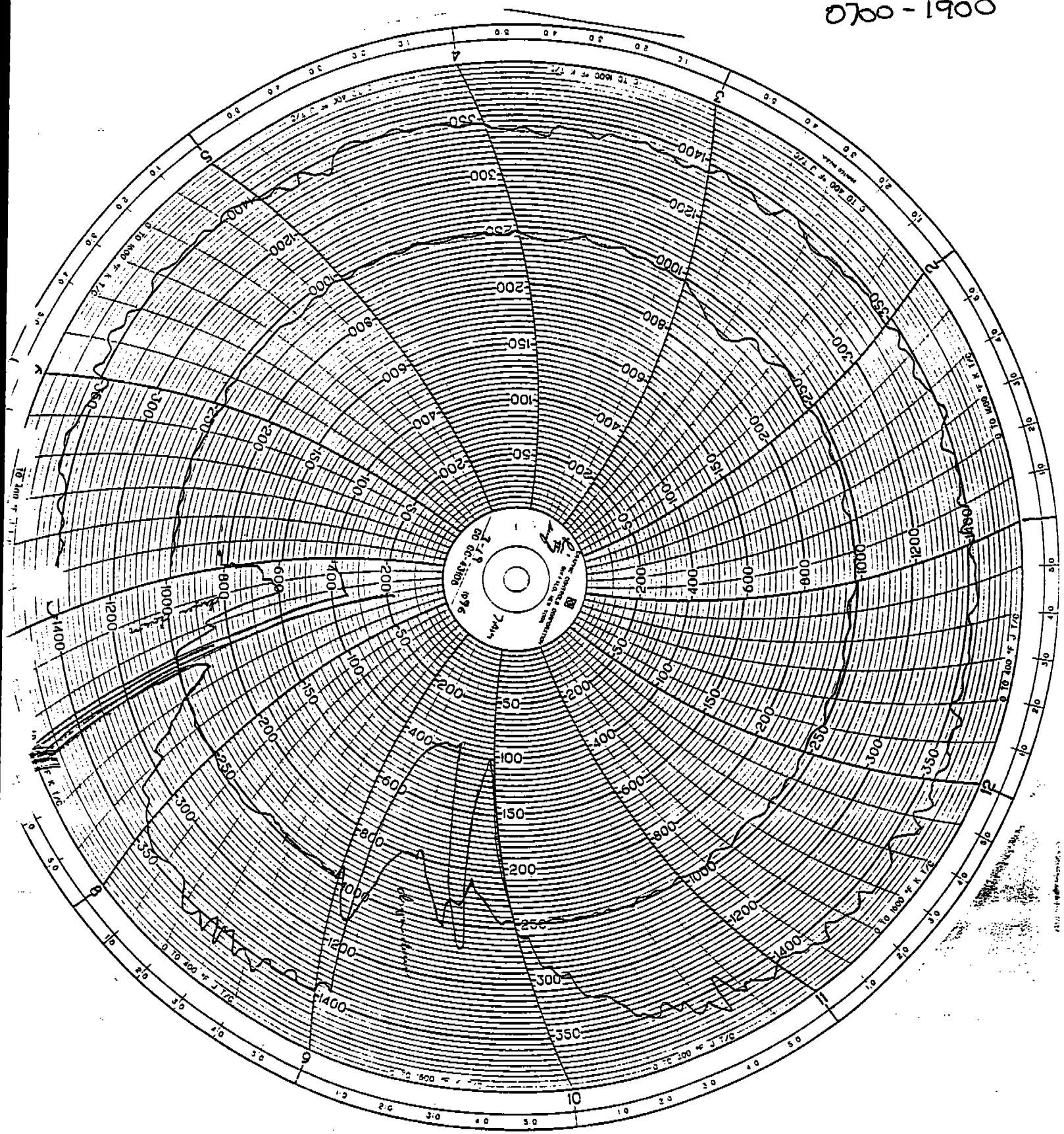


LINE II
CORE DRYER
3/19/96
1900 - 0700

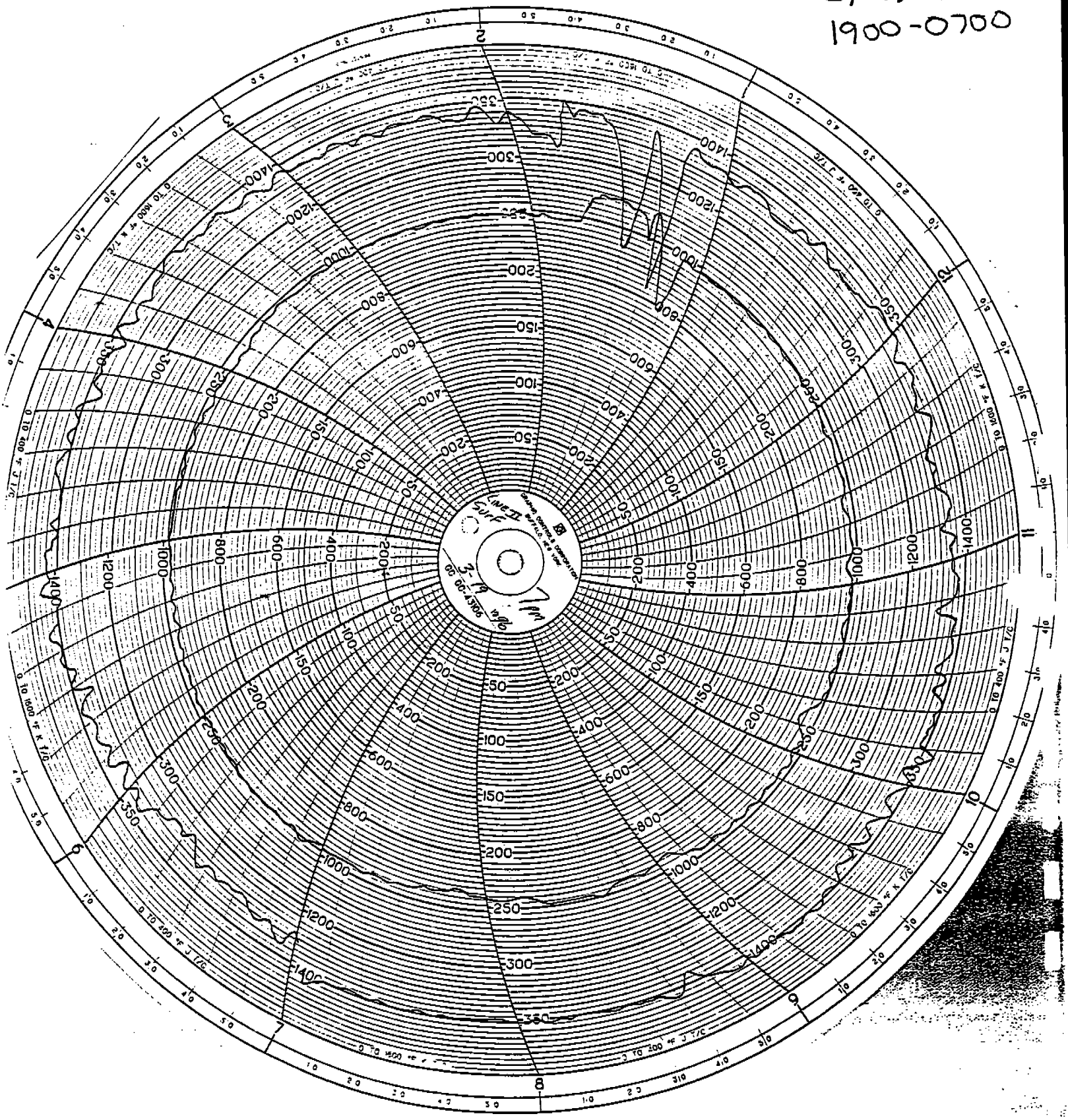


22

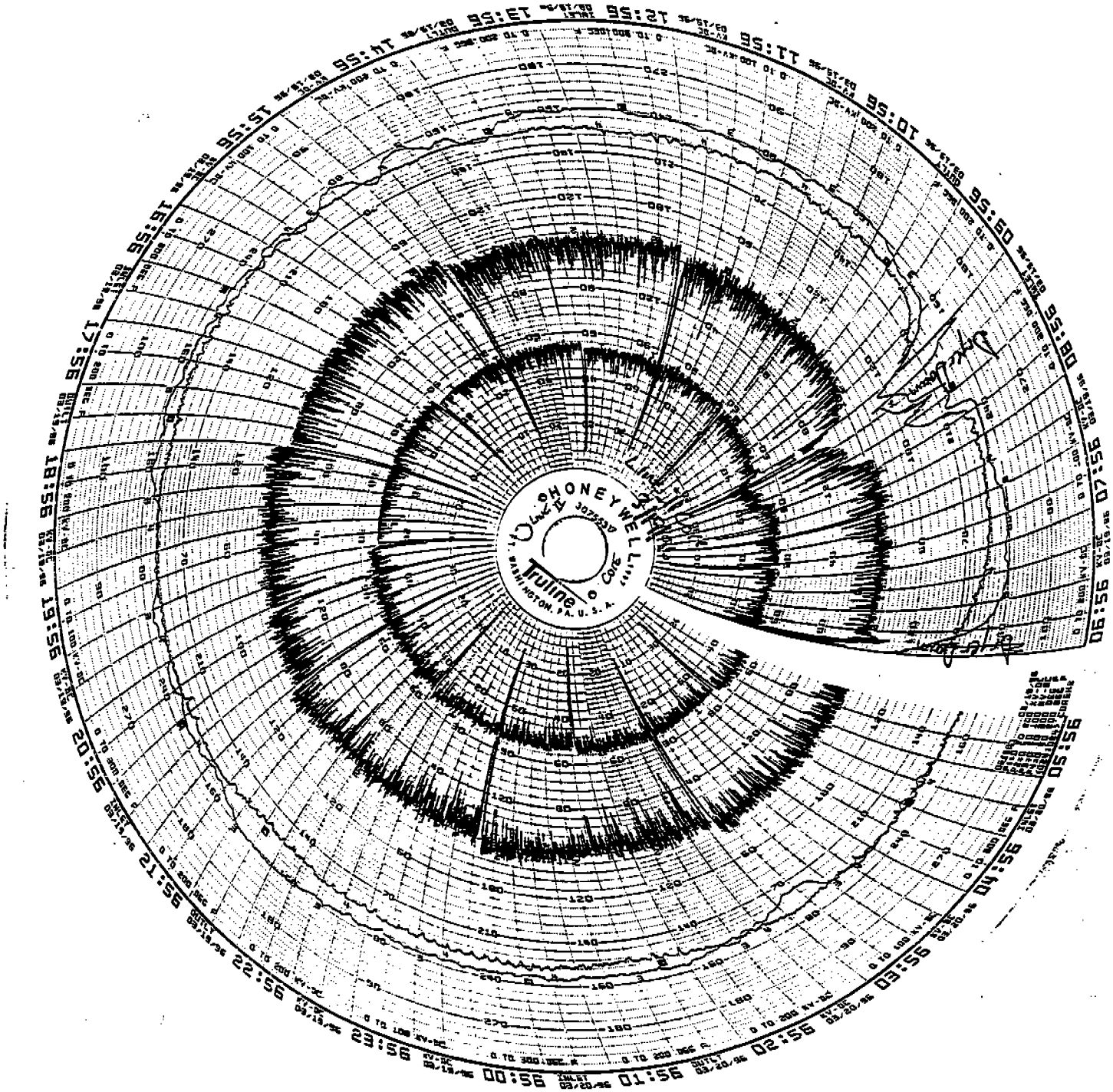
LINE II
SURFACE DRYER
3/19/96
0700 - 1900



LINE II
SURFACE DRYER
3/19/96
1900-0700

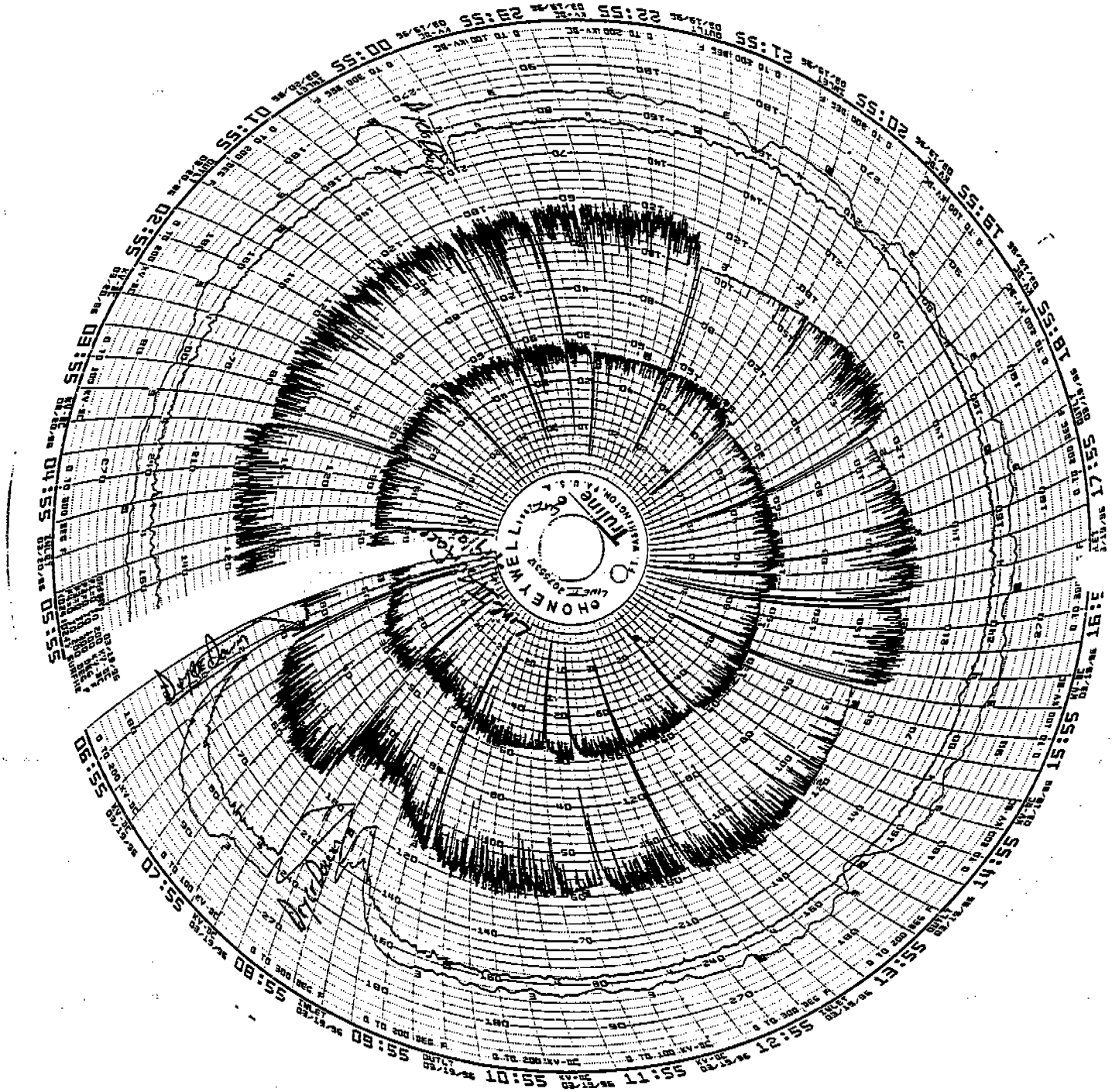


LINE II
CORE E-TUBE
3/19/96



25

Line II
Surf. E-Tube
3/19/96



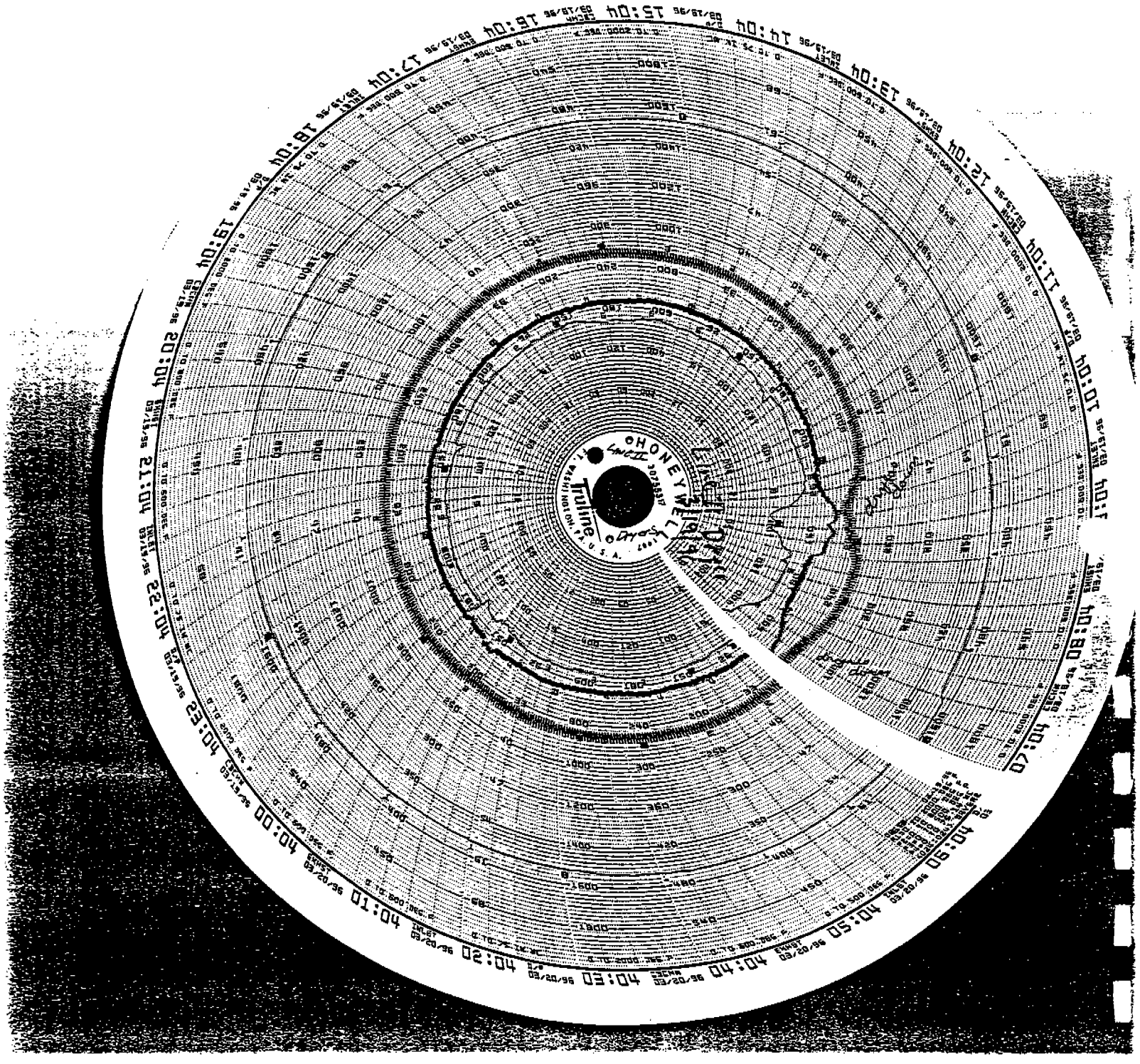
#II Dryer RTO

RECORD EVERY 15 MIN. — HAYWARD AIR TESTING WORKSHEET

Time	RTO Chamber Bed Temp. #1	#2	#3	#4	#5	Inlet Press.	Burners B#1	B#2	Combust. Temp.	Exhaust Temp.	Press. Drop	Gas Usage
9:00	425	378	428	318	418	1.5	1572	1571	1525	252	23.5	
9:15	422	373	429	315	418	0.9	1568	1564	1517	248	25.4	
	Down											
10:30	401	363	412	325	407	1.1	1582	1593	1511	244	23.2	
10:45	408	365	420	324	413	1.3	1562	1560	1523	256	22.7	
11:00	409	370	418	324	409	1.4	1579	1593	1526	248	23.7	
11:15	411	371	419	323	410	1.1	1580	1592	1528	249	23.2	
11:30	411	371	423	332	415	1.3	1559	1554	1528	259	23.9	
11:45	413	370	425	324	414	1.0	1565	1567	1531	254	23.3	
12:00	411	375	420	338	413	0.7	1569	1580	1535	263	23.5	
12:15	414	373	422	323	410	1.1	1578	1590	1534	250	23.4	
12:30	413	378	427	338	415	1.3	1565	1580	1537	2507	23.8	
12:45	414	373	427	332	415	1.1	1579	1595	1529	255	23.6	
1:00	417	371	429	323	411	1.4	1563	1566	1529	253	23.6	
1:15	416	372	429	320	410	0.2	1571	1567	1525	251	23.6	
1:30	414	376	427	340	413	0.2	1567	1578	1524	263	23.8	
1:45	414	376	427	339	414	0.9	1575	1590	1523	261	23.9	
2:00	417	374	429	322	411	0.5	1574	1571	1526	251	23.7	
2:15	415	378	425	333	411	1.2	1577	1595	1527	259	23.8	
2:30	415	377	429	340	415	1.3	1556	1550	1525	261	24.2	
2:45	414	379	427	341	412	0.8	1576	1598	1526	260	23.8	
3:00	418	376	428	321	411	0.9	1566	1561	1528	256	23.4	
3:15	414	378	426	340	412	1.4	1573	1589	1527	263	23.8	
3:30	414	379	426	341	412	0.8	1577	1593	1525	261	23.9	
3:45	415	379	426	334	412	0.8	1575	1593	1527	261	23.8	
4:00	418	375	432	327	415	0.9	1566	1562	1523	256	23.3	
4:15	418	376	428	324	412	1.4	1579	1578	1526	251	23.9	
4:30	418	376	430	325	414	0.9	1572	1565	1526	256	23.2	
4:45	417	375	430	338	417	1.5	1553	1551	1520	260	23.5	
5:00	415	379	426	336	413	0.9	1578	1594	1527	256	23.5	
Down												
5:30	414	375	433	332	417	0.9	1574	1571	1525	259	23.0	
5:45	418	377	427	327	414	1.4	1579	1582	1533	252	23.8	
		Down										
7:30	420	374	431	326	417	0.7	1571	1575	1531	252	23.4	
7:45	417	378	426	332	415	1.1	1574	1594	1529	256	23.5	
8:00	420	377	427	328	415	1.2	1579	1594	1531	255	23.4	
8:15	422	375	431	328	419	0.9	1574	1567	1534	258	23.4	
8:30	421	377	427	327	416	0.9	1565	1566	1534	258	23.3	
8:45	421	376	431	337	422	1.4	1560	1558	1534	263	24.2	

3-19-96

LINE II
DRYER RTO
3/19/96



28

DATE: 3-19-96
SHIFT/CREW: 1-B
OPERATOR: [illegible]

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
2		39 7/8	31	4328 lbs	
4	4366 lbs	39 7/8	32	4349 lbs	40 1/8
6		39 3/4	33	4337 lbs	
8	4312 lbs	39 3/4	34	4343 lbs	40
			35	4339 lbs	
1	4493 lbs (CALLED MEAN 8:30)		36	4315 lbs	39 5/8
2	4491 lbs	40 1/8	37	4358 lbs	
3	4484 lbs		38	4347 lbs	39 3/4
4	4419 lbs	40	39	4316 lbs	
5	4397 lbs		40	4288 lbs	39 5/8
6	4326 lbs	40 1/8	41	4296 lbs	
7	4293 lbs		42	4286 lbs	39 3/4
8	4362 lbs	40	43	4273 lbs	
9	4404 lbs		44	4247 lbs	39 7/8
10	4366 lbs	40 1/8	45	4224 (CALLED MEAN 203)	
11	4275 lbs		46	4233 lbs	39 7/8
12	4297 lbs	40 1/4	47	4276 lbs	
13	4327 lbs		48	4278 lbs	39 7/8
14	4386 lbs	40 1/4	49	4335 lbs	
15	4385 lbs		50	4333 lbs	40
16	4460 lbs	40 3 (CALLED MEAN 1651)	51	4378 lbs	
17	4529 lbs		52	4367 lbs	40
18	4501 lbs	40 1/8	53	4378 lbs	
19	4466 lbs		54	4235 (CALLED MEAN 3:02)	39 3/4
20	4435 lbs	40	55	4314 lbs	
21	4430 lbs		56	4346 lbs	40
22	4376 lbs	40	57	4359 lbs	
23	4361 lbs		58	4404 (CALLED MEAN 3:24)	40 1/8
24	4320 lbs	40	59	4424 lbs	
25	4356 lbs		60	4383 lbs	40
26	4275 lbs	40	61	4366 lbs	
27	4329 lbs (CALLED MEAN 1:20)		62	4351 lbs	39 7/8
28	4321 lbs	39 3/4	63	4375 lbs	
29	4239 lbs		64	4368 lbs	39 7/8
30	4276 lbs		65	4352 lbs	

7/16"

1/2"

29

DATE: 3/19/96
SHIFT/CREW: 1B
OPERATOR:

½"

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
66	4357 lbs	40			
67	4372 lbs				
68	4381 lbs	39 7/8			
70	4373 lbs				
72	4328 lbs	39 3/4			
73	4358 lbs	39 7/8			
73	4361 lbs				
74	4344 lbs	39 3/4			
75	4367 lbs				
76	4357	40			
77	4393 lbs				
78	4394 lbs	40			
79	4434 called 10am start				
80	4476 lbs	40 1/8			
81	4481 called 10am start				
82	4439 lbs	40			
83	4397 lbs				
84	4374 lbs	40			
85	4318 lbs				
86	4291 lbs	39 1/2 called 4:25			
87	4235 lbs				
88	4325 lbs	40			
89	4334 lbs				
90	4241 lbs	40 1/2 called 2pm start			

30

DATE: 3-19-96
SHIFT/CREW: 2 / D
OPERATOR: M. Riley

UNIT/ THICKNESS		WEIGHT	HEIGHT	UNIT/ THICKNESS		WEIGHT	HEIGHT
1/2	1	4346			22	4253	39 3/4
1/2	2	4313	39 1/2 cp		24		
	3	4280			26	4321	40 cp
	4	4329	39 1/2 "		28		39 1/2
	5	4345			30	4356	39 5/8
	6	4367	40		32		39 1/2
	7	4400			34	4514 "	40 cp
	8	4377	40 1/4		36		40 cp
	9	4399			38	4604 " cp	40 cp
	10	4328	40 1/4		40		39 1/2
	11	4354			42	4572	39 1/2
	12	4341	40 1/4		44		39 3/4
	13	4339			46	4457	39 cp
	14	4306	40		48		39
	15	4293			50	4347	38 3/4 cp
	16	4278	40 1/8		52		39 1/4
	17	4314			54	4312	39 1/4
	18	4310	40 1/8		56		39 3/8
	19	4322			58	4360	39 3/8
	20	4322	40 1/4		60		39 1/4
	21	4311			62	4504	39 1/2
	22	4282	40		64		39 3/4
	24		40 1/8		66	4398	39 1/2
	26	4277	40 1/8		68		39 3/4
1/16	X	X X X X X X X X			70	4481	39 7/8 cp
1/16	2	4178 cp	40		72		39 1/2
	4		39 7/8		74	4503	39 1/2
	6	4127 cp	39 1/2		76		39 1/2
	8		39 1/2		78	4309	+1
	10	4167 "	39 1/2		80		+1
	12		39 1/2				
	14	4179	39 5/8				
	16		39 3/4				
	18	4255	39 5/8				
	20		39 3/4				

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HAYWARD LINE 2 DRYER RTO STACK MARCH 20th 1996
FORMALDEHYDE

DATA TIME:	START=	08:30	END=	09:02	HOURS=	0.53
	START=	09:28	END=	14:00	HOURS=	4.53
					TOTAL=	5.07

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

	1/2"
per/peice	54.80
per/ 8' x 16'	219.20

PLANT PRODUCTION RATE

5.07	=hours during testing
81	=pressloads
972	=no. of 8'x16' boards produced (pressloads x 12 boards per load)
213,062	=lbs of finished product (boards produced x weight of finished board)
42,052	=lbs of finished product per hour (lbs of finshed product / hours)
21.03	=tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY DRY FUEL INPUT

SURFACE

10	=SURFACE fuel calibration in pounds per count
2,403	=SURFACE counts during testing hours
24,030	=SURFACE lbs of fuel burned during testing
5.07	=hours during testing
4,743	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.37	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,600	=estimated BTU content per pound of dry fuel,
40.8	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,432	=average inlet temperature
46.95	=average incoming moisture percent
5.37	=average dry moisture percent

CORE

10	=CORE fuel calibration in pounds per count
2,719	=CORE counts during testing hours
27,190	=CORE lbs of fuel burned during testing
5.07	=hours during testing
5,366	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.68	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,600	=estimated BTU content per pound of dry fuel,
46.2	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,472	=average inlet temperature
46.95	=average incoming moisture percent
5.73	=average dry moisture percent

DRYER THROUGHPUT RATE

10,109	=Total pounds of fuel burned per hour in Core and Surface Dryer
42,052	=lbs of finished product per hour (lbs of finshed product / hours)
52,161	=Pounds of material produced by the dryer per hour (dry basis, assumming fuel balances)
2,827	= weight of trim per hour at 6.3% of finished product
7,282	=weight of screened fines per hour (total fuel - trim)
13.96%	=resulting loss to fines as percentage of dryer throughput

LOUISIANA-PACIFIC CORPORATION

PRESS REPORT - LINE 1 ©

OPERATOR Linda Nelson SHIFT: Day CREW: C

DATE: 3-20-94

THICKNESS 7/16 - 1/2

PRESS LOS: 10 7/16 175 1/2

OVERALL TIMER: 157-174

DECOMPRESSION TIME: 15

PRESS TEMP: 210-215 N.I.R.

TOTAL REJECTS: 0

LOG COUNT: 1537

LINE SPEED	THICKNESS	FROM	TO
59'	7/16	7:00	7:38
54'	1/2	7:38	7:00

F.C.O.S. HYD. RADIATOR: 8:00 TIME

PRESS BLOWN DOWN: 8:21

SPINNER HEADS FLUSHED: X TIME

SURFACE BLENDER HOSED: X TIME

FORMER HYD RADIATOR: X TIME

3/8 = 376,377

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
9:02	9:16				24	Top Suction Transfer Conv. tripped out causing Flow-Gate and Haul-Up to plug

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

24

PRESS REPORT - LINE 1 (2) DATE: 3-20-96

OPERATOR Terry SHIFT: Night CREW: A

THICKNESS 1/2 - 7/16 - 1/4 PRESS LDS: 42½ 26¼ 12 6 7/16

OVERALL TIMER: 174 - 157 DECOMPRESSION TIME: 15 - 15

PRESS TEMP: 215 TOTAL REJECTS:

LOG COUNT: 1100

LINE SPEED	THKNS.	FROM	TO
55	½	700	1435
55	7/16	935	1250
50	1/4 SB	1250	1235
55	7/16	235	500
52	7/16	500	630
55	7/16	630	

F.C.O.S. HYD. RADIATOR: _____ TIME

PRESS BLOWN DOWN: _____

SPINNER HEADS FLUSHED: _____ TIME

SURFACE BLENDER HOSED: _____ TIME

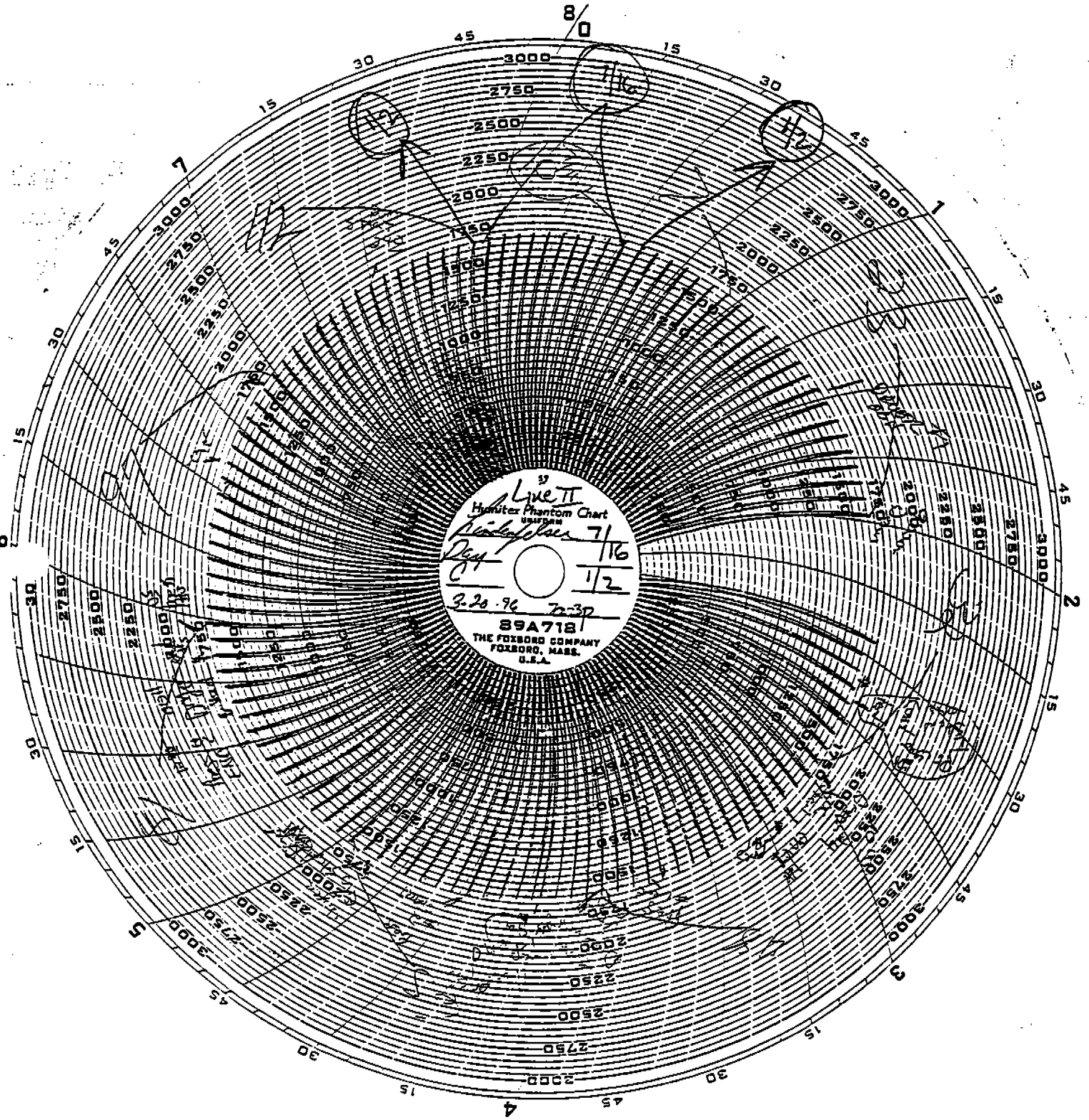
FORMER HYD RADIATOR: _____ TIME

338438

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
240	242	2				Tau up at Sacks

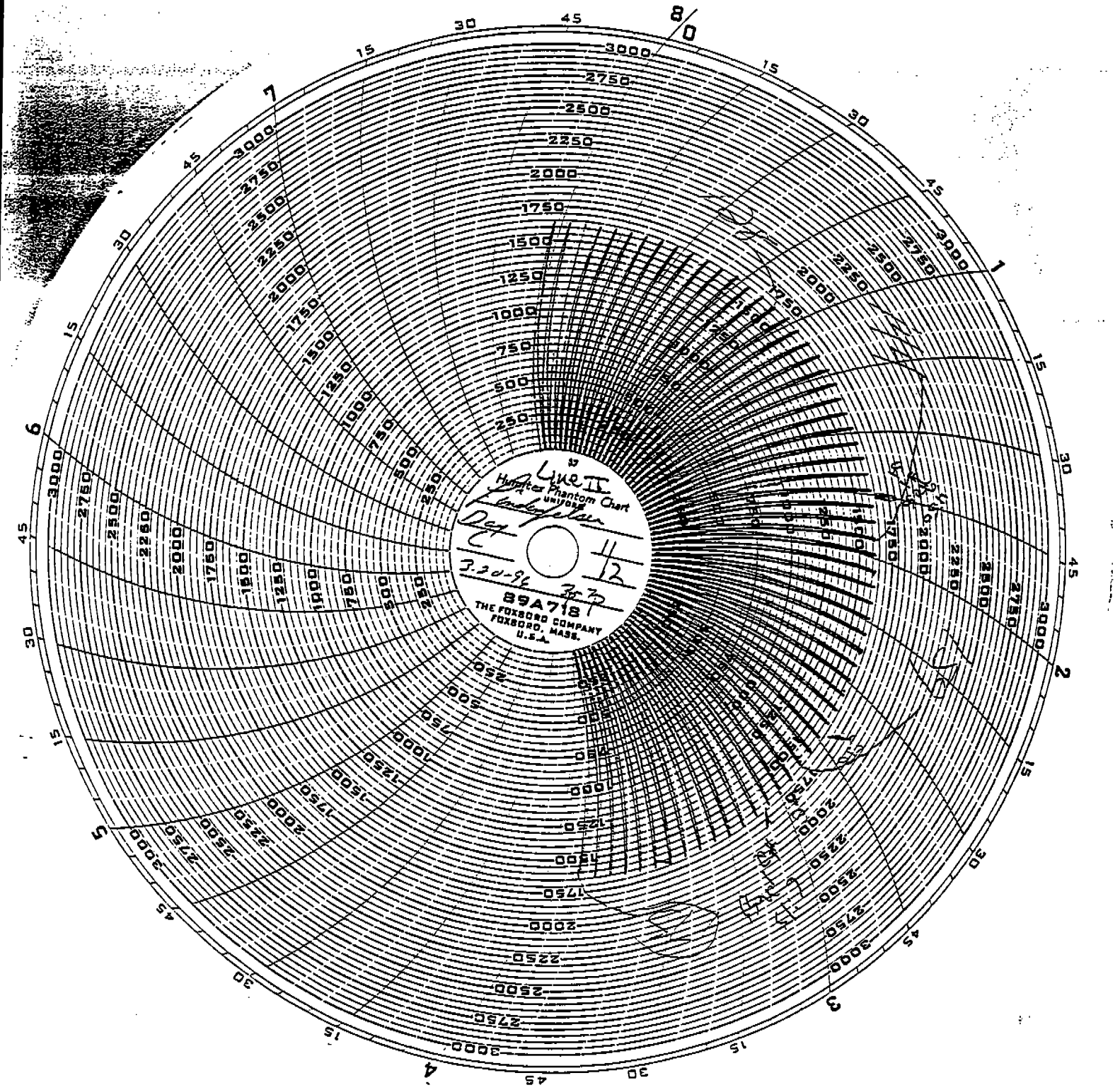
DOWNTIME CODE: M - MECHANICAL (2) E - ELECTRICAL O - OPERATOR

Line II
PRESS CHART
3/20/96
0700 - 1500



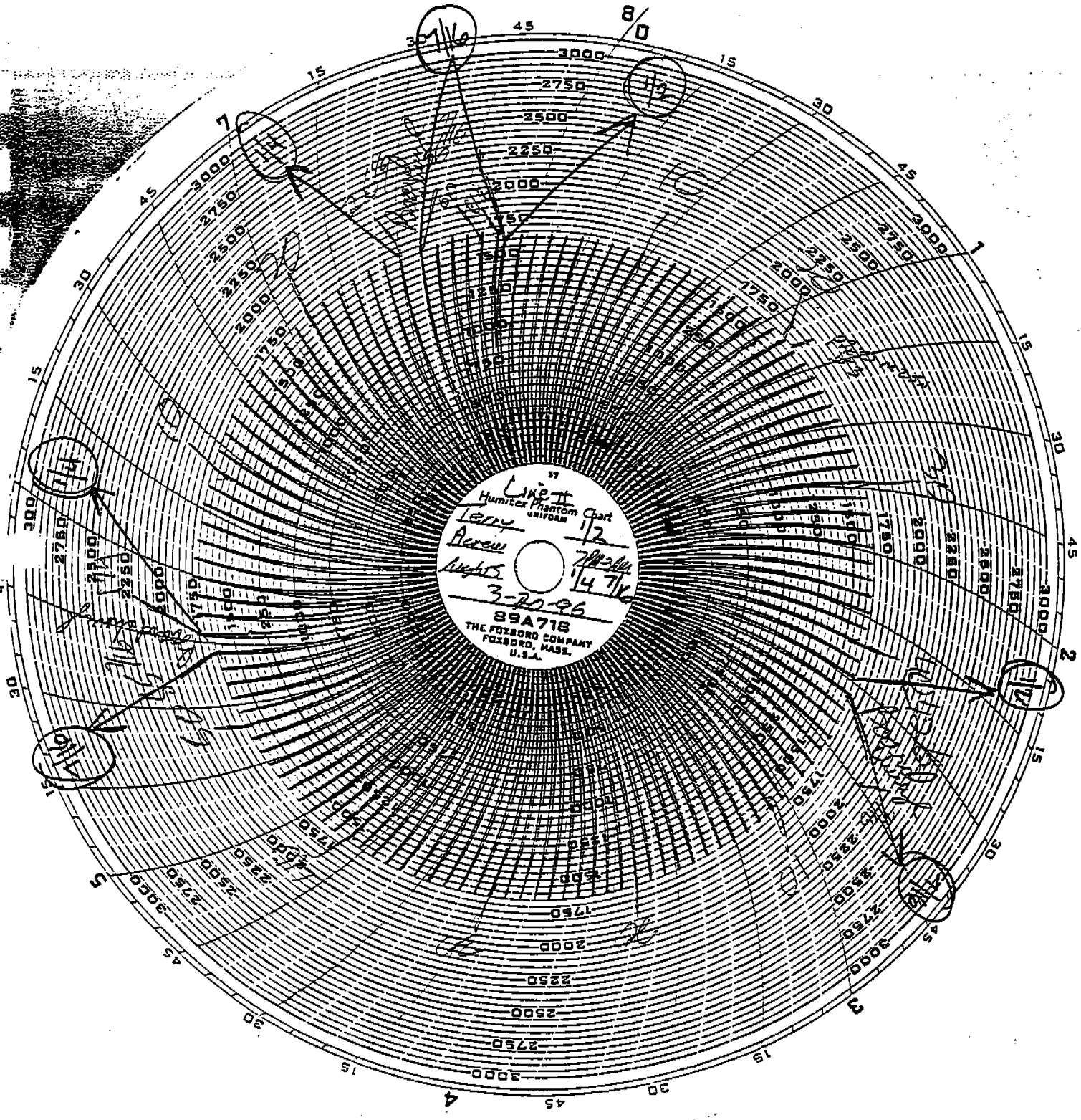
35

LINE II
PRESS CHART
3/20/96
1500 - 1900



36

LINE II
PRESS CHART
3/20/96
1900-0300



Dryer DATA
fuel calibration lb/coun face core

date 3/20/96
by
page 1 of

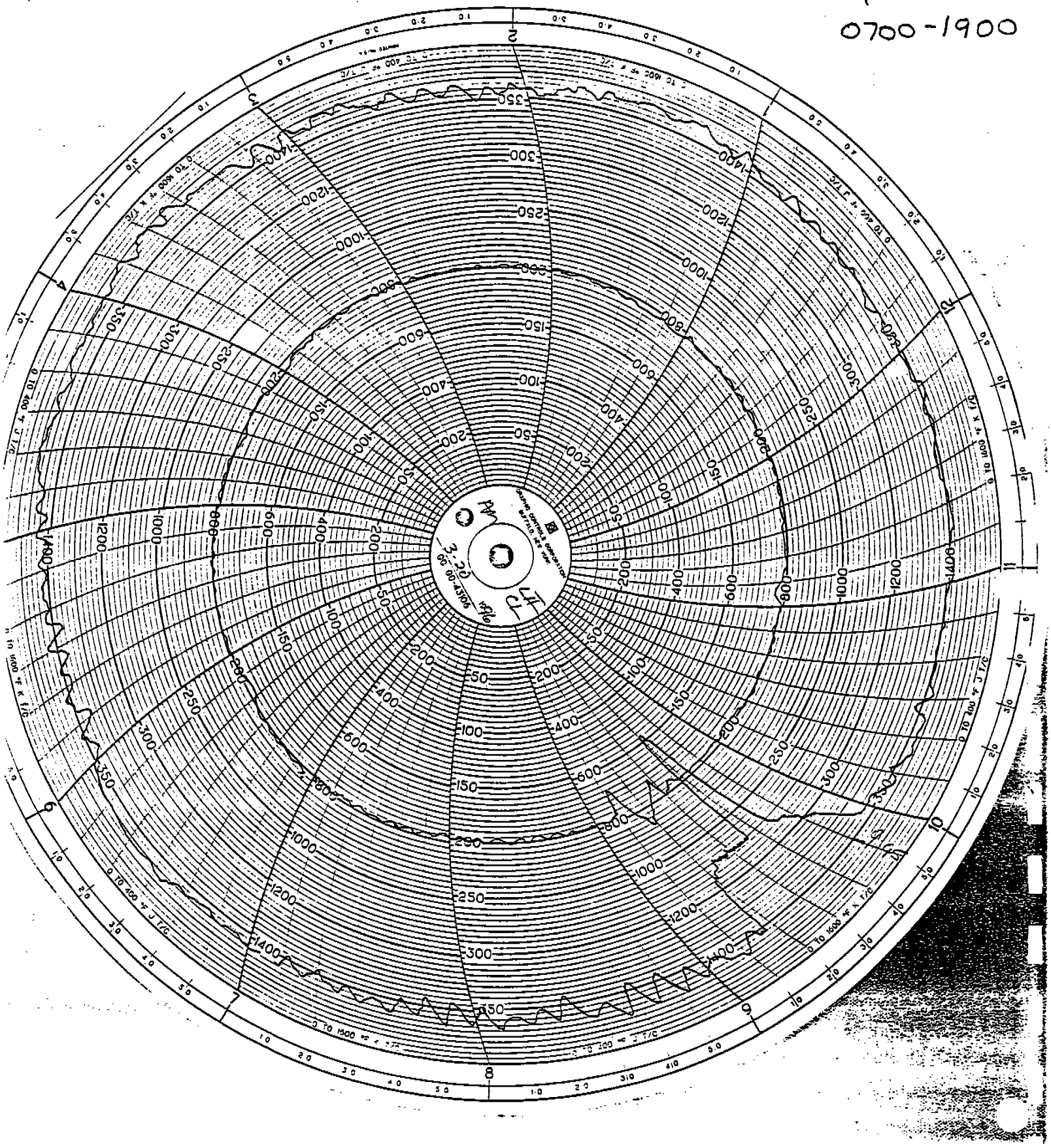
TIME	FACE OUT. SET POINT	FACE FEED RATE	FACE INLET TEMP	FACE OUTLET TEMP	FACE FUEL COUNT	FACE WET BIN LEVEL	CORE OUT. SET POINT	CORE FEED RATE	CORE INLET TEMP	CORE OUTLET TEMP	CORE FUEL COUNT	CORE WET BIN LEVEL	DRY BIN LEVEL FACE	DRY BIN LEVEL CORE	EVERY HOUR FLAKE MOISTURE IN	FACE	CORE
8:30	252	63	1404	250	1659	60%	213	67	1347	209	765	60%	90%	70%	115H	5.2	5.4
8:45	252	63	1411	250	762	70%	213	67	1505	208	890	60%	80%	70%		5.4	5.4
9:00	252	63	1586	250	873	80%	213	67	1500	213	1019	70%	90%	80%		5.2	5.3
9:15		DRYER DOWN				100%		DRYER DOWN				100%	100%	100%			
9:30		DRYER DOWN				100%		DRYER DOWN				100%	100%	100%	50.2		
9:45	252	62	1197	249	1028	100%	213	63	1187	212	1211	100%	75%	75%		6.0	6.4
10:00	252	67	1383	248	1133	100%	213	67	1437	211	1329	100%	75%	75%		5.6	5.8
10:15	250	70	1394	245	1284	90%	213	68	1488	211	1501	90%	75%	75%		5.2	5.6
10:30	250	70	1433	247	1366	100%	215	68	1457	214	1588	90%	75%	75%	46.4	5.6	5.8
10:45	250	70	1461	250	1492	100%	215	68	1467	214	1731	100%	75%	75%		5.4	5.9
11:00	250	70	1466	247	1617	100%	215	68	1489	214	1677	100%	75%	75%		5.8	6.0
11:15	252	70	1453	246	1752	100%	215	68	1467	214	2030	100%	75%	75%		5.1	5.6
11:30	252	70	1494	251	1858	100%	215	68	1439	212	2146	100%	75%	75%	47.6	4.8	5.0
11:45	252	70	1425	251	1984	100%	215	68	1473	213	2291	100%	75%	80%		4.7	5.3
12:00	250	70	1459	250	2089	90%	215	68	1458	215	2409	90%	75%	80%		4.9	5.2
12:15	250	70	1467	246	2212	70%	215	68	1452	213	2547	70%	75%	80%		5.5	5.8
12:30	250	70	1496	245	2329	70%	215	68	1436	214	01-76	70%	75%	80%	49.2	5.8	5.5
12:45	250	70	1498	248	2461	60%	215	68	1475	211	2830	60%	75%	80%		5.0	5.5
1:00	250	70	1489	249	2566	60%	215	68	1476	214	2936	60%	75%	80%		5.0	6.0
1:15	250	70	1489	241	2700	60%	215	68	1530	211	3086	60%	80%	80%	[illegible]	5.6	5.8
1:30	250	70	1455	244	2852	60%	215	68	1545	211	3222	60%	80%	80%	48.4	6.2	6.6
1:45	250	70	1455	247	2942	60%	215	68	1522	213	3354	65%	80%	80%		5.4	5.8
2:00	253	70	1444	246	3062	65%	215	68	1496	215	3484	65%	75%	80%		5.9	6.2
2:15	253	70	1478	251	3192	65%	215	68	1477	214	3625	65%	75%	75%		4.9	5.8
2:30	253	70	1457	252	3310	65%	215	68	1513	214	3753	65%	80%	80%	49.2	5.0	5.8
2:45	253	70	1423	251	3420	65%	215	68	1555	213	3882	65%	75%	80%		5.0	5.7
3:00	253	70	1459	250	3531	65%	215	68	1458	213	4011	65%	75%	80%		4.9	5.1
3:15	253	70	1538	251	3646	60%	215	68	1555	214	4145	60%	75%	80%		5.3	5.9
3:30	253	70	1453	250	3762	70%	215	68	1614	214	4274	70%	75%	90%	52.8	4.8	5.5
3:45	253	70	1485	251	3885	70%	215	68	1574	211	4419	70%	75%	90%		5.2	5.7
4:00	253	70	1528	250	4000	75%	215	68	1549	208	4545	75%	80%	80%		5.2	6.0
4:15	253	70	1491	250	4119	75%	215	66	1533	213	4689	75%	75%	90%		4.9	5.4
4:30	253	70	1536	249	4227	75%	215	65	1546	216	4810	75%	75%	90%	46.2	5.0	5.5
4:45	251	70	1490	248	4349	90%	215	63	1491	214	4957	80%	80%	90%		5.1	5.6
5:00	251	70	1501	250	4453	90%	216	63	1454	213	5074	90%	80%	90%		5.0	5.5
5:15	251	70	1425	250	4578	75	216	63	1478	214	5222	75%	90%	90%		5.1	5.6

Dryer DATA
fuel calibration lb/coun face core

date 3/20/96
by
page 1 of 2

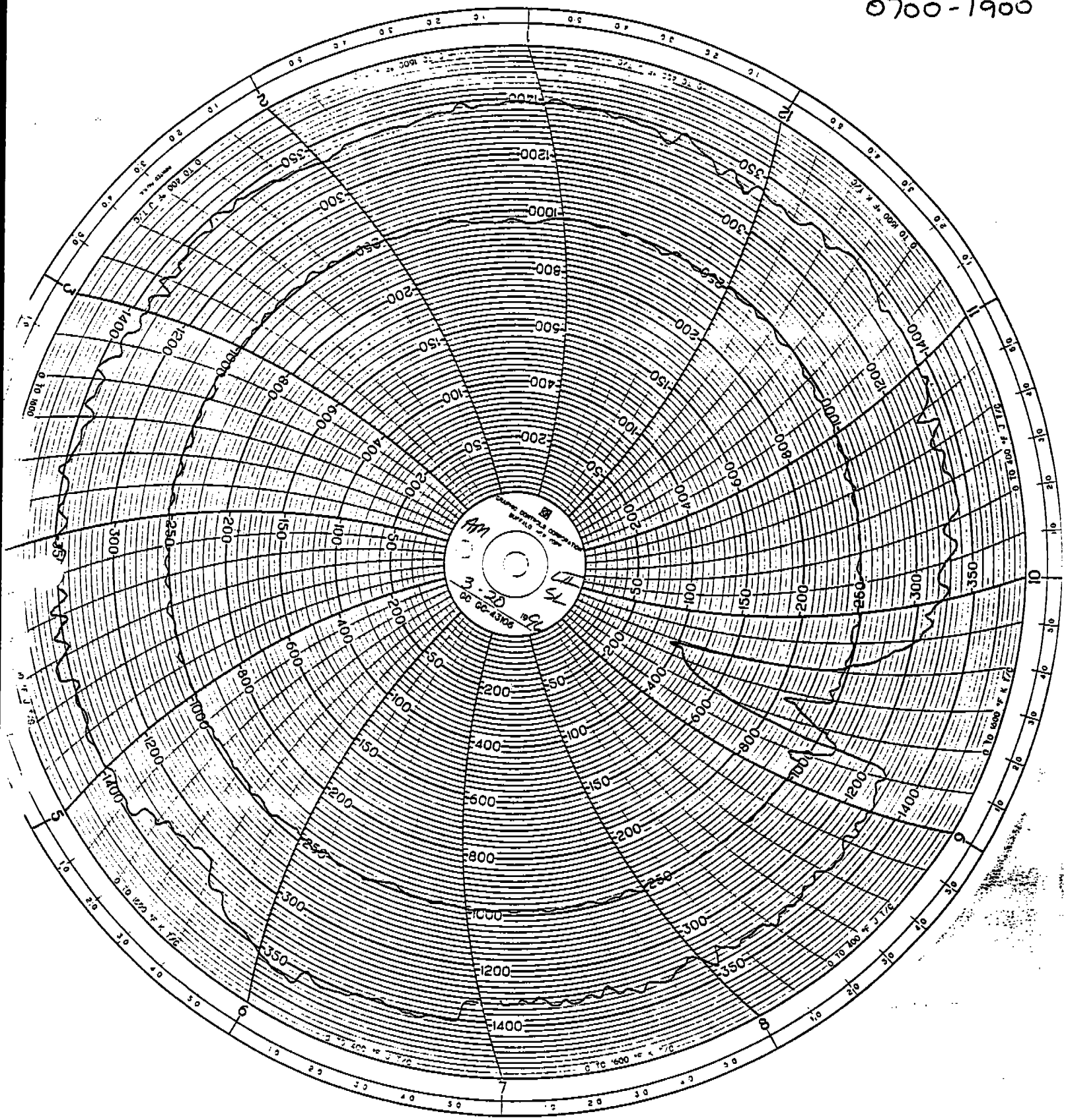
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5:30	251	70	1370	240	46892	75%	216	63	1466	213	5341	75%	60%	85%	50.2	5.3	5.7
5:45	251	70	1437	248	47914	100	216	63	1388	214	5463	100	90	95%		5.2	5.6
6:00	251	70	1550	245	4910	100	216	63	1489	213	5590	100	100	90		5.7	6.3
6:15																	
6:30																	
6:45																	

LINE II
CORE DRYER
3/20/96
0700-1900



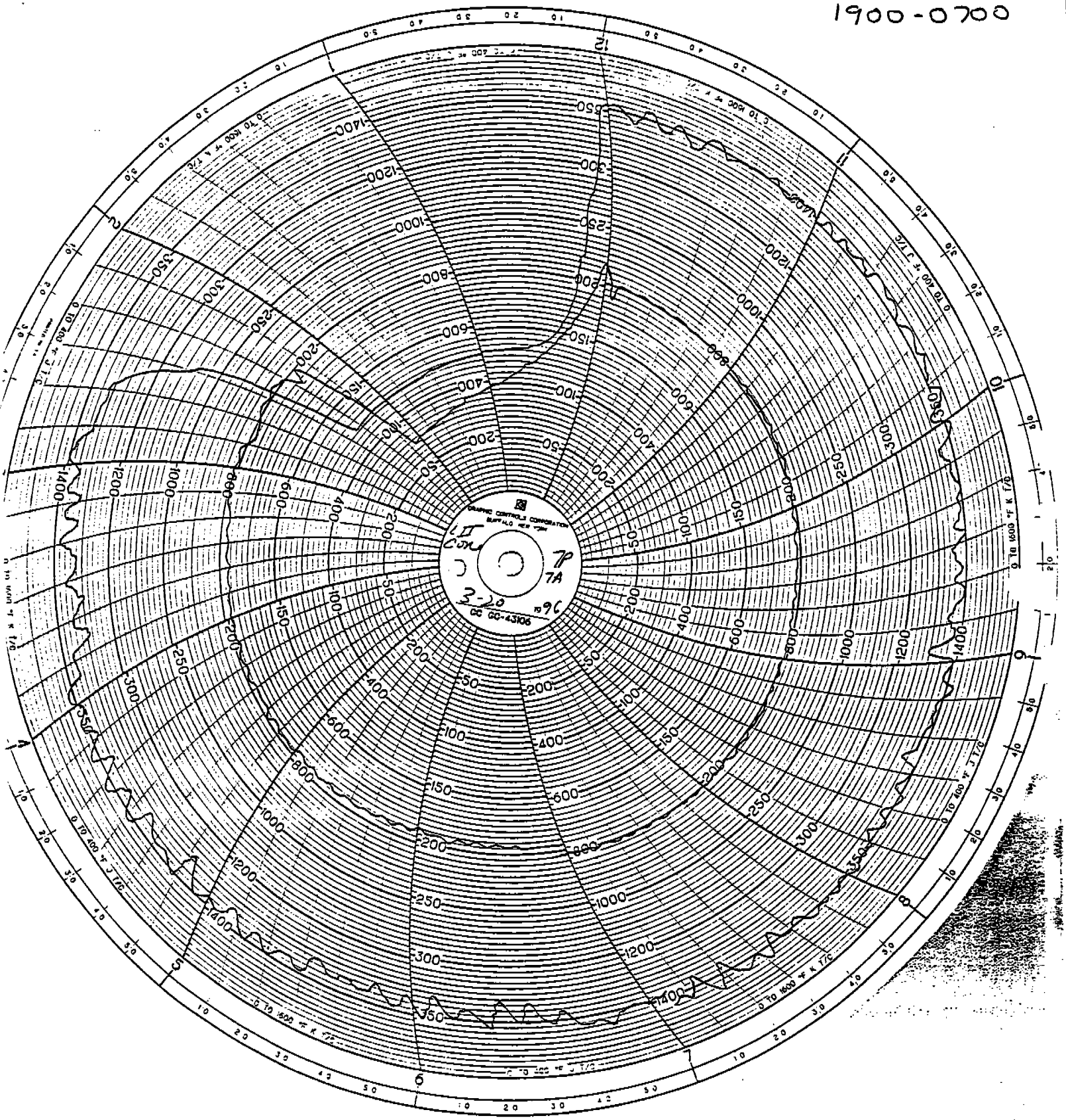
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LINE II
SURFACE DRYER
3/20/96
0700 - 1900



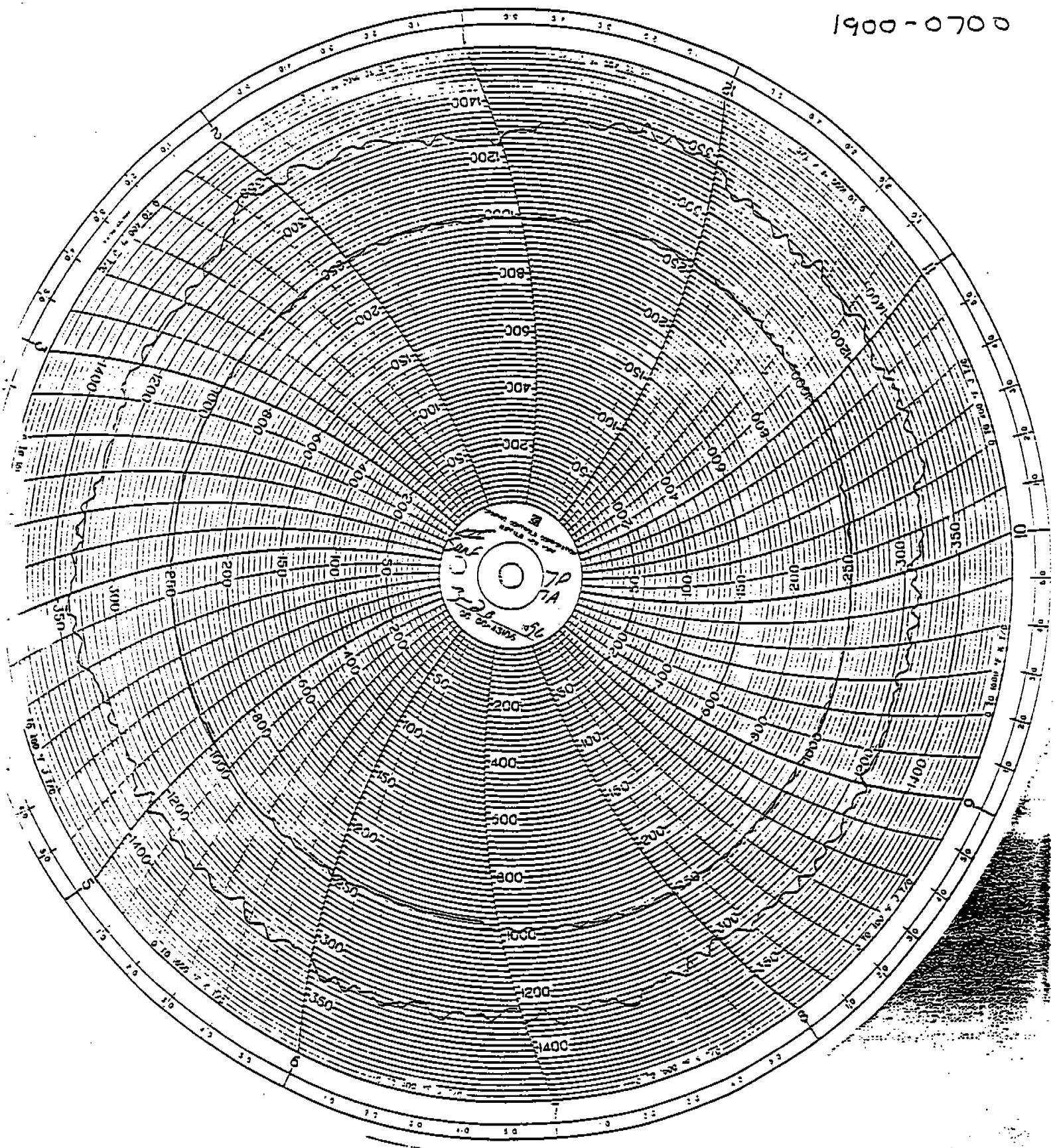
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LINE II
CORE DRYER
3/20/96
1900-0700



4a

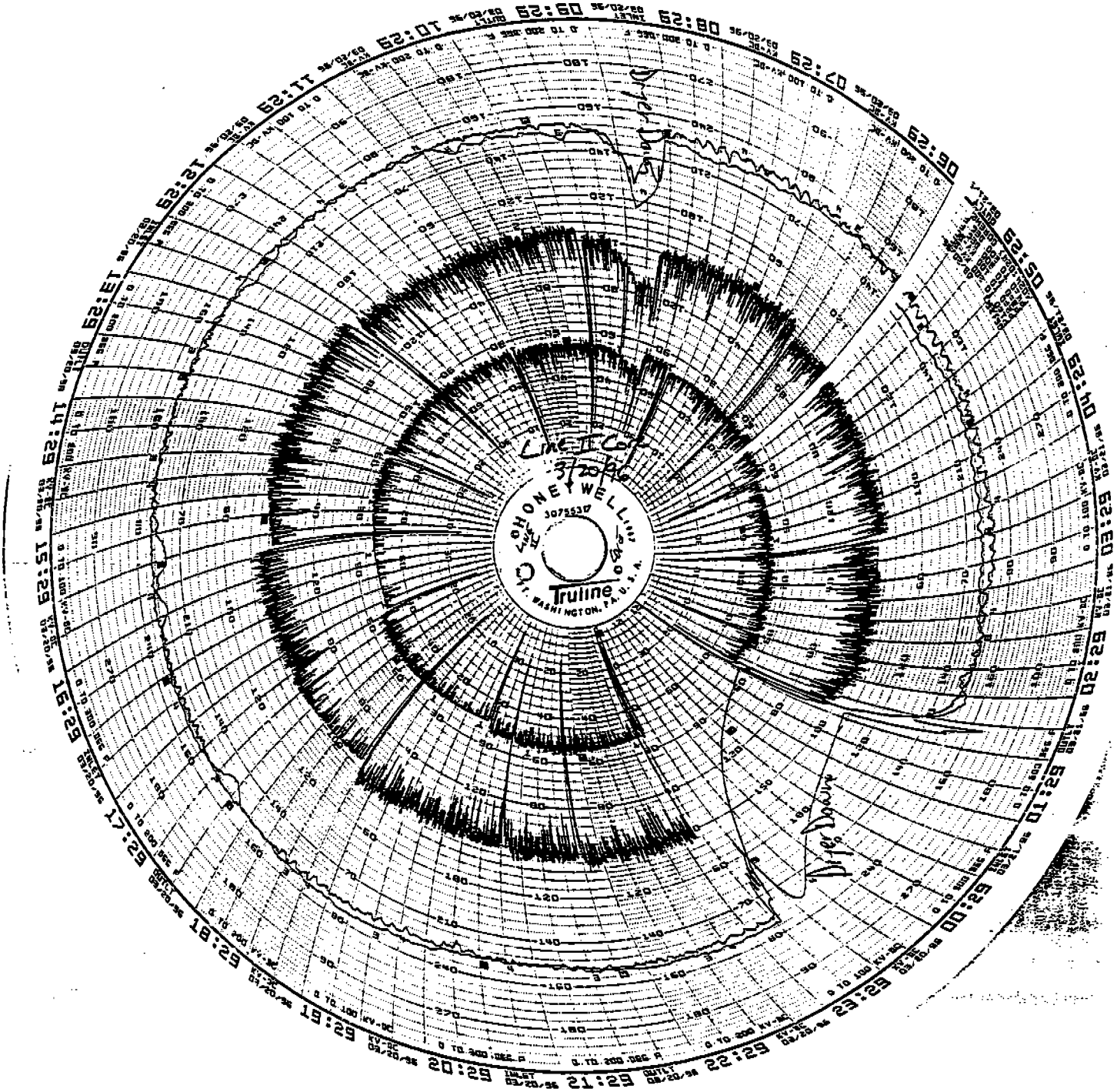
SURFACE DRYER
3/20/96
1900-0700



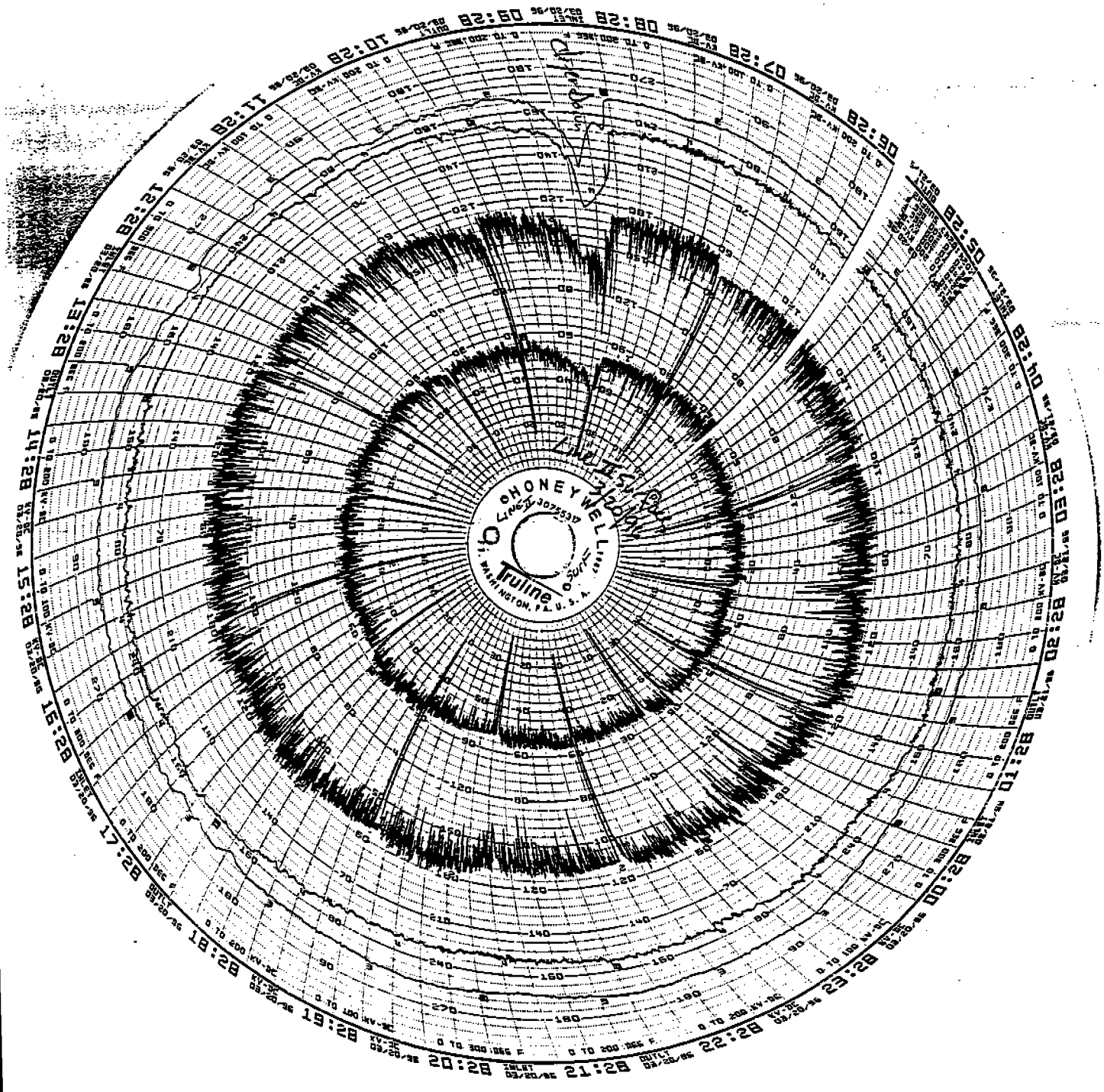
4B

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Line II
Core E-Tube
3/20/96



Line II
Surf. E-Tube
3/20/96



45

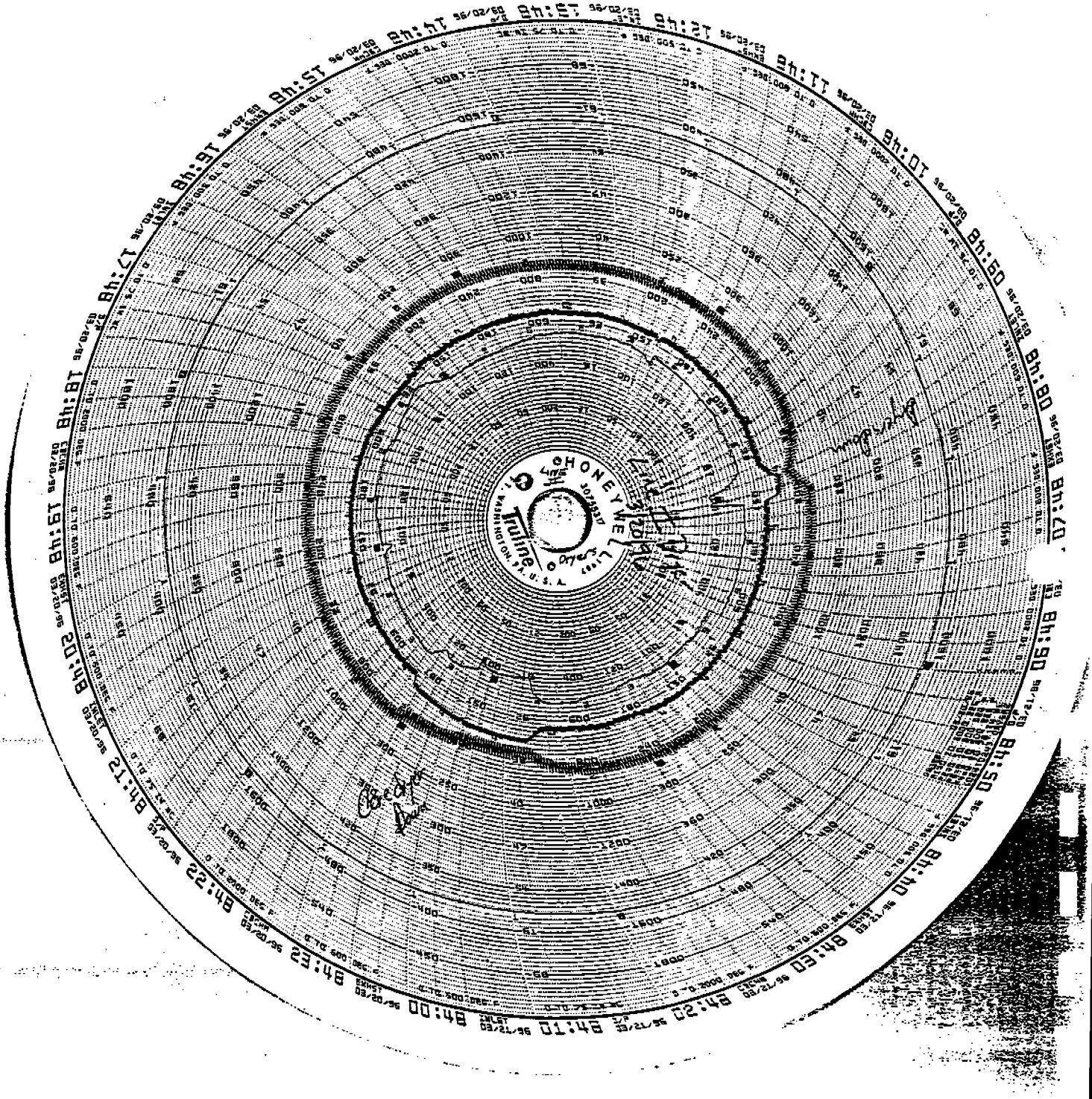
LII Driyer RTO 3/20/96

RECORD EVERY 15 MIN. HAYWARD AIR TESTING WORKSHEET

Time	RTO Chamber Bed Temp. #1	#2	#3	#4	#5	Inlet Press.	Burners B#1	B#2	Combust. Temp.	Exhaust Temp.	Press. Drop	WATER Usage	
8:30	409	380	426	338	412	1.3	1575	1597	1531	257	24.0		
8:45	409	380	431	329	416	1.1	1555	1556	1523	257	23.6	10210	
9:00	410	377	433	330	415	1.5	1580	1584	1530	248	23.9		
9:15			Dryer					Down					
9:30			Dryer					Down					
9:45	394	361	408	315	395	1.3	1572	1591	1506	245	24.8	10560	
10:00	401	365	417	313	399	1.0	1587	1594	1523	245	23.9		
10:15	403	371	424	329	409	1.1	1582	1599	1520	249	23.4	10740	
10:30	407	372	422	322	405	1.4	1576	1599	1531	245	24.0		
10:45	406	374	426	334	412	1.1	1563	1570	1529	253	23.7	10960	
11:00	410	373	425	318	407	1.2	1569	1567	1531	246	24.4		
11:15	410	373	430	317	409	1.5	1577	1584	1533	248	24.2	11090	
11:30	409	375	430	329	414	0.9	1565	1577	1532	252	23.9	NO H2O	
11:45	411	375	430	326	413	0.2	1574	1586	1537	251	23.9		
12:00	411	375	430	327	413	0.7	1577	1585	1538	251	23.5	NO H2O	
12:15	412	376	426	320	408	1.1	1582	1597	1534	254	23.8		
12:30	410	378	429	335	414	1.5	1562	1588	1524	256	23.5	NO H2O	
12:45	410	380	426	339	412	1.0	1560	1597	1527	260	24.2		
1:00	410	380	426	337	411	0.7	1559	1561	1528	260	24.2	NO H2O	
1:15	411	379	429	335	413	1.5	1559	1566	1531	254	23.4		
1:30	414	378	432	329	413	0.9	1567	1573	1535	254	23.7	NO H2O	
1:45	415	377	433	327	412	1.5	1570	1572	1533	250	24.0		
2:00	417	377	432	320	410	1.3	1575	1581	1533	248	24.1	11240	
2:15	416	380	429	323	408	1.2	1578	1575	1535	257	23.9		
2:30	414	382	432	330	415	1.4	1560	1563	1532	256	22.7	NO H2O	
2:45	415	384	428	338	411	1.3	1566	1575	1538	257	23.4		
3:00	415	384	429	340	412	0.3	1568	1581	1543	262	24.2	11400	
3:15	416	384	429	338	412	0.6	1570	1584	1544	263	24.1		
3:30	416	383	433	339	416	1.3	1563	1567	1540	259	23.5	11660	
3:45	420	382	433	322	412	1.0	1576	1600	1545	257	23.6		
4:00	417	386	433	343	416	1.3	1564	1575	1541	252	24.1	11850	
4:15	422	382	434	323	413	1.3	1580	1595	1543	254	23.4	12100	
4:30	420	385	431	334	414	0.8	1579	1600	1544	265	23.5		
4:45	420	386	432	337	415	0.3	1560	1564	1537	261	23.4	12220	
5:00	423	382	434	330	419	0.2	1574	1582	1540	251	24.1		
5:15	422	382	434	330	419	1.4	1574	1594	1540	260	23.4	12450	
5:30	422	383	434	325	416	0.4	1584	1594	1539	255	24.1		
5:45	418	385	435	343	422	1.7	1582	1565	1534	258	23.2	12700	
6:00	419	386	433	347	421	1.3	1561	1564	1538	262	23.4		

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LINE II
DRYER RTO
3/20/96



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DATE: 3-20-96
SHIFT/CREW: 1 - C
OPERATOR: AL RANG

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
7/16 1	4357	39 1/2	29	4370 (11:17)	40
2		39 1/2	30	4250 (11:23)	39 3/4
3		39 1/2	31	4218 (11:39)	39 3/4
4		39 3/4	32	4198 (11:35)	39 3/4
5	4448	39 1/2"	33	4187 (11:41)	39 3/4
6		39 3/4	34	4185 (11:45)	40
7		39 3/4	35	4215 (11:54)	40
1/2" 1	4448	40 1/4	36	4266 (12:00)	40
2	4485 (8:10)	40 1/4	37	4306 (12:06)	40
3	4393 (8:16)	40	38	4342 (12:32)	40 1/8
4	4279 (8:14)	40	39	4342 (12:19)	40
5	4330 (8:20)	40	40	4335 (12:25)	40
6	4362 (8:27)	40	41	4332 (12:32)	40
7	4375 (8:35)	40	42	4350 (12:39)	40 1/4
8	4371 (8:40)	40	43	4392 (12:44)	40 1/4
9	4385 (8:46)	40	44	4380 (12:52)	40 1/4
10	4390 (8:55)	40	45	4386 (12:58)	40 1/4
11	4432 (9:59)	40 1/4	46	4379 (1:03)	40 1/4
12	4391 (9:06)	40	47	4388 (1:09)	40 1/4
13	4353 (9:36)	40	48	4387 (1:15)	40 1/2
14	4371 (9:42)	40	49	4353 (1:21)	40 1/2
15	4313 (9:49)	40	50	4343 (1:28)	40 1/4
16	4279 (9:55)	40	51	4319 (1:34)	40 1/2
17	4426 (10:01)	40	52	4325 (1:40)	40 1/8
18	4437 (10:08)	40 1/4	53	4335 (1:47)	40 1/8
19	4450 (10:13)	40	54	4347 (1:54)	40
20	4472 (10:22)	40	55	4301 (1:59)	40
21	4426 (10:27)	40	56	4333 (2:06)	40
22	4427 (10:34)	40	57	4339 (2:13)	40
23	4445 (10:39)	40	58	4411 (2:18)	40
24	4389 (10:46)	40	59	4440 (2:25)	40
25	4351 (10:51)	40	60	4530 (2:32)	40 1/2
26	4360 (10:57)	40	61	4510 (2:37)	40 1/2
27	4395 (11:04)	40"	62	4608 (2:44)	40 3/4 CS
28	4393 (11:10)	40"	63	4613 (2:49)	41

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DATE: _____

SHIFT/CREW: _____

OPERATOR: _____

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
64	4592 (2:56)	41 cp	99	44 9630	40 3/4
65	4618 (3:03)	41	100	4471 (6:41)	40 1/4
66	4659 (3:13)	41 1/4 cp	101	4463 (6:11)	40 1/4
67	4584 (3:17)	40 3/4	102	4482 (6:58)	40 1/4
68	4521 (3:21)	40 1/2	103	4486 (7:)	40 1/4
69	4450 (3:28)	40 1/2			
70	4430 (3:33)	40 1/4			
71	4418 (3:41)	40 1/4			
72	4437 (3:47)	40 1/2			
73	4420 (3:52)	40 1/2			
74	4421 (3:59)	40 1/4			
75	4418 (4:05)	40 1/4			
76	4422 (4:13)	40 1/4			
77	4452 (4:18)	40 1/4			
78	4433 (4:24)	40 1/4			
79	4437 (4:29)	40 1/4			
80	4440 (4:35)	40 1/2			
81	4373 (4:43)	40			
82	4323 (4:50)	40			
83	4327 (4:56)	40			
84	4270 (5:02)	40			
85	4260 (5:09)	40			
86	4343 (5:15)	40			
87	4350 (5:21)	40			
88	4316 (5:28)	40			
89	4306 (5:31)	40			
90	4340 (5:39)	40 1/4			
91	4356 (5:45)	40 1/4			
92	4366 (5:52)	40			
93	4366 (5:59)	40			
94	4367 (6:04)	40			
95	4475 (6:10)	40			
96	4472 (6:17)	40 1/2			
97	4444 (6:23)	40 1/4			
98	4493 (6:29)	40 1/4			

DATE: 3-20-96
SHIFT/CREW: A-2
OPERATOR: Amy

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
1/2 1	4441#		22	4486#	39 3/4
2	4403#	40 1/4	24		39 3/8
3	4391#		26		39 1/2
4	4354#	40 1/8	28	4292#	39 1/4
5	4386#		30 collapsed	4371#	40 3/8
6	4377#	40	32 collapsed	4294#	39
7	4395#		34	4443#	39 1/4
8	4413#	40 1/4	36		39 7/8
9	4427#		38	4372#	39 3/4
10	4405#	40 1/4	40		39 3/8
11	4407#		42	4404#	39 3/4
12	4418#	40	44		39 5/8
13	4435#		46	4387#	39 3/4
14	4422#	40 1/4	48		39 1/2
15	4401#		50	4378	39 1/2
16	4405#	40 1/8	52		39 1/2
17	4355#		54	4454#	39 3/8
18	4360#	39 7/8	56		39 7/8
19	4400#		58	4330#	39 1/2
20	4351#	40	60		39 1/2
21	4286#		62		39 3/8
22	4284#	39 7/8	64		39 3/8
23 collapsed	4208#		66		
24		40 3/8	68		
25 26	4192	39 3/4	70		
7/16 1	4397#	39 7/8	1/4 collapsed	4502#	37 1/2
2		40	2		35 3/8
4 collapsed					
6 " "	4541#	40	4PC		35 1/2
8 collapsed		40	6		
10 " "	4539#	39 3/4	8		36 1/2
12		40 1/4	10		
14		40 3/8			
16		40 3/8			
18 collapsed	1544	40			
20 " "		40			

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HAYWARD LINE 2 DRYER RTO STACK MARCH 20th & 21st 1996
POM

DATA TIME:	START=	14:30	END=	17:30	HOURS=	3.00
DATA TIME:	START=	08:15	END=	14:15	HOURS=	6.00
					TOTAL=	9.00

BOARD WEIGHTS - LBS

average weights determined by taking bundle weights divided by peices per unit over the testing period.

	1/2"
per/peice	54.59
per/ 8' x 16'	218.36

PLANT PRODUCTION RATE

9.00	=hours during testing
144	=pressloads
1728	=no. of 8'x16' boards produced (pressloads x 12 boards per load)
377,326	=lbs of finished product (boards produced x weight of finished board)
41,925	=lbs of finished product per hour (lbs of finshed product / hours)
20.96	=tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY DRY FUEL INPUT

SURFACE

10	=SURFACE fuel calibration in pounds per count
4,213	=SURFACE counts during testing hours
42,130	=SURFACE lbs of fuel burned during testing
9.00	=hours during testing
4,681	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.34	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,600	=estimated BTU content per pound of dry fuel,
40.3	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,439	=average inlet temperature
47.34	=average incoming moisture percent
5.45	=average dry moisture percent

CORE

10	=CORE fuel calibration in pounds per count
4,811	=CORE counts during testing hours
48,110	=CORE lbs of fuel burned during testing
9.00	=hours during testing
5,346	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.67	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,600	=estimated BTU content per pound of dry fuel,
46.0	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,509	=average inlet temperature
47.34	=average incoming moisture percent
5.85	=average dry moisture percent

DRYER THROUGHPUT RATE

10,027	=Total pounds of fuel burned per hour in Core and Surface Dryer
41,925	=lbs of finished product per hour (lbs of finshed product / hours)
51,952	=Pounds of material produced by the dryer per hour (dry basis, assumming fuel balances)
2,819	= weight of trim per hour at 6.3% of finished product
7,208	=weight of screened fines per hour (total fuel - trim)
13.87%	=resulting loss to fines as percentage of dryer throughput

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LOUISIANA-PACIFIC CORPORATION

PRESS REPORT - LIKE 1 ©

OPERATOR Lindon Nelson SHIFT: Day DATE: 3-20-96 CREW: C

THICKNESS 7/16 - 1/2 PRESS LOS: 10 7/16 175 1/2

OVERALL TIMER: 157-174 DECOMPRESSION TIME: 15

PRESS TEMP: 210-215 N.I.R. TOTAL REJECTS: 0

LOG COUNT: 1537

LINE SPEED	THICKNESS	FROM	TO
54'	7/16	7 0c	7:38
54'	1/2	7:38	7:00

F.C.O.S. HYD. RADIATOR: 8:0C TIME

PRESS BLOWN DOWN: 8:21

SPINNER HEADS FLUSHED: X TIME

SURFACE BLENDER HOSED: X TIME

FORMER HYD RADIATOR: X TIME

3/8 - 376,377

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
7:02	7:16				24	Top Surface Transfer Conv. tripped out causing Flow-Stand Haul-Up to stop

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

24

52

PRESS REPORT - LINE 1 (2) DATE: 3-20-96

OPERATOR Terry SHIFT: Night CREW: A

THICKNESS 1/2 - 7/16 - 1/4 PRESS LDS: 42½ 26¼ 12 6 7/16

OVERALL TIMER: 174 - 157 DECOMPRESSION TIME: 15 - 15

PRESS TEMP: 215 TOTAL REJECTS:

LOG COUNT: 1100

LINE SPEED	THKNS.	FROM	TO
55	1/2	700	935
55	7/16	935	1250
50	1/4 &	1250	235
55	7/16	235	500
52	7/16	500	630
58	7/16	630	

F.C.O.S. HYD. RADIATOR: _____ TIME

PRESS BLOWN DOWN: _____

SPINNER HEADS FLUSHED: _____ TIME

SURFACE BLENDER HOSED: _____ TIME

FORMER HYD RADIATOR: _____ TIME

338438

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
240	242	2				Jam up at Spins

DOWNTIME CODE: M - MECHANICAL (2) E - ELECTRICAL O - OPERATOR

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LOUISIANA-PACIFIC CORPORATION

PRESS REPORT: ~~1~~ 2

OPERATOR: Underwood

DATE: 3-21-96

SHIFT: 1

CREW: C

THICKNESS: 7/16 - 1/2

PRESS LOS: 8 3/4 180 1/2

OVERALL TIMER: 167-174

DECOMPRESSION TIME: 15

PRESS TEMP: 210-215 N.O.R.

TOTAL REJECTS: 0

LOG COUNT: 1436

LINE SPEED	THICKNESS	FROM	TO
58'	7/16	7:00	7:32
54	1/2	7:32	7:00

F.C.O.S. HYD. RADIATOR: 8:00 TIME

PRESS BLOWN DOWN: 8:12

SPINNER HEADS FLUSHED: * TIME

SURFACE BLENDER HOSED: * TIME

FORMER HYD RADIATOR: * TIME

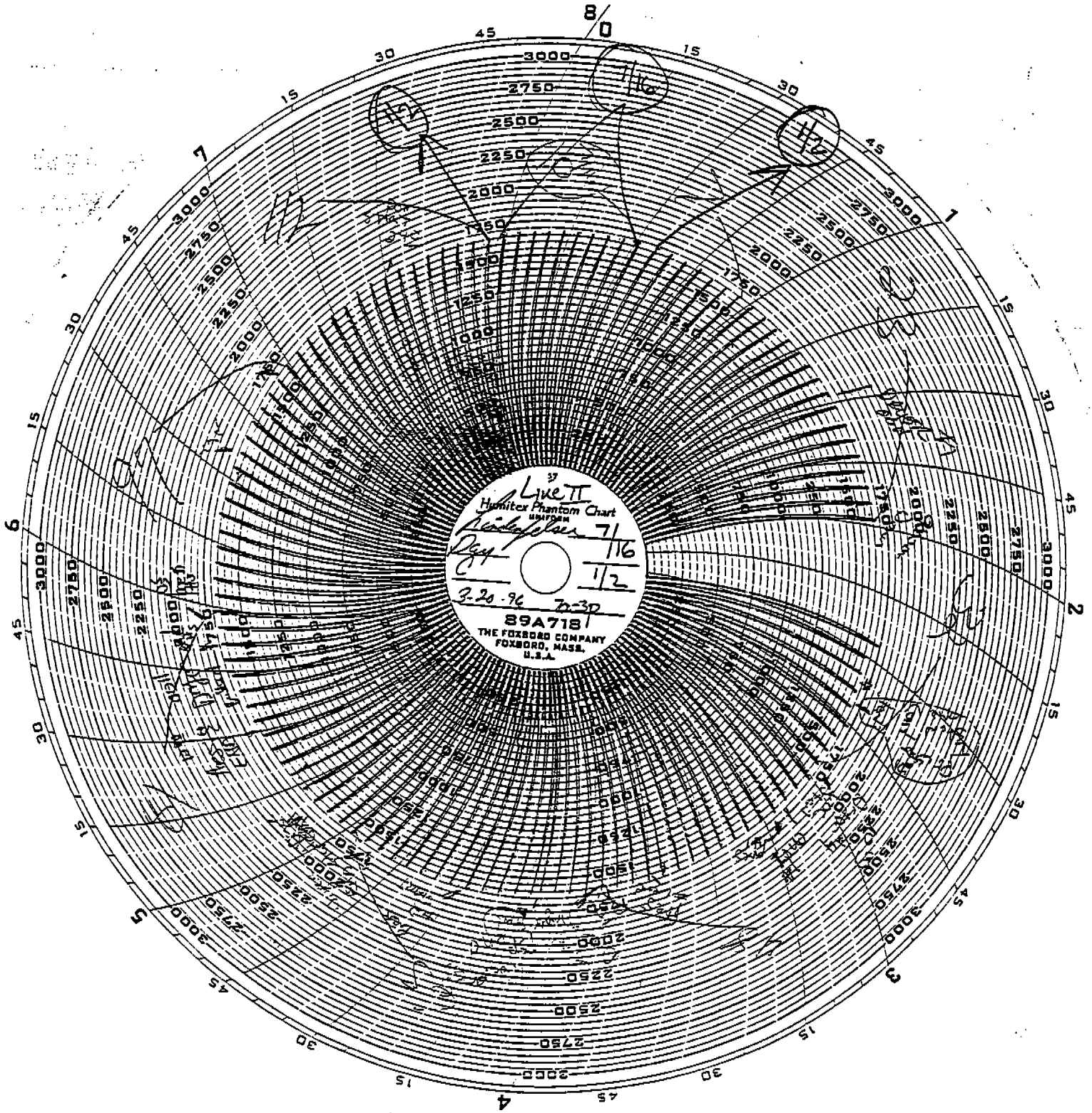
3/8 = 382,967

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
7:48	53				5	Baghouse outside plugged under Airlock.
					4	Same as above.
7:36	40				2	Baghouse related.
7:50	52					

DOWNTIME CODE: M - MECHANICAL (11) E - ELECTRICAL O - OPERATOR

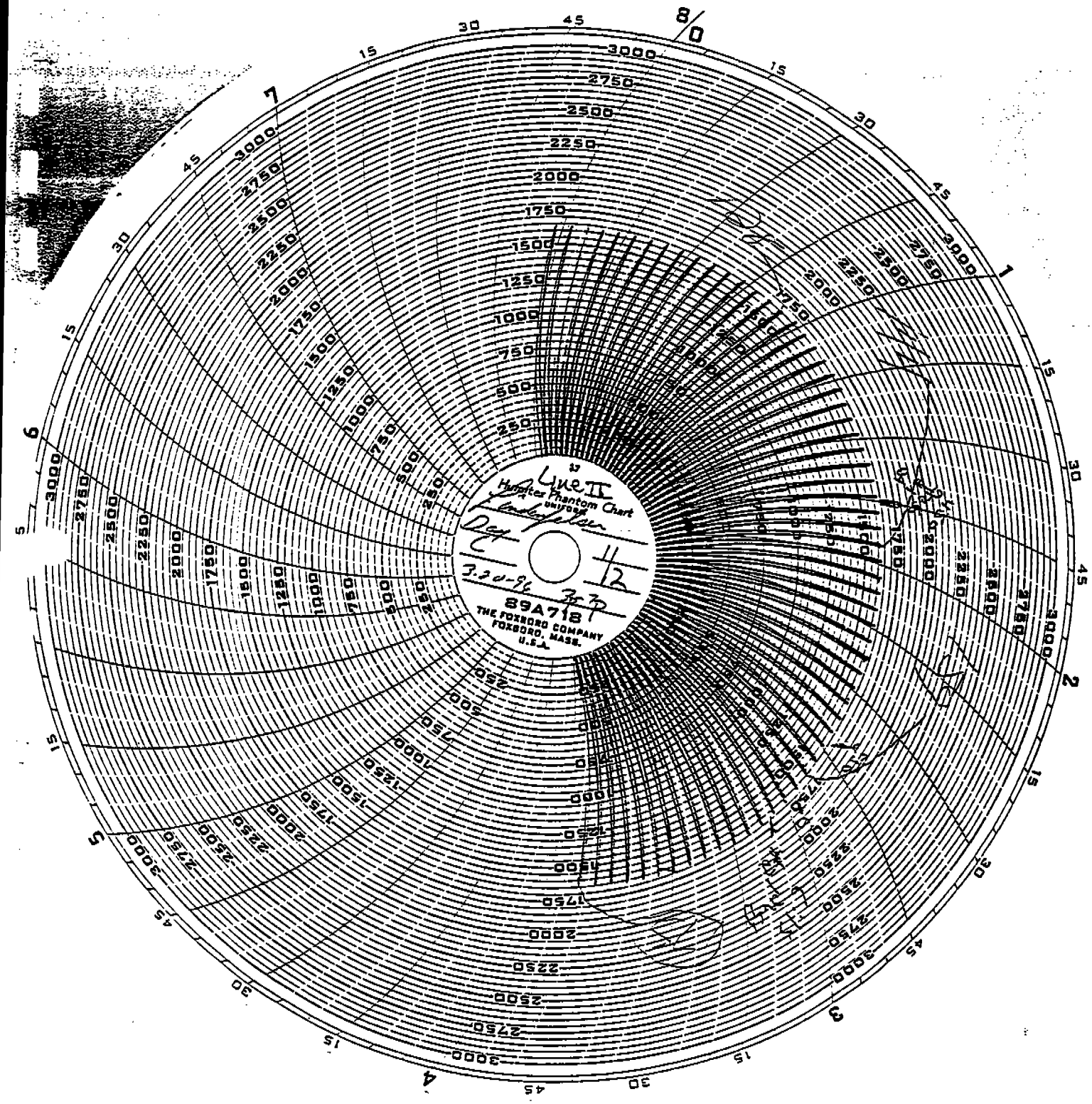
54

LINE II
PRESS CHART
3/20/96
0700 - 1500



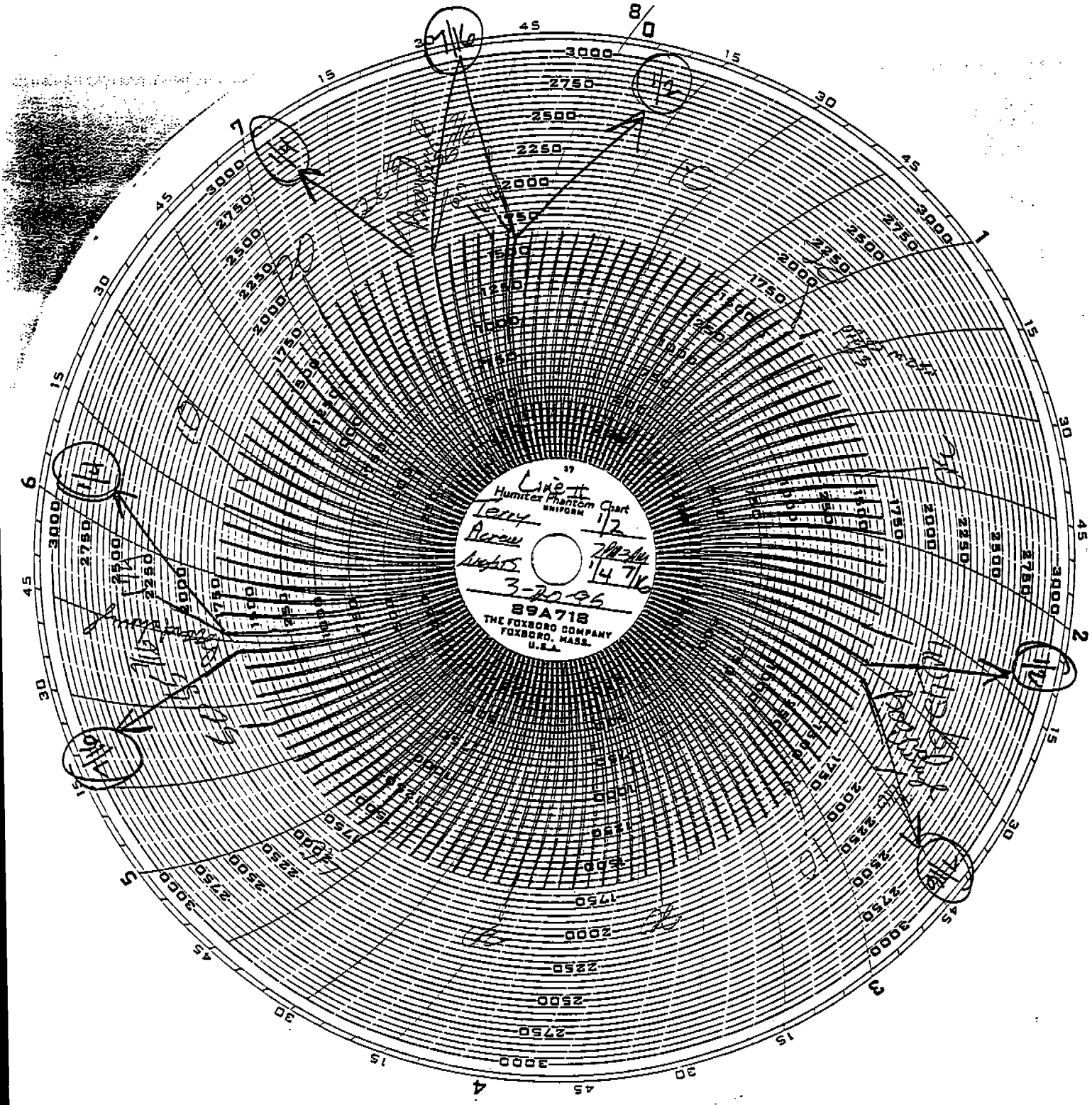
55

LINE II
PRESS CHART
3/20/96
1500 - 1900



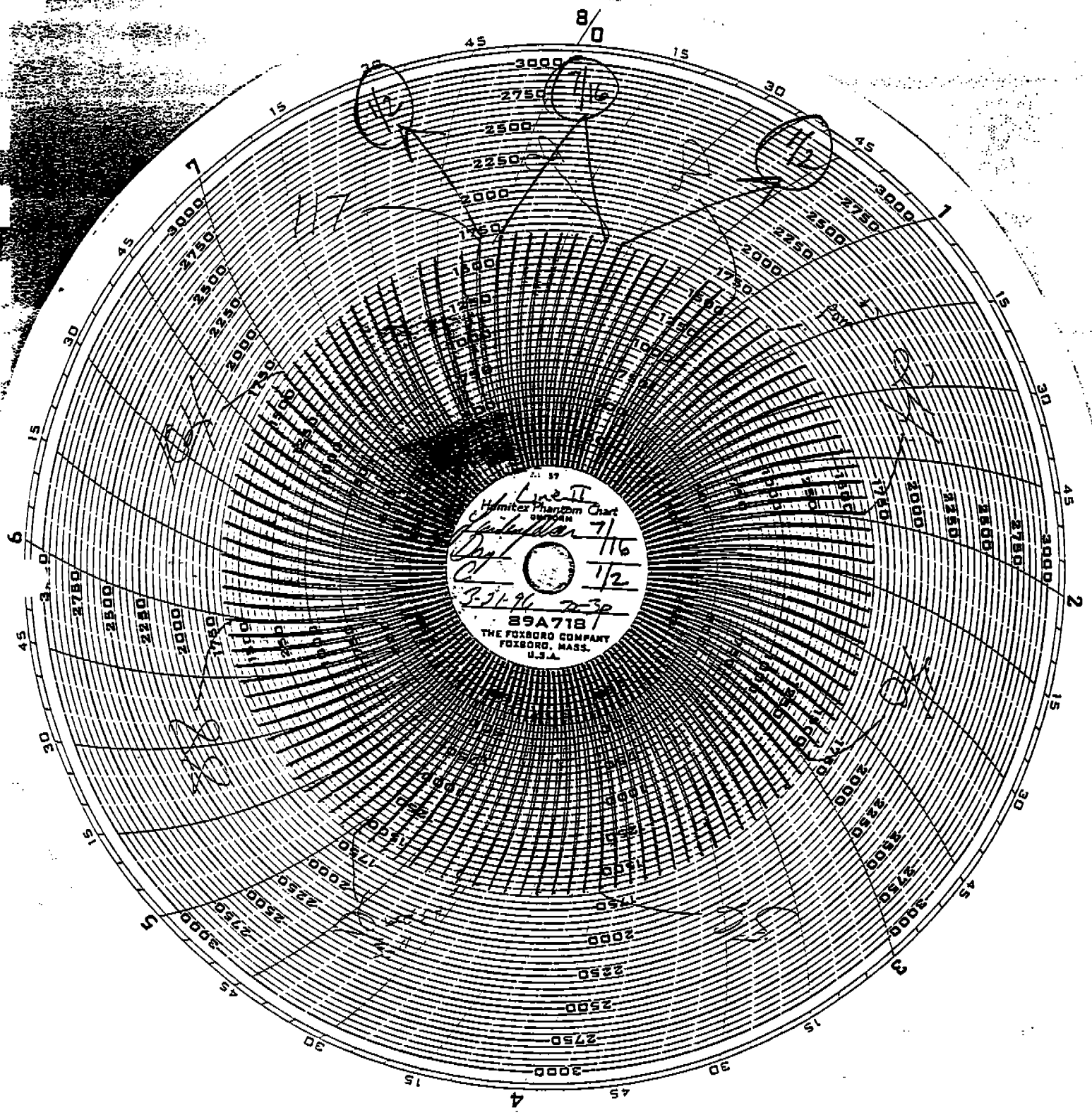
56

LINE II
PRESS CHART
3/20/96
1900-0300



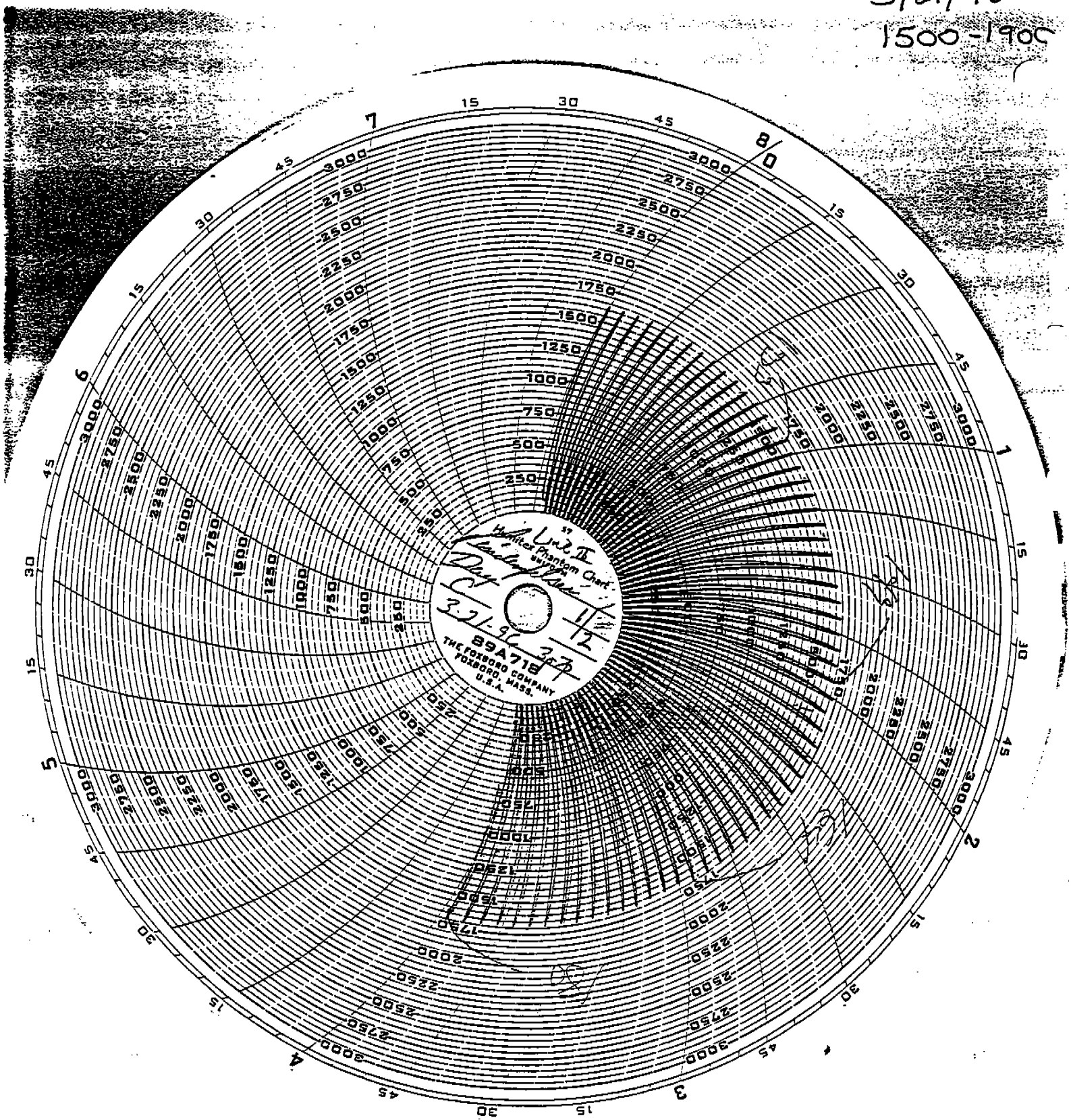
57

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



58

LINE II
PRESS CHART
3/21/96
1500-1900



59

Dryer DATA
fuel calibration lb/coun face core

date 3/20/96
by
page 1 of

TIME	FACE OUT. SET POINT	FACE FEED RATE	FACE INLET TEMP	FACE OUTLET TEMP	FACE FUEL COUNT	FACE WET BIN LEVEL	CORE OUT. SET POINT	CORE FEED RATE	CORE INLET TEMP	CORE OUTLET TEMP	CORE FUEL COUNT	CORE WET BIN LEVEL	DRY BIN LEVEL FACE	DRY BIN LEVEL CORE	EVERY HOUR FLAKE MOISTURE IN	FLAKE MOISTURE FACE	FLAKE MOISTURE CORE
8:30	252	63	1404	250	1659	60%	213	67	1547	209	765	60%	80%	70%	45.4	5.2	5.4
8:45	252	63	1411	250	7662	70%	213	67	1505	208	890	60%	80%	70%		5.4	5.4
9:00	252	63	1586	250	873	80%	213	67	1500	213	1019	70%	90%	80%		5.2	5.3
9:15		DRYER DOWN				100%		DRYER DOWN				100%	100%	100%			
9:30		DRYER DOWN				100%		DRYER DOWN				100%	100%	100%	50.2		
9:45	252	62	1197	249	1028	100%	213	63	1187	212	1211	100%	75%	75%		6.0	6.4
10:00	252	67	1383	248	1133	100%	213	67	1437	211	1329	100%	75%	75%		5.6	5.8
10:15	250	70	1394	245	1284	90%	213	68	1488	211	1501	90%	75%	75%		5.2	5.6
10:30	250	70	1433	247	13666	100%	213	68	1457	214	1588	90%	75%	75%	46.4	5.6	5.8
10:45	250	70	1461	250	1492	100%	215	68	1467	214	1731	100%	75%	75%		5.4	5.7
11:00	250	70	1466	247	16617	100%	215	68	1489	214	1677	100%	75%	75%		5.8	6.0
11:15	252	70	1453	246	1752	100%	215	68	1467	211	2030	100%	75%	75%		5.1	5.6
11:30	252	70	1494	251	1858	100%	215	68	1439	212	21466	100%	75%	75%	47.6	4.8	5.0
11:45	252	70	1425	251	1984	100%	215	68	1473	213	2291	100%	75%	80%		4.7	5.3
12:00	250	70	1459	250	20089	90%	215	68	1458	215	2409	90%	75%	80%		4.9	5.2
12:15	250	70	1467	246	2212	70%	215	68	1452	213	2547	70%	75%	80%		5.5	5.8
12:30	250	70	1496	245	2329	70%	215	68	1436	214	26766	70%	75%	80%	49.2	5.8	5.5
12:45	250	70	1498	248	2461	60%	215	68	1475	211	2830	60%	75%	80%		5.0	5.5
1:00	250	70	1489	249	2546	60%	215	68	1476	214	2936	60%	75%	80%		50	60
1:15	250	70	1489	241	2700	60%	213	68	1530	211	30316	60%	80%	80%	[redacted]	5.6	5.8
1:30	250	70	1455	244	28?2	60%	215	68	1545	211	3222	60%	80%	80%	48.1	6.2	6.0
1:45	250	70	1455	247	2942	60%	215	68	1522	213	33541	60%	80%	80%		5.4	5.8
2:00	253	70	1444	246	30662	65%	213	68	1496	215	34804	65%	75%	80%		5.9	6.2
2:15	253	70	1478	251	3192	65%	215	68	1477	214	36?5	65%	75%	75%		4.9	5.8
2:30	253	70	1457	252	3310	65%	215	68	1513	214	3753	65%	80%	80%	49.2	5.0	5.8
2:45	253	70	1423	251	3420	65%	215	68	1555	213	3882	65%	75%	80%		5.0	5.7
3:00	253	70	1459	250	3531	65%	215	68	1458	213	4011	65%	75%	80%		4.9	5.1
3:15	253	70	1538	251	36416	60%	215	68	1555	214	4143	60%	75%	80%		5.3	5.9
3:30	253	70	1453	250	3762	70%	215	68	16?4	214	4274	70%	75%	90%	52.8	4.8	5.5
3:45	253	70	1485	251	3885	70%	215	68	1594	211	4419	70%	75%	90%		5.2	5.7
4:00	253	70	1528	250	41000	75%	215	68	1549	208	4545	75%	80%	80%		5.2	6.0
4:15	253	70	1491	250	4119	75%	215	66	1533	213	41689	75%	75%	90%		4.9	5.4
4:30	253	70	15316	249	4227	75%	215	65	1546	216	41810	75%	75%	90%	46.2	5.0	5.5
4:45	251	70	1490	248	43?9	80%	215	63	1491	214	4957	80%	80%	90%		5.1	5.6
5:00	251	70	1501	250	44153	90%	216	63	14154	215	5074	90%	80%	90%		6.0	5.9
5:15	251	70	1425	250	4578	75	216	63	1478	214	5222	75%	90%	90%		51	56

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Dryer DATA
fuel calibration lb/coun face core

date 3/20/96
by
page 2 of 2

TIME	FACE						CORE						DRY BIN LEVEL		EVERY HOUR FLAKE MOISTURE		
	OUT. SET POINT	FEED RATE	INLET TEMP	OUTLET TEMP	FUEL COUNT	WET BIN LEVEL	OUT. SET POINT	FEED RATE	INLET TEMP	OUTLET TEMP	FUEL COUNT	WET BIN LEVEL	FACE	CORE	IN	FACE	CORE
5:30	251	70	1370	248	46902	75%	216	63	1466	213	5341	75%	610%	815%	50.2	5.3	5.7
5:45	251	70	1437	248	47914	100	216	63	1380	214	5463	100	90	805%		5.2	5.6
6:00	251	70	1550	245	4910	100	216	63	1409	213	5590	100	100	90		5.7	6.3
6:15																	
6:30																	
6:45																	

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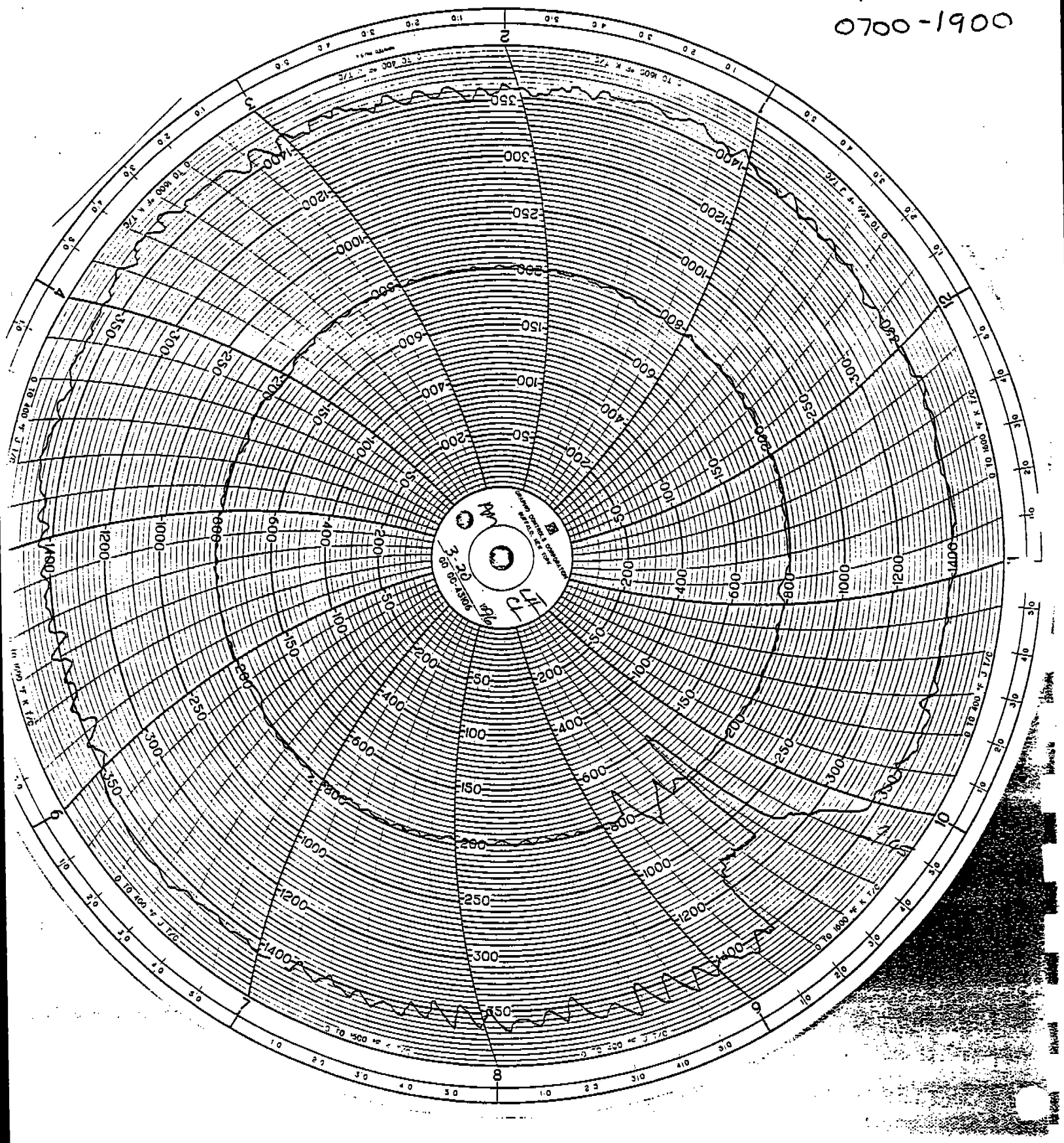
69

Dryer DATA
fuel calibration lb/coun face core

date 3/21/96
by
page 1 of

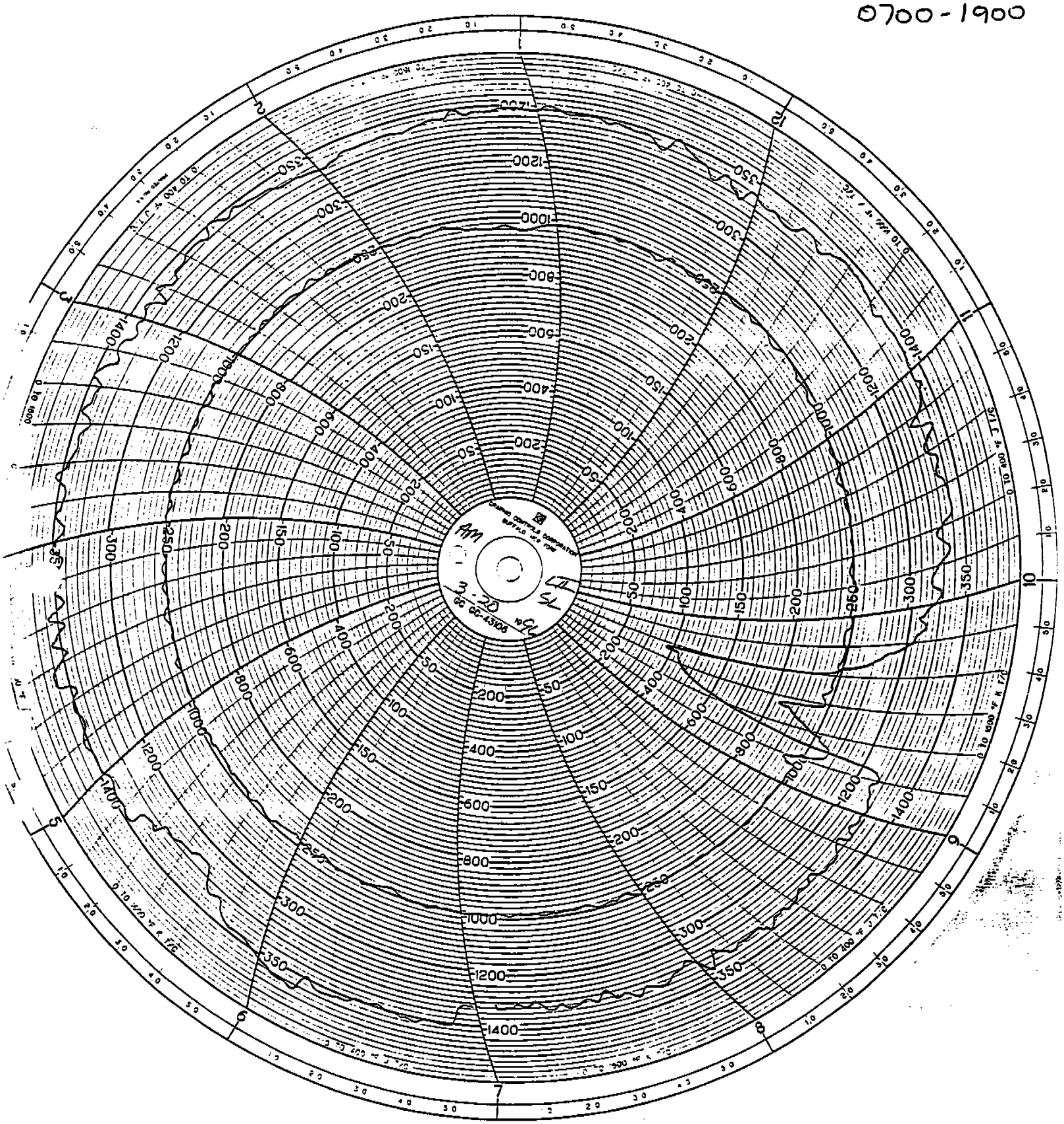
TIME	FACE OUT. SET POINT	FACE FEED RATE	FACE INLET TEMP	FACE OUTLET TEMP	FACE FUEL COUNT	FACE WET BIN LEVEL	CORE OUT. SET POINT	CORE FEED RATE	CORE INLET TEMP	CORE OUTLET TEMP	CORE FUEL COUNT	CORE WET BIN LEVEL	DRY BIN LEVEL FACE	DRY BIN LEVEL CORE	EVERY HOUR FLAKE MOISTURE IN	FACE	CORE
8:15	244	71	1382	242	578	100%	213	66	1399	211	520	100%	80%	80%	46.9	5.6	7.4
8:30	244	71	1379	241	684	100%	213	67	1453	212	643	100%	75%	75%		5.6	6.0
8:45	244	71	1419	243	796	90%	213	67	1473	212	769	90%	80%	75%		5.1	5.9
9:00	244	71	1497	242	914	80%	213	69	1521	211	905	80%	80%	75%		5.2	6.0
9:15	244	71	1503	241	1041	40%	213	69	1539	210	1043	80%	90%	75%	46.4	5.5	6.3
9:30	244	71	1462	242	1153	80%	213	69	1573	209	1170	80%	90%	75%		5.1	6.2
9:45	244	71	1453	244	1287	70%	213	69	1539	209	1318	70%	90%	80%		5.0	6.4
10:00	244	70	1455	240	1398	70%	213	69	1542	209	1443	70%	90%	80%		5.7	6.3
10:15	244	70	1460	242	1517	70%	213	67	1549	211	1578	70%	90%	90%	48.2	5.9	6.2
10:30	244	70	1455	242	1636	70%	213	67	1536	209	1709	70%	90%	90%		5.8	5.9
10:45	244	70	1400	242	1754	70%	213	67	1484	213	1844	70%	90%	90%		5.8	5.3
11:00	244	70	1385	241	1877	60%	217	65	1469	213	1981	70%	90%	90%		5.5	5.0
11:15	244	70	1396	241	2001	60%	217	65	1476	215	2126	70%	90%	90%	48.0	5.9	5.5
11:30	246	70	1392	246	2121	60%	217	65	1484	215	2263	70%	90%	90%		6.1	5.3
11:45	246	70	1318	232	2254	60%	217	65	1447	214	2405	70%	90%	90%		5.8	5.4
12:00	246	68	1377	238	2372	70%	217	65	1457	213	2534	60%	80%	80%		6.8	5.6
12:15	248	68	1375	241	2498	70%	219	65	1432	216	2676	70%	80%	80%	45.0	5.8	5.2
12:30	248	68	1419	245	2612	70%	219	65	1480	217	2803	80%	80%	80%		6.1	5.3
12:45	248	68	1437	240	2729	75%	219	65	1528	219	2926	75%	75%	75%		7.1	6.4
1:00	251	68	1373	250	2878	75%	219	66	1528	210	3084	80%	75%	75%		5.7	8.3
1:15	251	68	1452	248	2976	75%	220	66	1518	219	3205	80%	75%	75%	46.2	5.3	5.9
1:30	253	71	1441	252	3105	60%	221	66	1558	220	3346	70%	75%	80%		5.1	5.4
1:45	253	71	1466	251	3223	50%	221	66	1553	219	3475	60%	70%	75%		5.5	5.8
2:00	253	71	1437	250	3357	50%	221	66	1500	220	3613	60%	70%	75%		5.6	6.4
2:15	255	71	1381	250	3419	50%	221	66	1457	220	3743	60%	70%	75%		5.3	5.3

LINE II
CORE DRYER
3/20/96
0700-1900

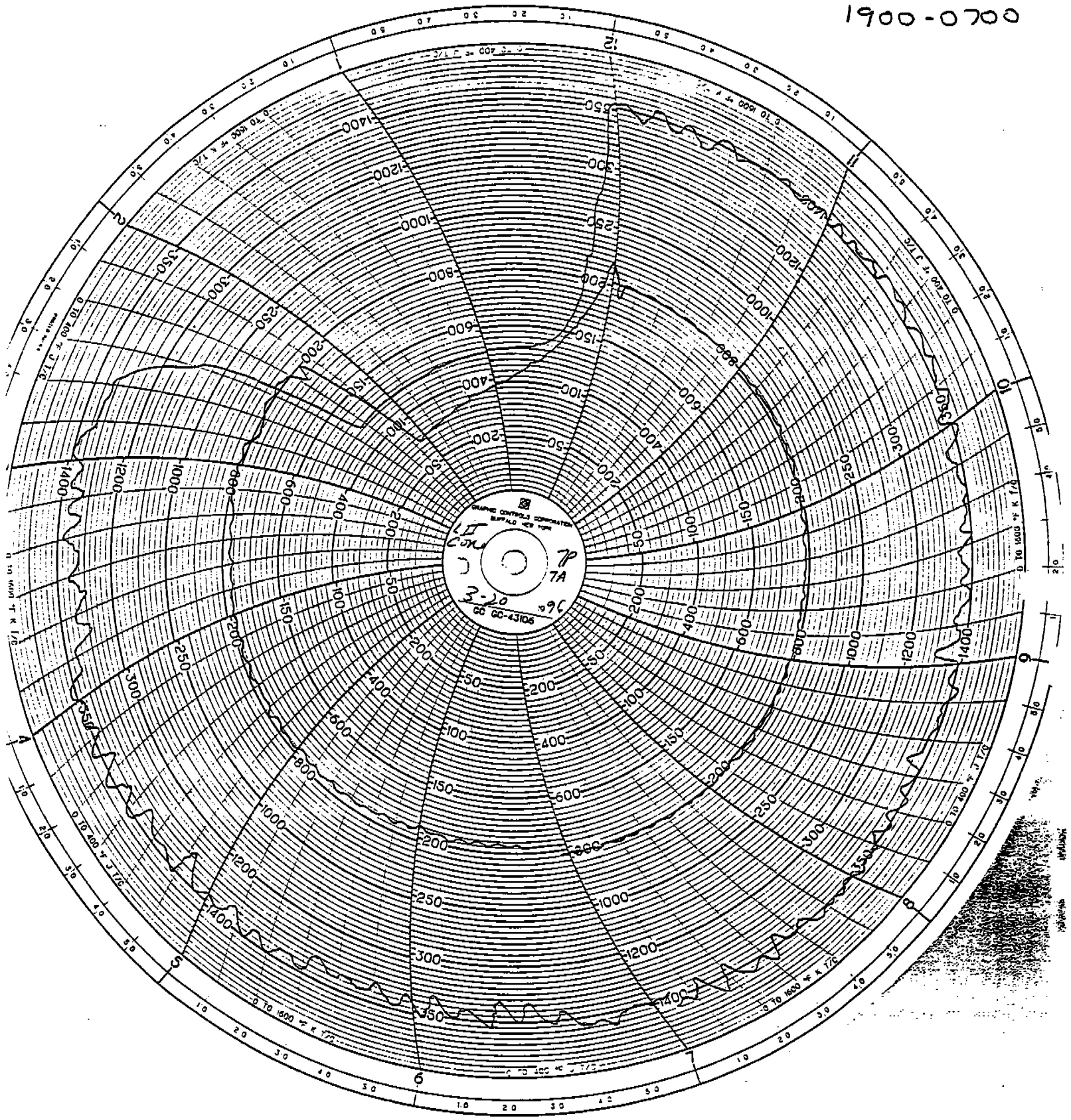


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LINE II
SURFACE DRYER
3/20/96
0700-1900

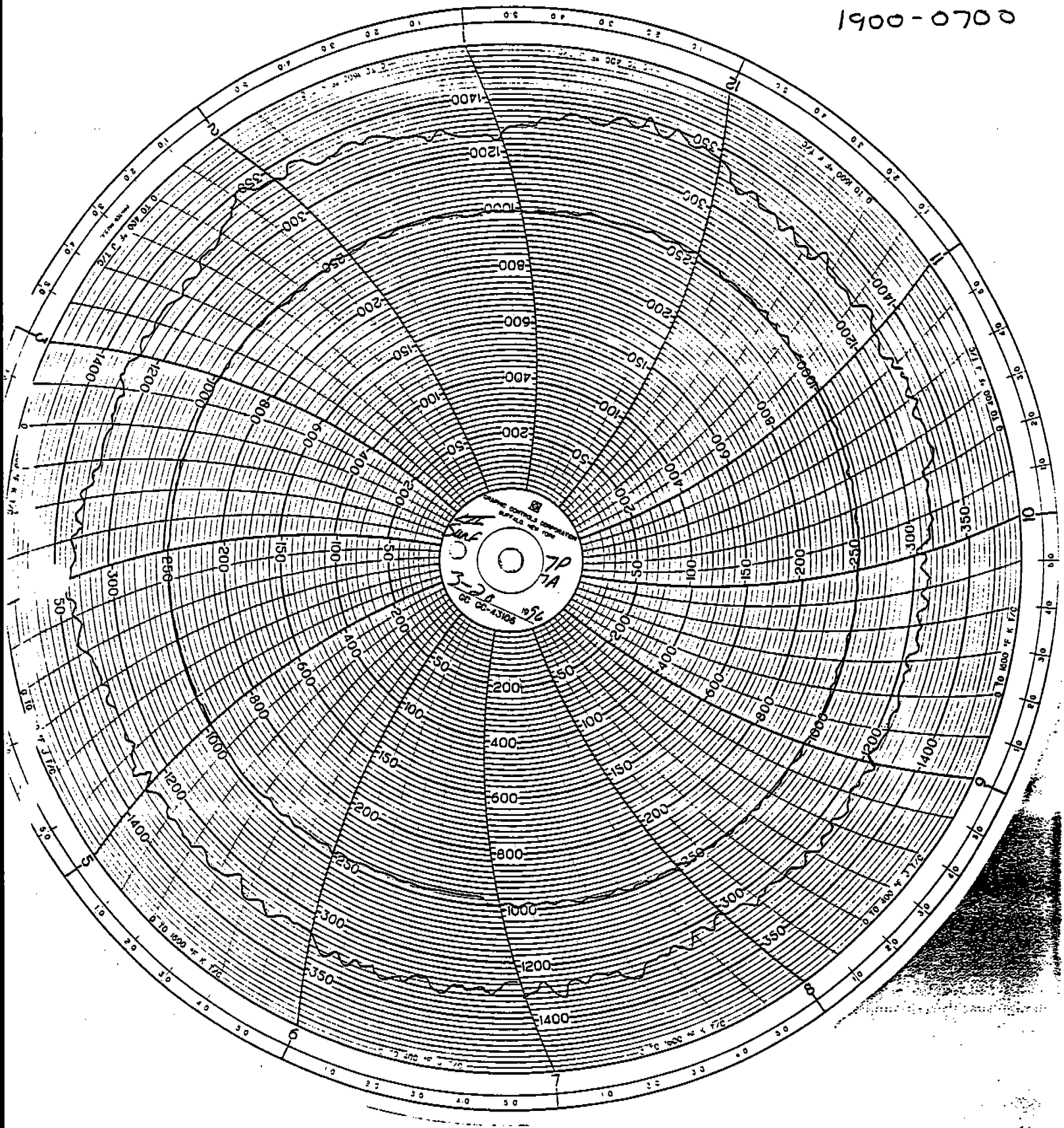


LINE II
CORE DRYER
3/20/96
1900-0700



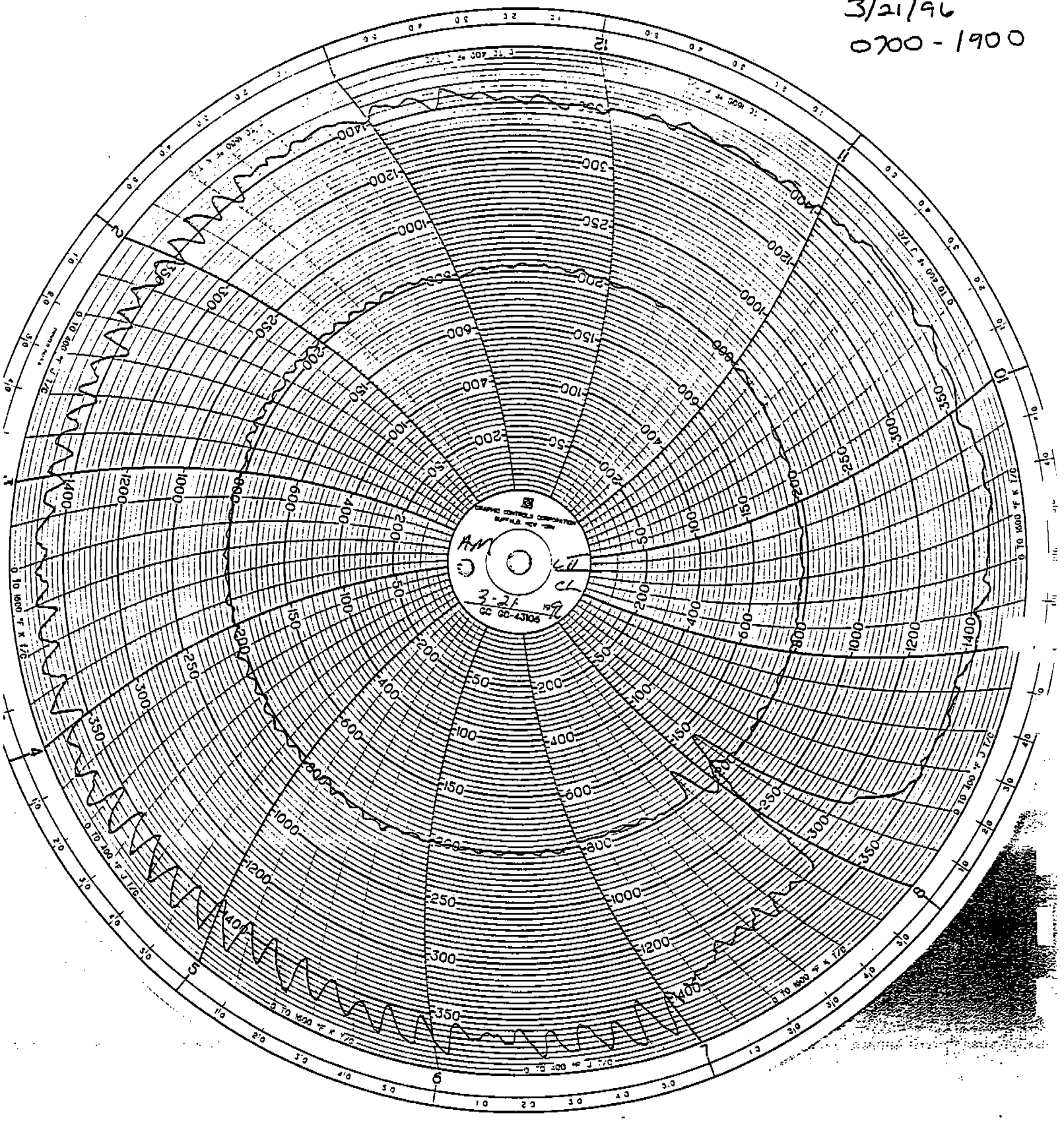
65

LINE II
SURFACE DRYER
3/20/96
1900-0700



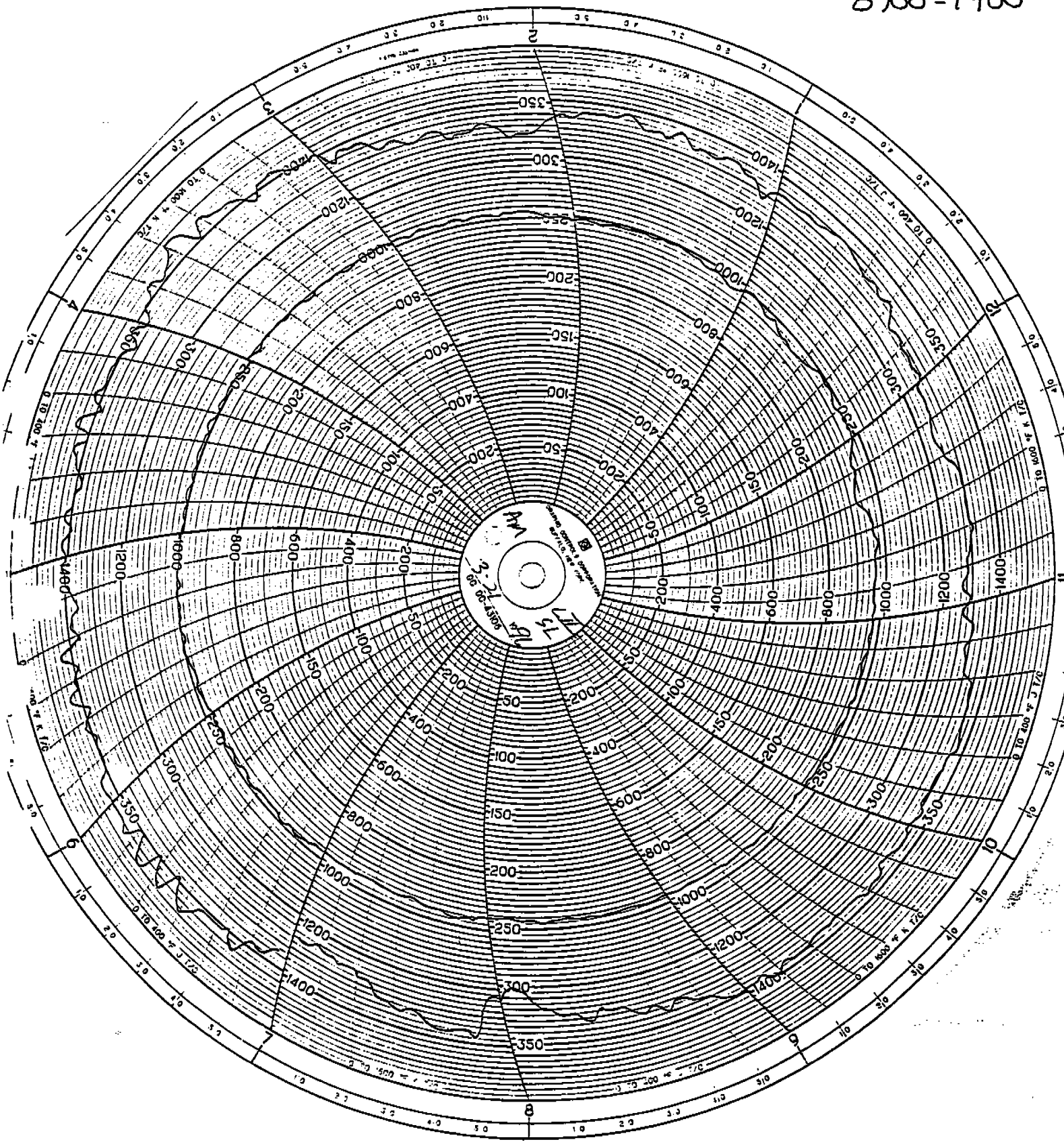
66

LINE II
CORE DRYER
3/21/96
0700 - 1900



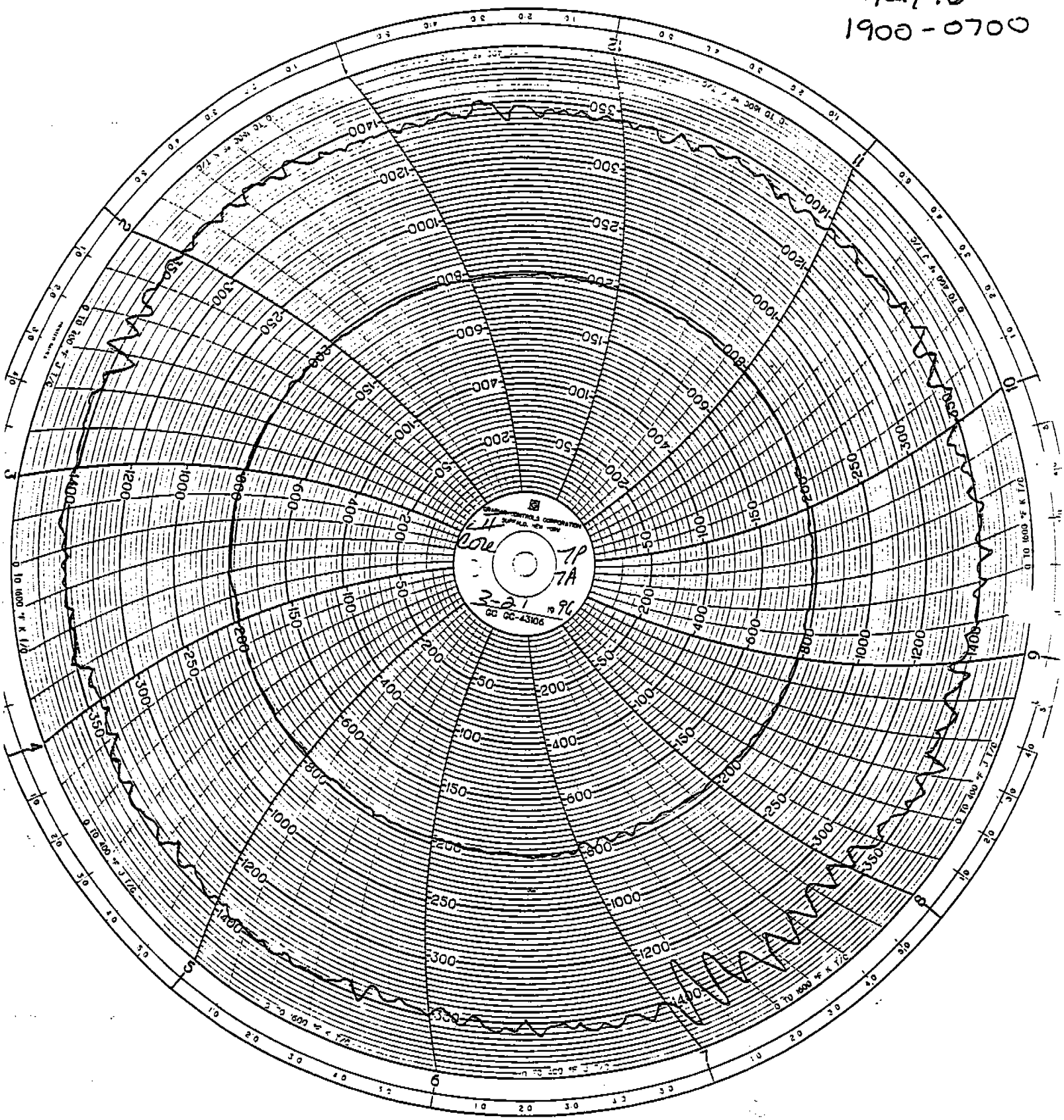
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LINE II
SURFACE DRYER
3/21/96
0700-1900



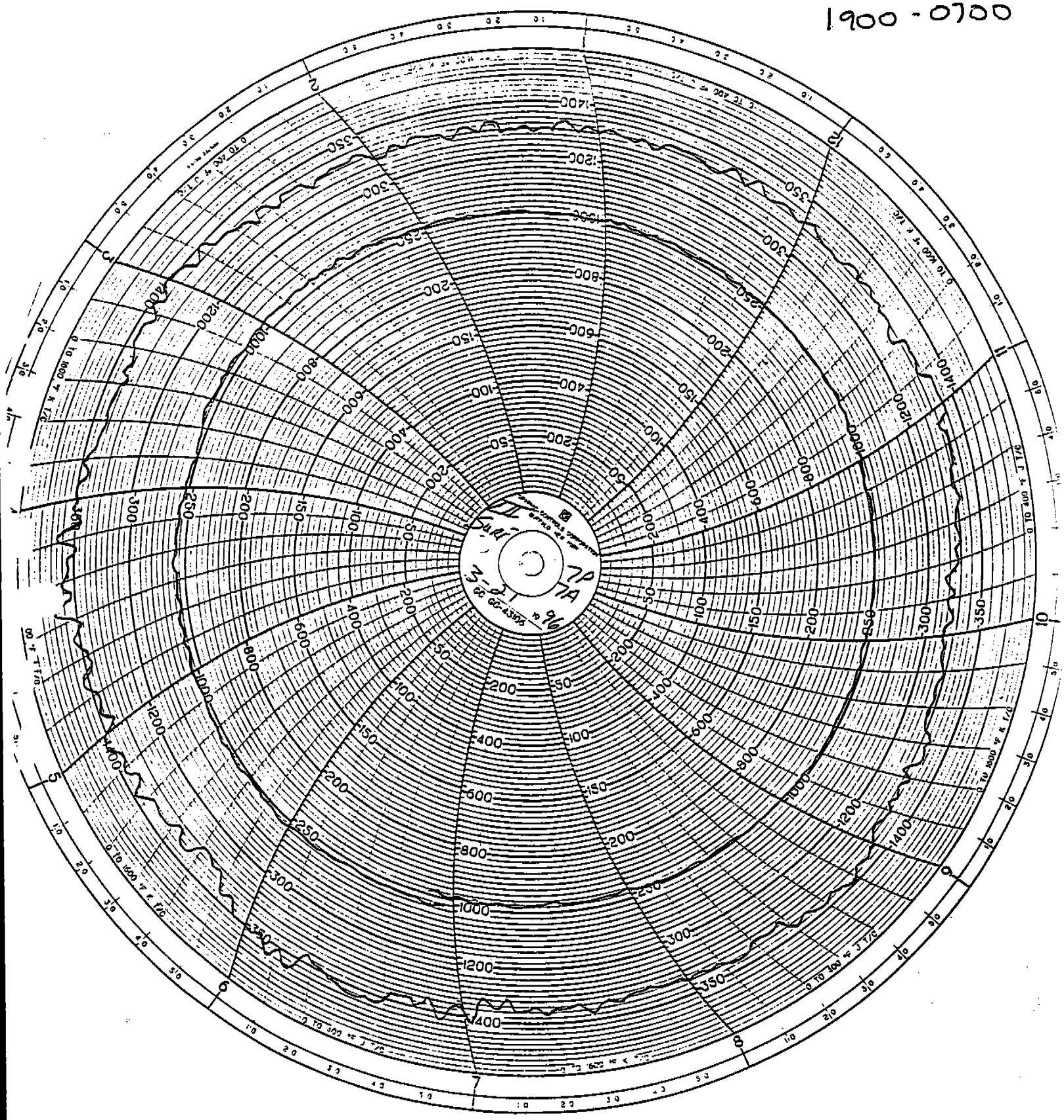
68

LINE II
CORE DRYER
3/21/96
1900-0700

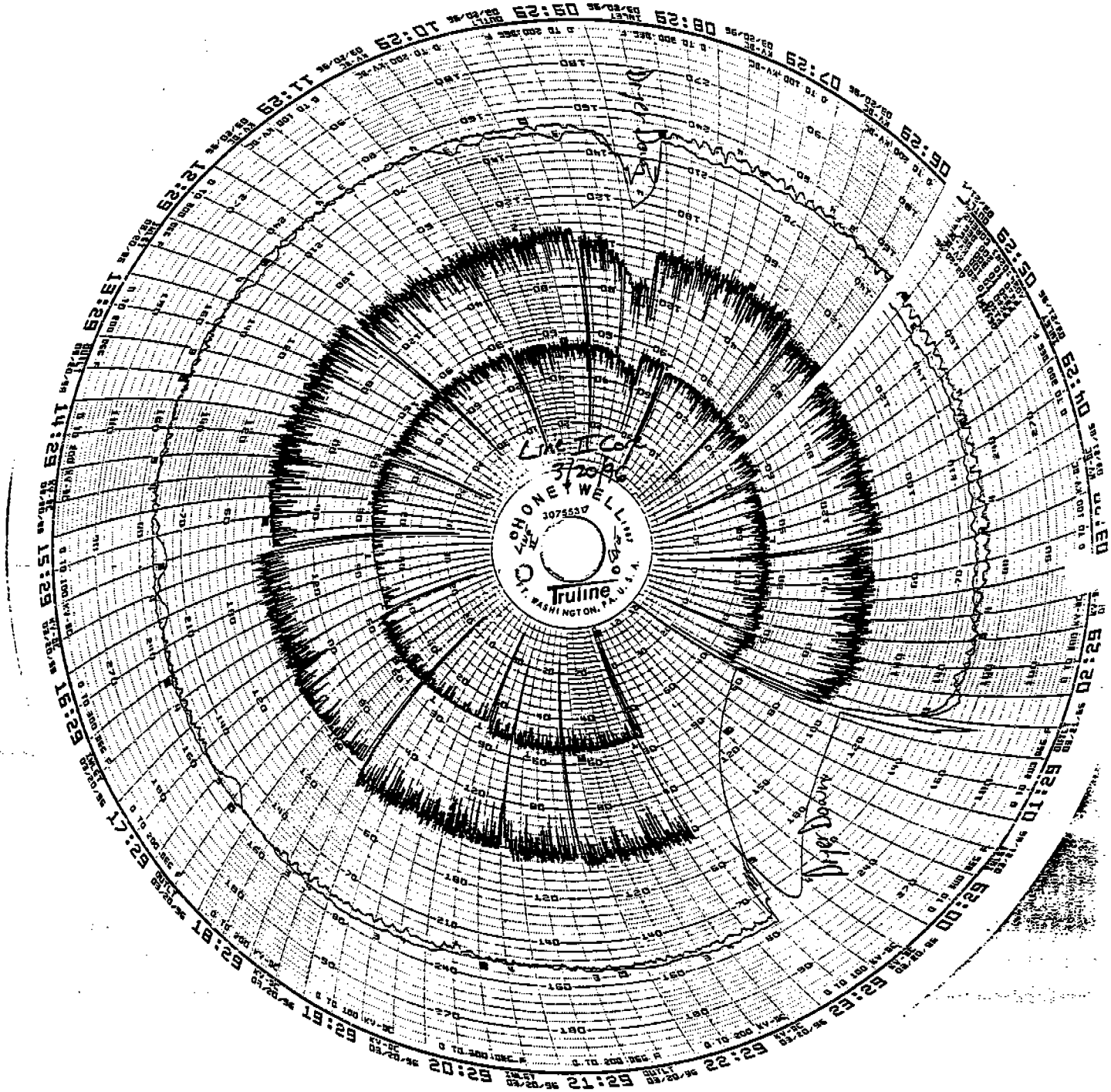


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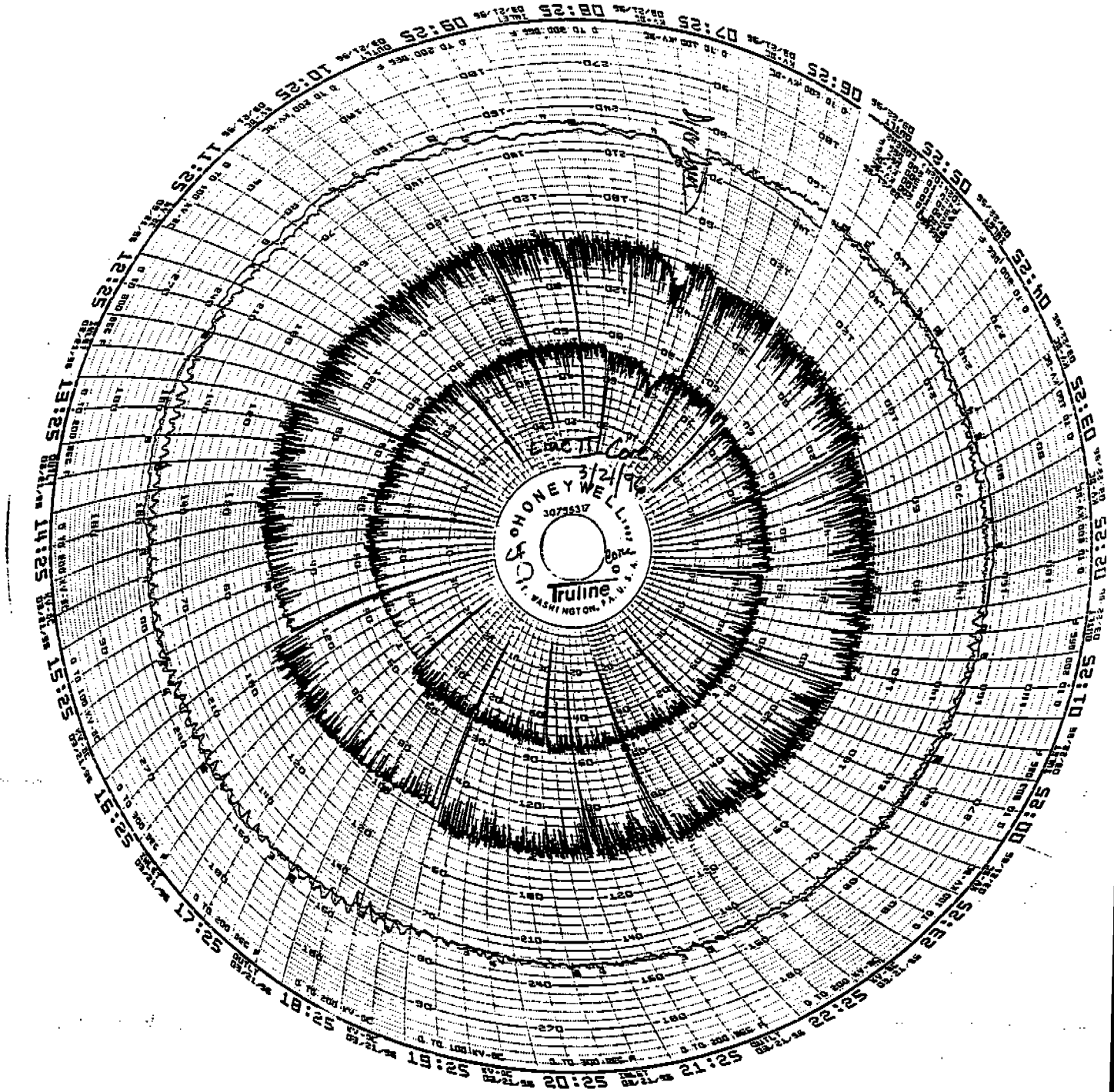
LINE II
SURFACE DRYER
3/21/96
1900 - 0700



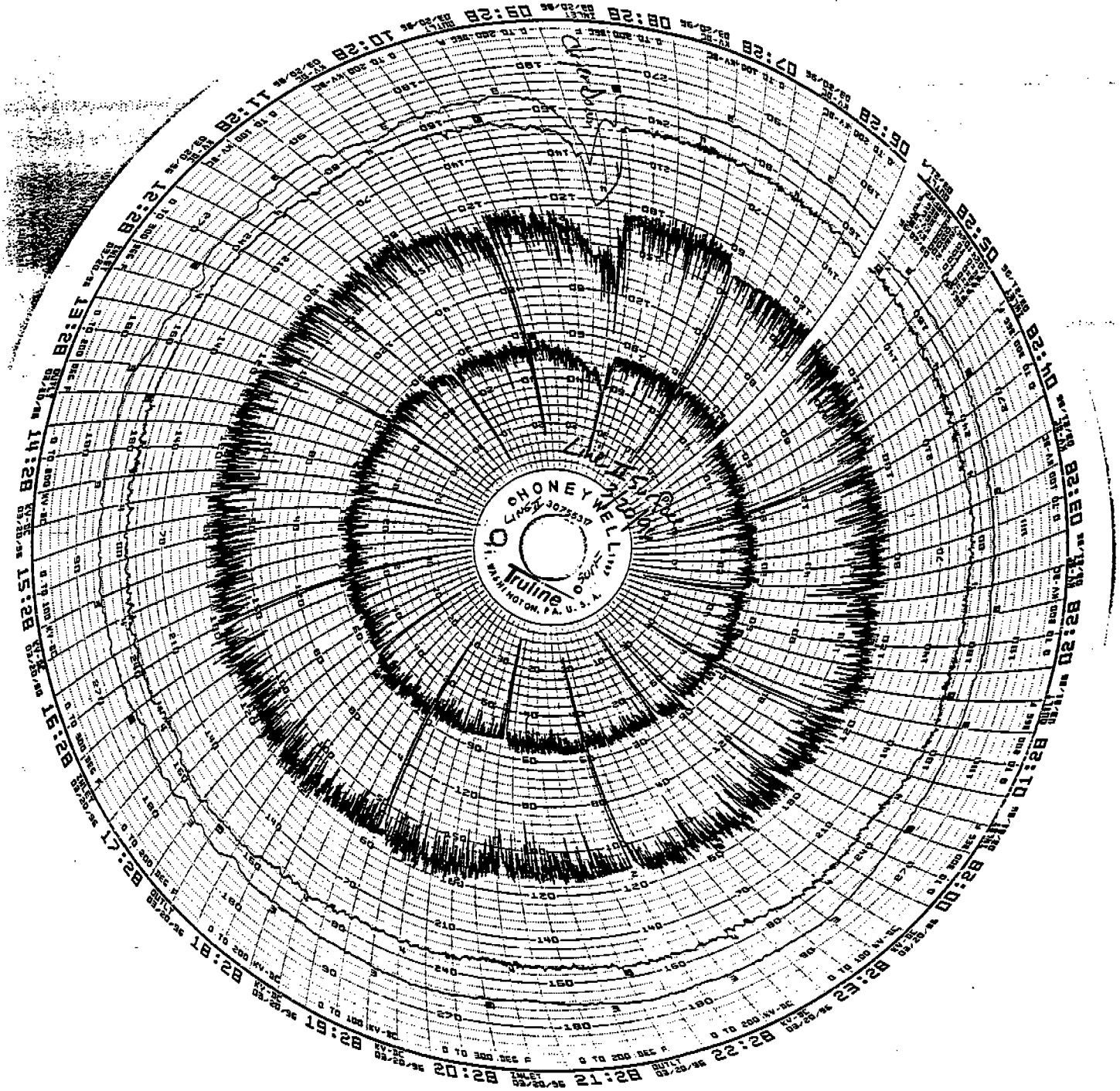
LINE II
CORE E-TUBE
3/20/96



LINE II
CORE E-TUBE
3/21/96

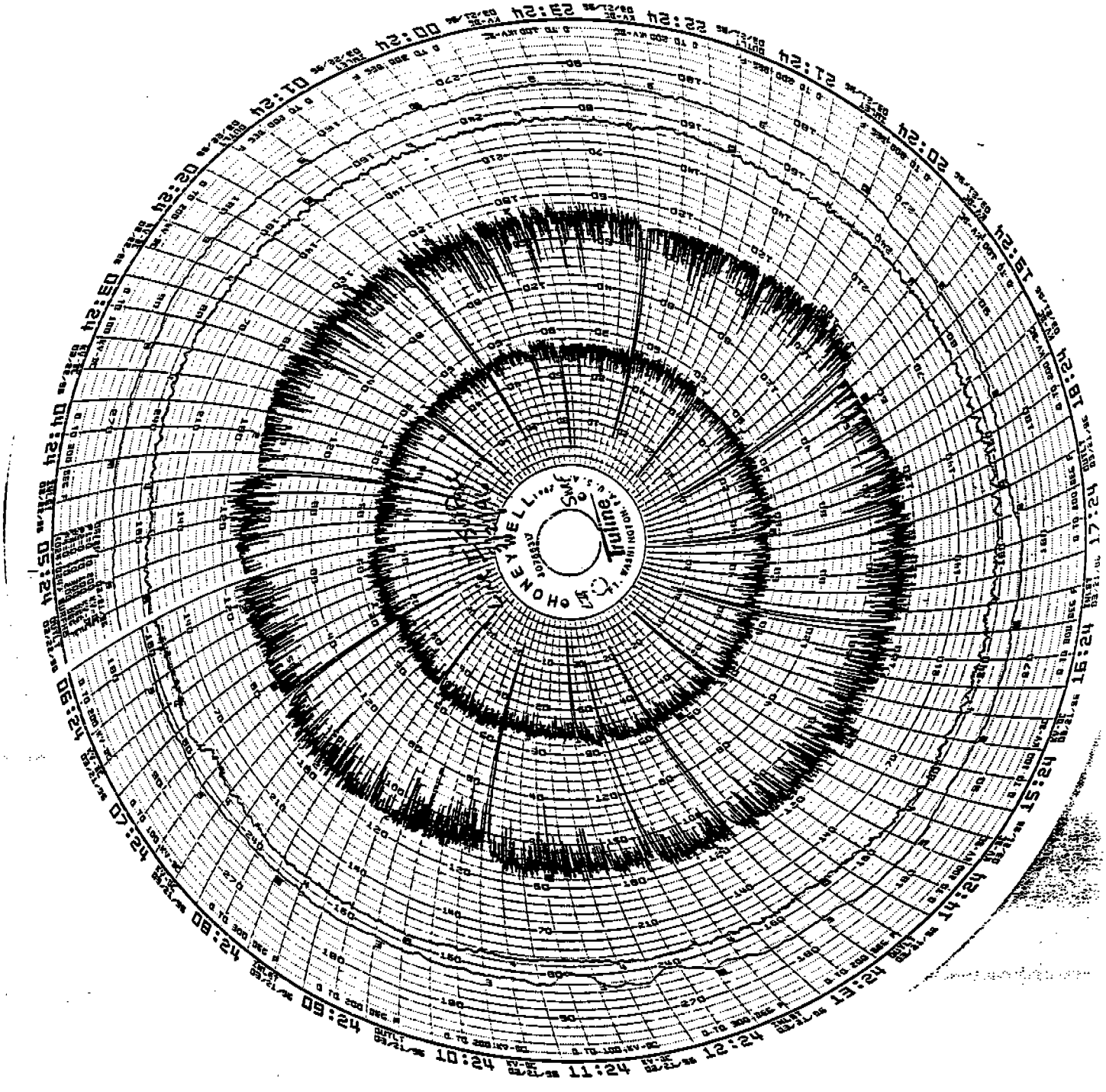


Line II
Surf. E-Tube
3/20/96



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LINE II
SURF. E-TUBE
3/21/96



LII FORMER RTO 3/20/96

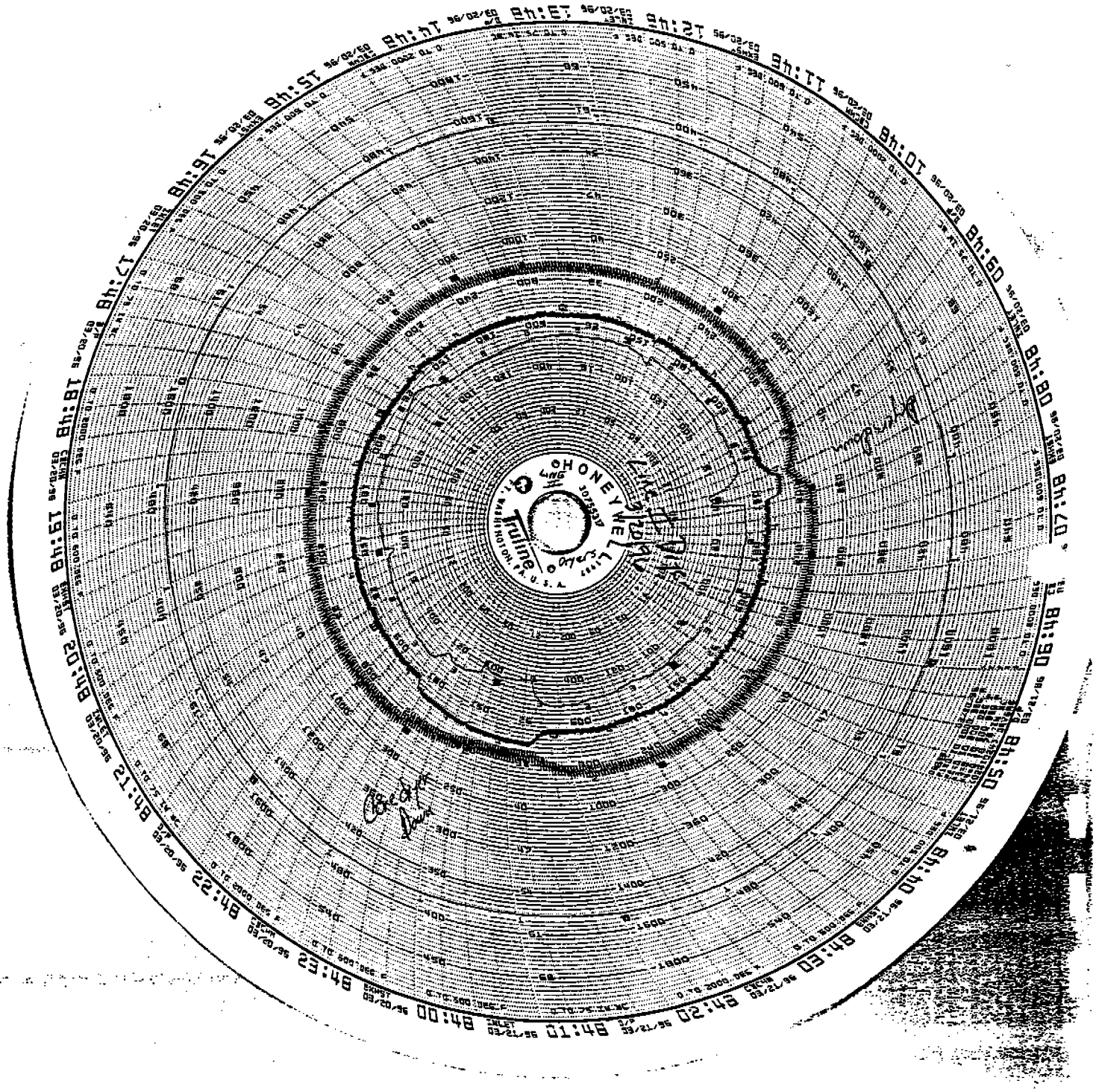
RECORD EVERY 15 MIN. HAYWARD AIR TESTING WORKSHEET

Time	RTO Chamber Bed Temp.					Inlet	Burners		Combust.	Exhaust	Press.	WATER
	#1	#2	#3	#4	#5	Press.	B#1	B#2	Temp.	Temp.	Drop	Usage
8:30	409	380	426	338	412	1.3	1575	1597	1531	257	24.0	
8:45	409	380	431	339	416	1.4	1555	1556	1523	257	23.6	10210
9:00	418	377	433	330	415	1.5	1580	1584	1530	248	23.9	
9:15			DRyer					DOWN				
9:30			DRyer					DOWN				
9:45	394	361	408	315	395	1.3	1572	1591	1506	245	24.8	10560
10:00	401	365	417	313	399	1.0	1587	1594	1523	245	23.9	
10:15	403	371	424	329	409	1.1	1582	1589	1520	249	23.4	10740
10:30	407	372	422	322	405	1.4	1576	1599	1531	245	24.0	
10:45	406	374	426	330	412	1.1	1563	1590	1529	253	23.7	10970
11:00	410	373	425	318	407	1.2	1569	1569	1531	246	24.4	
11:15	410	373	430	317	409	1.5	1577	1584	1533	248	24.2	11090
11:30	409	375	430	329	414	0.9	1565	1577	1532	252	23.9	NO H2O
11:45	411	375	430	326	413	0.2	1574	1586	1537	251	23.9	
12:00	411	375	430	327	413	0.7	1577	1585	1539	251	23.5	NO H2O
12:15	412	376	426	320	408	1.1	1582	1597	1534	254	23.8	
12:30	410	378	429	335	414	1.5	1562	1558	1524	256	23.5	NO H2O
12:45	410	380	426	339	412	1.0	1560	1559	1527	260	24.2	
1:00	410	380	426	337	411	0.7	1559	1561	1528	260	24.2	NO H2O
1:15	411	379	429	335	413	1.5	1559	1566	1531	254	23.4	
1:30	414	378	432	329	413	0.9	1567	1573	1535	254	23.7	NO H2O
1:45	415	377	433	327	412	1.5	1570	1572	1533	250	24.0	
2:00	417	377	432	320	410	1.3	1578	1581	1533	248	24.4	11240
2:15	416	380	428	323	408	1.2	1578	1578	1535	257	23.9	
2:30	414	382	432	338	415	1.4	1560	1563	1532	256	22.7	NO H2O
2:45	415	384	429	338	411	1.3	1566	1575	1538	257	23.4	
3:00	415	384	429	340	412	0.3	1568	1581	1543	262	24.2	11400
3:15	416	384	429	338	412	0.6	1570	1587	1544	263	24.1	
	L											
3:30	416	383	433	339	416	1.3	1563	1567	1540	259	23.5	11660
3:45	420	382	433	322	412	1.0	1576	1600	1545	257	23.6	
4:00	417	386	433	343	416	1.3	1564	1575	1541	252	24.1	11850
4:15	422	382	434	323	413	1.3	1580	1595	1543	254	23.4	12100
4:30	420	385	431	334	414	0.8	1579	1600	1544	265	23.5	
4:45	420	386	432	337	415	0.3	1560	1564	1537	261	23.4	12220
5:00	423	382	439	330	418	0.2	1574	1582	1540	25	24.1	
5:15	422	382	439	330	419	1.4	1574	1594	1540	260	23.4	12450
5:30	422	383	434	325	416	0.9	1584	1594	1539	255	24.1	
5:45	418	385	435	343	422	1.7	1558	1565	1534	258	23.2	12700
6:00	419	386	433	347	421	1.3	1561	1564	1538	262	23.4	

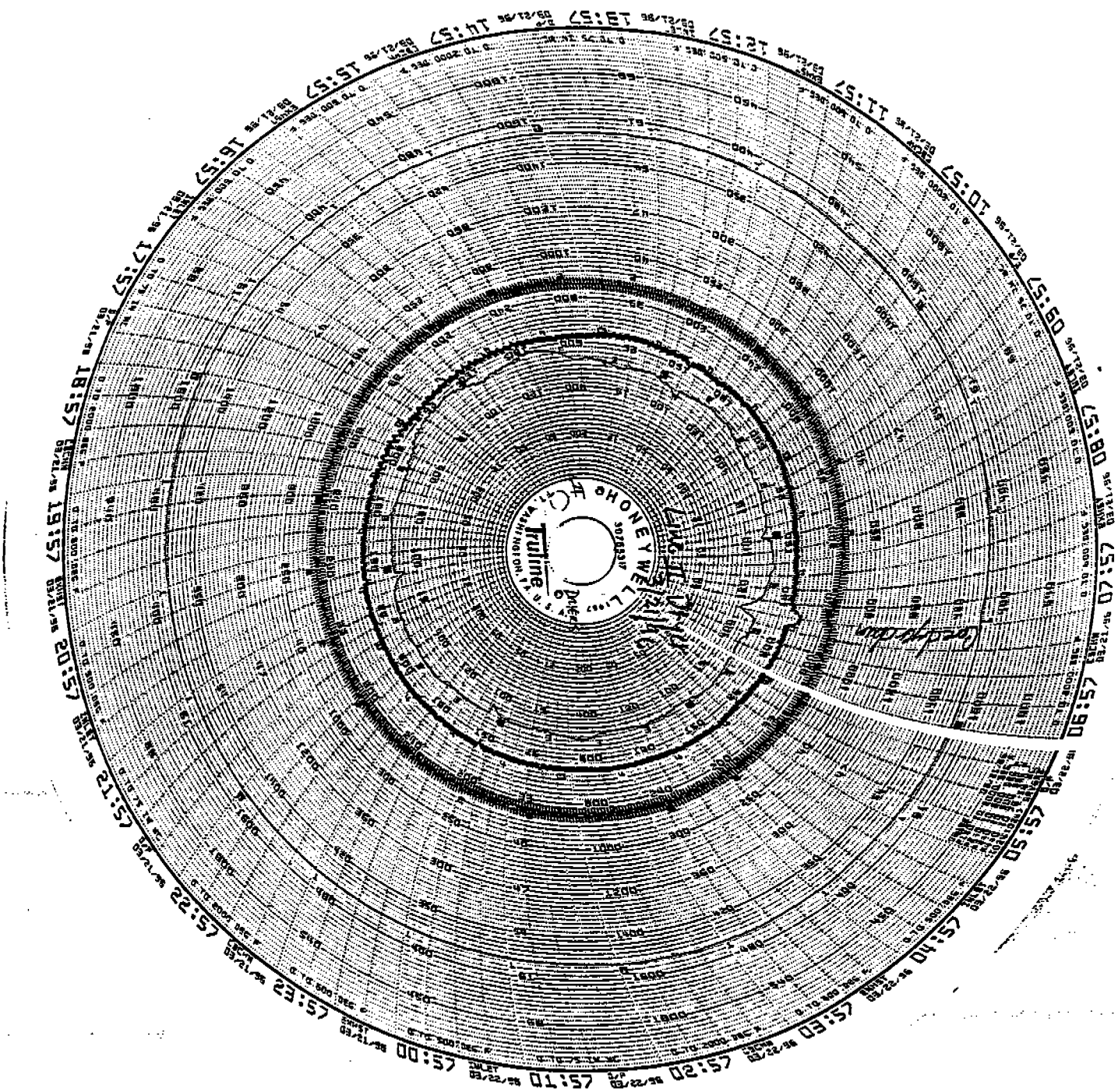
RECORD EVERY 15 MIN. — HAYWARD AIR TESTING WORKSHEET — WATER

Time	RTO Chamber Bed Temp. #1	#2	#3	#4	#5	Inlet Press.	Burners B#1	B#2	Combust. Temp.	Exhaust Temp.	Press. Drop	~~Gas~~ Usage
8.15	408	360	414	320	409	1.2	1581	1594	1515	252	23.9	
8.30	410	362	422	327	414	1.1	1572	1569	1517	244	23.6	11740
8:45	413	364	419	320	409	1.3	1565	1573	1515	256	23.6	
9:00	413	365	419	325	409	1.4	1580	1593	1528	256	23.6	17910
9:15	412	366	424	332	416	1.1	1565	1565	1525	253	23.2	
9:30	412	368	422	337	416	1.1	1599	1578	1531	261	23.7	18070
9:45	414	366	424	331	414	0.9	1569	1570	1534	252	23.7	
10:00	414	368	420	331	410	0.2	1573	1569	1536	257	23.3	18270
10:15	412	369	417	334	411	0.7	1566	1569	1542	256	23.7	
10:30	416	369	421	331	417	0.8	1567	1574	1535	253	23.5	18450
10:45	418	369	427	333	418	0.8	1561	1568	1530	254	24.0	
11:00	421	367	428	321	416	0.4	1576	1582	1534	249	24.5	18620
11:15	418	370	426	334	420	1.4	1572	1577	1532	248	24.4	
11:30	418	373	423	336	417	1.4	1563	1556	1525	256	24.1	NO H2O
11:45	420	371	428	332	421	0.9	1558	1561	1520	254	24.0	
12:00	421	368	429	324	420	1.4	1567	1566	1519	248	24.2	NO H2O
12:15	423	369	429	319	417	1.6	1580	1584	1524	249	23.9	
12:30	423	370	431	325	420	0.8	1574	1575	1527	249	23.8	NO H2O
12:45	420	374	431	339	421	1.2	1561	1555	1520	259	23.4	
1:00	423	371	431	328	421	1.6	1565	1567	1523	250	24.0	NO H2O
1:15	422	376	430	333	421	0.8	1564	1563	1523	255	23.6	
1:30	422	373	424	335	416	0.9	1568	1588	1531	263	24.2	NO H2O
1:45	425	369	431	323	417	0.1	1581	1579	1535	248	24.2	
2:00	424	371	427	322	415	1.1	1586	1596	1533	258	24.1	NO H2O
2:15	421	373	427	340	418	1.1	1570	1560	1533	260	24.1	

LINE II
DRYER RTO
3/20/96



LINE II
DRYER RTO
3/21/96



DATE: 3-20-96
SHIFT/CREW: 1-C
OPERATOR: AL RADIG

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
1	4357	39 1/2	29	4370 (11:17)	40"
2		39 1/2	30	4250 (11:23)	39 3/4
3		39 1/2	31	4218 (11:29)	39 3/4
4		39 3/4	32	4198 (11:35)	39 3/4
5	4448	39 1/2"	33	4187 (11:41)	39 3/4
6		39 3/4	34	4189 (11:45)	40
7		39 3/4	35	4215 (11:54)	40
1	4445	40 1/4	36	4166 (12:00)	40
2	4485 (8:10)	40 1/4	37	4306 (12:06)	40
3	4393 (8:15)	40	38	4342 (12:30)	40 1/8
4	4279 (8:20)	40	39	4342 (12:19)	40
5	4330 (8:25)	40	40	4335 (12:24)	40
6	4362 (8:27)	40	41	4332 (12:32)	40
7	4375 (8:35)	40	42	4350 (12:39)	40 1/4
8	4371 (8:40)	40	43	4392 (12:44)	40 1/4
9	4385 (8:46)	40	44	4380 (12:52)	40 1/4
10	4340 (8:55)	40	45	4386 (12:56)	40 1/4
11	4432 (8:59)	40 1/4	46	4379 (1:03)	40 1/4
12	4391 (9:06)	40	47	4388 (1:09)	40 1/4
13	4333 (9:13)	40	48	4387 (1:15)	40 1/2
14	4371 (9:42)	40	49	4353 (1:21)	40 1/2
15	4313 (9:49)	40	50	4343 (1:28)	40 1/4
16	4279 (9:55)	40	51	4379 (1:34)	40 1/4
17	4426 (10:01)	40	52	4325 (1:40)	40 1/8
18	4437 (10:08)	40 1/4	53	4355 (1:47)	40 1/8
19	4450 (10:13)	40	54	4347 (1:54)	40
20	4472 (10:32)	40	55	4301 (1:59)	40
21	4436 (10:24)	40	56	4333 (2:06)	40
22	4427 (10:34)	40	57	4339 (2:13)	40
23	4442 (10:39)	40	58	4411 (2:18)	40
24	4389 (10:44)	40	59	4440 (2:25)	40
25	4351 (10:51)	40	60	4520 (2:32)	40 1/2
26	4360 (10:57)	40	61	4510 (2:37)	40 1/2
27	4259 (11:04)	40"	62	4608 (2:44)	40 3/4 CR
28	4293 (11:10)	40"	63	4613 (2:49)	41

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DATE: _____

SHIFT/CREW: _____

OPERATOR: _____

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
64	4592 (2:56)	41 cp	99	44 9(630	40 3/4
65	4618 (3:03)	41	100	4471 (6:41)	40 1/4
66	4659 (3:13)	41 1/4 cp	101	4460 (6:46)	40 1/4
67	4584 (3:17)	40 3/4	102	4482 (6:51)	40 1/4
68	4521 (3:21)	40 1/2	103	4486 (6:57)	40 1/4
69	4450 (3:28)	40 1/2			
70	4430 (3:34)	40 1/4			
71	4418 (3:41)	40 1/4			
72	4437 (3:47)	40 1/2			
73	4420 (3:52)	40 1/2			
74	4421 (3:59)	40 1/4			
75	4418 (4:05)	40 1/4			
76	4422 (4:11)	40 1/4			
77	4452 (4:18)	40 1/4			
78	4433 (4:24)	40 1/4			
79	4437 (4:29)	40 1/4			
80	4440 (4:35)	40 1/2			
81	4373 (4:43)	40			
82	4323 (4:50)	40			
83	4327 (4:56)	40			
84	4270 (5:02)	40			
85	4260 (5:09)	40			
86	4343 (5:15)	40			
87	4350 (5:21)	40			
88	4316 (5:28)	40			
89	4306 (5:34)	40			
90	4340 (5:39)	40 1/4			
91	4356 (5:45)	40 1/4			
92	4366 (5:52)	40			
93	4366 (5:59)	40			
94	4367 (6:04)	40			
95	4425 (6:10)	40			
96	4472 (6:17)	40 1/2			
97	4444 (6:22)	40 1/4			
98	4493 (6:29)	40 1/4			

DATE: 3-26-96
SHIFT/CREW: A-2
OPERATOR: Amy

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
1/2 1	4441#		22	4486#	39 3/4
2	4403#	40 1/4	24		39 3/8
3	4391#		26		39 1/2
4	4354#	40 1/8	28	4292#	39 1/4
5	4386#		30 caliper	4371#	40 7/8
6	4377#	40	32 caliper	4294#	39
7	4395#		34	4343#	39 1/4
8	4413#	40 1/4	36		39 7/8
9	4427#		38	4392#	39 3/4
10	4405#	40 1/4	40		39 5/8
11	4407#		42	4404#	39 3/4
12	4418#	40	44		39 5/8
13	4435#		46	4387#	39 3/4
14	4422#	40 1/4	48		39 1/2
15	4401#		50	4378	39 1/2
16	4405#	40 1/8	52		39 1/2
17	4355#		54	4454#	39 5/8
18	4360#	39 7/8	56		39 7/8
19	4400#		58	4330#	39 1/2
20	4331#	40	60		39 1/2
21	4280#		62		39 5/8
22	4284#	39 7/8	64		39 3/8
23 caliper	4208#		66		
24		40 7/8	68		
25 26	4192	39 3/4	70		
7/16 1	4393#	39 7/8	1/4 caliper	4502#	37 11
2		40	2		35 5/8
4 caliper					
5 " "	4541#	40	4		35 1/2
6 caliper		40	6		
8 caliper					
10 " "	4539#	39 3/4	8		36 1/2
12		40 1/4	10		
14		40 3/8			
16		40 1/8			
18 caliper	4544#	43 [illegible]			
20 " "		40			

81

DATE: 3-21-56

SHIFT/CREW: 1-C

OPERATOR: [illegible]

UNIT THICKNESS	WEIGHT	HEIGHT	UNIT THICKNESS	WEIGHT	HEIGHT
7/16" 1	4411	39½"	30	4340 (10:55)	40
2		39 3/4	31	4298 (11:01)	40
3		39 3/4	32	4311 (11:08)	40
4	4420	39 3/4	33	4320 (11:14)	40
5		39 3/4	34	4328 (11:20)	40
6		39 3/4	35	4331 (11:27)	40
½" 1	4423 (7:50)	40	36	4327 (11:34)	40
2	4480 (7:56)	40 1/4	37	4300 (11:39)	40
3	4426 (8:05)	40 1/4	38	4303 (11:45)	40
4	4470 (8:11)	40	39	4280 (11:51)	40
5	4356 (8:17)	40	40	4240 (11:57)	40
6	4295 (8:23)	39 3/4	41	4226 (12:04)	40
7	4327 (8:30)	40	42	4219 (12:11)	40
8	4340 (8:36)	40	43	4216 (12:16)	40
9	4323 (8:42)	40	44	4227 (12:22)	39 3/4
10	4350 (8:48)	40	45	4200 (12:29)	39 3/4
11	4334 (8:56)	40	46	4225 (12:35)	39½
12	4327 (9:02)	40	47	4270 (12:41)	40
13	4329 (9:07)	40	48	4293 (12:47)	39 3/4
14	4360 (9:14)	40	49	4215 (12:53)	40
15	4372 (9:21)	40	50	4232 (13:07)	40
16	4364 (9:26)	40	51	4329 (1:10)	40
17	4364 (9:33)	40	52	4330 (1:16)	40
18	4350 (9:39)	40 1/4	53	4357 (1:22)	40
19	4343 (9:43)	40	54	4479 (1:29)	40
20	4353 (9:52)	40	55	4431 (1:35)	40
21	4308 (9:58)	40	56	4430 (1:41)	40
22	4328 (10:04)	40	57	4424 (1:47)	40
23	4322 (10:11)	40	58	4431 (1:54)	40
24	4338 (10:17)	40	59	4412 (2:01)	40
25	4360 (10:23)	40	60	4429 (2:07)	40
26	4265 (10:29)	40	61	4445 (2:14)	40
27	4305 (10:35)	40	62	4452 (2:19)	40
28	4346 (10:41)	40	63	4454 (2:28)	40
29	4329 (10:48)	40	64	4466 (2:33)	40

PRESS REPORT - LINE 1 (2) DATE: 3-20-96

OPERATOR Terry SHIFT: Night CREW: A

THICKNESS 1/2 - 7/16 - 1/4 PRESS LDS: 42½ 26¼ 12 6 7/16

OVERALL TIMER: 174 - 157 DECOMPRESSION TIME: 15 - 15

PRESS TEMP: 215 TOTAL REJECTS:

LINE SPEED	THKNS.	FROM	TO
55	½	700	935
55	7/16	935	1250
50	1/4 S	1250	1235
55	7/16	235	500
52	7/16	500	630
55	7/16	630	

LOG COUNT: 1100

F.C.O.S. HYD. RADIATOR: _____ TIME

PRESS BLOWN DOWN: _____

SPINNER HEADS FLUSHED: _____ TIME

SURFACE BLENDER HOSED: _____ TIME

FORMER HYD RADIATOR: _____ TIME

338438

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
240	242	2				Tear up at Seals

DOWNTIME CODE: M - MECHANICAL (2) E - ELECTRICAL O - OPERATOR

88

DATE: _____
SHIFT/CREW: _____
OPERATOR: _____

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
65	4478 (2:40)	40 1/4	100		40 1/4
66	4446 (2:46)	40 1/4	101	4485	40 1/4
67	4369 (2:50)	40	102		40 1/2
68	4466 (2:54)	40 1/4	103		40 1/2
69	4413 (3:05)	40 1/4	104		40 1/2
70	4396 (3:11)	40 1/4	105	4504	40 1/2
71	4403 (3:18)	40 1/4	106		40 1/4
72	4407 (3:24)	40 1/4	107		40 1/4
73	4396 (3:30)	40 1/4			
74	4411 (3:36)	40 1/4			
75	4390 (3:42)	40 1/4			
76	4366 (3:48)	40			
77	4361 (3:58)	40			
78	4356 (4:02)	40			
79	4380 (4:08)	40			
80	4370 (4:14)	40 1/4			
81	4353 (4:22)	40 1/4			
82		40 1/4			
83		40 1/2			
84		40 1/2			
85	4478	40 1/4			
86		40 3/4			
87		40 3/4			
88		40 3/4			
89	4483	41			
90		40 1/2			
91		40 1/4			
92		40 1/4			
93	4526	40 1/4			
94		40 3/4			
95		40 3/4 cp			
96		40 3/4 cp			
97	4600	40 1/2			
98		40 1/2 cp			
99		40 1/2			

1 1/2"

83

HAYWARD LINE 2 DRYER RTO STACK & CORE/SURF. DUCT MARCH 19th & 20th 1996
NOX/CO/CO2/THC/M2

DATA TIME:	START=	13:15	END=	14:30	HOURS=	1.25
DATA TIME:	START=	10:00	END=	13:00	HOURS=	3.00
					TOTAL=	4.25

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

	1/2"
per/peice	54.57
per/ 8' x 16'	218.28

PLANT PRODUCTION RATE

4.25	=hours during testing
66	=pressloads
792	=no. of 8'x16' boards produced (pressloads x 12 boards per load)
172,878	=lbs of finished product (boards produced x weight of finished board)
40,677	=lbs of finished product per hour (lbs of finshed product / hours)
20.34	=tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY DRY FUEL INPUT

SURFACE

10	=SURFACE fuel calibration in pounds per count
2,011	=SURFACE counts during testing hours
20,110	=SURFACE lbs of fuel burned during testing
4.25	=hours during testing
4,732	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.37	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,600	=estimated BTU content per pound of dry fuel,
40.7	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,556	=average inlet temperature
48.50	=average incoming moisture percent
5.42	=average dry moisture percent

CORE

10	=CORE fuel calibration in pounds per count
2,219	=CORE counts during testing hours
22,190	=CORE lbs of fuel burned during testing
4.25	=hours during testing
5,221	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.61	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,600	=estimated BTU content per pound of dry fuel,
44.9	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,436	=average inlet temperature
48.50	=average incoming moisture percent
5.64	=average dry moisture percent

DRYER THROUGHPUT RATE

9,953	=Total pounds of fuel burned per hour in Core and Surface Dryer
40,677	=lbs of finished product per hour (lbs of finshed product / hours)
50,630	=Pounds of material produced by the dryer per hour (dry basis, assumming fuel balances)
2,735	= weight of trim per hour at 6.3% of finished product
7,218	=weight of screened fines per hour (total fuel - trim)
14.26%	=resulting loss to fines as percentage of dryer throughput

84

LOUISIANA-PACIFIC CORPORATION

PRESS REPORT - LINE #1 (2) DATE: 3-19-96

OPERATOR Henderson SHIFT: 1st CREW: VB - LT

THICKNESS 7/16 PRESS LDS: 137/16 156 1/2

OVERALL TIMER: 157 / 174 DECOMPRESSION TIME: 15 / 18

PRESS TEMP: 205 TOTAL REJECTS:

LINE SPEED	THICKNESS	FROM	TO
43	7/16	7:00	8:00
45	1/2	8:00	8:30
50	1/2	8:30	8:45
55	1/2	8:45	7:02

LOG COUNT: 1346

F.C.O.S. HYD. RADIATOR: / TIME

PRESS BLOWN DOWN: /

SPINNER HEADS FLUSHED: / TIME

SURFACE BLENDER HOSED: / TIME

FORMER HYD RADIATOR: / TIME

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
7:01	:04	3				Starting Up
9:20	10:05	45				No Surface Infeed
11:51	1:54	3				Pulsed Baghouse
2:32	:35	3				" "
6:01	:05	4				" " "

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

58

85

PRESS REPORT - LINE 1 (B)

OPERATOR D. SLATER SHIFT: PM CREW: D

DATE: 3-19-96

THICKNESS 1/2 7/16

PRESS LDS: 43 1/2 157 7/16

OVERALL TIMER: 174 - 157

DECOMPRESSION TIME: 18 - 15

PRESS TEMP: 215

TOTAL REJECTS: 2

LOG COUNT: 1435

LINE SPEED	THKNS.	FROM	TO
54	1/2	7:00	
59	7/16	9:37	

F.C.O.S. HYD. RADIATOR: 7:00 TIME

PRESS BLOWN DOWN: 7:00

SPINNER HEADS FLUSHED: = TIME

SURFACE BLENDER HOSED: = TIME

FORMER HYD RADIATOR: = TIME

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
10:13	10:17				4	BLUE TUBE PLUGED

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

86

LOUISIANA-PACIFIC CORPORATION

PRESS REPORT - LINE 1 ©

OPERATOR Lindenfelser SHIFT: Day DATE: 3-20-94 CREW: C

THICKNESS 7/16 - 1/2 PRESS LOS: 10 7/16 175 1/2

OVERALL TIMER: 157-174 DECOMPRESSION TIME: 15

PRESS TEMP: 210-215 N.I.R. TOTAL REJECTS: 0

LINE SPEED	THICKNESS	FROM	TO
54'	7/16	7 oc	17:38
54'	1/2	7:38	17:00

LOG COUNT: 1537

F.C.O.S. HYD. RADIATOR: 8:0C TIME

PRESS BLOWN DOWN: 8:21

SPINNER HEADS FLUSHED: X TIME

SURFACE BLENDER HOSED: X TIME

FORMER HYD RADIATOR: X TIME

3/8' 374,377

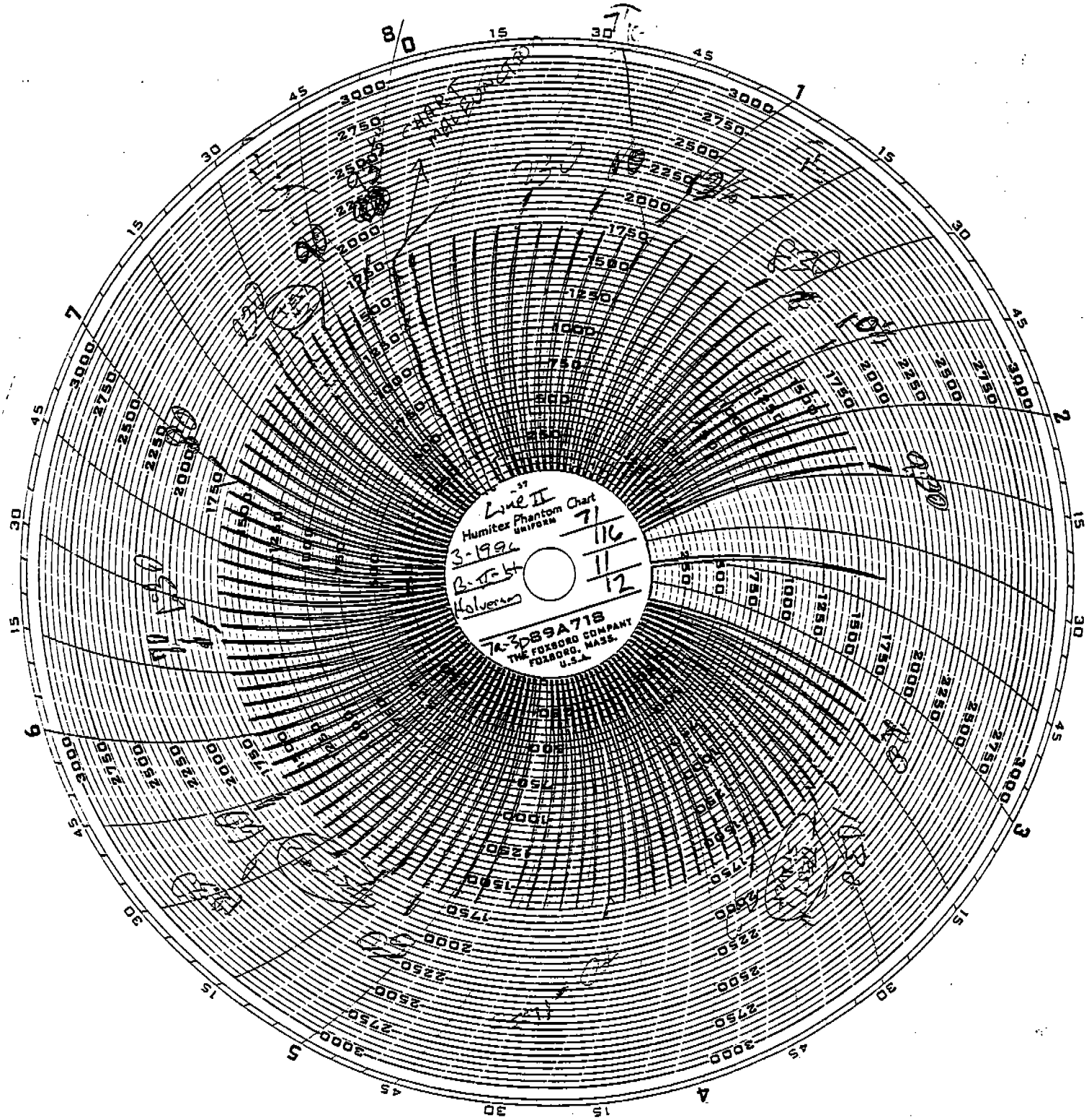
DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
9:02	9:26				24	Top Surface Transfer Conv. tripped out causing Flig-Gate and Haul-Up to plug

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

24

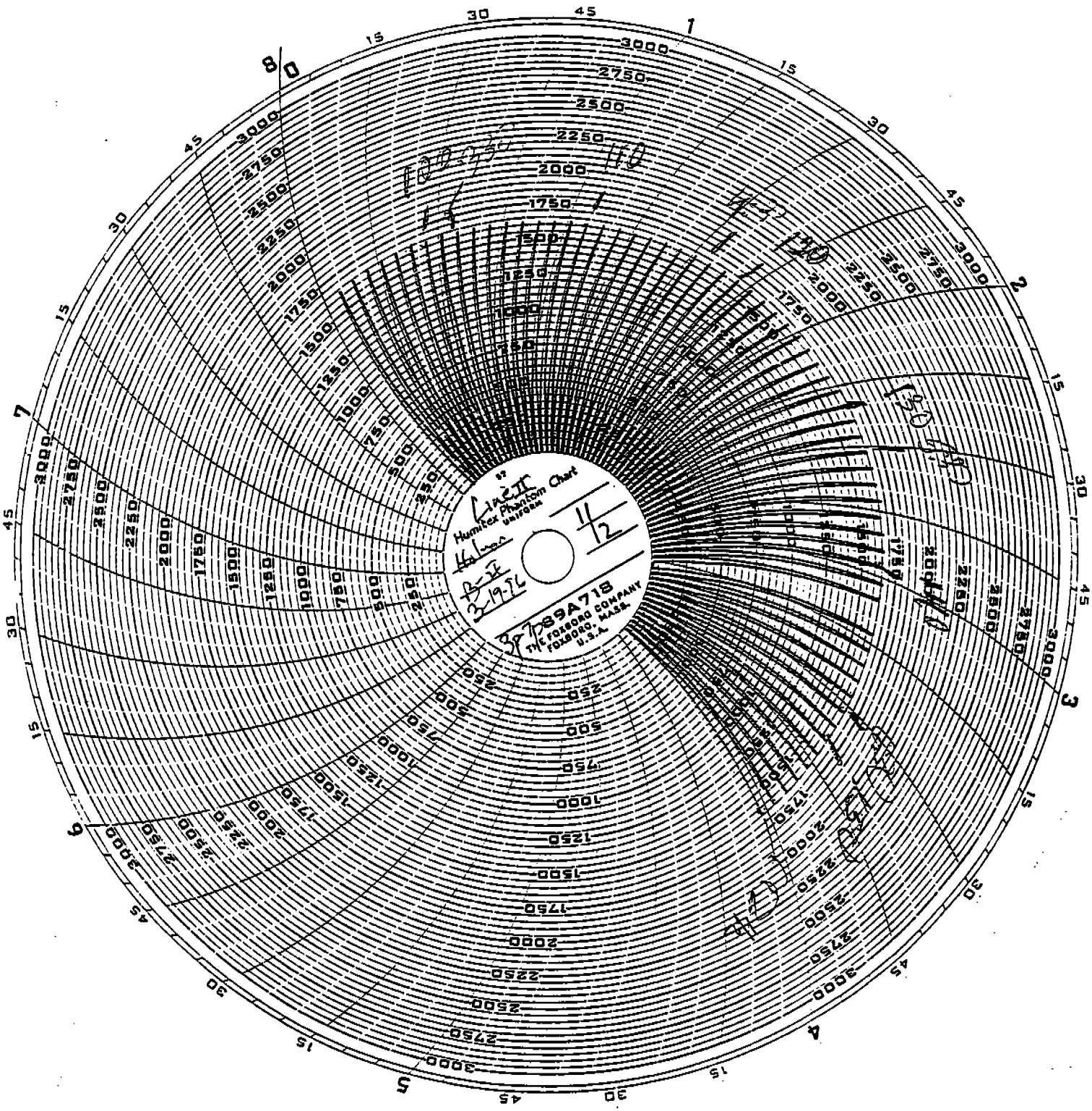
87

LINE II
PRESS CHART
3/19/96
0700-1500

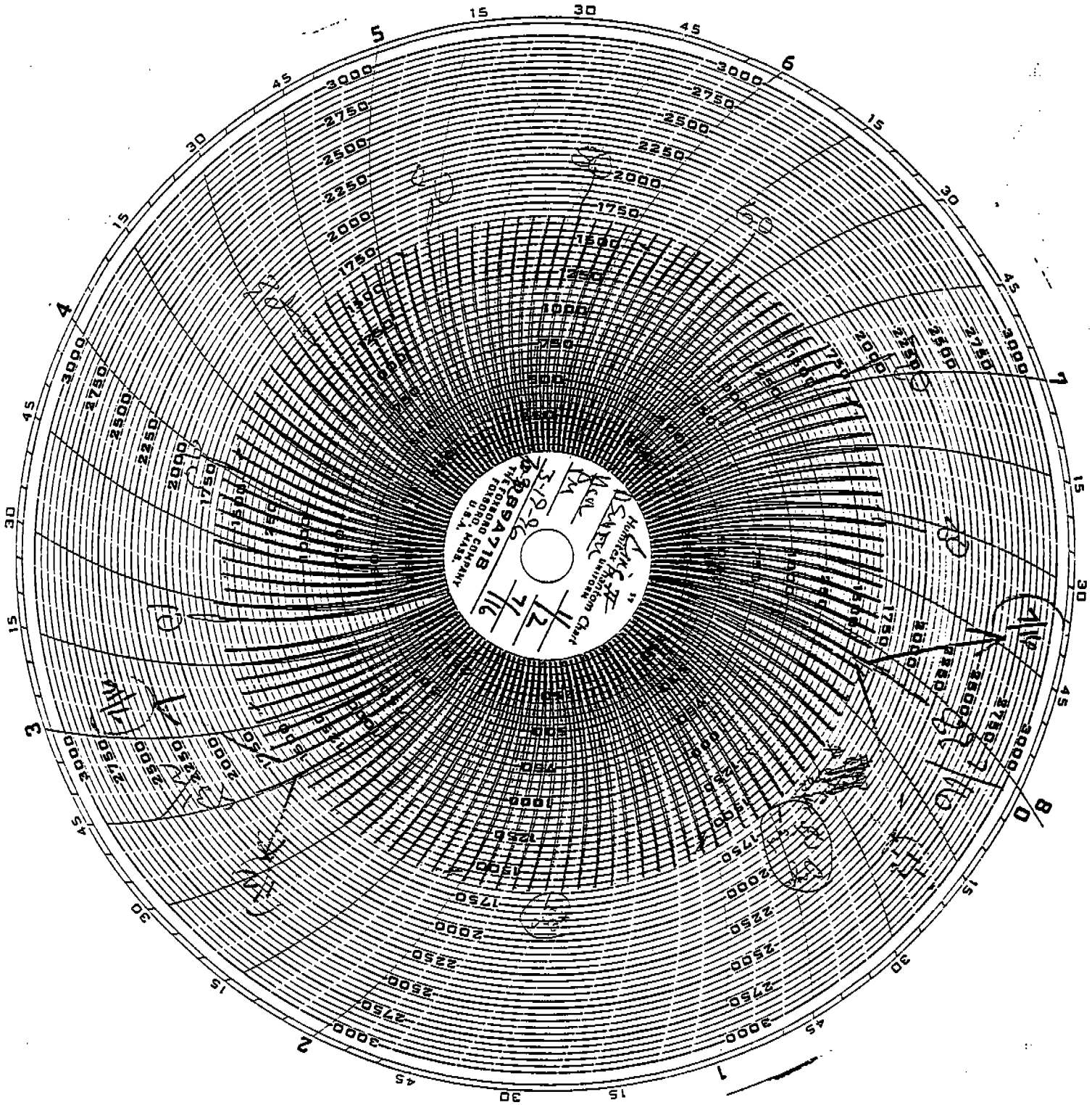


89

LINE II
PRESS CHART
3/19/96
1500-1900

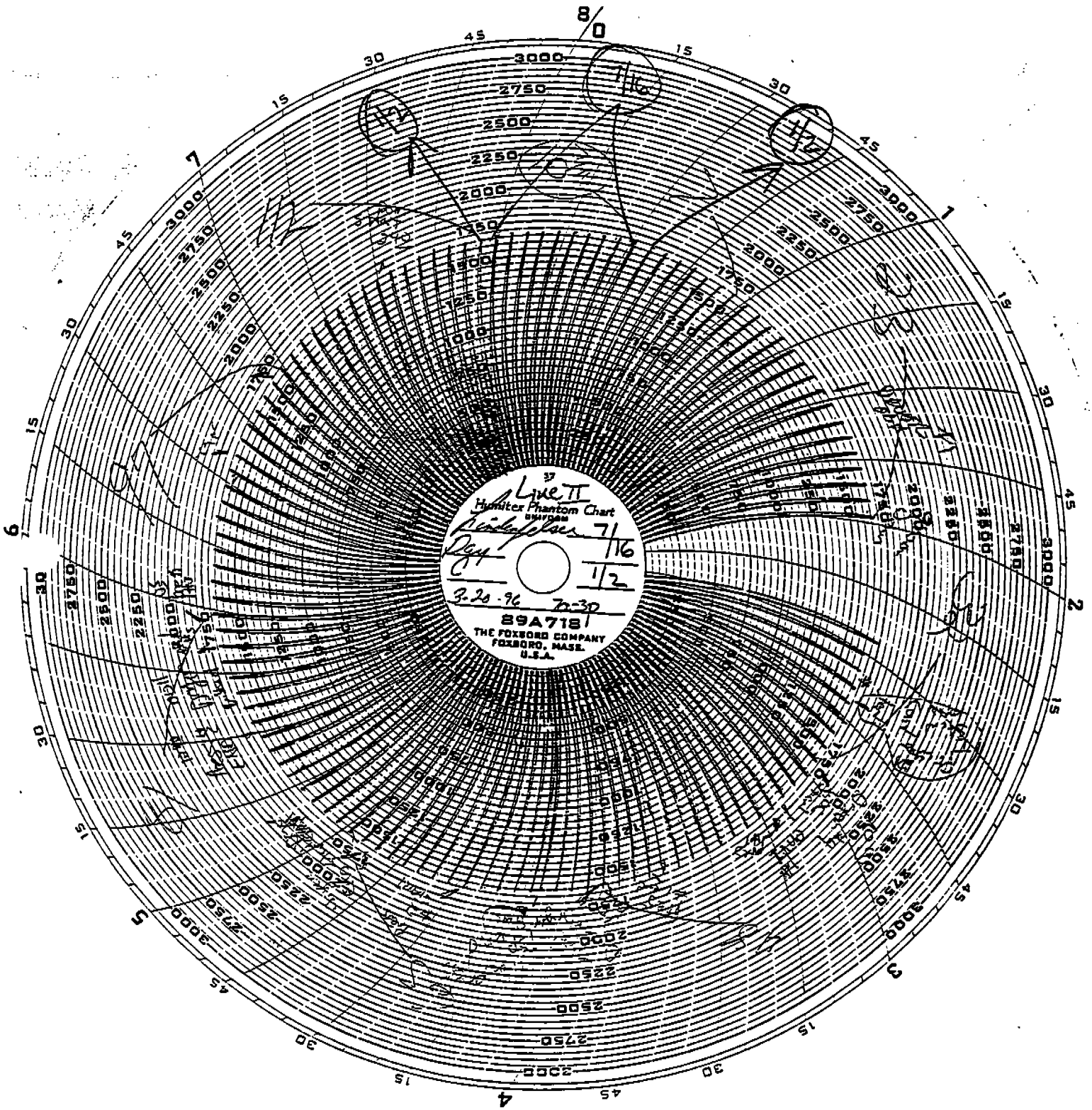


LINE II
PRESS CHART
3/19/96
0700-1500

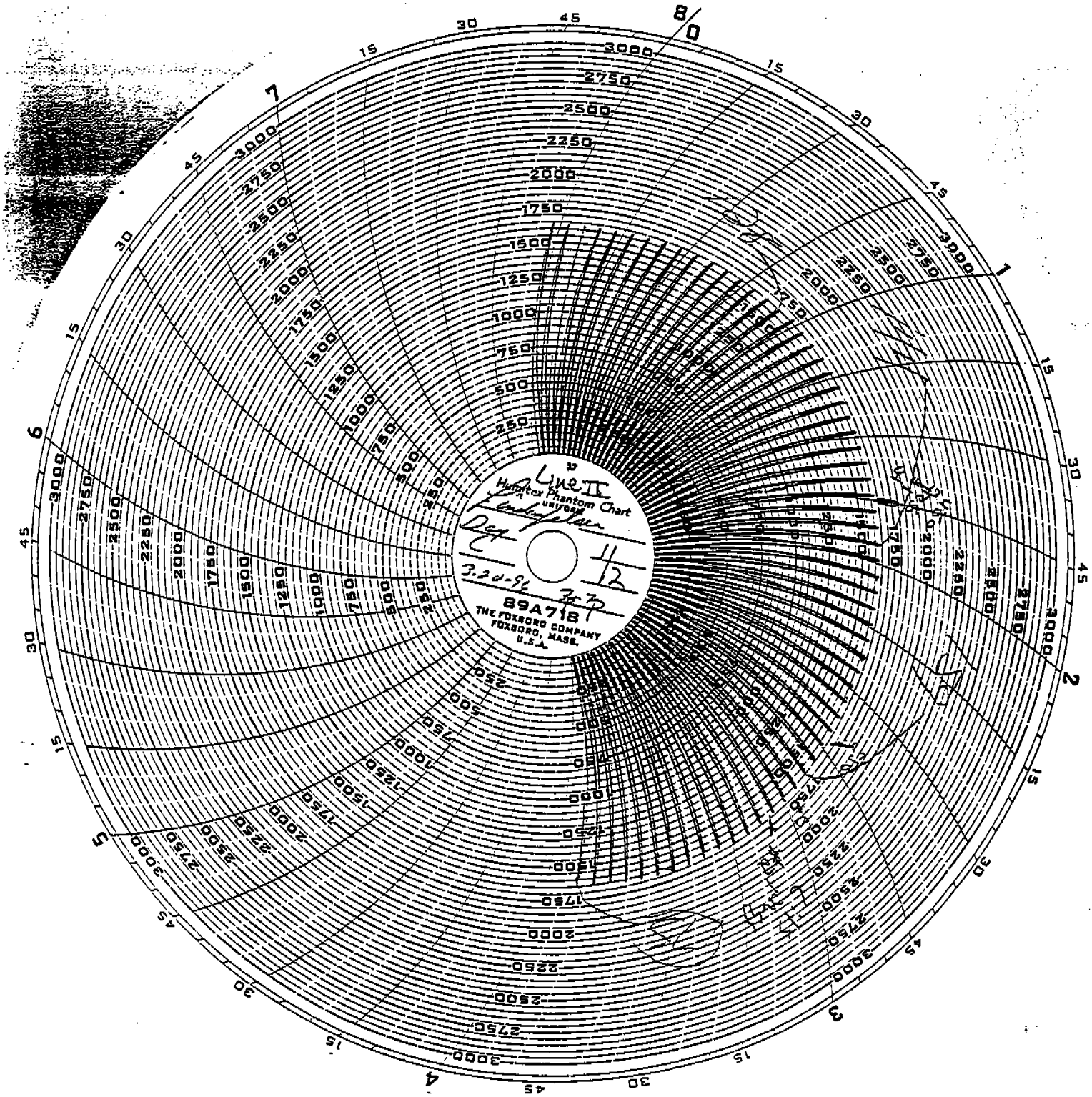


91

LINE II
PRESS CHART
3/20/96
0700 - 1500

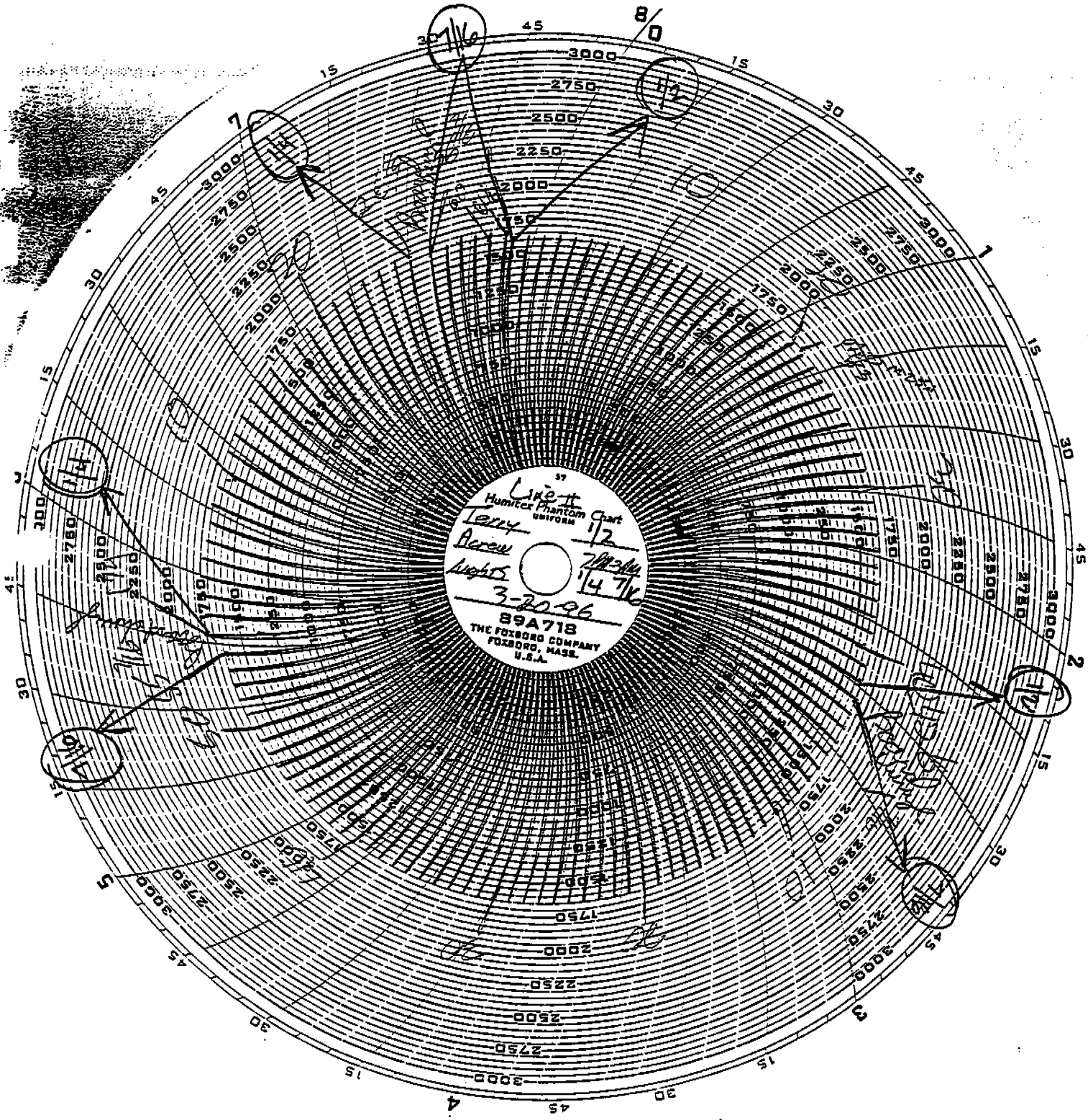


LINE II
PRESS CHART
3/20/96
1500 - 1900



93

LINE II
PRESS CHART
3/20/96
1900-0300



94

15 min

Dryer DATA
fuel calibration lb/coun face core

4 Dryer

date 3/19/96
by Smith
page 1 of

TIME	FACE OUT. SET POINT	FACE FEED RATE	FACE INLET TEMP	FACE OUTLET TEMP	FACE FUEL COUNT	FACE WET BIN LEVEL	CORE OUT. SET POINT	CORE FEED RATE	CORE INLET TEMP	CORE OUTLET TEMP	CORE FUEL COUNT	CORE WET BIN LEVEL	DRY BIN LEVEL FACE	DRY BIN LEVEL CORE	EVERY HOUR FLAKE MOISTURE IN	FACE	CORE
10:30	250	70	1483	249	990	75%	218	62	1337	217	1232	75%	60%	75%	48.2	5.9	7.2
10:45	250	71	1512	250	1100	70%	222	62	1426	218	1362	70%	55%	70%		5.3	6.4
11.00	250	71	1536	250	1215	70%	224	62	1449	224	1475	75%	60%	70%		5.4	7.8
11.15	250	71	1555	249	1327	70%	224	62	1497	223	1600	80%	65%	80%	48.0	5.2	5.5
11.30	248	71	1605	244	1443	70%	222	60	1412	220	1715	80%	60%	80%		5.1	5.8
11.45	248	71	1555	244	1560	65%	222	60	1455	221	1834	80%	70%	85%		5.0	5.1
12.00	248	71	1567	245	1677	70%	222	60	1495	222	1957	75%	70%	90%		5.2	5.8
12.15	248	69	1560	247	1804	80%	222	58	1488	219	9097	80%	80%	90%	49.2	5.2	5.5
12.30	248	69	1552	245	1911	76%	222	58	1451	220	2210	75%	80%	90%		5.5	5.6
12.45	248	69	1565	243	2028	85%	222	58	1449	220	2335	85%	90%	90%		5.6	5.2
1.00	248	69	1510	241	2136	70%	222	57	1371	221	2445	90%	80%	80%		5.2	5.2
1.15	248	69	1515	246	2254	75%	222	57	1369	220	2568	90%	80%	80%	48.6	5.7	5.7
1.30	250	69	1504	242	2369	70%	222	57	1367	221	2686	80%	80%	80%		5.2	5.5
1.45	250	69	1469	248	2483	70%	222	57	1360	220	2808	70%	80%	75%		5.1	5.3
2.00	250	69	1472	249	2597	60%	222	57	1406	221	2927	70%	80%	70%		5.3	5.8
2.15	250	69	1482	247	2718	70%	222	59	1425	221	3058	100%	80%	70%	49.8	6.4	5.3
2.30	250	69	1456	238	2832	90%	222	59	1412	219	3180	100%	80%	70%		5.8	5.6
2.45	250	69	1453	240	2955	90%	222	61	1405	217	3309	90%	80%	70%		5.5	6.0
3.00	250	69	1455	240	3075	100%	222	59	1408	209	3441	90%	80%	70%		5.3	5.4
3.15	250	66	1471	247	3184	100%	222	59	1403	218	3559	100%	80%	70%		5.1	5.8
3.30	250	66	1478	249	3299	90%	222	59	1427	217	3683	90%	80%	65%	53.8	5.3	6.0
3.45	250	66	1422	248	3421	90%	222	61	1398	218	3818	90%	80%	65%		5.4	6.2
4.00	250	66	1487	242	3533	90%	222	61	1422	208	3940	90%	80%	60%		5.0	5.6
4.15	250	66	1508	249	3659	100%	222	62	1496	220	4080	100%	80%	70%			
4.30	250	66	1525	245	3780	100%	222	62	1489	214	4213	100%	75%	70%	50.4	5.5	5.7
4.45	250	66	1468	246	3893	100%	220	62	1474	212	4343	100%	70%	65%		5.7	5.8
5.00	250	68	1492	248	4006	100%	220	63	1493	218	4470	100%	70%	70%		5.0	5.0
5.15																	
5.30	250	69	1516	243	4251	80%	220	63	1547	219	4737	80%	75%	75%	53.2	5.3	5.6
5.45	250	69	1544	247	4351	90%	220	63	1517	219	4865	80%	75%	75%		5.4	5.8
6.00																	
6.15																	
6.30																	
6.45																	
7.00																	
7.15																	

L-96

95

Dryer DATA
fuel calibration lb/coun face core

L II Onyx

date 3/19/96
by Smith
page 2 of

TIME	FACE OUT. SET POINT	FACE FEED RATE	FACE INLET TEMP	FACE OUTLET TEMP	FACE FUEL COUNT	FACE WET BIN LEVEL	CORE OUT. SET POINT	CORE FEED RATE	CORE INLET TEMP	CORE OUTLET TEMP	CORE FUEL COUNT	CORE WET BIN LEVEL	DRY BIN LEVEL FACE	DRY BIN LEVEL CORE	EVERY HOUR FLAKE MOISTURE IN	EVERY HOUR FLAKE MOISTURE FACE	EVERY HOUR FLAKE MOISTURE CORE
7:30	250	70	1529	246	237	100%	220	63	1513	215	266	100%	75%	80%	5026	5.1	5.5
7:45	250	69	1531	238	358	100%	220	63	1480	215	393	100%	75%	80%		5.8	6.0
8:00	250	69	1539	239	480	100%	220	63	1501	213	330	100%	70%	80%	[illegible]	5.8	6.0
8:15	250	69	1526	241	594	90%	220	63	1525	218	655	90%	70%	80%		5.2	5.9
8:30	250	70	1524	247	724	100%	220	63	1526	217	801	100%	70%	80%	#82	4.9	5.8
8:45	250	71	1449	248	840	100%	220	63	1501	215	930	100%	70%	75%		4.8	6.0
9:00	250	71	1531	243	962	100%	220	63	1517	213	1064	100%	70%	80%		5.4	6.1
9:15																	
9:30																	
9:45																	
10:00																	

L-97

96

Dryer DATA
fuel calibration lb/coun face core

date 3/20/96
by
page 1 of

TIME	FACE OUT. SET POINT	FACE FEED RATE	FACE INLET TEMP	FACE OUTLET TEMP	FACE FUEL COUNT	FACE WET BIN LEVEL	CORE OUT. SET POINT	CORE FEED RATE	CORE INLET TEMP	CORE OUTLET TEMP	CORE FUEL COUNT	CORE WET BIN LEVEL	DRY BIN LEVEL FACE	DRY BIN LEVEL CORE	EVERY HOUR FLAKE MOISTURE IN	EVERY HOUR FLAKE MOISTURE FACE	EVERY HOUR FLAKE MOISTURE CORE
8:30	252	63	1404	250	1659	60%	213	67	1547	209	765	60%	80%	70%	45.4	5.2	5.4
8:45	252	63	1411	250	762	70%	213	67	1605	208	890	60%	80%	70%		5.4	5.4
9:00	252	63	1586	250	873	80%	213	67	1500	213	1019	70%	90%	80%		5.2	5.3
9:15		DRYER DOWN				100%		DRYER DOWN				100%	100%	100%			
9:30		DRYER DOWN				100%		DRYER DOWN				100%	100%	100%	50.2		
9:45	252	62	1197	249	1028	100%	213	63	1187	212	1211	100%	75%	75%		6.0	6.4
10:00	252	67	1383	248	1133	100%	213	67	1437	211	1329	100%	75%	75%		5.6	5.8
10:15	250	70	1394	245	1284	90%	213	68	1488	211	1501	90%	75%	75%		5.2	5.6
10:30	250	70	1433	247	1366	100%	213	68	1457	214	1588	90%	75%	75%	46.4	5.6	5.8
10:45	250	70	1461	250	1492	100%	215	68	1467	214	1731	100%	75%	75%		5.4	5.9
11:00	250	70	1466	247	1617	100%	215	68	1489	214	1677	100%	75%	75%		5.8	6.0
11:15	252	70	1453	246	1752	100%	215	68	1467	214	2030	100%	75%	75%		5.1	5.6
11:30	252	70	1494	251	1858	100%	215	68	1439	212	2146	100%	75%	75%	47.6	4.8	5.0
11:45	252	70	1425	251	1984	100%	215	68	1473	213	2291	100%	75%	80%		4.7	5.3
12:00	250	70	1459	260	2089	90%	215	68	1458	215	2409	90%	75%	80%		4.9	5.2
12:15	250	70	1467	246	2212	70%	215	68	1452	213	2547	70%	75%	80%		5.5	5.8
12:30	250	70	1496	245	2329	70%	215	68	1436	214	2676	70%	75%	80%	49.2	5.8	5.5
12:45	250	70	1498	248	2461	60%	215	68	1475	211	2820	60%	75%	80%		5.0	5.8
1:00	250	70	1489	249	2566	60%	215	68	1476	214	2936	60%	75%	80%		5.0	6.0
1:15	250	70	1489	241	2700	60%	215	68	1530	211	3086	60%	80%	80%		5.6	5.8
1:30	250	70	1455	244	2822	60%	215	68	1545	211	3222	60%	80%	80%	48.4	6.2	6.0
1:45	250	70	1455	247	2942	60%	215	68	1522	213	3354	65%	80%	80%		5.4	5.8
2:00	253	70	1444	246	3062	65%	215	68	1496	215	3484	65%	75%	80%		5.9	6.2
2:15	253	70	1478	251	3192	65%	215	68	1477	214	3625	65%	75%	75%		4.9	5.8
2:30	253	70	1457	252	3310	65%	215	68	1513	214	3753	65%	80%	80%	44.2	5.0	5.8
2:45	253	70	1423	251	3420	65%	215	68	1555	213	3882	65%	75%	80%		5.0	5.7
3:00	253	70	1459	250	3531	65%	215	68	1458	213	4011	65%	75%	80%		4.9	5.1
3:15	253	70	1538	251	3646	60%	215	68	1555	214	4145	60%	75%	80%		5.3	5.9
3:30	253	70	1453	250	3762	70%	215	68	1614	214	4274	70%	75%	90%	52.8	4.8	5.5
3:45	253	70	1485	251	3885	70%	215	68	1594	211	4419	70%	75%	90%		5.2	5.2
4:00	253	70	1528	250	4000	75%	215	68	1549	208	4545	75%	80%	80%		5.2	6.0
4:15	253	70	1491	250	4119	75%	215	66	1533	213	4689	75%	75%	90%		4.9	5.4
4:30	253	70	1536	249	4227	75%	215	65	1546	216	4810	75%	75%	90%	46.2	5.0	5.2
4:45	251	70	1490	248	4349	80%	215	63	1491	214	4957	80%	80%	90%		5.1	5.6
5:00	251	70	1501	250	4453	90%	216	63	1454	215	5074	90%	80%	90%		5.0	5.50
5:15	251	70	1425	250	4578	75	216	63	1478	214	5222	75%	80%	90%		5.1	5.6

Dryer DATA
fuel calibration lb/coun face core

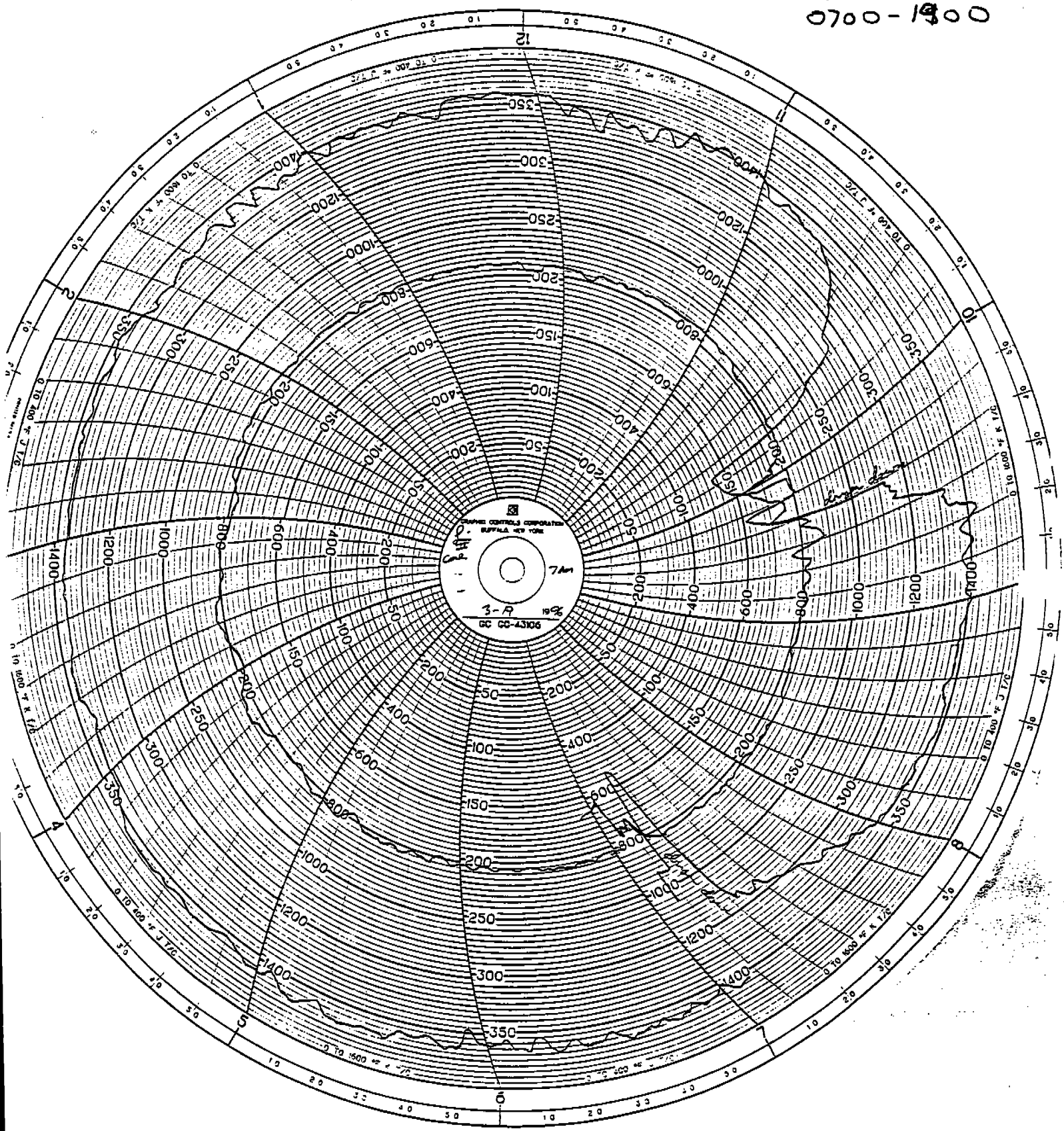
date 3/20/96
by
page 2 of 2

TIME	FACE						CORE						DRY BIN LEVEL		EVERY HOUR FLAKE MOISTURE		
	OUT. SET POINT	FEED RATE	INLET TEMP	OUTLET TEMP	FUEL COUNT	WET BIN LEVEL	OUT. SET POINT	FEED RATE	INLET TEMP	OUTLET TEMP	FUEL COUNT	WET BIN LEVEL	FACE	CORE	IN	FACE	CORE
5:30	251	70	1370	248	4692	75%	216	63	1466	213	5341	75%	90%	85%	50.2	5.3	5.7
5:45	251	70	1437	248	4794	100	216	63	1380	214	5463	100	90	95%		5.2	5.6
6:00	251	70	1550	245	4910	100	216	63	1481	213	5590	100	100	90		5.7	6.3
6:15																	
6:30																	
6:45																	

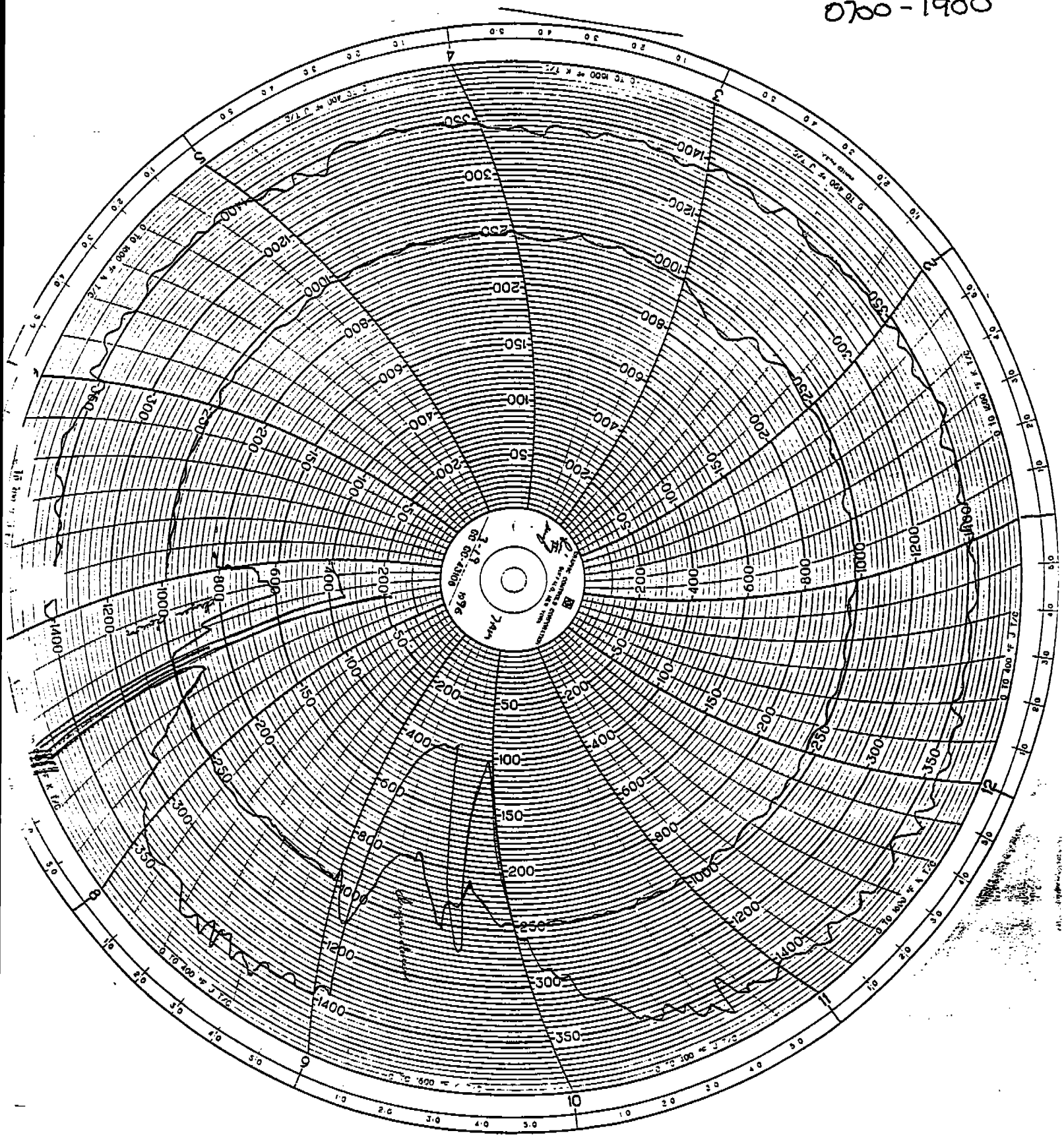
L-99

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LINE II
CORE DRYER
3/19/96
0700-1900

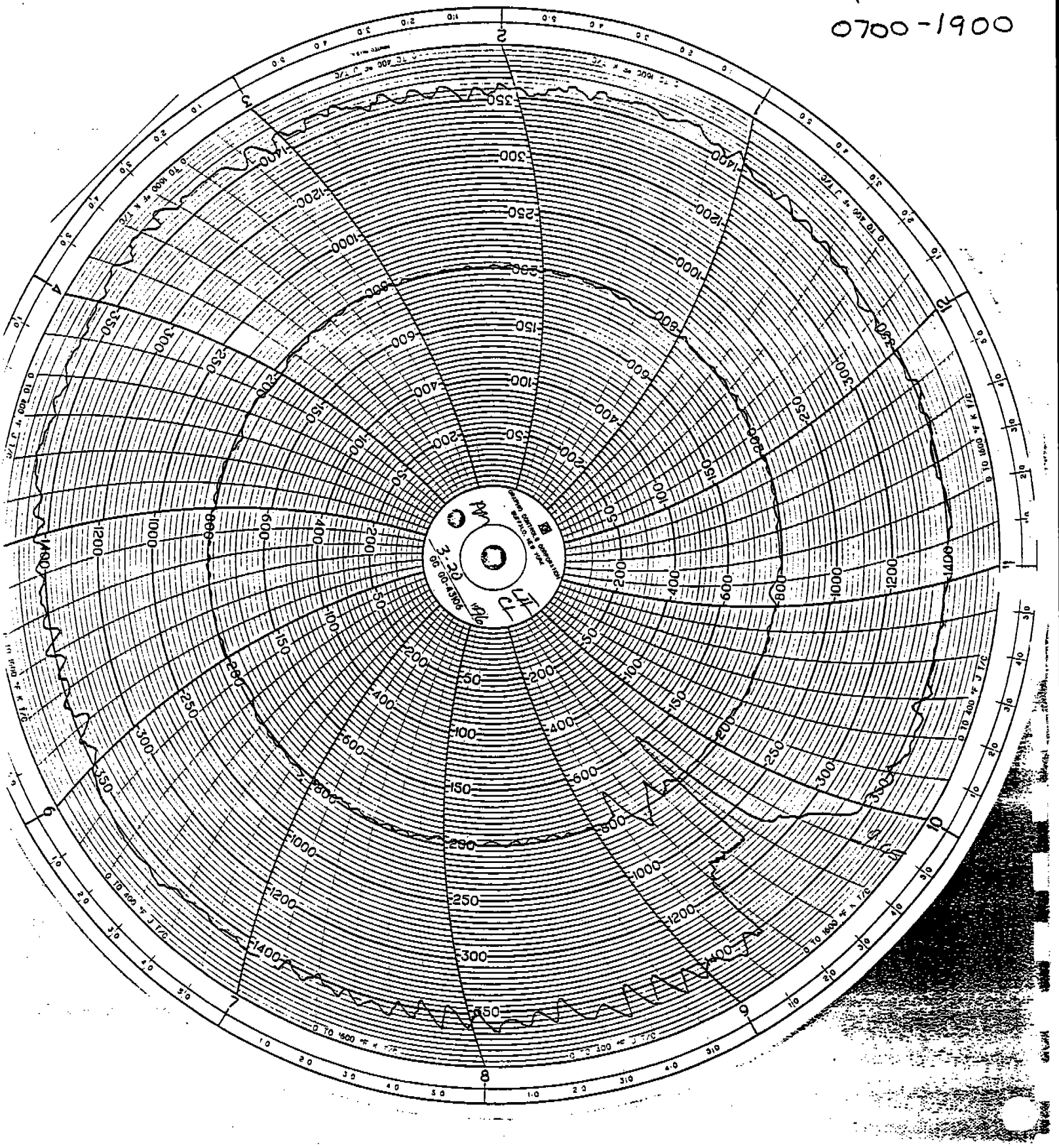


LINE II
SURFACE DRYER
3/19/96
0700 - 1900



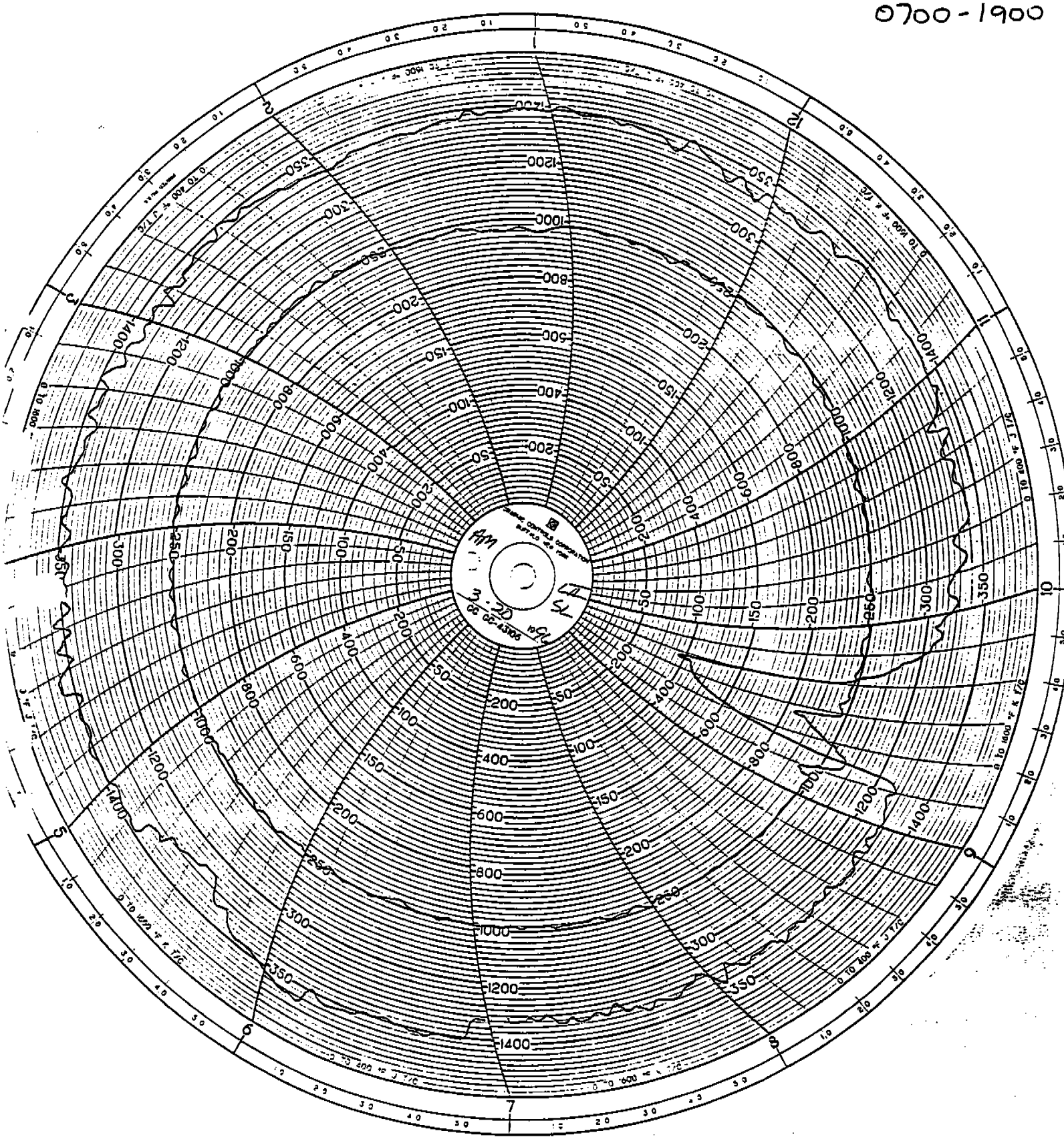
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LINE II
CORE DRYER
3/20/96
0700-1900

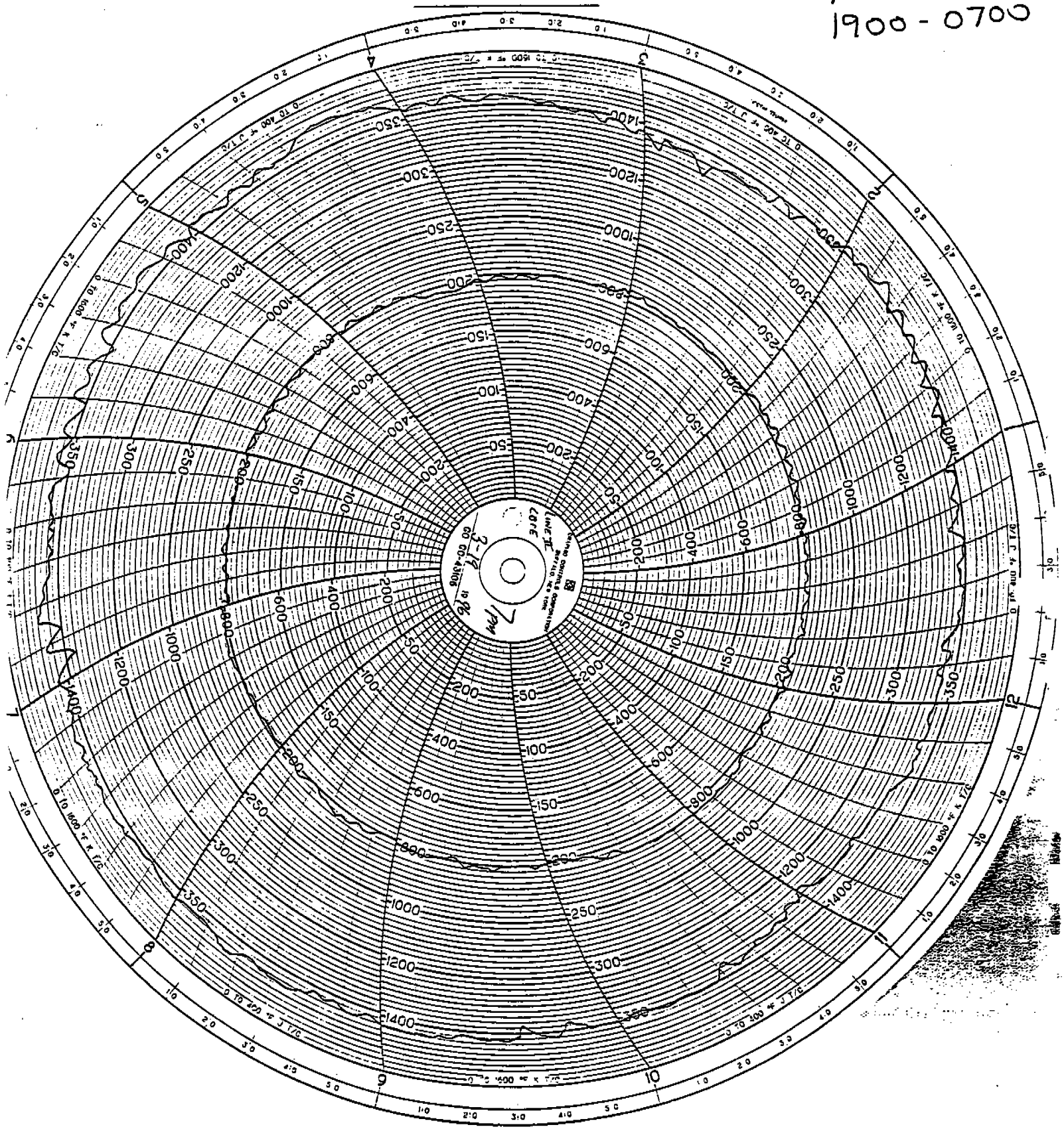


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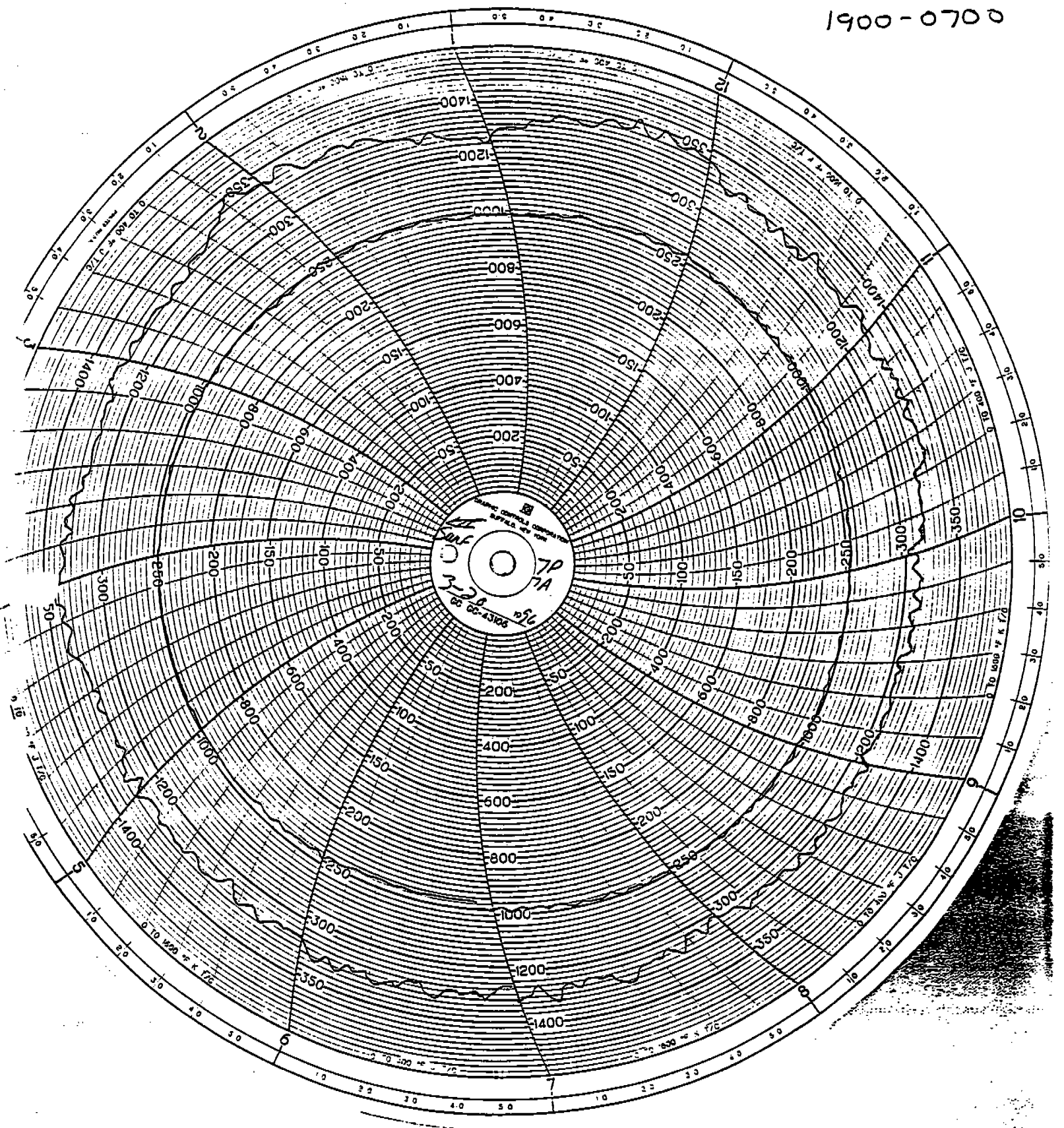
LINE II
SURFACE DRYER
3/20/96
0700-1900



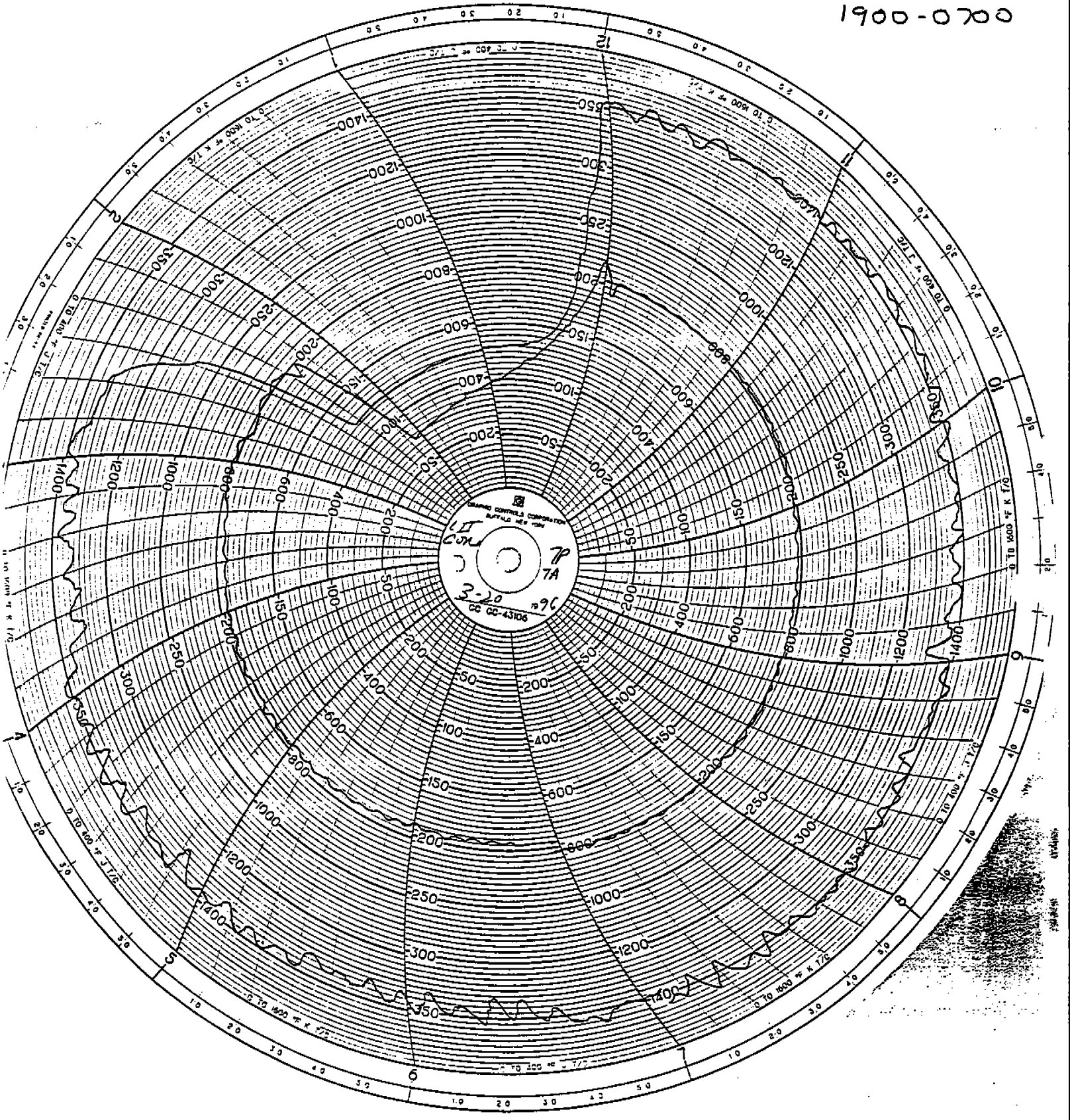
LINE II
CORE DRYER
3/19/96
1900 - 0700



LINE II
SURFACE DRYER
3/20/96
1900-0700

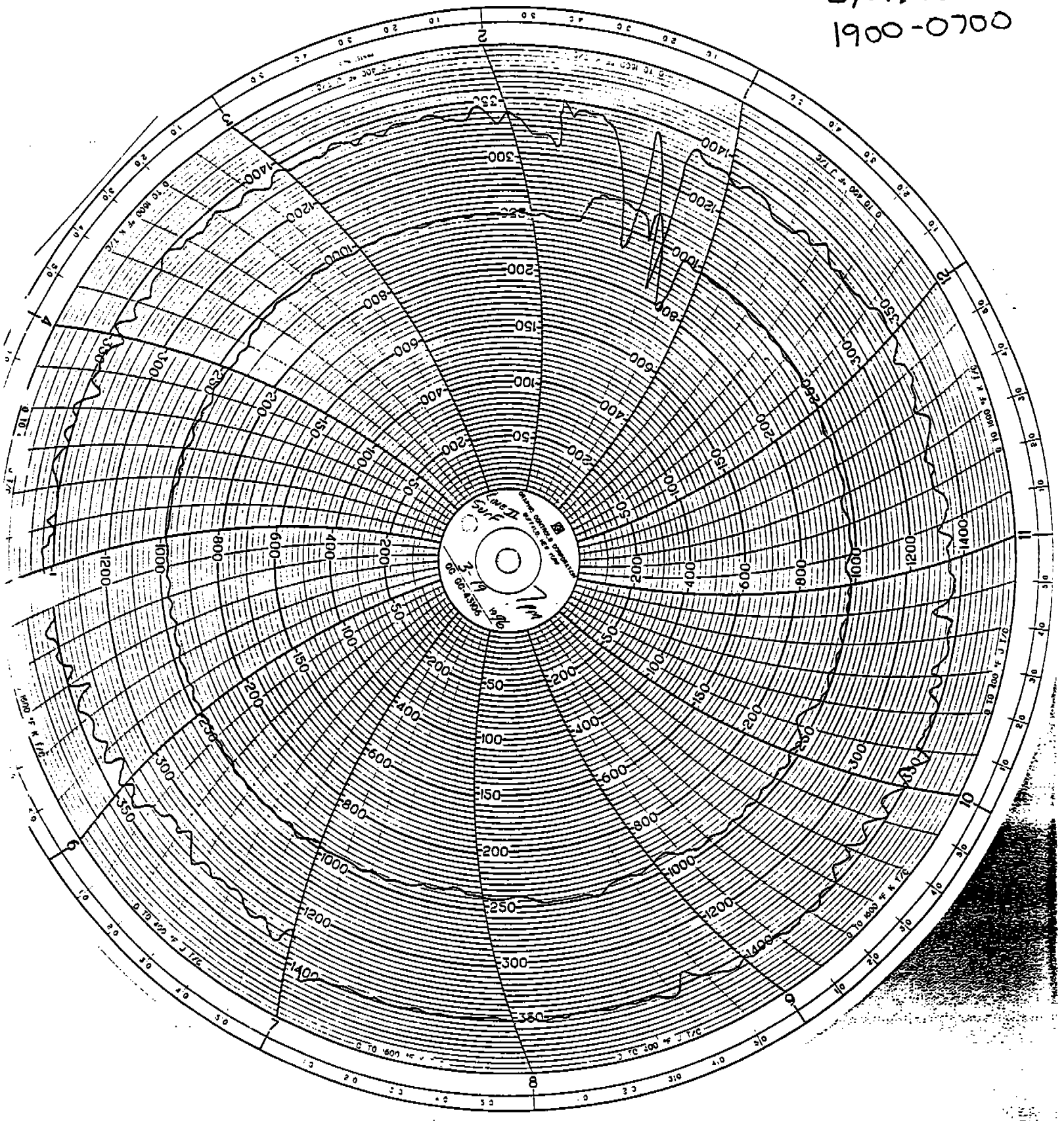


LINE II
CORE DRYER
3/20/96
1900-0700



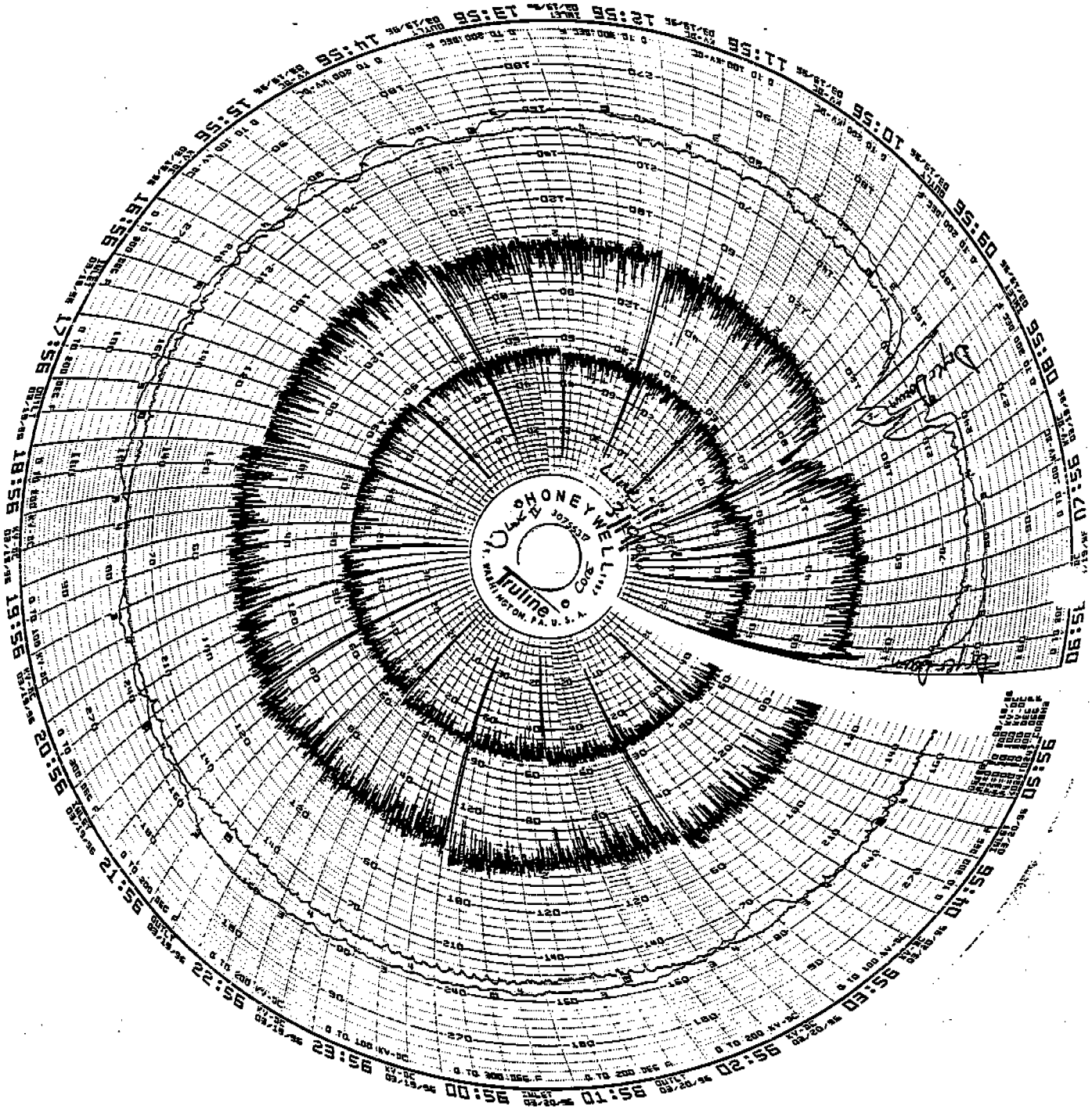
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LINE II
SURFACE DRYER
3/19/96
1900-0700

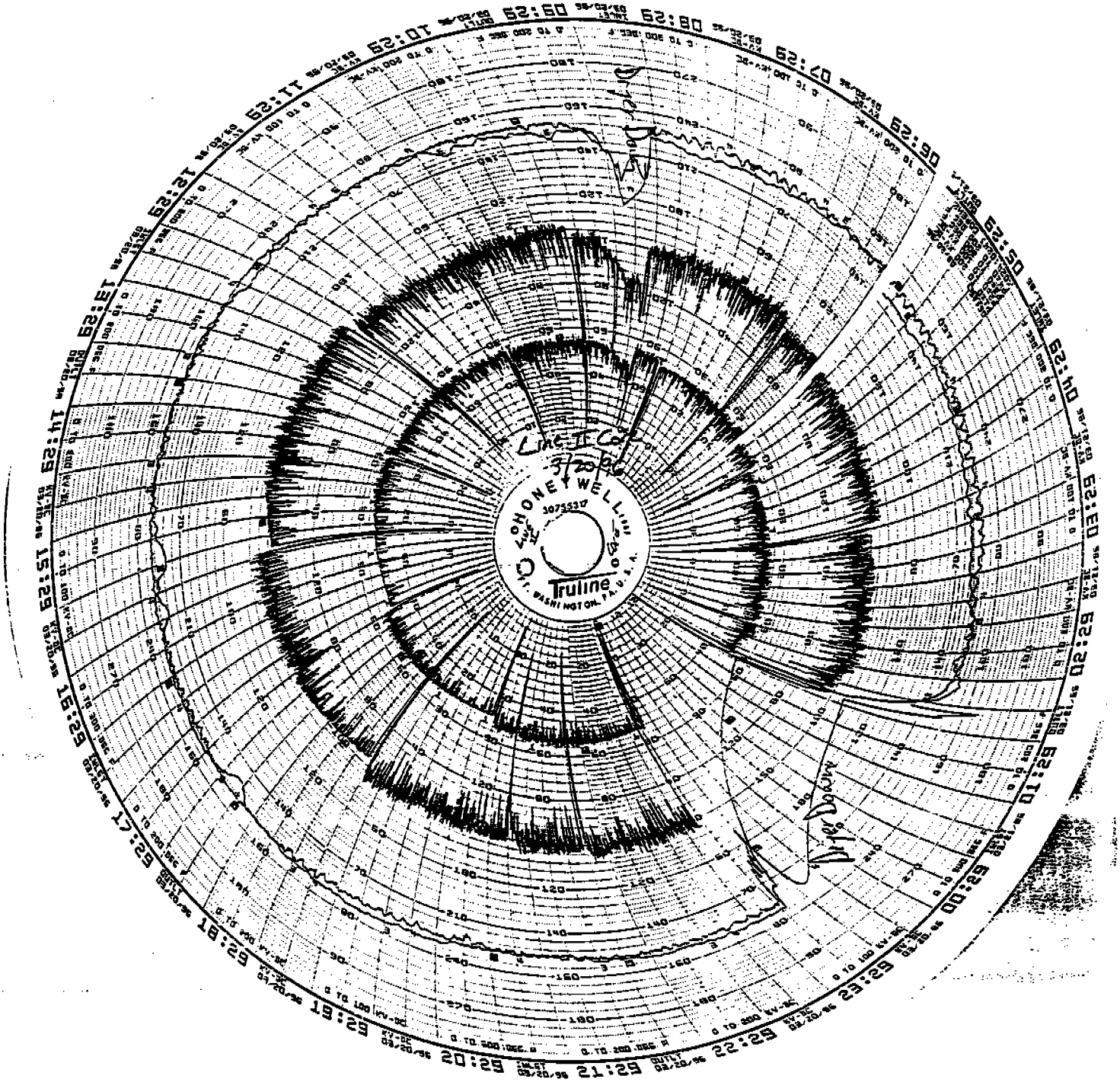


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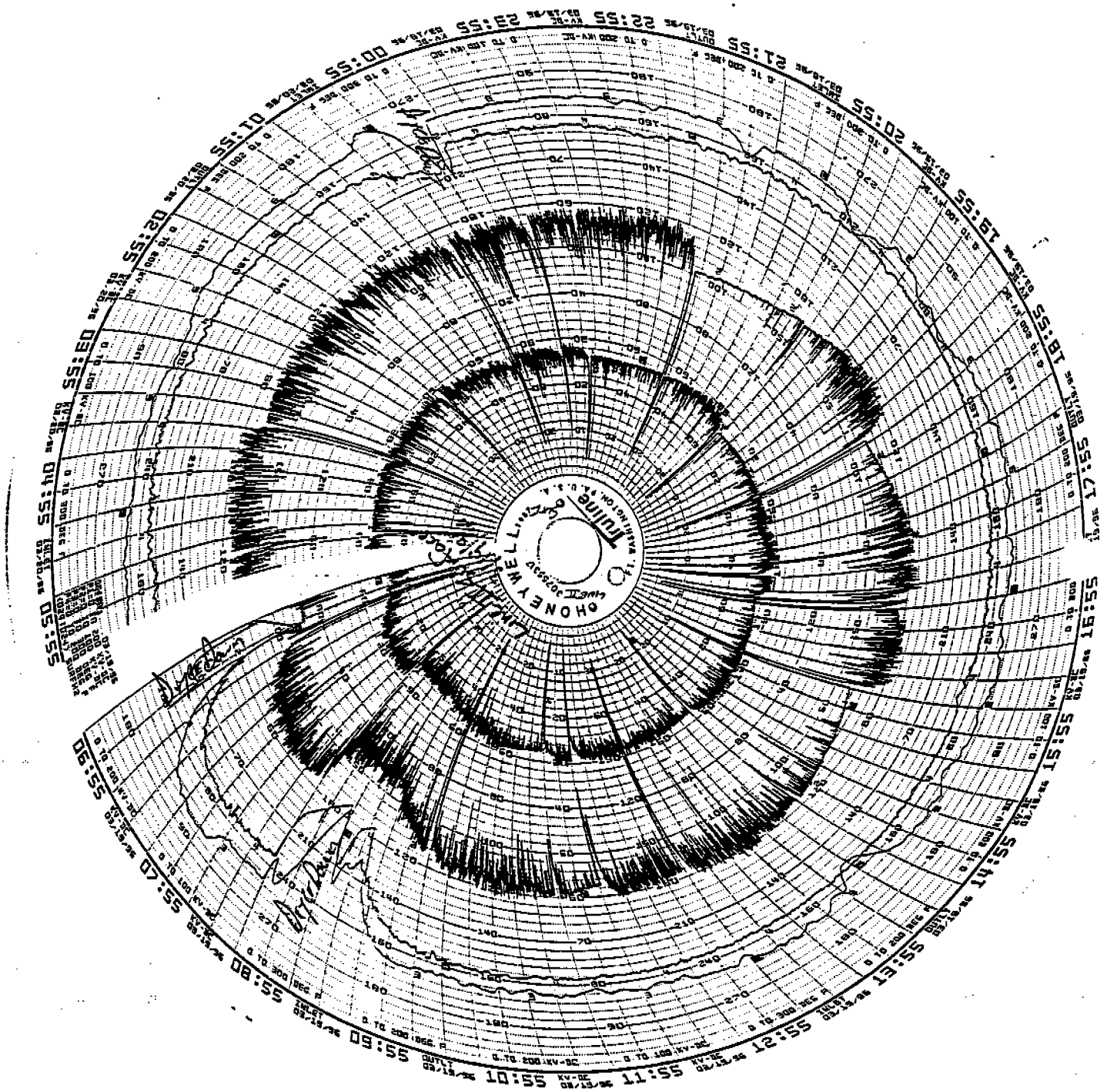
LINE II
CORE E-TUBE
3/19/96



LINE II
CORE E-TUBE
3/20/96

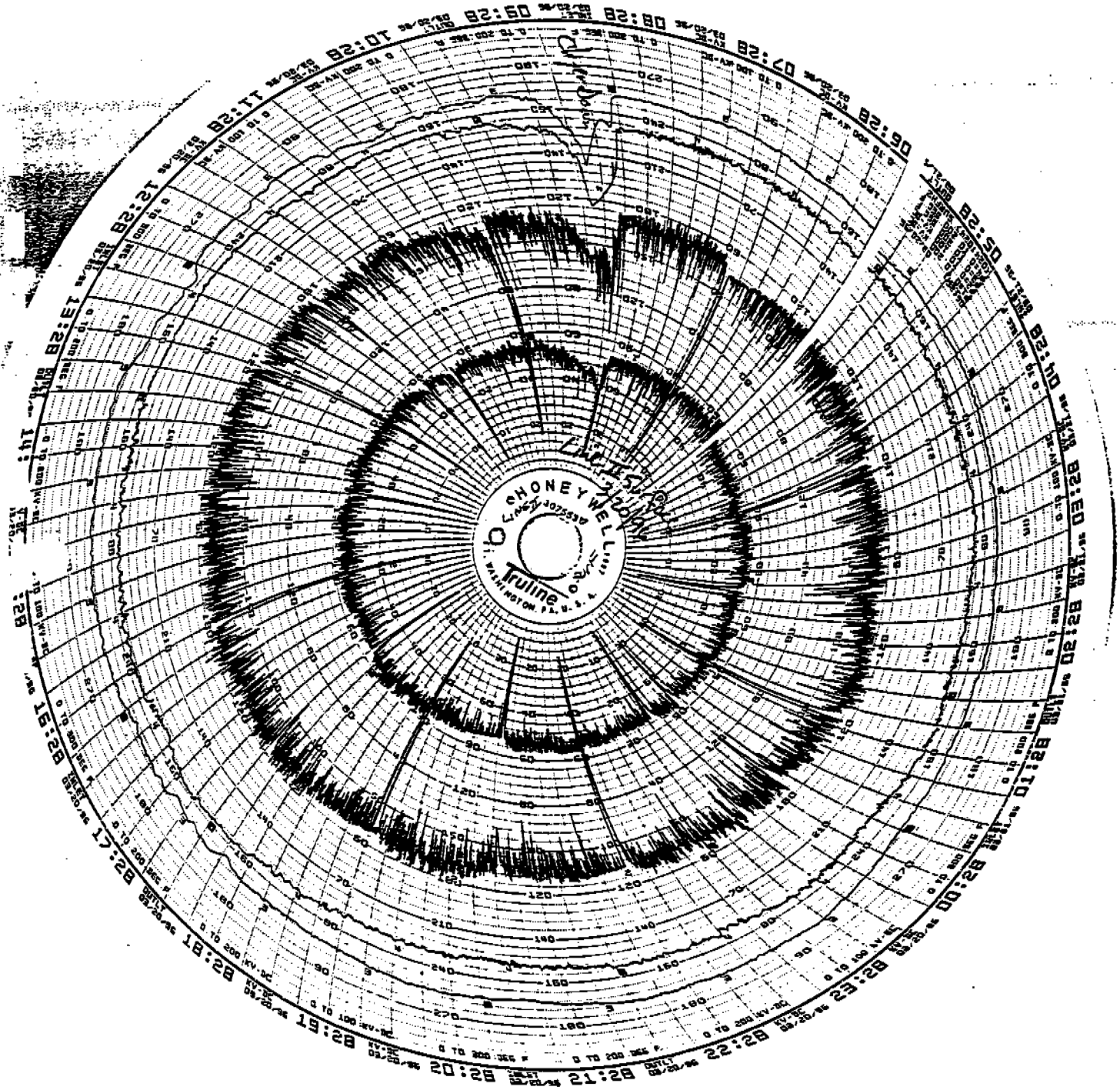


Line II
Surf. E-Tube
3/19/96



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Line II
Surf. E-Tube
3/20/96



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#II Dryer RTO 3/19/96

RECORD EVERY 15 MIN. — HAYWARD AIR TESTING WORKSHEET

Time	RTO Chamber Bed Temp.					Inlet	Burners		Combust.	Exhaust	Press.	Gas
	#1	#2	#3	#4	#5	Press.	B#1	B#2	Temp.	Temp.	Drop	Usage
9:00	425	378	428	318	418	1.5	1572	1571	1525	252	23.5	
9:15	422	373	429	315	418	0.9	1568	1564	1517	248	25.4	
	Down											
10:30	401	363	412	325	407	1.1	1582	1593	1511	244	23.2	
10:45	408	365	420	324	413	1.3	1562	1560	1523	256	22.7	
11:00	409	370	418	324	409	1.4	1579	1593	1526	248	23.7	
11:15	411	371	419	323	410	1.1	1580	1592	1528	249	23.2	
11:30	411	371	423	332	415	1.3	1559	1554	1528	259	23.9	
11:45	413	370	425	324	414	1.0	1565	1567	1531	254	23.3	
12:00	411	375	420	338	413	0.7	1569	1580	1535	263	23.5	
12:15	414	373	422	323	410	1.1	1578	1590	1534	250	23.4	
12:30	413	378	427	338	415	1.3	1565	1580	1537	257	23.8	
12:45	414	373	427	332	415	1.1	1579	1595	1529	255	23.6	
1:00	417	371	429	323	411	1.4	1563	1566	1529	253	23.6	
1:15	416	372	429	320	410	0.2	1571	1567	1525	251	23.6	
1:30	414	376	427	340	413	0.2	1567	1578	1534	263	23.8	
1:45	414	376	427	339	414	0.9	1575	1590	1523	261	23.9	
2:00	417	374	429	322	411	0.5	1574	1571	1526	251	23.7	
2:15	415	378	425	333	411	1.2	1577	1595	1527	259	23.8	
2:30	415	377	429	340	415	1.3	1556	1550	1525	261	24.2	
2:45	414	379	427	341	412	0.8	1576	1598	1526	260	23.8	
3:00	418	376	428	321	411	0.9	1566	1561	1528	256	23.4	
3:15	414	378	426	340	412	1.4	1573	1589	1527	263	23.8	
3:30	414	379	426	341	412	0.8	1577	1593	1525	261	23.9	
3:45	415	379	426	334	412	0.8	1575	1593	1527	261	23.8	
4:00	418	375	432	327	415	0.9	1566	1562	1523	256	23.3	
4:15	418	376	428	324	412	1.4	1578	1578	1526	251	23.9	
4:30	418	376	430	325	414	0.9	1572	1565	1526	256	23.2	
4:45	417	375	430	339	417	1.5	1559	1551	1520	260	23.5	
5:00	415	379	426	336	413	0.9	1578	1594	1527	256	23.5	
down												
5:30	415	375	433	332	417	0.8	1566	1571	1535	259	23.0	
5:45	418	377	427	327	414	1.4	1579	1580	1533	252	23.8	
		down										
7:30	420	374	431	326	417	0.7	1571	1575	1531	252	23.6	
7:45	417	378	426	332	415	1.1	1574	1594	1529	256	23.5	
8:00	420	377	427	328	415	1.2	1579	1594	1531	255	23.4	
8:15	422	375	431	328	419	0.9	1564	1567	1534	258	23.4	
8:30	421	377	427	327	416	0.9	1565	1566	1536	259	23.5	
8:45	421	376	431	337	422	1.4	1560	1558	1534	263	24.2	

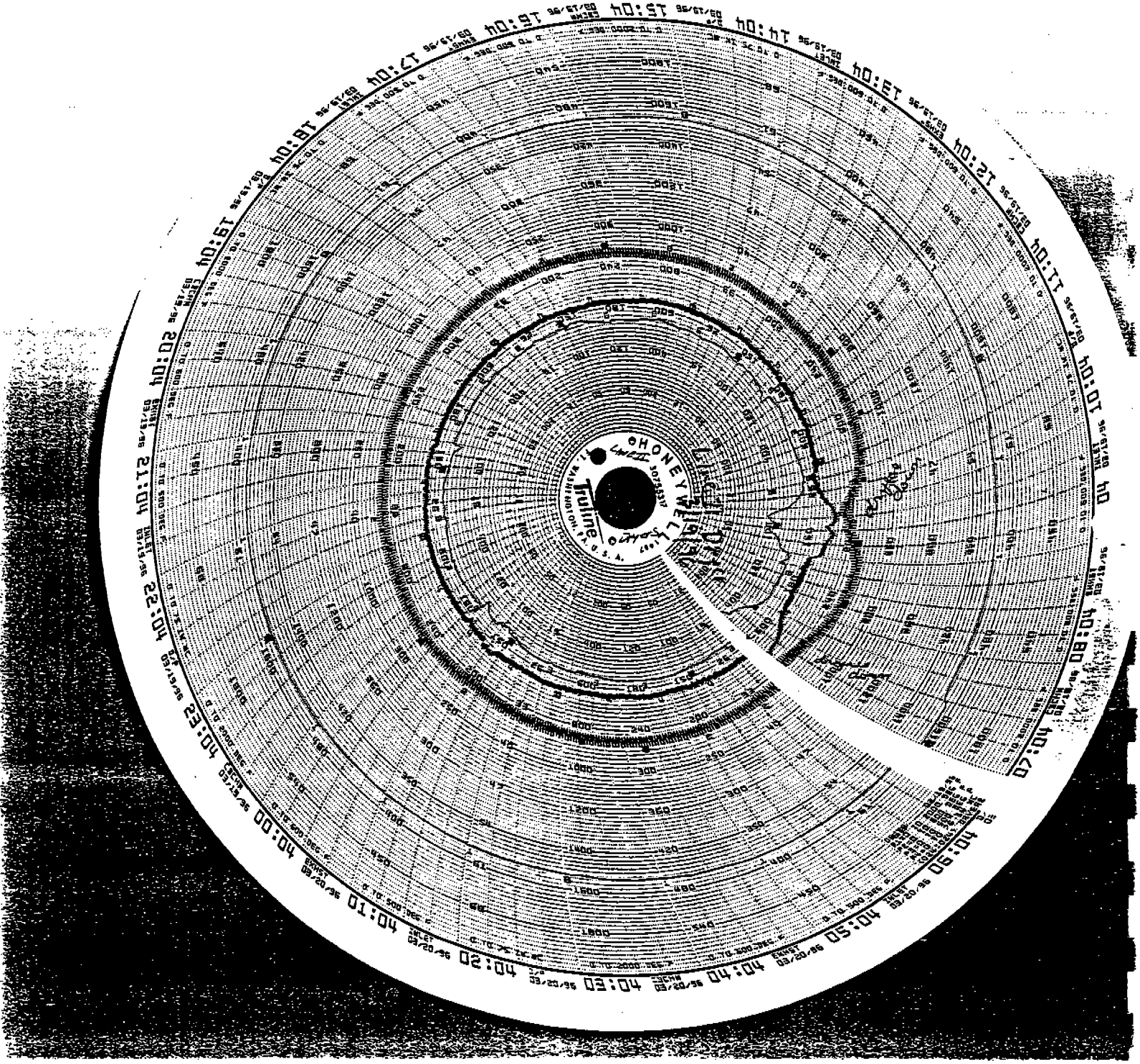
3-19-96

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LII Dryer RTO 3/20/96

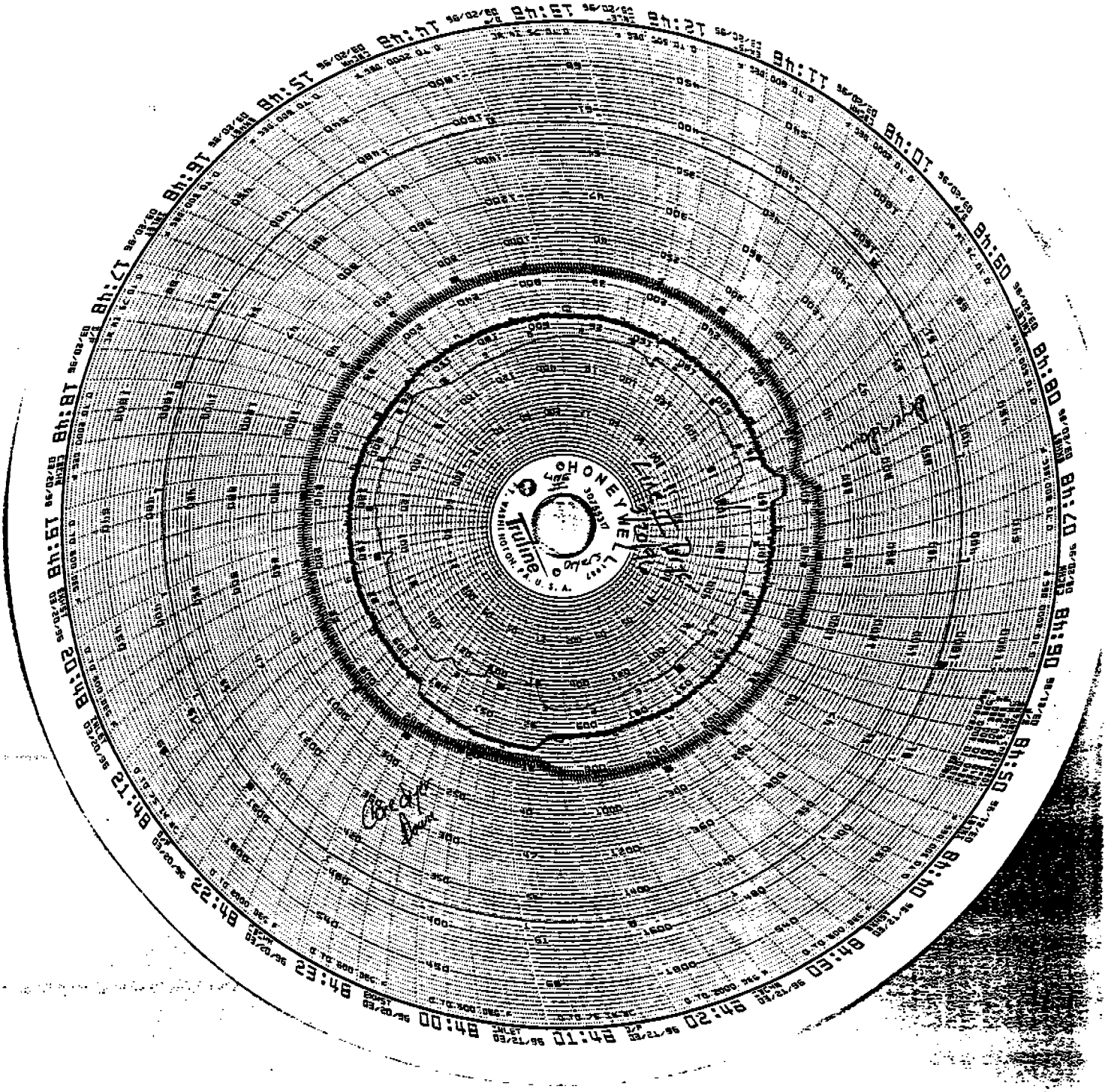
RECORD EVERY 15 MIN.					HAYWARD AIR TESTING WORKSHEET							WATER
Time	RTO Chamber Bed Temp.					Inlet	Burners		Combust.	Exhaust	Press.	
	#1	#2	#3	#4	#5	Press.	B#1	B#2	Temp.	Temp.	Drop	Usage
8:30	409	380	426	338	412	1.3	1575	1597	1531	257	24.0	
8:45	409	380	431	329	416	1.1	1555	1556	1523	257	23.6	10210
9:00	413	377	433	330	415	1.5	1580	1584	1530	248	23.9	
9:15			Dryer					Down				
9:30			Dryer					Down				
9:45	394	361	408	315	395	1.3	1572	1591	1506	245	24.8	10560
10:00	401	365	417	313	399	1.0	1587	1594	1523	245	23.9	
10:15	403	371	424	329	409	1.1	1560	1559	1520	249	23.4	10740
10:30	407	372	422	322	405	1.4	1576	1599	1531	245	24.0	
10:45	406	374	426	330	412	1.1	1563	1570	1529	253	23.7	10960
11:00	410	373	425	318	407	1.2	1569	1567	1531	246	24.4	
11:15	410	373	430	317	409	1.5	1577	1584	1533	248	24.2	11090
11:30	409	375	430	329	414	0.9	1565	1577	1532	252	23.9	NO H2O
11:45	411	375	430	326	413	0.2	1574	1586	1539	251	23.9	
12:00	411	375	430	327	413	0.7	1577	1585	1538	251	23.5	NO H2O
12:15	412	376	426	320	408	1.1	1582	1577	1534	254	23.8	
12:30	410	378	429	335	414	1.5	1562	1558	1524	256	23.5	NO H2O
12:45	410	380	426	339	412	1.0	1560	1559	1527	260	24.2	NO
1:00	410	380	426	337	411	0.7	1559	1561	1528	260	24.2	NO H2O
1:15	411	379	429	335	413	1.5	1559	1566	1531	254	23.4	
1:30	414	378	432	329	413	0.9	1567	1570	1535	254	23.7	NO H2O
1:45	415	377	433	327	412	1.5	1570	1572	1533	250	24.0	
2:00	417	377	432	320	410	1.3	1578	1581	1533	248	24.1	11240
2:15	416	380	428	323	408	1.2	1578	1590	1535	257	23.9	
2:30	414	382	432	330	415	1.4	1560	1563	1532	256	22.7	NO H2O
2:45	415	384	428	338	411	1.3	1566	1575	1538	257	23.4	
3:00	415	384	429	340	412	0.3	1568	1581	1543	262	24.2	11400
3:15	416	384	429	338	412	0.6	1570	1587	1544	263	24.1	
3:30	416	383	433	339	416	1.3	1563	1567	1540	259	23.5	11600
3:45	420	382	433	322	412	1.0	1576	1600	1545	257	23.6	
4:00	417	380	433	343	416	1.3	1564	1575	1541	252	24.1	11850
4:15	422	382	434	323	413	1.3	1580	1595	1543	254	23.4	12100
4:30	420	385	431	334	414	0.8	1579	1600	1544	265	23.5	
4:45	420	386	432	337	415	0.3	1560	1564	1539	261	23.4	12220
5:00	423	382	434	330	415	0.2	1574	1582	1540	251	24.1	
5:15	422	382	439	330	419	1.4	1574	1594	1540	260	23.4	12450
5:30	422	383	434	325	416	0.9	1584	1594	1539	255	24.1	
5:45	418	385	435	343	422	1.7	1558	1565	1534	258	23.2	12700
6:00	417	386	433	347	421	1.3	1561	1564	1538	262	23.4	

LINE II
DRYER RTO
3/19/96



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LINE II
DRYER RTO
3/20/96



DATE: 3-19-96
SHIFT/CREW: 1-B
OPERATOR: [illegible]

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
2		39 3/8	31	4328 lbs	
4	4366 lbs	39 3/8	32	4349 lbs	40 1/8
6		39 3/4	33	4337 lbs	
8	4312 lbs	39 3/4	34	4343 lbs	40
			35	4339 lbs	
1	4493 lbs CALLED MEAS. 8126		36	4315 lbs	39 5/8
2	4491 lbs	40 1/8	37	4358 lbs	
3	4484 lbs		38	4347 lbs	39 3/4
4	4419 lbs	40	39	4316 lbs	
5	4397 lbs		40	4288 lbs	39 5/8
6	4326 lbs	40 1/8	41	4296 lbs	
7	4293 lbs		42	4286 lbs	39 3/4
8	4362 lbs	40	43	4273 lbs	
9	4404 lbs		44	4247 lbs	39 3/8
10	4366 lbs	40 1/8	45	4224 CALLED MEAS. 203	
11	4275 lbs		46	4233 lbs	39 7/8
12	4297 lbs	40 1/4	47	4276 lbs	
13	4327 lbs		48	4278 lbs	39 7/8
14	4381 lbs	40 1/4	49	4335 lbs	
15	4385 lbs		50	4333 lbs	40
16	4460 lbs	40 3/8 CALLED MEAS. 1.51	51	4378 lbs	
17	4529 lbs		52	4367 lbs	40
18	4501 lbs	40 1/8	53	4378 lbs	
19	4461 lbs		54	4335 CALLED MEAS. 3.02	39 3/4
20	4435 lbs	40	55	4314 lbs	
21	4430 lbs		56	4346 lbs	40
22	4376 lbs	40	57	4359 lbs	
23	4361 lbs		58	4404 CALLED MEAS. 3.31	40 1/8
24	4320 lbs	40	59	4424 lbs	
25	4356 lbs		60	4353 lbs	40
26	4275 lbs	40	61	4366 lbs	
27	4329 lbs CALLED MEAS. 1.20		62	4351 lbs	39 7/8
28	4321 lbs	39 3/4	63	4375 lbs	
29	4239 lbs		64	4368 lbs	39 7/8
30	4276 lbs	40	65	4352 lbs	

7/16"

1/2"

115

DATE: 3/19/96
SHIFT/CREW: 1B
OPERATOR:

½"

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
66	4357 lbs	40			
67	4372 lbs				
68	4381 lbs	39 7/8			
70	4373 lbs				
72	4328 lbs	39 3/4			
73	4358 lbs	39 7/8			
73	4361 lbs				
74	4344 lbs	39 7/8			
75	4367 lbs				
76	4357	40			
77	4353 lbs				
78	4394 lbs	40			
79	4434 called from 5:47				
80	4476 lbs	40 1/8			
81	4481 called from 5:53				
82	4439 lbs	40			
83	4397 lbs				
84	4374 lbs	40			
85	4318 lbs				
86	4291 lbs	39 1/2 called from 6:25			
87	4235 lbs				
88	4325 lbs	40			
89	4334 lbs				
90	4241 lbs	40 1/2 called from 6:43			

116

DATE: 3-19-96
SHIFT/CREW: 2 / D
OPERATOR: M. Riley

UNIT/ THICKNESS		WEIGHT	HEIGHT	UNIT/ THICKNESS		WEIGHT	HEIGHT
1/2	1	4346			22	4253	39 3/4
1/2	2	4313	39 1/2 cp		24		
	3	4280			26	4321	40 cp
	4	4329	39 1/2 "		28		39 1/2
	5	4345			30	4356	39 5/8
	6	4367	40		32		39 1/2
	7	4400			34	4514 "	40 cp
	8	4377	40 1/4		36		40 cp
	9	4399			38	4604 " cp	40 cp
	10	4328	40 1/4		40		39 1/2
	11	4354			42	4512	39 1/2
	12	4341	40 1/4		44		39 3/4
	13	4339			46	4457	39 cp
	14	4306	40		48		39
	15	4293			50	4347	38 3/4 cp
	16	4278	40 1/8		52		39 1/4
	17	4314			54	4312	39 1/4
	18	4310	40 1/8		56		39 3/8
	19	4322			58	4360	39 3/8
	20	4322	40 1/4		60		39 1/4
	21	4311			62	4504	39 1/2
	22	4282	40		64		39 3/4
	24		40 1/8		66	4398	39 1/2
	26	4277	40 1/8		68		39 3/4
7/16	X	X X X X X X X	X		70	4481	39 7/8 cp
	2	4178 cp	40		72		39 1/2
	4		39 3/4		74	4003	39 1/2
	6	4127 cp	39 1/2		76		39 1/2
	8		39 1/2		78	4309	+1
	10	4167 #	39 1/2		80		+1
	12		39 1/2				
	14	4179 "	39 5/8				
	16		39 3/4				
	18	4255	39 5/8				
	20		39 3/4				

117

DATE: 3-20-96
SHIFT/CREW: 1-C
OPERATOR: AL RANG

UNIT/ THICKNESS	WEIGHT	HEIGHT
1		
2		
3		
4		
5	4448	39½"
6		39 3/4
7		35 3/4
1	4445	40 1/4
2	4458 (8:07)	40 1/4
3	4393 (8:10)	40
4	4279 (8:14)	40
5	4330 (8:20)	40
6	4362 (8:27)	40
7	4375 (8:35)	40
8	4371 (8:40)	40
9	4385 (8:46)	40
10	4340 (8:55)	40
11	4432 (8:59)	40 1/4
12	4397 (9:06)	40
13	4355 (9:36)	40
14	4351 (9:42)	40
15	4313 (9:49)	40
16	4274 (9:55)	40
17	4426 (10:0)	40
18	4437 (10:08)	40 1/4
19	4450 (10:17)	40
20	4472 (10:32)	40
21	4426 (10:26)	40
22	4427 (10:34)	40
23	4445 (10:39)	40
24	4389 (10:41)	40
25	4351 (10:51)	40
26	4360 (10:57)	40
27	4295 (11:04)	40
28	4263 (11:10)	40

UNIT/ THICKNESS	WEIGHT	HEIGHT
29	4270 (11:17)	40
30	4250 (11:23)	39 3/4
31	4208 (11:29)	39 3/4
32	4198 (11:35)	39 3/4
33	4187 (11:40)	39 3/4
34	4189 (11:45)	40
35	4215 (11:54)	40
36	4266 (12:00)	40
37	4306 (12:06)	40
38	4342 (12:30)	40 1/8
39	4392 (12:19)	40
40	4335 (12:26)	40
41	4332 (12:32)	40
42	4350 (12:35)	40 1/4
43	4392 (12:44)	40 1/4
44	4380 (12:52)	40 1/4
45	4366 (12:58)	40 1/4
46	4379 (1:03)	40 1/4
47	4388 (1:09)	40 1/4
48	4387 (1:15)	40 1/2
49	4353 (1:21)	40 1/2
50	4343 (1:28)	40 1/4
51	4319 (1:34)	40 1/4
52	4325 (1:40)	40 1/8
53	4355 (1:47)	40 1/8
54	4347 (1:54)	40
55	4301 (1:59)	40
56	4333 (2:06)	40
57	4339 (2:13)	40
58	4411 (2:18)	40
59	4440 (2:25)	40
60	4530 (2:32)	40 1/2
61	4510 (2:37)	40 1/2
62	4608 (2:44)	40 3/4 CS
63	4613 (2:49)	41

118

DATE: _____
SHIFT/CREW: _____
OPERATOR: _____

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
64	4592 (2:56)	41 cp	99	44 96630	40 3/4
65	4618 (3:03)	41	100	4471 (6:41)	40 1/4
66	4659 (3:19)	41 1/4 cp	101	4463 (6:46)	40 1/4
67	4584 (3:17)	40 3/4	102	4482 (6:54)	40 1/4
68	4521 (3:21)	40 1/2	103	44866 57	40 1/4
69	4450 (3:28)	40 1/2			
70	4430 (3:33)	40 1/4			
71	4418 (3:41)	40 1/4			
72	4437 (3:47)	40 1/2			
73	4420 (3:52)	40 1/2			
74	4421 (3:59)	40 1/4			
75	4418 (4:05)	40 1/4			
76	4422 (4:13)	40 1/4			
77	4452 (4:18)	40 1/4			
78	4433 (4:24)	40 1/4			
79	4437 (4:29)	40 1/4			
80	4440 (4:35)	40 1/2			
81	4373 (4:43)	40			
82	4323 (4:50)	40			
83	4327 (4:56)	40			
84	4270 (5:02)	40			
85	4260 (5:09)	40			
86	4293 (5:15)	40			
87	4350 (5:21)	40			
88	4316 (5:28)	40			
89	4306 (5:31)	40			
90	4340 (5:39)	40 1/4			
91	4356 (5:45)	40 1/4			
92	4366 (5:52)	40			
93	4366 (5:59)	40			
94	4367 (6:04)	40			
95	4475 (6:10)	40			
96	4472 (6:17)	40 1/2			
97	4444 (6:23)	40 1/4			
98	4493 (6:29)	40 1/4			

119

DATE: 3-20-96
SHIFT/CREW: A-2
OPERATOR: Amy

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
1/2 1	4441#		22	4486#	39 3/4
2	4403#	40 1/4	24		39 3/8
3	4391#		26		39 1/2
4	4354#	40 1/8	28	4292#	39 1/4
5	4386#		30 calliper	4371#	40 3/8
6	4377#	40	32 calliper	4294#	39
7	4395#		34	4443#	39 1/4
8	4413#	40 1/4	36		39 1/8
9	4427#		38	4372#	39 3/4
10	4405#	40 1/4	40		39 3/8
11	4407#		42	4404#	39 3/4
12	4418#	40	44		39 5/8
13	4435#		46	4287#	39 3/4
14	4422#	40 1/4	48		39 1/2
15	4401#		50	4378	39 1/2
16	4405#	40 1/8	52		39 1/2
17	4355#		54	4454#	39 3/8
18	4360#	39 7/8	56		39 3/8
19	4400#		58	4330#	39 1/2
20	4331#	40	60		39 1/2
21	4286#		62		39 5/8
22	4284#	39 7/8	64		39 3/8
23 calliper	4208#		66		
24		40 3/8	68		
25 26	4192	39 3/4	70		
7/16 1	4397#	39 7/8	1/4 calliper	4502#	37 1/2
2		40	2		35 3/8
4 calliper	4541#	40	4		35 1/2
6 " "		40	6		
8 calliper	4539#	39 3/4	8		36 1/2
10 " "		40 1/4	10		
12		40 3/8			
14		40 1/8			
16		40			
18 calliper	4544#	40			
20 " "					

120

HAYWARD LINE 2 DRYER RTO STACK MARCH 21st 1996
BENZENE
DATA TIME: START= 08:15 END= 12:45 HOURS= 4.50

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

	1/2"
per/peice	54.38
per/ 8' x 16'	217.51

PLANT PRODUCTION RATE

4.50	=hours during testing
69	=pressloads
828	=no. of 8'x16' boards produced (pressloads x 12 boards per load)
180,097	=lbs of finished product (boards produced x weight of finished board)
40,021	=lbs of finished product per hour (lbs of finshed product / hours)
20.01	=tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY DRY FUEL INPUT

	SURFACE
10	=SURFACE fuel calibration in pounds per count
2,151	=SURFACE counts during testing hours
21,510	=SURFACE lbs of fuel burned during testing
4.50	=hours during testing
4,780	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.39	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,600	=estimated BTU content per pound of dry fuel,
41.1	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,420	=average inlet temperature
46.63	=average incoming moisture percent
5.76	=average dry moisture percent
	CORE
10	=CORE fuel calibration in pounds per count
2,406	=CORE counts during testing hours
24,060	=CORE lbs of fuel burned during testing
4.50	=hours during testing
5,347	=lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
2.67	=tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
8,600	=estimated BTU content per pound of dry fuel,
46.0	=estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)
1,496	=average inlet temperature
46.63	=average incoming moisture percent
5.95	=average dry moisture percent

DRYER THROUGHPUT RATE

10,127	=Total pounds of fuel burned per hour in Core and Surface Dryer
40,021	=lbs of finished product per hour (lbs of finshed product / hours)
50,148	=Pounds of material produced by the dryer per hour (dry basis, assumming fuel balances)
2,691	= weight of trim per hour at 6.3% of finished product
7,436	=weight of screened fines per hour (total fuel - trim)
14.83%	=resulting loss to fines as percentage of dryer throughput

LOUISIANA-PACIFIC CORPORATION

PRESS REPORT: ~~1~~ 2 DATE: 3-21-96

OPERATOR: [illegible] SHIFT: 1 CREW: C

THICKNESS: 7/16 - 1/2 PRESS LOS: 8 3/4 180 1/2

OVERALL TIMER: 167-174 DECOMPRESSION TIME: 15

PRESS TEMP: 210-215 N.O.R. TOTAL REJECTS: 0

LOG COUNT: 1436

LINE SPEED	THICKNESS	FROM	TO
58'	7/16	7:00	7:32
54	1/2	7:32	7:00

F.C.O.S. HYD. RADIATOR: 8:00 TIME

PRESS BLOWN DOWN: 8:12

SPINNER HEADS FLUSHED: * TIME

SURFACE BLENDER HOSED: * TIME

FORMER HYD RADIATOR: * TIME

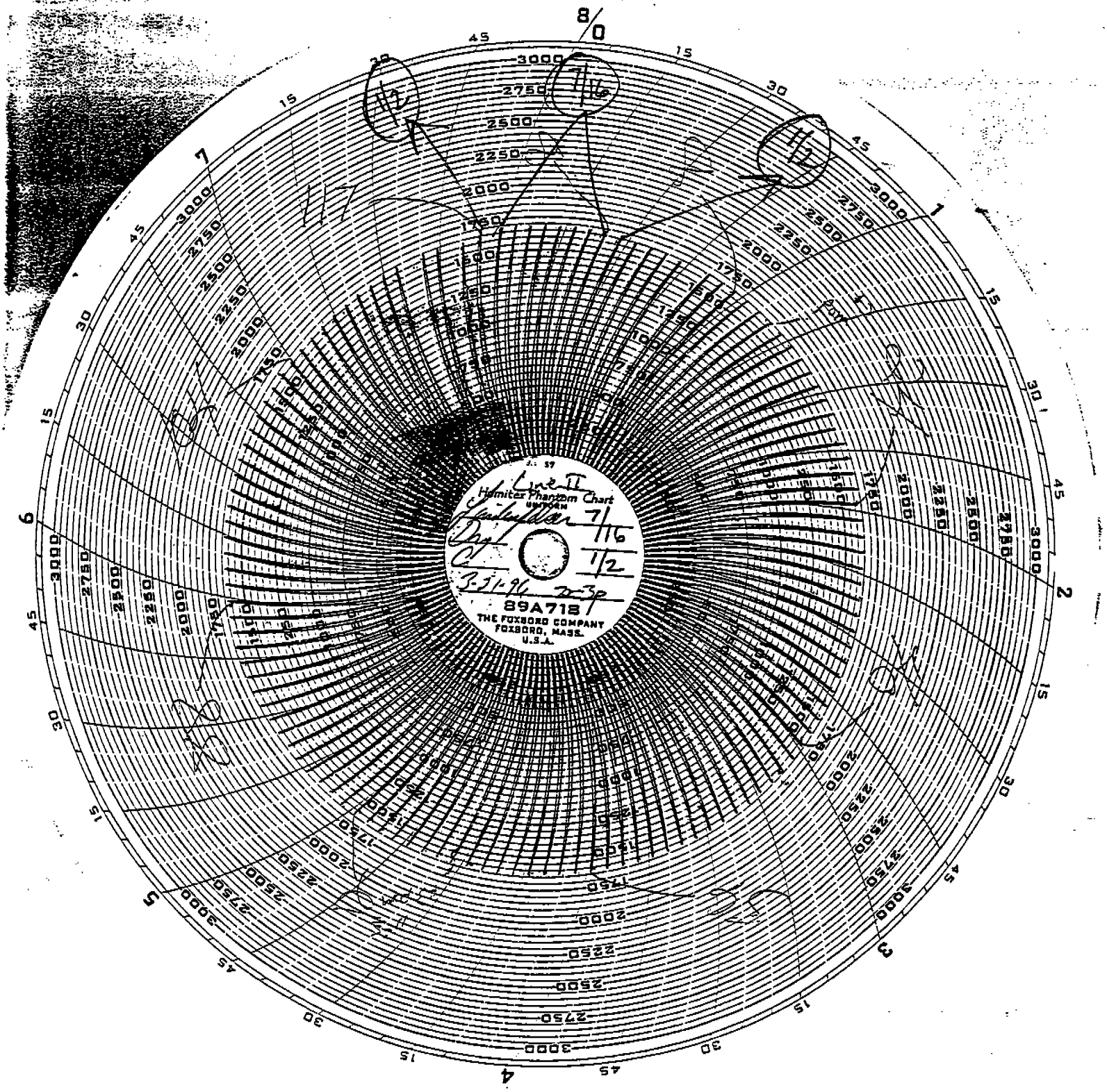
3/8 = 382,967

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
7:48	53				5	Baghouse outside plugged under Airlock.
2:36	40				14	Same as above.
2:50	52				2	Baghouse related.

DOWNTIME CODE: M - MECHANICAL (11) E - ELECTRICAL O - OPERATOR

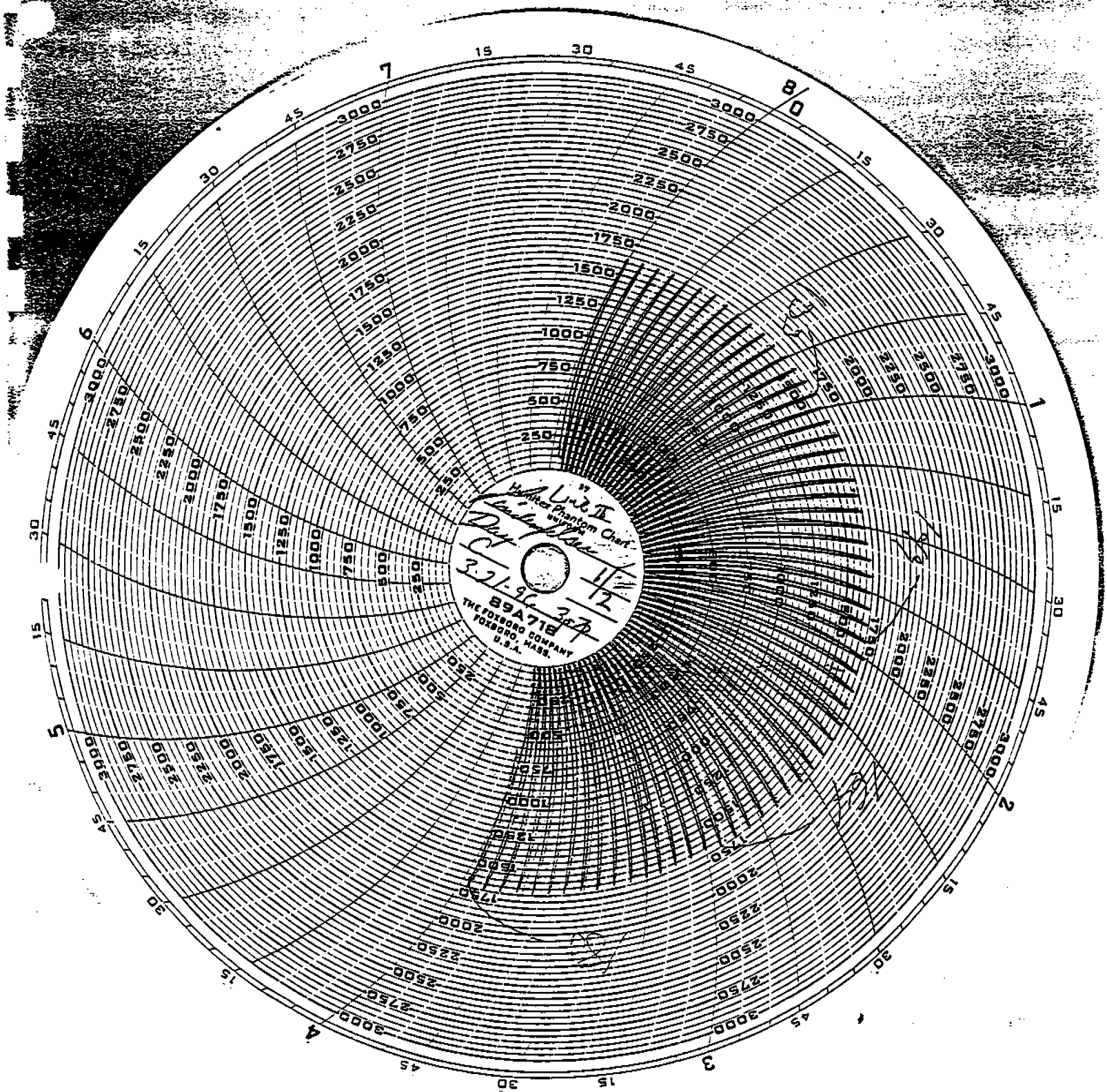
122

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



123

LINE II
PRESS CHART
3/21/96
1500-1900



124

Dryer DATA
fuel calibration lb/coun face core

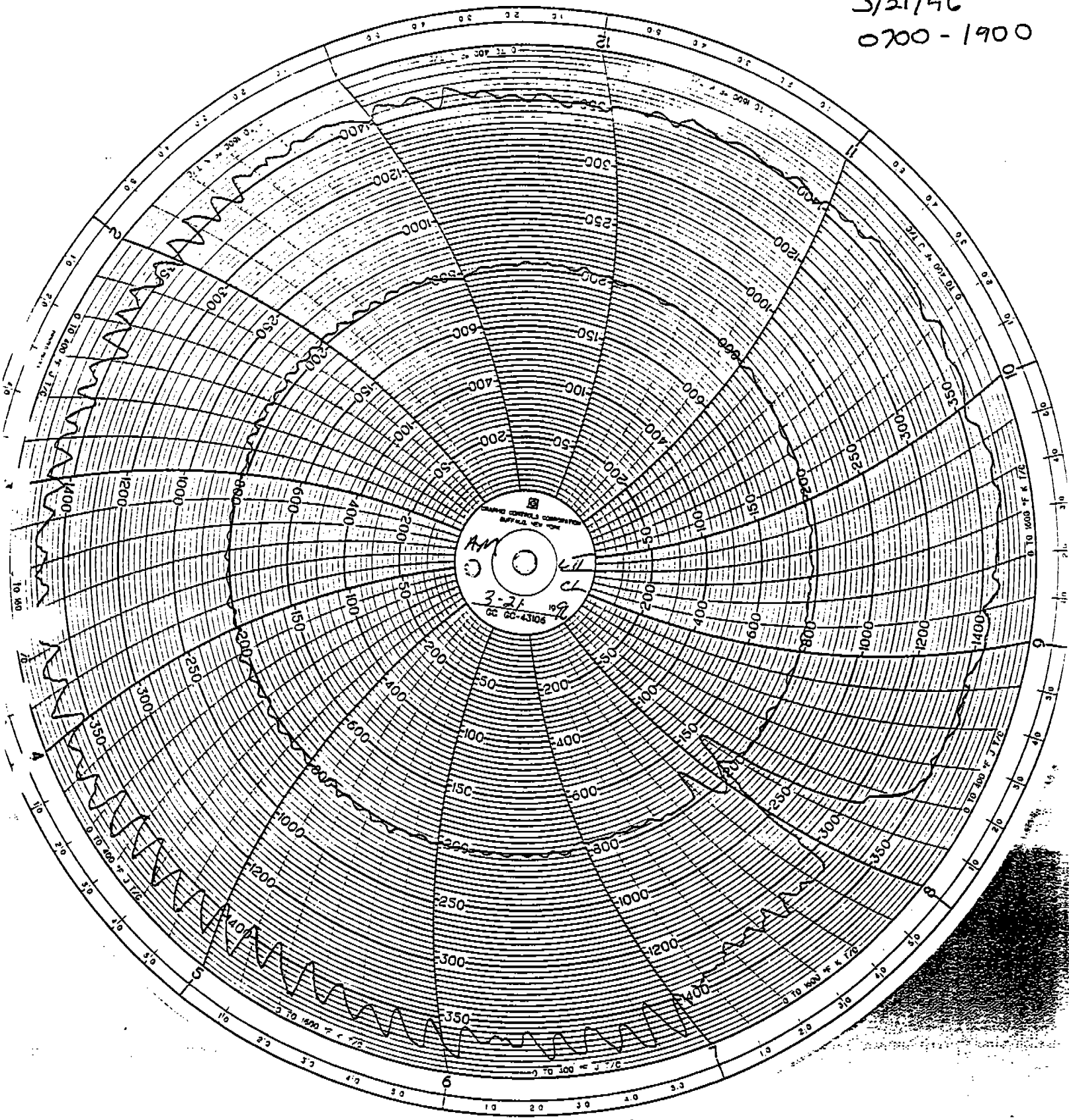
date 3/21/96
by
page 1 of

TIME	FACE OUT. SET POINT	FACE FEED RATE	FACE INLET TEMP	FACE OUTLET TEMP	FACE FUEL COUNT	FACE WET BIN LEVEL	CORE OUT. SET POINT	CORE FEED RATE	CORE INLET TEMP	CORE OUTLET TEMP	CORE FUEL COUNT	CORE WET BIN LEVEL	DRY BIN LEVEL FACE	DRY BIN LEVEL CORE	EVERY HOUR FLAKE MOISTURE IN	FACE	CORE
8:15	244	71	1382	242	578	100%	213	66	1399	211	520	100%	80%	80%	46.9	5.6	7.4
8:30	244	71	1379	241	684	100%	213	67	1453	212	643	100%	75%	75%		5.6	6.6
8:45	244	71	1419	243	796	90%	213	67	1473	212	769	90%	80%	75%		5.1	5.9
9:00	244	71	1497	242	914	80%	213	69	1521	211	905	80%	80%	75%		5.2	6.0
9:15	244	71	1503	241	1041	40%	213	69	1539	210	1043	80%	90%	75%	46.4	5.5	6.3
9:30	244	71	1462	242	1153	80%	213	69	1573	209	1170	80%	90%	75%		5.1	6.2
9:45	244	71	1453	244	1287	70%	213	69	1539	209	1318	70%	90%	80%		5.0	6.4
10:00	244	70	1455	240	1398	70%	213	69	1542	209	1443	70%	90%	80%		5.7	6.3
10:15	244	70	1460	242	1517	70%	213	67	1549	211	1578	70%	90%	90%	48.2	5.9	6.2
10:30	244	70	1455	242	1636	70%	213	67	1536	209	1709	70%	90%	90%		5.8	5.9
10:45	244	70	1400	242	1754	70%	213	67	1484	213	1844	70%	90%	90%		5.8	5.3
11:00	244	70	1385	241	1877	60%	217	65	1469	213	1981	70%	90%	90%		5.5	5.0
11:15	244	70	1396	241	2001	60%	217	65	1476	215	2126	70%	90%	90%	48.0	5.7	5.5
11:30	246	70	1392	246	2121	60%	217	65	1484	215	2263	70%	90%	90%		6.1	5.3
11:45	246	70	1318	232	2254	60%	217	65	1447	214	2405	70%	90%	90%		5.8	5.4
12:00	246	68	1377	238	2372	70%	217	65	1457	213	2534	60%	80%	80%		6.8	5.6
12:15	248	68	1375	241	2498	70%	219	65	1432	216	2676	70%	80%	80%	45.0	5.8	5.2
12:30	248	68	1419	245	2612	70%	219	65	1480	217	2803	80%	80%	80%		6.1	5.3
12:45	248	68	1437	240	2729	75%	219	65	1528	219	2926	75%	75%	75%		7.1	6.4
1:00	251	68	1373	250	2878	75%	219	66	1528	210	3084	80%	75%	75%		5.7	8.3
1:15	251	68	1452	248	2976	75%	220	66	1518	219	3205	80%	75%	75%	46.2	5.3	5.9
1:30	253	71	1441	252	3105	60%	221	66	1558	220	3346	70%	75%	80%		5.1	5.4
1:45	253	71	1466	251	3223	50%	221	66	1553	219	3475	60%	70%	75%		5.5	5.8
2:00	253	71	1437	250	3357	50%	221	66	1500	220	3613	60%	70%	75%		5.6	6.4
2:15	255	71	1381	250	3419	50%	221	66	1457	220	3743	60%	70%	75%		5.3	5.3

L-126

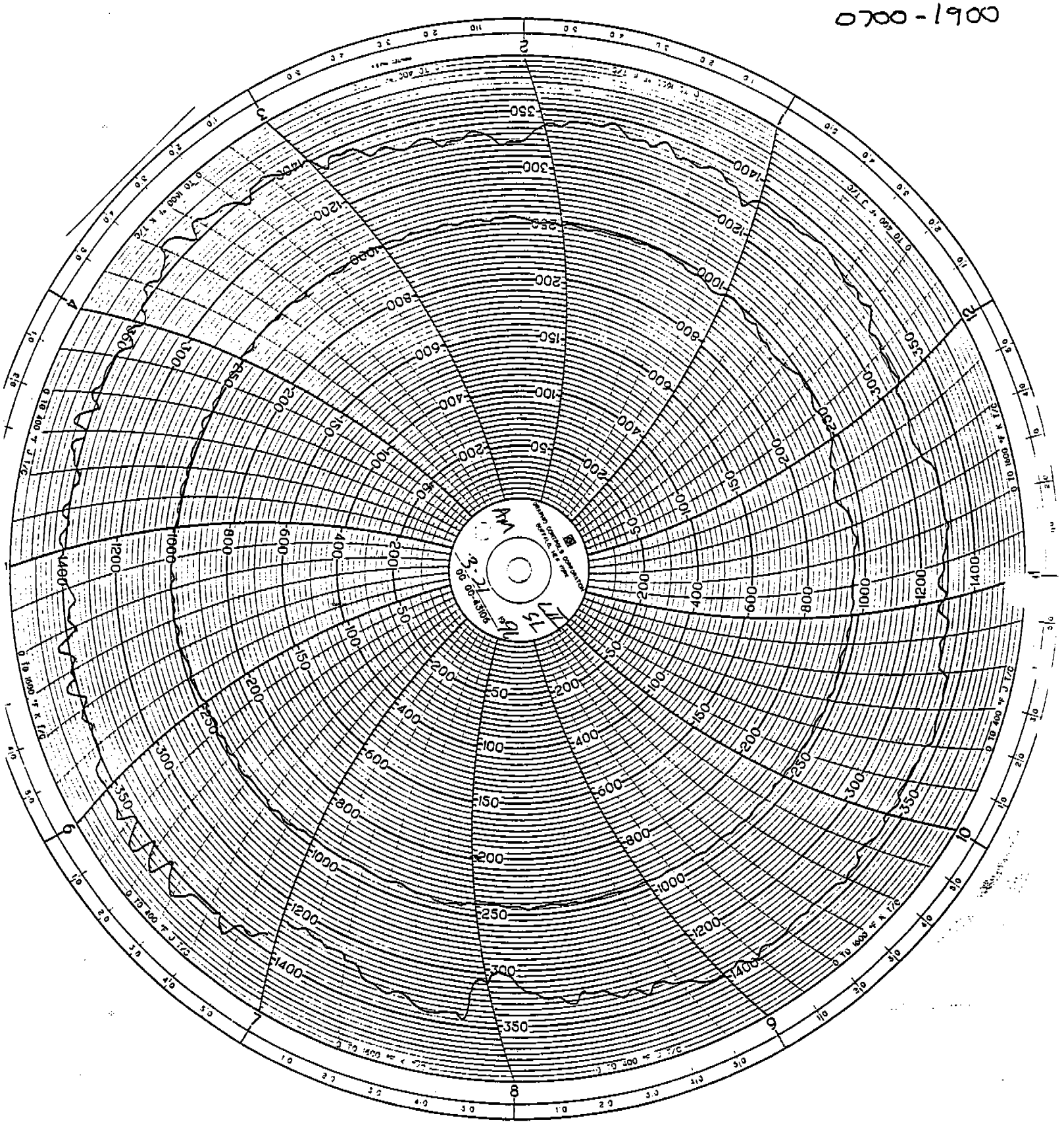
123

LINE II
CORE DRYER
3/21/96
0700 - 1900



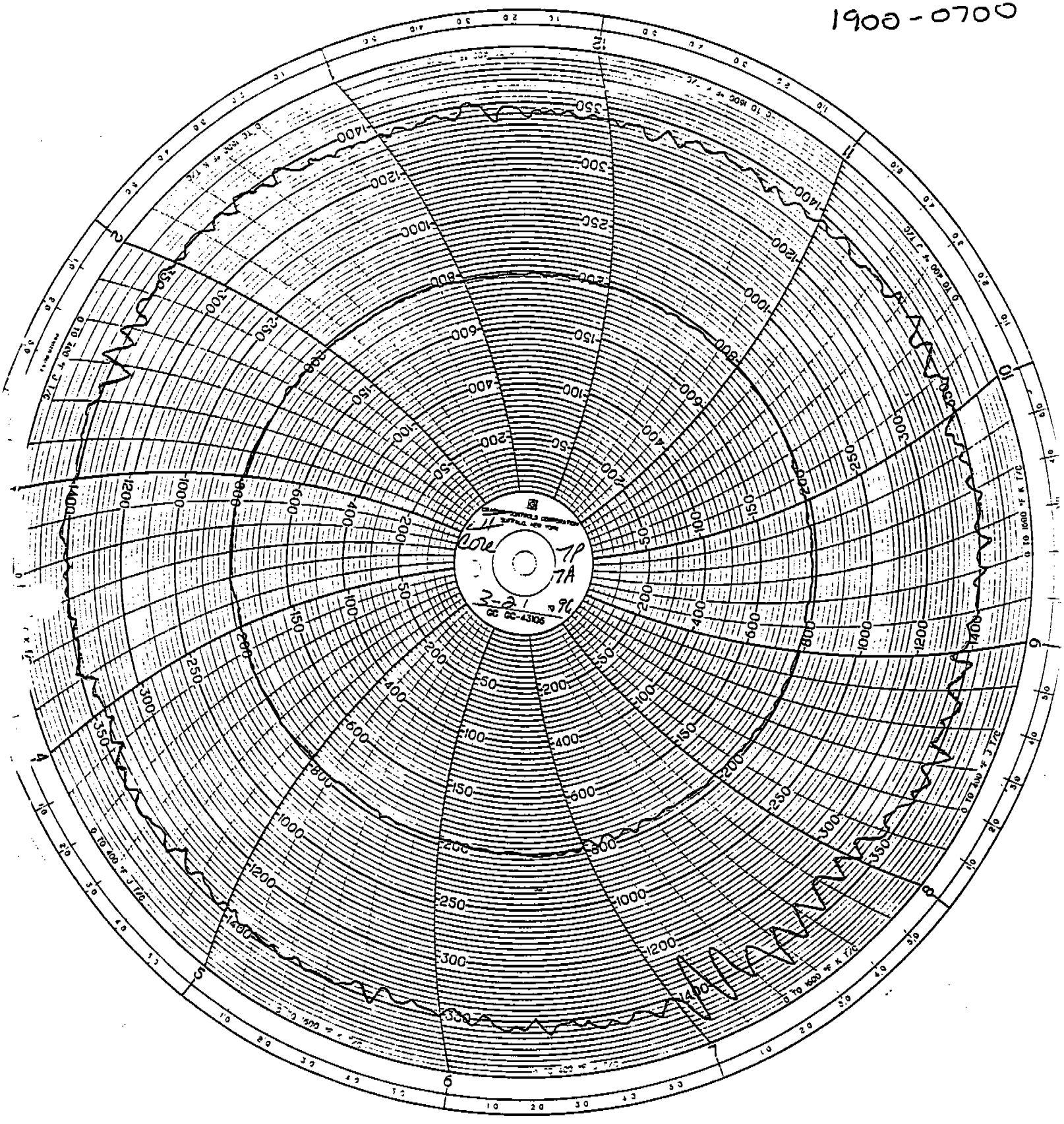
126

LINE II
SURFACE DRYER
3/21/96
0700 - 1900



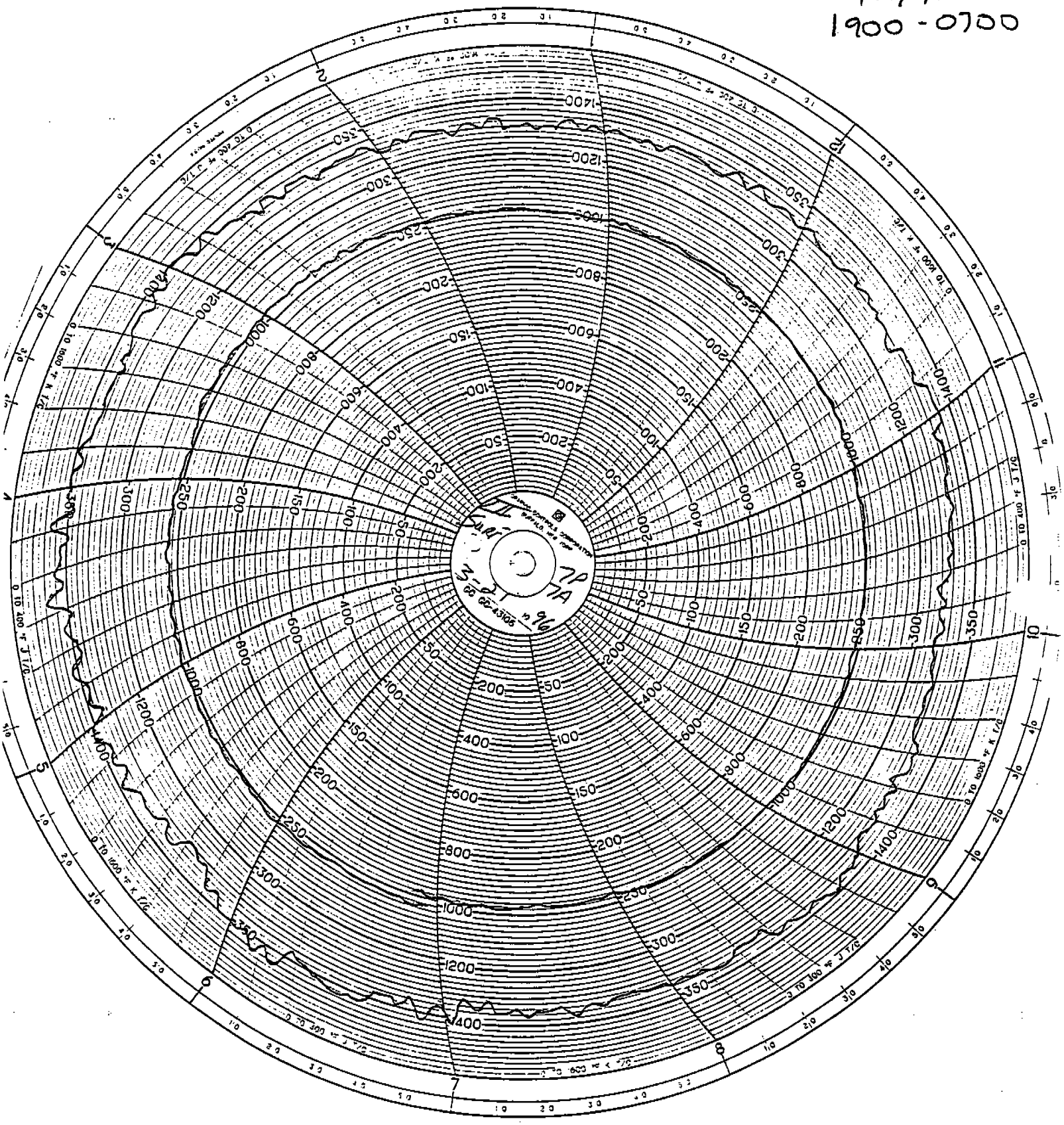
127

LINE II
CORE DRYER
3/21/96
1900-0700



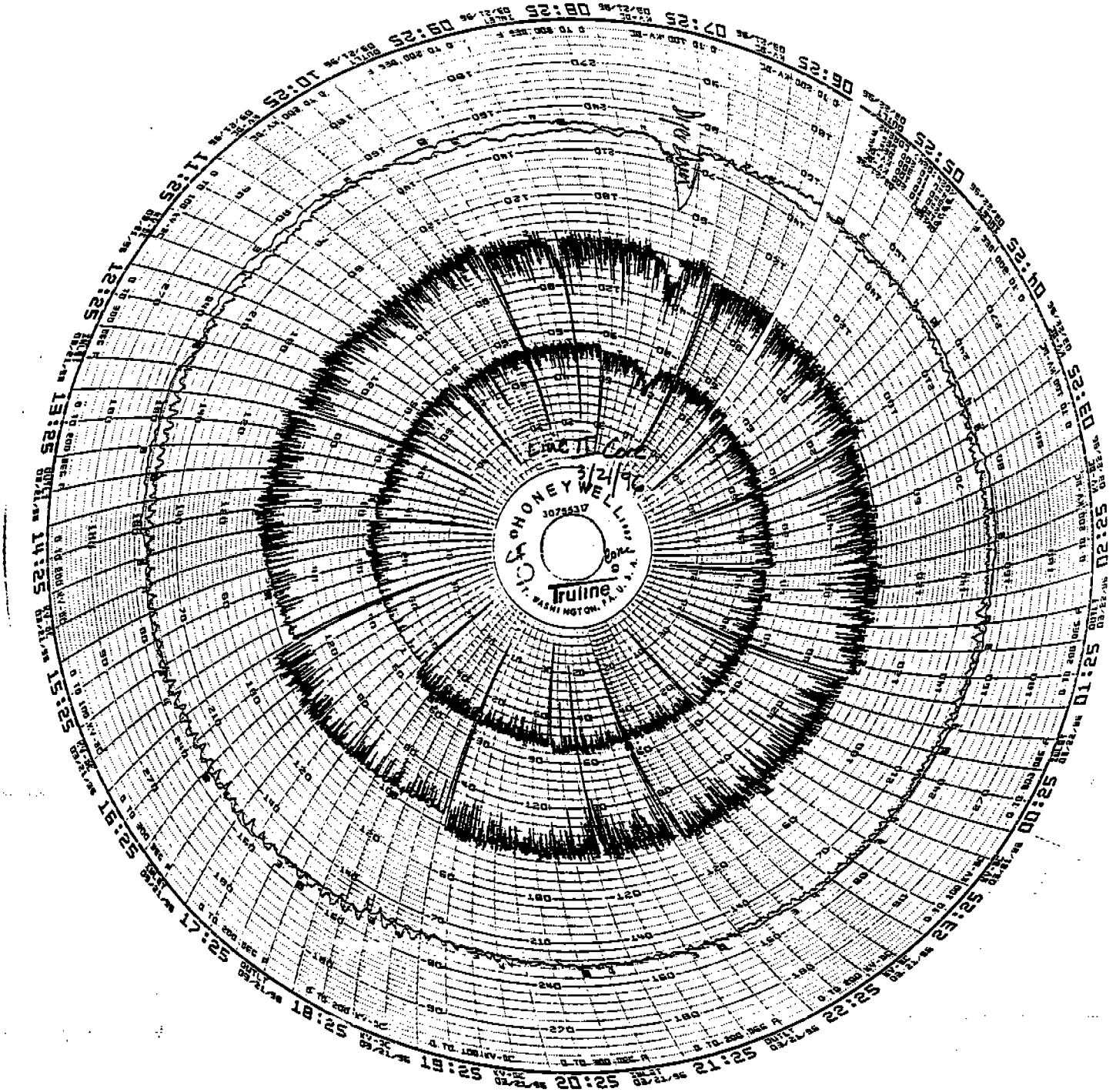
128

LINE II
SURFACE DRYER
3/21/96
1900 - 0700

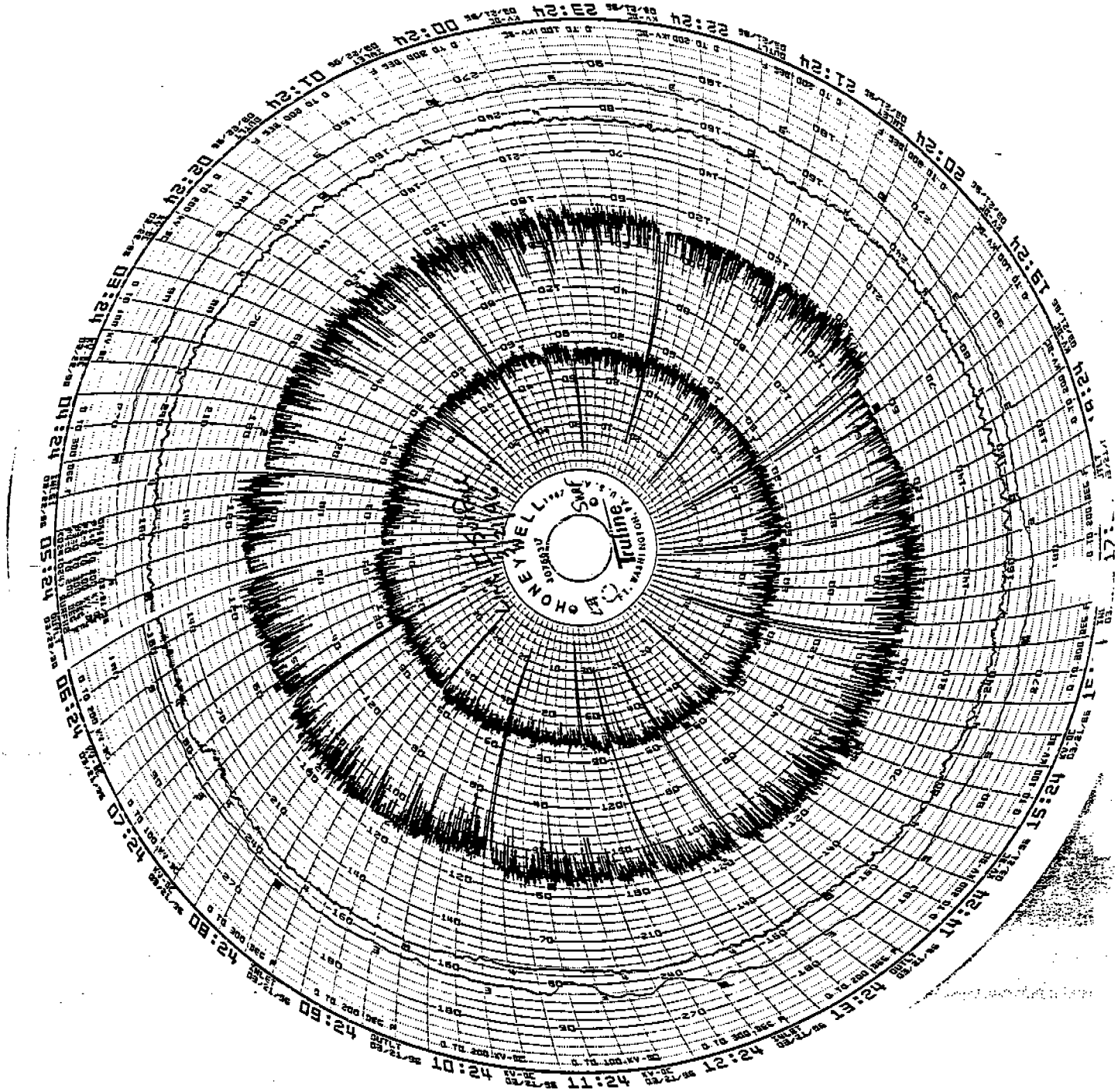


129

LINE II
CORE E-TUBE
3/21/96



LINE II
SURF. E-TUBE
3/21/96

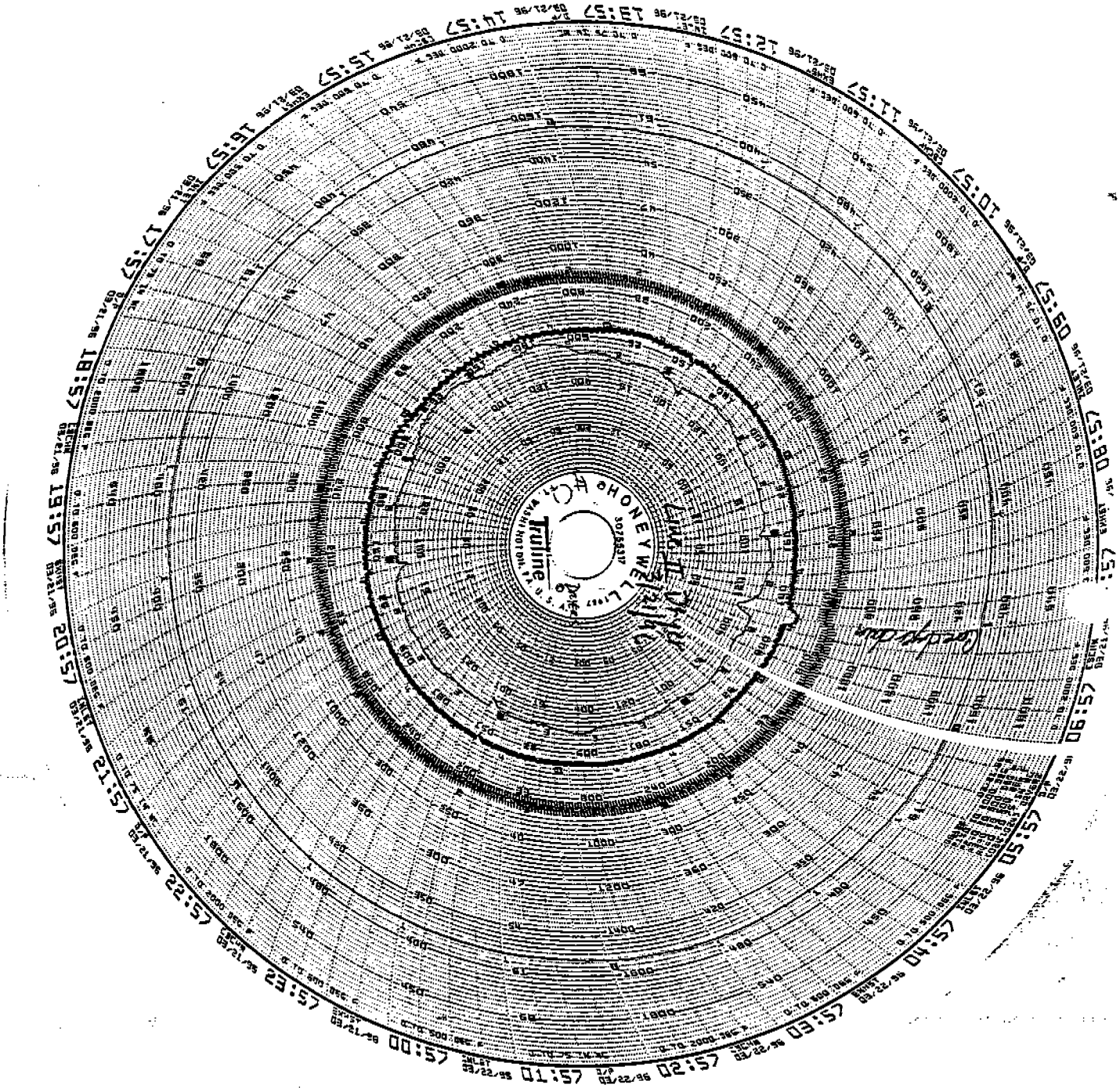


131

RECORD EVERY 15 MIN. | HAYWARD AIR TESTING WORKSHEET

Time	RTO Chamber Bed Temp. #1	#2	#3	#4	#5	Inlet Press.	Burners B#1	B#2	Combust. Temp.	Exhaust Temp.	Press. Drop	WATER ~~Gas~~ Usage
8:15	408	360	414	320	409	1.2	1581	1594	1515	252	23.9	
8:30	410	362	422	327	414	1.1	1572	1569	1511	244	23.6	11740
8:45	413	364	419	320	409	1.3	1565	1573	1515	256	23.6	
9:00	413	365	419	325	409	1.4	1580	1593	1528	256	23.6	17910
9:15	412	366	424	332	416	1.1	1565	1565	1525	253	23.2	
9:30	412	368	422	337	416	1.1	1599	1576	1531	261	23.7	18070
9:45	414	366	424	331	414	0.9	1564	1570	1534	252	23.7	
10:00	414	368	420	331	410	0.2	1523	1564	1536	257	23.3	18270
10:15	412	369	417	334	411	0.9	1566	1569	1542	256	23.7	
10:30	416	369	421	331	417	0.8	1567	1574	1535	253	23.5	18450
10:45	418	369	427	333	418	0.8	1561	1568	1530	254	24.0	
11:00	421	367	428	321	416	0.4	1576	1582	1534	249	24.5	18620
11:15	418	370	426	334	420	1.4	1572	1577	1532	248	24.4	
11:30	418	373	423	336	417	1.4	1563	1556	1525	256	24.1	NO H2O
11:45	420	371	428	332	421	0.9	1558	1561	1520	254	24.0	
12:00	421	368	429	324	420	1.4	1567	1566	1519	248	24.2	NO H2O
12:15	423	369	429	319	417	1.6	1580	1584	1524	249	23.9	
12:30	423	370	431	325	420	0.8	1574	1575	1527	249	23.8	NO H2O
12:45	420	374	431	339	421	1.2	1561	1555	1520	254	23.4	
1:00	423	371	431	328	421	1.6	1565	1567	1523	250	24.0	NO H2O
1:15	422	371	430	333	421	0.8	1564	1563	1523	255	23.6	
1:30	422	373	424	335	416	0.9	1568	1588	1531	263	24.2	NO H2O
1:45	425	369	431	323	417	0.1	1581	1579	1535	248	24.2	
2:00	424	371	427	322	415	1.1	1586	1596	1533	258	24.1	NO H2O
2:15	421	373	427	340	418	1.1	1570	1560	1533	260	24.1	

LINE II
DRYER RTO
3/21/96



133

DATE: 3-21-56

SHIFT/CREW: LC

OPERATOR: Ramp

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
7/16" 1	4411	39½"	30	4340 (10:55)	40
2		35 3/4	31	4298 (11:01)	40
3		39 3/4	32	4311 (11:08)	40
4	44 20	39 3/4	33	4320 (11:14)	40
5		39 3/4	34	4338 (11:20)	40
6		39 3/4	35	4331 (11:27)	40
½" 1	4463 (7:50)	40	36	4327 (11:34)	40
2	4480 (7:56)	40 1/4	37	4300 (11:39)	40
3	4426 (8:05)	40 1/4	38	4303 (11:45)	40
4	4470 (8:11)	40	39	4280 (11:51)	40
5	4356 (8:17)	40	40	4240 (11:57)	40
6	4295 (8:23)	39 3/4	41	4226 (12:04)	40
7	4327 (8:30)	40	42	4219 (12:11)	40
8	4340 (8:36)	40	43	4216 (12:16)	40
9	4323 (8:42)	40	44	4227 (12:22)	39 3/4
10	4350 (8:49)	40	45	4200 (12:29)	39 3/4
11	4334 (8:56)	40	46	4215 (12:35)	39 1/2 up
12	4337 (9:02)	40	47	4270 (12:41)	40
13	4329 (9:07)	40	48	4243 (12:47)	39 3/4
14	4360 (9:14)	40	49	4219 (12:53)	40
15	4372 (9:21)	40	50	4232 (1:07)	40
16	4364 (9:26)	40	51	4329 (1:10)	40
17	4364 (9:32)	40	52	4330 (1:16)	40
18	4360 (9:39)	40 1/4	53	4357 (1:23)	40
19	4343 (9:43)	40	54	4419 (1:29)	40
20	4283 (9:52)	40	55	4431 (1:35)	40
21	4308 (9:58)	40	56	4430 (1:41)	40
22	4328 (10:04)	40	57	4424 (1:47)	40
23	4322 (10:11)	40	58	4431 (1:54)	40
24	4338 (10:17)	40	59	4412 (2:01)	40
25	4360 (10:23)	40	60	4429 (2:07)	40
26	4365 (10:29)	40	61	4445 (2:14)	40
27	4305 (10:35)	40	62	4452 (2:19)	40
28	4346 (10:41)	40	63	4454 (2:28)	40
29	4329 (10:48)	40	64	4466 (2:33)	40 1/4

DATE: _____

SHIFT/CREW: _____

OPERATOR: _____

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
65	4478 (2:07)	40 1/4	100		40 1/4
66	4446 (2:47)	40 1/4	101	4485	40 1/4
67	4369 (2:50)	40	102		40 1/2
68	4466 (2:54)	40 1/4	103		40 1/2
69	4413 (3:05)	40 1/4	104		40 1/2
70	4396 (3:11)	40 1/4	105	4504	40 1/2
71	4403 (3:18)	40 1/4	106		40 1/4
72	4407 (3:24)	40 1/4	107		40 1/4
73	4396 (3:30)	40 1/4			
74	4411 (3:36)	40 1/4			
75	4390 (3:42)	40 1/4			
76	4366 (3:49)	40			
77	4361 (3:58)	40			
78	4356 (4:02)	40			
79	4380 (4:08)	40			
80	4370 (4:14)	40 1/4			
81	4353 (4:22)	40 1/4			
82		40 1/4			
83		40 1/2			
84		40 1/2			
85	4478	40 1/2			
86		40 3/4			
87		40 3/4			
88		40 3/4			
89	4483	41			
90		40 1/2			
91		40 1/4			
92		40 1/4			
93	4526	40 1/4			
94		40 1/4			
95		40 3/4 CP			
96		40 3/4 CP			
97	4600	40 1/2			
98		40 1/2 CP			
99		40 1/2			

1 1/2"

HAYWARD LINE 2 MARCH 19th 1996
PRESS VENT RTO STACK - FORMALDEHYDE
DATA TIME: START= 10:30 END= 16:00 HOURS= 5.50

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

	1/2"
per/peice	54.34
per/ 8' x 16'	217.34

PLANT PRODUCTION RATE

5.50 =hours during testing
85 =pressloads
1020 =no. of 8'x16' boards produced (pressloads x 12 boards per load)
221,691 =lbs of finished product (boards produced x weight of finished board)
40,307 =lbs of finished product per hour (lbs of finshed product / hours)
20.15 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE TAKEN FROM MICRO - MOTIONS

TIME	MDI	PHENOL	WAX
10:30-11:30	450	861	332
12:20-13:20	525	792	222
14:40-15:40	541	1,086	268
AVERAGE	505.33	913.00	271.00

40,307 =average lbs. per hour finished product produced during testing
505.33 =average lbs. per hour of MDI resin used during testing
1.25% = MDI resin used as % of finished product

913.00 =average lbs. per hour of phenolic resin (100% solids) used during testing
2.27% =Phenolic resin used as % of finished product

271.00 =average lbs. per hour of wax (100% solids) used during testing
0.67% =wax used as % of finished product

136

PRESS REPORT - LINE 1 (2) DATE: 3-19-96

OPERATOR Hudson SHIFT: 1st CREW: B-D

THICKNESS 7/16 PRESS LDS: 137/16 156 1/2

OVERALL TIMER: 157 / 174 DECOMPRESSION TIME: 15 / 18

PRESS TEMP: 205 TOTAL REJECTS:

LINE SPEED	THKNS.	FROM	TO
43	7/16	7:00	8:00
45	1/2	8:00	8:30
50	1/2	8:30	8:45
55	1/2	8:45	7:00

LOG COUNT: 1346

F.C.O.S. HYD. RADIATOR: ✓ TIME

PRESS BLOWN DOWN: ✓

SPINNER HEADS FLUSHED: ✓ TIME

SURFACE BLENDER HOSED: ✓ TIME

FORMER HYD RADIATOR: ✓ TIME

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
7:01	:04	3				Stacker Jam
9:20	10:05	45				No Surface Infeed
11:51	1:54	3				Pulse Baghouse
2:32	:35	3				" "
6:01	:05	4				" " "

DOWNTIME CODE: M - MECHANICAL (50) E - ELECTRICAL O - OPERATOR

LOUISIANA-PACIFIC CORPORATION

PRESS REPORT - LINE 1 B

OPERATOR D. SLATER SHIFT: PM DATE: 3-19-96 CREW: D

THICKNESS 1/2 7/16 PRESS LOS: 43 1/2 157 7/16

OVERALL TIMER: 174 - 157 DECOMPRESSION TIME: 18 - 15

PRESS TEMP: 215 TOTAL REJECTS: 2

LOG COUNT: 1435

LINE SPEED	THKNS.	FROM	TO
54	1/2	7:00	
59	7/16	9:37	

F.C.O.S. HYD. RADIATOR: 7:00 TIME

PRESS BLOWN DOWN: 7:00

SPINNER HEADS FLUSHED: = TIME

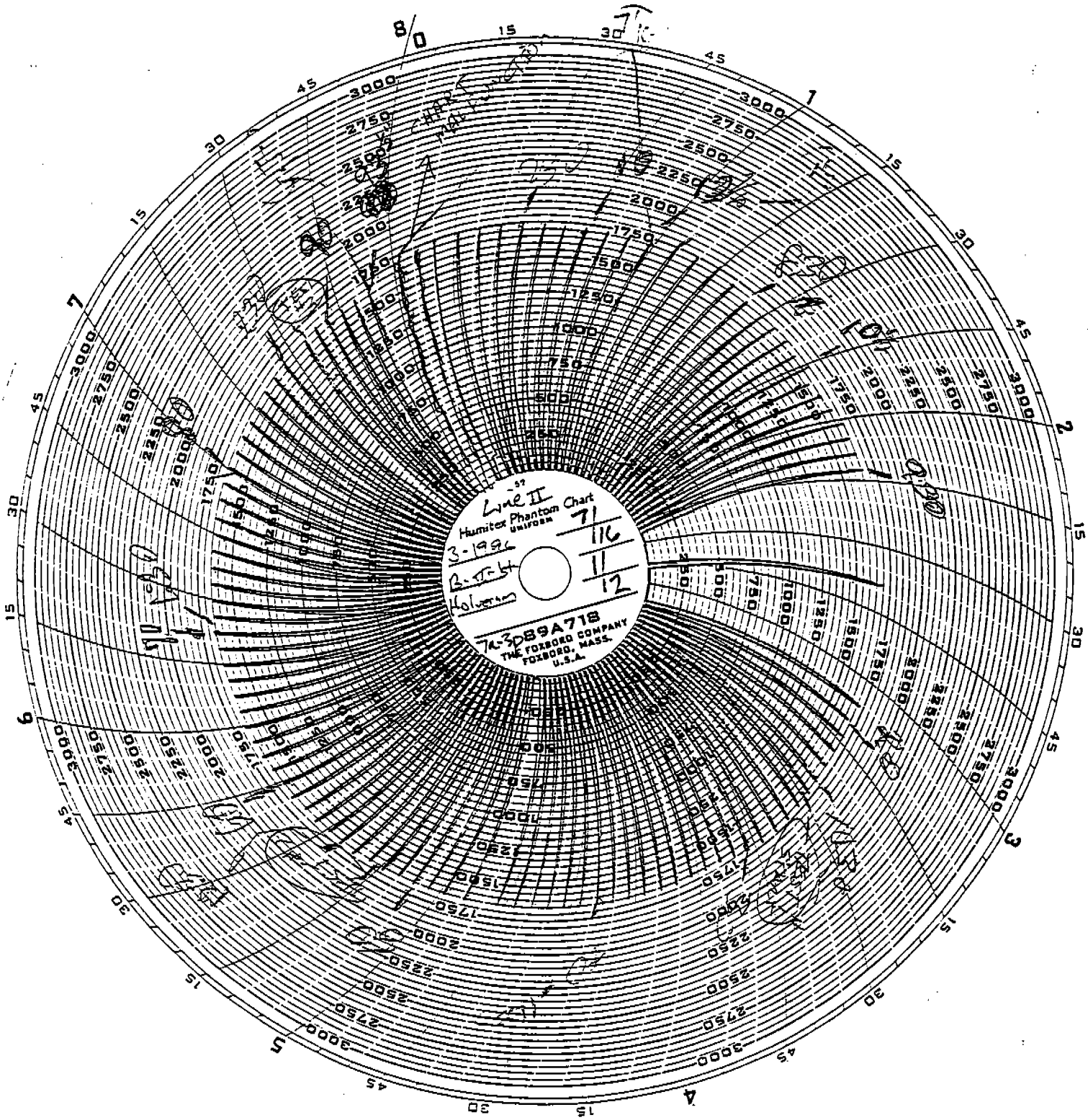
SURFACE BLENDER HOSED: = TIME

FORMER HYD RADIATOR: = TIME

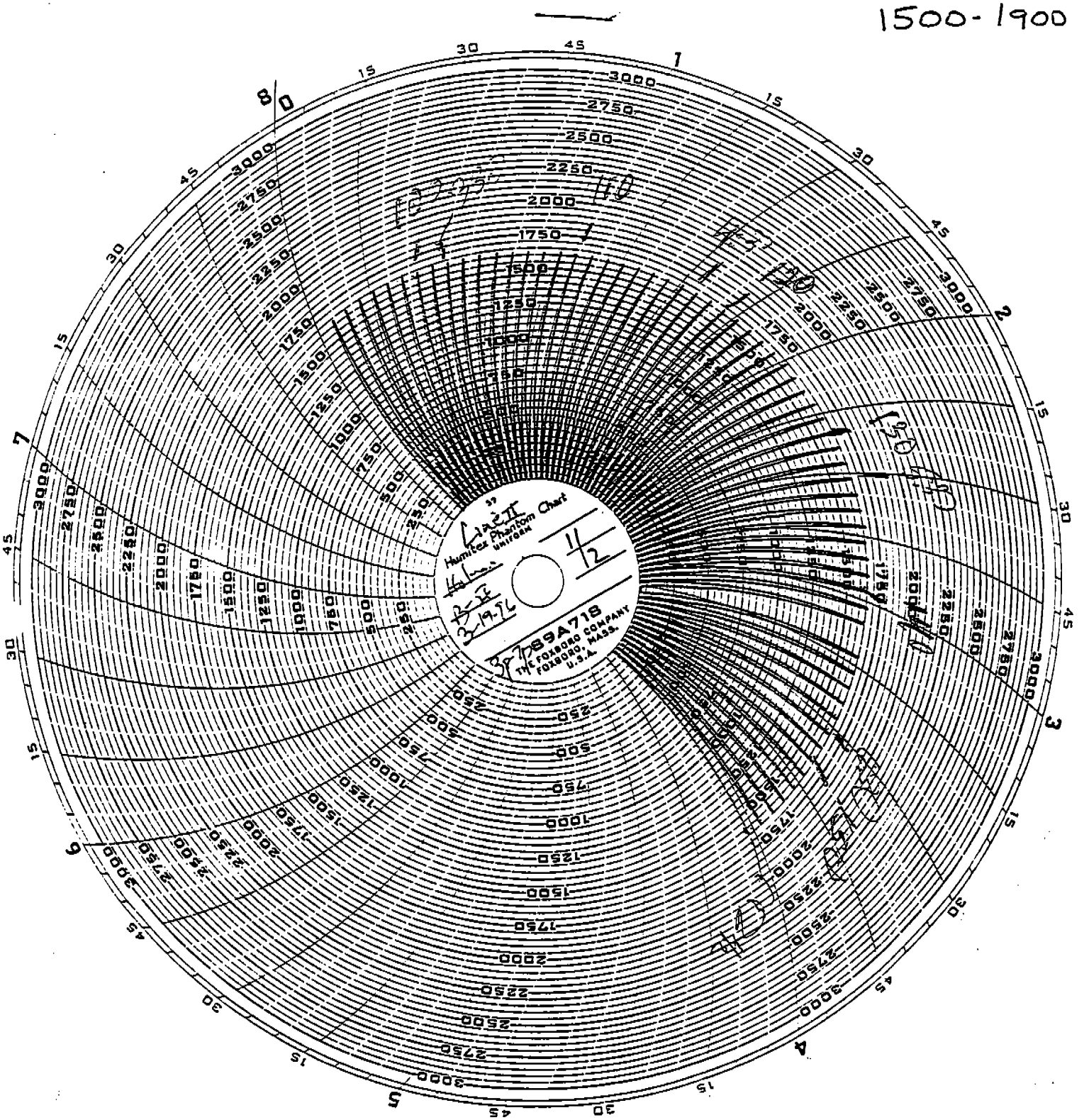
DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
10:13	10:17				4	BLUE TUBE PLUGGED

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

LINE II
PRESS CHART
3/19/96
0700-1500

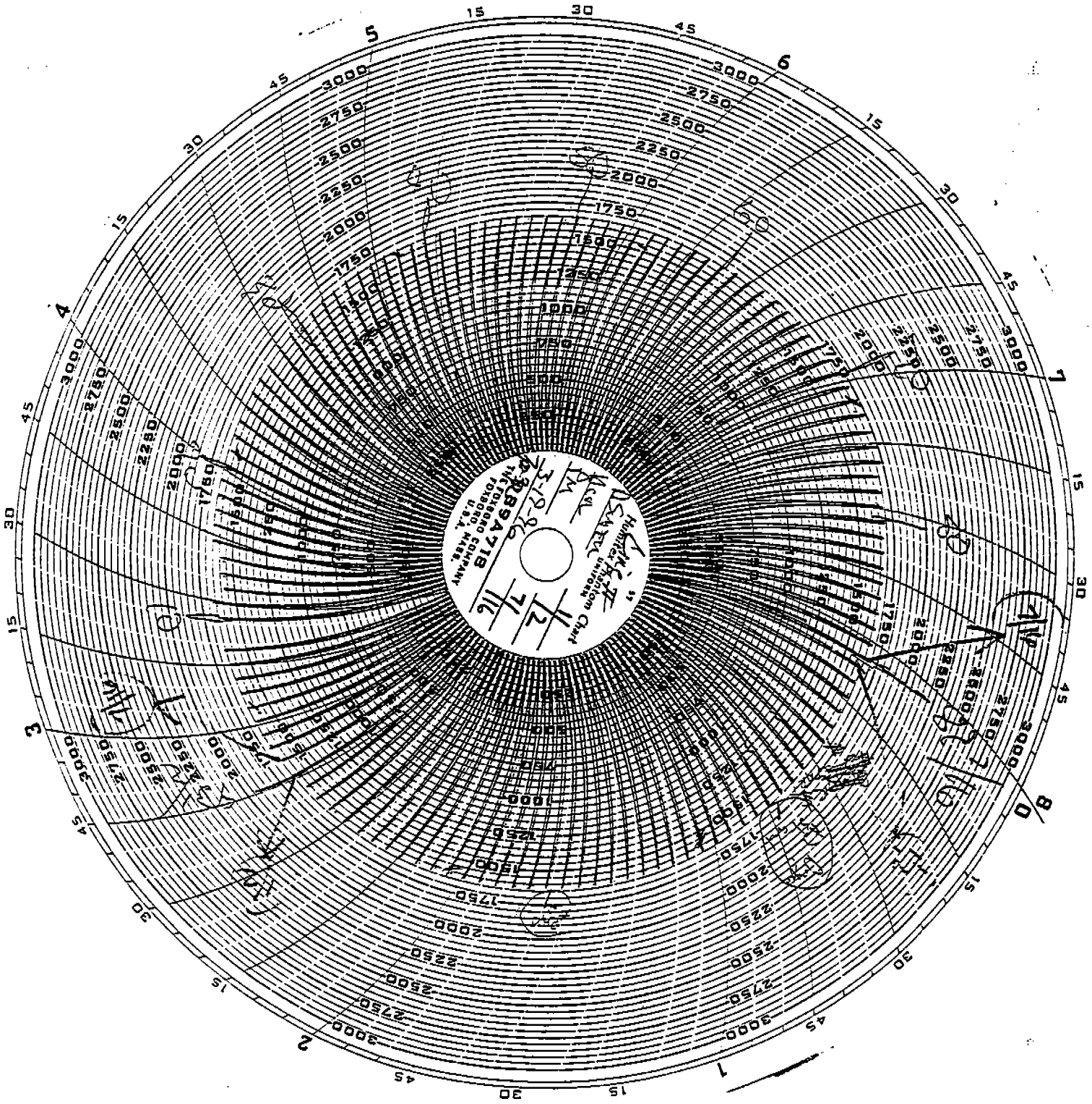


LINE II
PRESS CHART
3/19/96
1500-1900



140

LINE II
PRESS CHART
3/19/96
0700-1500



141

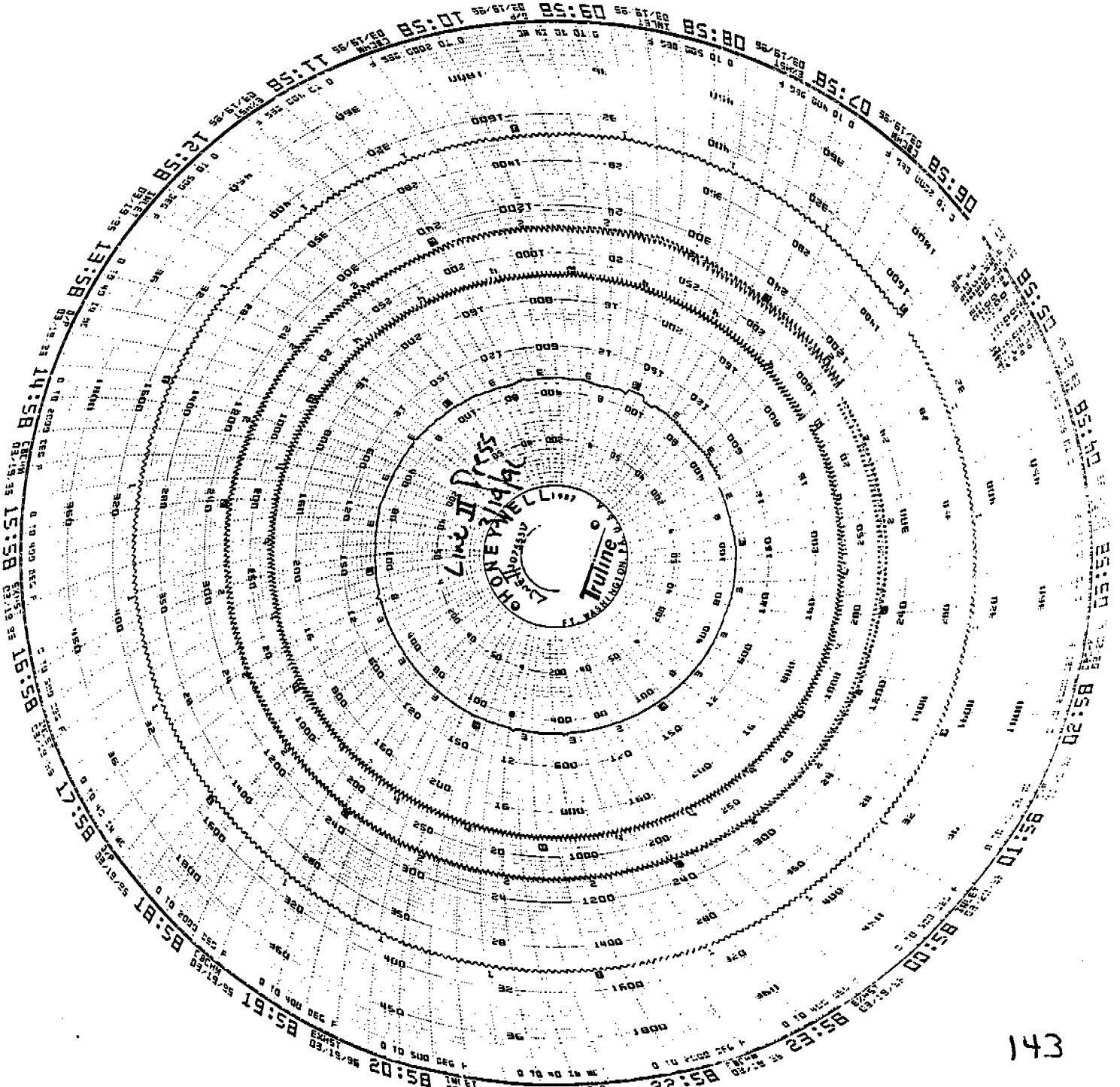
LII Press RTO 3-19-96

RECORD EVERY 15 MIN. — HAYWARD AIR TESTING WORKSHEET

Time	RTO Chamber Bed Temp. #1	#2	#3	#4	#5	Inlet Press.	Burners B#1	B#2	Combust. Temp.	Exhaust Temp.	Press. Drop	Gas Usage
10:30	409	414	401	419	420	3.6	1559	1560	1503	220	18.1	N/A
10:45	404	416	399	422	420	3.8	1563	1554	1507	220	18.2	NA
11:00	405	415	400	420	421	3.8	1561	1566	1502	219	18.1	NA
11:15	403	417	398	422	422	3.6	1557	1554	1501	222	15.1	NA
11:30	401	419	396	425	420	3.7	1562	1553	1504	221	18.1	NA
11:45	402	419	396	426	419	3.6	1564	1553	1504	221	18.1	NA
12:00	402	419	396	428	417	3.6	1581	1577	1508	222	18.0	NA
12:15	405	418	399	422	418	3.5	1593	1596	1513	219	18.3	NA
12:30	404	417	397	421	418	3.6	1603	1596	1514	219	18.2	NA
12:45	404	417	396	422	417	3.5	1593	1589	1514	218	18.2	NA
1:00	405	418	396	423	416	3.4	1598	1590	1512	219	18.2	NA
1:15	400	419	395	425	416	3.9	1562	1567	1503	219	18.4	NA
1:30	399	418	396	427	416	3.6	1558	1559	1503	221	18.1	NA
1:45	399	417	398	423	417	3.6	1560	1564	1504	220	18.2	NA
2:00	400	418	398	425	417	3.6	1560	1555	1501	221	18.1	NA
2:40	402	420	395	431	416	3.7	1568	1556	1505	221	18.1	NA
2:55	406	419	397	428	416	3.8	1605	1603	1513	221	18.1	NA
3:10	404	419	397	430	415	3.6	1576	1562	1508	222	18.2	NA
3:25	406	418	400	422	417	3.8	1605	1595	1512	222	18.0	NA
3:40	403	418	400	421	418	3.4	1590	1584	1512	220	18.2	NA
3:55	404	419	399	423	418	3.5	1605	1597	1516	223	18.1	NA

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LINE II
PRESS RTO
3/19/96



3-19-96 Press Test # 1 10:30 AM – 11:30 AM

Micro-Motions

Solids		Pounds	100% Solids
100%	MDI Core -	470	470
57%	PF Surf. -	1557	888
58%	Wax Core -	167	275
58%	Wax Surf. -	307	

Tanks

Solids		Before	After	Pounds	100% Solids
100%	Core MDI -	123.5"	122.75	450	450
2 ÷ 61%	Surf PF -	141"	141"	0	
? ÷ 57%	Day Tank PF -	918	621	1511	861
2 ÷ 57%	Mix Tank PF -	4	2		
2 ÷ 58%	Wax -	42"	41"	191	111

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

3-19-96 Press Test # 2 12:20 pm – 1:20 pm

Micro-Motions

Solids		Pounds	100% Solids
100%	MDI Core –	476	476
57%	PF Surf. –	1552	885
58%	Wax Core –	165	267
58%	Wax Surf. –	295	

Tanks

Solids		Before	After	Pounds	100% Solids
100%	Core MDI –	122.25"	121.375	525	525
2 ÷ 61%	Surf PF –	130.25"	130.25	0	0
2 ÷ 57%	Day Tank PF –	391 (1210)	928	1390	792
2 ÷ 57%	Mix Tank PF –	819	?		
2 ÷ 58%	Wax –	40"	38.5	573	332

Factors per inch

MDI Tank – 600.466

PF Tank – 727.583

Wax Tank – 381.86

Factors per gallon

Day Tank – 10.11

Mix Tank – 10.11

145

3-19-96 Press Test # 3 2:40 PM - 3:55 PM

Micro-Motions

Solids		Pounds	100% Solids
100%	MDI Core -	590	590
57%	PF Surf. -	1953	1113
58%	Wax Core -	204	118
58%	Wax Surf. -	374	217

Tanks

Solids		Before	After	Pounds	100% Solids
100%	Core MDI -	120.5	119.375	676	670
2 ÷ 61%	Surf PF -	130.25	119.25		
2 ÷ 57%	Day Tank PF -	551	1012	~~2380~~	1357
2 ÷ 57%	Mix Tank PF -	3	13		
2 ÷ 58%	Wax -	37.5	35.75	334	194

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

DATE: 3-19-96
SHIFT/CREW: 1-B
OPERATOR: [illegible]

7/16"

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
2		39 7/8	31	4328 lbs	
4	4366 lbs	39 7/8	32	4349 lbs	40 1/8
6		39 3/4	33	4337 lbs	
8	4312 lbs	39 3/4	34	4343 lbs	40
			35	4339 lbs	
1	4493 lbs (CALLED 4294, 5126)		36	4315 lbs	39 5/8
2	4491 lbs	40 1/8	37	4358 lbs	
3	4484 lbs		38	4347 lbs	39 7/4
4	4419 lbs	40	39	4316 lbs	
5	4397 lbs		40	4288 lbs	39 5/8
6	4326 lbs	40 1/8	41	4296 lbs	
7	4293 lbs		42	4286 lbs	39 3/4
8	4362 lbs	40	43	4273 lbs	
9	4404 lbs		44	4247 lbs	39 7/8
10	4366 lbs	40 1/8	45	4224 (CALLED 4294, 203)	
11	4275 lbs		46	4233 lbs	39 7/8
12	4297 lbs	40 1/4	47	4276 lbs	
13	4327 lbs		48	4278 lbs	39 7/8
14	4386 lbs	40 1/4	49	4335 lbs	
15	4385 lbs		50	4333 lbs	40
16	4460 lbs	40 3 (CALLED 4294, 1451)	51	4378 lbs	
17	4529 lbs		52	4367 lbs	40
18	4501 lbs	40 1/8	53	4378 lbs	
19	4466 lbs		54	4235 (CALLED 4294, 302)	39 3/4
20	4455 lbs	40	55	4314 lbs	
21	4436 lbs		56	4346 lbs	40
22	4376 lbs	40	57	4359 lbs	
23	4361 lbs		58	4404 (CALLED 4294, 328)	40 1/8
24	4330 lbs	40	59	4424 lbs	
25	4356 lbs		60	4383 lbs	40
26	4275 lbs	40	61	4366 lbs	
27	4329 lbs (CALLED 4294, 120)		62	4351 lbs	39 7/8
28	4321 lbs	39 3/4	63	4375 lbs	
29	4339 lbs		64	4368 lbs	39 7/8
30	4276 lbs		65	4352 lbs	

1/2"

147

DATE: 3/19/96
SHIFT/CREW: 1B
OPERATOR:

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
66	4357 lbs	40			
67	4392 lbs				
68	4381 lbs	39 7/8			
70	4333 lbs				
72	4328 lbs	39 3/4			
73	4358 lbs	39 7/8			
73	4361 lbs				
74	4344 lbs	39 7/8			
75	4367 lbs				
76	4357	40			
77	4393 lbs				
78	4394 lbs	40			
79	4434 called from 5:47				
80	4476 lbs	40 1/8			
81	4480 called from 5:57				
82	4439 lbs	40			
83	4397 lbs				
84	4374 lbs	40			
85	4318 lbs				
86	4291 lbs	39 1/2 called from 6:05			
87	4235 lbs				
88	4325 lbs	40			
89	4334 lbs				
90	4241 lbs	40 1/2 called from 6:17			

1/2"

148

DATE: 3-19-96
SHIFT/CREW: 2 / D
OPERATOR: M. Riley

UNIT/ THICKNESS		WEIGHT	HEIGHT	UNIT/ THICKNESS		WEIGHT	HEIGHT
1/2	1	4346			22	4253	39 3/4
1/2	2	4313	39 1/2 cp		24		
	3	4280			26	4321	40 cp
	4	4329	39 1/2 "		28		39 1/2
	5	4345			30	4356	39 5/8
	6	4367	40		32		39 1/2
	7	4400			34	4514 "	40 cp
	8	4377	40 1/4		36		40 cp
	9	4399			38	4604 " cp	40 cp
	10	4328	40 1/4		40		39 1/2
	11	4354			42	4572	39 1/2
	12	4341	40 1/4		44		39 3/4
	13	4339			46	4457	39 cp
	14	4306	40		48		39
	15	4293			50	4347	38 3/4 cp
	16	4278	40 1/8		52		39 1/4
	17	4314			54	4312	39 1/4
	18	4310	40 1/8		56		39 3/8
	19	4322			58	4360	39 3/8
	20	4322	40 1/4		60		39 1/4
	21	4311			62	4504	39 1/2
	22	4282	40		64		39 3/4
	24		40 1/8		66	4398	39 1/2
	26	4277	40 1/8		68		39 3/4
7/16	X	X X X X X X X X X			70	4481	39 7/8 cp
7/16	2	4178 cp	40		72		39 1/2
	4		39 3/4		74	4503	39 1/2
	6	4127 cp	39 1/2		76		39 1/2
	8		39 1/2		78	4309	+/-
	10	4107 "	39 1/2		80		+/-
	12		39 1/2				
	14	4179	39 5/8				
	16		39 3/4				
	18	4258	39 5/8				
	20		39 3/4				

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HAYWARD LINE 2 MARCH 20th 1996
PRESS VENT RTO STACK PM/METH/CO/VE
DATA TIME: START= 10:00 END= 14:15 HOURS= 4.25

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

	1/2"
per/peice	54.80
per/ 8' x 16'	219.21

PLANT PRODUCTION RATE

4.25 =hours during testing
64 =pressloads
768 =no. of 8'x16' boards produced (pressloads x 12 boards per load)
168,355 =lbs of finished product (boards produced x weight of finished board)
39,613 =lbs of finished product per hour (lbs of finshed product / hours)
19.81 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE TAKEN FROM MICRO - MOTIONS

TIME	MDI	PHENOL	WAX
11:35-12:35	487	841	332
13:05-14:05	450	935	222
AVERAGE	468.50	888.00	277.00

39,613 =average lbs. per hour finished product produced during testing
468.50 =average lbs. per hour of MDI resin used during testing
1.18% = MDI resin used as % of finished product

888.00 =average lbs. per hour of phenolic resin (100% solids) used during testing
2.24% =Phenolic resin used as % of finished product

277.00 =average lbs. per hour of wax (100% solids) used during testing
0.70% =wax used as % of finished product

150

LOUISIANA-PACIFIC CORPORATION

PRESS REPORT - LINE 1 ©

OPERATOR Linden Olsen SHIFT: Day CREW: C

DATE: 3-20-96

THICKNESS 7/16 - 1/2

PRESS LDS: 10 7/16 175 1/2

OVERALL TIMER: 157 - 174

DECOMPRESSION TIME: 15

PRESS TEMP: 210-215 N.I.R.

TOTAL REJECTS: 0

LOG COUNT: 1537

LINE SPEED	THICKNESS	FROM	TO
54'	7/16	7 oc	17:38
54'	1/2	7:38	17:00

F.C.O.S. HYD. RADIATOR: 8:06 TIME

PRESS SLOWN DOWN: 8:21

SPINNER HEADS FLUSHED: X TIME

SURFACE BLENDER HOSED: X TIME

FORMER HYD RADIATOR: X TIME

3/8 = 376,377

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
9:02	9:26				24	Top Surface Transfer Conv. tripped out causing Flow-Strand Haul-Up to plug

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

24

LOUISIANA-PACIFIC CORPORATION

PRESS REPORT - LINE 1 (2)

OPERATOR Terry SHIFT: Night DATE: 3-20-96 CREW: A

THICKNESS 1/2 - 7/16 - 1/4 PRESS LDS: 42½ 26¼ 12 6 7/16

OVERALL TIMER: 174 - 157 DECOMPRESSION TIME: 15-15

PRESS TEMP: 215 TOTAL REJECTS:

LOG COUNT: 1100

LINE SPEED	THKNS.	FROM	TO
55	1/2	700	935
55	7/16	935	1250
50	1/4 & 7/16	1250	235
55	7/16	235	500
52	7/16	500	630
58	7/16	630	

F.C.O.S. HYD. RADIATOR: _____ TIME

PRESS BLOWN DOWN: _____

SPINNER HEADS FLUSHED: _____ TIME

SURFACE BLENDER HOSED: _____ TIME

FORMER HYD RADIATOR: _____ TIME

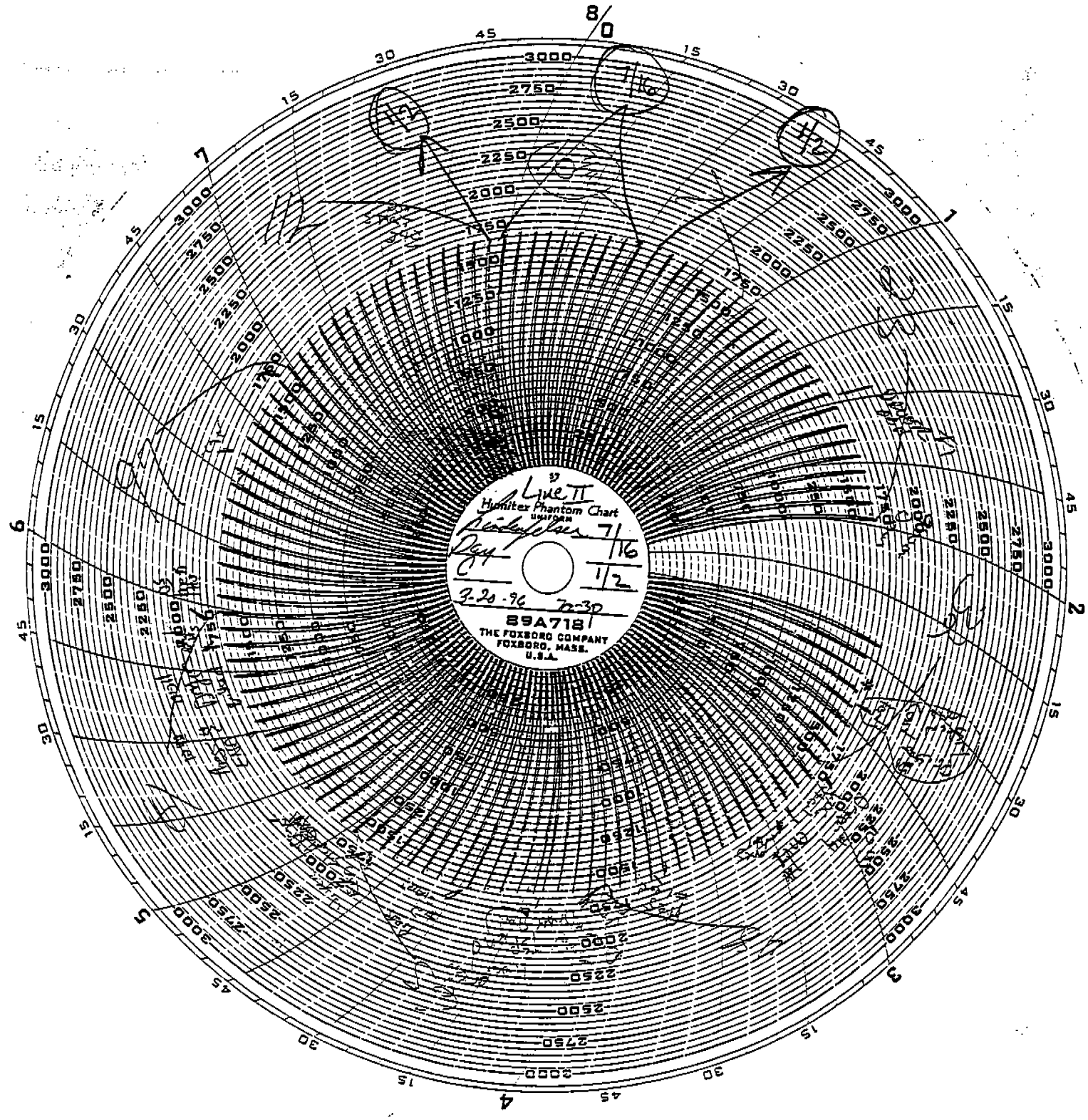
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DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
240	242	2				Tune up at Sims

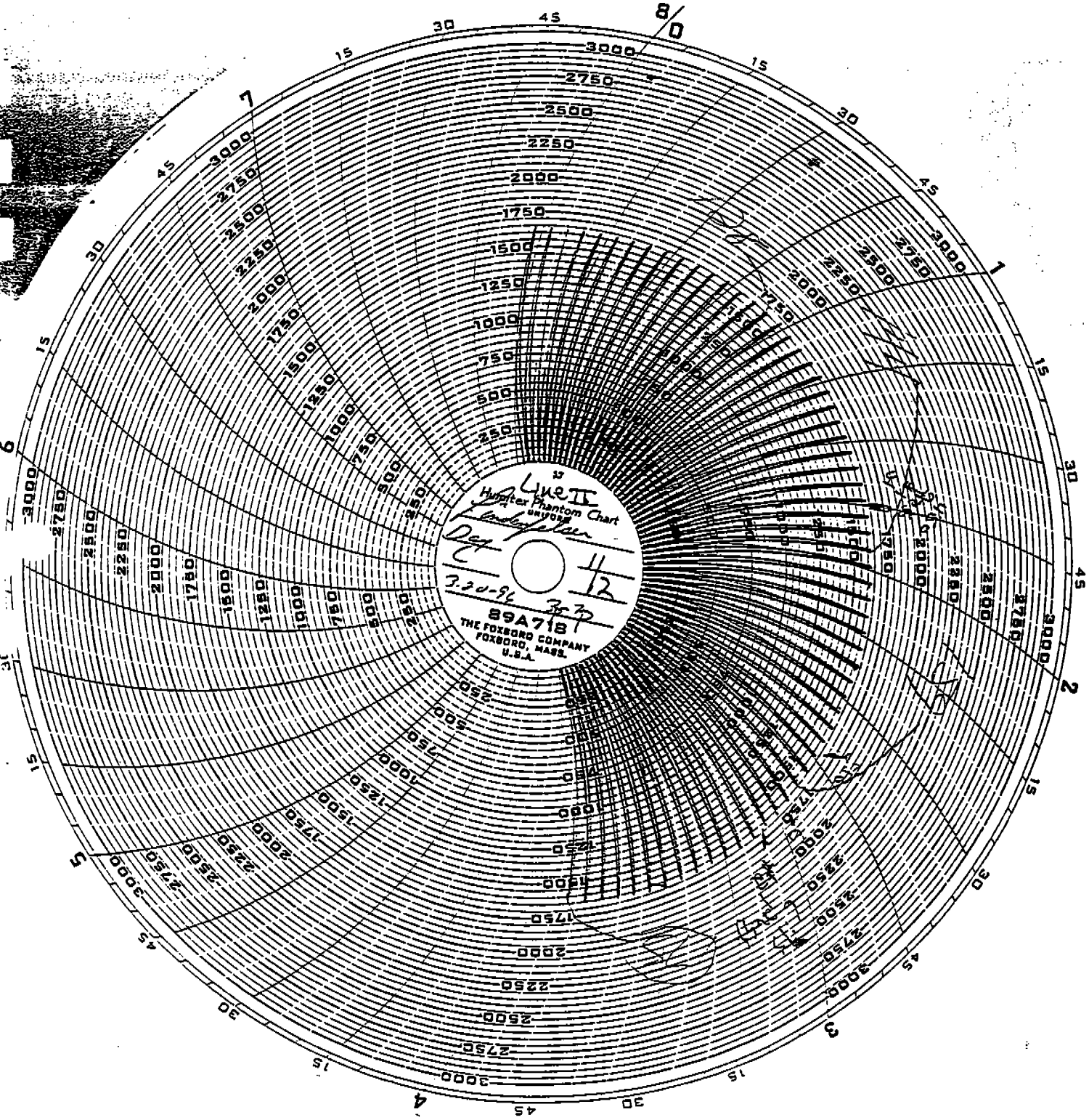
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152

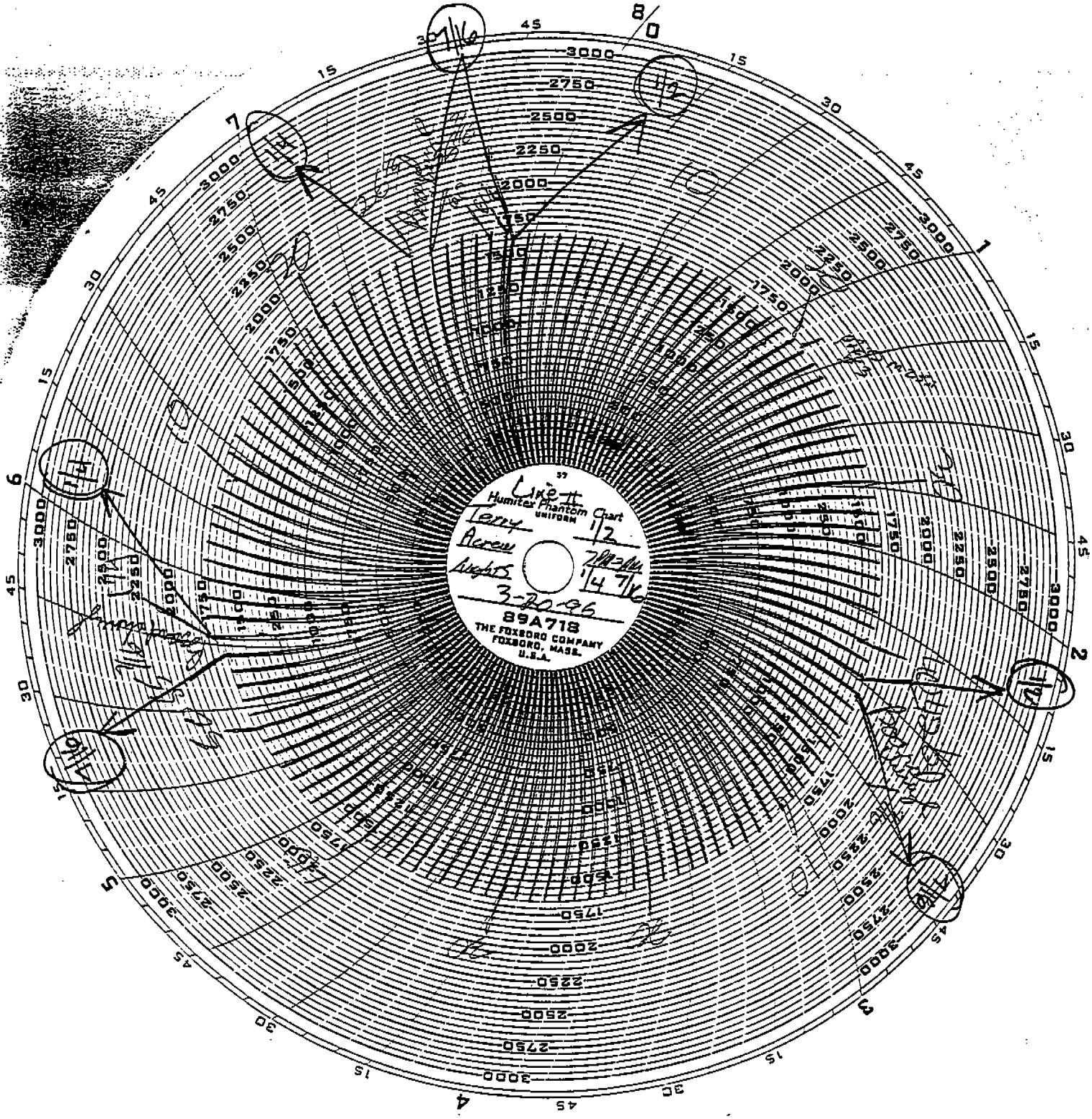
LINE II
PRESS CHART
3/20/96
0700 - 1500



LINE II
PRESS CHART
3/20/96
1500 - 1900



LINE II
PRESS CHART
3/20/96
1900-030



LII Press RTO 3/20/96

RECORD EVERY 15 MIN.					HAYWARD AIR TESTING WORKSHEET							
Time	RTO Chamber Bed Temp.					Inlet	Burners		Combust.	Exhaust	Press.	Gas
	#1	#2	#3	#4	#5	Press.	B#1	B#2	Temp.	Temp.	Drop	Usage
9:00	410	394	404	426	406	3.8	1566	1553	1509	216	18.5	
9:15	417	394	405	228	405	3.8	1604	1605	1510	222	18.3	
9:30	418	394	406	227	405	3.5	1572	1569	1502	218	18.5	
9:45	412	395	405	429	405	3.7	1588	1586	1507	222	18.2	
10:00	418	393	406	425	404	3.5	1575	1577	1507	216	18.7	
10:15	410	395	405	427	406	3.7	1578	1566	1506	222	18.2	
10:30	412	395	405	424	406	3.7	1558	1556	1501	221	18.2	
10:45	416	397	403	430	405	3.6	1588	1584	1507	217	18.6	
11:00	410	399	402	426	408	3.9	1562	1551	1503	221	18.3	
11:15	414	400	401	427	406	3.5	1566	1571	1503	218	18.3	
11:30	410	403	397	435	404	3.8	1602	1607	1512	222	18.1	
11:45	414	402	398	433	403	3.8	1585	1583	1507	216	18.7	
12:00	409	403	399	429	405	3.7	1559	1556	1506	221	18.2	
12:15	410	401	400	427	405	3.6	1557	1562	1502	222	18.2	
12:30	411	403	399	434	403	3.8	1607	1605	1515	220	18.2	
12:45	405	405	399	426	409	3.7	1558	1560	1503	222	18.2	
1:00	404	408	399	427	411	3.9	1560	1554	1505	221	18.3	
1:15	405	410	396	435	409	3.8	1604	1603	1515	221	18.3	
1:30	406	411	395	436	409	3.7	1608	1605	1516	222	18.2	
1:45	405	413	394	437	409	3.8	1606	1603	1514	220	18.3	
2:00	408	414	395	434	409	3.6	1589	1587	1510	218	18.5	
2:15	408	414	396	433	410	3.6	1601	1596	1514	220	18.3	
2:30	403	415	396	432	412	3.7	1591	1593	1515	222	18.1	
2:45	405	415	399	424	414	3.5	1566	1572	1504	220	18.4	
3:00	400	418	396	431	414	3.8	1607	1606	1513	222	18.0	
3:15	397	419	395	427	416	3.8	1570	1565	1508	222	18.3	
3:30	398	419	394	429	416	3.7	1565	1559	1508	222	18.2	
3:45	398	420	393	431	416	3.7	1581	1580	1510	222	18.1	
4:00	403	420	394	433	415	3.7	1605	1602	1515	221	18.2	
4:15	405	419	396	428	416	3.8	1582	1584	1510	220	18.4	
4:30	403	420	396	431	417	3.7	1604	1603	1515	222	18.2	
4:45	399	420	397	427	419	3.7	1570	1563	1509	223	18.2	
5:00	405	420	397	431	417	3.6	1604	1600	1515	222	18.2	
5:15	401	421	395	432	418	3.8	1605	1606	1514	222	18.1	
5:30	406	420	396	426	418	3.5	1569	1577	1504	220	18.4	
5:45	401	420	397	426	419	3.7	1559	1559	1504	222	18.1	
6:00	410	417	398	430	414	3.4	1577	1582	1507	219	18.5	
6:15	408	417	397	435	412	3.8	1609	1606	1515	222	18.1	
6:30	408	416	397	434	412	3.7	1605	1603	1516	221	18.2	
6:45	402	418	398	424	418	3.7	1561	1558	1503	222	181	

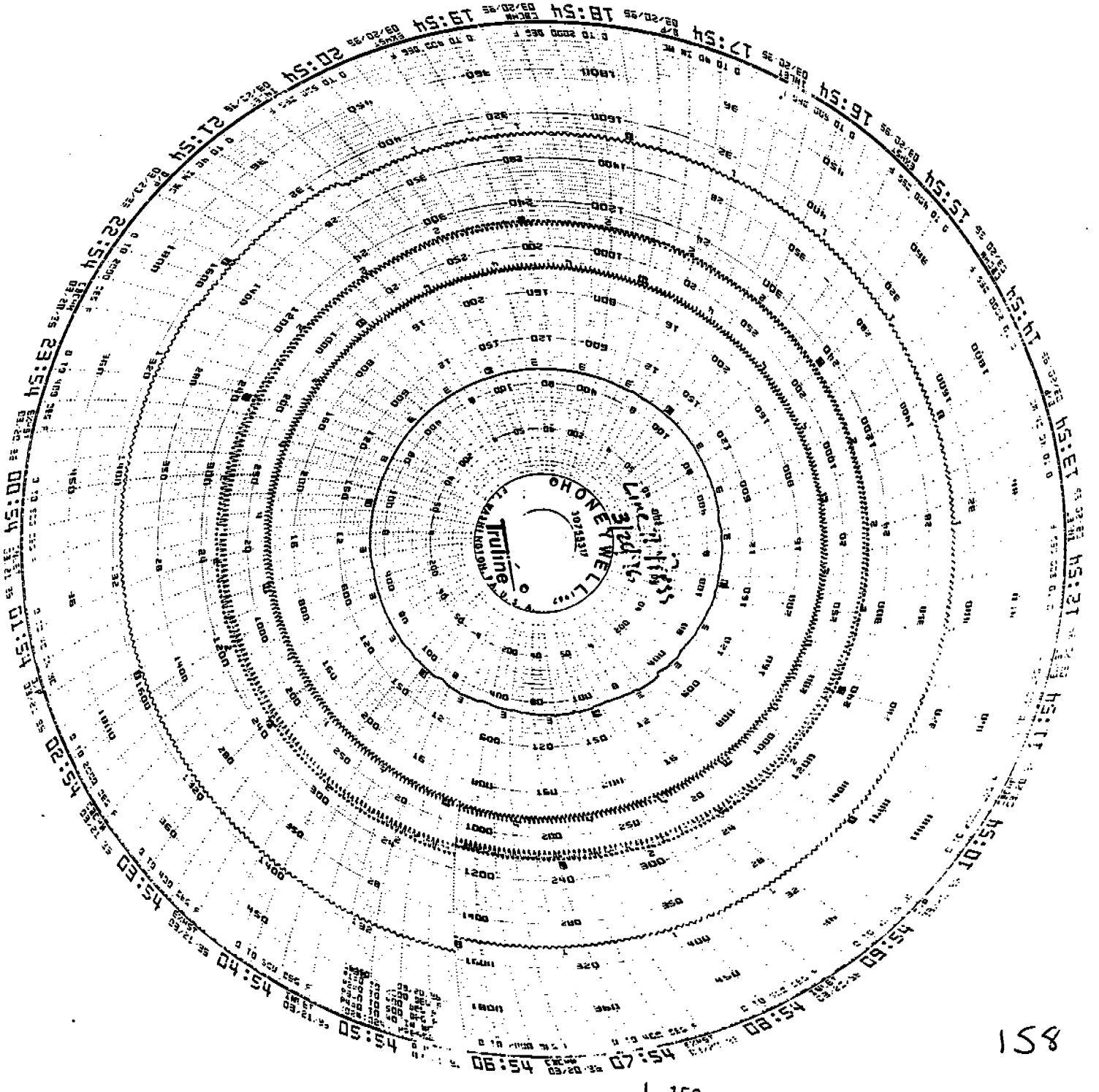
156

LII Press RTO 3/20/96

RECORD EVERY 15 MIN.					HAYWARD AIR TESTING WORKSHEET							
Time	RTO Chamber Bed Temp.					Inlet	Burners		Combust.	Exhaust	Press.	Gas
	#1	#2	#3	#4	#5	Press.	B#1	B#2	Temp.	Temp.	Drop	Usage
700	405	418	397	430	416	3.8	1597	1594	1511	223	18.2	
7:15	404	419	396	429	418	3.8	1607	1604	1520	222	18.1	
7:30	400	420	395	428	421	3.9	1558	1558	1502	222	18.2	
7:45	405	419	396	426	419	3.7	1559	1564	1504	222	18.2	
8.00	414	418	395	430	415	3.6	1590	1589	1575	220	18.3	
8:15	396	416	395	427	415	3.7	1557	1562	1502	222	18.2	
8:30	401	415	396	428	414	3.7	1560	1559	1503	223	18.1	
8:45	410	414	397	426	413	3.7	1558	1566	1502	222	18.2	
9:00	409	413	397	426	414	3.7	1567	1559	1504	220	18.3	
9:15	410	415	396	429	415	3.7	1571	1566	1509	223	18.2	
9:30												
9:45												
10:00												

157

Line II
Press RTO
3/20/96



158

Press Test #2 3-20-96 11:35A.M - 12:35

Micro-Motions

Solids		Pounds	100% Solids
100%	MDI Core	453	453
57%	PF Surf.	1557	887
58%	Wax Core	215	332
58%	Wax Surf.	358	

Tanks

Solids		Before	After	Pounds	100% Solids
100%	Core MDI	105.625"	104.813"	487	487
2 ÷ 61%	Surf PF	42.75"			
2 ÷ 57%	Day Tank PF	406	890	2952	841
2 ÷ 57%	Mix Tank PF	778	2		
2 ÷ 58%	Wax	6'11.5"(83.50")	6'8.5"(80.5")	1146	332

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

159

Press Test # 3 3-20-96 1:05 P.M. - 2:05 P.M.

Micro-Motions

Solids		Pounds	100% SOLIDS
100%	MDI Core	- 454	454
57%	PF Surf.	- 1560	889
58%	Wax Core	- 216	329
58%	Wax Surf.	- 352	

4721

Tanks

Solids		Before	After	Pounds	100% Solids
	100% Core MDI	104.438"	103.688"	450	450
2 ÷	61% Surf PF	- 42.813"	31.813"		
2 ÷	57% Day Tank PF	- 738	491	3282	935
2 ÷	57% Mix Tank PF	- 1	7.5		
2 ÷	58% Wax	- 79.00"	77.00"	764	222

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

160

L-161

Press Test #4 3-20-96 4:50 P.M.-

Micro-Motions

Solids		Pounds	100% SOLIDS
100%	MDI Core -	454	454
57%	PF Surf. -	1554	886
58%	Wax Core -	209	335
58%	Wax Surf. -	369	

Tanks

Solids		Before	After	Pounds	100% SOLIDS
100%	Core MDI -	101.75"	101.125"	375	375
2 ÷ 61%	Surf PF -	31.375"			
2 ÷ 57%	Day Tank PF -	511	1034	3750	1069
2 ÷ 57%	Mix Tank PF -	67	15		
2 ÷ 58%	Wax -	69.00"	60.00"	573	332

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

161

Press Test #5 3-20-96 6:15 P.M. - 7:15 P.

Micro-Motions

Solids		Pounds	100% Solids
100%	MDI Core -	454	454
57%	PF Surf. -	1543	880
58%	Wax Core -	207	327
58%	Wax Surf. -	357	

Tanks

Solids		Before	After	Pounds	100% Solids
100%	Core MDI -	100.75"	99.938"	488	488
2 ÷ 61%	Surf PF -				
2 ÷ 57%	Day Tank PF -	908	604	3094	882
2 ÷ 57%	Mix Tank PF -	6	4		
2 ÷ 58%	Wax -	65"	62"	573	332

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

Press Test #6 3-20-96 8:15 P.M - 9:15 P.M

Micro-Motions

Solids		Pounds	100% Solids
100%	MDI Core -	451	451
57%	PF Surf. -	1522	867
58%	Wax Core -	192	271
58%	Wax Surf. -	276	

Tanks

Solids		Before	After	Pounds	100% Solids
100%	Core MDI -	99.125"	98.125"	600	600
2 ÷ 61%	Surf PF -	32.875"			
2 ÷ 57%	Day Tank PF -	750	872	2528	72
2 ÷ 57%	Mix Tank PF -	375	3		
2 ÷ 58%	Wax -	~~60~~ 60.5"	60"	190	111

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

163

DATE: 3-20-96
SHIFT/CREW: 1-C
OPERATOR: AL RANG

UNIT/ THICKNESS	WEIGHT	HEIGHT
1	4357	39 1/2
2		39 1/2
3		35 1/2
4		35 3/4
5	4448	39 1/2"
6		39 3/4
7		35 3/4
1	4445	40 1/4
2	4485 (8:17)	40 1/4
3	4393 (8:23)	40
4	4279 (8:14)	40
5	4330 (8:20)	40
6	4362 (8:27)	40
7	4375 (8:35)	40
8	4371 (8:40)	40
9	4385 (8:46)	40
10	4390 (8:55)	40
11	4432 (8:59)	40 1/4
12	4397 (9:06)	40
13	4323 (9:36)	40
14	4371 (9:42)	40
15	4313 (9:49)	40
16	4324 (9:55)	40
17	4426 (10:02)	40
18	4437 (10:08)	40 1/4
19	4450 (10:17)	40
20	4472 (10:22)	40
21	4426 (10:28)	40
22	4427 (10:34)	40
23	4445 (10:39)	40
24	4385 (10:44)	40
25	4351 (10:51)	40
26	4360 (10:57)	40
27	4297 (11:04)	40
28	4293 (11:10)	40

UNIT/ THICKNESS	WEIGHT	HEIGHT
29	4370 (11:17)	40
30	4250 (11:23)	39 3/4
31	4214 (11:29)	39 3/4
32	4198 (11:35)	39 3/4
33	4187 (11:41)	39 3/4
34	4189 (11:49)	40
35	4215 (11:54)	40
36	4266 (12:00)	40
37	4306 (12:06)	40
38	4342 (12:30)	40 1/8
39	4342 (12:19)	40
40	4335 (12:26)	40
41	4332 (12:32)	40
42	4350 (12:39)	40 1/4
43	4392 (12:44)	40 1/4
44	4380 (12:52)	40 1/4
45	4366 (12:58)	40 1/4
46	4379 (1:03)	40 1/4
47	4388 (1:09)	40 1/4
48	4387 (1:15)	40 1/2
49	4353 (1:21)	40 1/2
50	4343 (1:28)	40 1/4
51	4319 (1:34)	40 1/4
52	4325 (1:40)	40 1/8
53	4355 (1:47)	40 1/8
54	4347 (1:54)	40
55	4301 (1:59)	40
56	4333 (2:06)	40
57	4339 (2:13)	40
58	4411 (2:18)	40
59	4440 (2:25)	40
60	4520 (2:32)	40 1/2
61	4510 (2:37)	40 1/2
62	4608 (2:44)	40 3/4 CP
63	4613 (2:49)	41

164

DATE: _____

SHIFT/CREW: _____

OPERATOR: _____

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
64	4592 (2:56)	41 cp	99	44 96630	40 3/4
65	4618 (3:03)	41	100	4471 (6:41)	40 1/4
66	4659 (3:09)	41 1/4 cp	101	4460 (6:46)	40 1/4
67	4584 (3:15)	40 3/4	102	4482 (6:54)	40 1/4
68	4521 (3:21)	40 1/2	103	4486 6:57	40 1/4
69	4450 (3:28)	40 1/2			
70	4430 (3:35)	40 1/4			
71	4418 (3:41)	40 1/4			
72	4437 (3:47)	40 1/2			
73	4420 (3:52)	40 1/2			
74	4421 (3:59)	40 1/4			
75	4418 (4:05)	40 1/4			
76	4422 (4:13)	40 1/4			
77	4452 (4:18)	40 1/4			
78	4433 (4:24)	40 1/4			
79	4437 (4:29)	40 3/4			
80	4440 (4:35)	40 1/2			
81	4373 (4:43)	40			
82	4383 (4:50)	40			
83	4327 (4:56)	40			
84	4270 (5:02)	40			
85	4200 (5:09)	40			
86	4263 (5:15)	40			
87	4350 (5:21)	40			
88	4316 (5:28)	40			
89	4306 (5:34)	40			
90	4340 (5:39)	40 1/4			
91	4356 (5:45)	40 1/4			
92	4366 (5:52)	40			
93	4366 (5:59)	40			
94	4367 (6:04)	40			
95	4475 (6:10)	40			
96	4472 (6:17)	40 1/2			
97	4444 (6:22)	40 1/4			
98	4493 (6:29)	40 1/4			

165

DATE: 3-20-96
SHIFT/CREW: A-2
OPERATOR: Amir

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
1/2 1	4441#		22	4486#	39 3/4
2	4409#	40 1/4	24		39 3/8
3	4391#		26		39 1/2
4	4354#	40 1/8	28	4292#	39 1/4
5	4386#		30 calibrate	4371#	40 3/8
6	4377#	40	32 calibrate	4294#	39
7	4395#		34	4443#	39 1/4
8	4413#	40 1/4	36		39 7/8
9	4427#		38	4372#	39 3/4
10	4405#	40 1/4	40		39 3/8
11	4407#		42	4404#	39 3/4
12	4418#	40	44		39 5/8
13	4435#		46	4387#	39 3/4
14	4422#	40 1/4	48		39 1/2
15	4401#		50	4378	39 1/2
16	4405#	40 1/8	52		39 1/2
17	4355#		54	4454#	39 3/8
18	4360#	39 7/8	56		39 7/8
19	4400#		58	4330#	39 1/2
20	4331#	40	60		39 1/2
21	4280#		62		39 3/8
22	4284#	39 7/8	64		39 3/8
23 calibrate	4208#		66		
24		40 1/8	68		
26	4192	39 3/4	70		
1/16 2	4392#	39 7/8	1/4 calibrate	4502#	37 1/2
4 calibrate		40	2		35 3/8
6 " "	4541#	40	4 C		35 1/2
8 calibrate		40	6		
10 " "	4539#	39 3/4	8		36 1/2
12		40 1/4	10		
14		40 3/8			
16		40 1/8			
18 calibrate	1.5441	43 3/4			
20 " "		40			

HAYWARD LINE 2 PRESS VENT RTO INLET MARCH 20th 1996
NOX/CO/CO2/THC/M2/O2

DATA TIME: START= 16:45 END= 21:15 HOURS= 4.50

BOARD WEIGHTS - LBS

average weights determined by taking bundle weights divided by peices per unit over the testing period.

	1/2"
per/peice	54.80
per/ 8' x 16'	219.21

PLANT PRODUCTION RATE

4.50 =hours during testing
70 =pressloads
840 =no. of 8'x16' boards produced (pressloads x 12 boards per load)
184,138 =lbs of finished product (boards produced x weight of finished board)
40,920 =lbs of finished product per hour (lbs of finshed product / hours)
20.46 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE TAKEN FROM MICRO - MOTIONS

TIME	MDI	PHENOL	WAX
16:50-17:50	454	886	335
18:15:19:15	454	880	327
20:15-21:15	451	867	271
AVERAGE	453.00	877.67	311.00

40,920 =average lbs. per hour finished product produced during testing
453.00 =average lbs. per hour of MDI resin used during testing
1.11% = MDI resin used as % of finished product

877.67 =average lbs. per hour of phenolic resin (100% solids) used during testing
2.14% =Phenolic resin used as % of finished product

311.00 =average lbs. per hour of wax (100% solids) used during testing
0.76% =wax used as % of finished product

167

LOUISIANA-PACIFIC CORPORATION

PRESS REPORT - LINE: 1 ©
OPERATOR: Linda Nelson SHIFT: Day DATE: 3-20-96 CREW: C

THICKNESS: 7/16 - 1/2 PRESS LOS: 10 7/16 175 1/2

OVERALL TIMER: 157 - 174 DECOMPRESSION TIME: 15

PRESS TEMP: 210-215 N.I.R. TOTAL REJECTS: 0

LOG COUNT: 1537

LINE SPEED	THICK	FROM	TO
59'	7/16	7 oc	7:38
54'	1/2	7:38	7:00

F.C.O.S. HYD. RADIATOR: 8:06 TIME

PRESS BLOWN DOWN: 8:21

SPINNER HEADS FLUSHED: X TIME

SURFACE BLENDER HOSED: X TIME

FORMER HYD RADIATOR: X TIME

3/8 = 374,377

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
9:02	9:26				24	Top Surface Transfer Conv. tripped out causing Flow-g/Sta and Haul-Off to plug

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

24

LOUISIANA ACRYLIC CORPORATION

PRESS REPORT - LINE 1 (2) DATE: 3-20-96

OPERATOR Terry SHIFT: Night CREW: A

THICKNESS 1/2 - 7/16 - 1/4 PRESS LDS: 42½ 26¼ 12 6 7/16

OVERALL TIMER: 174 - 157 DECOMPRESSION TIME: 15 - 15

PRESS TEMP: 215 TOTAL REJECTS:

LOG COUNT: 1100

LINE SPEED	THKNS.	FROM	TO
55	1/2	700	935
55	7/16	935	1250
50	1/4 & 1/2	1250	235
55	7/16	235	500
52	7/16	500	630
56	7/16	630	

F.C.O.S. HYD. RADIATOR: _____ TIME

PRESS BLOWN DOWN: _____

SPINNER HEADS FLUSHED: _____ TIME

SURFACE BLENDER HOSED: _____ TIME

FORMER HYD RADIATOR: _____ TIME

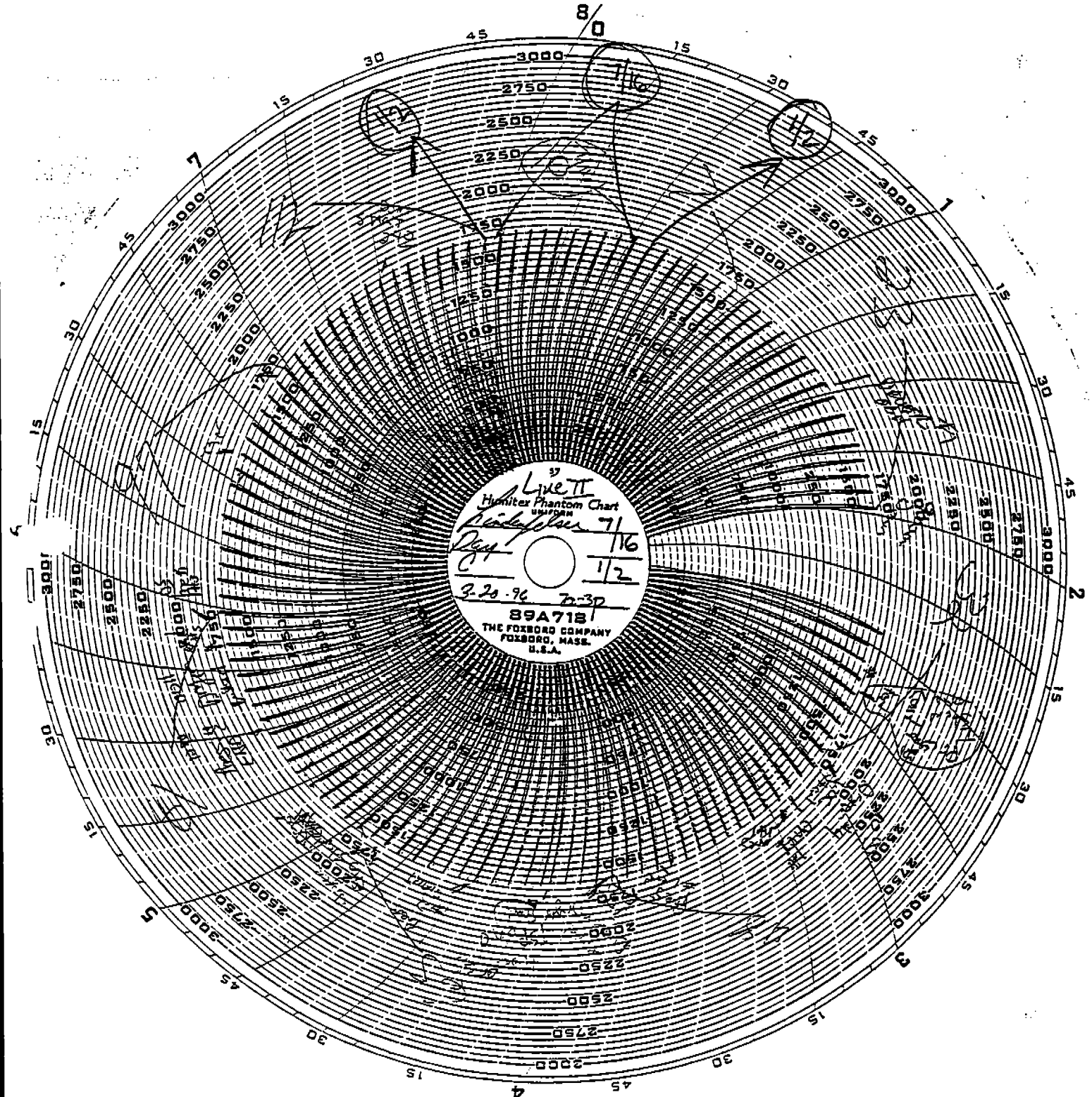
338438

DOWNTIME FROM	DOWNTIME TO	DOWNTIME (MINS) M	E	O	KEY	REASONS FOR DOWNTIME
240	242	2				Tear up at Seals

DOWNTIME CODE: M - MECHANICAL (2) E - ELECTRICAL O - OPERATOR

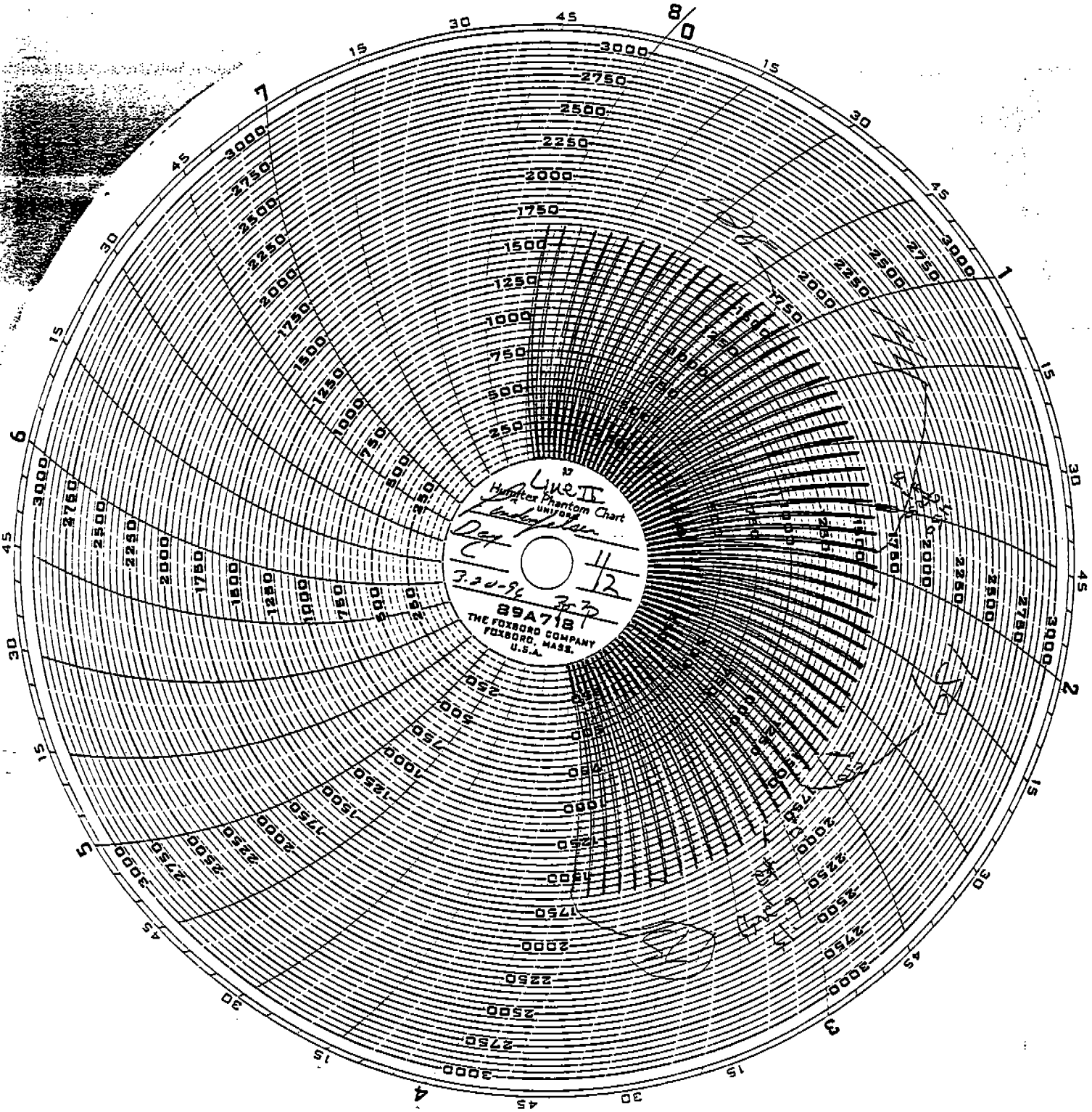
169

LINE II
PRESS CHART
3/20/96
0700 - 1500

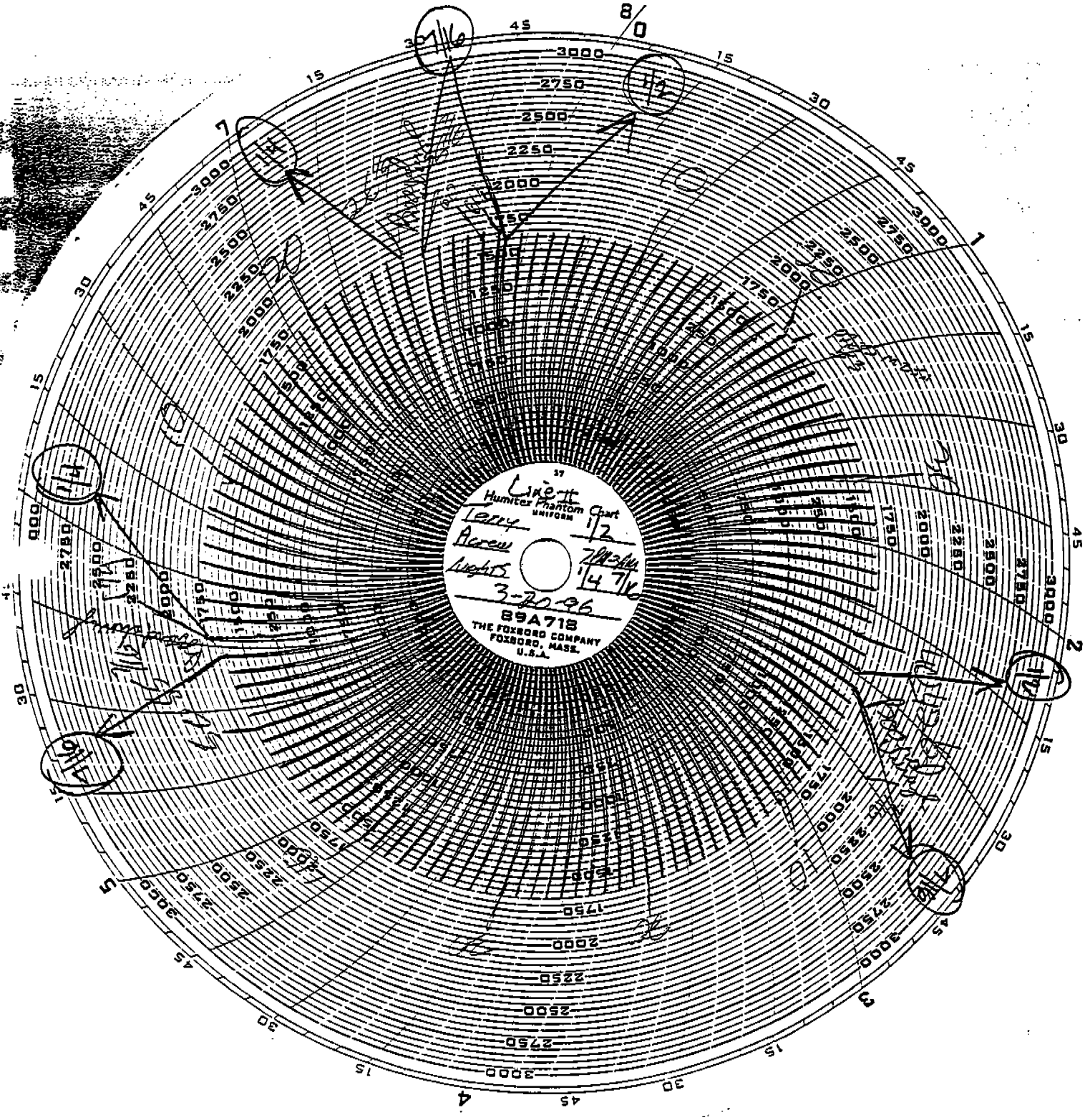


170

LINE II
PRESS CHART
3/20/96
1500 - 1900



LINE II
PRESS CHART
3/20/96
1900-0300



172

LII Press RTO 3/20/96

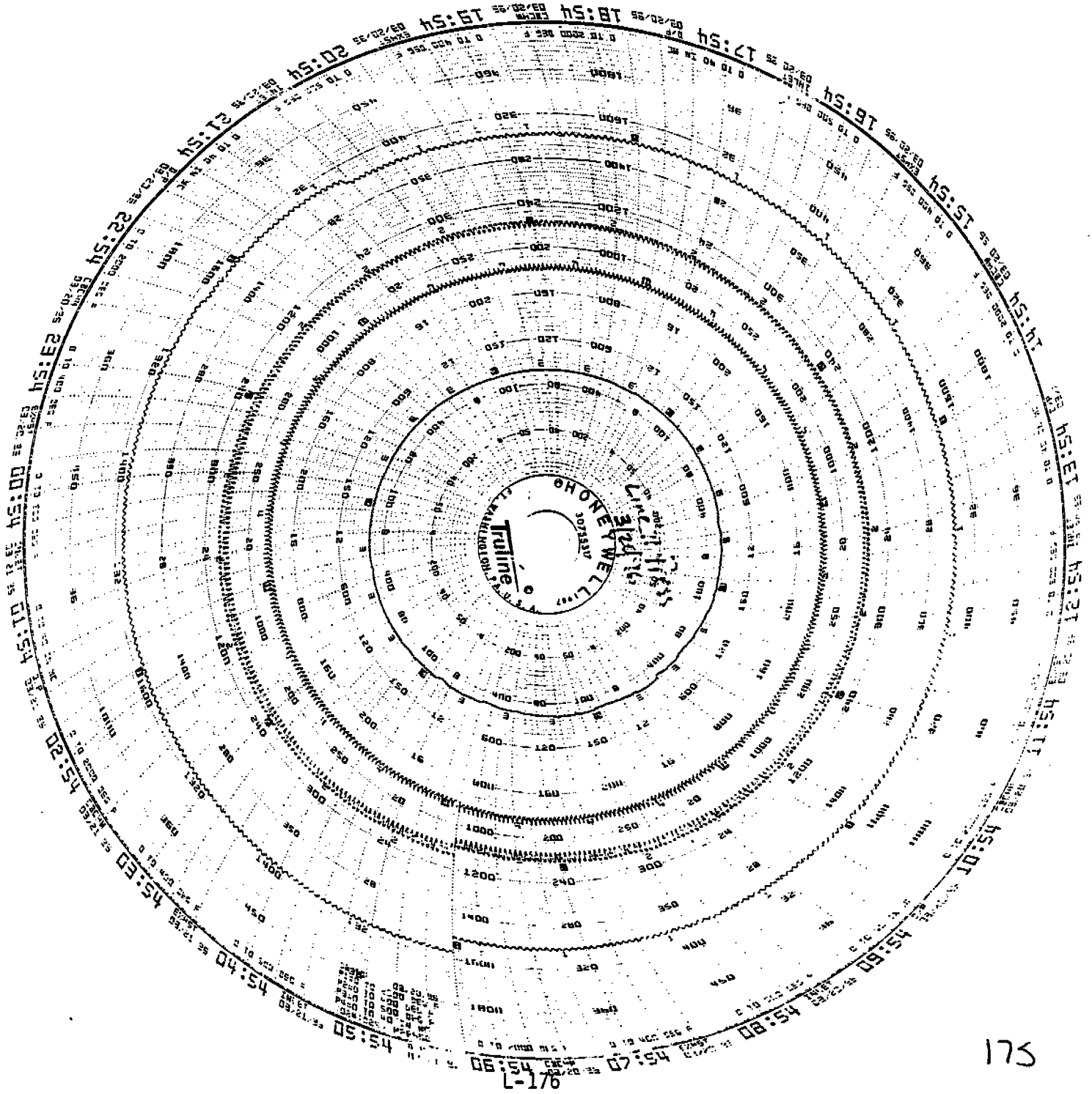
RECORD EVERY 15 MIN.					HAYWARD AIR TESTING WORKSHEET							
Time	RTO Chamber Bed Temp.					Inlet	Burners		Combust.	Exhaust	Press.	Gas
	#1	#2	#3	#4	#5	Press.	B#1	B#2	Temp.	Temp.	Drop	Usage
9:00	410	394	404	426	406	3.8	1566	1553	1509	216	18.5	
9:15	417	394	405	228	405	3.8	1604	1605	1516	222	18.3	
9:30	418	394	406	227	405	3.5	1572	1569	1502	218	18.5	
9:45	412	395	405	429	405	3.7	1588	1586	1507	222	18.2	
10:00	418	393	406	425	404	3.5	1575	1577	1507	216	18.7	
10:15	410	395	405	427	406	3.7	1575	1566	1506	222	18.2	
10:30	412	395	405	424	406	3.7	1558	1556	1501	221	18.2	
10:45	416	397	403	430	405	3.6	1588	1584	1507	217	18.6	
11:00	410	399	402	426	408	3.9	1562	1551	1503	221	18.3	
11:15	414	400	401	427	406	3.5	1566	1571	1503	218	18.3	
11:30	410	403	397	435	404	3.8	1602	1607	1512	222	18.1	
11:45	414	402	398	433	403	3.8	1585	1583	1507	216	18.7	
12:00	409	403	399	429	405	3.7	1559	1556	1506	221	18.2	
12:15	410	401	400	427	405	3.6	1557	1562	1502	222	18.2	
12:30	411	403	399	434	403	3.8	1607	1605	1515	220	18.2	
12:45	405	405	399	426	409	3.7	1558	1560	1503	222	18.2	
1:00	404	408	399	427	411	3.9	1560	1554	1505	221	18.3	
1:15	405	410	396	435	409	3.8	1604	1603	1515	221	18.3	
1:30	406	411	395	436	409	3.7	1608	1608	1516	222	18.2	
1:45	405	413	394	437	409	3.8	1606	1603	1514	220	18.3	
2:00	408	414	395	434	409	3.6	1589	1587	1510	218	18.5	
2:15	408	414	396	433	410	3.6	1601	1596	1514	220	18.3	
2:30	403	415	396	432	412	3.7	1591	1593	1515	222	18.1	
2:45	405	415	399	424	414	3.5	1566	1572	1504	220	18.4	
3:00	400	418	396	431	414	3.8	1607	1606	1513	222	18.0	
3:15	397	419	395	427	416	3.8	1570	1565	1508	222	18.3	
3:30	398	419	394	429	416	3.7	1565	1559	1508	222	18.2	
3:45	398	420	393	431	416	3.7	1581	1580	1510	222	18.1	
4:00	403	420	394	433	415	3.7	1605	1602	1515	221	18.2	
4:15	405	419	396	428	416	3.8	1582	1584	1510	220	18.4	
4:30	403	420	396	431	417	3.7	1604	1603	1515	222	18.2	
4:45	399	420	397	427	419	3.7	1570	1563	1509	223	18.2	
5:00	405	420	397	431	417	3.6	1604	1600	1515	222	18.2	
5:15	401	421	395	432	418	3.8	1605	1606	1514	222	18.1	
5:30	406	420	396	426	418	3.5	1569	1577	1504	220	18.4	
5:45	401	420	397	426	419	3.7	1559	1559	1504	222	18.1	
6:00	410	417	398	430	414	3.4	1577	1582	1507	219	18.5	
6:15	408	417	397	435	412	3.5	1609	1606	1515	222	18.1	
6:30	408	416	397	434	412	3.7	1605	1603	1516	221	18.2	
6:45	402	418	398	424	418	3.7	1561	1558	1503	222	181	

LII Press RTO 3/20/96

RECORD EVERY 15 MIN.					HAYWARD AIR TESTING WORKSHEET							
Time	RTO Chamber Bed Temp.					Inlet	Burners		Combust.	Exhaust	Press.	Gas
	#1	#2	#3	#4	#5	Press.	B#1	B#2	Temp.	Temp.	Drop	Usage
700	405	418	397	430	416	3.8	1597	1594	1511	223	18.2	
7:15	404	419	396	429	418	3.8	1607	1604	1520	222	18.1	
7:30	400	420	395	428	421	3.9	1558	1558	1502	222	18.2	
7:45	405	419	396	426	419	3.7	1559	1564	1504	222	18.2	
8:00	414	418	395	430	415	3.6	1590	1589	1575	220	18.3	
8:15	396	416	395	427	415	3.7	1557	1562	1502	222	18.2	
8:30	401	415	396	428	414	3.7	1560	1559	1503	223	18.1	
8:45	410	414	397	426	413	3.7	1558	1566	1502	222	18.2	
9:00	409	413	397	426	414	3.7	1567	1559	1504	220	18.3	
9:15	410	415	396	429	415	3.7	1571	1566	1509	223	18.2	
9:30												
9:45												
10:00												

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Line II
Press RTO
3/20/96



Press Test #2 3-20-96 11:35A.M. - 12:35

Solids	Micro-Motions Pounds	100% Solids
100% MDI Core	- 453	453
57% PF Surf.	- 1557	887
58% Wax Core	- 575	332
58% Wax Surf.	- 358	

Tanks

Solids		Before	After	Pounds	100% Solids
100% Core	MDI -	105.625"	104.813"	487	487
2 ÷ 61% Surf	PF -	42.75"			
2 ÷ 57% Day Tank	PF -	406	890	2952	841
2 ÷ 57% Mix Tank	PF -	778	2		
2 ÷ 58% Wax		6'11.5" (83.50")	6'8.5" (80.5")	1146	332

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

176

Press Test #3 3-20-96 1:05 P.M. - 2:05 P.M.

Micro-Motions

Solids		Pounds	100% SOLIDS
100%	MDI Core	- 454	454
57%	PF Surf.	- 1560	889
58%	Wax Core	- 216	- 329
58%	Wax Surf.	- 352	

4721

Tanks

Solids		Before	After	Pounds	100% Solids
100%	Core MDI -	104.438"	103.688"	450	450
2 ÷ 61.7%	Surf PF -	42.813"	31.813"		
2 ÷ 57%	Day Tank PF -	738	491	3282	935
2 ÷ 57%	Mix Tank PF -		715		
2 ÷ 58%	Wax -	79.00"	77.00"	764	222

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

177

Press Test #4 3-20-96 4:50 P.M.-

Micro-Motions

Solids	Pounds	100% SOLIDS
100% MDI Core -	454	454
57% PF Surf. -	1554	886
58% Wax Core -	209	335
58% Wax Surf. -	369	

Tanks

Solids	Before	After	Pounds	100% SOLIDS
100% Core MDI -	101.75"	101.125"	375	375
2 ÷ 61% Surf PF -	81.375"			
2 ÷ 57% Day Tank PF -	511	1034	3750	1069
2 ÷ 57% Mix Tank PF -	67	15		
2 ÷ 58% Wax -	69.00"	100.00"	573	332

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

178

Press Test #5 3-20-96 6:15 P.M. - 7:15 P.

Micro-Motions

Solids		Pounds	100% SOLIDS
100%	MDI Core	- 454	454
57%	PF Surf.	- 1543	880
58%	Wax Core	- 207	327
58%	Wax Surf.	- 357	

Tanks

Solids		Before	After	Pounds	100% SOLIDS
100%	Core MDI =	100.75"	99.938"	488	488
2 ÷ 61%	Surf PF =				
2 ÷ 57%	Day Tank PF =	908	604	3094	881
2 ÷ 57%	Mix Tank PF =	6	4		
2 ÷ 58%	Wax =	65"	62"	573	332

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

179

Press Test #6 3-20-96 8:15 P.M - 9:15 P.M

Micro-Motions

Solids		Pounds	100% SOLIDS
100%	MDI Core	- 451	451
57%	PF Surf.	- 1522	867
58%	Wax Core	- 192	271
58%	Wax Surf.	- 276	

Tanks

Solids		Before	After	Pounds	100% SOLIDS
100%	Core MDI	- 99.125"	98.125"	600	600
2 ÷ 61%	Surf PF	- 32.875"			
2 ÷ 57%	Day Tank PF	- 750	872	2528	720
2 ÷ 57%	Mix Tank PF	- 375	3		
2 ÷ 58%	Wax	- ~~60~~ 60.5"	60"	190	111

Factors per inch

MDI Tank - 600.466

PF Tank - 727.583

Wax Tank - 381.86

Factors per gallon

Day Tank - 10.11

Mix Tank - 10.11

180

DATE: 3-20-96
SHIFT/CREW: 1-C
OPERATOR: AL RANG

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
1/4 1	4357	39 1/2	29	4270 (11:17)	40"
1/16 2		39 1/2	30	4250 (11:23)	39 3/4
3		35 1/2	31	4218 (11:29)	39 3/4
4		35 3/4	32	4198 (11:35)	39 3/4
5	4448	39 1/2"	33	4187 (11:41)	39 3/4
6		39 3/4	34	4189 (11:45)	40
7		35 3/4	35	4215 (11:54)	40
1	4445	40 1/4	36	4266 (12:00)	40
2	4485 (5:03)	40 1/4	37	4306 (12:06)	40
3	4393 (5:08)	40	38	4342 (12:30)	40 1/8
4	4279 (8:14)	40	39	4342 (12:19)	40
5	4330 (8:20)	40	40	4335 (12:26)	40
6	4362 (8:27)	40	41	4332 (12:32)	40
7	4375 (8:35)	40	42	4350 (12:39)	40 1/4
8	4371 (8:40)	40	43	4392 (12:44)	40 1/4
9	4385 (8:46)	40	44	4380 (12:52)	40 1/4
10	4340 (8:55)	40	45	4366 (12:58)	40 1/4
11	4432 (9:59)	40 1/4	46	4379 (1:03)	40 1/4
12	4391 (9:06)	40	47	4388 (1:09)	40 1/4
13	4335 (9:36)	40	48	4387 (1:15)	40 1/2
14	4371 (9:42)	40	49	4355 (1:21)	40 1/2
15	4313 (9:49)	40	50	4343 (1:28)	40 1/4
16	4279 (9:55)	40	51	4319 (1:34)	40 1/4
17	4426 (10:02)	40	52	4335 (1:40)	40 1/8
18	4437 (10:08)	40 1/4	53	4355 (1:47)	40 1/8
19	4450 (10:17)	40	54	4347 (1:54)	40
20	4452 (10:23)	40	55	4301 (1:59)	40
21	4436 (10:28)	40	56	4333 (2:06)	40
22	4427 (10:34)	40	57	4339 (2:13)	40
23	4445 (10:39)	40	58	4411 (2:18)	40
24	4389 (10:44)	40	59	4440 (2:25)	40
25	4351 (10:51)	40	60	4530 (2:32)	40 1/2
26	4360 (10:57)	40	61	4510 (2:37)	40 1/2
27	4295 (11:04)	40"	62	4608 (2:44)	40 3/4 CS
28	4293 (11:10)	40"	63	4613 (2:49)	41

1/2"

DATE: _____

SHIFT/CREW: _____

OPERATOR: _____

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
64	4592 (2:56)	41 cp	94	4496 (6:30)	40 1/4
65	4618 (3:03)	41	100	4471 (6:41)	40 1/4
66	4659 (3:13)	41 1/4 cp	101	4460 (6:46)	40 1/4
67	4584 (3:17)	40 3/4	102	4482 (6:55)	40 1/4
68	4521 (3:21)	40 1/2	103	4486 (6:57)	40 1/4
69	4450 (3:25)	40 1/2			
70	4430 (3:33)	40 1/4			
71	4418 (3:41)	40 1/4			
72	4437 (3:47)	40 1/2			
73	4420 (3:52)	40 1/2			
74	4421 (3:59)	40 1/4			
75	4418 (4:05)	40 1/4			
76	4422 (4:12)	40 1/4			
77	4452 (4:18)	40 1/4			
78	4433 (4:24)	40 1/4			
79	4437 (4:29)	40 1/4			
80	4440 (4:35)	40 1/2			
81	4373 (4:43)	40			
82	4323 (4:50)	40			
83	4327 (4:56)	40			
84	4270 (5:02)	40			
85	4260 (5:07)	40			
86	4243 (5:15)	40			
87	4350 (5:21)	40			
88	4316 (5:28)	40			
89	4306 (5:31)	40			
90	4340 (5:39)	40 1/4			
91	4356 (5:45)	40 1/4			
92	4366 (5:52)	40			
93	4346 (5:59)	40			
94	4367 (6:04)	40			
95	4435 (6:10)	40			
96	4472 (6:17)	40 1/2			
97	4444 (6:23)	40 1/4			
98	4493 (6:29)	40 1/4			

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DATE: 3-20-96
SHIFT/CREW: A-2
OPERATOR: Amy

UNIT/ THICKNESS	WEIGHT	HEIGHT	UNIT/ THICKNESS	WEIGHT	HEIGHT
1/2 1	4441#		22	4486#	39 3/4
2	4403#	40 1/4	24		39 3/8
3	4391#		26		39 1/2
4	4354#	40 1/8	28	4292#	39 1/4
5	4386#		30 callipers	4371#	40 3/8
6	4377#	40	32 callipers	4294#	39
7	4395#		34	4343#	39 1/4
8	4413#	40 1/4	36		39 7/8
9	4427#		38	4372#	39 3/4
10	4405#	40 1/4	40		39 5/8
11	4407#		42	4404#	39 3/4
12	4418#	40	44		39 5/8
13	4435#		46	4287#	39 3/4
14	4422#	40 1/4	48		39 1/2
15	4401#		50	4378	39 1/2
16	4405#	40 1/8	52		39 1/2
17	4355#		54	4454#	39 5/8
18	4360#	39 7/8	56		39 7/8
19	4400#		58	4330#	39 1/2
20	4331#	40	60		39 1/2
21	4288#		62		39 5/8
22	4284#	39 7/8	64		39 3/8
23 callipers	4208#		66		
24		40 1/8	68		
25	4192	39 3/4	70		
7/16 2	4392#	39 7/8	1/4 callipers	4502#	37 1/2
4 callipers		40	2		35 7/8
6 " "	4541#	40	4 PC		35 1/2
8 callipers		40	6		
10 " "	4539#	39 3/4	8		36 1/2
12		40 1/4	10		
14		40 3/8			
16		40 1/8			
18 callipers	1544#	43 3/4			
20 " "		40			

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KONUS EFB REPORT DATE 3-11-96

SHIFT: (I) OR II
LINES 1 & 2

K-1 - K-2

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	14										13.5	2
Bed Amperage (MA)	.01										.01	.10
Ionizer Voltage (KV)	30										25	25
Ionizer Amperage (MA)	1.2										3.2	3.2
EFB Pressure Drop (In.)	0										1.4	1.4
Inlet Temperature	312										406	414
Outlet Temperature	267										247	282
Rock Flow	OK										OK	OK
Condition Code*	OK	8	8	8	8	8	8	8	8	8	4	3

Rock Usage/Shift: Added 1 Bag of Rock to Storage

K-3 - K-4

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10	10	10.5
Bed Amperage (MA)	.28	.28	.26	.26	.26	.32	.28	.27	.26	.26	.28	.26
Ionizer Voltage (KV)	25	25	24	24	24	25	25	25	24	24	24	24
Ionizer Amperage (MA)	3.2	3.2	3.4	3.2	3.2	3.2	3.0	2.8	3.3	3.2	3.6	3.2
EFB Pressure Drop (In.)	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
.nlet Temperature	476	476	477	475	472	497	489	472	472	476	488	496
Outlet Temperature	399	392	390	388	378	391	386	397	389	389	391	384
Rock Flow	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Condition Code*	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Rock Usage/Shift: _____

Baghouse Pressure Drop: (in.)		7	8	9	10	11	12	1	2	3	4	5	6
	L-I	3.5										3.5	3.9
	L-II	4.6	4.9	4.4	4.4	4.4	4.3	4.4	4.4	4.4	4.3	4.3	4.2

Comments/Problems: Cleaned Line I Ionizers, Changed top Left pipe and Bounce pad.

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

VOLUME PER SHIFT

LINE I	1
LINE II	2

123/EFBFORMS/KNSRPT

SHIFT: I OR II
LINES 1 & 2

K-1 - K-2

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	10	8.0	10.5	10.2	12.0	12.0	11.0	11.5	12.0	12.0	14.0	15.0
Bed Amperage (MA)	.2	.6	1.2	1.4	1.6	1.6	1.6	1.8	1.6	1.4	.6	.2
Ionizer Voltage (KV)	28	28	28	28	28	28	28	28	28	28	28	28
Ionizer Amperage (MA)	3.8	3.6	3.6	3.6	3.4	3.4	3.4	3.4	3.4	3.4	2.2	1.8
EFB Pressure Drop (In.)	1.6	1.6	1.6	1.6	1.6	1.6	1.4	1.4	1.6	1.6	1.8	0
Inlet Temperature	421	422	417	416	412	411	411	409	408	378	297	178
Outlet Temperature	309	311	311	312	313	311	310	309	310	316	293	217
Rock Flow	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok
Condition Code*	3	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok

Rock Usage/Shift: _____

K-3 - K-4

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	11.0	11.0	11.0	11.0	10.5	10.5	10.0	10.0	10.0	11.0	11.0	11.0
Bed Amperage (MA)	2.6	2.8	2.8	2.8	3.0	3.0	3.0	3.0	2.6	2.6	2.8	3.0
Ionizer Voltage (KV)	24	24	24	24	25	25	24	24	24	24	24	24
Ionizer Amperage (MA)	2.8	3.0	3.0	3.2	3.2	3.2	3.2	3.0	3.2	3.4	3.4	3.4
EFB Pressure Drop (In.)	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
Inlet Temperature	465	483	519	521	522	527	530	530	529	501	508	51
Outlet Temperature	385	381	380	380	380	381	382	383	375	365	369	37
Rock Flow	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok
Condition Code*	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok

Rock Usage/Shift: _____

Baghouse Pressure Drop: (in.)	7	8	9	10	11	12	1	2	3	4	5	6
L-I	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
L-II	4.4	4.4	4.4	4.4	4.4	4.4	4.2	4.2	4.4	4.4	4.6	4.6

Comments/Problems: _____

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

VOLUME PER SHIFT

LINE I	3
LINE II	3

123/EFBFORMS/KNSRPT

KONUS EFB REPORT DATE 3-26-96

SHIFT: (1) OR II
LINES 1 & 2

K-1 - K-2

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	14	16	14	12.5	13	13			1	1.5	1	13
Bed Amperage (MA)	.01	.0	0	0	0	0			.28	.34	0	.03
Ionizer Voltage (KV)	28	28	15	23	30	30			20	19.5	26	20
Ionizer Amperage (MA)	2.6	2.0	1.8	1.8	1.7	1.4			2.6	2.8	2.4	1.2
EFB Pressure Drop (In.)	0	.09	0	1.0	.05	.08			.06	0	0	0
Inlet Temperature	177	175	161	151	152	150			393	409	405	394
Outlet Temperature	199	166	135	121	109	103			125	253	301	302
Rock Flow	OK	OK	OK	OK	OK	OK			OK	OK	OK	OK
Condition Code*	8	8	8	8	8	8	8	8	3	3	3	OK

Rock Usage/Shift: _____

K-3 - K-4

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	10	5	5.5	6	5.5	5.5	5.5	5.5	5.5	7	6.5	6.5
Bed Amperage (MA)	.30	.20	.18	.13	.18	.16	.16	.17	.17	.20	.20	.20
Ionizer Voltage (KV)	24	25	25	24	24	24	24	24	24	25	24	24
Ionizer Amperage (MA)	3.2	2.8	3.0	3.3	3.2	3.3	3.5	3.2	2.9	3.2	3.4	3.4
EFB Pressure Drop (In.)	.05	.04	.04	.04	.04	.04	.04	.00	.05	.03	.04	.04
Inlet Temperature	516	527	500	492	493	489	470	487	475	479	494	519
Outlet Temperature	392	387	390	364	386	390	391	394	396	389	390	389
Rock Flow	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Condition Code*	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Rock Usage/Shift: _____

Baghouse Pressure Drop: (in.)	7	8	9	10	11	12	1	2	3	4	5	6
L-I	3.7	3.3	3.2	3.4	3.4	3.4			2.5	1.5	2.6	2.0
L-II	4.8	4.8	4.4	4.4	4.6	4.6	4.7	4.8	4.6	4.5	4.5	4.6

Comments/Problems: _____

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

VOLUME PER SHIFT

LINE I	1
LINE II	2

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SHIFT: I OR (II)
LINES 1 & 2

K-1 - K-2

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	14	14	14	14	14	14	14	14	14	14	14	13
Bed Amperage (MA)	.06	.06	.05	.06	.08	.08	.08	110	110	.08	.08	.08
Ionizer Voltage (KV)	30	30	28	28	28	28	28	28	28	28	28	28
Ionizer Amperage (MA)	3.8	3.8	2.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
EFB Pressure Drop (In.)	0	0	0	.08	.08	.01	.01	.01	.01	0	0	0
Inlet Temperature	400	396	361	394	396	386	384	385	386	382	384	377
Outlet Temperature	297	297	294	285	287	288	287	289	290	291	293	290
Rock Flow	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Condition Code*	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Rock Usage/Shift: _____

K-3 - K-4

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	7	7	7	7	7	7	7	7	7	7	7	7
Bed Amperage (MA)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ionizer Voltage (KV)	25	25	22	22	22	20	20	20	20	20	20	20
Ionizer Amperage (MA)	3.0	3.0	2.8	3.6	3.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EFB Pressure Drop (In.)	.04	.04	.04	.03	.03	.03	.04	.04	.04	.03	.03	.03
Inlet Temperature	515	504	500	504	507	531	533	516	494	509	500	52?
Outlet Temperature	384	390	392	396	348	392	343	362	387	395	396	39
Rock Flow	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Condition Code*	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Rock Usage/Shift: _____

Baghouse Pressure Drop: (in.)		7	8	9	10	11	12	1	2	3	4	5	6
	L-I	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	L-II	4.5	4.5	4.4	4.6	4.8	4.5	4.5	4.6	4.8	4.5	4.5	4.5

Comments/Problems: _____

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

VOLUME PER SHIFT

LINE I	1½
LINE II	1½

123\EFB\FORMS\KNSRPT

KONUS EFB REPORT DATE 3-21-96

SHIFT: (I) OR II
LINES 1 & 2

K-1 - K-2

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	13	12.5	12	12	11.5	11.5	11.5	11.5	10	11	11	11
Bed Amperage (MA)	.08	.10	.14	.15	.17	.20	.16	.18	.20	.21	.22	.22
Ionizer Voltage (KV)	29	28	28	27	29	29	28	29	28	28	28	26
Ionizer Amperage (MA)	3.0	3.2	3.6	3.8	3.9	3.4	3.6	3.9	4.0	3.6	3.6	3.4
EFB Pressure Drop (In.)	0	1.7	1.7	2.2	2.6	2.2	2.4	2.1	2.0	1.8	1.6	1.6
Inlet Temperature	378	395	404	411	416	418	403	411	418	419	420	419
Outlet Temperature	290	299	303	312	320	323	323	323	327	327	330	329
Rock Flow	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Condition Code*	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Rock Usage/Shift: _____

K-3 - K-4

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	7	7	7	7	7
Bed Amperage (MA)	.20	.20	.20	.19	.18	.18	.20	.20	.18	.18	.18	.17
Ionizer Voltage (KV)	21	21	21	21	20	20	21	21	21	21	21	21
Ionizer Amperage (MA)	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.2	2.0	2.0	2.1	2.2
EFB Pressure Drop (In.)	.04	.04	.05	.04	.04	.04	.05	.04	.04	.04	.04	.04
Inlet Temperature	499	475	484	449	439	439	443	435	449	453	458	480
Outlet Temperature	395	398	396	397	403	403	407	403	404	405	407	408
Rock Flow	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Condition Code*	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Rock Usage/Shift: _____

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

Comments/Problems: _____

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

VOLUME PER SHIFT

LINE I	1½
LINE II	1½

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KONUS EFB REPORT DATE 3-21-96

SHIFT: I OR (II)
LINES 1 & 2

K-1 - K-2

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	10	10	7	7	7	7	7	7	7	5	6	5
Bed Amperage (MA)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.8
Ionizer Voltage (KV)	28	28	26	26	26	24	24	24	24	24	24	24
Ionizer Amperage (MA)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.5	2.5	2.5	2.4	2.4
EFB Pressure Drop (In.)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	.0	.0	0	0
Inlet Temperature	434	436	449	460	466	455	453	444	445	443	447	460
Outlet Temperature	330	332	348	361	371	370	371	368	365	363	369	355
Rock Flow	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Condition Code*	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Rock Usage/Shift: _____

K-3 - K-4

	7	8	9	10	11	12	1	2	3	4	5	6
Bed Voltage (KV)	7	7	7	7	7	7	7	7	7	7	7	7
Bed Amperage (MA)	1.8	1.8	1.8	1.8	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ionizer Voltage (KV)	20	20	20	20	20	20	20	20	20	20	20	20
Ionizer Amperage (MA)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EFB Pressure Drop (In.)	.04	.04	.04	.03	.03	.03	.03	.04	.04	.04	.04	.0
Inlet Temperature	478	480	389	496	495	531	533	346	349	551	561	543
Outlet Temperature	401	403	402	400	402	404	406	405	406	407	405	402
Rock Flow	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Condition Code*	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Rock Usage/Shift: _____

Baghouse Pressure Drop: (in.)		7	8	9	10	11	12	1	2	3	4	5	6
	L-I	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	L-II	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5

Comments/Problems: _____

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

VOLUME PER SHIFT

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

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APPENDIX M

SAMPLING TRAIN CALIBRATION DATA

INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job L.P. Hayward Date 3/18/94

Operator D. VanHoever Module No. 6

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 28.74 in.Hg θ = 1.0054 ΔH@ 1.89 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(818.30)		
2.5	820.17	48	45
5.0	821.98	54	46
7.5	823.85	57	47
10	825.70	59	47
	V_m = 7.40	Avg(t_m) =	50.38 °F

Calculate Y_{cm} as follows:

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

$$Y_{cm} = \frac{1.786}{(1.0054)(7.4)} \left[\frac{(50.38) + 460}{(28.74)}\right]^{0.5}$$

$$Y_{cm} = 1.01$$

If Y_{cm} is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job C.P. Hayward Date 3-19-96

Operator EJ Module No. 10

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data:

Bar press 28.76 in.Hg θ = 1.0012 ΔH@ 1.94 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(233.00)		
2.5	234.89	46	30
5.0	236.75	47	30
7.5	238.65	47	27
10	240.49	48	27
	V_m = 7.49	Avg(t_m) = 37.75	°F

Calculate Y_{cn} as follows:

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

$$Y_{cn} = \frac{1.786}{(7.49)(1.0012)}\left[\frac{(37.75 + 460)}{(28.76)}\right]^{0.5} \quad 4.14$$

Y_{cn} = .985

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 C P Hayward Date 3/18/96
Operator SK Module No. 13

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data:

Bar press 28.74 in.Hg θ = 1.0023 ΔH@ 1.82 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(307.600)		
2.5	309.434	56	36
5.0	311.265	58	36
7.5	313.140	61	37
10	314.995	62	38
	V_m = 7.395	Avg(t_m) = 48	°F

Calculate Y_{cal} as follows:

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

$$Y_{cal} = \frac{1.786}{(1.0023)(7.395)} \left[\frac{(48) + 460}{(28.74)}\right]^{0.5}$$

$$Y_{cal} = 1.013$$

If Y_{cal} 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 HAYWARD Date 3-21-96

Operator J. BADEVILLE J. LONGRIE Module No. 13

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data: 1.0023

Bar press 29.26 in.Hg θ = 1.82 ΔH@ 1.82 in.WC.

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

Calculate Y_m as follows:

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

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

$$Y_m = 1.005$$

If Y_m 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/Hayward Date 3-19-96

Operator S. Yelk Module No. 14

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data:

Bar press 28.78 in.Hg θ = .9936 ΔH@ 1.81 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(919.00)		
2.5	920.83	42	29
5.0	922.64	44	29
7.5	924.49	46	31
10	926.30	48	31
	V_m = 7.30	Avg(t_m) = 37.5	°F

Calculate Y_{cm} as follows:

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

$$Y_{cm} = \frac{1.786}{(\quad)(\quad)}\ \left[\frac{(\quad) + 460}{(\quad)}\right]^{0.5}$$

$$Y_{cm} = 1.02357$$

If Y_{cm} is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

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INTERPOLL LABORATORIES, INC.
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EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job LP/Hayward Date 3-20-96

Operator S. Gyletta Module No. 14

Instructions:
Operate the control module at a flow rate equal to ΔH@ for 10 minutes before attaching the umbilical.

Record the following data:

Bar press 29.31 in.Hg θ = 0.0936 ΔH@ 1.81 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(097.30)		
2.5	099.15	34	25
5.0	101.00	41	26
7.5	102.74	44	26
10	104.49	45	27
	V_m = 7.19	Avg(t_m) = 33.5	°F

Calculate Y_{cm} as follows:

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

$$Y_{cm} = \frac{1.786}{(\quad)(\quad)}\left[\frac{(\quad) + 460}{(\quad)}\right]^{0.5}$$

$$Y_{cm} = 1.02583$$

If Y_{cm} is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job CPJ HUYWARD Date 3-19-96

Operator _____ Module No. 15

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 28.69 in.Hg θ = .9964 ΔH@ 1.78 in.WC.

Time (min)	Volume (CF)	Meter Temp (°F)	
		Inlet	Outlet
	(994.70)		
2.5	996.52	50	39
5.0	998.37	54	39
7.5	1000.17	56	40
10	1002.00	58	40
	V_m = 7.30	Avg(t_m) = 47.0	°F

Calculate Y_{cal} as follows:

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

$$Y_{cal} = \frac{1.786}{(.9964)(7.30)} \left[\frac{(47.0 + 460}{(28.67)}\right]^{0.5}$$

$$Y_{cal} = 1$$

If Y_{cal} is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

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Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: March 26, 1996

Meter Box No. : 6 (Rockwell Dry Test Meter Serial No. 964548)

Date of Last Calibration: January 11, 1996
Calibration Technician: S. Fjelsta
Wet Test Meter No.: American Meter AL-20

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
February 22, 1996	6-7318	437.32	595.20	157.88	157.88
March 05, 1996	6-7378	607.00	816.99	209.99	367.87
March 18, 1996	6-7451	826.00	1474.30	648.30	1016.17

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: March 26, 1996

Meter Box No. : 10 (Rockwell Dry Test Meter Serial No. 1334112)

Date of Last Calibration: March 11, 1996
Calibration Technician: E. Juers
Wet Test Meter No.: American Meter AL-20

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
March 15, 1996	6-7446	40.80	214.48	173.68	173.68
March 19, 1996	6-7451	241.40	342.86	101.46	275.14

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: March 26, 1996

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

Date of Last Calibration: January 5, 1996
Calibration Technician: S. Fjelsta
Wet Test Meter No.: American Meter AL-20

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
March 19, 1996	6-7451	315.18	639.72	324.54	324.54

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: March 26, 1996

Meter Box No. : 14 (Rockwell Dry Test Meter Serial No. 1334123)

Date of Last Calibration: January 10, 1996
Calibration Technician: S. Fjelsta
Wet Test Meter No.: American Meter AL-20

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
February 20, 1996	6-7331	670.87	770.94	100.07	100.07
February 21, 1996	6-7319	781.55	909.89	128.34	228.41
March 19, 1996	6-7451	926.79	1245.33	318.54	546.95

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: March 26, 1996

Meter Box No. : 15 (Rockwell Dry Test Meter Serial No. 1334118)

Date of Last Calibration: March 12, 1996
Calibration Technician: S. Kelker
Wet Test Meter No.: American Meter AL-20

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
March 19, 1996	6-7451	10.50	288.61	278.11	278.11

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: March 26, 1996

Meter Box No. : 6-S (Rockwell Dry Test Meter Serial No. 649078)

Date of Last Calibration: January 11, 1996
Calibration Technician: S. Fjelsta
Wet Test Meter No.: American Meter AL-17 (0.05 CF/REV)

Date of Use	Report No.	Initial Meter Reading	Final Meter Reading	Volume/Job (cu. ft.)	Total Volume* (cu. ft.)
February 13, 1996	6-7285	463.200	465.830	2.630	2.630
February 20, 1996	6-7318	466.403	473.379	6.976	9.606
March 21, 1996	6-7451	482.168	507.109	24.941	34.547

* Total volume through meter since last calibration.

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

Date 1-11-96
Bar. Press. 29.97 IN.HG
Wet Test Meter No. AL-20

Control Module No. 6
Serial No. DTM 964568
Technician SF

ΔH (IN.WC)		Gas Volume Wet Test Meter	• Cal. Index φ	• Diff. Wet Test Meter ΔP_W	Gas Volume Dry Test Meter (ft^3)		Gas Temperatures			Time θ	Meter Coeff.	Orifice Const.	C_f
Nominal	Actual	(ft^3)	(%)	(IN.WC.)	V_{di}	V_{df}	Wet Test t_w (°F)	Dry Test t_{di} (°F)	Dry Test t_{do} (°F)	(Min/ Sec)	Y	ΔH@	
0.5	0.5	2	99.85	0.01	969.132	971.146	69.5	81	70	5/08	1.0015	1.830	
1.2	1.2	3	99.91	0.025	971.451	974.465	69.5	86	71	5/02	1.0083	1.564	
2.0	2.0	3	99.93	0.055	965.629	968.626	69.5	80	69	5/56	1.0046	1.910	
3.3	3.3	5	100.00	0.09	974.975	980.022	69.5	91	72	5/09	1.0047	1.931	
4.7	4.7	5	100.02	0.12	980.635	985.673	69.5	95	73	4/2	1.0029	1.939	
		2	3	4	5	6	7	8	9	10	11/12 Avg	1.0054	1.519	

Positive leak check performed by SF
☒ Meter was in tolerance
Approved by

Meter was not in tolerance
Meter was not in tolerance
Date 1/17/96

☐: readjusted linkage
☐: changed dry test meter

*Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

Date 3-11-96
Bar. Press. 29.24 IN.HG
Wet Test Meter No. AL-20

Control Module No. 10
Serial No. DTM 1334112
Technician ES

ΔH (IN.WC)		Gas Volume Wet Test Meter	* Cal. Index	* Diff. Wet Test Meter	Gas Volume Dry Test Meter (ft^3)		Gas Temperatures			Time	Meter Coeff.	Orifice Const.	C_f
							Wet Test	Dry Test					
Nominal	Actual	(ft^3)	(%)	ΔP_w (IN.WC.)	V_{di}	V_{df}	t_w (°F)	t_{di} (°F)	t_{do} (°F)	θ (Min/Sec)	Y	ΔH@	
0.5	0.5	2	99.85	0.01	15.97	17.99	69	84	72	5/07	1.0041	1.85	
1.2	1.2	3	99.91	0.025	10.915	13.95	69	82	71	5/03	.9985	1.93	
2.0	2.0	3	99.93	0.055	3.65	6.68	68	83	74	3/58	1.0004	1.97	
3.3	3.3	5	100.00	0.09	19.00	24.03	69	90	73	5/09	1.0089	1.96	
4.7	4.7	5	100.02	0.12	26.04	31.07	69	93	74	4/20	1.0092	1.97	
		2	3	4	5	6	7	8	9	10	Avg		
											1.0042	1.94	

Positive leak check performed by ES
Meter was in tolerance
Approved by

Meter was not in tolerance ☐: readjusted linkage
Meter was not in tolerance ☐: changed dry test meter
Date 3-11-96

*Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

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M-15

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

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

Control Module No. 13
Serial No. DTM 1334119
Technician SF

ΔH (IN.WC)		Gas Volume Wet Test Meter	* Cal. Index	* Diff. Wet Test Meter ΔP_w	Gas Volume Dry Test Meter (ft^3)		Gas Temperatures			Time	Meter Coeff.	Orifice Const.	C_f
Nominal	Actual	(ft^3)	(%)	(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	0.5	2	99.85	0.01	295.745	297.811	65	92	72	5/01	0.99664	1.7184	
1.2	1.2	3	99.91	0.025	292.358	295.450	65	95	72	5/01	1.00049	1.8357	
2.0	2.0	3	99.93	0.055	288.874	291.955	65	97	72	3/55	1.00404	1.8506	
3.3	3.3	5	100.00	0.09	282.735	287.843	65	97	71	5/05	1.00581	1.8508	
4.7	4.7	5	100.02	0.12	275.830	280.910	65	94	68	4/16	1.00425	1.8599	
		2	3	4	5	6	7	8	9	10	(Avg)		
											Avg	1.00225	1.82	

Positive leak check performed by SF
Meter was in tolerance
Approved by

Meter was not in tolerance
Meter was not in tolerance
Date 1/9/96

☐: readjusted linkage
☐: changed dry test meter

*Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

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M-16

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

Date: 1-10-96
Bar. Press. 29.15 IN.HG
Wet Test Meter No. AL-20

Control Module No. 14
Serial No. DTM 1334123
Technician SF

ΔH (IN.WC)		Gas Volume Wet Test Meter	* Cal. Index φ	* Diff. Wet Test Meter ΔP_w	Gas Volume Dry Test Meter (ft^3)		Gas Temperatures			Time θ	Meter Coeff.	Orifice Const.	C_f
							Wet Test t_w (°F)	Dry Test					
Nominal	Actual	(ft^3)	(%)	(IN.WC.)	V_{di}	V_{df}		t_{di} (°F)	t_{do} (°F)	(Min/ Sec)	Y	ΔH@	
0.5	0.5	2	99.85	0.01	632.750	634.803	64	82	69	4/57	0.99279	1.713	
1.2	1.2	3	99.91	0.025	635.535	638.630	64	88	69	4/57	0.99217	1.815	
2.0	2.0	3	99.93	0.055	638.930	642.019	64	90	69	3/51	0.99406	1.826	
3.3	3.3	5	100.00	0.09	642.450	647.606	64	92	70	5/01	0.99271	1.834	
4.7	4.7	5	100.02	0.12	653.375	658.525	63.5	96	71	4/14	0.99605	1.847	
7	1	4	5	6	7	8	9	10		11/12 Avg	0.99356	1.807	

Positive leak check performed by SF
Meter was in tolerance
Approved by

Meter was not in tolerance ☐: readjusted linkage
Meter was not in tolerance ☐: changed dry test meter
Date 1/17/96

*Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

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M-17

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Meter Calibration Sheet EPA/Method 5

Date 3/12/96
Bar. Press. 28.97 IN.HG
Wet Test Meter No. AL-20

Control Module No. 15
Serial No. DTM 133418
Technician Steve Kelley

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_p
							Wet Test	Dry Test					
Nominal	Actual	(ft³)	(%)	ΔP_w (IN.WC.)	V_{dr}	V_{df}	t_w (°F)	t_{di} (°F)	t_{do} (°F)	θ (Min/Sec)	Y	ΔH@	
0.5	0.5	2	99.85	0.01	950.756	952.771	71	80	73	4/50	1.0000	1.68	
1.2	1.2	3	99.91	0.025	953.780	956827	71	83	73	4/50	.9937	1.79	
2.0	2.0	3	99.93	0.055	946.708	949.742	71	82	73	3/48	.9950	1.84	
3.3	3.3	5	100.00	0.09	957.839	962.886	71	86	73	4/55	.9980	1.82	
4.7	4.7	5	100.02	0.12	969.923	974.980	71	87	75	4/08	.9954	1.83	
		2	3	4	5	6	7	8	9	10	Avg	.9964	1.78	

Positive leak check performed by SK
Meter was in tolerance ☒
Approved by [signature]

Meter was not in tolerance ☐: readjusted linkage
Meter was not in tolerance ☐: changed dry test meter
Date 3/14/96

*Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

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M-18

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Minimodule Calibration Sheet/Flow Rate Range 0-0.13 CFM/(0-4 LPM)

Date 1-11-96
Bar. Press. 28.98 IN.HG
Wet Test Meter No. AL-17 (.05 CF/FEV)

Meter Box No. 63
Serial No. DTM 64078
Technician SF

Rotameter Reading (cc/Min)	ΔP_d (IN.WC)	Gas Volume Wet Test Meter (ft^3)	** Cal Index ϕ (%)	Diff. Wet Test Meter ΔP_w (IN.WC)	Gas Volume Dry Test Meter (ft^3) V_{di}	Gas Volume Dry Test Meter (ft^3) V_{df}	Gas Temperature Wet Test t_w (°F)	Gas Temperature Dry Test t_{di} (°F)	Time θ (Min/Sec)	Meter Coeff. Y	Rotameter Coeff. Z
1000	.001	0.2	99.55	0.04	433.953	434.152	69.5	72		1.0087	
1000	.001	0.2	99.55	0.04	434.417	434.618	69.5	77		1.0081	
1000	.001	0.2	99.55	0.04	434.637	434.842	69.5	80		0.9939	
1	2	3	4	5	6	7	8	9	10/11 Avg.	1.0036	

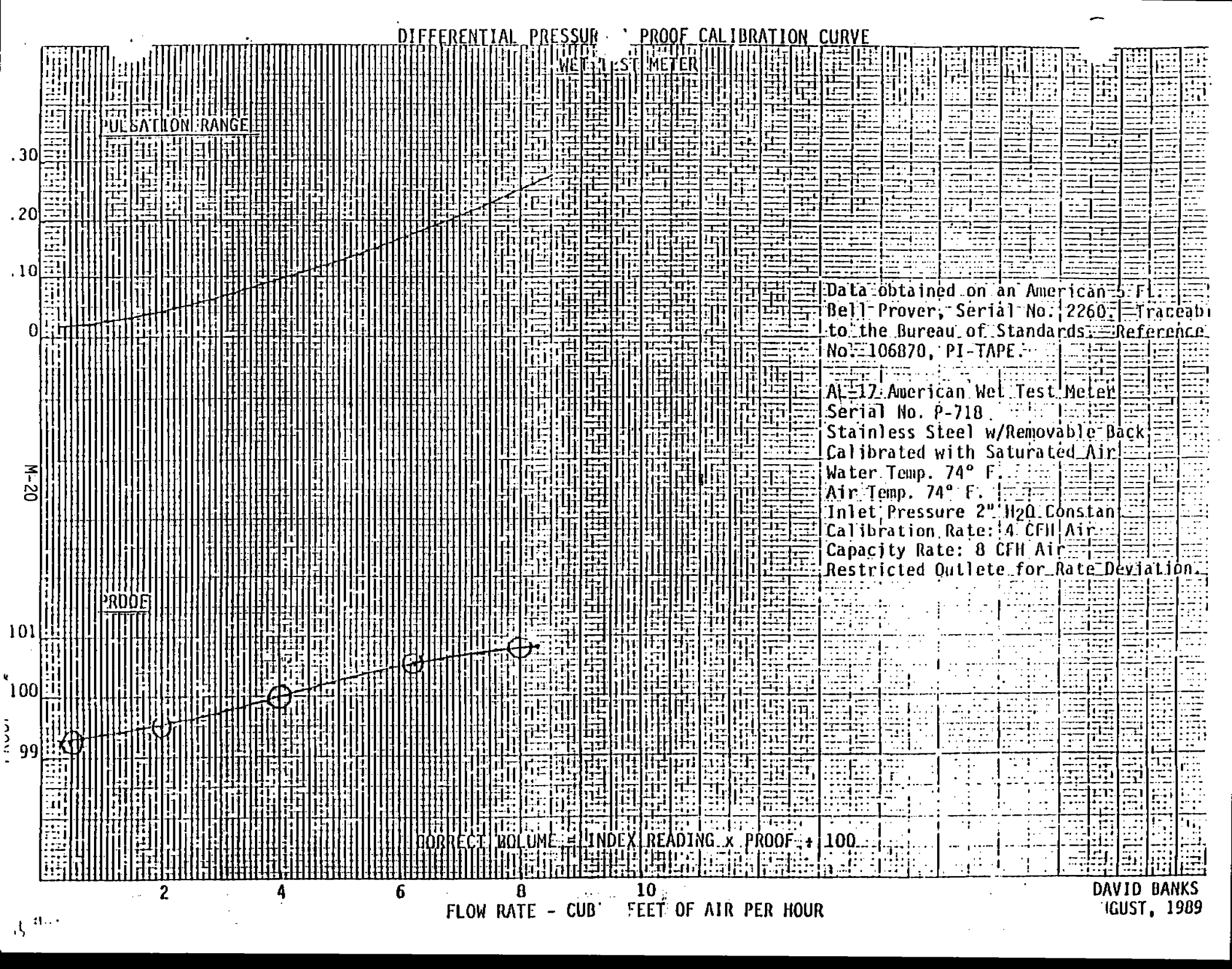
Meter was in tolerance ☒
Meter was not in tolerance ☐: readjusted linkage
Meter was not in tolerance ☐: changed dry test meters
Approved by _____ Date 1/10/96

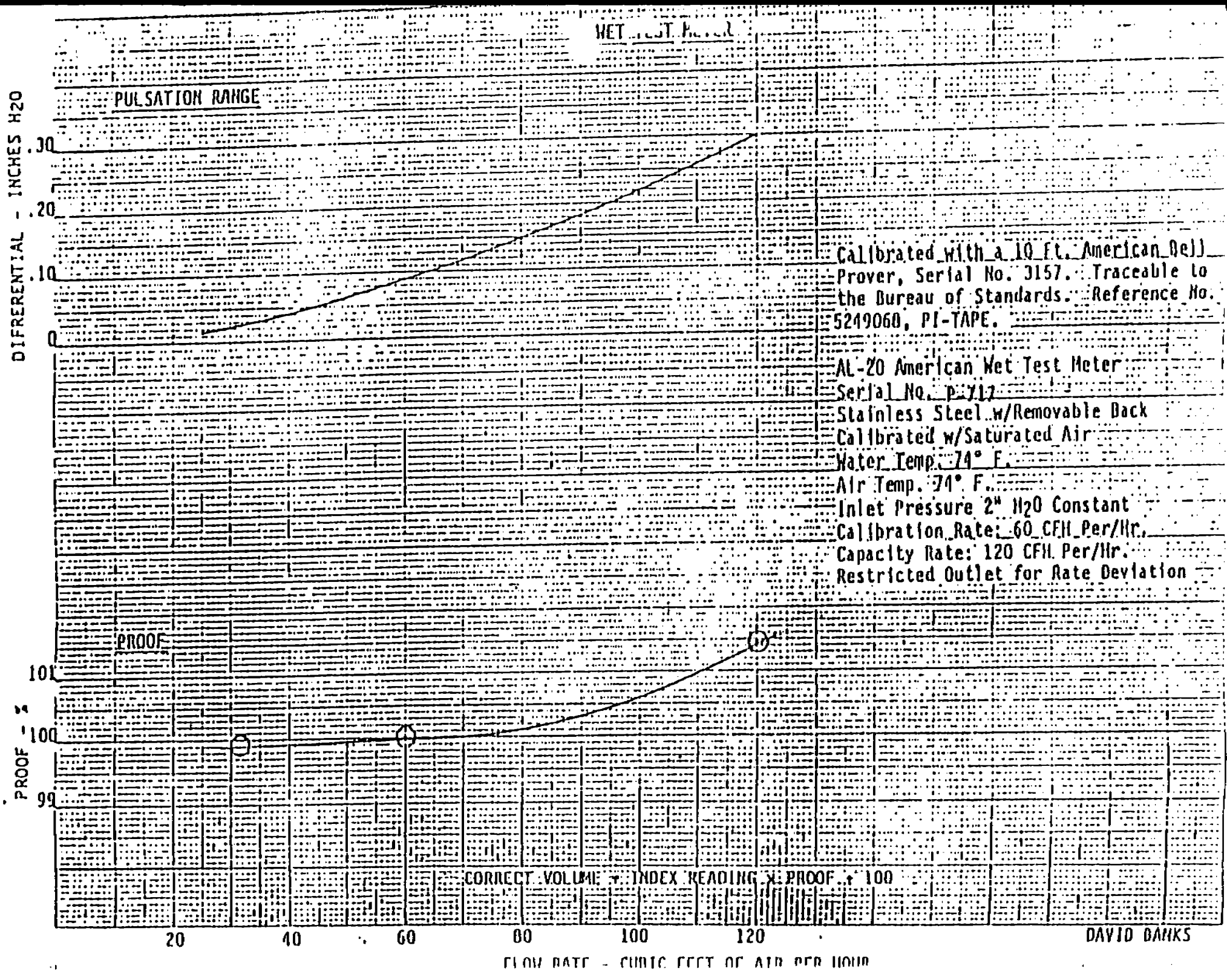
Gas Meter Bimetallic Therm. Calibration/Verification *
☐ ≥ ± 5°F (Out of control)
☒ ≤ ± 5°F (In control)

☐ Recalibrated _/_/_
☒ No action required

*Verified against mercury in glass thermometer or calibrated platinum resistance thermometer.

*Based on AL-17 wet test meter calibration in Aug. 1989 against Bell Prover (NBS Traceable) - Carl Poe Co.


DIFFERENTIAL PRESSUR ' PROOF CALIBRATION CURVE
WET TEST METER
PULSATION RANGE
.30
.20
.10
0
M-20
PROOF
101
100
99
Data obtained on an American 5 Fl.
Bell Prover, Serial No. 2260. Traceab
to the Bureau of Standards. Reference
No. 106870, PI-TAPE.
AL-17 American Wet Test Meter
Serial No. P-718
Stainless Steel w/Removable Back
Calibrated with Saturated Air
Water Temp. 74° F.
Air Temp. 74° F.
Inlet Pressure 2" H2O Constan
Calibration Rate: 4 CFH Air
Capacity Rate: 8 CFH Air
Restricted Outlete for Rate Deviation.
CORRECT VOLUME = INDEX READING x PROOF ÷ 100
2
4
6
8
10
FLOW RATE - CUB FEET OF AIR PER HOUR
DAVID BANKS
IGUST, 1989


WET TEST METER
PULSATION RANGE
DIFRERENTIAL - INCHES H2O
.30
.20
.10
0
PROOF
101
100
99
PROOF - %
Calibrated with a 10 Ft. American Bell Prover, Serial No. 3157. Traceable to the Bureau of Standards. Reference No. 5249060, PI-TAPE.
AL-20 American Wet Test Meter
Serial No. P-711
Stainless Steel w/Removable Back
Calibrated w/Saturated Air
Water Temp. 74° F.
Air Temp. 74° F.
Inlet Pressure 2" H2O Constant
Calibration Rate: 60 CFH Per/Hr.
Capacity Rate: 120 CFH Per/Hr.
Restricted Outlet for Rate Deviation
CORRECT VOLUME = INDEX READING X PROOF ÷ 100
20
40
60
80
100
120
DAVID BANKS
FLOW RATE - CUBIC FEET OF AIR PER HOUR

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Temperature Measurement Device Calibration Sheet

Unit Under Test: 35
Vendor: Omega
Model: HH81
Serial Number: 74JX0332
Range: 0 - 2100 °F
Thermocouple Type: K
Date of Calibration: 2/26/96
Technician: Mark Petersen
Method of Calibration:
PDT No. 35

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100°F) ± 1 degree (for negative temperatures add ± 2 degrees). The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation	
			Δt (°F)	(%)
0	0	-3	3	0.65
100	100	98	2	0.36
200	200	200	0	0
300	300	298	2	0.26
400	400	398	2	0.23
500	500	499	1	0.10
600	600	600	0	0
700	700	699	1	0.09
800	800	801	1	0.08
900	900	900	0	0
1000	1000	1000	0	0
1100	1100	1100	0	0
1200	1200	1201	1	0.06
1300	1300	1299	1	0.06
1400	1400	1402	2	0.11
1500	1500	1500	0	0
1600	1600	1603	3	0.15
1700	1700	1701	1	0.05
1800	1800	1803	3	0.13
1900	1900	1901	1	0.04
2000	2000	2001	1	0.04
2100	2100	2099	1	0.04
		Averages:	1.18	0.111

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
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 03-19-96
Technician: Duane Van Hoever
Nozzle Number: 7-4

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	0.247
2	0.247
3	0.248
Average	0.247

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 03-19-96
Technician: Ed Juers
Nozzle Number: 8-3

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	0.189
2	0.189
3	0.190
Average	0.189

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 03-19-96
Technician: Bob Aschenbach
Nozzle Number: 9-5

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	0.311
2	0.311
3	0.310
Average	0.311

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 03-19-96
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	0.370
2	0.370
3	0.370
Average	0.370

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 03-19-96
Technician: Scott Fjelsta
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	0.242
2	0.242
3	0.242
Average	0.242

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 03-20-96
Technician: Scott Fjelsta
Nozzle Number: 10-4

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	0.250
2	0.248
3	0.248
Average	0.249

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

Date of Calibration: 03-20-96
Technician: Duane Van Hoever
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	0.269
2	0.269
3	0.270
Average	0.269

Interpoll Laboratories
(612) 786-6020

Nozzle Calibration Data Sheet

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

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

Position	Diameter (inches)
1	0.432
2	0.431
3	0.432
Average	0.432

Interdoll Laboratories, Inc.

Temperature Measurement Device Calibration Sheet

Unit under test:
Vendor Beckman Industrial
Model HD 110 T
Range ____ °F
Date of Calibration 12/8/95
Serial Number PDT #18
Thermocouple Type K
Technician D. Van Hoever

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☐ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± 1 degree (for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation Δt (°F)	Deviation (%)
0		-1	1	.217
100		95	5	.89
200		198	2	.3
300		296	4	.52
400		394	6	.7
500		493	7	.81
600		596	4	.38
700		697	3	.26
800		802	2	.16
900		904	4	.29
1000		1010	10	.68
1100		1113	13	.83
1200		1220	20	1.2
1300		1320	20	1.14
1400		1424	24	1.29
1500		1523	23	1.17
1600		1624	27	1.16
1700		1720	20	.92
1800		1818	18	.80
1900		1911	11	.46
2000				
2100				
		Averages:		.71

OF = off scale response by unit under test (°F)
% dev = 100 Δt / (460 + t)

☐ Unit in tolerance
☐ Unit was not in tolerance: recalibrated - See new calibration sheet.

S-433

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Temperature Measurement Device Calibration Sheet

Unit Under Test:
Vendor: Omega
Model: HH 81
Range: 0-2000 °F
Date of Calibration: 12-26-95
Method of Calibration:

Serial Number: 73J X 1495
Thermocouple Type: K
Technician: Mark Gaebler
PDT No.: 31

☐ 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		-3	3	.65
100		97	3	.54
200		200	0	0
300		298	2	.26
400		397	3	.35
500		497	3	.31
600		599	1	.09
700		698	2	.17
800		800	0	0
900		899	1	.07
1000		999	1	.07
1100		1099	1	.06
1200		1199	1	.06
1300		1298	2	.11
1400		1400	0	0
1500		1498	2	.10
1600		1600	0	0
1700		1699	1	.05
1800		1800	0	0
1900		1897	3	.13
2000		1998	2	.08
2100		2095	5	.20
		Averages:	1.64	.15

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	HH 81	Serial Number	24JX0773
Range	0-2300 °F	Thermocouple Type	K
Date of Calibration	2-2-96	Technician	BA
Method of Calibration:		PDT No.	33

☐ 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	-4	-4	.908
100	100	97	3	.535
200	200	199	1	.151
300	300	298	2	.263
400	400	397	3	.348
500	500	497	3	.312
600	600	599	1	.094
700	700	698	2	.172
800	800	800	0	0
900	900	899	1	.073
1000	1000	999	1	.068
1100	1100	1098	2	.128
1200	1200	1199	1	.060
1300	1300	1298	2	.113
1400	1400	1400	0	0
1500	1500	1499	1	.051
1600	1600	1602	2	.097
1700	1700	1699	1	.046
1800	1800	1802	2	.068
1900	1900	1899	1	.042
2000	2000	2000	0	0
2100	2100	2097	3	.117
		Averages:	1.272	.125

OF = off scale response by unit under test (°F)

☒ Unit in tolerance

% dev = 100 Δt/(460 + t)

☐ Unit was not in tolerance: recalibrated - See new calibration sheet.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Temperature Measurement Device Calibration Sheet

Unit Under Test:
Vendor: OMEGA
Model: HH81
Range: -160°C to 1372°C = F
Date of Calibration: 2-6-96
Method of Calibration:
Serial Number: 741X1327
Thermocouple Type: K
Technician: EJ
PDT No.: 42

☐ 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	97	3	.53
200	200	199	1	.15
300	300	297	3	.39
400	400	397	3	.35
500	500	497	3	.31
600	600	599	1	.09
700	700	698	2	.17
800	800	800	0	0
900	900	899	1	.07
1000	1000	1000	0	0
1100	1100	1098	2	.13
1200	1200	1200	0	0
1300	1300	1298	2	.11
1400	1400	1401	1	.05
1500	1500	1499	1	.05
1600	1600	1602	2	.09
1700	1700	1701	1	.05
1800	1800	1802	2	.09
1900	1900	1901	1	.04
2000	2000	2000	0	0
2100	2100	2099	1	.04
		Averages:	1.5	.153

OS = 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: HH81J
Range: 0-2000 °F
Date of Calibration: 2-16-96
Serial Number: 745X1539
Thermocouple Type: K
Technician: LH
PDT No.: 43

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100°F) ± 1 degree (for negative temperatures add ± 2 degrees). The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation	
			at (°F)	(%)
0	0	-3	3	.650
100	100	98	2	.357
200	200	200	0	0
300	300	299	1	-.133
400	400	398	2	.233
500	500	499	1	.104
600	600	600	0	0
700	700	699	1	.086
800	800	801	1	.079
900	900	899	1	.074
1000	1000	1000	0	0
1100	1100	1098	2	.128
1200	1200	1200	0	0
1300	1300	1298	2	.113
1400	1400	1401	1	.054
1500	1500	1499	1	.051
1600	1600	1602	2	.097
1700	1700	1700	0	0
1800	1800	1802	2	.088
1900	1900	1900	0	0
2000	2000	2000	0	0
2100	2100	2097	3	.117
		Averages:	1.137	.107

OF = off scale response by unit under test (°F)

% dev = 100 Δt/(460 + t)

☒ Unit in tolerance

☐ Unit was not in tolerance: recalibrated - See new calibration sheet.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Temperature Measurement Device Calibration Sheet

Unit Under Test:
Vendor: Omega
Model: HH81
Range: 0-2000 °F
Date of Calibration: 12-26-95
Method of Calibration:
Serial Number: 743X1560
Thermocouple Type: K
Technician: Mark Boehler
PDT No. 45

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☐ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100°F) ± 1 degree (for negative temperatures add ± 2 degrees). The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation	
			Δt (°F)	(%)
0		-2	2	.43
100		98	2	.36
200		200	0	0
300		298	2	.26
400		398	2	.23
500		499	1	.10
600		600	0	0
700		699	1	.09
800		801	1	.08
900		900	0	0
1000		1001	1	.07
1100		1099	1	.06
1200		1201	1	.06
1300		1299	1	.06
1400		1402	2	.11
1500		1499	1	.05
1600		1602	2	.10
1700		1701	1	.05
1800		1802	2	.09
1900		1901	1	.04
2000		2001	1	.04
2100		2099	1	.04
		Averages:	1.18	.11

OF = off scale response by unit under test (°F)
% dev = 100 Δt/(460 + t)
☑ Unit in tolerance
☐ Unit was not in tolerance: recalibrated - See new calibration sheet.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Temperature Measurement Device Calibration Sheet

Unit Under Test:
ndor: OMEGA
Model: HH81
Range: -160 to +1,372 °C
Date of Calibration: 2-6-96
Serial Number: 75JX1176
Thermocouple Type: K
Technician: EJ
PDT No.: 47

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	-3	3	.65
100	100	98	2	.36
200	200	200	0	0
300	300	298	2	.26
400	400	398	2	.24
500	500	499	1	.10
600	600	600	0	0
700	700	699	1	.09
800	800	801	1	.08
900	900	901	1	.07
1000	1000	1001	1	.07
1100	1100	1099	1	.06
1200	1200	1201	1	.06
1300	1300	1299	1	.06
1400	1400	1402	2	.11
1500	1500	1500	0	0
1600	1600	1602	2	.09
1700	1700	1701	1	.05
1800	1800	1803	3	.13
1900	1900	1901	1	.04
2000	2000	2001	1	.04
2100	2100	2099	1	.04
		Averages:	1.27	.12

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: 49
Vendor: Omega
Model: HH81
Range: 0 - 2100 °F
Date of Calibration: 2/20/96
Method of Calibration:

Serial Number: 75JX2567
Thermocouple Type: K
Technician: Mark Petersen
PDT No.: 49

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100°F) ± 1 degree (for negative temperatures add ± 2 degrees). The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation	
			Δt (°F)	(%)
0	0	-3	3	~~0.007~~ 0.65
100	100	97	3	0.54
200	200	200	0	0
300	300	298	2	0.26
400	400	397	3	0.35
500	500	498	2	0.21
600	600	600	0	0
700	700	699	1	0.086
800	800	800	0	0
900	900	900	0	0
1000	1000	1000	0	0
1100	1100	1098	2	0.13
1200	1200	1200	0	0
1300	1300	1298	2	0.11
1400	1400	1401	1	0.05
1500	1500	1499	1	0.05
1600	1600	1602	2	0.10
1700	1700	1700	0	0
1800	1800	1802	2	0.09
1900	1900	1901	1	0.04
2000	2000	2000	0	0
2100	2100	2099	1	0.04
		Averages:	1.18	0.123

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: #51

Vendor	Omega	Serial Number	753x2119
Model		Thermocouple Type	K
Range	0-2000 °F	Technician	KN
Date of Calibration	Jan 17-1996	PDT No.	#51

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	~~99~~ -1	~~0~~ 1	.2174
100	100	100	0	0
200	200	202	2	.303
300	300	300	0	0
400	400	399	-1	.1163
500	500	500	0	0
600	600	601	+1	.09433
700	700	700	0	0
800	800	803	+3	.2380
900	900	901	+1	.0735
1000	1000	1001	+1	~~.0665~~ .0685
1100	1100	1100	0	0
1200	1200	1201	+1	.0602
1300	1300	1300	0	0
1400	1400	1404	+4	~~.2150~~ .2151
1500	1500	1501	+1	.0511
1600	1600	1604	+4	.1942
1700	1700	1701	+1	.0463
1800	1800	1804	+4	.1870
1900	1900	1901	+1	.0474
2000	2000	2001	+1	.0407
2100	2100	~~2100~~ 2099	-1	.0391
Totals		Averages:	1.273	.0903

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

S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 22-8

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

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

Date of Inspection: 1-8-94

Inspected by: [signature]

CFR Title 40 Part 60 Appenidix A Method 2

S-348

Interpoll Laboratories, Inc.
(612) 786-6020

S-Type Pitot Tube Inspection Sheet

Pitot Tube No 23-5

Pitot tube dimensions:

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

Alignment:

4. α_1 < 10° 0
5. α_2 < 10° 0

6. B_1 < 5° 0
7. B_2 < 5° 0

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

Distance from Pitot to Probe Components:

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

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

Date of Inspection: 2-8-94

Inspected by: [signature]

CFR Title 40 Part 60 Appenidix A Method 2

S-348

Interpoll Laboratories, Inc.
(612) 786-6020

S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 23-8

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" .03
9. W <.0625" .02

Distance from Pitot to Probe Components:

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

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

Date of Inspection:

1-8-94

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. 2-7-6

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. 29-6

Pitot tube dimensions:

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

Alignment:

4. α_1 < 10° 0
5. α_2 < 10° 0

6. B_1 < 5° 0
7. B_2 < 5° 0

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

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .750 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

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

Date of Inspection: 4-7-94

Inspected by: [signature]

CFR Title 40 Part 60 Appenidix A Method 2

S-348

Interpoll Laboratories, Inc.
(612) 786-6020

S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 31-5

Pitot tube dimensions:

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

Alignment:

4. α_1 < 10° 0
5. α_2 < 10° 0

6. B_1 < 5° 0
7. B_2 < 5° 0

8. Z <.125" 0
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) .757 IN.

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

Date of Inspection:

4-7-94

Inspected by:

CFR Title 40 Part 60 Appenidix A Method 2

S-348

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 2-2-96
Technician BOB
Mercury Column Barometer No. Company 1
Aneroid Barometer No. 10713059

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjusted Mercury Barometer Read	Initial Aneroid Barometer Read	Difference (P_{ba} - P_{bm})
29.79	69	.107	29.68	29.69	.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.

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 1-17-96
Technician S. Fjelsta
Mercury Column Barometer No. Lab / Balance Room
Aneroid Barometer No. 20901010

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjusted Mercury Barometer Read	Initial Aneroid Barometer Read	Difference (P_{ba} - P_{bm})
28.95	70	.107	28.843	28.850	.007

Has this barometer shown any consistent problems with calibration? Yes/No. If yes, explain. NO

Has problem been alleviated? Yes/No. How?

Note: Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20 - 30 minutes before calibrating. Aneroid barometer will be calibrated to the adjusted mercury barometer readings.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date: 2-9-96
Technician: E. Jurs
Mercury Column Barometer No.: 1
Aneroid Barometer No.: 10724004

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjusted Mercury Barometer Read	Initial Aneroid Barometer Read	Difference (P_{ba} - P_{bm})
28.99	82	.136	28.85	28.85	0

Has this barometer shown any consistent problems with calibration? Yes/No. If yes, explain. NO

Has problem been alleviated? Yes/No. How?

Note: Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20 - 30 minutes before calibrating. Aneroid barometer will be calibrated to the adjusted mercury barometer readings.

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 12-26-95
Technician Mark Gaehler
Mercury Column Barometer No. Lab I
Aneroid Barometer No. 21029004

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjusted Mercury Barometer Read	Initial Aneroid Barometer Read	Difference (P_{ba} - P_{bm})
29.080	80	.131	28.949	28.95	.001

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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INTERPOLL LABORATORIES
(612)786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 1-10-96

Technician E Trowbridge

Mercury Column Barometer No. ULTIMETER MODEL 12

Aneroid Barometer No. SN -01002005

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjsted Mercury Barometer Read	Initial Aneriod Barometer Read	Difference (P_{ba}-P_{bm})
29.164	72	.116	29.05	29.05	-0-

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.

INTERPOLL LABORATORIES, INC.
(612) 786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 12/8/95
Technician D. VAN HOEVER
Mercury Column Barometer No. LAB
Aneroid Barometer No. DUH'S

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjusted Mercury Barometer Read	Initial Aneroid Barometer Read	Difference (P_{ba} - P_{bm})
29.14	82	.142	28.998	28.94	-.058

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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INTERPOLL LABORATORIES, INC.
(612) 786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date: 10-17-95
Technician: R.R.
Mercury Column Barometer No.: NOVA-1
Aneroid Barometer No.: 560209

Actual Mercury Barometer Read	Ambient Temp.	Temperature Correction Factor	Adjusted Mercury Barometer Read	Initial Aneroid Barometer Read	Difference (P_{ba} - P_{bm})
28.91	82	.14	28.77	28.76	.01

Has this barometer shown any consistent problems with calibration? Yes/No. If yes, explain. BAROMETER HAS BEEN REPAIRED

Has problem been alleviated? Yes/No. How?

Note: Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20 - 30 minutes before calibrating. Aneroid barometer will be calibrated to the adjusted mercury barometer readings.