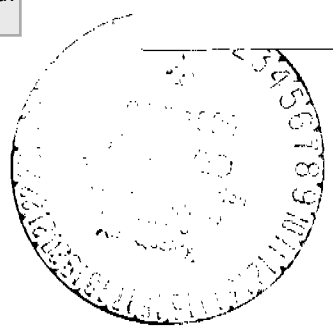

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RESULTS OF THE JULY 31 AND AUGUST 1, 1990 NO_x EMISSION COMPLIANCE TEST ON THE FLUX PELLET INDURATION FURNACE AT THE INLAND STEEL MINING PLANT

Submitted to:

Inland Steel Mining Company
P.O. Box 1
Virginia, Minnesota 55792

Attention:

Gus Josephson

Approved by:

Perry Lonnes

Perry Lonnes, Ph.D.
Senior Data Analyst
Field Testing Division

Report Number 0-3104
October 10, 1990
DD/jg

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ABBREVIATIONS

ACFM	actual cubic feet per minute
cc (ml)	cubic centimeter (milliliter)
DSCFM	standard cubic foot of dry gas per minute
DSML	dry standard milliliter
DEG-F (^{0}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
<	$\leq$ (when following a number)

Standard conditions are defined as 68 ^{0}F (20 ^{0}C) and 29.92 IN. of mercury pressure.

1 INTRODUCTION

During July 31 and August 1, 1990 Interpoll Laboratories personnel conducted a Federal NO_x emission compliance test on the Induration Furnace Scrubbers A, B, C and D at the Inland Steel Plant located near Virginia, Minnesota. On-site testing was performed by D. Smith and S. Lonnes. Coordination between plant operation and testing activities was provided by Gus Josephson of Inland Steel. The test was not witnessed by a member of the Minnesota Pollution Control Agency.

The four induration furnaces tested are natural gas-fired furnaces with fuel oil backup. The furnaces were built by Dravo Engineering. Each furnace is equipped with a venturi rod scrubber to control particulate emissions.

Evaluations were performed in accordance with EPA Methods 2, 4 and 7E, CFR Title 40, Part 60, Appendix A (revised July 1, 1988). A slip stream of exhaust gas was drawn from the exhaust gas stream using test port(s) provided by the Plant. The sample gas was drawn with a heated stainless-steel-lined probe using an in stack filter to remove interfering particulate material from the gas stream. The sample gas stream was then passed through a permeation tube dryer. The dry particulate-free sample gas stream was then introduced into a chemiluminescent NO_x analyzer. The analog output of the analyzer was monitored with a strip chart recorder. The NO_x analyzer was calibrated with Linde Gases EPA Protocol I standard gases.

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

2 SUMMARY AND DISCUSSION

The important results of the Federal NO_x emission compliance tests are summarized in Table 1. As will be noted, the total NO_x emission rate from all four furnaces averaged 1053 LB/HR.

No difficulties were encountered in the field. On the basis of this fact and a complete review of the entire 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 1. Summary of the Results of the July 31 and August 1, 1990 Oxides of Nitrogen Emission Tests on the Indurating Gas Scrubbers at the Inland Steel Mining Plant in Virginia, Minnesota.

Run	Process Rate (LT/HR)	Oxides of Nitrogen Conc. (ppm,w)	Oxides of Nitrogen Emission (LB/HR)	Emission Factor (LB/LT)
("A" Stack)				
1	353	125	130	0.37
2	353	120	124	0.35
3	353	115	120	0.34
Avg:	353	120	125	0.35
("B" Stack)				
1	353	158	164	0.46
2	353	162	168	0.48
3	353	162	168	0.48
Avg:	353	161	167	0.47
("C" Stack)				
1	381	340	334	0.88
2	381	329	323	0.85
3	381	333	327	0.86
Avg:	381	334	328	0.86
("D" Stack)				
1	381	393	394	1.03
2	381	440	438	1.15
3	381	474	467	1.23
Avg:	381	436	433	1.14
Overall Avg:	367			0.708
Total:			1053	

This looks like ppmdv, not ppm,w

APPENDIX A

VOLUMETRIC FLOW RATE DETERMINATION

Interpoll Labs Report No. O-3104
Inland Steel Mining Company
Virginia, Minnesota

Test No. 1
Unit A Scrubber Stack

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

Date of Determination.....	08-01-90
Time of Determination.....(HRS)	1220
Barometric pressure.....(IN.HG)	28.58
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.43
Avg. gas temp.....(DEG-F)	119
Moisture content.....(% V/V)	9.70
Avg. linear velocity.....(FT/SEC)	51.1
Gas density.....(LB/ACF)	.06279
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	694583
Volumetric flow rate.....	
actual.....(ACFM)	184358
dry standard.....(DSCFM)	144858

Test No. 1
Unit A Scrubber Stack

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

Date of Determination.....	08-01-90
Time of Determination.....(HRS)	1320
Barometric pressure.....(IN.HG)	28.58
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.43
Avg. gas temp.....(DEG-F)	119
Moisture content.....(% V/V)	9.70
Avg. linear velocity.....(FT/SEC)	51.1
Gas density.....(LB/ACF)	.06279
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	694071
Volumetric flow rate.....	
actual.....(ACFM)	184222
dry standard.....(DSCFM)	144751

Test No. 1
Unit A Scrubber Stack

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

Date of Determination.....	08-01-90
Time of Determination.....(HRS)	1435
Barometric pressure.....(IN.HG)	28.58
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.43
Avg. gas temp.....(DEG-F)	119
Moisture content.....(% V/V)	9.70
Avg. linear velocity.....(FT/SEC)	51.3
Gas density.....(LB/ACF)	.06279
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	697865
Volumetric flow rate.....	
actual.....(ACFM)	185229
dry standard.....(DSCFM)	145542

Test No. 1
Unit B Scrubber Stack

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

Date of Determination.....	08-01-90
Time of Determination.....(HRS)	835
Barometric pressure.....(IN.HG)	28.58
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.45
Avg. gas temp.....(DEG-F)	118
Moisture content.....(% V/V)	10.39
Avg. linear velocity.....(FT/SEC)	51.3
Gas density.....(LB/ACF)	.06273
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	696847
Volumetric flow rate.....	
actual.....(ACFM)	185148
dry standard.....(DSCFM)	144608

Test No. 1
Unit B Scrubber Stack

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

Date of Determination.....	08-01-90
Time of Determination.....(HRS)	955
Barometric pressure.....(IN.HG)	28.58
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.45
Avg. gas temp.....(DEG-F)	118
Moisture content.....(% V/V)	10.39
Avg. linear velocity.....(FT/SEC)	51.2
Gas density.....(LB/ACF)	.06273
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	694781
Volumetric flow rate.....	
actual.....(ACFM)	184599
dry standard.....(DSCFM)	144179

Test No. 1
Unit B Scrubber Stack

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

Date of Determination.....	08-01-90
Time of Determination.....(HRS)	1100
Barometric pressure.....(IN.HG)	28.58
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.43
Avg. gas temp.....(DEG-F)	118
Moisture content.....(% V/V)	10.39
Avg. linear velocity.....(FT/SEC)	51.3
Gas density.....(LB/ACF)	.06273
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	696201
Volumetric flow rate.....	
actual.....(ACFM)	184966
dry standard.....(DSCFM)	144475

Test No. 1
Unit C Scrubber Stack

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

Date of Determination.....	07-31-90
Time of Determination.....(HRS)	735
Barometric pressure.....(IN.HG)	28.6
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.45
Avg. gas temp.....(DEG-F)	128
Moisture content.....(% V/V)	12.15
Avg. linear velocity.....(FT/SEC)	50.5
Gas density.....(LB/ACF)	.06128
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	669395
Volumetric flow rate.....	
actual.....(ACFM)	182062
dry standard.....(DSCFM)	137121

Test No. 1
Unit C Scrubber Stack

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

Date of Determination.....	07-31-90
Time of Determination.....(HRS)	1725
Barometric pressure.....(IN.HG)	28.58
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.45
Avg. gas temp.....(DEG-F)	129
Moisture content.....(% V/V)	12.16
Avg. linear velocity.....(FT/SEC)	50.6
Gas density.....(LB/ACF)	.06113
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	670009
Volumetric flow rate.....	
actual.....(ACFM)	182673
dry standard.....(DSCFM)	137238

Test No. 1
Unit C Scrubber Stack

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

Date of Determination.....	07-31-90
Time of Determination.....(HRS)	2045
Barometric pressure.....(IN.HG)	28.6
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.45
Avg. gas temp.....(DEG-F)	128
Moisture content.....(% V/V)	12.15
Avg. linear velocity.....(FT/SEC)	50.4
Gas density.....(LB/ACF)	.06128
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	668555
Volumetric flow rate.....	
actual.....(ACFM)	181834
dry standard.....(DSCFM)	136949

Test No. 1
Unit D Scrubber Stack

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

Date of Determination.....	07-31-90
Time of Determination.....(HRS)	1145
Barometric pressure.....(IN.HG)	28.6
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.46
Avg. gas temp.....(DEG-F)	139
Moisture content.....(% V/V)	14.18
Avg. linear velocity.....(FT/SEC)	53.8
Gas density.....(LB/ACF)	.05967
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	695319
Volumetric flow rate.....	
actual.....(ACFM)	194210
dry standard.....(DSCFM)	140260

Test No. 1
Unit D Scrubber Stack

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

Date of Determination.....	07-31-90
Time of Determination.....(HRS)	1300
Barometric pressure.....(IN.HG)	28.58
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	.46
Avg. gas temp.....(DEG-F)	139
Moisture content.....(% V/V)	14.60
Avg. linear velocity.....(FT/SEC)	53.5
Gas density.....(LB/ACF)	.05967
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	691290
Volumetric flow rate.....	
actual.....(ACFM)	193078
dry standard.....(DSCFM)	139006

Test No. 1
Unit D Scrubber Stack

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

Date of Determination.....	07-31-90
Time of Determination.....(HRS)	1445
Barometric pressure.....(IN.HG)	28.6
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.48
Avg. gas temp.....(DEG-F)	139
Moisture content.....(% V/V)	15.07
Avg. linear velocity.....(FT/SEC)	53.4
Gas density.....(LB/ACF)	.05946
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	687448
Volumetric flow rate.....	
actual.....(ACFM)	192696
dry standard.....(DSCFM)	137728

Test No. 1
Unit D Scrubber Stack

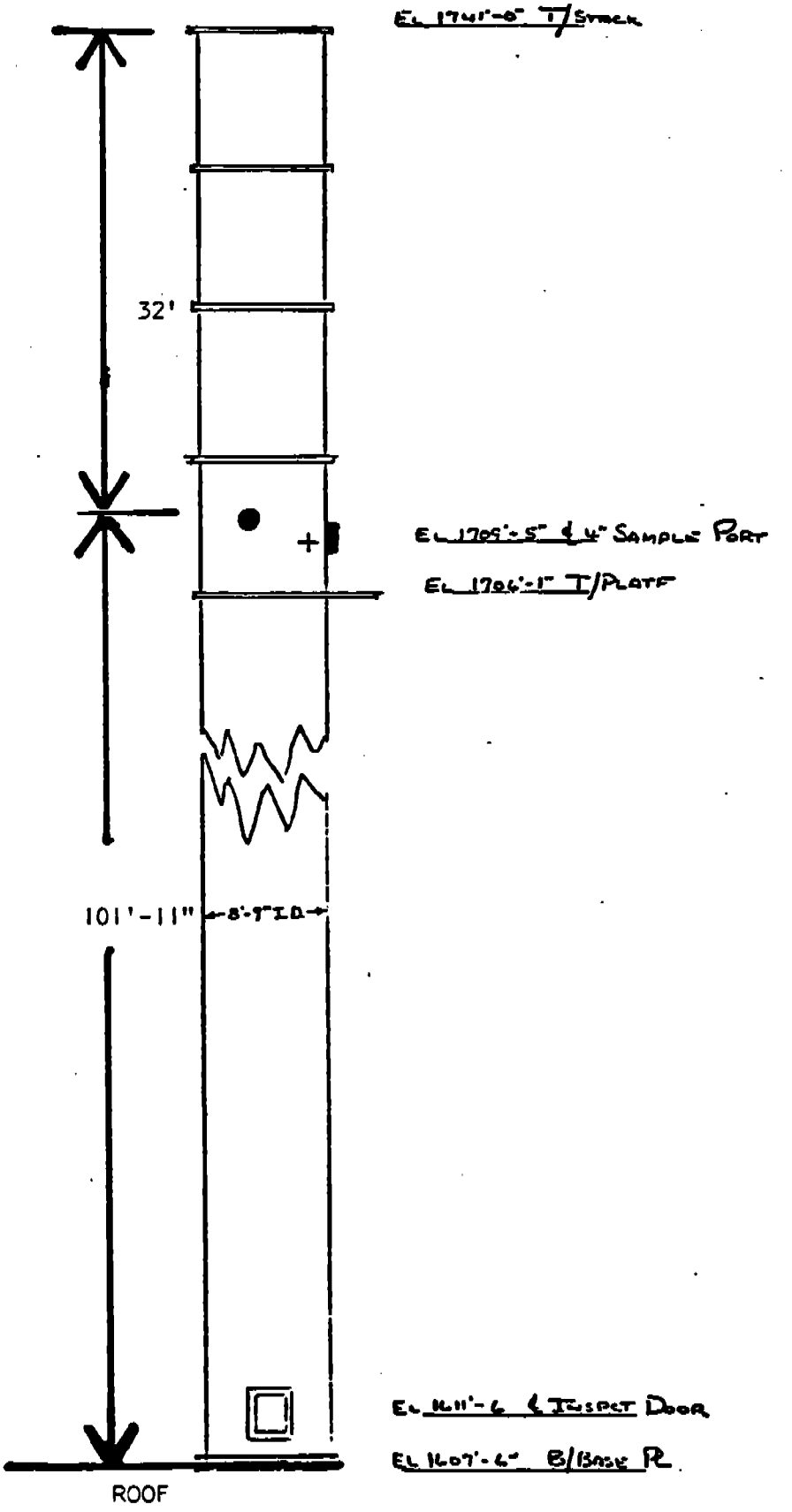
Results of Volumetric Flow Rate Determination-------Method 2

Date of Determination.....	07-31-90
Time of Determination.....(HRS)	1550
Barometric pressure.....(IN.HG)	28.58
Pitot tube coefficient.....	.84
Number of sampling ports.....	2
Total number of points.....	12
Shape of duct.....	Round
Stack diameter.....(IN)	105
Duct area.....(SQ.FT)	60.13
Direction of flow.....	UP
Static pressure.....(IN.WC)	-.48
Avg. gas temp.....(DEG-F)	139
Moisture content.....(% V/V)	15.08
Avg. linear velocity.....(FT/SEC)	53.6
Gas density.....(LB/ACF)	.05941
Molecular weight.....(LB/LBMOLE)	28.84
Mass flow of gas.....(LB/HR)	689750
Volumetric flow rate.....	
actual.....(ACFM)	193486
dry standard.....(DSCFM)	138178

APPENDIX B

LOCATION OF TEST PORTS

INLAND STEEL - INDURATING GAS WET SCRUBBER STACK



APPENDIX C

FIELD DATA SHEETS

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "D" SCRUBBER STACK

Test 1 Run 1 Date 7-31-90

Stack dimen. 105" IN.

Dry bulb 139 °F Wet bulb 127 °F

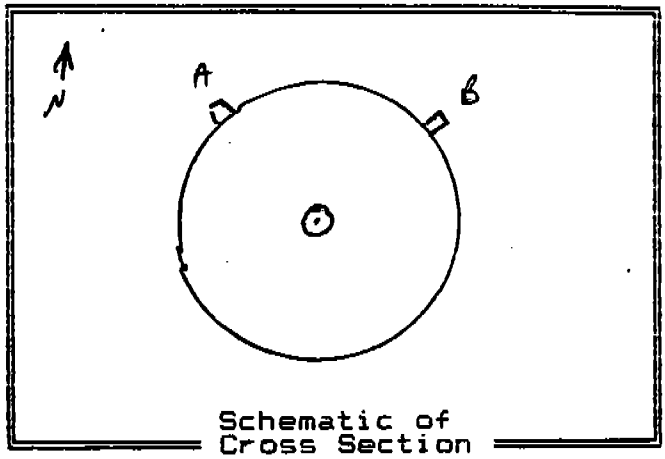
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.60 in Hg

Static pressure -.46 in WC

Operators D. SMITH & S. LONNES

Pitot No. 214-10 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5" in.		Time start: 1145 hrs	
A - 1	.044	4.62	13.12	.63	139
2	.146	15.33	23.83	.80	139
3	.296	31.08	39.58	.83	140
4	.704	73.92	82.42	.87	140
5	.854	89.67	98.17	.78	139
6	.956	100.38	108.88	.51	139
B - 1				.72	139
2				.77	139
3				.83	140
4				.85	140
5				.70	139
6				.53	139
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 1158 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "D" SCRUBBER STACK

Test 1 Run 2 Date 2-31-90

Stack dimen. 105 IN.

Dry bulb 139 °F Wet bulb 128 °F

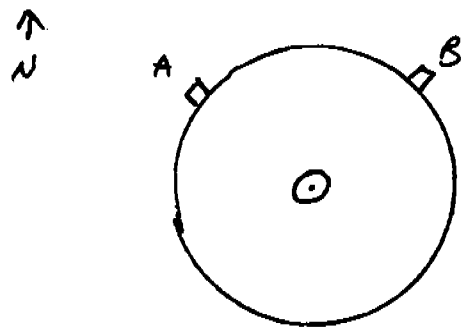
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.58 in Hg

Static pressure -.46 in WC

Operators D. SMITH & S. LONNES

Pitot No. 214-10 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5 in.		Time start: 1300 hrs	
A - 1	.044	4.62	13.12	.62	139
2	.146	15.33	23.83	.77	139
3	.296	31.08	39.58	.84	139
4	.704	73.92	82.42	.88	139
5	.854	89.67	98.17	.78	140
6	.956	100.38	108.88	.58	140
B - 1				.61	140
2				.75	139
3				.83	139
4				.82	139
5				.72	139
6				.53	139
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 1315 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEELE

Source UNIT D SCRUBBER STACK

Test 1 Run 3 Date 7-31-90

Stack dimen. 105 IN.

Dry bulb 139 °F Wet bulb 129 °F

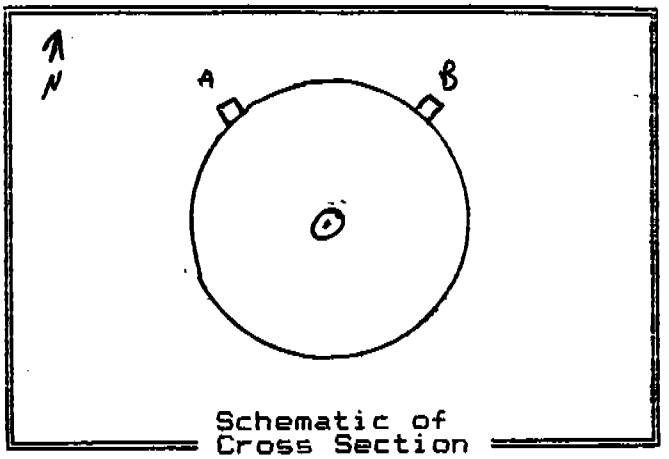
Manometer: ☐ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.60 in Hg

Static pressure -.98 in WC

Operators D. SMITH & S. LONNES

Pitot No. 214-10 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5 in.		Time start: 1445 hrs	
A - 1	.044	4.62	13.12	.60	139
2	.146	15.33	23.83	.72	139
3	.296	31.08	39.58	.86	139
4	.704	73.92	82.42	.92	140
5	.854	89.67	98.17	.82	140
6	.956	100.38	108.88	.61	139
B - 1				.53	139
2				.74	140
3				.82	140
4				.79	140
5				.75	139
6				.52	139
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 1455 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "D" SCRUBBER STACK

Test 1 Run 4 Date 7-31-90

Stack dimen. 105 IN.

Dry bulb 139 °F Wet bulb 129 °F

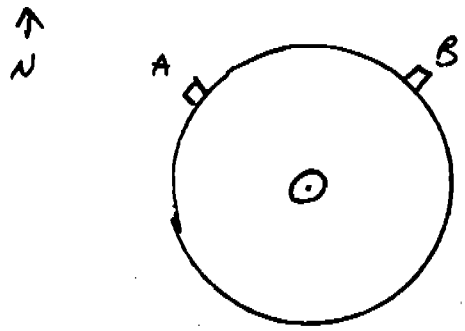
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.58 in Hg

Static pressure -.48 in WC

Operators D. SMITH & S. LONNES

Pitot No. 214-10 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5 in.		Time start: 1550 hrs	
A - 1	.044	4.62	13.12	.61	
2	.146	15.33	23.83	.72	
3	.296	31.08	39.58	.87	
4	.704	73.92	82.42	.90	
5	.854	89.67	98.17	.84	
6	.956	100.38	108.88	.63	
B - 1				.51	
2				.73	
3				.83	
4				.80	
5				.74	
6				.56	
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 1600 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "C" SCRUBBER STACK

Test 1 Run 1 Date 7-31-90

Stack dimen. 105 IN.

Dry bulb 128 °F Wet bulb 121 °F

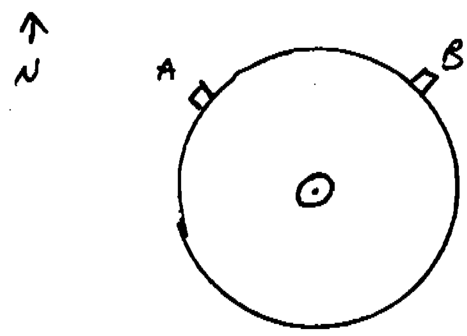
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.58 in Hg

Static pressure -.45 in WC

Operators D. SMITH & S. LONNES

Pitot No. 214-10 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5 in.		Time start: 1725 hrs	
A - 1	.044	4.62	13.12	.48	128
2	.146	15.33	23.83	.68	128
3	.296	31.08	39.58	.75	128
4	.704	73.92	82.42	.82	129
5	.854	89.67	98.17	.80	129
6	.956	100.38	108.88	.54	129
B - 1				.49	128
2				.62	128
3				.76	128
4				.80	129
5				.76	129
6				.53	129
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 1735 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "C" SCRUBBER STACK

Test 1 Run 2 Date 7-31-90

Stack dimen. 105 IN.

Dry bulb 128 °F Wet bulb 121 °F

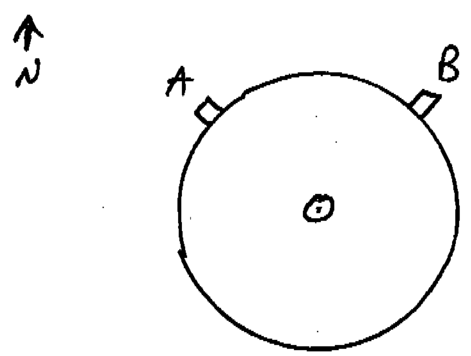
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.60 in Hg

Static pressure -.45 in WC

Operators D. SMITH & S. LONNES

Pitot No. 21U-10 Cp .840



Schematic of Cross Section

Traverse Point No.		Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
			Port length: 8.5 in.		Time start: 0735 hrs	
	A - 1	.044	4.62	13.12	.48	128
	2	.146	15.33	23.83	.67	128
	3	.296	31.08	39.58	.76	128
	4	.704	73.92	82.42	.80	128
	5	.854	89.67	98.17	.80	129
	6	.956	100.38	108.88	.53	129
	B - 1				.47	128
	2				.65	128
	3				.75	129
	4				.80	129
	5				.77	128
	6				.52	128
Temp. meas. tool & S/N: PDT-1 DIGITAL Ia					Time end: 0750 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "C" SCRUBBER STACK

Test 1 Run 3 Date 7-31-90

Stack dimen. 105 IN.

Dry bulb 128 °F Wet bulb 121 °F

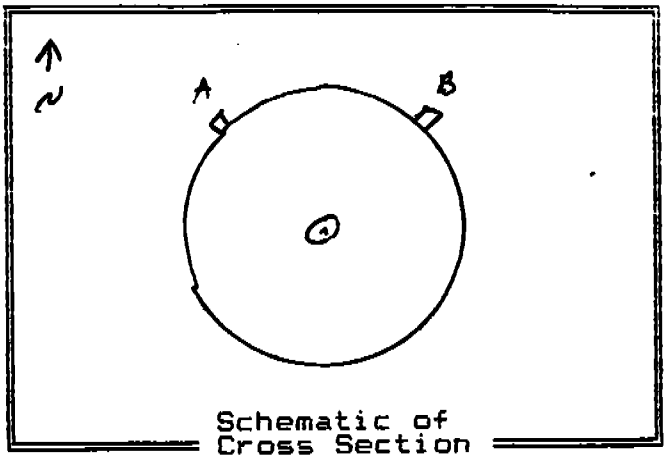
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.60 in Hg

Static pressure -.45 in WC

Operators D. SMITH & S. LONNES

Pitot No. 214-10 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5 in.		Time start: 2045 hrs	
A - 1	.044	4.62	13.12	.46	128
2	.146	15.33	23.83	.68	128
3	.296	31.08	39.58	.75	128
4	.704	73.92	82.42	.82	128
5	.854	89.67	98.17	.74	128
6	.956	100.38	108.88	.51	128
B - 1				.49	128
2				.70	129
3				.75	129
4				.81	128
5				.75	128
6				.52	128
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 2055 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "B" SCRUBBER STACK

Test 1 Run 1 Date 8-1-90

Stack dimen. 105 IN.

Dry bulb 118 °F Wet bulb 115 °F

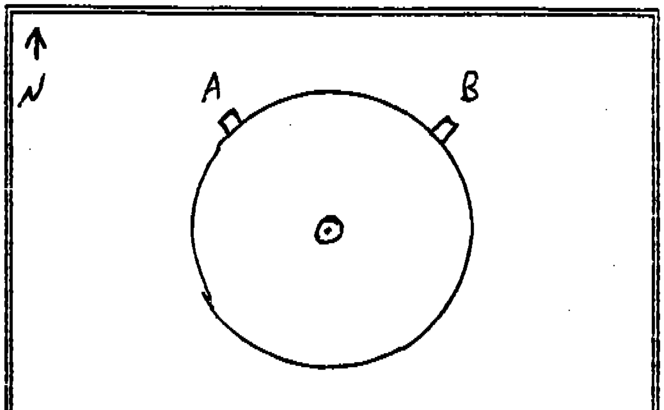
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.58 in Hg

Static pressure -.45 in WC

Operators D. SMITH & S. LONNES

Pitot No. 214-10 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5 in.		Time start: 0835 hrs	
A-1	.044	4.62	13.12	.54	118
2	.146	15.33	23.83	.76	118
3	.296	31.08	39.58	.85	118
4	.704	73.92	82.42	.81	118
5	.854	89.67	98.17	.72	118
6	.956	100.38	108.88	.50	118
B-1				.54	118
2				.76	119
3				.80	119
4				.86	118
5				.76	118
6				.56	118
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 0845 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "B" SCRUBBER STACK

Test 1 Run 2 Date 8-1-90

Stack dimen. 105 IN.

Dry bulb 118 °F Wet bulb 115 °F

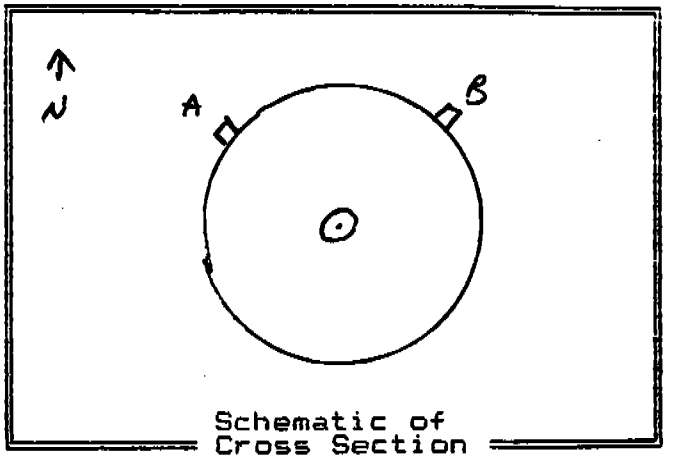
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.58 in Hg

Static pressure -.45 in WC

Operators D. SMITH & S. LOWNES

Pitot No. 214-10 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5 in.		Time start: 0955 hrs	
A - 1	.044	4.62	13.12	.55	118
2	.146	15.33	23.83	.74	118
3	.296	31.08	39.58	.83	118
4	.704	73.92	82.42	.78	119
5	.854	89.67	98.17	.73	119
6	.956	100.38	108.88	.51	118
B - 1				.55	118
2				.75	118
3				.80	118
4				.85	119
5				.75	119
6				.56	118
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 1010 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "B" SCRUBBER STACK

Test 1 Run 3 Date 8-1-90

Stack dimen. 105 IN.

Dry bulb 118 °F Wet bulb 115 °F

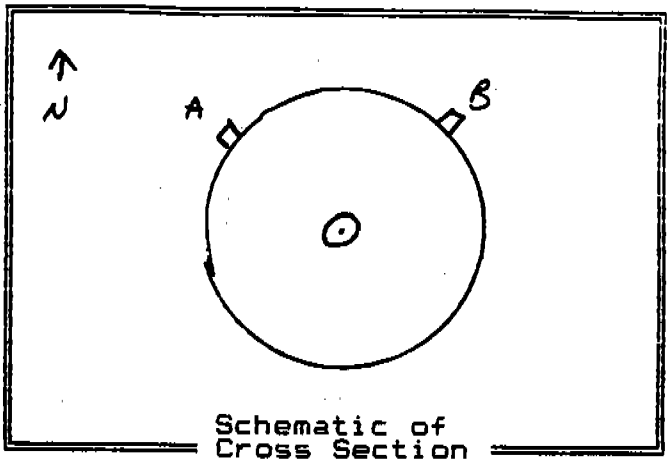
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.58 in Hg

Static pressure -.43 in WC

Operators D. SMITH & S. LOWNES

Pitot No. 214-10 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5 in.		Time start: 1100 hrs	
A - 1	.044	4.62	13.12	.55	118
2	.146	15.33	23.83	.73	118
3	.296	31.08	39.58	.82	118
4	.704	73.92	82.42	.78	118
5	.854	89.67	98.17	.72	118
6	.956	100.38	108.88	.53	118
B - 1				.57	118
2				.75	119
3				.82	119
4				.85	119
5				.76	118
6				.55	118
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 1115 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "A" SCRUBBER STACK

Test 1 Run 1 Date 8-1-90

Stack dimen. 105 IN.

Dry bulb 119 °F Wet bulb 113 °F

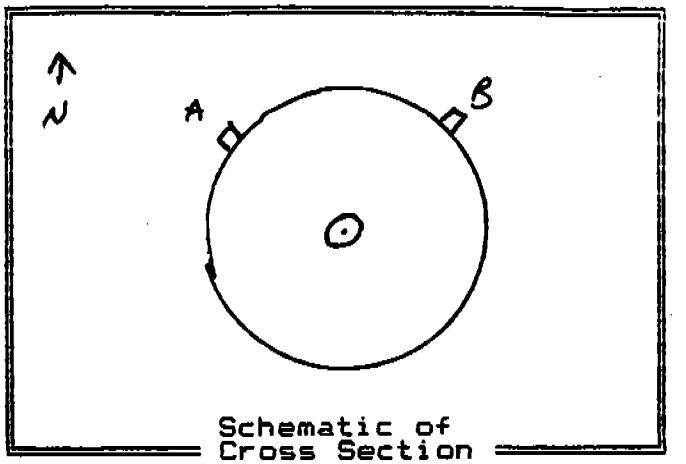
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.58 in Hg

Static pressure -.43 in WC

Operators D. SMITH & S. LONNES

Pitot No. 216-10 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5 in.		Time start: 1220 hrs	
A - 1	.044	4.62	13.12	.56	119
2	.146	15.33	23.83	.71	119
3	.296	31.08	39.58	.80	119
4	.704	73.92	82.42	.82	119
5	.854	89.67	98.17	.75	119
6	.956	100.38	108.88	.55	119
B - 1				.54	119
2				.75	119
3				.80	119
4				.83	119
5				.72	119
6				.55	119
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 1235 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "A" SCRUBBER STACK

Test 1 Run 2 Date 8-1-90

Stack dimen. 105 IN.

Dry bulb 119 °F Wet bulb 113 °F

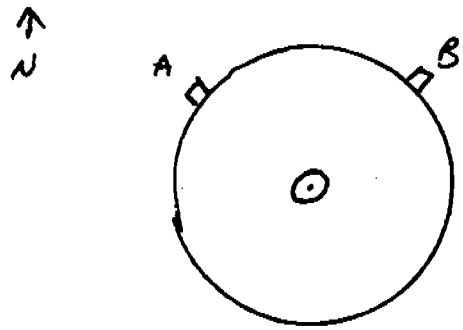
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.58 in Hg

Static pressure -.43 in WC

Operators D. SMITH & S. LONNES

Pitot No. 214-10 Cp .840



Schematic of Cross Section

Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5 in.		Time start: 1320 hrs	
A - 1	.044	4.62	13.12	.56	119
2	.146	15.33	23.83	.72	119
3	.296	31.08	39.58	.81	119
4	.704	73.92	82.42	.80	119
5	.854	89.67	98.17	.72	119
6	.956	100.38	108.88	.56	119
B - 1				.52	119
2				.73	119
3				.80	120
4				.85	120
5				.75	120
6				.55	119
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 1330 hrs	

R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

INTERPOLL LABORATORIES EPA METHOD 2 FIELD DATA SHEET

Job INLAND STEEL

Source UNIT "A" SCRUBBER STACK

Test 1 Run 3 Date 8-1-90

Stack dimen. 105 IN.

Dry bulb 119 °F Wet bulb 113 °F

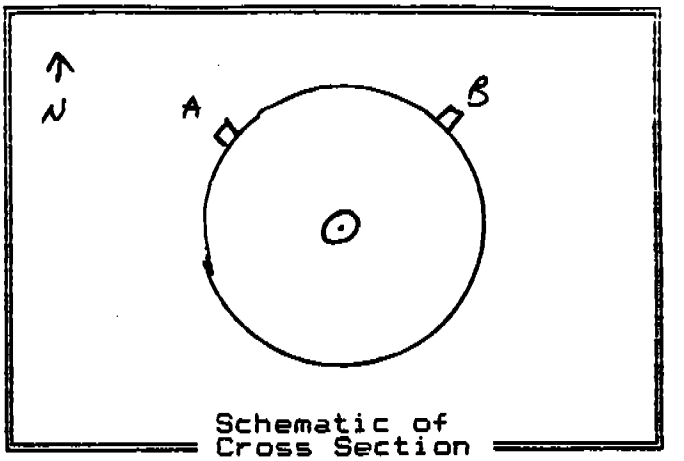
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

Barometric pressure 28.58 in Hg

Static pressure -.43 in WC

Operators D. SMITH & S. LONNES

Pitot No. 214-10 Cp .840



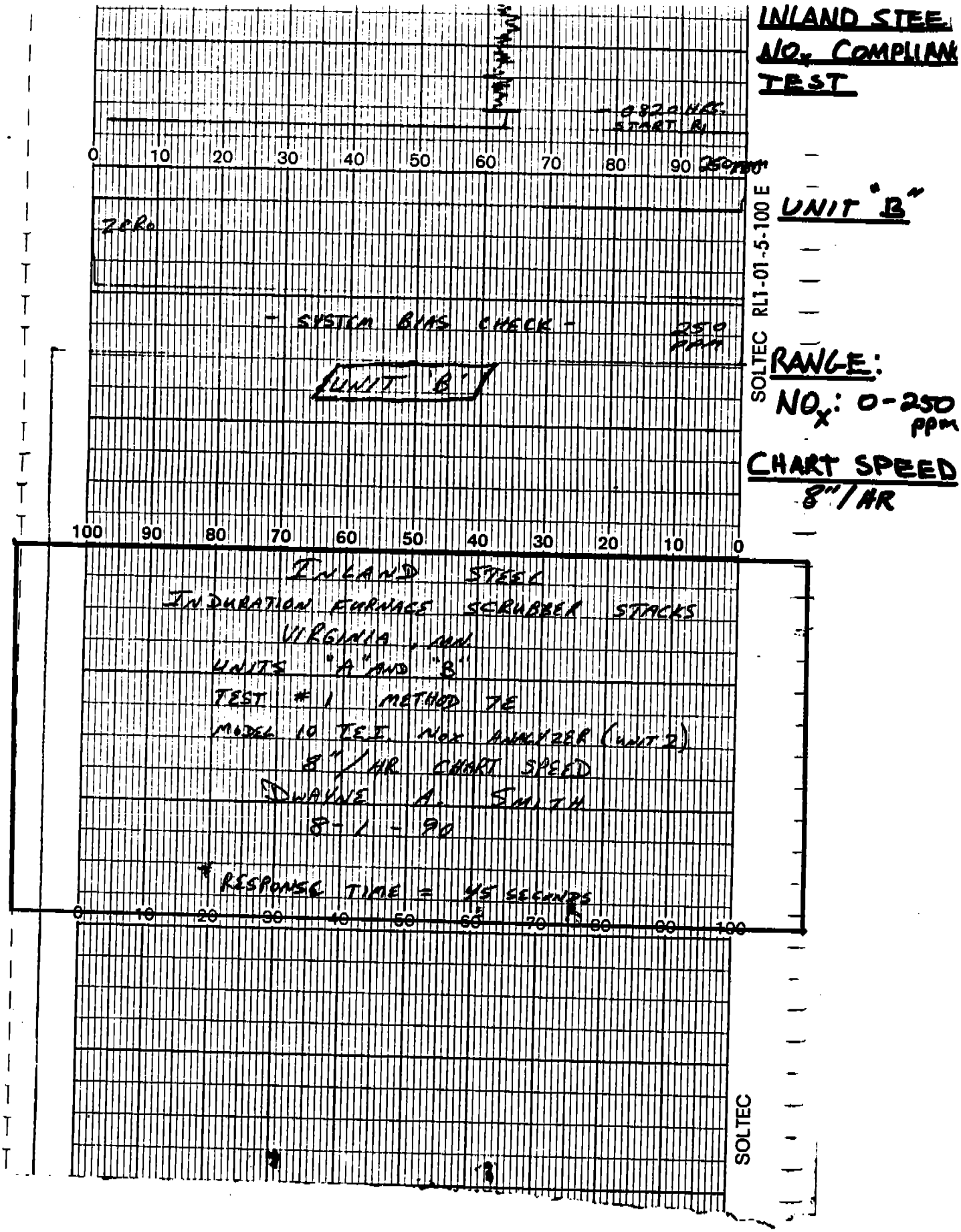
Schematic of Cross Section

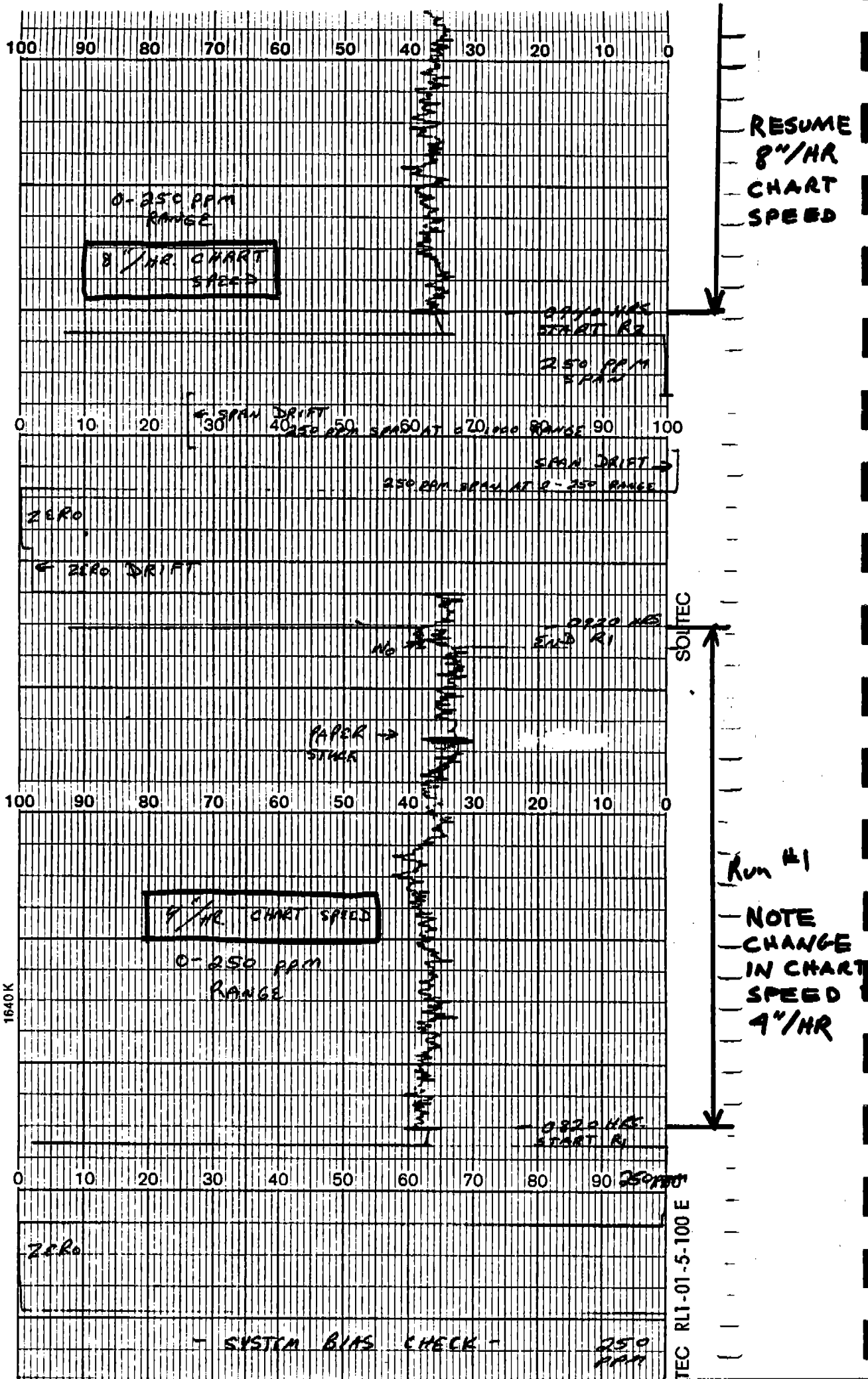
Traverse Point No.	Fraction of Diameter	Distance from Stack Wall (in)	Distance from End of Port (in)	Velocity Pressure (in WC)	Temperature of gas (°F)
		Port length: 8.5 in.		Time start: 1435 hrs	
A - 1	.044	4.62	13.12	.55	119
2	.146	15.33	23.83	.75	119
3	.296	31.08	39.58	.83	119
4	.704	73.92	82.42	.82	119
5	.854	89.67	98.17	.75	119
6	.956	100.38	108.88	.57	119
B - 1				.53	119
2				.75	119
3				.82	119
4				.85	119
5				.73	119
6				.52	119
Temp. meas. tool & S/N: PDT-1 DIGITAL T/C				Time end: 1445 hrs	

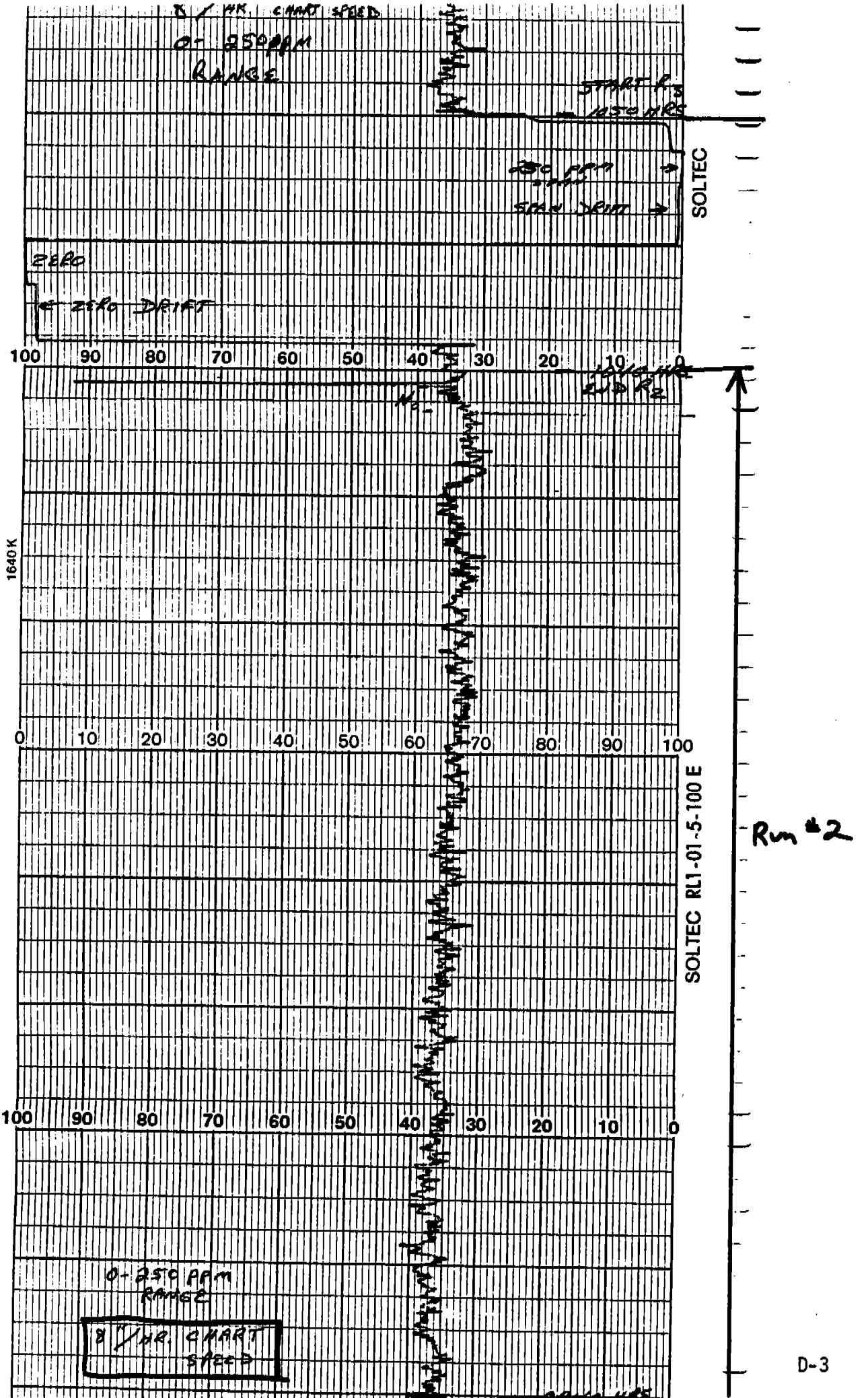
R or nothing= reg. manometer; S= expanded; E = electronic S-392.1

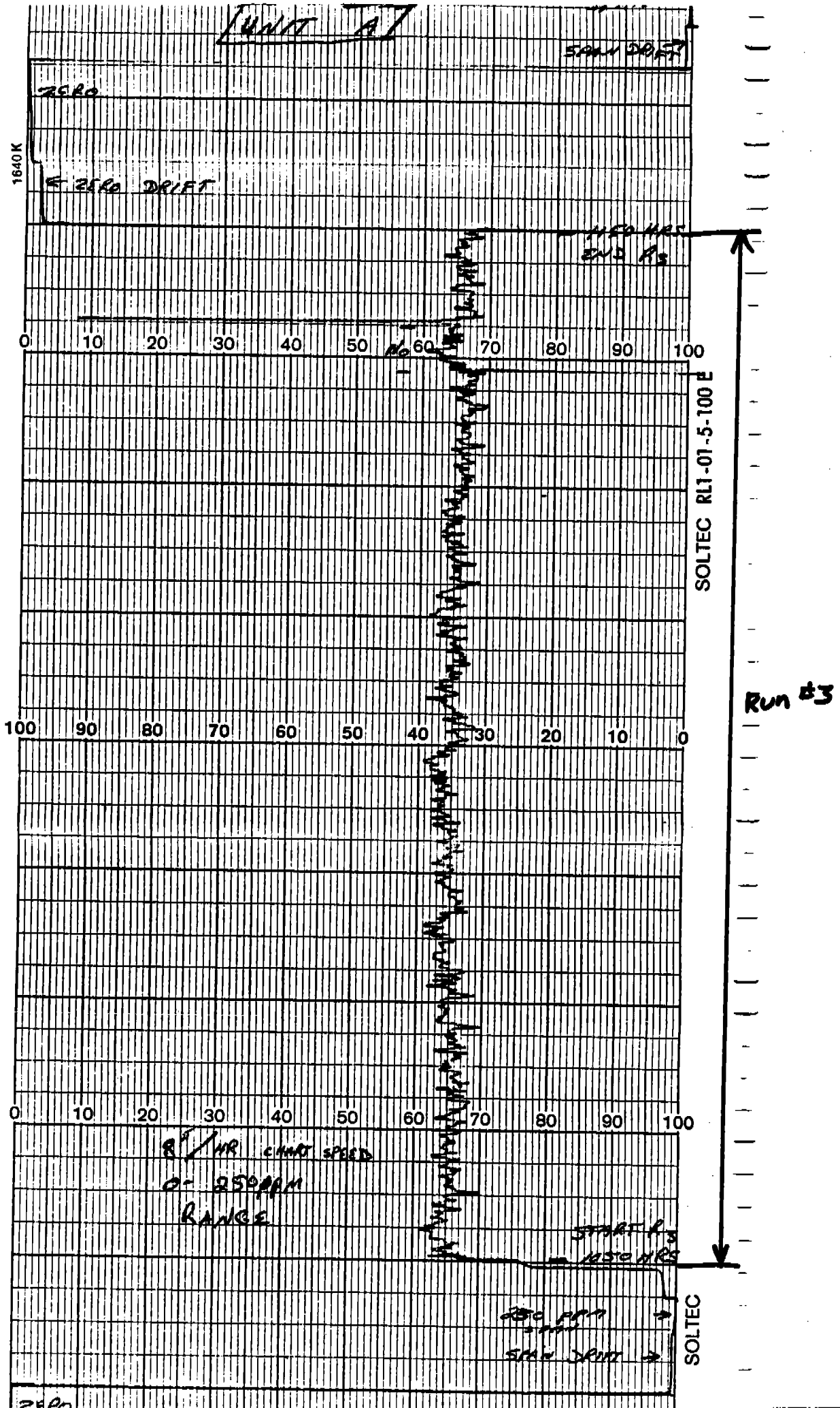
APPENDIX D

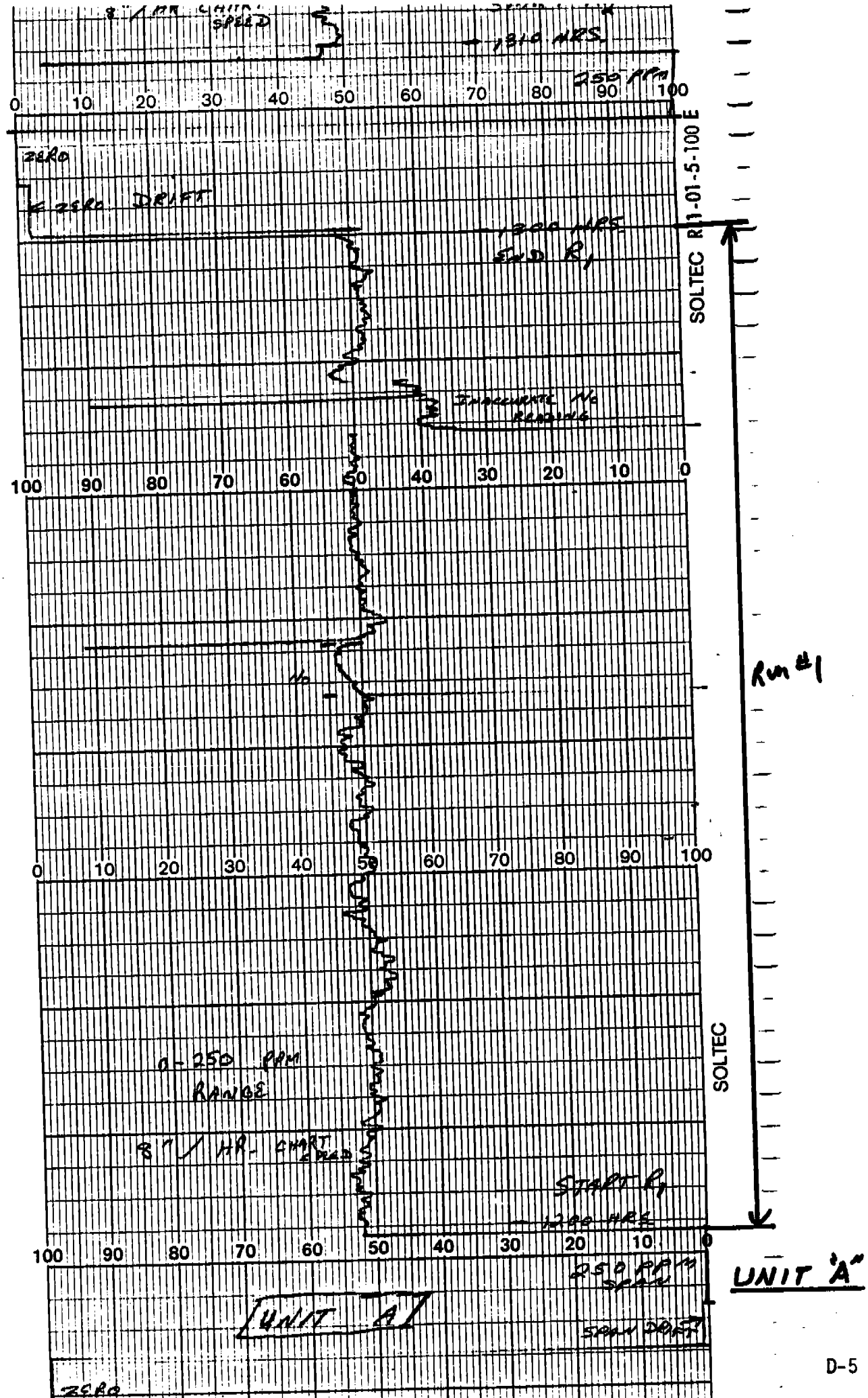
NO_x STRIP CHARTS

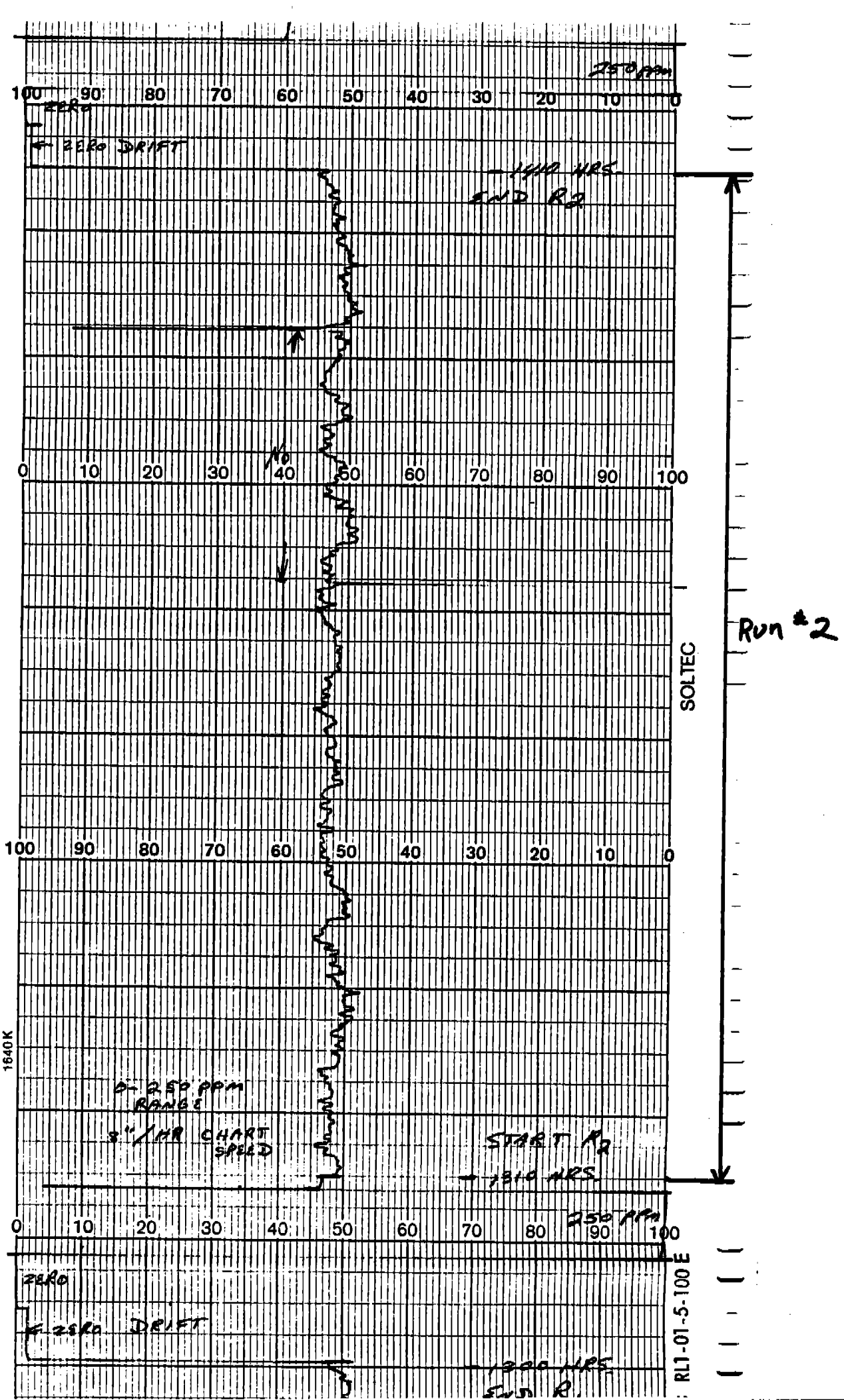

INLAND STEEL
NOx COMPLIANCE
TEST
UNIT "B"
RANGE:
NOx: 0-250 ppm
CHART SPEED
8"/HR
SOLTEC RL1-01-5-100 E
0 10 20 30 40 50 60 70 80 90 250 PPM
ZERO
- SYSTEM BIAS CHECK -
UNIT "B"
250 PPM
100 90 80 70 60 50 40 30 20 10 0
INLAND STEEL
INDURATION FURNACE SCRUBBER STACKS
VIRGINIA, IND.
UNITS "A" AND "B"
TEST # 1 METHOD 7E
MODEL 10 TEI NOx ANALYZER (UNIT 2)
8"/HR CHART SPEED
DWAINE A. SMITH
8-1-90
RESPONSE TIME = 45 SECONDS
0 10 20 30 40 50 60 70 80 90 100
SOLTEC

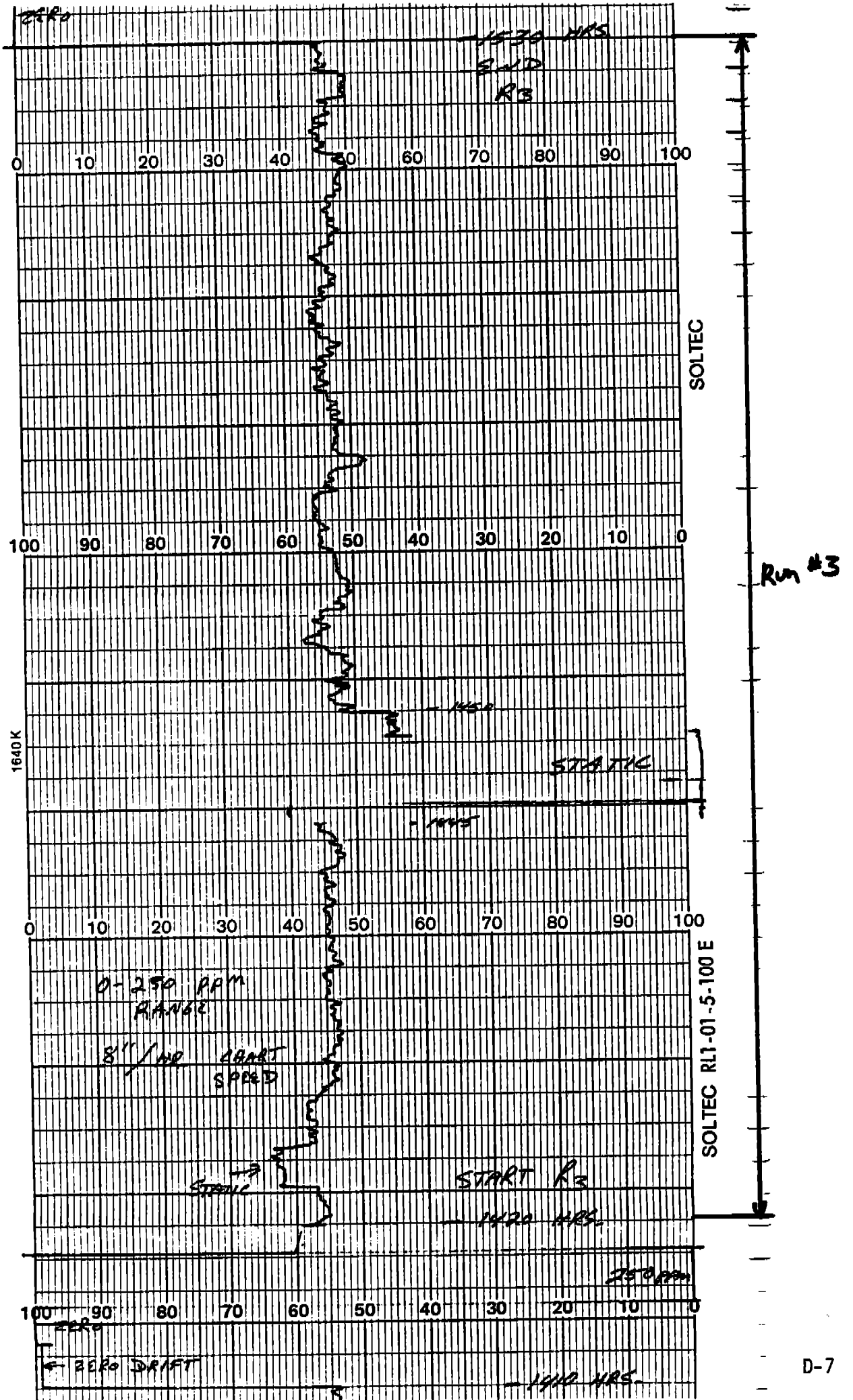

RESUME 8"/HR CHART SPEED
0-250 PPM RANGE
8"/HR. CHART SPEED
START R2
250 PPM SPAN
SPAN DRIFT
250 PPM SPAN AT 0-250 RANGE
ZERO
ZERO DRIFT
END R1
START R1
SOLTEC
Run #1
NOTE CHANGE IN CHART SPEED 9"/HR
9"/HR CHART SPEED
0-250 PPM RANGE
1640K
SYSTEM BIAS CHECK
SOLTEC RL1-01-5-100 E

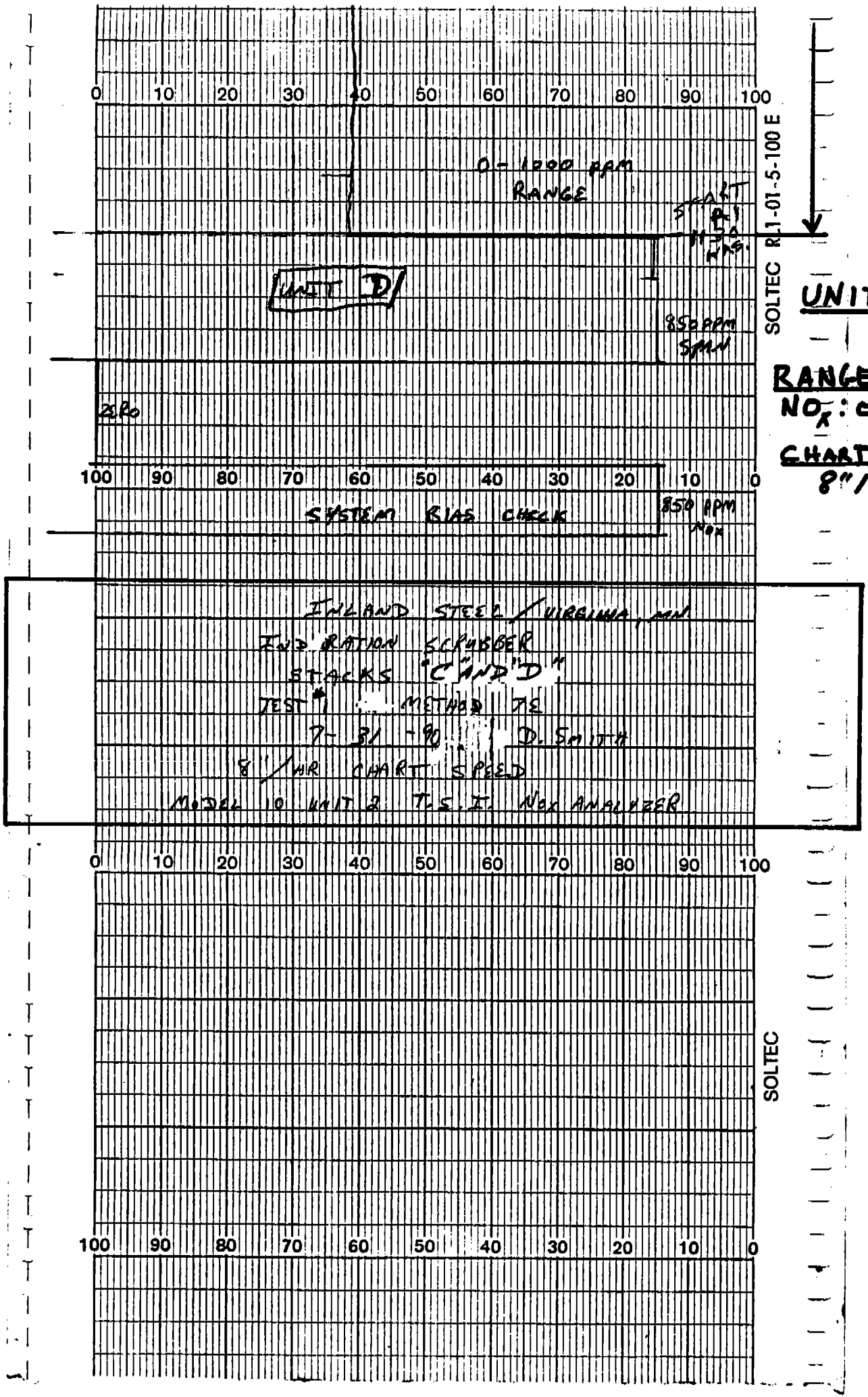

8" / HR. CHART SPEED
0-250 PPM RANGE
START R
1640 OHMS
SOLTEC
ZERO
ZERO DRIFT
100 90 80 70 60 50 40 30 20 10 0
1640 OHMS
1640 K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
Run #2
100 90 80 70 60 50 40 30 20 10 0
0-250 PPM RANGE
8" / HR. CHART SPEED


UNIT A1
ZERO
ZERO DRIFT
1640K
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
SOLTEC RL1-01-5-100 E
Run #3
8"/HR CHART SPEED
0-250 PPM
RANGE
SOLTEC


8" / HR CHART SPEED
1810 HRS.
250 RPM
0 10 20 30 40 50 60 70 80 90 100
ZERO
ZERO DRIFT
1200 HRS
END R1
SOLTEC R1-01-5-100 E
INCIDENTAL No READING
100 90 80 70 60 50 40 30 20 10 0
No 1
Run #1
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
0-250 RPM
RANGE
8" / HR. CHART SPEED
START R1
1200 HRS
100 90 80 70 60 50 40 30 20 10 0
250 RPM
SPEED
UNIT 'A'
UNIT A
ZERO


250 ppm
100 90 80 70 60 50 40 30 20 10 0
ZERO
← ZERO DRIFT
→ 1440 HRS.
END R2
0 10 20 30 40 50 60 70 80 90 100
No
100 90 80 70 60 50 40 30 20 10 0
SOLTEC
Run #2
1640K
0-250 PPM
RANGE
8"/HR CHART
SPEED
START R2
→ 1810 HRS.
0 10 20 30 40 50 60 70 80 90 100
250 ppm
ZERO
← ZERO DRIFT
→ 1900 HRS.
RL1-01-5-100 E

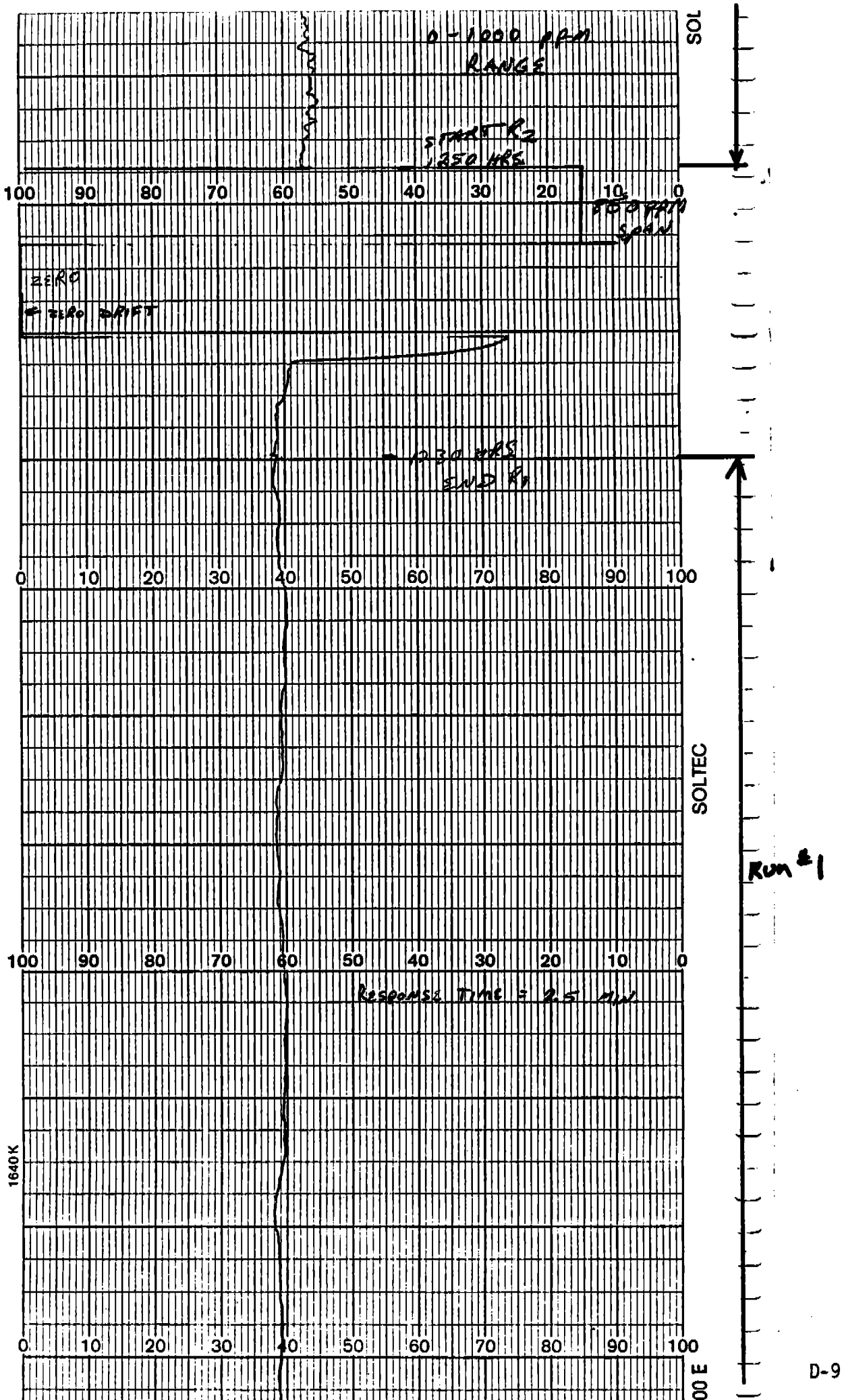

ZERO
1530 HRS
END
R3
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
Run #3
1640K
STATIC
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
0-250 RPM
RANGE
8"/HR CHART
SPEED
STATIC
START R3
1420 HRS.
250 RPM
100 90 80 70 60 50 40 30 20 10 0
ZERO
ZERO DRAFT
1410 HRS.

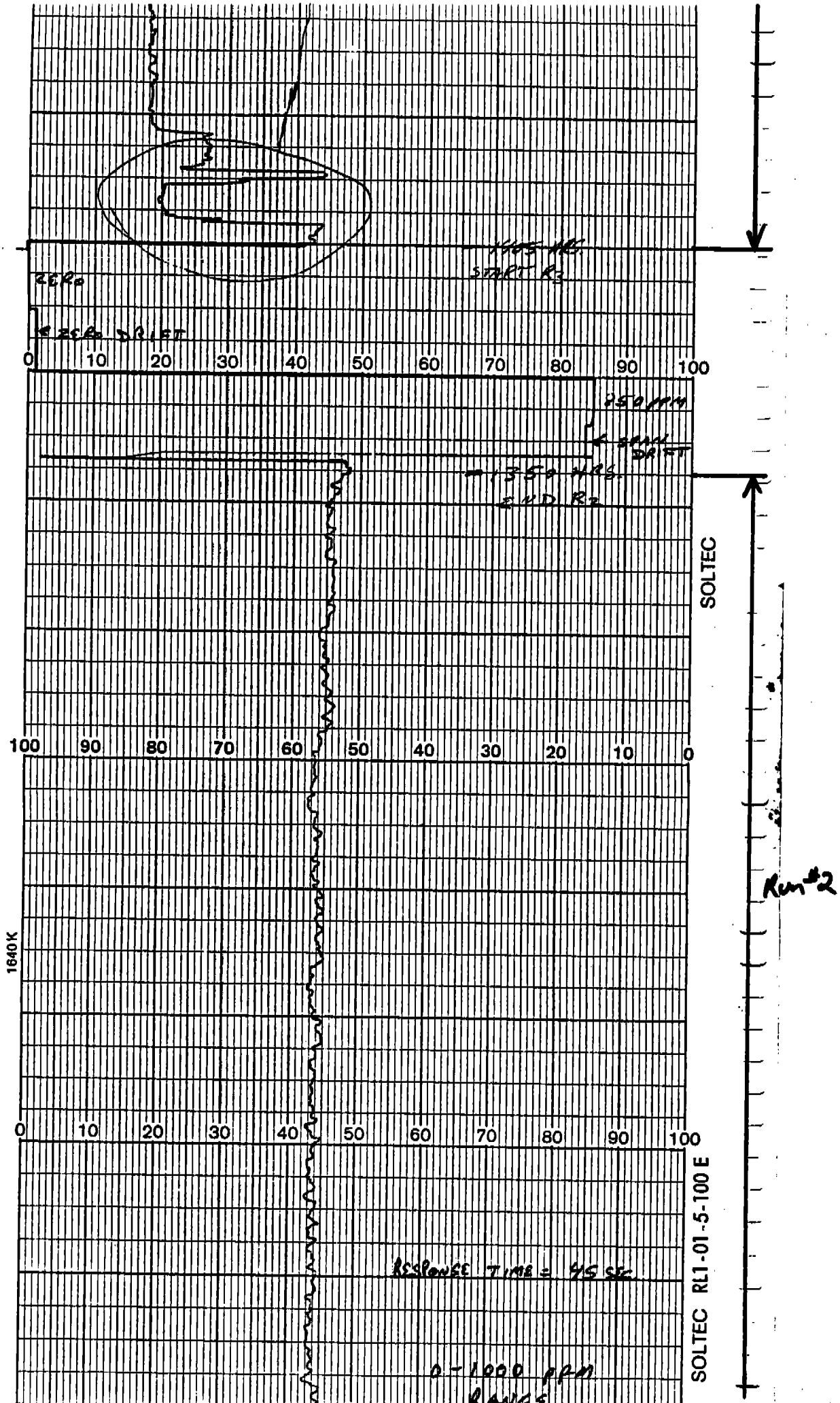


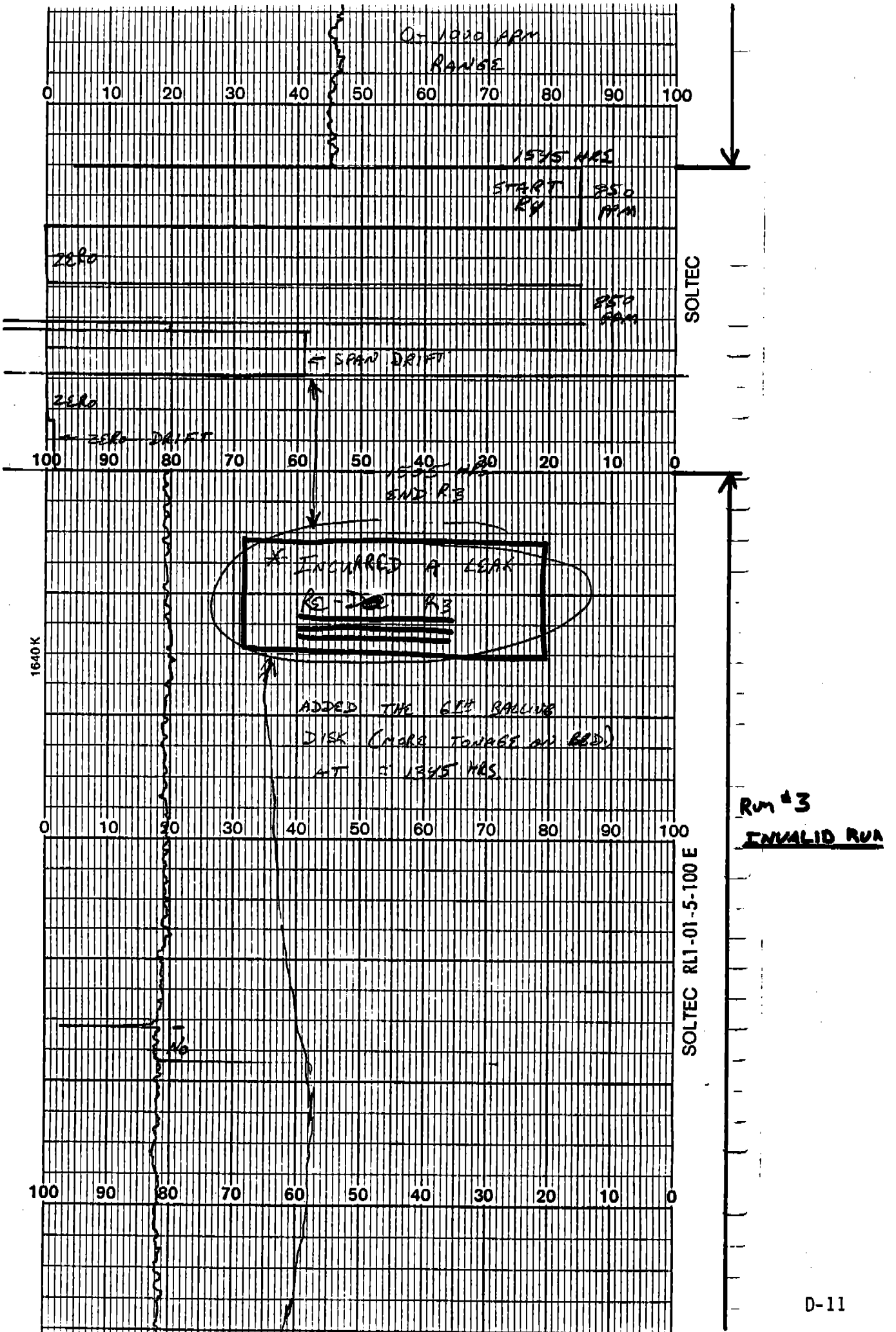
UNIT "D"

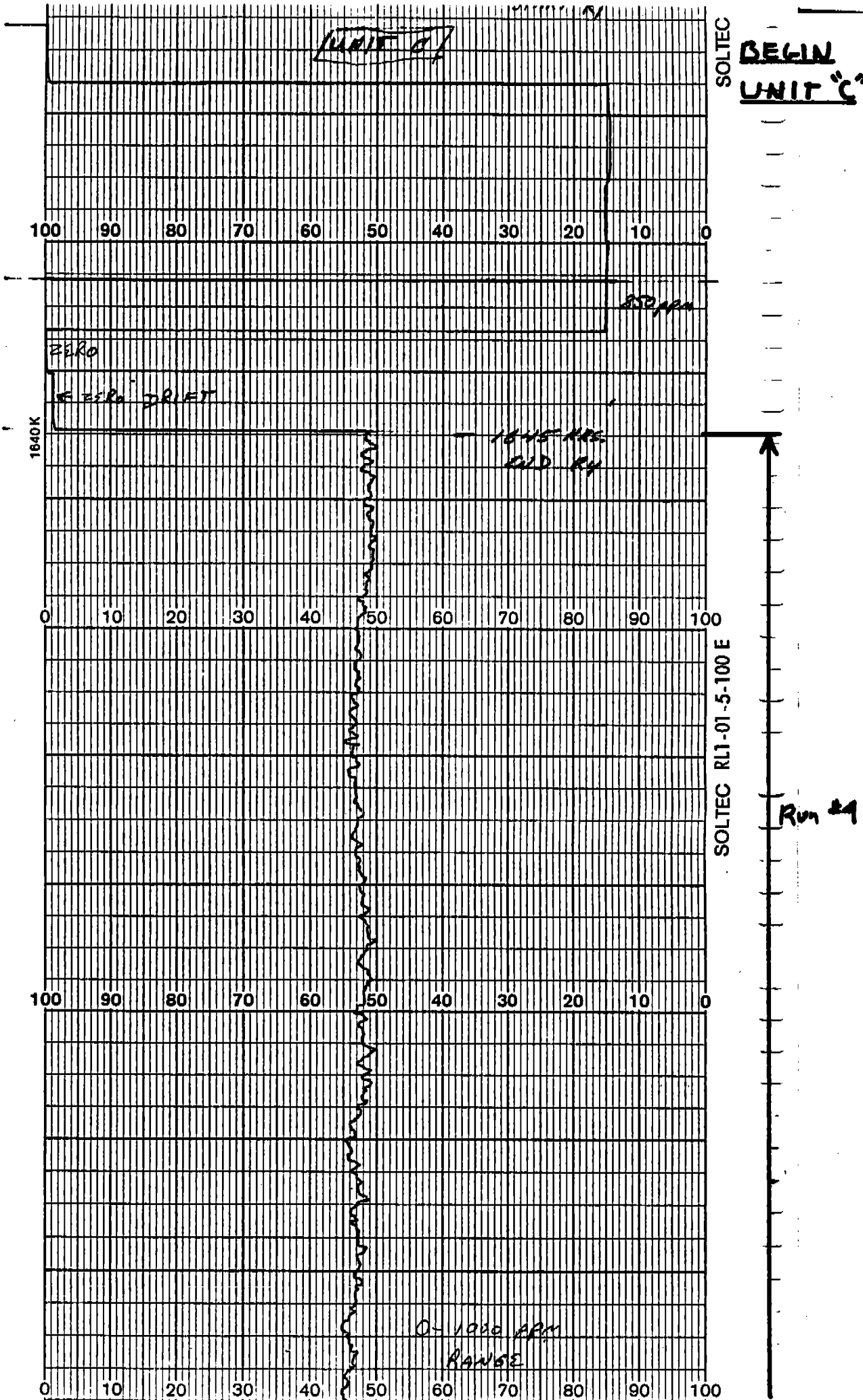
RANGE:
NO_x: 0 - 1000 ppm

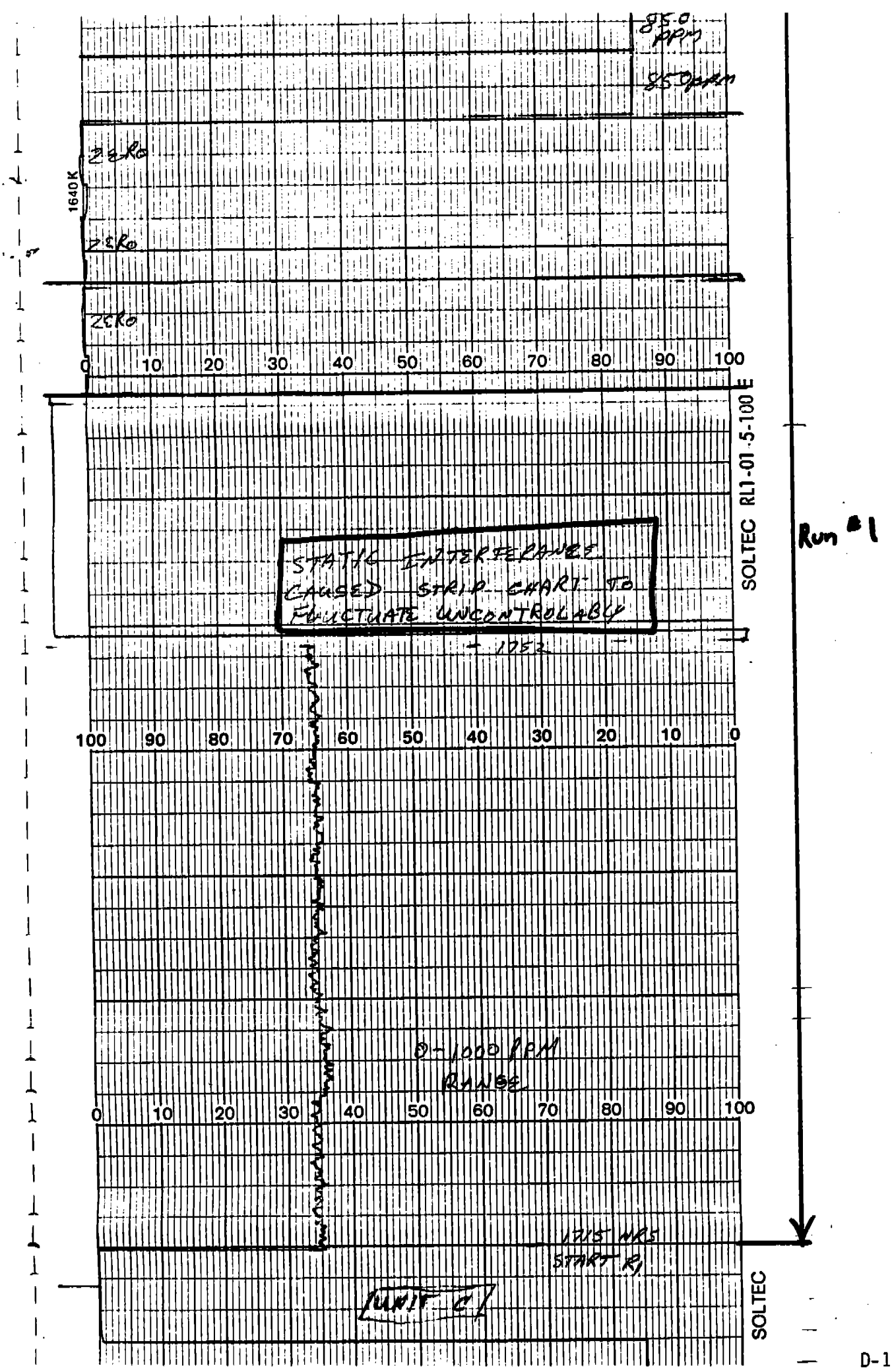
CHART SPEED:
8"/HR

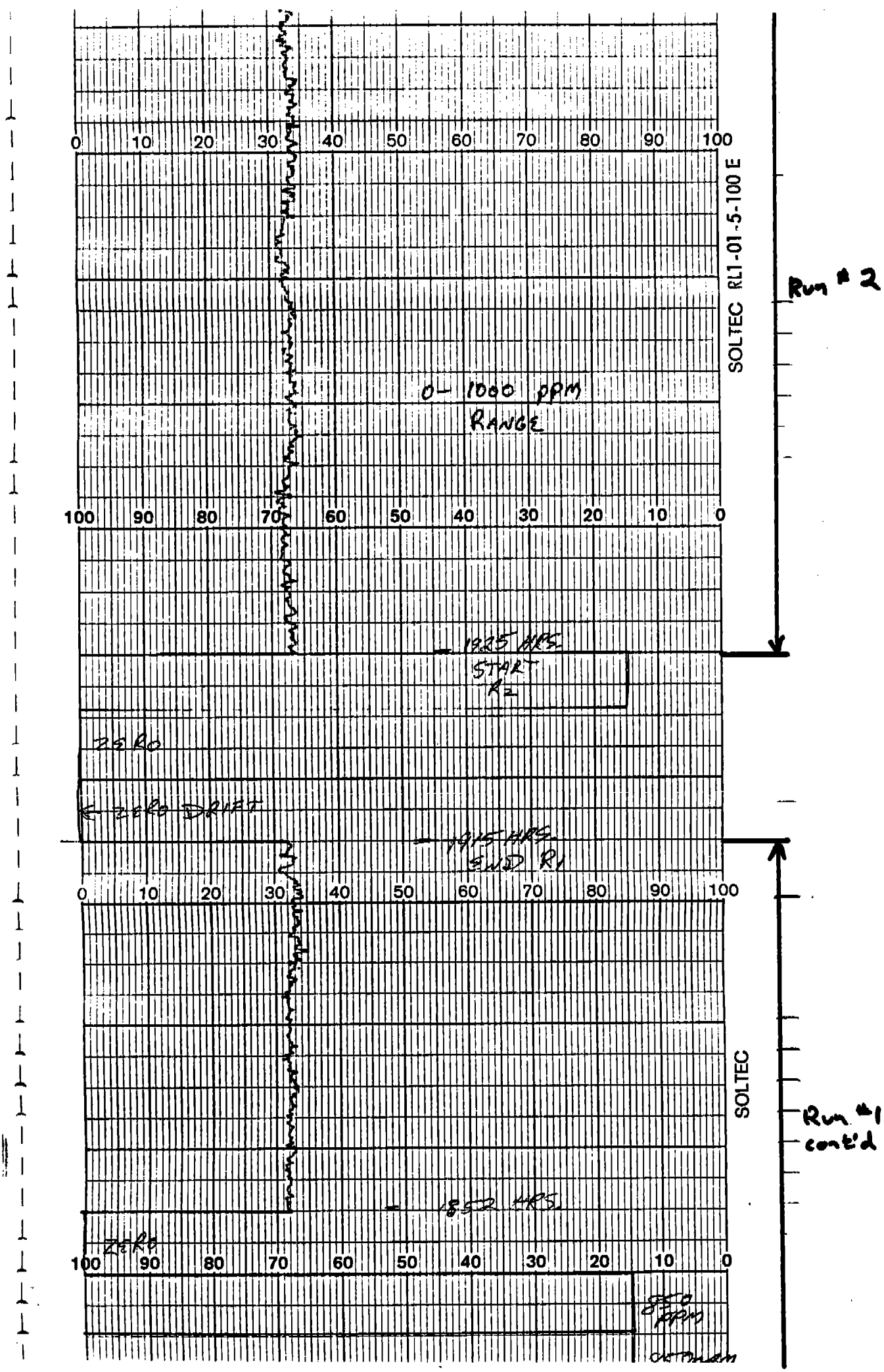

0-1000 ppm
RANGE
START K2
250 HRS
100 90 80 70 60 50 40 30 20 10 0
100 PPM
SPAN
ZERO
= ZERO DRIFT
1230 HRS
END K2
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
Response Time = 2.5 min
1640K
0 10 20 30 40 50 60 70 80 90 100
SOL
RUN #1

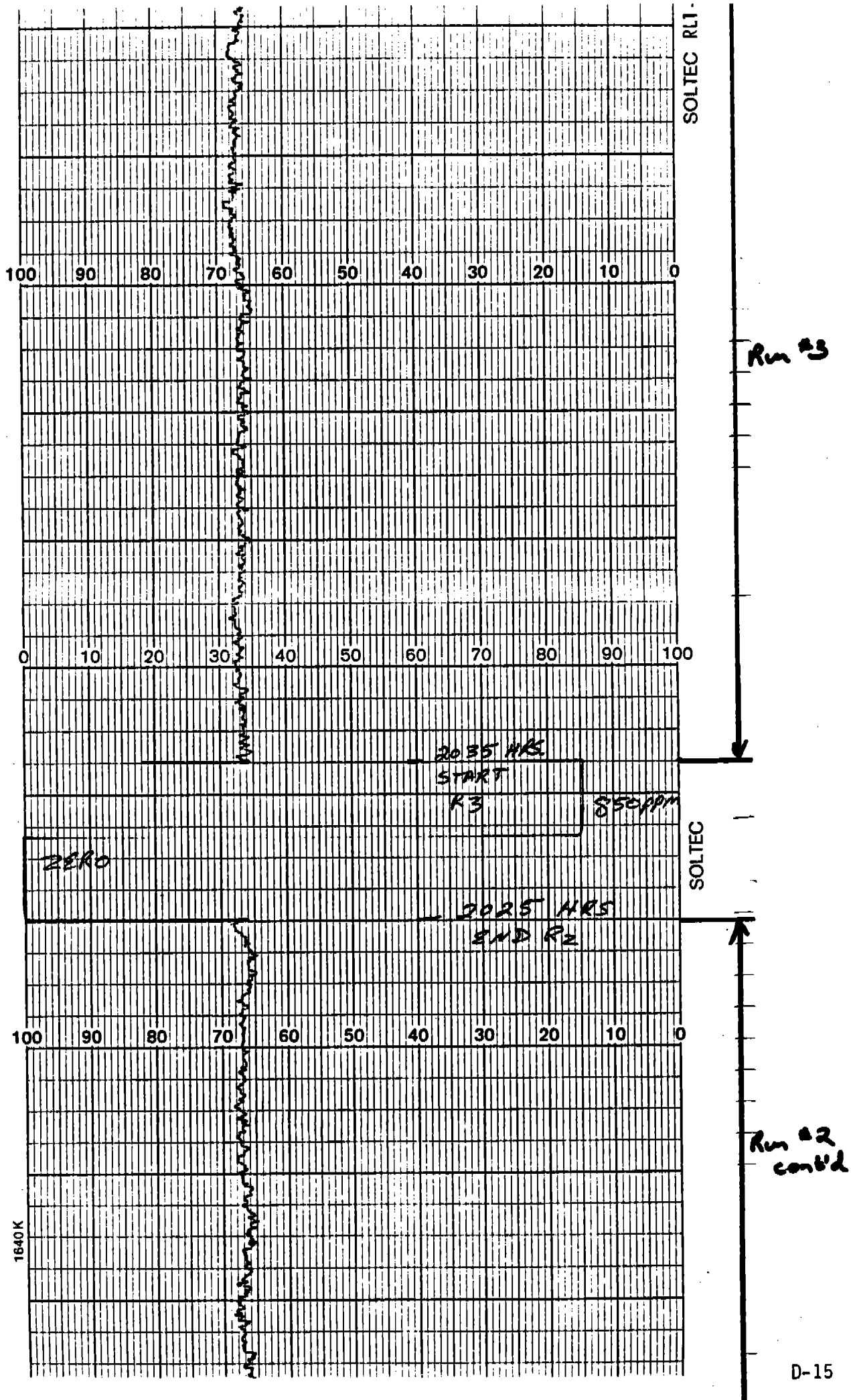

ZERO
ZERO DRIFT
0 10 20 30 40 50 60 70 80 90 100
250 PPM
SPAN DRIFT
END R2
100 90 80 70 60 50 40 30 20 10 0
SOLTEC
Run #2
1640K
0 10 20 30 40 50 60 70 80 90 100
RESPONSE TIME = 45 SEC
0-1000 PPM
RANGE
SOLTEC RL1-01-5-100 E

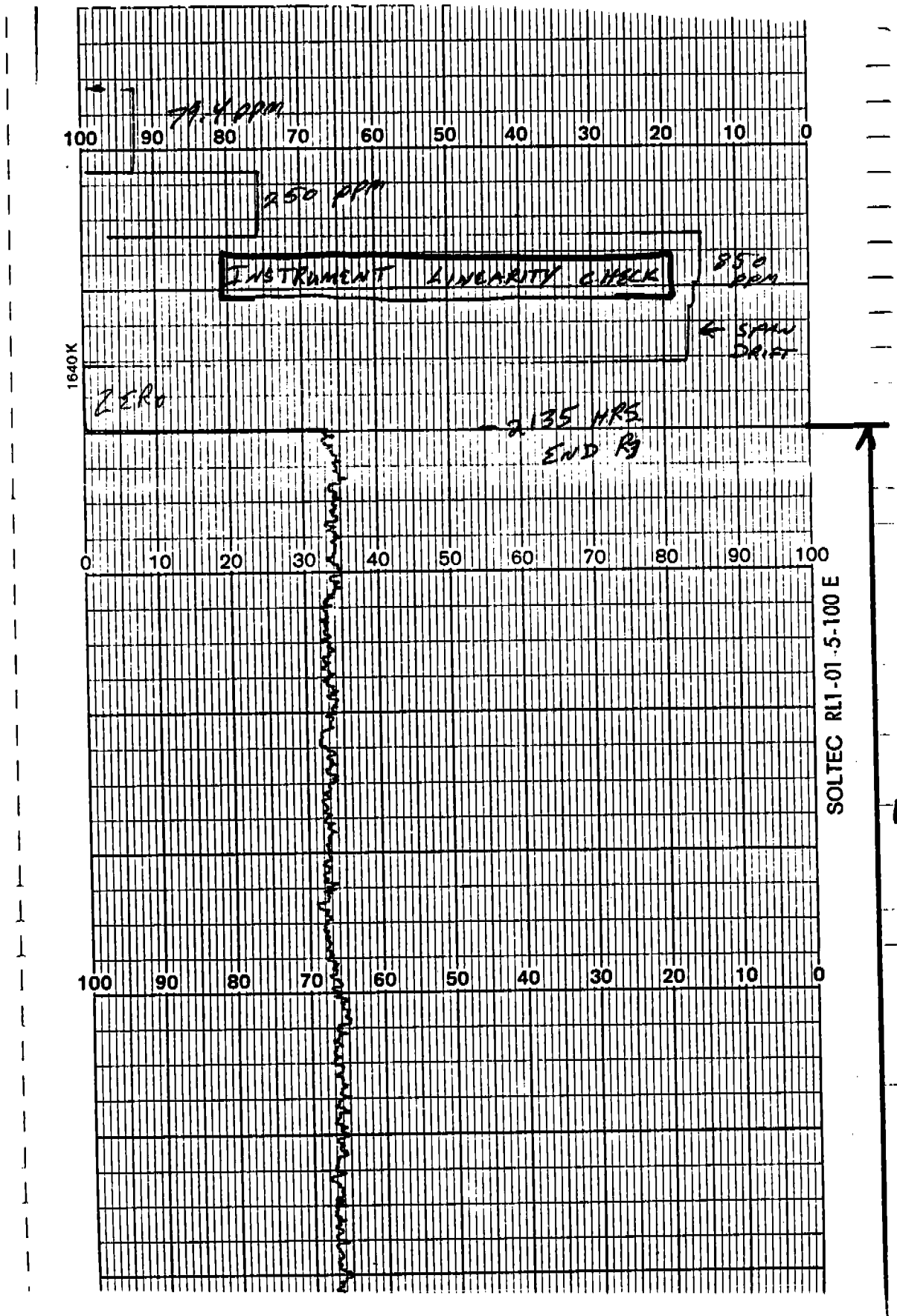

0-1000 PPM
RANGE
0 10 20 30 40 50 60 70 80 90 100
15315T HRS
START R4
850 PPM
ZERO
850 PPM
SPAN DRIFT
ZERO
ZERO DRIFT
100 90 80 70 60 50 40 30 20 10 0
END R3
INCURRED A LEAK
R3
ADDED THE 6TH BAGLINE
DISK (CHARGE TONNAGE on BED)
AT 1345 HRS
SOLTEC
1640K
SOLTEC RL1-01-5-100 E
Run #3
INVALID RUN

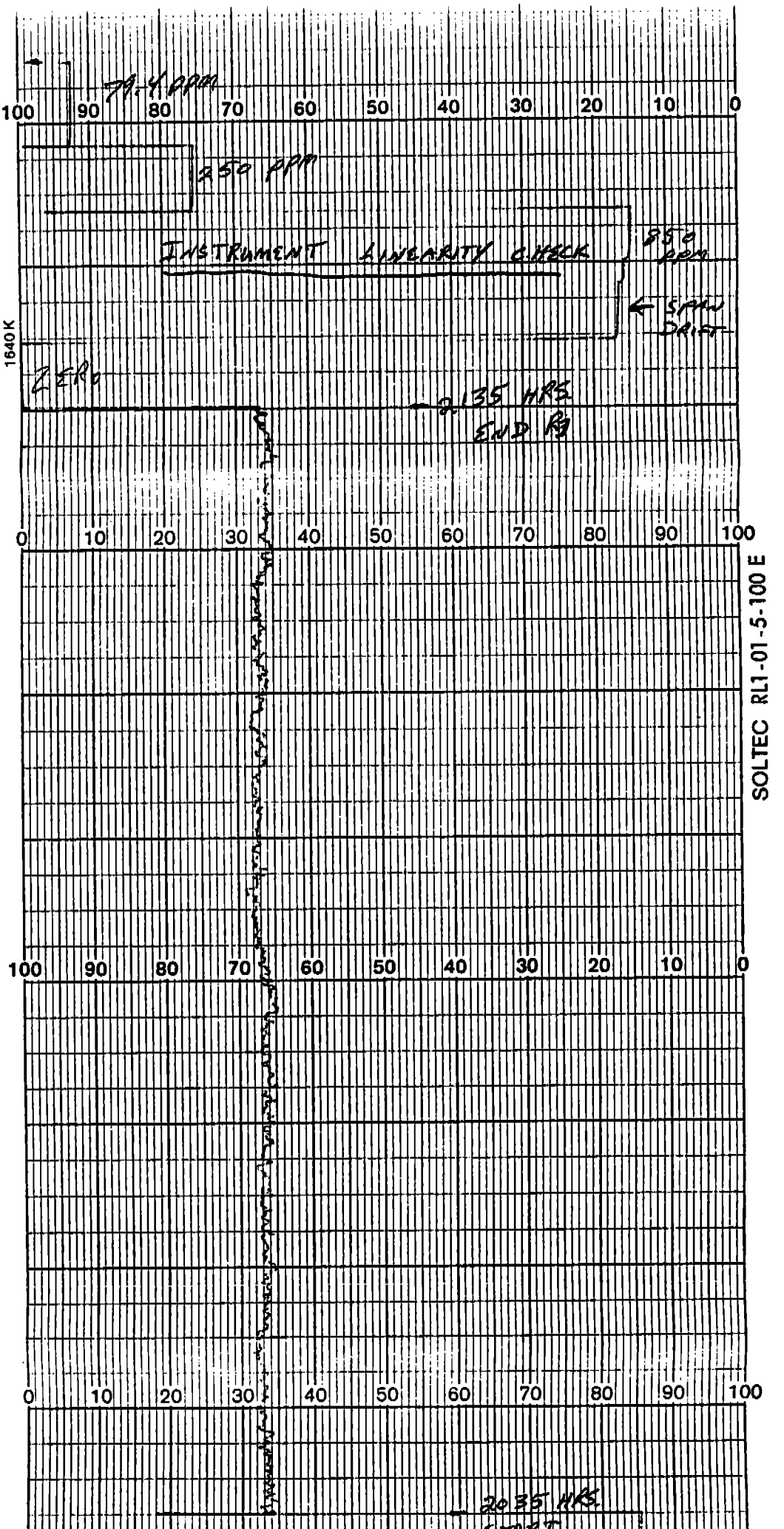

SOLTEC
BEGIN UNIT "C"
100 90 80 70 60 50 40 30 20 10 0
ZERO
1640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
Run #1
0 - 1000 PPM RANGE


85.0 PPM
85.0 PPM
ZERO
1640K
ZERO
ZERO
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
Run #1
STATIC INTERFERANCE CAUSED STRIP CHART TO FLUCTUATE UNCONTROLABLY
1752
100 90 80 70 60 50 40 30 20 10 0
0-1000 RPM RANGE
0 10 20 30 40 50 60 70 80 90 100
1715 HRS
START R1
UNIT #1
SOLTEC


0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
Run # 2
0- 1000 ppm
RANGE
100 90 80 70 60 50 40 30 20 10 0
1825 HRS
START
R2
ZERO
ZERO DRIFT
1915 HRS
END R1
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
Run #1
cont'd
1852 HRS
ZERO
100 90 80 70 60 50 40 30 20 10 0


SOLTEC RL1-
100 90 80 70 60 50 40 30 20 10 0
Run #3
0 10 20 30 40 50 60 70 80 90 100
2035 HRS
START
R3
850ppm
ZERO
SOLTEC
2025 HRS
END R2
100 90 80 70 60 50 40 30 20 10 0
Run #2
cont'd
1640 K


79.4 ppm
250 ppm
INSTRUMENT LINEARITY CHECK
850 ppm
SPAN DRIFT
ZERO
2135 HRS
END RUN
1640 K
SOLTEC RL1-01-5-100 E
Run #3 cont'd


79.4 PPM
250 PPM
INSTRUMENT LINEARITY CHECK
95.0 PPM
SPAN DRIFT
ZERO
2135 HRS
END RS
1640 K
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
2035 HRS

APPENDIX E

MEASUREMENT SYSTEM PERFORMANCE SPECIFICATIONS

INTERPOLL LABORATORIES

Calibration Error Check

Job INLAND STEEL

Test 1 Run 1 Date 7-31-90
Operator DWAYNE A. SMITH

SO_2 Calibration: N/A 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	250	250	0	1000	0
High level	850	850	0	1000	0

O_2 Calibration: N/A 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: N/A Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)	Difference (ppm)	Span Value (ppm)	Percent of Span
Zero gas	0				
Mid level					
High level					

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

INTERPOLL LABORATORIES

System Bias Check *UNIT "A"

Job INLAND STEEL

Test 1 Run 1 Date 8-1-90
Operator DWAYNE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 250 Time(HRS) 1302

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	4.5	4.5	1.8
Upscale	250	250	250	0	0

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

Must be within 5% of the span for the zero or upscale cal gas. S420-11

INTERPOLL LABORATORIES

System Bias Check * UNIT A

Job INLAND STEEL

Test 1 Run 2 Date 8-1-90
Operator DUAYNE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 250 Time(HRS) 1410

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	2.5	2.5	1.0
Upscale	250	250	250	0	0

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

Must be within 5% of the span for the zero or upscale cal gas. S420-11

INTERPOLL LABORATORIES

System Bias Check *UNIT A

Job INLAND STEEL

Test 1 Run 3 Date 8-1-90
Operator DWAYNE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 250 Time(HRS) 1530

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	0	0	0
Upscale	250	250	247.5	2.5	1.0

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

Must be within 5% of the span for the zero or upscale cal gas. S420-11

INTERPOLL LABORATORIES

System Bias Check * UNIT B

Job INLAND STEEL

Test 1 Run 1 Date 8-1-90
Operator DUANE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 250 ppm Time(HRS) 0925

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	5	5	2
Upscale	250	250	255	5	2

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

Must be within 5% of the span for the zero or upscale cal gas. S420-11

INTERPOLL LABORATORIES

System Bias Check * UNIT B

Job INLAND STEEL

Test 1 Run 2 Date 8-1-90
Operator DWAYNE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 250 ppm. Time(HRS) 1045

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	4	4	1.6
Upscale	250	250	249	1	.4

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

Must be within 5% of the span for the zero or upscale cal gas. S420-11

INTERPOLL LABORATORIES

System Bias Check * UNIT B

Job INLAND STEEL

Test 1 Run 3 Date 8-1-90
Operator DWAYNE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 250 ppm Time(HRS) 1151

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	6	6	2.4
Upscale	250	250	248	2	.8

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

Must be within 5% of the span for the zero or upscale cal gas. S420-11

INTERPOLL LABORATORIES

System Bias Check * UNIT C

Job INLAND STEEL

Test 1 Run 1 Date 7-31-90
Operator DWAYNE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 1000 Time(HRS) 1915

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	-6	6	.6
Upscale	850	850	855	5	.5

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

Must be within 5% of the span for the zero or upscale cal gas. S420-11

INTERPOLL LABORATORIES

System Bias Check # UNIT C

Job INLAND STEEL

Test 1 Run 2 Date 7-31-90
Operator DWAYNE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 1000 Time(HRS) 2025

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	0	0	0
Upscale	850	850	855	5	.5

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

Must be within 5% of the span for the zero or upscale cal gas. S420-11

INTERPOLL LABORATORIES

System Bias Check * UNIT C

Job INLAND STEEL

Test 1 Run 3 Date 7-31-90
Operator DWAYNE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 1000 Time(HRS) 2138

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	0	0	0
Upscale	850	850	834	16	1.6

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

Must be within 5% of the span for the zero or upscale cal gas. S420-11

INTERPOLL LABORATORIES

System Bias Check *UNIT D

Job INLAND STEEL

Test 1 Run 1 Date 7-31-90
Operator DWAYNE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 1000 Time(HRS) 1235

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	2	2	.2
Upscale	850	850	852	2	.2

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

Must be within 5% of the span for the zero or upscale cal gas. S420-11

INTERPOLL LABORATORIES

System Bias Check *UNIT D

Job INLAND STEEL

Test 1 Run 2 Date 7-31-90
Operator DWAYNE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 1000 Time(HRS) 1352

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	12	12	1.2
Upscale	850	850	840	10	1.0

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

Must be within 5% of the span for the zero or upscale cal gas. S420-11

LABORATORIES

System Bias Check * UNIT D

Job INLAND STEEL

Test 1 Run 3 Date 7-31-90

Operator DWAYNE A. SMITH

SO_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

NO_x Calibration: Span Value 1000 Time(HRS) 1505

***	Cylinder Value (ppm)	Analyzer Response (ppm)		Diff. CE - SB (ppm)	Percent of Span
		Calib Error	System Bias		
Zero gas	0	0	12	12	1.2
Upscale	850	850	610	240	24

O_2 Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

CO Calibration: Span Value _____ Time(HRS) _____

***	Cylinder Value (%)	Analyzer Response (%)		Diff. CE - SB (%)	Percent of Span
		Calib Error	System Bias		
Zero gas	0				
Upscale					

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

S420-11

G.S. #137

LINDE

Linde Gases
and Equipment
21725 Groesbeck Highway
Warren, MI 48089
313-445-3350

Oxygen Service
1111 Pierce Butler Rte
St. Paul, MN 55104

August 25, 1989

RECEIVED

SEP 06 1989

INTERPOLL LABORATORIES

EPA PROTOCOL DATA:

CYLINDER: LL26358
REQUESTED COMPOSITION: 80ppm Nitric Oxide/Nitrogen

ANALYTICAL DATA

MEAN CONCENTRATION: 79.4ppm Nitric Oxide/Nitrogen

REPLICATE ANALYSIS:

A)79.6ppm Nitric Oxide/Nitrogen
B)79.3ppm Nitric Oxide/Nitrogen
C)79.3ppm Nitric Oxide/Nitrogen

CYLINDER PRESSURE: 2200psig @70 F
DATE OF CERTIFICATION: 8-23-89
EXPIRATION DATE OF CERTIFICATION: 2-23-91

NBS/SRM NUMBER: 16848
CERTIFIED NBS/SRM CONCENTRATION:97.2ppm Nitric Oxide/Nitrogen
+/- 1.1ppm
NBS/SRM SERIAL NUMBER: Cal 12816

GAS ANALYZER:

MAKE	MODEL:	SERIAL#:
Thermo Electron	10AR	10AR 5028-71

ANALYTICAL PRINCIPLE: Chemiluminescence
DATE OF LAST MULTIPOINT CALIBRATION: 8-1-89

ANALYSIS PERFORMED BY: Robert L. Lerchenfeld

The above certification was performed in accordance with EPA Protocol, Section 3.04 6/9/87.

Lab Superintendent

GS# 162

LINDE

Linde Gases
and Equipment
21725 Groesbeck Highway
Warren, MI 48089
313-445-3350

Oxygen Service Company
1111 Pierce Butler Rte
St. Paul, MN 55704

May 2, 1990
Customer P.O.: 1397-SA

RECEIVED
MAY 08 1990
INTERPOLL LABORATORIES

EPA PROTOCOL DATA:

CYLINDER: LL25477
REQUESTED COMPOSITION: 250ppm Nitric Oxide/Nitrogen

ANALYTICAL DATA

MEAN CONCENTRATION: 250ppm Nitric Oxide/Nitrogen

REPLICATE ANALYSIS:

A) 250ppm Nitric Oxide/Nitrogen
B) 249ppm Nitric Oxide/Nitrogen
C) 250ppm Nitric Oxide/Nitrogen

CYLINDER PRESSURE: 2200 psig @ 70F
DATE OF CERTIFICATION: 4-30-90
EXPIRATION DATE OF CERTIFICATION: 10-30-91

NBS/SRM NUMBER: 1685A
CERTIFIED NBS/SRM CONCENTRATION: 243ppm Nitric Oxide/Nitrogen +/-3ppm
NBS/SRM SERIAL NUMBER: FF4006

GAS ANALYZER:

MAKE	MODEL:	SERIAL#:
Thermo Electron	10AR	10AR 6028-71

ANALYTICAL PRINCIPLE: Chemiluminscence
DATE OF LAST MULTIPOINT CALIBRATION: 4/16/90

ANALYSIS PERFORMED BY: Robert Lerchenfeld

The above certification was performed in accordance with EPA Protocol, Section 3.04 6/9/87.

Lab Superintendent

Scott Specialty Gases

a division of
Scott Environmental Technology, Inc.

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

[redacted]ship[redacted]

Our Project # : 932168
Your P.O. # : 9404PL
Page ____ of ____
Expiration Date : 7-10-90

Customer :
INTERPOL
4500 BALL ROAD
CIRCLE PINES, MINNESOTA 55014

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES

Certified Per Traceability Protocol # 1

Procedure # 81

File # P02116

Certified Accuracy 1 % NBS Traceable

Cylinder Number SAL-1581

Cylinder Pressure 2000 psig

COMPONENT	CERTIFIED CONC.	REFERENCE STD SRM # (CRM #)	REFERENCE STD CYLINDER NUMBER	REFERENCE STD CONC.
NITRIC OXIDE	849.6 PPM	1697B	AAL19320	965.7 PPM
		8M19	AAL-20920	589.4 PPM

GAS ANALYZER MAKE/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
HORIBA	12-28-88	CHEMILUMINESCENCE

BALANCE GAS : NITROGEN

NITROGEN DIOXIDE 0.33 PPM

FIRST ANALYSIS — DATE : 12-28-88

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS PPM
0.00	85.00	850.6	965.7 PPM	96.50	965.7
0.00	84.90	849.6		96.50	965.7
0.00	84.90	849.6		96.50	965.7

CALCULATED RESULTS: 850.6, 849.6, 849.6

AVERAGE : 849.9 PPM

SECOND ANALYSIS — DATE : 1-10-89

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS PPM
0.00	84.80	848.6	965.7 PPM	96.50	965.7
0.00	84.90	849.6		96.50	965.7
0.00	84.90	849.6		96.50	965.7
0.00	84.90 NOX	849.6			

CALCULATED RESULTS: 848.6, 849.6, 849.6

849.6 PPM NOX

AVERAGE : 849.2 PPM

CALIBRATION CURVE 1 st DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1697B	965.7	100	96.50	965.7	.00
	772.6	80	77.10	771.5	-0.14
	579.4	60	57.70	577.3	-0.37
	386.3	40	38.50	385.1	-0.32
	193.1	20	19.30	194.8	0.88
	0.0000	0	0.00	0.0000	0.00
	0.00			0.00	0.00
1685B	219.0	LOW	21.80	217.9	-0.52
	589.4	GMIS	59.00	590.4	0.17

: GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : [signature]

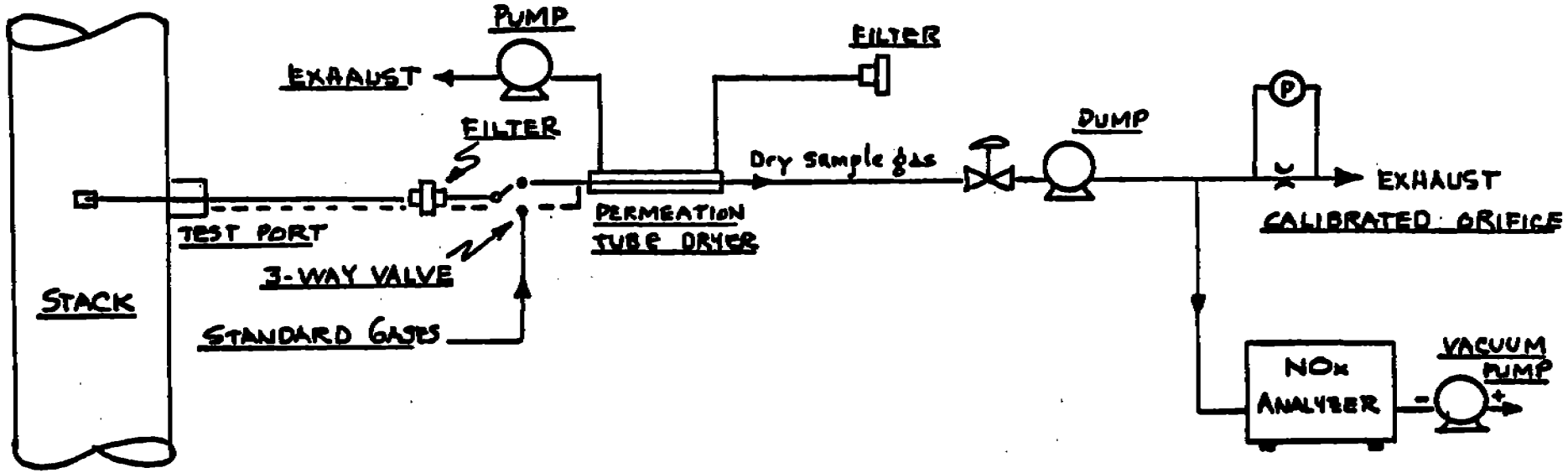
Approved By : [signature]

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

APPENDIX G

GAS ANALYZER SPECIFICATIONS

FLOW SCHEMATIC



------ HEAT TRACED

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

LP 9/11/90

Thermo Electron
CORPORATION

MODEL 10A
RACK-MOUNTED
CHEMILUMINESCENT
NO-NO_x GAS ANALYZER
SPECIFICATIONS

Sensitivity	Each instrument is equipped with the folling 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 standard. Other outputs available upon request.
Zero Drift	Negligible after 1/2-hour warm-up.
Linearity	±1% of full scale.
Input Power Requirements	Standard: 115v/50Hz; 115v/60Hz Optional: 220v/50Hz; 220v/60Hz

Thermo Electron Corporation
Instruments Division
8 West Forge Parkway
Franklin, Massachusetts 02038
(617) 520-0430

APPENDIX H

MPCA EXHIBIT C

Interpoll Laboratories
(612)786-6020

MPCA Exhibit C for Combustion Sources

JOB_____

SOURCE_____

DATE_____

C. Fuel Input

1. Itemize all fuels and materials that are added to the combustion process during the test period. Attach ultimate analysis of the fuel.

FUEL DESCRIPTION Coal:State, City, Mine Oil: Specify Grade	INPUT (LBS/HR) (GAL/HR)	& MOISTURE AS REC'D	AS REC'D (BTU/LB) (BTU/GAL)	HEAT INPUT (BTU/HR)
No. 1				
No. 2				
No. 3				
		TOTAL		

2. Are the above fuels substantially the same as those normally burned_____. If not explain_____

_____.

3. Are the above fuels normally burned in the proportions shown above_____. If not, explain_____

_____.

4. Describe any changes anticipated for procurement of fuels within the next twelve (12) months. _____

_____.

D. Equipment & Operating Data

1. Furnace No._____.
2. Furnace Mfg._____.
3. Type of Firing_____.
4. Furnace operating under normal operating conditions: No_____; Yes_____.

S-350R(1)

Interpoll Laboratories
(612)786-6020

MPCA Exhibit C for Process Emissions

JOB_____

SOURCE_____

DATE_____

C. Equipment & Operating Data

1. Process Equip. No./Ident._____.
2. Process Equip. Description_____

_____.

3. Process equipment operating under normal operating conditions:

No____. Yes_____.

D. Instrument Data on Process Equipment

1. Include copy of production records or instrumentation which indicates rate of production or operation of the equipment, i.e. units per hour, lbs. per hour, pressure, air flow, etc.

E. Air Pollution Control Equipment

1. Type/model control equipment_____.
2. Air pressure drop across the control equipment_____.
3. Air flow through the control equipment_____.
4. Was the control equipment operating normally?_____.
5. Data of last major maintenance/cleaning of control equipment

_____

_____.

F. Plant Manager's Certification

I certify that the information submitted herein is accurate and correct and that no information requested was withheld from MPCA, Division of Air Quality.

By_____, Position_____

S-349R

APPENDIX I

PROCESS RATE DATA

B[redacted]IIZ[redacted]PRO[redacted]S[redacted]RY

DATE	PH MCF	A MCF	B MCF	BTUS PER TON	BT INDEX	AT INDEX	Q INDEX	+1/2	+7/16	+3/8	+5/16	+1/4	+100M	-100M	CCS	% -200 LBS
07/01/90	2565	1350	957	661	98.15	94.58	92.84	14.67	17.75	39.73	20.30	5.70	1.10	0.76	546	0.00
07/02/90	2577	1350	916	624	98.09	95.34	93.51	13.33	20.38	40.04	18.69	5.65	1.15	0.77	531	0.00
07/03/90	2308	1350	948	673	97.87	95.08	93.05	14.19	15.78	37.72	23.14	7.04	1.18	0.96	563	0.00
07/04/90	2525	1375	975	654	98.39	95.70	94.16	11.37	17.54	40.44	22.92	6.12	0.85	0.75	538	0.00
07/05/90	2619	1350	975	744	98.81	96.87	95.72	21.89	24.39	49.93	26.88	7.04	0.91	0.43	543	0.00
07/06/90	2562	1350	981	667	98.47	96.62	95.13	10.90	19.15	38.95	23.25	6.20	0.87	0.66	545	0.00
07/07/90	2605	1350	943	682	98.41	95.27	93.75	7.25	17.41	36.00	28.89	8.86	1.05	0.54	634	0.00
07/08/90	2594	1350	963	685	98.46	95.20	93.73	15.36	20.01	36.84	20.20	6.06	1.09	0.45	590	0.00
07/09/90	2540	1425	970	747	98.46	95.04	93.57	15.49	20.97	31.90	22.07	8.03	1.29	0.26	584	0.00
07/10/90	2624	1425	966	615	98.41	94.03	92.54	17.16	20.08	36.39	19.34	5.44	0.95	0.64	564	0.00
07/11/90	2621	1425	929	675	98.47	96.49	95.01	14.35	20.88	36.54	20.59	6.10	0.94	0.59	561	0.00
07/12/90	2511	1425	924	640	98.64	95.85	94.55	14.14	21.39	41.49	17.75	3.88	0.69	0.66	485	1.67
07/13/90	2559	1425	971	654	98.70	97.22	95.96	13.50	19.86	43.71	18.07	3.56	0.56	0.74	553	0.00
07/14/90	2664	1425	960	678	98.54	97.16	95.74	11.49	20.73	42.07	19.79	4.46	0.69	0.76	530	0.00
07/15/90	3488	1425	966	816	98.64	96.96	95.65	10.68	19.99	40.36	22.35	5.26	0.70	0.65	547	0.00
07/16/90	2282	1425	972	783	98.20	96.71	94.97	11.33	23.08	35.47	21.27	7.08	1.34	0.69	580	0.00
07/17/90	2330	1425	892	659	98.16	97.18	95.40	12.87	23.81	39.61	17.61	4.27	0.99	0.85	522	0.00
07/18/90	2156	1425	920	668	97.99	97.38	95.43	10.53	14.07	37.56	26.23	9.61	1.57	0.43	476	0.00
07/19/90	2541	1425	889	659	98.60	97.58	96.21	10.81	18.72	43.63	20.71	4.73	0.82	0.58	571	0.00
07/20/90	2409	1425	899	668	97.87	97.38	95.31	9.22	17.23	40.02	24.39	7.01	1.30	0.83	581	0.00
07/21/90	2520	1425	840	617	98.66	97.56	96.25	13.25	19.16	41.64	19.70	4.92	0.81	0.53	577	0.00
07/22/90	2518	1425	868	695	98.82	97.75	96.60	15.87	21.31	39.09	18.12	4.43	0.82	0.36	543	0.00
07/23/90	2350	1425	840	629	98.56	96.84	95.45	14.53	19.91	39.15	19.94	5.03	0.89	0.54	561	0.00
07/24/90	2404	1425	937	768	98.04	95.81	93.94	16.07	18.65	35.62	20.29	6.61	1.61	0.34	567	0.00
07/25/90	2133	1425	900	749	97.90	96.10	94.08	12.43	18.12	34.84	23.68	8.82	1.81	0.29	587	0.00
07/26/90	2437	1425	880	547	98.11	96.05	94.24	10.42	20.15	39.89	21.82	5.83	1.17	0.72	543	0.00
07/27/90	1427	950	766	942	98.32	92.31	90.78	15.71	18.94	38.61	20.15	4.93	1.20	0.49	548	0.00
07/28/90	2578	1425	964	619	98.45	94.86	93.40	15.58	19.73	39.35	18.81	4.98	0.89	0.66	552	0.00
07/29/90	2484	1425	924	713	98.61	95.64	94.32	10.16	17.59	41.72	23.12	6.03	1.00	0.38	527	0.00
07/30/90	2453	1425	969	783	98.62	95.55	94.23	10.77	19.83	41.06	20.90	6.06	1.12	0.26	531	0.00
* 07/31/90	2678	1425	930	562	98.29	95.56	93.93	10.48	17.59	38.96	24.07	7.20	1.30	0.41	562	0.00
AVERAGE	2486	1391	927	677	98.38	96.09	94.54	13.09	19.50	39.31	21.47	6.04	1.05	0.57	553	0.05

SUMMARY OF DAILY STATISTICS

(all numbers are natural lt)

DATE	COARSE ORE	FINE ORE	RMF	WEIGHT REC.	RAW CONC.	FLUX FEED	FLUXED CONC.	PELLETS PROD.	PELLETS SHIPPED	PELLET SILICA	PELLET C/S
07/01/90	0	0	25417	27.55	7531	907	8632	7520	9064	4.23	1.08
07/02/90	36100	36100	25268	26.97	7300	879	8578	7917	9187	4.21	1.09
07/03/90	34100	34100	20344	30.05	6553	787	7179	6987	9076	4.42	1.04
07/04/90	29200	29200	24151	29.32	7568	909	8511	7607	8810	4.73	1.04
07/05/90	37700	37700	23965	25.61	6538	786	7393	6782	0	4.39	1.08
07/06/90	36600	36600	23418	27.95	7047	847	7600	7483	9174	4.24	1.10
07/07/90	0	0	25543	26.10	7098	853	7887	7334	9252	4.16	1.11
07/08/90	0	0	22254	28.10	6689	805	8165	7311	9398	4.37	1.08
* 07/09/90	35900	35900	22829	28.68	6964	838	7529	6744	9254	4.30	1.12
07/10/90	39500	39500	28301	28.73	8715	1049	9348	8318	7845	4.15	1.12
07/11/90	30300	30300	22372	28.14	6746	811	8275	7522	0	4.15	1.10
07/12/90	34900	34900	25562	29.53	8132	978	9034	7743	9353	4.26	1.10
07/13/90	26100	26100	24697	31.40	8326	1000	8791	7732	9331	4.22	1.14
07/14/90	0	0	22409	30.05	7248	871	8888	7595	9159	4.24	1.11
07/15/90	0	0	26350	27.73	7790	936	8601	7354	8980	4.26	1.14
07/16/90	30600	30600	25368	26.25	7158	861	8002	6094	9160	4.35	1.07
07/17/90	33600	33600	25220	30.08	8202	986	8882	7196	0	4.24	1.10
07/18/90	39600	39600	21062	36.14	8157	981	9893	6880	10580	4.20	1.13
07/19/90	36700	36700	20075	31.11	6693	806	7569	7520	9132	4.18	1.12
07/20/90	28500	28500	23556	25.33	6430	772	7363	7233	9019	4.14	1.13
07/21/90	0	0	27370	26.95	7921	953	8797	7916	0	4.26	1.11
07/22/90	0	0	26065	27.32	7666	922	8646	7061	9186	4.19	1.10
07/23/90	36300	36300	26631	27.36	7740	930	8704	7484	9256	4.21	1.08
07/24/90	32000	32000	24154	26.73	6908	830	7788	6331	9174	4.23	1.11
07/25/90	33290	33290	30098	24.25	7856	943	8398	6077	7732	4.00	1.10
07/26/90	25400	25400	25783	31.56	8690	1044	10126	8846	1374	4.03	1.16
07/27/90	29400	29400	26760	30.41	8732	1050	9944	4340	9291	4.12	1.10
07/28/90	0	0	25299	28.35	7671	922	8582	8190	8613	4.23	1.09
07/29/90	0	0	20681	25.04	5576	671	6905	6916	0	4.16	1.12
07/30/90	35900	35900	28696	24.50	7575	910	7665	6319	9247	4.12	1.10
* 07/31/90	33171	33171	29346	27.99	8778	1056	10503	9146	10470	4.23	1.07
TOTAL	734861	734861	769044		231999	27893	262180	225497	230117		
AVERAGE	33403	33403	24808	28.14	7484	900	8457	7274	8851	4.24	1.10
PROJECT.	734861	734861	769044		231999	27893	262180	225497	230117@		

SUMMARY OF DAILY STATISTICS
(all numbers are natural lt)

DATE	COARSE ORE	FINE ORE	RMF	WEIGHT REC.	RAW CONC.	FLUX FEED	FLUXED CONC.	PELLETS PROD.	PELLETS SHIPPED	PELLET SILICA	PELLET C/S
08/01/90	38900	38900	30641	27.56	9103	1095	9879	8461	9292	4.19	1.11
08/02/90	32400	32400	28625	26.96	8268	995	9651	7818	9241	4.07	1.13
08/03/90	31400	31400	26060	26.31	7388	889	9046	8485	0	4.11	1.14
08/04/90	0	0	29344	26.11	8252	992	9215	7689	9105	4.18	1.11
08/05/90	0	0	28315	25.97	7809	940	8762	7765	8976	4.11	1.15
08/06/90	35100	35100	26941	27.23	7869	945	8412	7558	9107	4.29	1.12
08/07/90	36900	36900	28457	27.58	8488	1021	9253	7902	9166	4.23	1.06
08/08/90	36300	36300	21848	30.57	7170	862	8432	7460	9058	4.24	1.10
08/09/90	35000	35000	23863	38.23	9792	1177	10426	8832	10603	4.28	1.13
TOTAL	246000	246000	244094		74140	8916	83076	71970	74548		
AVERAGE	35143	35143	27122	28.27	8238	991	9231	7997	9318	4.19	1.12
PROJECT.	808286	808286	840768		255370	30711	286150	247898	279555		

PELLETIZING PROCESS SUMMARY

DATE	PH MCF	A MCF	B MCF	BTUS PER TON	BT INDEX	AT INDEX	Q INDEX	+1/2	+7/16	+3/8	+5/16	+1/4	+100M	-100M	CCS	% -200 LBS
08/01/90	2543	1425	913	589	98.52	95.18	93.76	11.52	17.19	43.68	21.48	4.65	0.97	0.51	575	0.00
08/02/90	2539	1450	933	642	98.70	95.36	94.12	10.85	17.12	44.53	21.50	4.70	0.85	0.45	522	0.00
08/03/90	2568	1425	908	589	98.50	95.77	94.34	10.73	16.01	44.56	22.16	5.04	0.89	0.61	528	0.00
08/04/90	2513	1425	1009	657	98.30	95.45	93.82	10.59	18.06	43.09	21.04	5.51	0.85	0.84	514	0.00
08/05/90	2619	1425	1004	663	98.82	95.86	94.74	13.43	22.88	39.25	19.20	4.06	0.73	0.44	483	0.00
08/06/90	2599	1425	914	667	98.91	95.70	94.65	10.01	20.34	43.43	20.94	4.19	0.68	0.42	510	0.00
08/07/90	1772	950	625	650	98.97	95.79	94.79	13.37	19.10	41.44	23.85	6.16	0.82	0.44	577	0.00
08/08/90	2545	1425	986	678	98.97	91.46	90.52	16.51	18.56	39.18	19.60	5.12	0.70	0.33	530	0.00
08/09/90	2600	1425	927	572	98.67	95.21	93.94	12.71	21.21	39.98	19.31	5.46	0.75	0.58	535	0.00
AVERAGE	2478	1375	913	631	98.69	95.03	93.78	12.23	18.88	42.10	20.90	4.97	0.81	0.50	529	0.00

INLAND STEEL MINING COMPANY - MINORCA MINE

CONTROL ROOM OPERATOR REPORT #4

	1	2	3	4
306B3 Comb. Chamber B Recoup Temp.(7)				
306B4 Comb. Chamber B Disch. Temp.(8)				
306A3 Comb. Chamber A Recoup Temp.(9)				
306A4 Comb. Chamber A Disch.Temp.(10)				
PIC 205 Updraft Drying Hood Pressure	-2	-2	-2	-2.1
PIC 206 U.D.D. Header Press Bleed Off	17	17	16	15
TIC 207B U.D.D Header Temp.	630	623	631	633
PIC 209 D.D.D. Hood Pressure	-1.1	-1	-1	-1.1
PIC 213 Windbox Exhaust Header Pressure	-24	-24	-24	-24
PI 210 Preheat Zone Air Pressure	-.7	-.4	-.6	-.6
PI 212 Recoup Air Header Pressure	-.1	0	+.1	-.1
PI 268 Pri. Cooling Zone Air Pressure	-.4	-.3	+4	-4
Hood Exhaust Fan Vibration	1.8	1.7	1.8	1.6
Windbox Exhaust Fan Vibration	1.8	2	1.9	2
Windbox Recoup Fan Vibration	4.4	4.2	4.3	4.2
Updraft Drying Fan Vibration	5.4	5.6	5.6	5.6
Cooling Air Fan Vibration	0	0	0	0
Hood Exhaust Fan H.P.	1850	1800	1750	1850
Windbox Exhaust Fan H.P.	3500	3500	3500	3500
Windbox Recoup Fan H.P.	2800	2900	2900	3100
Updraft Drying Fan H.P.	3100	3100	3100	3100
Cooling Air Fan H.P.	2700	3000	3000	3000
PI 314A Comb. Chamber A Recoup Air Press.	+.3	+.3	+.3	+.3
PI 315A Comb. Chamber A Discharge Pressure	-.2	-.4	-.2	-.2
PI 314B Comb. Chamber B Recoup Air Press.	-.3	-.4	-.3	-.3
PI 315B Comb. Chamber B Discharge Pressure	0	0	0	0
TIC 214 Windbox Recoup Fan Suction Temp.	475	456	465	423
TIC 323 A1 Comb. Chamber A Gas Firing Temp.	2365	2370	2363	2365
TIC 323 B1 Comb. Chamber B Gas Firing Temp.	2361	2369	2364	2376
TIC 215 Burn Thru Temp.	669	675	6	688
PIC 211 Firing Hood Pressure	-1	-1	-1.1	-1
TIC 207A Updraft Drying Header Temp.	630	623	631	633
PIC 208 Sec. Cooling Hood Pressure	-1.8	-1.5	-1.9	-1.6
LIC 230 Hearth Layer Bin Level	88	90	74	93

	"A" Chamber	"B" Chamber
Total Hours on Gas	8	8
Total Minutes to MD-2:		

8/1/90
31

JLA:sed 3/29/85

INLAND STEEL MINING COMPANY - MINORCA MINE

CONTROL ROOM OPERATOR REPORT #4

TIME	1	2	3	4
306B3 Comb. Chamber B Recoup Temp.(7)	2034	2043	2039	
306B4 Comb. Chamber B Disch. Temp.(8)	2368	2370	2372	
306A3 Comb. Chamber A Recoup Temp.(9)	1991	2001	2004	
306A4 Comb. Chamber A Disch.Temp.(10)	2362	2364	2365	
PIC 205 Updraft Drying Hood Pressure	-1.9	-1.9	-2.0	-2.0
PIC 206 U.D.D. Header Press Bleed Off	17	17	17	17
TIC 207B U.D.D Header Temp.	648	640	636	630
PIC 209 D.D.D. Hood Pressure	-1.0	-.9	1.1	-1.1
PIC 213 Windbox Exhaust Header Pressure	24	24	24	23
PI 210 Preheat Zone Air Pressure	6	6	8	8
PI 212 Recoup Air Header Pressure	3	3	2	2
PI 268 Pri. Cooling Zone Air Pressure	4	4	5	4
Hood Exhaust Fan Vibration	1.4	1.8	1.8	1.8
Windbox Exhaust Fan Vibration	1.8	1.8	2.0	2.0
Windbox Recoup Fan Vibration	2.8	3.0	4.2	4.2
Updraft Drying Fan Vibration	3.0	4.2	6.8	7.0
Cooling Air Fan Vibration	0	0	0	0
Hood Exhaust Fan H.P.	18	18	18	18
Windbox Exhaust Fan H.P.	35	35	34	33
Windbox Recoup Fan H.P.	31	30	30	30
Updraft Drying Fan H.P.	32	31	31	31
Cooling Air Fan H.P.	30	30	30	30
PI 314A Comb. Chamber A Recoup Air Press.	0	0	0	0
PI 315A Comb. Chamber A Discharge Pressure	4	3	2	4
PI 314B Comb. Chamber B Recoup Air Press.	0	5	5	5
PI 315B Comb. Chamber B Discharge Pressure	0	0	0	0
TIC 214 Windbox Recoup Fan Suction Temp.	425	431	430	432
TIC 323 A1 Comb. Chamber A Gas Firing Temp.	2356	2363	2367	2373
TIC 323 B1 Comb. Chamber B Gas Firing Temp.	2361	2364	2370	2372
TIC 215 Burn Thru Temp.	633	640	670	674
PIC 211 Firing Hood Pressure	-1.2	1.1	-1.2	-1.1
TIC 207A Updraft Drying Header Temp.	634	637	631	630
PIC 208 Sec. Cooling Hood Pressure	1.4	1.2	1.1	1
LIC 230 Hearth Layer Bin Level	90	87	79	91

	"A" Chamber	"B" Chamber
Total Hours on Gas	8	8
Total Minutes to MD-2:		

8/1/90

JLA:sed 3/29/85

INLAND STEEL MINING COMPANY - MINORCA MINE

CONTROL ROOM OPERATOR REPORT #4

TIME	1	2	3	4
306B3 Comb. Chamber B Recoup Temp.(7)	2038	2040	2046	2037
306B4 Comb. Chamber B Disch. Temp.(8)	2368	2372	2374	2364
306A3 Comb. Chamber A Recoup Temp.(9)	2007	2016	2017	2018
306A4 Comb. Chamber A Disch.Temp.(10)	2367	2370	2368	2366
PIC 205 Updraft Drying Hood Pressure	-1.9	-2.2	-1.9	-2.0
PIC 206 U.D.D. Header Press Bleed Off	17.9	17.0	18.9	19.4
TIC 207B U.D.D Header Temp.	630	630	640	630
PIC 209 D.D.D. Hood Pressure	-1.1	-1.2	-1.1	-1.1
PIC 213 Windbox Exhaust Header Pressure	-24.2	-24.7	-23.9	-24.0
PI 210 Preheat Zone Air Pressure	-.8	-.8	-.8	-.8
PI 212 Recoup Air Header Pressure	-.2	-.2	-.2	-.2
PI 268 Pri. Cooling Zone Air Pressure	-.4	-.5	-.5	-.5
Hood Exhaust Fan Vibration	1.6	1.5	1.7	1.6
Windbox Exhaust Fan Vibration	1.7	1.8	1.8	1.9
Windbox Recoup Fan Vibration	2.9	3.0	2.8	3.4
Updraft Drying Fan Vibration	7.5	7.9	7.6	7.9
Cooling Air Fan Vibration	.2	.2	.2	.2
Hood Exhaust Fan H.P.	1800	1800	1900	1800
Windbox Exhaust Fan H.P.	3400	3400	3400	3400
Windbox Recoup Fan H.P.	3000	3100	3000	3100
Updraft Drying Fan H.P.	3100	3200	3100	3100
Cooling Air Fan H.P.	2900	2900	2900	2800
PI 314A Comb. Chamber A Recoup Air Press.	+.2	+.1	+.1	+.1
PI 315A Comb. Chamber A Discharge Pressure	-.3	-.3	-.3	-.3
PI 314B Comb. Chamber B Recoup Air Press.	-.6	-.5	-.4	-.3
PI 315B Comb. Chamber B Discharge Pressure	0	0	0	0
TIC 214 Windbox Recoup Fan Suction Temp.	460	420	450	410
TIC 323 A1 Comb. Chamber A Gas Firing Temp.	2368	2371	2368	2367
TIC 323 B1 Comb. Chamber B Gas Firing Temp.	2362	2368	2370	2359
TIC 215 Burn Thru Temp.	720	670	720	630
PIC 211 Firing Hood Pressure	-1.1	-1.3	-1.1	-1.1
TIC 207A Updraft Drying Header Temp.	630	630	640	630
PIC 208 Sec. Cooling Hood Pressure	-1.3	-.7	-2.4	-1.2
LIC 230 Hearth Layer Bin Level	100	84	89	87

	"A" Chamber	"B" Chamber
Total Hours on Gas	8	8

Total Minutes to MD-2: 0

8/1/90
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JLA:sed 3/29/85

INLAND STEEL MINING COMPANY - MINORCA MINE

CONTROL ROOM OPERATOR REPORT #4

TIME	1	2	3	4
306B3 Comb. Chamber B Recoup Temp.(7)				
306B4 Comb. Chamber B Disch. Temp.(8)				
306A3 Comb. Chamber A Recoup Temp.(9)				
306A4 Comb. Chamber A Disch.Temp.(10)				
PIC 205 Updraft Drying Hood Pressure	-2	-2	-2	-2
PIC 206 U.D.D. Header Press Bleed Off	15	15	15	16
TIC 207B U.D.D Header Temp.	618	623	624	629
PIC 209 D.D.D. Hood Pressure	-1.1	-1.1	-1.1	-1
PIC 213 Windbox Exhaust Header Pressure	-24	-24	-24	-24
PI 210 Preheat Zone Air Pressure	-.4	-.5	-.7	-.7
PI 212 Recoup Air Header Pressure	+.1	-.1	+.1	-.1
PI 268 Pri. Cooling Zone Air Pressure	-.4	-.3	-.4	-.3
Hood Exhaust Fan Vibration	1.8	1.8	1.6	1.7
Windbox Exhaust Fan Vibration	1.7	1.9	2	1.9
Windbox Recoup Fan Vibration	4.4	3.8	2	2.6
Updraft Drying Fan Vibration	4.9	4.6	4.9	5
Cooling Air Fan Vibration	0	0	0	0
Hood Exhaust Fan H.P.	1800	1750	1750	1850
Windbox Exhaust Fan H.P.	3500	3600	3500	3600
Windbox Recoup Fan H.P.	2900	2800	2800	3100
Updraft Drying Fan H.P.	3100	3100	3200	3200
Cooling Air Fan H.P.	3000	3100	3500	3100
PI 314A Comb. Chamber A Recoup Air Press.	+.3	+.3	+.2	+.3
PI 315A Comb. Chamber A Discharge Pressure	-.2	-.2	-.2	-.2
PI 314B Comb. Chamber B Recoup Air Press.	-.3	-.3	-.4	-.3
PI 315B Comb. Chamber B Discharge Pressure	0	0	0	0
TIC 214 Windbox Recoup Fan Suction Temp.	475	517	502	444
TIC 323 A1 Comb. Chamber A Gas Firing Temp.	2369	2357	2374	2374
TIC 323 B1 Comb. Chamber B Gas Firing Temp.	2363	2361	2371	2374
TIC 215 Burn Thru Temp.	704	771	753	685
PIC 211 Firing Hood Pressure	-1.1	-1.1	-1.1	-1
TIC 207A Updraft Drying Header Temp.	618	623	624	629
PIC 208 Sec. Cooling Hood Pressure	-3.9	-3.8	-3.4	-2.9
LIC 230 Hearth Layer Bin Level	84	78	81	92

	"A" Chamber	"B" Chamber
Total Hours on Gas	8	8
Total Minutes to MD-2:		

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JLA:sed 3/29/85

INLAND STEEL MINING COMPANY - MINORCA MINE

CONTROL ROOM OPERATOR REPORT #4

TIME	1	2	3	4
306B3 Comb. Chamber B Recoup Temp.(7)	205	2030	2014	2031
306B4 Comb. Chamber B Disch. Temp.(8)	2375	2367	2367	2376
306A3 Comb. Chamber A Recoup Temp.(9)	1972	1963	1949	1970
306A4 Comb. Chamber A Disch.Temp.(10)	2378	2358	2371	2381
PIC 205 Updraft Drying Hood Pressure	-2.0	-2.1	-1.9	-1.9
PIC 206 U.D.D. Header Press Bleed Off	16	14	15	15
TIC 207B U.D.D Header Temp.	638	639	616	633
PIC 209 D.D.D. Hood Pressure	1.0	1.1	1.1	1.0
PIC 213 Windbox Exhaust Header Pressure	24	23	23	23
PI 210 Preheat Zone Air Pressure	8	8	6	6
PI 212 Recoup Air Header Pressure	2	2	3	2
PI 268 Pri. Cooling Zone Air Pressure	4	5	4	5
Hood Exhaust Fan Vibration	1.8	1.8	1.8	1.8
Windbox Exhaust Fan Vibration	1.9	2.0	2.0	2.0
Windbox Recoup Fan Vibration	1.0	3.0	3.0	3.4
Updraft Drying Fan Vibration	5.0	5.0	5.0	4.9
Cooling Air Fan Vibration	0	0	0	2
Hood Exhaust Fan H.P.	18	18	18	18
Windbox Exhaust Fan H.P.	35	35	35	35
Windbox Recoup Fan H.P.	30	30	28	29
Updraft Drying Fan H.P.	30	30	31	31
Cooling Air Fan H.P.	30	30	30	29
PI 314A Comb. Chamber A Recoup Air Press.	0	0	0	0
PI 315A Comb. Chamber A Discharge Pressure	3	3	4	4
PI 314B Comb. Chamber B Recoup Air Press.	0	0	0	0
PI 315B Comb. Chamber B Discharge Pressure	0	0	0	0
TIC 214 Windbox Recoup Fan Suction Temp.	512	495	537	[illegible]
TIC 323 A1 Comb. Chamber A Gas Firing Temp.	[illegible]	2363	2367	[illegible]
TIC 323 B1 Comb. Chamber B Gas Firing Temp.	[illegible]	2361	[illegible]	[illegible]
TIC 215 Burn Thru Temp.	[illegible]	746	601	[illegible]
PIC 211 Firing Hood Pressure	[illegible]	-1.2	-1.1	[illegible]
TIC 207A Updraft Drying Header Temp.	[illegible]	644	617	[illegible]
PIC 208 Sec. Cooling Hood Pressure	[illegible]	[illegible]	[illegible]	[illegible]
LIC 230 Hearth Layer Bin Level	[illegible]	65	76	[illegible]

	"A" Chamber	"B" Chamber
Total Hours on Gas		
Total Minutes to MD-2:		

7/31/80
S2

JLA:sed 3/29/85

INLAND STEEL MINING COMPANY - MINORCA MINE

CONTROL ROOM OPERATOR REPORT #4

TIME	1	2	3	4
306B3 Comb. Chamber B Recoup Temp.(7)	2021	2041	2050	2041
306B4 Comb. Chamber B Disch. Temp.(8)	2368	2374	2372	2378
306A3 Comb. Chamber A Recoup Temp.(9)	1970	1986	2000	1991
306A4 Comb. Chamber A Disch.Temp.(10)	2364	2367	2370	2372
PIC 205 Updraft Drying Hood Pressure	-2.1	-2.0	-2.0	-2.0
PIC 206 U.D.D. Header Press Bleed Off	16.5	17.0	17.1	16.2
TIC 207B U.D.D Header Temp.	630	630	630	630
PIC 209 D.D.D. Hood Pressure	-1.2	-1.1	-1.1	-1.2
PIC 213 Windbox Exhaust Header Pressure	-25.1	-24.3	-24.5	-24.6
PI 210 Preheat Zone Air Pressure	-.8	-.8	-.6	-.8
PI 212 Recoup Air Header Pressure	-.2	-.2	-.2	-.2
PI 268 Pri. Cooling Zone Air Pressure	-.5	-.5	-.4	-.5
Hood Exhaust Fan Vibration	1.7	1.7	1.7	1.7
Windbox Exhaust Fan Vibration	1.7	1.5	1.6	1.6
Windbox Recoup Fan Vibration	3.4	3.1	3.2	3.6
Updraft Drying Fan Vibration	4.6	4.9	3.5	5.0
Cooling Air Fan Vibration	.1	.2	.2	.1
Hood Exhaust Fan H.P.	1700	1800	1800	1700
Windbox Exhaust Fan H.P.	3400	3400	3400	3500
Windbox Recoup Fan H.P.	2900	2800	2800	2700
Updraft Drying Fan H.P.	3000	3100	3100	3100
Cooling Air Fan H.P.	2800	2800	2800	2900
PI 314A Comb. Chamber A Recoup Air Press.	0	+.1	+.1	+.1
PI 315A Comb. Chamber A Discharge Pressure	-.3	-.3	-.3	-.3
PI 314B Comb. Chamber B Recoup Air Press.	-.5	-.4	-.5	-.5
PI 315B Comb. Chamber B Discharge Pressure	0	0	0	0
TIC 214 Windbox Recoup Fan Suction Temp.	470	460	480	520
TIC 323 A1 Comb. Chamber A Gas Firing Temp.	2359	2366	2369	2370
TIC 323 B1 Comb. Chamber B Gas Firing Temp.	2353	2370	2364	2374
TIC 215 Burn Thru Temp.	730	700	730	790
PIC 211 Firing Hood Pressure	-1.1	-1.1	-1.1	-1.1
TIC 207A Updraft Drying Header Temp.	630	630	630	630
PIC 208 Sec. Cooling Hood Pressure	-3.2	-2.6	-2.7	-3.7
LIC 230 Hearth Layer Bin Level	100	98	86	89

	"A" Chamber	"B" Chamber
Total Hours on Gas	8	8

Total Minutes to MD-2: 0

7/31/90
53

JLA:sed 3/29/85

APPENDIX J

PROCEDURES

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.

APPENDIX K

CALCULATION EQUATIONS

CALCULATION EQUATIONS

METHOD 7

$$V_{m(std)} = 17.64\ (V_f - 25)\left[\frac{P_f}{T_f} - \frac{P_i}{T_i}\right]$$

$$C_s = 6.243 \times 10^{-5}\ \frac{M}{V_{m(std)}}$$

$$E = \frac{2090\ C_s F}{20.9 - B'_{0_2}}$$

$$C_s\ (GR/DSCF) = 7000\ C_s$$

$$C_s\ (MG/DSCM) = 1.60186 \times 10^{7}\ C_s$$

$$C_s\ (ppm\text{-}dry) = 8.37552 \times 10^{6}\ C_s$$

$$C_s\ (ppm\text{-}3\%\ O_2) = 8.37552 \times 10^{6}\ C_s \left\{1 + \left[\frac{\bar{B}'_{0_2} - 3}{20.9 - B'_{0_2}}\right]\right\}$$

$$C_s\ (ppm\text{-}wet) = 8.37552 \times 10^{6}\ C_s\ \left(1 - \frac{MC}{100}\right)$$

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, µg

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, ^{o}R

T_i = Initial absolute temperature in flask, ^{o}R

V_f = Volume of flask and valve, cc

$V_{m(std)}$ = Sample volume at standard conditions, dry basis, cc

APPENDIX L

INSTRUMENT CALIBRATION SHEET

Interpoll Laboratories, Inc.

Temperature Measurement Device Calibration Sheet

Unit under test:

Vendor Arkins

Model 39658-K Serial Number DVH PDT-1

Range 0-1599 °F Thermocouple Type K

Date of Calibration 6-15-90 Technician Mark Koehler

PDT # 1

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± 1 degree (for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

Desired Temp (°F) Nominal	Temperature of Standard or Simulated Temp (°F)	Response of Unit Under Test (°F)	Deviation Δt (°F)	Deviation (%)
0	0	-1.6	1.6	.35
100	100	96	4	.71
200	200	199	1	.115
300	300	297	3	.39
400	400	394	6	.70
500	500	494	6	.63
600	600	596	4	.38
700	700	696	4	.34
800	800	800	0	0
900	900	902	2	.15
1000	1000	1006	6	.41
1100	1100	1109	9	.58
1200	1200	1214	14	.84
1300	1300	1313	13	.74
1400	1400	1417	17	.91
1500	1500	1513	13	.66
1600	1600	1613	13	.63
1700	1700	1707	7	.32
1800	1800	1803	3	.13
1900	1900	1894	6	.25
2000	2000	1987	13	.53
2100				
		Averages:	6.93	0.47

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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