AP42 Section:	10.5
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Title:	*Press Room Vent Emissions Sampling, Willamette Industries, Inc., Emerson, Louisiana, Test Dates February 8-9, 1995*, prepared for Willamette Industries, Inc., by Armstrong Environmental, Inc., Project W-1653-95, February 20, 1995. 2002 supplement

(21)

P-SPW1, P-SPW2
PLANT 196

Press Room Vent Emission Sampling
Willamette Industries, Inc., Emerson, LA
February 8-9, 1995
Armstrong Environmental, Inc.
Project W-1653-95

Report Prepared For:
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Report Prepared February 20, 1995 By:
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WILLAMETTE INDUSTRIES, INC.
INTEROFFICE COMMUNICATION

Date: April 24, 1995

To: Jedd Lewis

From: Kim Carter

Re: VOC Press Emission Tests
Emerson and Taylor Divisions

Tests to measure VOC emissions from pressing operations were conducted at the Emerson Division on February 8 and 9, 1995, and at the Taylor Division on March 14, 1995. This is to summarize the testing project and results.

Emerson Division

The Emerson plant operates two identical 30-opening presses, positioned side-by-side, approximately 10 feet apart. The press area is situated to the west of the north end of the layup line, and receives assembled plywood veneer directly off of the bundling station at the end of the layup line. Each bundle is prepressed for approximately four minutes prior to loading into the press. Both presses always run the same grade and dimension of plywood, thus their production (and emissions) can be expected to be nearly identical.

The press area is approximately 45-feet square and is enclosed on the north and east sides by solid walls, and on the west side by a wall that extends approximately 12-feet down from the ceiling, leaving an opening of about 12-feet from the floor to the bottom of the wall above. The south wall is similar to the west wall except that it does not extend as close to the floor, so a 12-foot wide tarp was hung along the bottom of the south wall to help contain press emissions in the press area.

The press area is ventilated by four motor-driven box fans, two mounted at the top of the west wall, and two at the top of the east wall. For identification purposes, the fans on the west wall are identified as Northwest (NW), and Southwest (SW). The fans on the east side are identified as Northeast (NE), and Southeast (SE). None of the four fans are the same. The NW and SW fans are both 5-feet in diameter, but are fitted with different size motors, and different size pulleys, so the air flows from each are different. The NE fan is four-foot in diameter, and the SE fan is three feet in diameter.

The objective of the tests was to establish an emission factor for VOCs from pressing operations in terms of pounds of VOCs per 1000 square feet of plywood pressed. The NE and SE fans were turned off and sealed with heavy plastic sheeting and duct tape, thus all emissions were vented through the NW and SW fans. Both the NW and SW fans discharge directly to the atmosphere without stacks, so temporary testing stacks were installed on the discharge side of the NW and SW fans. A 5.5-foot square plywood box, 3.0-feet deep was constructed, and mounted on the fan frame of the NW and SW fans. On the face of the box, parallel to the plane of the fan blade, a 3-

foot diameter hole was sawn. In this opening a 12 foot section of 36" sonotube was fitted and sealed, thus creating a discharge stack. Two three-inch diameter holes were sawn 90° apart 36-inches from the end of the sonotube for insertion of the sampling probes.

The plan had originally been to test one stack, and measure the air flow in the other stack so that a total air flow could be determined, and based on the VOC emissions measured in one stack, VOC emissions could be assigned to the other stack in an amount proportionate to that stack's air flow. While the stacks were being installed, however, it was necessary to turn off the fan, leaving only one fan running. It appeared, observing from underneath, that one fan kept the press area ventilated without emissions billowing out underneath the "current" walls on the west and south sides. So it was decided that during the tests, only the fan being tested would be running, and the other three would be off and sealed with plastic sheeting.

The tests began early the next morning (February 8), and because the temperature was very cool (upper 30's), much more steam was visible from pressing than had been visible the day before when it was warmer. This allowed us to see (and stop) several leaks in the seals we had installed over the other fans, and it also made a situation where it would have been very obvious if any emissions were billowing out under the bottom of the curtain walls.

The first tests were run on the SW fan while pressing 3/4" plywood. Three one-hour runs were done. Table I summarizes the average results from the tests.

On the second day, tests were run on the NW fan with the SW fan off and sealed. Two runs were done while pressing 3/4" plywood, and three runs were done while pressing 5/8" board. These average results are also tabulated in Table I.

Table I Emerson Press Emission Test Results

Stack	Date	Air Flow, SCFM	Board Thickness	Production SF/hr, 3/8"	Production SF/hr, surface	VOCs lb/hr	VOCs lb/1000 SF, 3/8	VOCs lb/1000 SF, surface
SW	2/8/95	2800	3/4"	31263	17595	2.27	0.073	0.13
NW	2/9/95	4100	3/4"	29424	16560	3.5	0.12	0.21
NW	2/9/95	5100	5/8"	34983	23805	4.49	0.13	0.19

Table I shows VOC emissions calculated on a 3/8" ft^2 basis and a surface ft^2 basis. The reason for this is that VOC emissions vary as a function of the weight of board being pressed (weight is directly correlated to 3/8" basis ft^2), and surface ft^2. The extent to which each factor affects VOC emission has not been determined but it is clear that on either basis, a factor of 0.25, or 0.3 lb/1000 SF is a conservative factor, meaning emissions would be over-estimated.

Figure 1 shows a typical press emission pattern during the tests. The peaks correspond to the release at the completion of the press cycle. This is when a visible release of heat and steam from the boards occurs. Note that both the #1 and #2 press cycle releases appear as peaks. The smaller peak is from the press furthest away from the vent being tested. Its peak is smaller because more dispersion has occurred by the time the emissions are drawn into the ventilation vent.

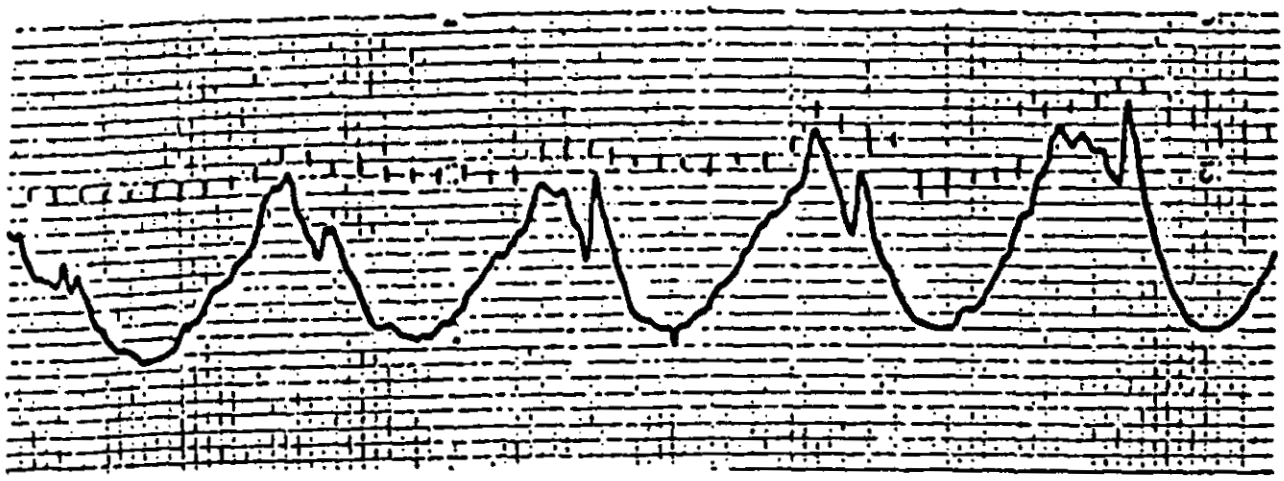

Figure 1 VOC Emission Levels Through Several Press Cycles - Emerson Division

Taylor Division

The purpose of the Taylor tests was the same as at Emerson, to establish an emission factor for VOCs produced during press operations. The Taylor press area is approximately 65 feet by 40 feet. The presses are side by side, approximately 20 feet apart. A curtain wall around the perimeter of the press area contains heat and steam produced during pressing, and prevents its dissipation into the surrounding areas of the building. The press area is ventilated with three horizontally-mounted roof fans, numbered 1, 2, and 3. The fans are fitted with a cowling with a self-closing damper that closes the opening when the fan is off.

In contrast to the Emerson tests, at Taylor only one vent was tested, and no test stack was installed. Without a stack, it is more difficult to accurately measure air flows, although for engineering purposes, the 10-15% error which might result in air flow measurement was acceptable for our purposes since this was not a compliance test.

Another difference in the press area venting system is the air flows from the fans are much larger than the Emerson fans. The Taylor fans each discharge about 46000 scfm, ten times more than the Emerson fans.

As was done at Emerson, only the vent being tested was operating during the test. Prior to beginning the test it was confirmed that the single fan was adequately venting the press area. No visible steam was escaping the "attic" in the press area.

Table II shows the results from the Taylor press tests.

Table II Taylor Press Emission Test Results

Stack	Date	Air Flow, SCFM	Board Thickness	Production SF/hr, 3/8"	Production SF/hr, surface	VOCs lb/hr	VOCs lb/1000 SF, 3/8	VOCs lb/1000 SF, surface
2	3/14/95	49000	3/8"	28125	28125	2.79	0.099	0.099
2	3/14/95	44700	1/2"	33120	26500	3.283	0.099	0.124

Figure 2 shows a portion of the VOC strip chart during the test. Again, both press cycle peaks are visible, the larger peak belonging to the press which is closer to the #2 vent fan.

The Taylor emission numbers are in good agreement with those seen at Emerson, especially in the sense that for the numbers to agree, the concentrations observed at Taylor would have to be less by a factor of at least 10 to compensate for the air flows which were greater by a factor of 10. This was, in fact, our observation.

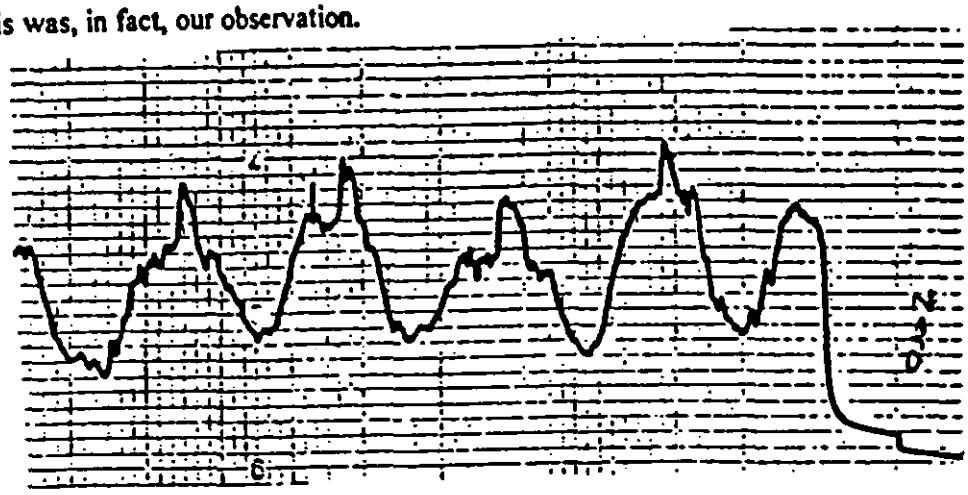

Figure 2 VOC Emission Levels Through Several Press Cycles - Taylor Division

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I. INTRODUCTION

A series of tests were performed on two press room vents at the Willamette Industries Inc. facility in Emerson, AR on February 8 and 9, 1995.

The purpose of this test series was to quantify VOC emissions resulting from press operations.

Testing followed procedures detailed in Title 40: Code of Federal Regulations (40:CFR).

Sampling was performed by Joe Barrera, Dan Barrera and Cody Jefferson of Armstrong Environmental, Inc. using an Apex Method 5 sampling train and a TECO Model 51 continuous FID.

Three repetitions were performed on the South West PressVent #1 commencing at 1:27 PM and ending at 5:15 PM on February 8, 1995 while manufacturing 3/4" board. Five repetitions were performed on the North West Press Vent #2 commencing at 8:23 AM and ending at 3:54 PM on February 9, 1995 , the first two repetitions were performed for VOC only while manufacturing 3/4" board, the following three repetitions were performed for VOC and formaldehyde while manufacturing 5/8" board.

Present to witness testing was Tim Jackson from the Arkansas Department of Pollution Control and Ecology.

Submitted by:
Armstrong Environmental, Inc.

Mark Peterson/os

Mark Peterson
Environmental Coordinator

Joe Barrera/os

Joe Barrera
Project Manager

II. SUMMARY

A series of tests were performed on two press room vents at the Willamette Industries, Inc. facility in Emerson, AR on February 8 and 9, 1995.

Sampling was performed following procedures detailed in Title 40: Code of Federal Regulations.

Results of this test series are summarized in Table 1-3.

Emissions rates are as follows:

Run #	1	2	3	Average
South West Press Room Vent #1				
3/4" board				
VOC as Carbon				
Emissions, lbs/hr	2.134	2.111	2.558	2.268
Formaldehyde				
Emissions, lbs/hr	0.005	0.010	0.012	0.009
North West Press Room Vent #2				
3/4" board				
VOC as Carbon				
Emissions, lbs/hr	3.745	3.252	NA	3.499
5/8"board				
VOC as Carbon				
Emissions, lbs/hr	4.432	4.953	4.086	4.490
Formaldehyde				
Emissions, lbs/hr	0.026	0.032	0.029	0.029

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SUMMARY OF EMISSIONS TEST DATA

Table : 1
Plant : Willamette, Emerson, AR
Location : South West Press Vent, 3/4" Board
Operator : D. Barrera, C. Jefferson, J. Barrera
Test Date : 8-Feb-95

Repetition :	1	2	3
STACK GAS			
Temperature, F	81.5	89.3	83.5
Velocity, fps	7.56	6.98	7.49
Volume Flow, acfm	3030.9	2797.5	3001.4
scfm	2954.7	2687.1	2860.4
scfh	177283	161229	171627
Moisture, %	1.18%	1.22%	3.03%
CO2, %	0.50	0.50	0.00
O2, %	20.50	20.50	20.00
SAMPLE			
Start Time, hrs:min	1:27 PM	2:52 PM	4:15 PM
Finish Time, hrs:min	2:27 PM	3:52 PM	5:15 PM
Sample Volume, scf	35.859	35.795	35.944
Isokinetic Ratio, %	99.68962	109.4192	103.2196
FORMALDEHYDE			
Sample Weight, mg	0.43	0.88	1.06
Concentration, ppm	0.340426	0.696539	0.83798
Emissions, lbs/hr	0.004705	0.009627	0.011582
VOC AS CARBON			
Concentration, ppm	386.4	382.2	463.2
Emissions, lbs/hr	2.134026	2.11083	2.55818

SUMMARY OF EMISSIONS TEST DATA

Table : 2
Plant : Willamette, Emerson, AR
Location : North West Press Vent, 3/4" Board
Operator : D. Barrera, C. Jefferson, J. Barrera
Test Date : 9-Feb-95

Repetition :	1	2
STACK GAS		
Temperature, F	79.2	83.3
Velocity, fps	11.29	10.62
Volume Flow, acfm	4527.1	4258.3
scfm	4276.6	3924.3
scfh	256596	235460
Moisture, %	4.12%	5.74%
CO_2, %	0.00	0.00
O_2, %	21.00	21.00
SAMPLE		
Start Time, hrs:min	8:23 AM	9:38 AM
Finish Time, hrs:min	9:23 AM	10:38 AM
Sample Volume, scf	21.678	21.397
VOC AS CARBON		
Concentration, ppm	468.6	443.4
Emissions, lbs/hr	3.745824	3.25243

SUMMARY OF EMISSIONS TEST DATA

Table : 3
Plant : Willamette, Emerson, AR
Location : North West Press Vent, 5/8" Board
Operator : D. Barrera, C. Jefferson, J. Barrera
Test Date : 9-Feb-95

Repetition :	1	2	3
STACK GAS			
Temperature, F	85.4	85.8	86.0
Velocity, fps	12.98	13.65	2323.02
Volume Flow, acfm	5204.1	5470.8	931254.3 ?
scfm	4852.1	5073.0	5.4
scfh	291128	304379	326
Moisture, %	3.49%	3.95%	87.71%
CO2, %	0.00	0.00	0.00
O2, %	21.00	21.00	21.00
SAMPLE			
Start Time, hrs:min	12:19 PM	1:40 PM	2:53 PM
Finish Time, hrs:min	1:19 PM	2:40 PM	3:54 PM
Sample Volume, scf	60.795	63.525	0.250
Isokinetic Ratio, %	103.3771	103.317	379.1958
FORMALDEHYDE			
Sample Weight, mg	2.47	3.07	2.73
Concentration, ppm	1.148197	1.429849	1.269786
Emissions, lbs/hr	0.02606	0.032452	0.028819
VOC AS CARBON			
Concentration, ppm	488.7	546.087	450.558
Emissions, lbs/hr	4.432215	4.952681	4.08629

III. PROCEDURES

The procedure for emissions sampling followed USEPA test methods as detailed in Title 40: Code of Federal Regulations. The following methods were used:

Method	Title
1	Sample and Velocity Traverses for Stationary Sources
2	Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
3	Gas Analysis for CO2, O2, Excess Air and Dry Molecular Weight
4	Determination of Moisture Content in Stack Gas
25A	Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer
0011	Sampling for Aldehyde and Ketone Emissions from Stationary Sources

O2 and CO2 were determined using a Fyrite analyzer.

Formaldehyde was determined using an Apex Method 5 sampling train. Sample was pulled through a teflon lined heated probe, through a heated filter into a series of four impingers, the first two containing 100 mls DNPH each, the third empty and the fourth containing 200 grams silica gel. Sample was extracted with a methylene chloride rinse. Samples were analyzed with a Dionex HPLC. All formaldehyde repetitions were performed 100% isokinetic, +/-10%.

VOC as C3H8 was determined using a TECO Model 51 continuous FID. Sample was drawn through a heated sample line, through a pump, into a heated manifold to the back of the FID. The FID was spanned from the end of the sample line via tedlar gas bags with 816 ppm, 200 ppm, and 31.9 ppm EPA Protocol 1 C3H8 in N2standards.

APPENDIX A

EMISSION TEST SUMMARY

PLANT : Willamette, Emerson, AR
DATE : 8-Feb-95
PLACE : South West Press Vent Exhaust
RUN# : 1

TEST DURATION (MINUTES) :	60	LIQUID COLLECTED (mls) :	9.1
NOZZLE DIAMETER (INCH.) :	0.4987	PARTICULATE WEIGHT (Front half mg) :	0
METER COEFFICIENT (Y) :	1.023197	PARTICULATE WEIGHT (Back half mg) :	0
PITOT COEFFICIENT (Cp) :	0.84	STATIC PRESSURE (in. H2O) :	0.01
GAS METER VOL.(Cu.Ft.) :	34.036	PERCENT CO2 :	0.5
BAROMETRIC PRESSURE :	30.27	PERCENT O2 :	20.5
		PERCENT CO :	0

FOR CIRCULAR STACK		FOR RECTANGULAR STACK	
STACK DIAMETER (inch):	35	STACK LENGTH(inchs) :	
STACK AREA (Sq.Ft.) :	6.681339	STACK WIDTH(inchs) :	
NOZZLE AREA (feet):	0.001356	STACK AREA (Sq.Ft.) :	0

ENTER THE STACK AREA SHOWN ABOVE: 6.681339

FLOWS

SAMPLED VOLUME (STD. CU.FT.):	35.8590
VOLUME OF WATER VAPOR (STD. CU.FT.):	0.4283
FRACTIONAL MOISTURE CONTENT (%):	0.0118 1.18
DRY BASE:	79.0000
MOLECULAR WT. OF STACK GAS (DRY BASE):	28.9000
MOLECULAR WT. OF STACK GAS (WET BASE):	28.7713
STACK PRESSURE (inch Hg):	30.2707
STACK GAS VELOCITY (ft/sec.):	7.5607
ACTUAL STACK GAS FLOW RATE (ACFM):	3030.9334
STANDARD STACK GAS FLOW RATE (SCFH):	177283.193
ISOKINETIC RATIO (%):	99.6896

POINTS	STACK T. deg F	DELTA P	QUAR D.	DELTA H	METER T. INLET	METER T. OUTLET	
1	82	0.01	0.1	1.00	56	57	
2	84	0.01	0.1	1.00	57	57	
3	78	0.01	0.1	1.00	59	57	
4	80	0.01	0.1	1.00	59	58	
5	80	0.02	0.141421	1.00	60	58	
6	78	0.02	0.141421	1.00	61	59	
7	82	0.01	0.1	1.00	62	60	
8	84	0.02	0.141421	1.00	62	60	
9	81	0.01	0.1	1.00	62	61	
10	82	0.04	0.2	1.00	62	61	
11	85	0.02	0.141421	1.00	63	61	
12	82	0.03	0.173205	1.00	63	61	
13		0.04	0.2				
14		0.02	0.141421				
15		0.02	0.141421				
16		0.02	0.141421				
17		0.02	0.141421				
18		0.04	0.2				
19		0.04	0.2				
20		0.01	0.1				
21		0.01	0.1				
22		0.01	0.1				
23		0.01	0.1				METER T.
24		0.01	0.1				AVERAGE
	81.5		0.1335	1.0000	60.5000	59.1667	59.8333

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EMISSION TEST SUMMARY

PLANT : Willamette, Emerson, AR
DATE : 8-Feb-95
PLACE : South West Press Vent Exhaust
RUN# : 2

TEST DURATION (MINUTES) :	60	LIQUID COLLECTED (mls) :	9.4
NOZZLE DIAMETER (INCH.) :	0.4987	PARTICULATE WEIGHT (Front half mg) :	0
METER COEFFICIENT (Y) :	1.023197	PARTICULATE WEIGHT (Back half mg) :	0
PITOT COEFFICIENT (Cp) :	0.84	STATIC PRESSURE (in. H2O) :	0.01
GAS METER VOL.(Cu.Ft.) :	34.081	PERCENT CO2 :	0.5
BAROMETRIC PRESSURE :	30.27	PERCENT O2 :	20.5
		PERCENT CO :	0

FOR CIRCULAR STACK		FOR RECTANGULAR STACK	
STACK DIAMETER (inch):	35	STACK LENGTH(inches) :	
STACK AREA (Sq.Ft.) :	6.681339	STACK WIDTH(inches) :	
NOZZLE AREA (feet):	0.001356	STACK AREA (Sq.Ft.) :	0

ENTER THE STACK AREA SHOWN ABOVE: 6.681339

FLOWS

SAMPLED VOLUME (STD. CU.FT.):	35.7945
VOLUME OF WATER VAPOR (STD. CU.FT.):	0.4425
FRACTIONAL MOISTURE CONTENT (%):	0.0122
DRY BASE:	79.0000
MOLECULAR WT. OF STACK GAS (DRY BASE):	28.9000
MOLECULAR WT. OF STACK GAS (WET BASE):	28.7669
STACK PRESSURE (inch Hg):	30.2707
STACK GAS VELOCITY (ft/sec.):	6.9783
ACTUAL STACK GAS FLOW RATE (ACFM):	2797.48155
STANDARD STACK GAS FLOW RATE (SCFH):	161228.719
ISOKINETIC RATIO (%):	109.4192

POINTS	STACK T. deg F	DELTA P	QUAR D.	DELTA H	METER T. INLET	METER T. OUTLET	
1	90	0.02	0.141421	1.00	60	61	
2	88	0.01	0.1	1.00	59	61	
3	87	0.01	0.1	1.00	61	60	
4	90	0.01	0.1	1.00	61	61	
5	88	0.02	0.141421	1.00	61	61	
6	89	0.02	0.141421	1.00	61	61	
7	89	0.01	0.1	1.00	62	61	
8	87	0.01	0.1	1.00	62	61	
9	93	0.01	0.1	1.00	63	61	
10	94	0.03	0.173205	1.00	64	62	
11	88	0.03	0.173205	1.00	63	63	
12	89	0.04	0.2	1.00	63	62	
13		0.01	0.1				
14		0.02	0.141421				
15		0.02	0.141421				
16		0.02	0.141421				
17		0.02	0.141421				
18		0.01	0.1				
19		0.01	0.1				
20		0.01	0.1				
21		0.01	0.1				
22		0.01	0.1				
23		0.01	0.1				METER T.
24		0.01	0.1				AVERAGE
	89.333333		0.1223	1.0000	61.6667	61.2500	61.4583

EMISSION TEST SUMMARY

PLANT : Willamette, Emerson, AR
DATE : 8-Feb-95
PLACE : South West Press Vent Exhaust
RUN# : 3

TEST DURATION (MINUTES) :	60	LIQUID COLLECTED (mls) :	23.9
NOZZLE DIAMETER (INCH.) :	0.4987	PARTICULATE WEIGHT (Front half mg) :	0
METER COEFFICIENT (Y) :	1.023197	PARTICULATE WEIGHT (Back half mg) :	0
PITOT COEFFICIENT (Cp) :	0.84	STATIC PRESSURE (in. H2O) :	0.01
GAS METER VOL.(Cu.Ft.) :	34.051	PERCENT CO2 :	0
BAROMETRIC PRESSURE :	30.27	PERCENT O2 :	20
		PERCENT CO :	0

FOR CIRCULAR STACK		FOR RECTANGULAR STACK	
STACK DIAMETER (inch):	35	STACK LENGTH(inchs) :	
STACK AREA (Sq.Ft.) :	6.681339	STACK WIDTH(inchs) :	
NOZZLE AREA (feet):	0.001356	STACK AREA (Sq.Ft.) :	0

ENTER THE STACK AREA SHOWN ABOVE: 6.681339

FLOWS

SAMPLED VOLUME (STD. CU.FT.):	35.9440
VOLUME OF WATER VAPOR (STD. CU.FT.):	1.1250
FRACTIONAL MOISTURE CONTENT (%):	0.0303
DRY BASE:	80.0000
MOLECULAR WT. OF STACK GAS (DRY BASE):	28.8000
MOLECULAR WT. OF STACK GAS (WET BASE):	28.4722
STACK PRESSURE (inch Hg):	30.2707
STACK GAS VELOCITY (ft/sec.):	7.4870
ACTUAL STACK GAS FLOW RATE (ACFM):	3001.38738
STANDARD STACK GAS FLOW RATE (SCFH):	171626.717
ISOKINETIC RATIO (%):	103.2196

POINTS	STACK T. deg F	DELTA P	QUAR D.	DELTA H	METER T. INLET	METER T. OUTLET	
1	89	0.02	0.141421	1.00	58	58	
2	86	0.01	0.1	1.00	59	59	
3	83	0.01	0.1	1.00	60	59	
4	82	0.02	0.141421	1.00	60	59	
5	85	0.02	0.141421	1.00	60	58	
6	84	0.01	0.1	1.00	60	58	
7	85	0.01	0.1	1.00	60	58	
8	82	0.01	0.1	1.00	60	58	
9	83	0.02	0.141421	1.00	60	58	
10	82	0.03	0.173205	1.00	60	58	
11	81	0.04	0.2	1.00	59	57	
12	80	0.04	0.2	1.00	59	57	
13		0.01	0.1				
14		0.02	0.141421				
15		0.02	0.141421				
16		0.02	0.141421				
17		0.01	0.1				
18		0.01	0.1				
19		0.01	0.1				
20		0.01	0.1				
21		0.01	0.1				
22		0.02	0.141421				
23		0.03	0.173205				METER T.
24		0.03	0.173205				AVERAGE
	83.5		0.1313	1.0000	59.5833	58.0833	58.8333

EMISSION TEST SUMMARY

PLANT : Willamette, Emerson, AR
DATE : 9-Feb-95
PLACE : North West Press Vent, 3/4" Board
RUN# : 1

TEST DURATION (MINUTES) :	60	LIQUID COLLECTED (mls) :	19.8
NOZZLE DIAMETER (INCH.) :	0	PARTICULATE WEIGHT (Front half mg) :	0
METER COEFFICIENT (Y) :	1.023197	PARTICULATE WEIGHT (Back half mg) :	0
PITOT COEFFICIENT (Cp) :	0.84	STATIC PRESSURE (in. H2O) :	0.04
GAS METER VOL.(Cu.Ft.) :	20.054	PERCENT CO2 :	0
BAROMETRIC PRESSURE :	30.1	PERCENT O2 :	21
		PERCENT CO :	0

FOR CIRCULAR STACK		FOR RECTANGULAR STACK	
STACK DIAMETER (inch):	35	STACK LENGTH(inchs) :	
STACK AREA (Sq.Ft.) :	6.681339	STACK WIDTH(inchs) :	
NOZZLE AREA (feet):	0	STACK AREA (Sq.Ft.) :	0

ENTER THE STACK AREA SHOWN ABOVE: 6.681339

FLOWS

SAMPLED VOLUME (STD. CU.FT.):	21.6783
VOLUME OF WATER VAPOR (STD. CU.FT.):	0.9320
FRACTIONAL MOISTURE CONTENT (%):	0.0412
DRY BASE:	79.0000
MOLECULAR WT. OF STACK GAS (DRY BASE):	28.8400
MOLECULAR WT. OF STACK GAS (WET BASE):	28.3932
STACK PRESSURE (inch Hg):	30.1029
STACK GAS VELOCITY (ft/sec.):	11.2929
ACTUAL STACK GAS FLOW RATE (ACFM):	4527.11465
STANDARD STACK GAS FLOW RATE (SCFH):	256596.131

POINTS	STACK T. deg F	DELTA P	QUAR D.	DELTA H	METER T. INLET	METER T. OUTLET	
1	78	0.08	0.282843	1.50	42	42	
2	82	0.11	0.331662	1.50	44	42	
3	81	0.08	0.282843	1.50	46	43	
4	78	0.06	0.244949	1.50	47	43	
5	78	0.02	0.141421	1.50	48	44	
6	78	0.01	0.1	1.50	48	44	
7		0.01	0.1				
8		0.02	0.141421				
9		0.05	0.223607				
10		0.07	0.264575				
11		0.08	0.282843				
12		0.06	0.244949				
13		0.02	0.141421				
14		0.01	0.1				
15		0.01	0.1				
16		0.01	0.1				
17		0.01	0.1				
18		0.01	0.1				
19		0.03	0.173205				
20		0.03	0.173205				
21		0.04	0.2				
22		0.06	0.244949				
23		0.11	0.331662				METER T.
24		0.12	0.34641				AVERAGE
	79.166667		0.1980	1.5000	45.8333	43.0000	44.4167

174

EMISSION TEST SUMMARY

PLANT : Willamette, Emerson, AR
DATE : 9-Feb-95
PLACE : North West Press Vent, 3/4" Board
RUN# : 2

TEST DURATION (MINUTES) :	60	LIQUID COLLECTED (mls) :	27.7
NOZZLE DIAMETER (INCH.) :	0	PARTICULATE WEIGHT (Front half mg) :	0
METER COEFFICIENT (Y) :	1.023197	PARTICULATE WEIGHT (Back half mg) :	0
PITOT COEFFICIENT (Cp) :	0.84	STATIC PRESSURE (In. H2O) :	0.04
GAS METER VOL.(Cu.Ft.) :	19.869	PERCENT CO2 :	0
BAROMETRIC PRESSURE :	30.1	PERCENT O2 :	21
		PERCENT CO :	0

FOR CIRCULAR STACK		FOR RECTANGULAR STACK	
STACK DIAMETER (inch):	35	STACK LENGTH(inches) :	
STACK AREA (Sq.Ft.) :	6.681339	STACK WIDTH(inches) :	
NOZZLE AREA (feet):	0	STACK AREA (Sq.Ft.) :	0

ENTER THE STACK AREA SHOWN ABOVE: 6.681339

FLOWS

SAMPLED VOLUME (STD. CU.FT.):	21.3970
VOLUME OF WATER VAPOR (STD. CU.FT.):	1.3038
FRACTIONAL MOISTURE CONTENT (%):	0.0574
DRY BASE:	79.0000
MOLECULAR WT. OF STACK GAS (DRY BASE):	28.8400
MOLECULAR WT. OF STACK GAS (WET BASE):	28.2174
STACK PRESSURE (inch Hg):	30.1029
STACK GAS VELOCITY (ft/sec.):	10.6225
ACTUAL STACK GAS FLOW RATE (ACFM):	4258.33923
STANDARD STACK GAS FLOW RATE (SCFH):	235460.121

POINTS	STACK T. deg F	DELTA P	QUAR D.	DELTA H	METER T. INLET	METER T. OUTLET	
1	82	0.09	0.3	1.50	44	44	
2	89	0.05	0.223607	1.50	46	44	
3	81	0.05	0.223607	1.50	48	45	
4	82	0.03	0.173205	1.50	49	45	
5	84	0.01	0.1	1.50	50	45	
6	82	0.01	0.1	1.50	50	46	
7		0.01	0.1				
8		0.02	0.141421				
9		0.06	0.244949				
10		0.04	0.2				
11		0.05	0.223607				
12		0.10	0.316228				
13		0.12	0.34641				
14		0.07	0.264575				
15		0.02	0.141421				
16		0.01	0.1				
17		0.01	0.1				
18		0.01	0.1				
19		0.01	0.1				
20		0.01	0.1				
21		0.01	0.1				
22		0.04	0.2				
23		0.05	0.223607				METER T.
24		0.10	0.316228				AVERAGE
	83.333333		0.1850	1.5000	47.8333	44.8333	46.3333

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EMISSION TEST SUMMARY

PLANT : Willamette, Emerson, AR
DATE : 9-Feb-95
PLACE : North West Press Vent, 5/8" Board
RUN# : 3

TEST DURATION (MINUTES) :	60	LIQUID COLLECTED (mls) :	37.9
NOZZLE DIAMETER (INCH.) :	0.4976	PARTICULATE WEIGHT (Front half mg) :	0
METER COEFFICIENT (Y) :	1.023197	PARTICULATE WEIGHT (Back half mg) :	0
PITOT COEFFICIENT (Cp) :	0.84	STATIC PRESSURE (in. H2O) :	0.02
GAS METER VOL.(Cu.Ft.) :	29.85483	PERCENT CO2 :	0
BAROMETRIC PRESSURE :	0	PERCENT O2 :	21
		PERCENT CO :	0

FOR CIRCULAR STACK		FOR RECTANGULAR STACK	
STACK DIAMETER (inch):	35	STACK LENGTH(inchs) :	
STACK AREA (Sq.Ft.) :	6.681339	STACK WIDTH(inchs) :	
NOZZLE AREA (feet):	0.00135	STACK AREA (Sq.Ft.) :	0

ENTER THE STACK AREA SHOWN ABOVE: 6.681339

FLOWS

SAMPLED VOLUME (STD. CU.FT.):	0.2499
VOLUME OF WATER VAPOR (STD. CU.FT.):	1.7840
FRACTIONAL MOISTURE CONTENT (%):	0.8771
DRY BASE:	79.0000
MOLECULAR WT. OF STACK GAS (DRY BASE):	28.8400
MOLECULAR WT. OF STACK GAS (WET BASE):	19.3321
STACK PRESSURE (inch Hg):	0.0015
STACK GAS VELOCITY (ft/sec.):	2323.0233
ACTUAL STACK GAS FLOW RATE (ACFM):	931254.334
STANDARD STACK GAS FLOW RATE (SCFH):	326.357854
ISOKINETIC RATIO (%):	379.1958

POINTS	STACK T. deg F	DELTA P	QUAR D.	DELTA H	METER T. INLET	METER T. OUTLET	
1	86	0.11	0.331662	5.60	56	56	
2	86	0.12	0.34641	6.10	57	56	
3	86	0.09	0.3	4.50	57	55	
4	87	0.07	0.264575	3.50	59	56	
5	87	0.06	0.244949	3.00	60	55	
6	88	0.05	0.223607	2.50	60	55	
7	85	0.02	0.141421	1.00	61	55	
8	84	0.01	0.1	0.51	60	56	
9	85	0.01	0.1	0.51	61	56	
10	84	0.04	0.2	2.00	60	56	
11	85	0.09	0.3	4.60	61	55	
12	86	0.12	0.34641	6.10	61	55	
13	85	0.14	0.374166	7.10	61	55	
14	86	0.12	0.34641	6.10	61	56	
15	88	0.14	0.374166	7.10	61	56	
16	87	0.13	0.360555	6.60	61	56	
17	89	0.08	0.282843	4.10	61	57	
18	88	0.01	0.1	0.51	61	57	
19	84	0.01	0.1	0.51	62	57	
20	85	0.01	0.1	0.51	62	57	
21	88	0.01	0.1	0.51	62	57	
22	86	0.02	0.141421	1.00	62	57	
23	85	0.04	0.2	2.00	62	57	METER T.
24	84	0.05	0.223607	2.50	62	57	AVERAGE
	86		0.2334	3.2692	60.4583	56.0417	58.2500

176

EMISSION TEST SUMMARY

PLANT : Willamette, Emerson, AR
DATE : 9-Feb-95
PLACE : North West Press Vent, 5/8" Board
RUN# : 2

TEST DURATION (MINUTES) :	60	LIQUID COLLECTED (mls) :	55.5
NOZZLE DIAMETER (INCH.) :	0.4976	PARTICULATE WEIGHT (Front half mg) :	0
METER COEFFICIENT (Y) :	1.023197	PARTICULATE WEIGHT (Back half mg) :	0
PITOT COEFFICIENT (Cp) :	0.84	STATIC PRESSURE (In. H2O) :	0.02
GAS METER VOL.(Cu.Ft.) :	60.445	PERCENT CO2 :	0
BAROMETRIC PRESSURE :	29.85483	PERCENT O2 :	21
		PERCENT CO :	0

FOR CIRCULAR STACK		FOR RECTANGULAR STACK	
STACK DIAMETER (inch):	35	STACK LENGTH(inches) :	
STACK AREA (Sq.Ft.) :	6.681339	STACK WIDTH(inches) :	
NOZZLE AREA (feet):	0.00135	STACK AREA (Sq.Ft.) :	0

ENTER THE STACK AREA SHOWN ABOVE: 6.681339

FLOWS

SAMPLED VOLUME (STD. CU.FT.):	63.5253
VOLUME OF WATER VAPOR (STD. CU.FT.):	2.6124
FRACTIONAL MOISTURE CONTENT (%):	0.0395
DRY BASE:	79.0000
MOLECULAR WT. OF STACK GAS (DRY BASE):	28.8400
MOLECULAR WT. OF STACK GAS (WET BASE):	28.4118
STACK PRESSURE (inch Hg):	29.8563
STACK GAS VELOCITY (ft/sec.):	13.6470
ACTUAL STACK GAS FLOW RATE (ACFM):	5470.80624
STANDARD STACK GAS FLOW RATE (SCFH):	304379.147
ISOKINETIC RATIO (%):	103.3170

POINTS	STACK T. deg F	DELTA P	QUAR D.	DELTA H	METER T. INLET	METER T. OUTLET	
1	81	0.12	0.34641	6.10	52	52	
2	83	0.12	0.34641	6.10	54	52	
3	83	0.10	0.316228	5.10	58	52	
4	87	0.06	0.244949	3.00	59	53	
5	86	0.05	0.223607	2.50	59	53	
6	88	0.02	0.141421	1.00	59	53	
7	86	0.01	0.1	0.50	60	53	
8	88	0.01	0.1	0.50	60	53	
9	84	0.03	0.173205	1.50	60	54	
10	88	0.06	0.244949	3.00	60	54	
11	85	0.08	0.282843	4.10	60	55	
12	87	0.13	0.360555	6.60	60	55	
13	87	0.15	0.387298	7.60	60	55	
14	86	0.16	0.4	8.10	60	55	
15	87	0.14	0.374166	7.10	60	55	
16	89	0.14	0.374166	7.10	60	55	
17	86	0.09	0.3	4.60	60	55	
18	85	0.01	0.1	0.50	60	56	
19	84	0.01	0.1	0.50	61	56	
20	86	0.01	0.1	0.50	61	56	
21	88	0.01	0.1	0.50	61	56	
22	87	0.03	0.173205	1.50	62	56	
23	85	0.05	0.223607	2.50	62	57	METER T.
24	82	0.03	0.173205	1.50	62	57	AVERAGE
	85.75		0.2369	3.4167	59.5833	54.5000	57.0417

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EMISSION TEST SUMMARY

PLANT : Willamette, Emerson, AR
DATE : 9-Feb-95
PLACE : North West Press Vent, 5/8" Board
RUN# : 1

TEST DURATION (MINUTES) :	60	LIQUID COLLECTED (mls) :	46.7
NOZZLE DIAMETER (INCH.) :	0.4976	PARTICULATE WEIGHT (Front half mg) :	0
METER COEFFICIENT (Y) :	1.023197	PARTICULATE WEIGHT (Back half mg) :	0
PITOT COEFFICIENT (Cp) :	0.84	STATIC PRESSURE (In. H2O) :	0.02
GAS METER VOL.(Cu.Ft.) :	57.567	PERCENT CO2 :	0
BAROMETRIC PRESSURE :	29.85483	PERCENT O2 :	21
		PERCENT CO :	0

FOR CIRCULAR STACK		FOR RECTANGULAR STACK	
STACK DIAMETER (inch):	35	STACK LENGTH(inchs) :	
STACK AREA (Sq.Ft.) :	6.681339	STACK WIDTH(inchs) :	
NOZZLE AREA (feet):	0.00135	STACK AREA (Sq.Ft.) :	0

ENTER THE STACK AREA SHOWN ABOVE: 6.681339

FLOWS

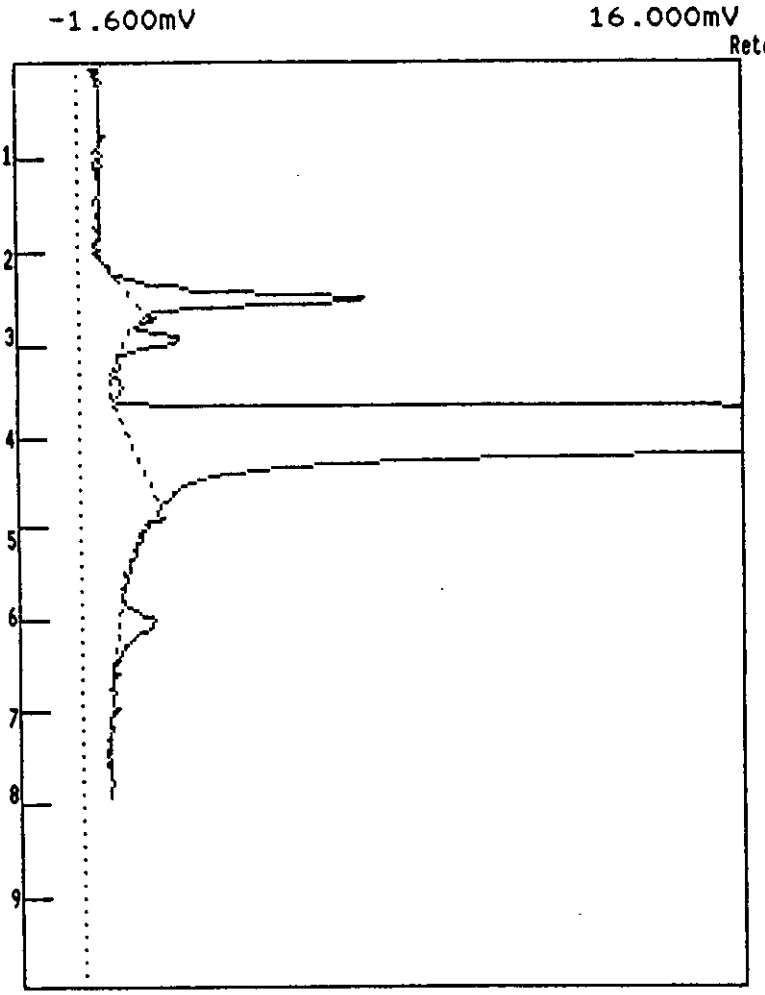
SAMPLED VOLUME (STD. CU.FT.):	60.7951
VOLUME OF WATER VAPOR (STD. CU.FT.):	2.1982
FRACTIONAL MOISTURE CONTENT (%):	0.0349
DRY BASE:	79.0000
MOLECULAR WT. OF STACK GAS (DRY BASE):	28.8400
MOLECULAR WT. OF STACK GAS (WET BASE):	28.4617
STACK PRESSURE (inch Hg):	29.8563
STACK GAS VELOCITY (ft/sec.):	12.9817
ACTUAL STACK GAS FLOW RATE (ACFM):	5204.08945
STANDARD STACK GAS FLOW RATE (SCFH):	291127.698
ISOKINETIC RATIO (%):	103.3771

POINTS	STACK T. deg F	DELTA P	QUAR D.	DELTA H	METER T. INLET	METER T. OUTLET	
1	85	0.13	0.360555	6.60	49	50	
2	86	0.11	0.331662	5.60	51	50	
3	84	0.10	0.316228	5.10	53	50	
4	89	0.06	0.244949	3.00	55	51	
5	87	0.04	0.2	2.00	56	51	
6	88	0.01	0.1	0.51	55	51	
7	89	0.02	0.141421	1.00	56	51	
8	89	0.04	0.2	2.00	56	51	
9	87	0.07	0.264575	3.50	57	51	
10	87	0.08	0.282843	4.10	57	50	
11	87	0.09	0.3	4.60	57	51	
12	86	0.03	0.173205	1.50	58	52	
13	87	0.11	0.331662	5.60	57	52	
14	88	0.09	0.3	4.60	57	52	
15	85	0.07	0.264575	3.50	58	52	
16	84	0.04	0.2	2.00	57	52	
17	84	0.03	0.173205	1.50	57	52	
18	82	0.01	0.1	0.51	57	52	
19	80	0.01	0.1	0.51	58	53	
20	78	0.01	0.1	0.51	58	53	
21	79	0.02	0.141421	1.00	58	53	
22	83	0.02	0.141421	1.00	58	53	
23	87	0.10	0.316228	5.10	58	53	METER T.
24	88	0.11	0.331662	5.60	58	53	AVERAGE
	85.375		0.2257	2.9558	56.2917	51.6250	53.9583

178

APPENDIX B

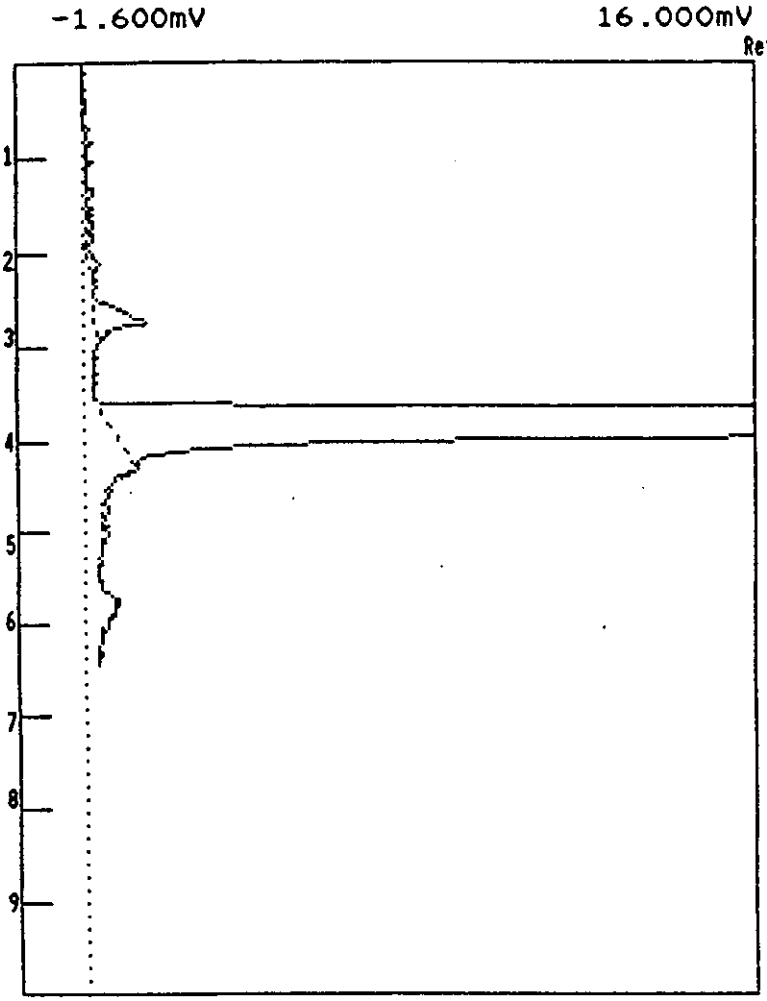
Description : Channel 1
Conditions : Blank
: 20ml
: 100x
Date : 02/07/1995
Time : 09:56:21



Component	External	Units	Retention	Height	Area
(unknown)	N/A		2.500	5.470	54.33
(unknown)	N/A		2.916	1.325	14.05
(unknown)	N/A		3.833	624.867	7598.20
Formaldehyde	2.71	ng/	6.008	0.962	17.90

180

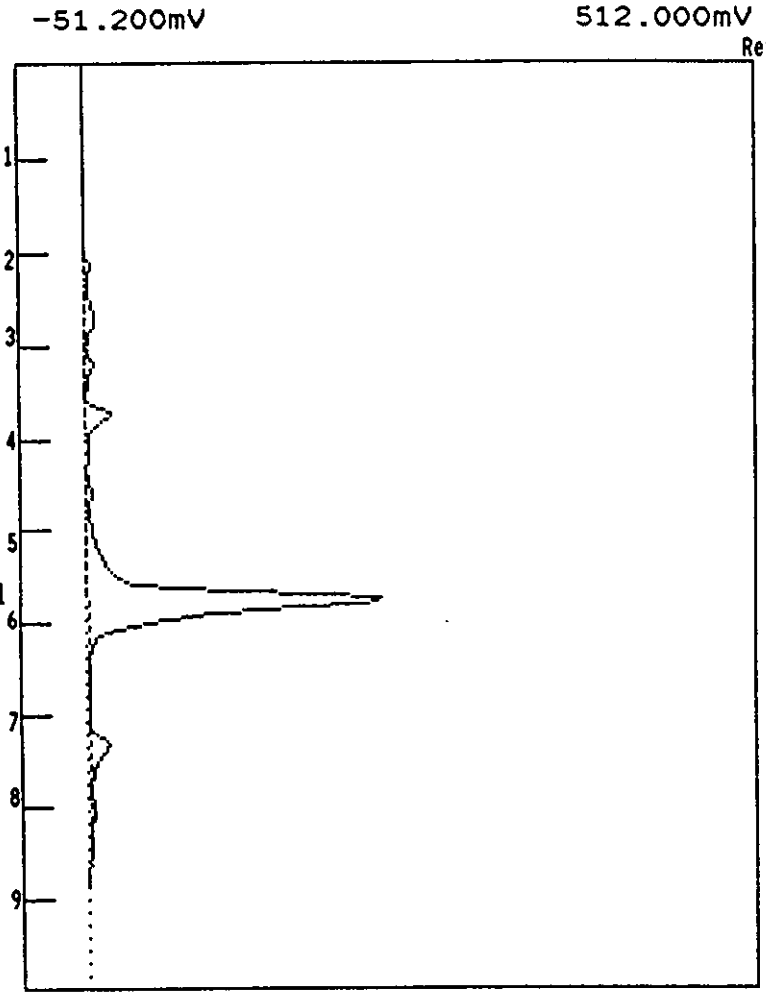
Description : Channel 1
Conditions : Willamet
: Blank 2\8\95
: 250 ml ext
: 200x dil
Date : 02/11/1995
Time : 13:29:25



Component	External	Units	Retention	Height	Area
(unknown)	N/A		2.725	1.256	15.25
(unknown)	N/A		3.741	119.756	1371.50

181

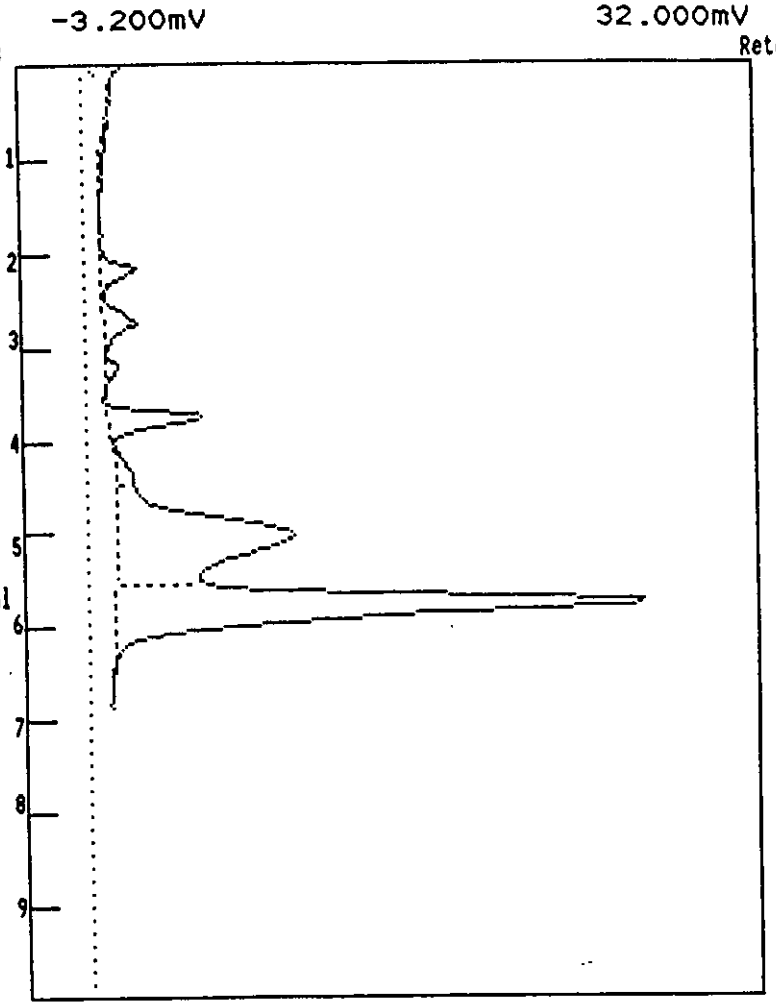
Description : Channel 1
Conditions : Willamet
: Formaldehyde Std 753 ng/ml
Date : 02/11/1995
Time : 13:37:47



Component	External	Units	Retention	Height	Area
(unknown)	N/A		2.141	3.355	39.69
(unknown)	N/A		2.725	6.863	133.52
(unknown)	N/A		3.208	6.134	64.17
(unknown)	N/A		3.733	18.919	220.03
(unknown)	N/A		4.541	2.888	54.68
Formaldehyde	753.13	ng/ml	5.733	226.897	4130.72
(unknown)	N/A		7.333	14.470	251.50
(unknown)	N/A		8.033	2.230	42.92

182

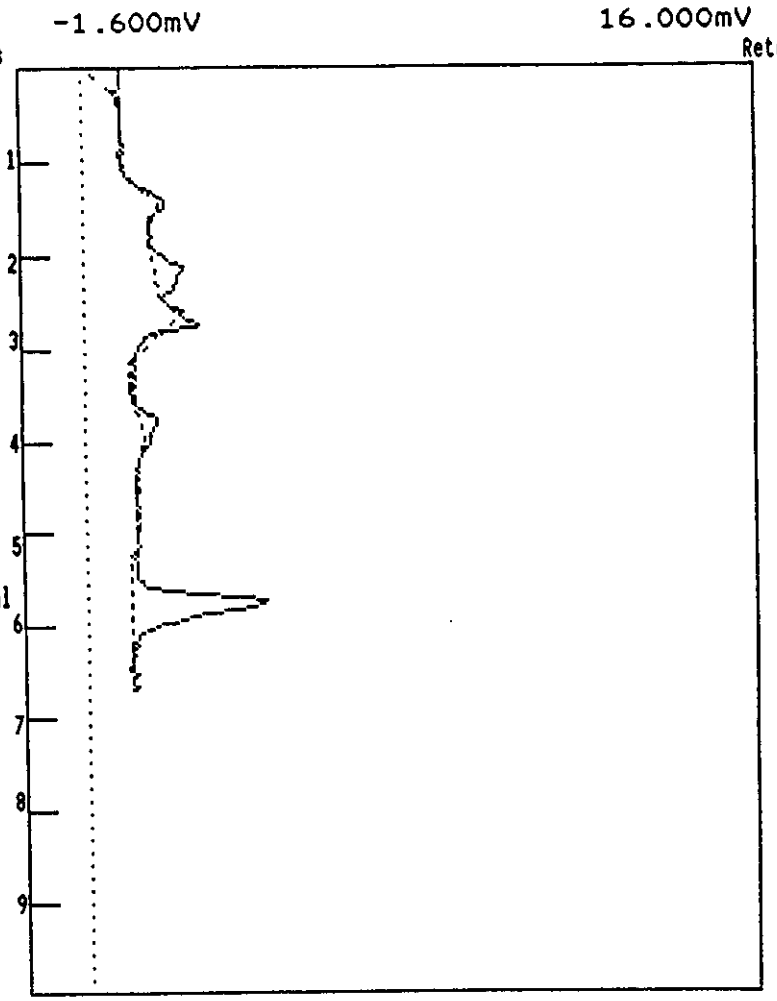
Description : Channel 1
Conditions : Willamet
: Formaldehyde Std 110 ng/ml
Date : 02/11/1995
Time : 13:49:18



Component	External	Units	Retention	Height	Area
(unknown)	N/A		0.000	1.900	12.75
(unknown)	N/A		2.141	1.665	20.07
(unknown)	N/A		2.716	1.563	23.70
(unknown)	N/A		3.733	4.570	50.50 M
(unknown)	N/A		4.400	0.900	10.45 M
(unknown)	N/A		5.008	8.400	296.55 M
Formaldehyde	109.84	ng/ml	5.741	25.727	439.38 M

183

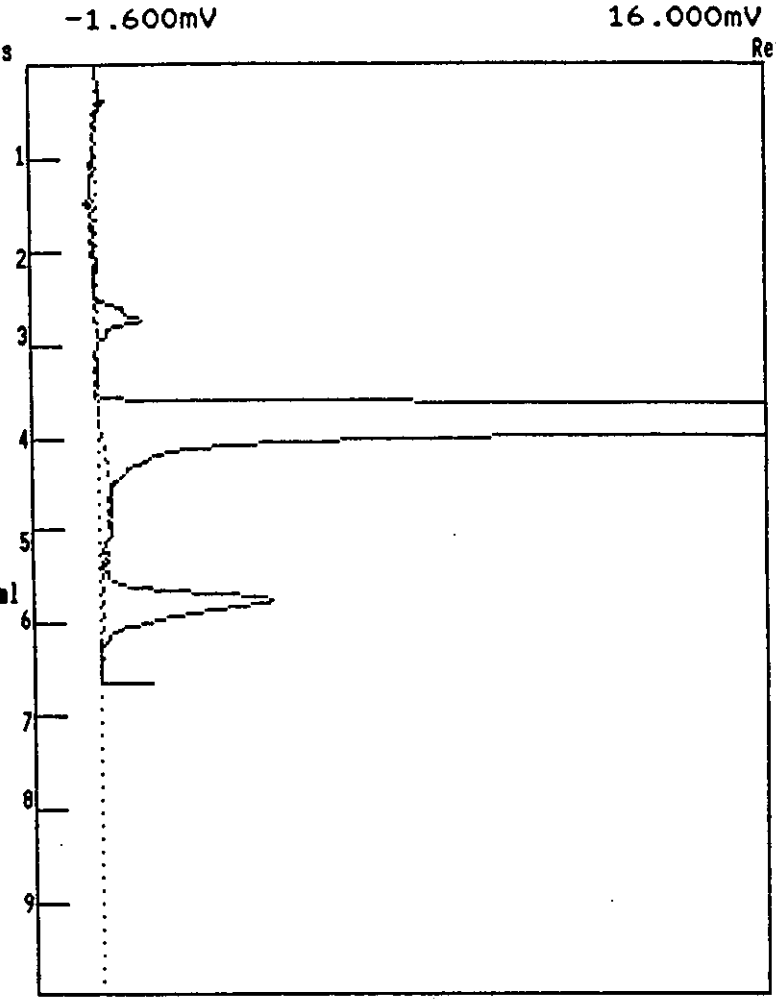
Description : Channel 1
Conditions : Willamet
: Formaldehyde Std 7.4 ng/ml
Date : 02/11/1995
Time : 13:58:47



Component	External	Units	Retention	Height	Area
(unknown)	N/A		2.108	0.786	13.72
Formaldehyde	8.37	ng/ml	5.725	3.300	55.25

184

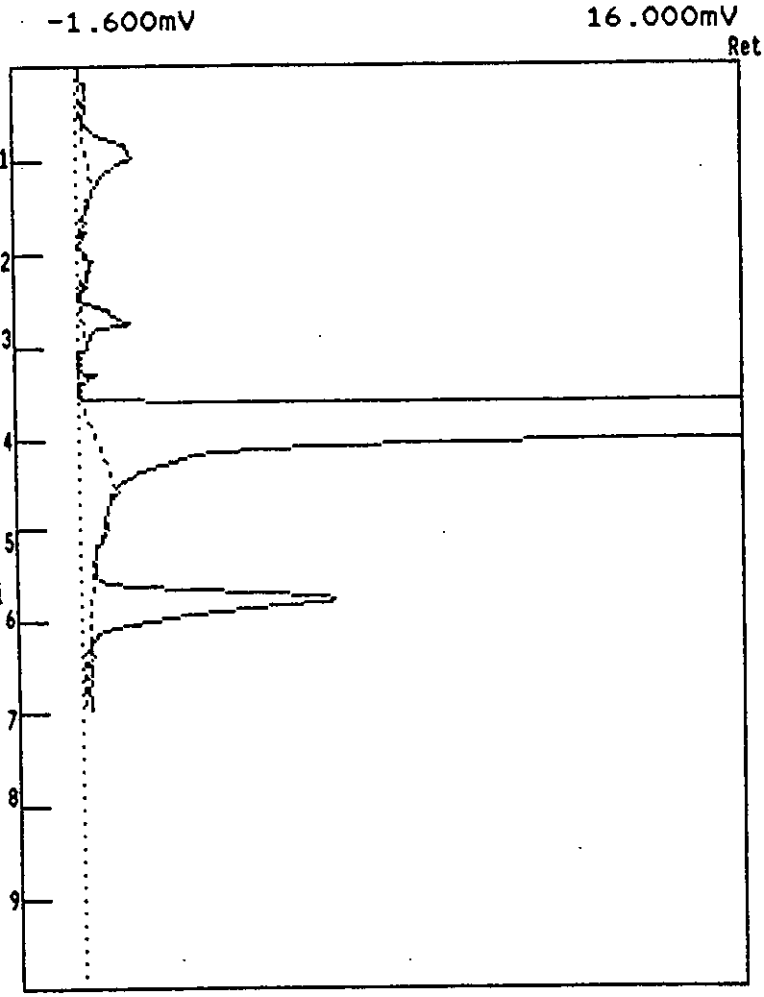
Description : Channel 1
Conditions : Willamete Emerson AR
: SW Press Vent
R1 : Imps & Line Wash
: 200 Ml
: 200x Dil
Date : 02/11/1995
Time : 14:09:19



Component	External	Units	Retention	Height	Area
(unknown)	N/A		2.716	1.155	14.62
(unknown)	N/A		3.733	149.821	1734.00
Formaldehyde	10.34	ng/ml	5.741	4.135	68.28

185

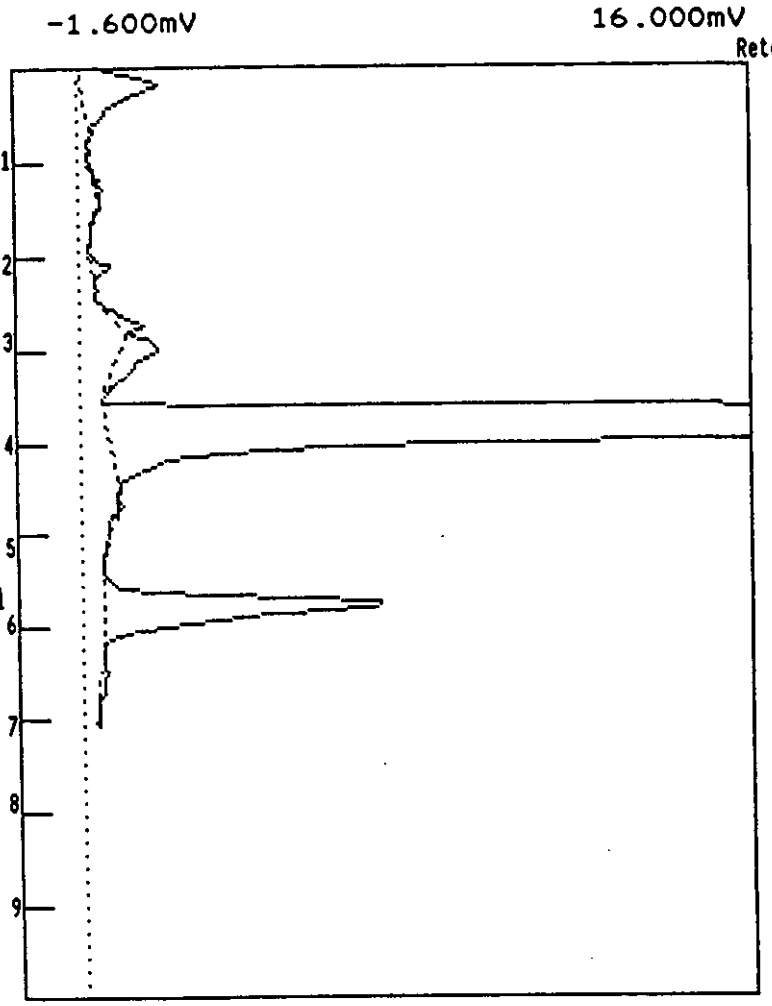
Description : Channel 1
Conditions : Willamete Emerson AR
: R2 SW Press Vent
: Imps & Line Wash
: 250 ml
: 200x Dil
Date : 02/11/1995
Time : 14:19:19



Component	External	Units	Retention	Height	Area
(unknown)	N/A		0.925	1.171	23.88
(unknown)	N/A		2.725	1.199	14.60
(unknown)	N/A		3.741	284.410	3233.28
Formaldehyde	17.63	ng/ml	5.750	5.942	95.55

186

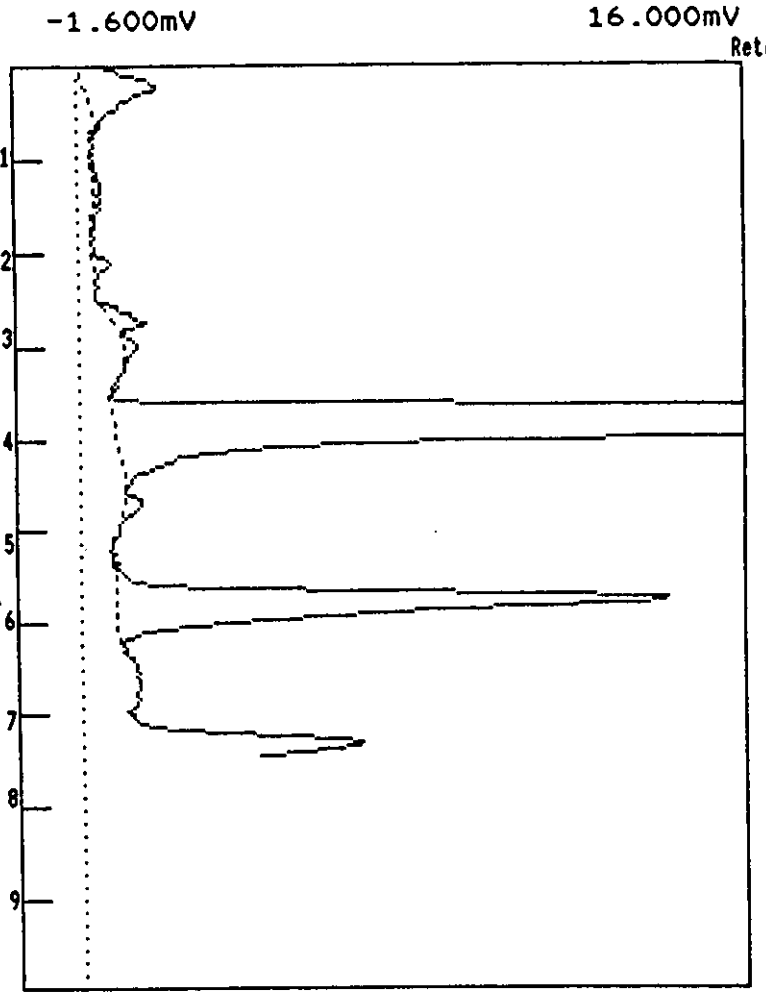
Description : Channel 1
Conditions : Willamete Emerson AR
: R3 SW Press Vent
: Imps & Line Wash
: 250 ml
: 200x Dil
Date : 02/11/1995
Time : 14:27:12



Component	External	Units	Retention	Height	Area
(unknown)	N/A		0.166	1.924	36.40
(unknown)	N/A		2.958	0.824	19.68
(unknown)	N/A		3.741	204.797	2367.55
Formaldehyde	21.21	ng/ml	5.733	6.700	108.55

187

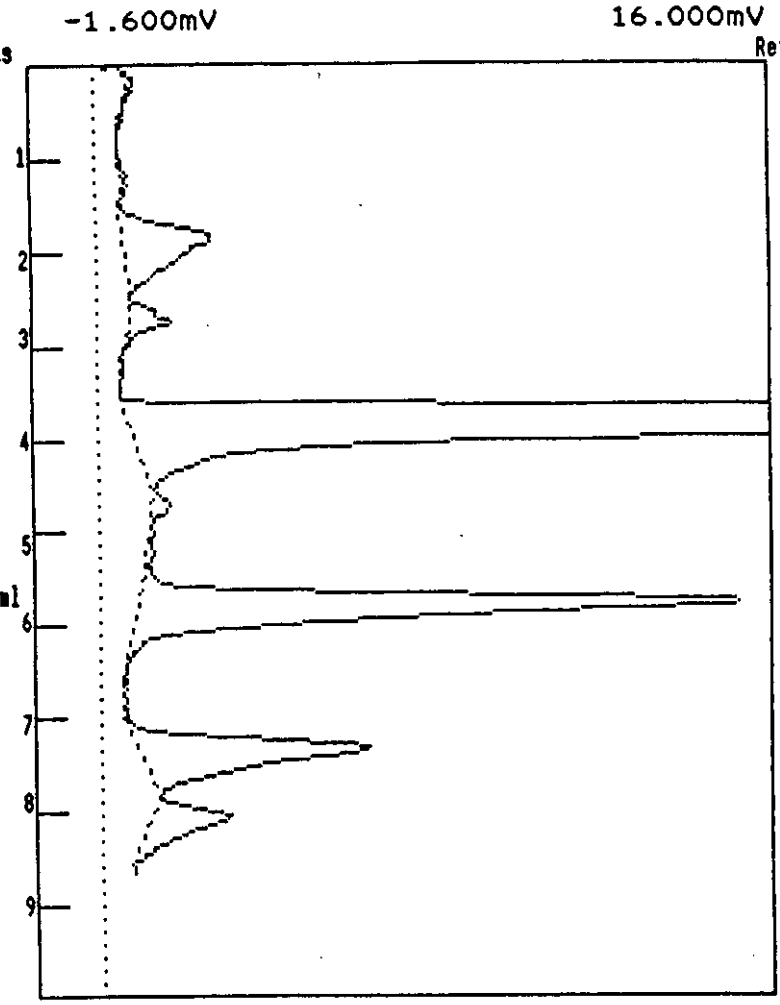
Description : Channel 1
Conditions : Willamete Emerson AR
: R3 NW Press Vent#2
: Imps & Line Wash
: 250 ml
: 200x dil
Date : 02/11/1995
Time : 14:35:02



Component	External	Units	Retention	Height	Area
(unknown)	N/A		0.200	1.745	35.33
(unknown)	N/A		3.741	176.222	2052.40
Formaldehyde	49.36	ng/ml	5.733	13.361	210.88

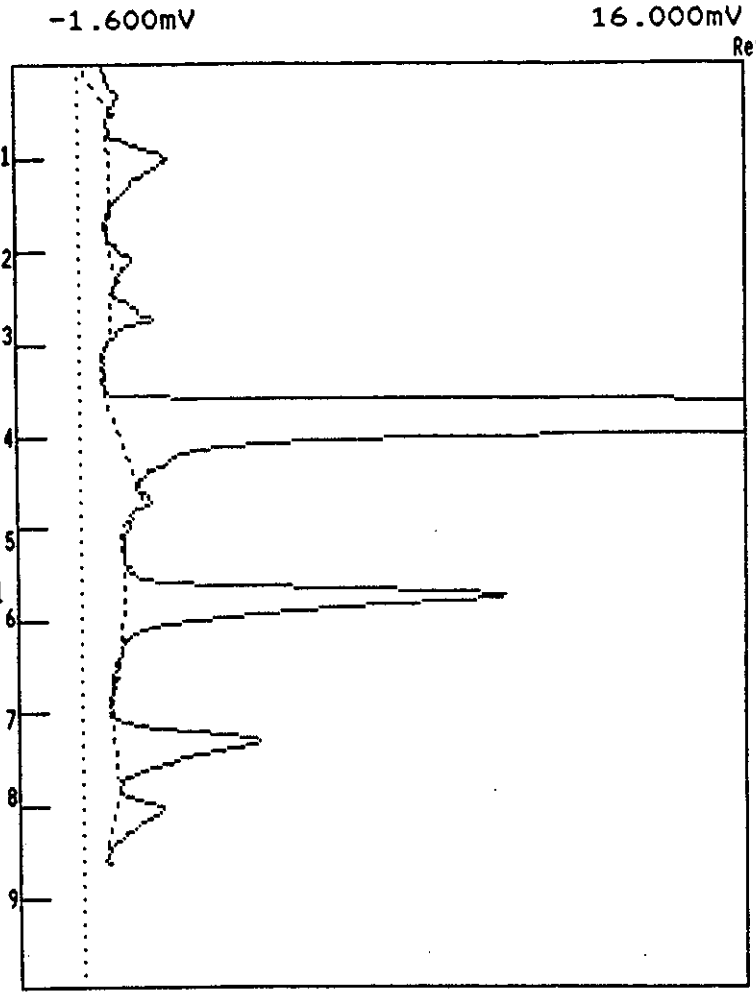
188

Description : Channel 1
Conditions : Willamete Emerson AR
: R4 NW Press Vent#2
: Imps & Line Wash
: 275 ml
: 200x dil
Date : 02/11/1995
Time : 14:44:05



Component	External	Units	Retention	Height	Area
(unknown)	N/A		1.800	2.105	56.70
(unknown)	N/A		2.725	1.147	13.15
(unknown)	N/A		3.741	170.851	2004.75
Formaldehyde	55.88	ng/ml	5.741	14.589	234.95
(unknown)	N/A		7.316	5.544	106.30
(unknown)	N/A		8.050	1.894	36.48

Description : Channel 1
Conditions : Willamete Emerson AR
: R3-5 Boiler
: Imps & Line Wash
: 425 ml
: 200x dil
Date : 02/11/1995
Time : 14:53:57



Component	External	Units	Retention	Height	Area
(unknown)	N/A		0.291	0.534	11.85
(unknown)	N/A		1.000	1.465	32.40
(unknown)	N/A		2.733	1.100	12.50
(unknown)	N/A		3.733	170.663	2007.47
Formaldehyde	32.11	ng/ml	5.716	9.230	148.18
(unknown)	N/A		7.308	3.624	68.45
(unknown)	N/A		8.008	1.174	22.95

190

APPENDIX C

Northwest Press Vent #2 2/9/95

5/8" board VOC's

Run # 3; 12:14- 1:15

28 19 19.5
23 18 16
28.5 19 18
36 32 33
37 39 40
36 42 43
28 35 35.5
30 26.5 22.5
25.5 20 19.5
26.5 19 17
24 27 21
40.5 40 37
41 48 37
35 50.5 2791.5 ÷ 89 = 31.37
30 39 UV = 5.195
23 38 = 162.9 PPM = 488.7 as C
19.5 28.5
21 26
32 31.5
41 40.5
43 40.5
43 35
32 29
22.5 24
19 19
22 23.5
33 36
46.5 43
54 42
45 32
29 25
23 21.5
21 20.5
30 29.5
44 37
48.5 38.5
46 37

NW Press Vent #2 2/9/95
5/8" Board VOC

	R2 1:40-2:42					R3 2:53 - 3:54				
	1	2	3	4	5	6	7	8	9	
1	14	27	44			33	27	22		
2	16	42	50			26	20	18		
3	30	39	50			32	17	22		
4	45	36	52			38	21	32		
5	46	28	38			44	30	37		
6	41	19	33			41	33	35		
7	28	19	31			33	37	30		
8	20	21	43			29	28	23		
9	16	34	47			20	19	19		
10	20	47	47			12	17	21		
11	31	44	36			10	18	29		
12	37	39	25			8	24	42		
13	36	27	23			10	40	48		
14	29	22	27			19	39	41		
15	17	21	34			38	34	29		
16	14	27	41			37	24	24		
17	19	41	43			34	17	16		
18	32	50	49			31	18	18		
19	41	57	43			26	21	25		
20	49	42	31			22	39	28		
21	46	28	31			20	52	27		
22	34	28	34			30	49	26		
23	21	24	37			27	34	24		
24	23	37	41			19	22	21		
25	29	48	42			13	20	23		
26	40	41	2930 ÷ 87 = 33.678			11	18	32		
27	38	44	UV 5.405			13	30	44		
28	37	31	= 182.029 ppm			21	47	2473 ÷ 89 = 27.786		
29	26	28				33	47	UV = 5.405		
30	21	23				37	39	150.186 ppm		
31	21	27			27	39	29			

Southwest Press Vent #1 2/8/95

3/4" board VOC's

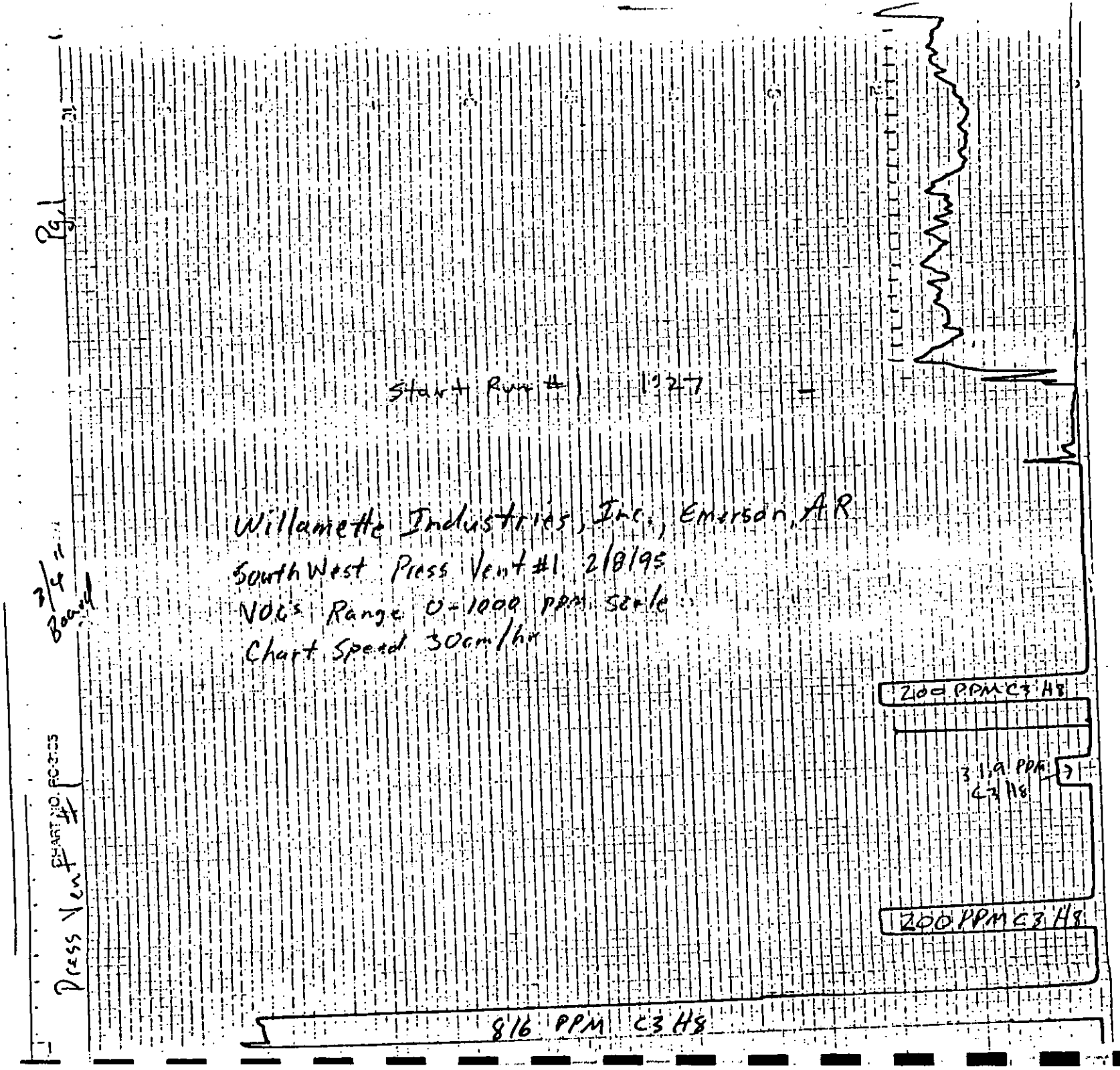
Run #1; 1:27-2:27			Run #2; 2:52-3:52			Run #3; 4:14-5:14		
4	11	9	25	18	25	18.5	34.5	28
16	13	9	23	17.5	19	21	30	32
13	15.5	10.5	21	19	14.5	44	33	37
13	19	13	20	25	12	35.5	33	37
12.5	15	15	14	31.5	15	30	26.5	27
13	16	17	12	36	19	17	30.5	19
12.5	11.5	20	11	38	32	14	39	21
15	9.5	22	14	52	17	13.5	35	25
13	9.5	17	21	38	15	22	33.5	30
14.5	11	15.5	29	23	24	43	44	41.5
12	13.5	11	38	18	27	30	29	33
12	15	9	41	15.5	27.5	30	31	2685.5 ÷ 87
13.5	18	1162 ÷ 88 = 13.20	42	17	2243 ÷ 88 = 25.49	24	33	= 30.87
10.5	18	Unit Value: 9.756	44	22	Unit Value: 5.0	25	39	Unit Value: 5.0
10.5	16	= 128.8 PPM	31	31	= 127.4 PPM	32	31	= 154.4 PPM
10.5	14		20	37		32.5	30	463.2 °C
10	10	356.4 °C	16.5	38	352.2 °C	40	33	
11	9		15	37.5		28	27	
12.5	10		17.5	39		27	28.5	
13.5	11		22	30		25	31	
14	14		30	22		24.5	45	
13	16		39	13		28.5	36.5	
19	18		41.5	11.5		39	39	
12	21.5		41	10.5		33	26.5	
10.5	17		47	15		34	27	
10.5	17		33	22		32	31	
10.5	12		22	26		26	35	
11	9		18	26		29	41	
7.5	9		17	47		29	34	
14.5	11		18	23		34	29	
16.5	13		26	14		24	21	
14	16		32	11.5		30	28	
13	19		40.5	10		32	30	
12.5	21		43	13		30	36	
9	20.5		42	16.5		30.5	37.5	
8	18		48	20		41.5	41	
8	18		30	23		30	26	

Northwest Press Vent #2 2/9/95

3/4" board VOC's

Run #1; 8:23-9:26			Run #2; 9:38-10:38		
16.5	34.5	29	15	42	28
28	31	41	15.5	42	26
39	23.5	38	17	42	25
50.5	22	40	26	32	28
47	20	40	33	35.5	35
43	24	33	36	29.5	38
40	24.5	31	37	17	35
34.5	19.5	31	36	17	36
25	19	28	29	22	32
24	21	22	23.5	33.5	23.5
25	37	22	19.5	39	27
28	39.5	27	15.5	39.5	30.5
40	37	2611.5 ÷ 88 = 29.68	13	38.5	26
44.5	35.5	Unit Value = 5.263	16	40	2631 ÷ 89 = 29.56
44	32	= 156.2 PPM	25	28	U V = 5.0
40.5	28	468.6 C	34	26	= 147.8 PPM
37	23.5		36.5	21.5	
32	16		36.5	20	443.4 C
24	13.5		40	22.5	
27	10		32.5	27	
29	8.5		28.5	26.5	
29	13		24.5	41	
32	12		20	39	
28	18		18	27	
41	24.5		21	34	
41	35.5		31.5	25	
38.5	40		38	23	
33.5	42		40	24.5	
31	40		42	27	
24	37		38	25.5	
35	22		29	30	
23.5	21.5		24.5	39	
24	20		20.5	50	
30	19		18	42	
33	23		18	38	
40	20		23	34	
41	20		35	28	

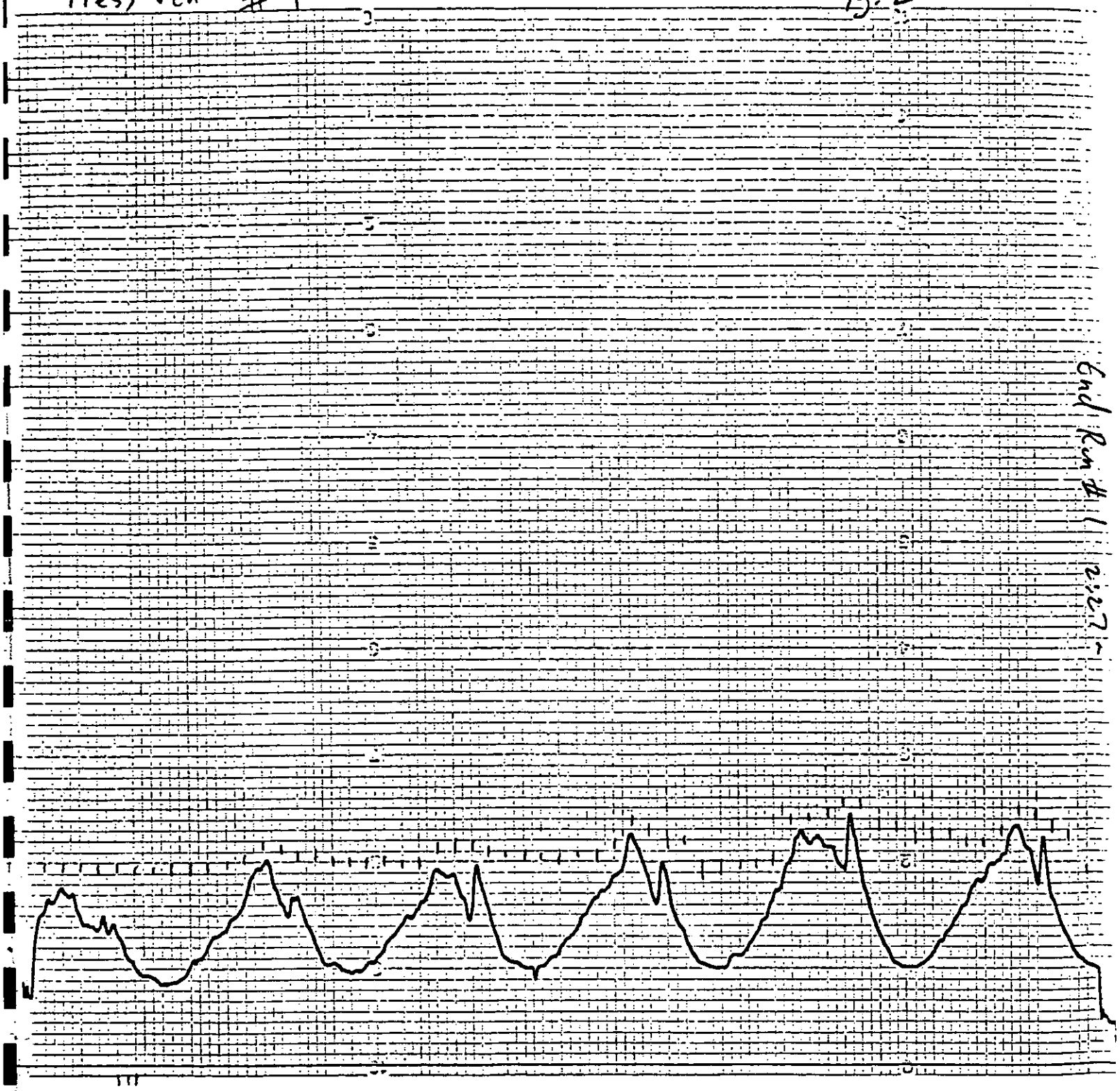
195


Start Run #1 1327
Willamette Industries, Inc., Emerson, AR
SouthWest Press Vent #1 2/8/95
VOCs Range 0-1000 PPM Scale
Chart Speed 30cm/hr
200 PPM C3 H8
319 PPM C3 H8
200 PPM C3 H8
816 PPM C3 H8
Press Vent #1
Pg 1
3/4 = Board
30

Press Vent #1

THE RECORDER Co. P.O.BOX 3, San Marcos, Tx 78667 Tel. 512-[illegible]

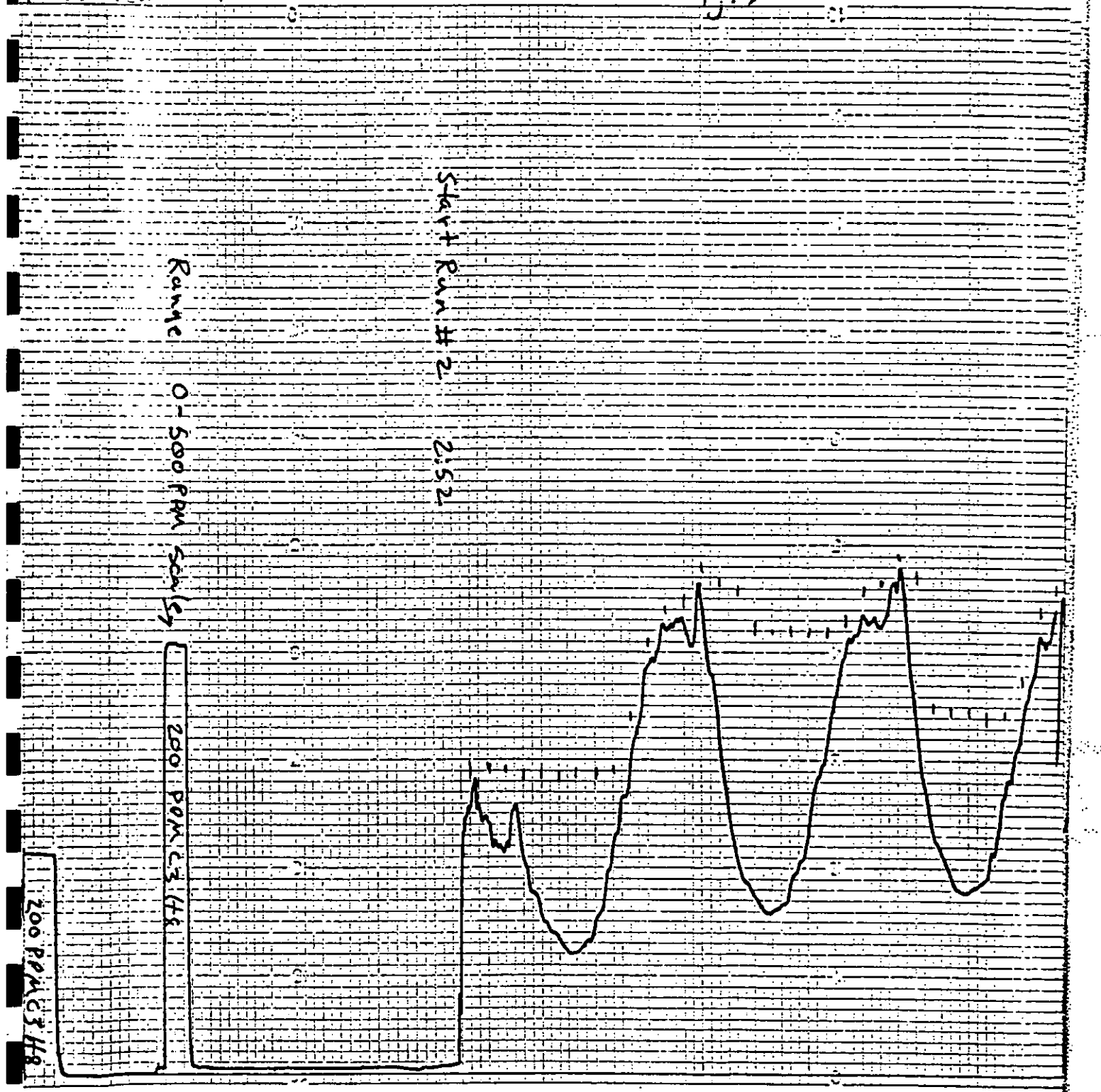
Pg. 2



197

Press Vent #1

Pg. 3

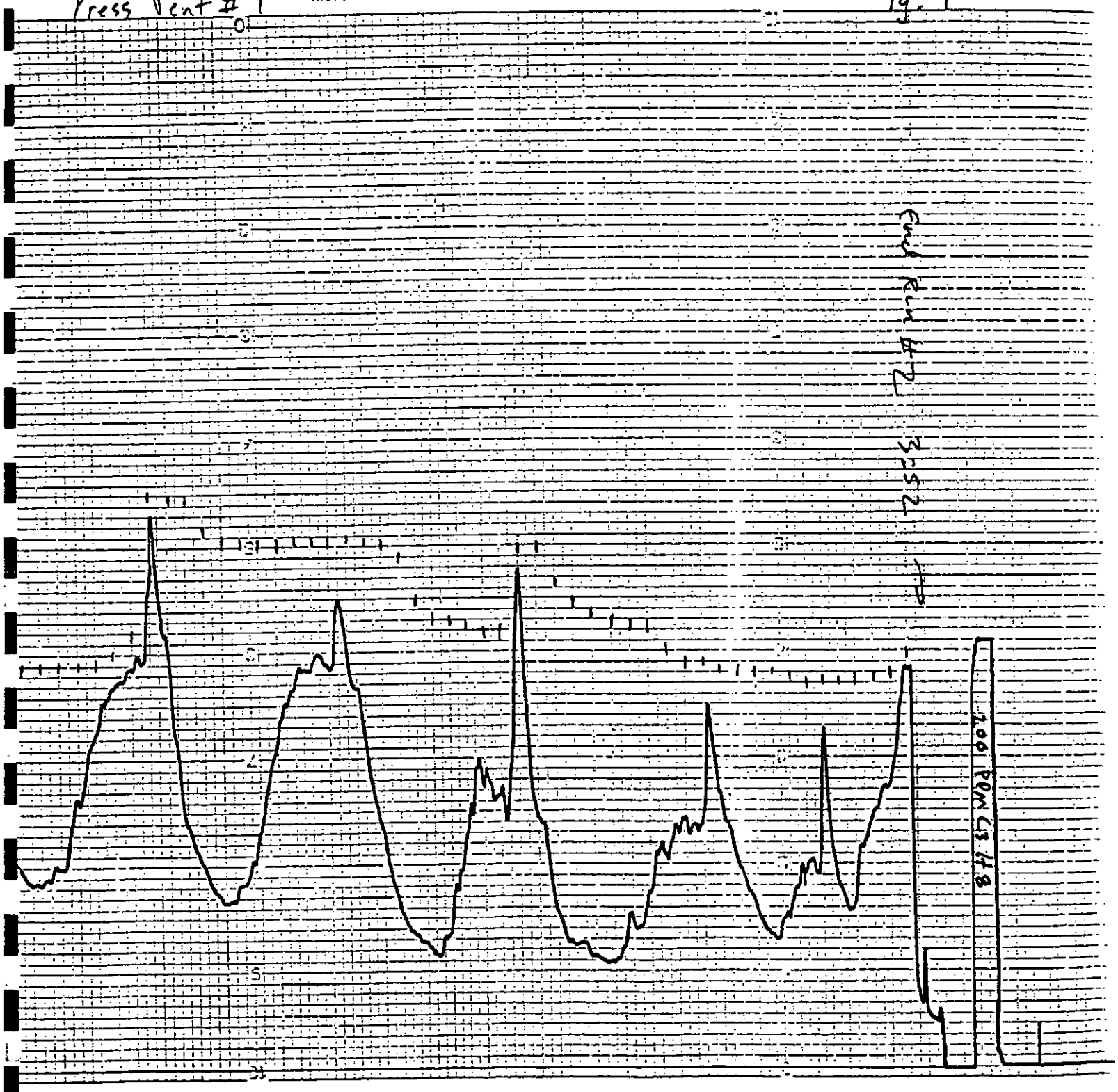


198

T NO. RC-3135

Press Vent # 1

Pg. 4



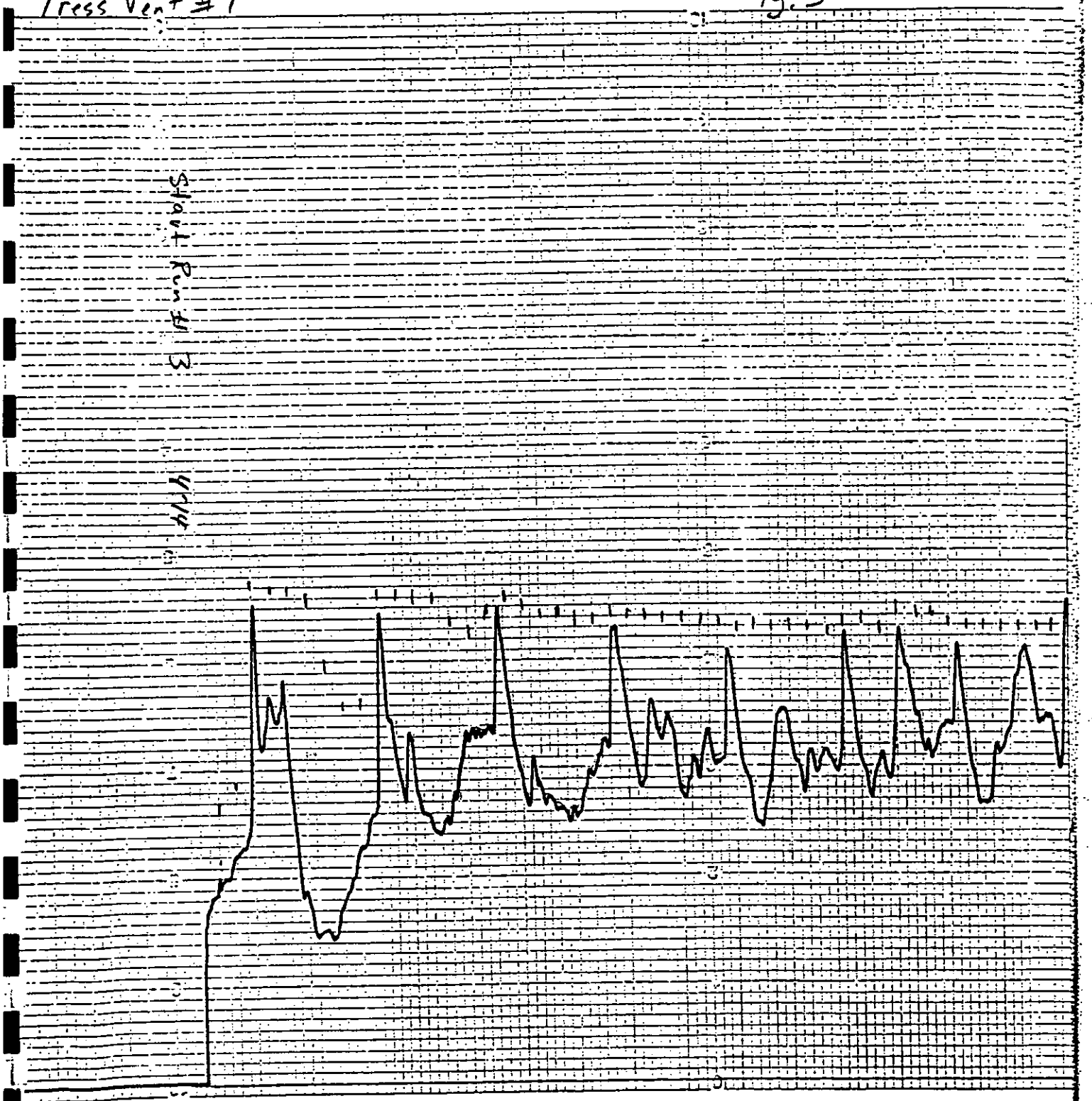
199

Press Vent #1

Pg. 5

Start Run #3

4/4/4

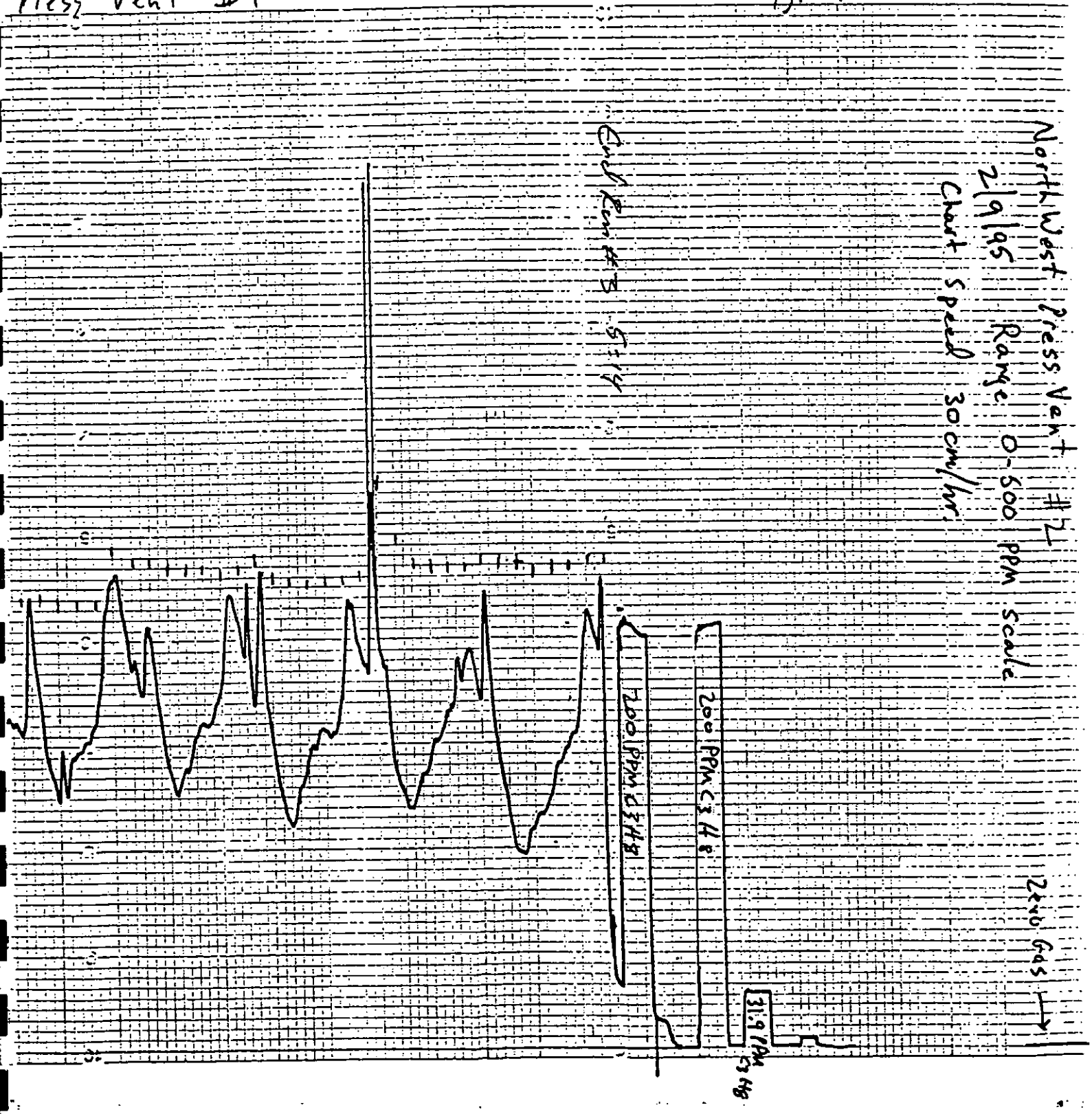


200

Press Vent #1

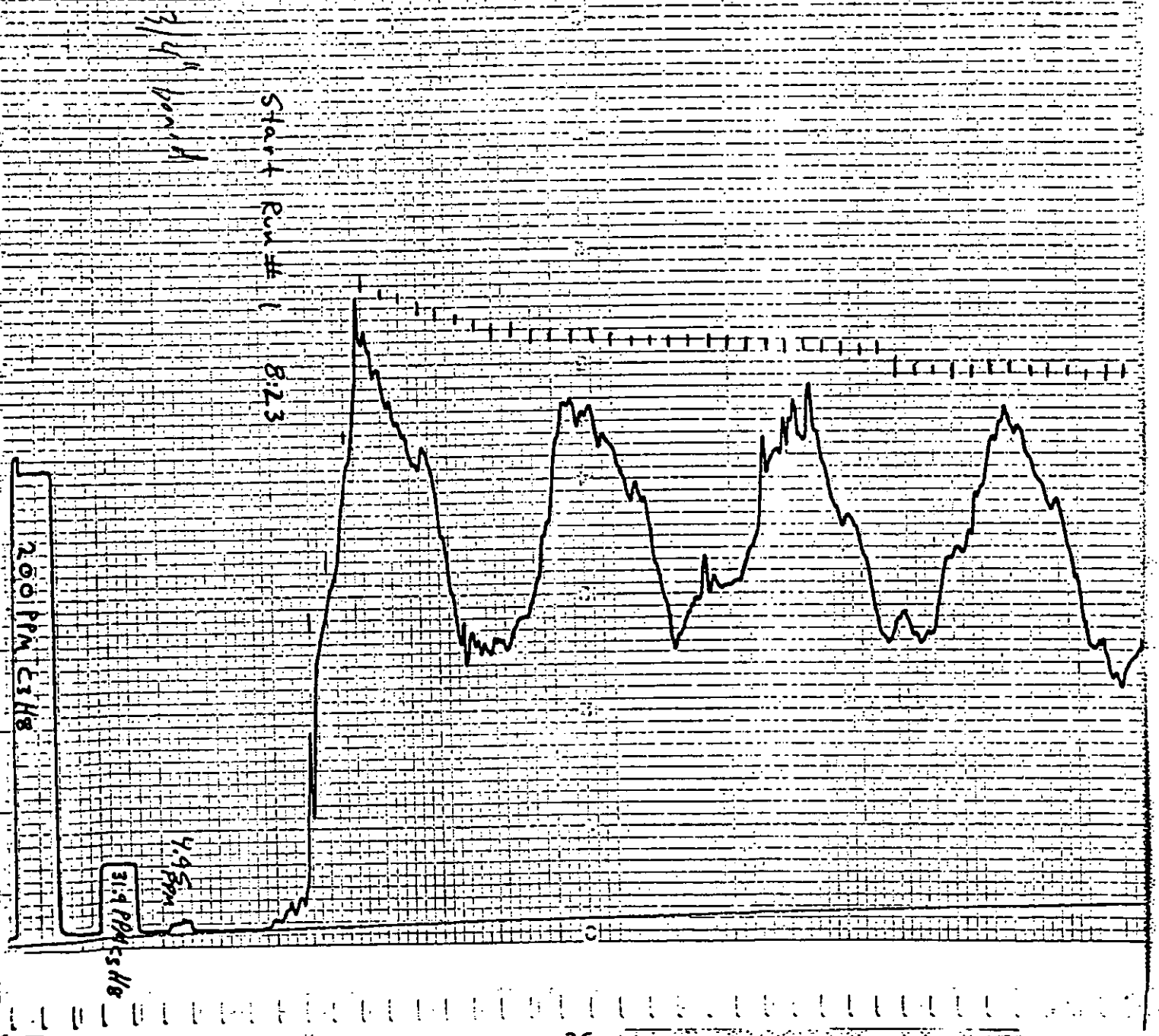
Pg. 7

CHART NO. RC-3105



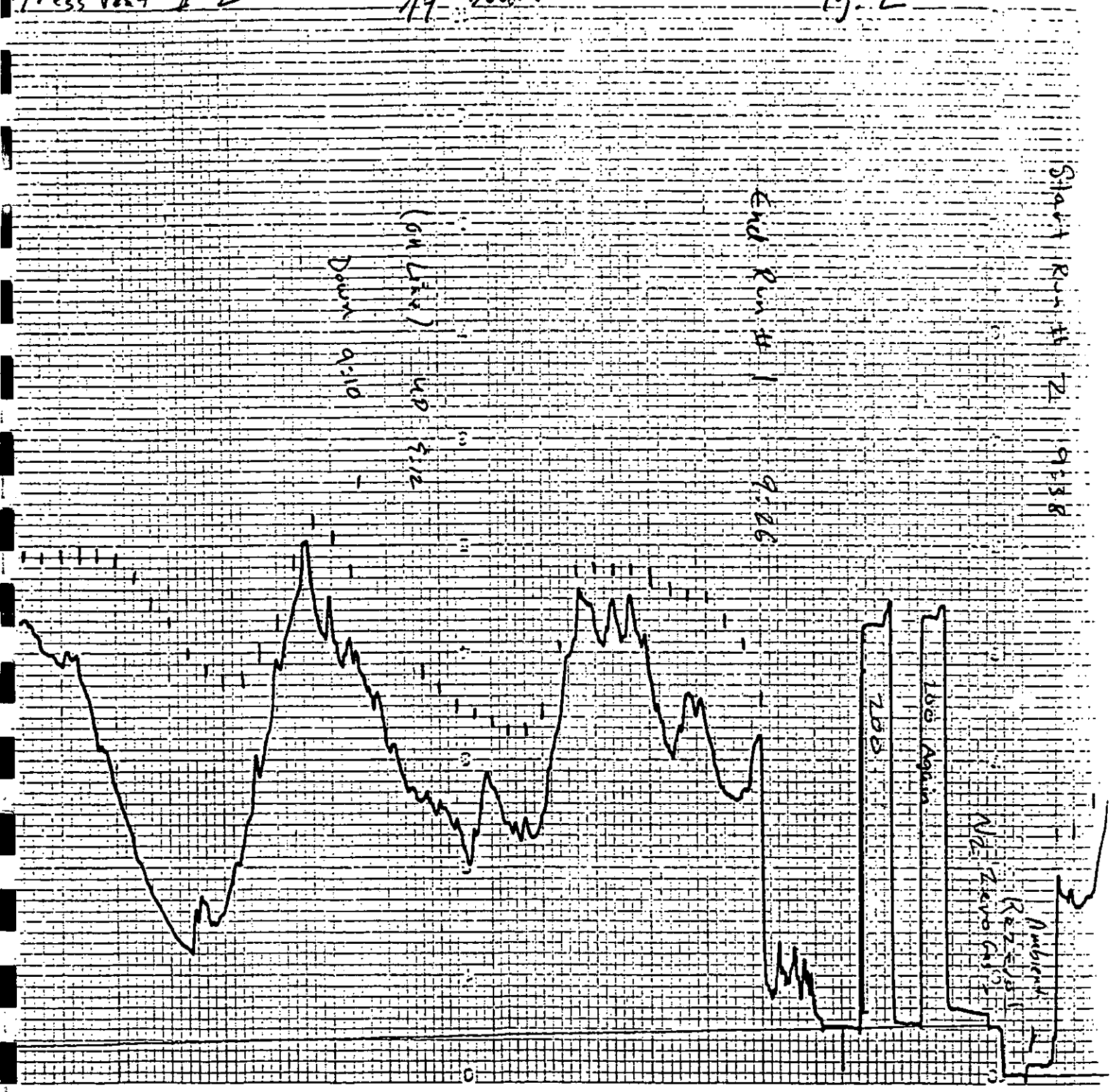
201

Press Vent #2 3/4" board Pg. 1



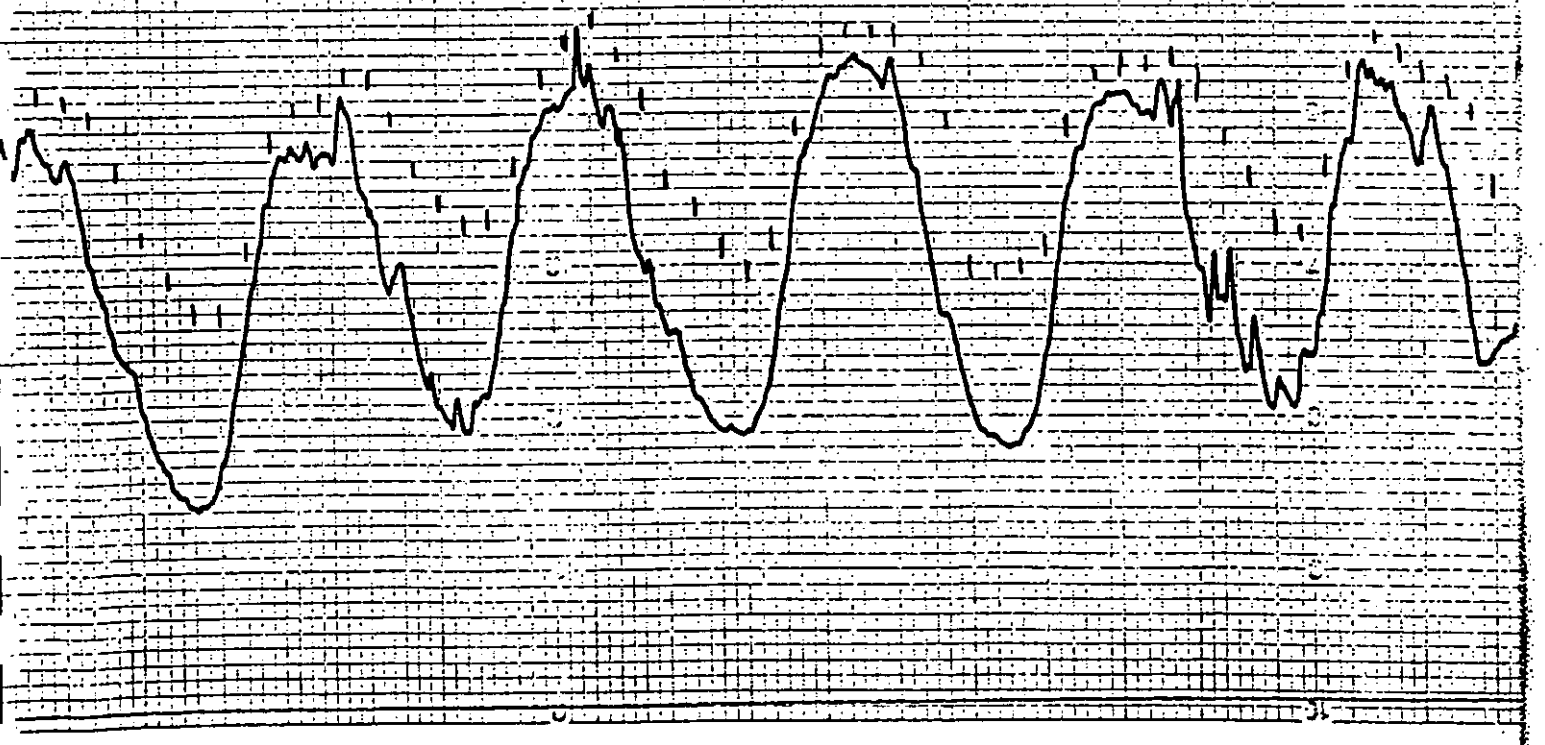
202

Press Vent # 2 3/4" board Pg. 2



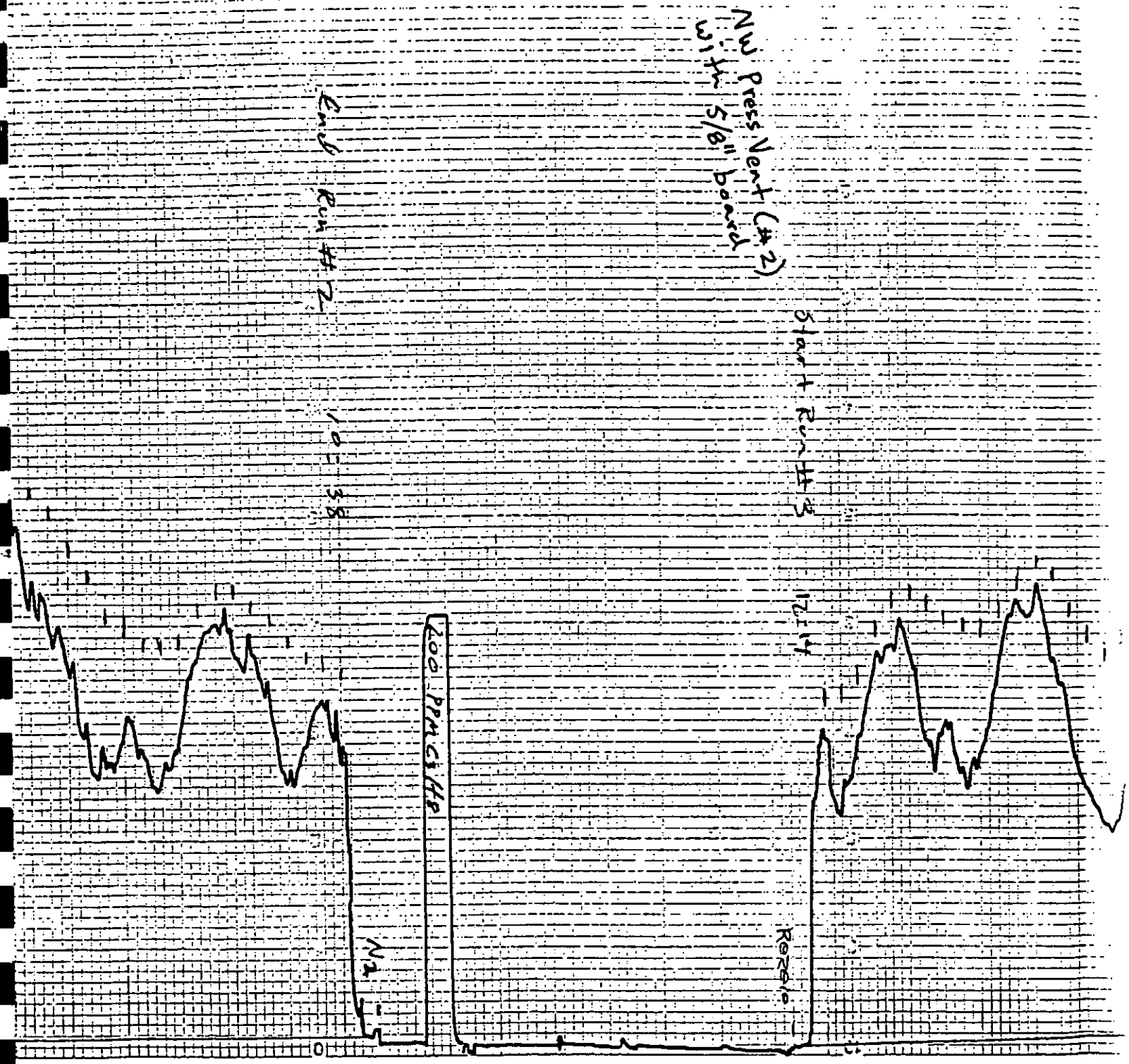
203

Press Vent #2 3/4" board CHART NO. RD-3 Pg. 3



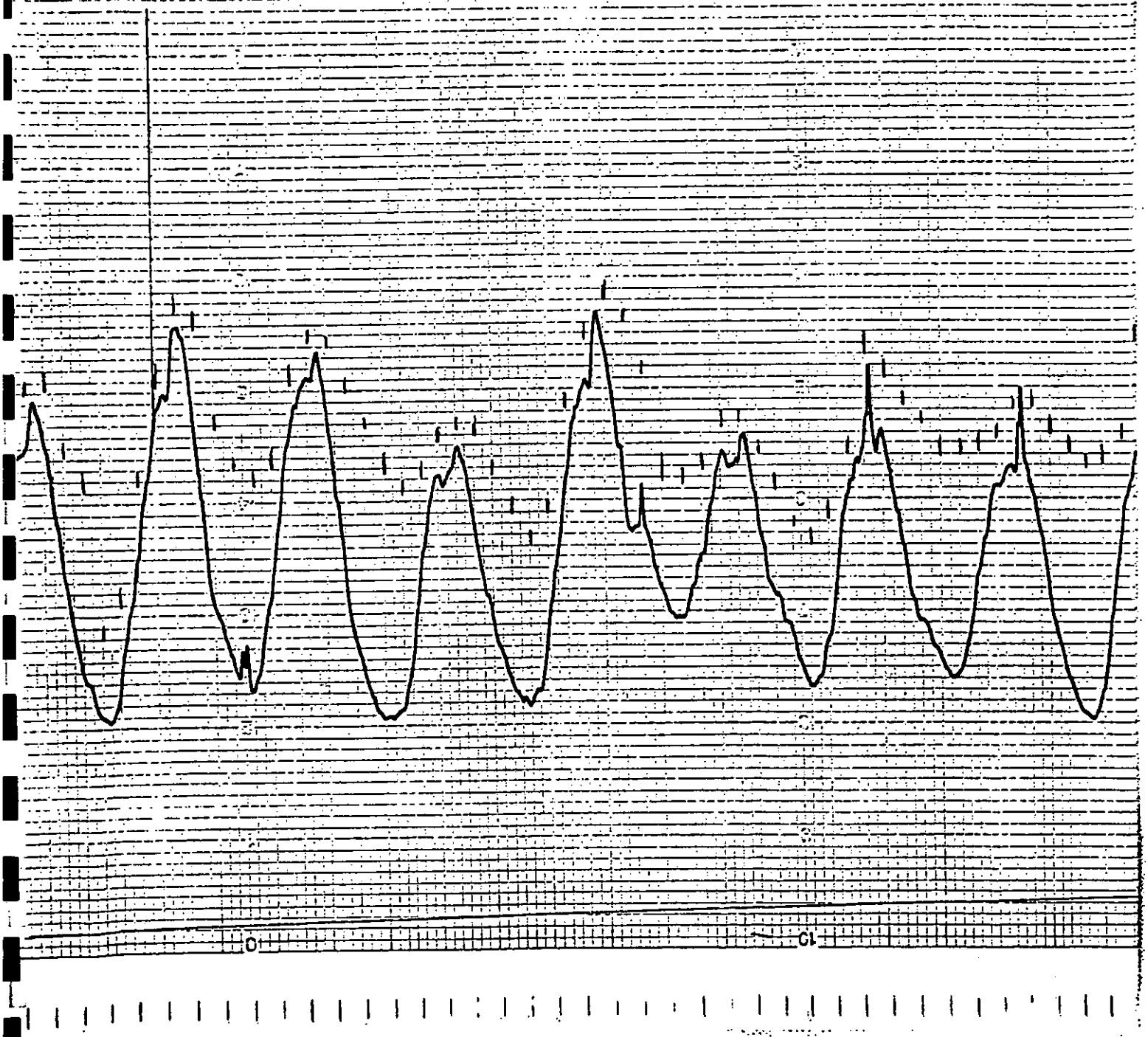
204

Press Vent # 2 3/4" board Pg. 4



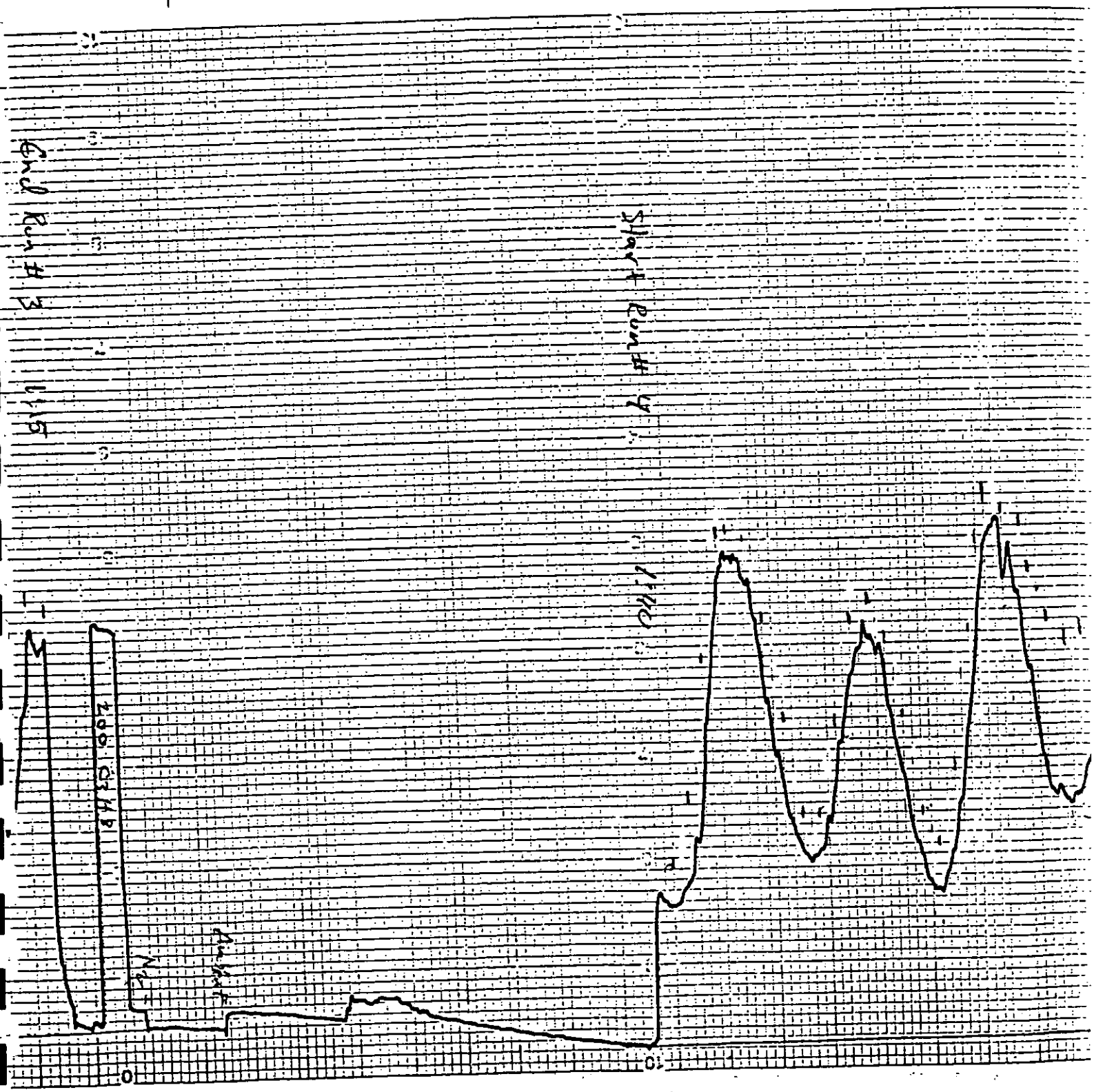
205

Press Vent # 2 5/8" board Pg. 5

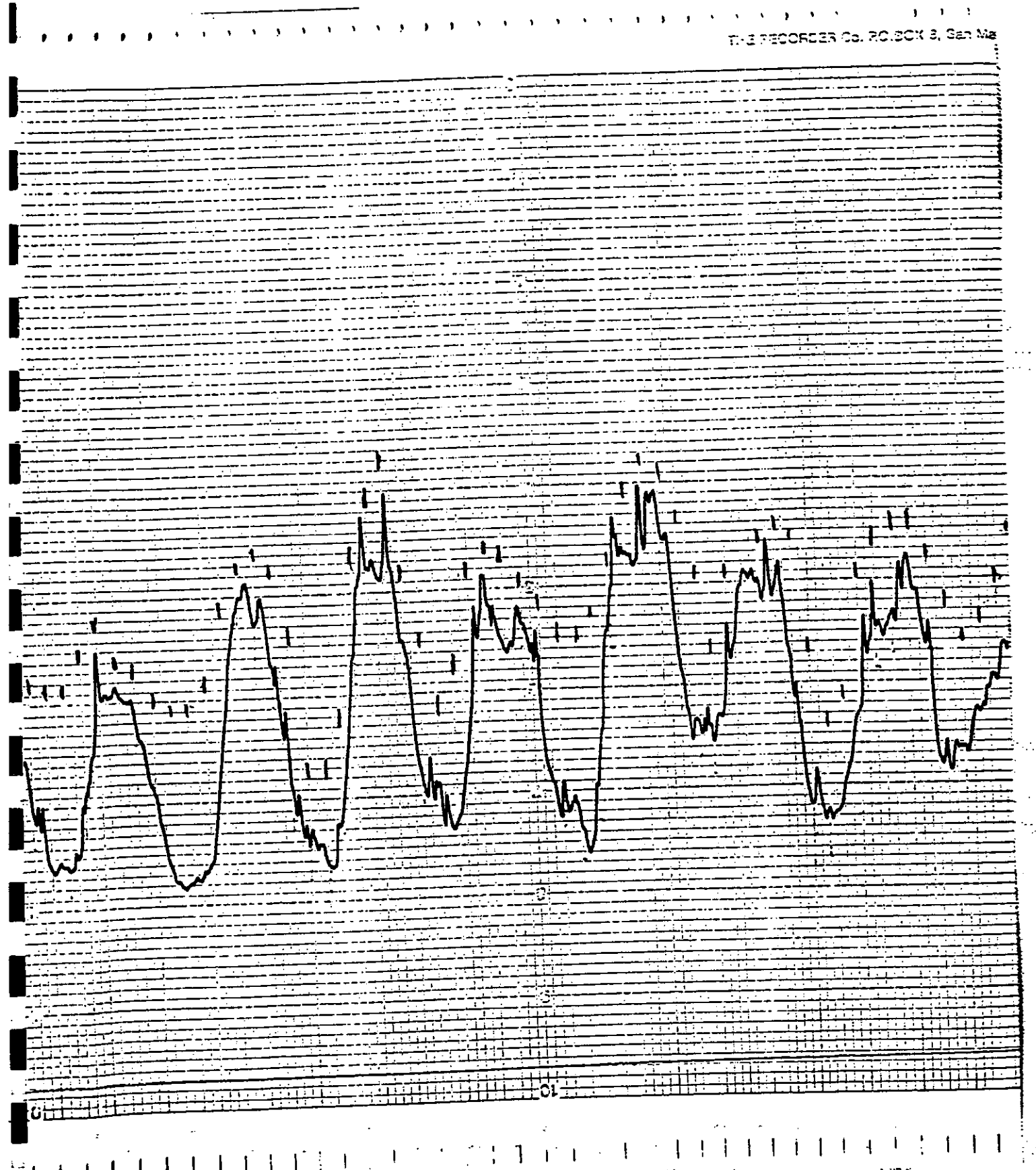


206

CHART NO. RC-3135

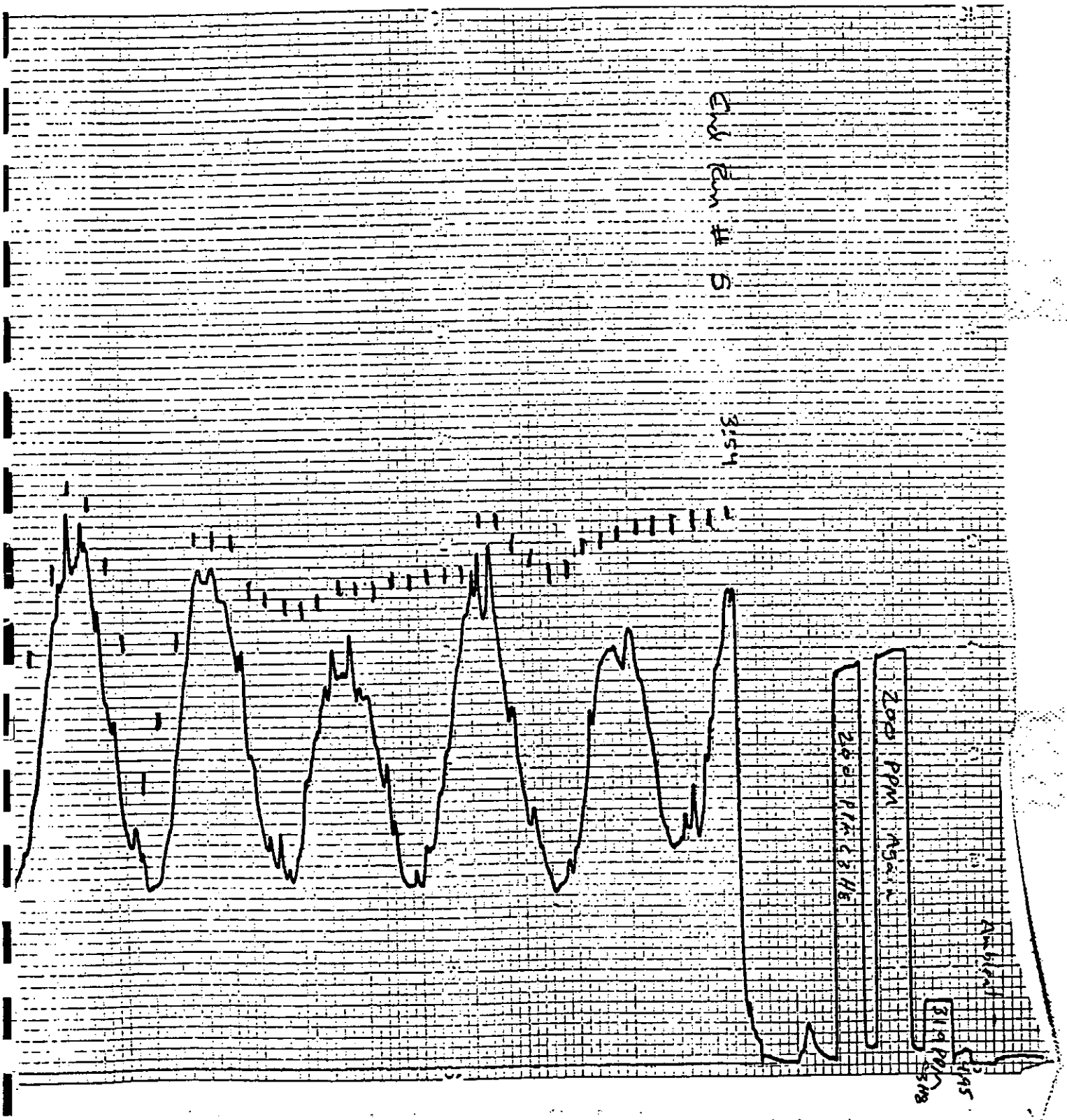


207



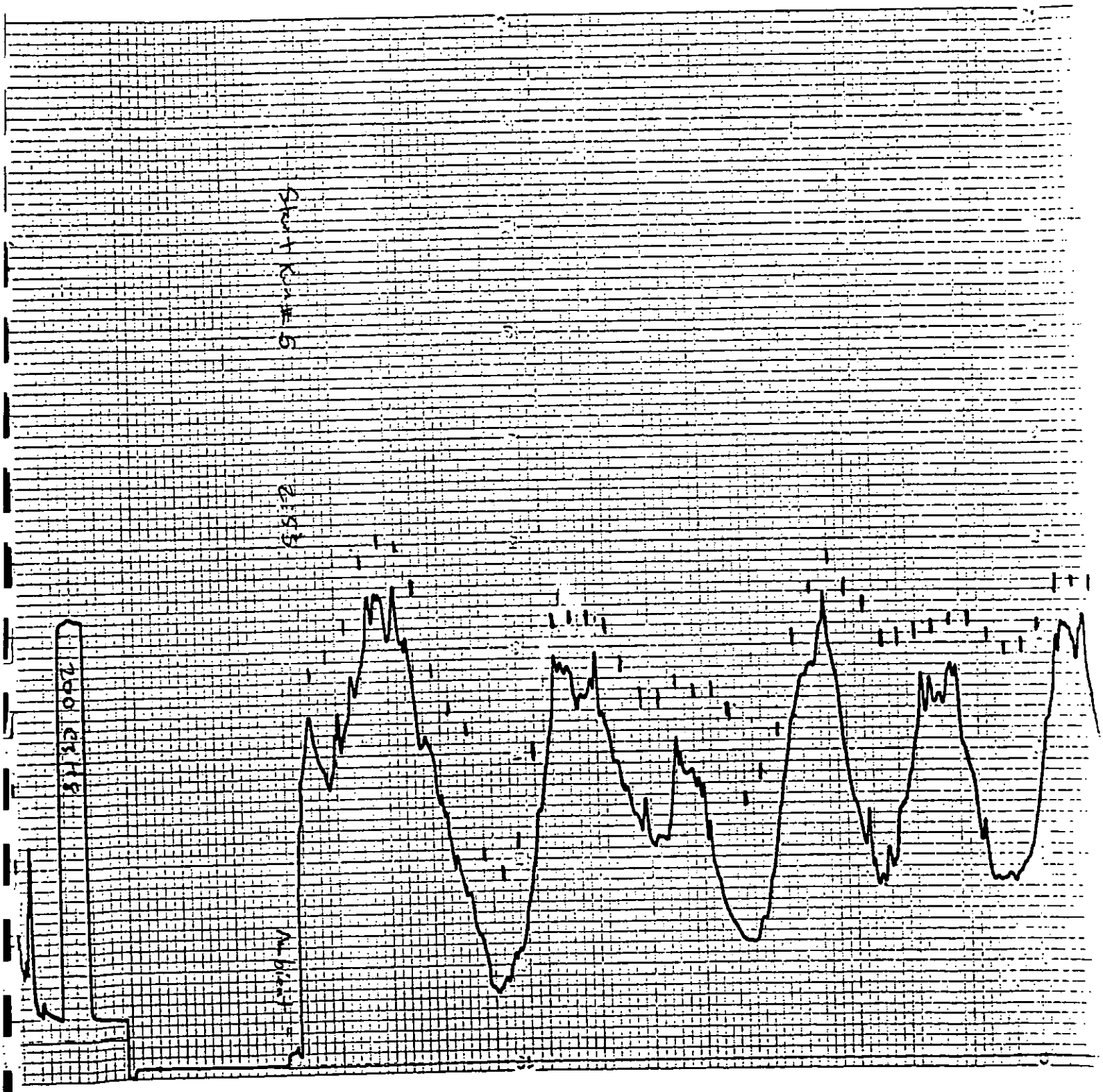
208

CHART NO. RC-S105



209

3367 Tel 512-6291400



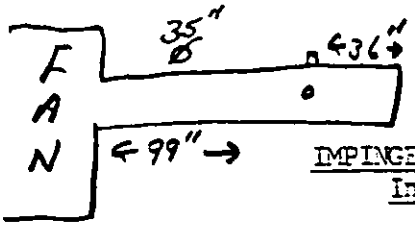
210

APPENDIX D

PARTICULATE FIELD DATA

0 = 4.357
1 = 2.82
2 = 3.0

PLANT: Willamette Emerson
DATE: 2-8-95
REPETITION: 1



LOCATION: Press Vent
OPERATOR: DB, CJB
STACK #: S.W
SAMPLE BOX #: 12
METER BOX #: 8
AMBIENT TEMPERATURE: 48°
BAROMETRIC PRESSURE: 30.27
ASSUMED MOISTURE: 1%
PROBE LENGTH: 73"
NOZZLE IDAMETER: .499, .499, .498
STACK DIAMETER: 35"
METER H : 1.564869
C FACTOR: .84
METER CO-EFFICIENT: 1.023197

IMPINGERS

	Initial	Final
#1:	200 ml S	200
#2:	200 ml S	200
#3:		
#4:	200 gm	
#5:		

DMPH
S.G.

COMMENTS

CO2	O2
.5%	20.5%

FILTER TARE: .4713

PRE-TEST LEAK CHECK
Meter: 0.010 cu. ft. 15 in. HG
Pitots: in. H2O
3.2
3.3

Constant Rate

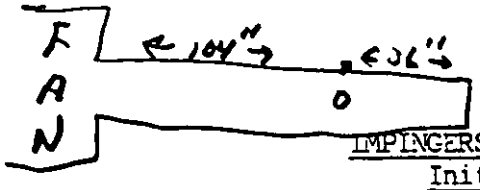
POST-TEST LEAK CHECK
Meter: 0.010 cu.ft. 6 in. HG
Pitots: in. H2O
3.3
3.5

P #	θ	STATIC PRES.	Ts °F	ΔP	√ΔP	ΔH	Vm FT.3	Tm INLET	Tm OUTLET	OVEN TEMP.	IMP OUTLET TEMP.	VACUUM (IN Hg)
A 1	1:27		82	.01		1.0	897.798	56	57	236	54	1.0
2	1:32		84	.01		1.0	900.641	57	57	248	54	1.0
3	1:37		78	.01		1.0	903.458	59	57	252	55	1.0
4	1:42		80	.01		1.0	906.317	59	58	254	56	1.0
5	1:47		80	.02		1.0	909.138	60	58	252	57	1.0
6	1:52		78	.02		1.0	911.959	61	59	253	58	1.0
7	1:57		82	.01		1.0	914.783	62	60	255	58	1.0
8	2:02		84	.02		1.0	917.542	62	60	256	56	1.0
9	2:07		81	.01		1.0	920.452	62	61	254	58	1.0
10	2:12		82	.04		1.0	923.284	62	61	253	59	1.0
11	2:17		85	.02		1.0	926.131	63	61	252	59	1.0
12	2:22		82	.03		1.0	928.973	63	61	240	58	1.0
B 1	2:37			.04		X	931.834					
2				.02								
3				.02								
4				.02								
5				.02								
6				.04								
7		+.01		.04								
8				.01								
9				.01								
10				.01								
11				.01								
12				.01								
Av												

PARTICULATE FIELD DATA

PLANT: Willamette Emerson
DATE: 2-9-95
REPETITION: 1

LOCATION: Press Vent
OPERATOR: DB, CJ, JD
STACK #: N.W.
SAMPLE BOX #: 12
METER BOX #: 8
AMBIENT TEMPERATURE: 45°
BAROMETRIC PRESSURE: 30.1
ASSUMED MOISTURE: 1%
PROBE LENGTH: —
NOZZLE IDAMETER: —
STACK DIAMETER: 35"
METER H : 1.564869
C FACTOR: .84
METER CO-EFFICIENT: 1.023197



IMPINGERS

	Initial	Final
#1:	100ml S	112
#2:	100ml S	100
#3:	—	
#4:	200gr. S.G	
#5:		

COMMENTS

CO2 O2

FILTER TARE: N/A

PRE-TEST LEAK CHECK
Meter: 0.010 cu. ft. 15 in. HG
Pitots: in. H20
L 3.1
L 3.3

POST-TEST LEAK CHECK
Meter: 0.010 cu.ft. 6 in. HG
Pitots: in. H20
L 2.8
L 20

P #	Θ	STATIC PRES.	Ts °F	ΔP	√ΔP	ΔH	Vm FT.3	Tm INLET	Tm OUTLET	OVEN TEMP.	IMP OUTLET TEMP.	VACU (IN H
A 1	8:23		78	.08		1.5	1.545	42	42		44	1.0
2	8:28		82	.11		1.5	4.839	44	42		44	1.0
3	8:33		81	.08		1.5	8.091	46	43		43	1.0
4	8:38		78	.06		1.5	11.344	47	43		43	1.0
5	8:43		78	.02		1.5	14.589	48	44		44	1.0
6	8:48		79	.01		1.5	17.954	48	44		44	1.0
7	8:52			.01		X	21.599					
8				.02								
9				.05								
10				.07								
11				.08								
12				.06								
B 1				.02								
2				.01								
3				.01								
4				.01								
5				.01								
6				.01								
7		+.04		.03								
8				.03								
9				.04								
10				.06								
11				.11								
12				.12								
AV				.19799			20.054					

PARTICULATE FIELD DATA

PLANT: Willamette Emerson
DATE: 2-7-95
REPETITION: 2

LOCATION: Press Vent
OPERATOR: DB, CJ, JB
STACK #: N.W.
SAMPLE BOX #: 12
METER BOX #: 8
AMBIENT TEMPERATURE: 45°
BAROMETRIC PRESSURE: 30.1
ASSUMED MOISTURE: 1%
PROBE LENGTH: —
NOZZLE IDAMETER: —
STACK DIAMETER: 35"
METER H : 1.564869
C FACTOR: .84
METER CO-EFFICIENT: 1.023197

IMPINGERS

	Initial		Final
#1:	100ml S	H_2O	116
#2:	100ml S		100
#3:	—		
#4:	200gm	S.G.	
#5:			

COMMENTS

COL O2

FILTER TARE: N/A

PRE-TEST LEAK CHECK
Meter: 0.010 cu. ft. 15 in. HG
Pitots: in. H20
L 3.1
L 3.2

POST-TEST LEAK CHECK
Meter: 0.010 cu.ft. 6 in. HG
Pitots: in. H20
L 3.2
L 3.4

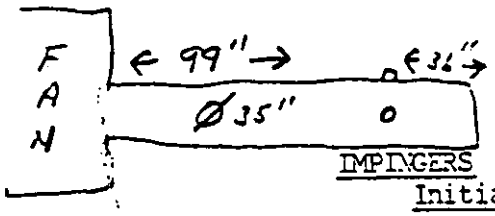
P #	Θ	STATIC PRES.	Ts °F	ΔP	√ΔP	ΔH	Vm FT.3	Tm INLET	Tm OUTLET	OVEN TEMP.	IMP OUTLET TEMP.	VACUU (IN Hg
A 1	9:38		82	.09		1.5	21.750	44	44		45	1.0
2	9:43		89	.05		1.5	24.536	46	44		46	
3	9:48		81	.05		1.5	28.376	48	45		45	
4	9:53		82	.03		1.5	31.701	49	45		45	
5	9:58		84	.01		1.5	35.526	50	45		45	
6	10:03		82	.01		1.5	38.331	50	46		45	
7	10:08			.01		X	41.619					
8				.02								
9				.06								
10				.04								
11				.05								
12				.10								
B 1				.12								
2				.07								
3				.02								
4				.01								
5				.01								
6				.01								
7		+.04		.01								
8				.01								
9				.01								
10				.04								
11				.05								
12				.10								
Avg				18495			19.869					2.11

PARTICULATE FIELD DATA

0 = 4.35
1 = 2.82
2 = ~~2.5~~ 3.0

PLANT: Willamette Emerson
DATE: 2-8-95
REPETITION: 2

LOCATION: Press Vent
OPERATOR: DB, CJ, JB
STACK #: S.W.
SAMPLE BOX #: 12
METER BOX #: 8
AMBIENT TEMPERATURE: 60°
BAROMETRIC PRESSURE: 1025 mb / 30.27
ASSUMED MOISTURE: 1%
PROBE LENGTH: 73"
NOZZLE IDAMETER: .499, .499, .498
STACK DIAMETER: 35"
METER H : 1.564869
C FACTOR: .84
METER CO-EFFICIENT: 1.023197



Ts = 515
MD = 21.9
MS = 28.8
PS = 30.27 } 872
FPS = 5.88
Tm = 515

IMPINGERS

	Initial	Final
#1:	200 ml S	200
#2:	200 ml S	200
#3:		
#4:	200 gr. S.G.	
#5:		

} DMPH

COMMENTS

CO2	O2
.5 %	20.5%

FILTER TARE: .47717

PRE-TEST LEAK CHECK
Meter: .009 cu. ft. 7 in. HG
Pitots: in. H2O
L 2.2 / 3.3

POST-TEST LEAK CHECK
Meter: cu.ft. in. HG
Pitots: in. H2O

P #	Θ	STATIC PRES.	Ts °F	ΔP	√ΔP	ΔH	Vm FT.3	Tm INLET	Tm OUTLET	OVEN TEMP.	IMP OUTLET TEMP.	VACUU (IN HG
A 1	2:52		90	.02		1.0	932344	60	61	250	63	1.0
2			68	.01			35.138	59	61	253	62	1.0
3	3:02		87	.01			38.6	61	60	251	61	1.0
4			90	.01			40.921	61	61	251	61	1.0
5	3:12		88	.02			43.9	61	61	256	61	1.0
6			89	.02			46.7	61	61	256	61	1.0
7	3:22		89	.01			49.37	62	61	255	61	1.0
8			87	.01			52.211	62	61	256	63	1.0
9	3:32		93	.01			55.023	63	61	254	62	1.0
10			94	.03			57.854	64	62	251	62	1.0
11	3:42		88	.03			60.717	63	63	256	62	1.0
12			89	.04			63.629	63	62	250	62	1.0
B 1	3:52			.01			966.425 *					
2				.02								
3				.02								
4				.02								
5				.02								
6				.01								
7		+.01		.01								
8				.01								
9				.01								
10				.01								
11				.01								
12				.01								
AV					.1065							

PARTICULATE FIELD DATA

PLANT: Willamette, Emerson AR
DATE: 2/8/95
REPETITION: 3

LOCATION: Pressvent
OPERATOR: DB, KJ, JB
STACK #: S.W
SAMPLE BOX #: 12
METER BOX #: 8
AMBIENT TEMPERATURE: 60°
BAROMETRIC PRESSURE: 30.27
ASSUMED MOISTURE: 1%
PROBE LENGTH: 73"
NOZZLE IDAMETER: .499, .499, .498
STACK DIAMETER: 35"
METER H : 1.564869
C FACTOR: .84
METER CO-EFFICIENT: 1.023197

IMPINGERS

	Initial	Final
#1:	200ml/5	212
#2:	200ml/5	205
#3:	—	
#4:	200gr.	5.6.
#5:		

DMPH

COMMENTS

CO2 / 0 — O2 / 20

FILTER TARE: .4775

PRE-TEST LEAK CHECK
Meter: 0.010 cu. ft. 15 in. HG
Pitots: in. H20

POST-TEST LEAK CHECK
Meter: 0.010 cu.ft. 6 in. HG
Pitots: in. H20

3.2
3.4

P #	Θ	STATIC PRES.	Ts °F	ΔP	√ΔP	ΔH	Vm FT.3	Tm INLET	Tm OUTLET	OVEN TEMP.	IMP OUTLET TEMP.	VACUUM (IN Hg)
1	4:15		89	.02		1.0	966.967	58	58	242	56	1.0
2	4:20		86	.01			969.799	59	59	250	55	1.0
3	4:25		83	.01			972.631	60	59	251	53	1.0
4	4:30		82	.02			975.437	60	59	252	52	1.0
5	4:35		85	.02			978.342	60	58	253	54	1.0
6	4:40		84	.01			981.156	60	58	254	55	1.0
7	4:45		85	.01			983.944	60	58	252	54	1.0
8	4:50		82	.01			986.778	60	58	253	53	1.0
9	4:55		83	.02			989.584	60	58	251	52	1.0
10	5:00		82	.03			992.418	60	58	252	52	1.0
11	5:05		81	.04			995.279	59	57	254	51	1.0
12	5:10		80	.04			998.094	59	57	251	51	1.0
B1	5:15			.01		X	1001.018					
2				.02								
3				.02								
4				.02								
5				.01								
6				.01								
7				.01								
8				.01								
9				.01								
10				.02								
11				.03								
12				.03								
AV												

PARTICULATE FIELD DATA

PLANT: Willamette Emerson
DATE: 2-9-95
REPETITION: 3 (1)

LOCATION: North/West
OPERATOR: S.
STACK #: 2f
SAMPLE BOX #: 11
METER BOX #: 8
AMBIENT TEMPERATURE: 35°
BAROMETRIC PRESSURE: 1011mb
ASSUMED MOISTURE: 1%
PROBE LENGTH: 73"
NOZZLE IDAMETER: .499, .498, .496 (.4976)(.0013508)
STACK DIAMETER: 35'
METER H : 1.564869
C FACTOR: .84
METER CO-EFFICIENT: 1.023197

0 = 4.252
1 = 2.804
2 = 2.5

IMPINGERS

	Initial	Final
#1:	260ml >DNPH	216
#2:	200ml	219
#3:	—	
#4:	200556	11.7
#5:		

COMMENTS

O_2 21% CO_2 0.%

FILTER TARE: .4655

PRE-TEST LEAK CHECK
Meter: .005 cu. ft. 11 in. HG
Pitots: LC in. H2O

POST-TEST LEAK CHECK
Meter: 0.010 cu.ft. 6 in. HG
Pitots: 3.3 / 3.1 in. H2O

P #	θ	STATIC PRES.	Ts °F	ΔP	√ΔP	ΔH	Vm FT.3	Tm INLET	Tm OUTLET	OVEN TEMP.	IMP OUTLET TEMP.	VACU (IN H
A1	V2:19	8	85	.13		1.6	51.024	46	50	250	48	1.0
2			86	.11		5.6	54.8617	51	50	251	48	1.0
3			84	.10		5.1	58.387	53	50	253	48	1.0
4			87	.06		3.0	61.748	55	51	254	48	1.0
5			87	.04		2.0	64.352	56	51	256	48	1.0
6			88	.01		.51	66.478	55	51	253	48	1.0
7			89	.02		1.0	67.541	56	51	251	48	1.0
8			89	.04		2.0	69.644	56	51	250	49	1.0
9			87	.07		3.5	71.170	57	51	249	48	1.0
10			87	.08		4.1	73.943	57	50	251	48	1.0
11			87	.09		4.6	76.949	57	51	256	48	1.0
12			86	.03		1.5	80.178	56	52	253	49	1.0
B1			87	.11		5.6	82.020	57	52	249	48	1.0
2			88	.09		4.6	85.545	57	52	247	49	1.0
3			85	.07		3.5	88.734	58	52	249	95	1.0
4			84	.04		2.0	91.547	57	52	251	49	1.0
5			84	.03		1.5	93.673	57	52	253	49	1.0
6			82	.01		.51	95.514	57	52	256	49	1.0
7		+.02	80	.01		.51	96.577	58	53	254	49	1.0
8			78	.01		.51	97.646	58	53	251	49	1.0
9			79	.02		1.0	98.703	58	53	253	48	1.0
10			83	.02		1.0	100.206	58	53	256	48	1.0
11			87	.10		5.1	101.709	55	53	255	48	1.0
12			88	.11		5.6	105.871	58			48	1.0
							108.546					
Av			85.4		.2374	2.58	57.567		53.9		217	

PARTICULATE FIELD DATA

PLANT: Willamette Emerson
DATE: 2-9-95
REPETITION: 4 (2)

LOCATION: Press Vent
OPERATOR: DO, CW, JO
STACK #: N.W.
SAMPLE BOX #: 12
METER BOX #: 9
AMBIENT TEMPERATURE: 52°
BAROMETRIC PRESSURE: 10.4 in
ASSUMED MOISTURE: 1%
PROBE LENGTH: 23"
NOZZLE IDAMETER: .499, .498, .496
STACK DIAMETER: 35"
METER H : 1.564869
C FACTOR: 184
METER CO-EFFICIENT: 1.023197

IMPINGERS

	Initial	Final
#1:	200 ml	229
#2:	200 ml	213
#3:		
#4:	200 gr	
#5:		

DHMP

COMMENTS

O_2 21% CO_2 0%

FILTER TARE: .5069

PRE-TEST LEAK CHECK
Meter: .009 cu. ft. 17 in. HG
Pitots: ✓ in. H20

POST-TEST LEAK CHECK
Meter: [illegible] cu.ft. " in. HG
Pitots: ✓ in. H20

P #	θ	STATIC PRES.	Ts °F	ΔP	√ΔP	ΔH	Vm FT.3	Tm INLET	Tm OUTLET	OVEN TEMP.	IMP OUTLET TEMP.	VACU (IN H
A 1	1:40		81	.12		6.1	109.478	52	52	242	47	1.0
2			83	.12		6.1	113.160	54	52	250	47	1.0
3			83	.10		5.1	116.842	58	52	252	48	2.0
4			87	.06		3.0	120.204	59	53	250	49	2.0
5			86	.05		2.5	122.808	59	53	251	49	2.0
6			88	.02		1.0	125.185	59	53	252	49	2.0
7			86	.01		.5	126.688	60	53	251	50	2.0
8			88	.01		.5	127.751	60	53	254	50	2.0
9			84	.03		1.5	128.814	60	54	252	51	2.0
10			88	.06		3.0	130.655	60	54	254	50	2.0
11			85	.08		4.1	133.259	60	55	251	49	2.0
12			87	.13		6.6	136.266	60	55	253	49	2.0
B 1			87	.15		7.6	140.098	60	55	256	49	2.0
2			86	.16		8.1	144.216	60	55	254	50	2.0
3			87	.14		7.1	148.467	60	55	255	50	2.0
4			89	.14		7.1	152.445	60	55	254	50	2.0
5			86	.09		4.6	156.422	60	55	256	49	2.0
6			85	.01		.5	159.611	61	56	252	49	2.0
7			84	.01		.5	160.674	61	56	254	50	2.0
8			86	.01		.5	161.737	61	56	255	50	2.0
9			88	.01		.5	162.800	61	56	253	49	2.0
10			87	.03		1.5	163.863	62	56	252	50	2.0
11			85	.05		2.5	165.704	62	57	253	51	2.0
12			82	.03		1.5	168.081	62	57	251	51	2.0
	2:40						169.923					
Avg							60.445				218	

PARTICULATE FIELD DATA

PLANT: Willamette "Emerson"
DATE: 2-9-95
REPETITION: 5 (3)

LOCATION: Press Vent
OPERATOR: DC, JB
STACK #: N.W.
SAMPLE BOX #: 11
METER BOX #: 6
AMBIENT TEMPERATURE: 54°
BAROMETRIC PRESSURE: 1011 mb
ASSUMED MOISTURE: 1%
PROBE LENGTH: 78"
NOZZLE IDAMETER: .499, .496, .498
STACK DIAMETER: 35"
METER H : 1.564869
C FACTOR: .84
METER CO-EFFICIENT: 1.023597

IMPINGERS

	Initial	Final
#1:	200 ml	209
#2:	200 ml	218
#3:		
#4:	200 sil.	
#5:		

DMPLH

56.

COMMENTS

CO2 0% O2 21%

FILTER TARE:

PRE-TEST LEAK CHECK
Meter: 0.610 cu. ft. 15 in. HG
Pitots: 3.1 in. H2O
3.3

POST-TEST LEAK CHECK
Meter: .005 cu.ft. 7 in. HG
Pitots: 3.1 in. H2O
3.2

P #	θ	STATIC PRES.	Ts °F	ΔP	√ΔP	ΔH	Vm FT.3	Tm INLET	Tm OUTLET	OVEN TEMP.	IMP OUTLET TEMP.	VACUUM (IN HG)
A 1	2:53		86	.11		5.6	173.900	56	56	242	50	2.0
2			86	.12		6.1	177.425	57	56	251	50	2.0
3			86	.09		4.5	81.107	57	55	253	50	2.0
4			87	.07		3.5	84.296	59	56	254	50	2.0
5		+.02	87	.06		3.0	87.109	60	55	256	50	2.0
6			88	.05		2.5	89.713	60	55	256	50	2.0
7			85	.02		1.0	92.040	61	55	257	50	2.0
8			84	.01		.51	93.593	60	56	259	50	2.0
9			85	.01		.51	94.656	61	56	257	50	2.0
10			84	.04		2.0	95.714	60	56	256	50	2.0
11			85	.09		4.6	97.848	61	55	259	50	2.0
12			84	.12		6.1	201.034	60	56	256	50	2.0
B 1			85	.14		7.0	4.716	61	55	257	50	2.0
2			86	.12		6.1	8.694	61	56	258	50	2.0
3			88	.14		7.1	12.376	61	56	259	50	2.0
4			87	.13		6.6	16.253	61	56	257	50	2.0
5			89	.08		4.1	20.186	61	57	256	50	2.0
6			88	.01		.51	23.193	61	57	255	50	2.0
7			84	.01		.51	24.256	62	57	254	51	2.0
8			85	.01		.51	25.314	62	57	256	51	2.0
9			88	.01		.51	26.382	62	57	259	51	2.0
10			86	.02		1.0	27.445	62	57	257	51	2.0
11			85	.04		2.0	28.448	62	57	258	51	2.0
12			84	.05		2.5	31.074	62	52	250	51	2.0
	3:54						233.451					

APPENDIX E

SUMMARY OF PRE METER BOX CALIBRATION

METER BOX NUMBER: 8
CALIBRATION DATE:2/6/95
CALIBRATED BY:Dan Barrera
BAROMETRIC PRESSURE: 29.8

```
*******************************************************
*                                                     *
*      DELTA H = ORFICE PRESSURE                      *
*      VW = VOLUME OF WET GAS METER                   *
*      TW = AVERAGED TEMPERATURE OF WET METER         *
*      VD = VOLUME OF DRY GAS METER                   *
*      TD = AVERAGED TEMPERATURE OF DRY GAS METER     *
*      TIME = DURATION OF EACH POINT RUN              *
*                                                     *
*******************************************************
```

POINT 1
DELTA H = .5 VW = 5 TW = 65.5
VD = 4.762 TD = 63 TIME = 11.75 TEST METER Y = .9701
METER BOX Y = 1.01249
METER BOX H = 1.550931

POINT 2
DELTA H = 1 VW = 5 TW = 66
VD = 4.739 TD = 65.5 TIME = 8.310001 TEST METER Y = .9701
METER BOX Y = 1.020039
METER BOX H = 1.547048

POINT 3
DELTA H = 1.5 VW = 10 TW = 66
VD = 9.497 TD = 67.5 TIME = 13.64 TEST METER Y = .9701
METER BOX Y = 1.020616
METER BOX H = 1.557084

POINT 4
DELTA H = 2 VW = 10 TW = 66
VD = 9.479 TD = 69.25 TIME = 11.97 TEST METER Y = .9701
METER BOX Y = 1.024687
METER BOX H = 1.593573

POINT 5
DELTA H = 3 VW = 10 TW = 66.5
VD = 9.425999 TD = 70.25 TIME = 9.72 TEST METER Y = .9701
METER BOX Y = 1.028889
METER BOX H = 1.576206

POINT 6
DELTA H = 4 VW = 10 TW = 67
VD = 9.387999 TD = 71.75 TIME = 8.390001 TEST METER Y = .9701
METER BOX Y = 1.032464
METER BOX H = 1.564374

AVERAGE Y = 1.023197
AVERAGE H = 1.564869

Meter Box Calibration

Dry Gas Meter #: 8
Calibrated by: Dan Barrera
Date: 2-6-95
Barometric Pressure: 29.8

Orifice ΔH	Test Meter Volume V_w	Dry Gas Meter Volume V_d	Temperature: Test Meter T_w	Temperature: Dry Gas Meter Inlet T_{di}	Temperature: Dry Gas Meter Outlet T_{do}	Temperature: Dry Gas Meter Ave T_d	Time θ	γ	ΔH@
.5	5	4.762	65.5	62/67	61/62	63	11.75	.9701	
1.0	5	4.739	66	67/71	63/64	65.5	8.31	.9701	
1.5	10	9.497	66	67/77	64/66	67.5	13.64	.9701	
2.0	10	9.497	66	69/75	66/67	69.25	11.97	.9701	
3.0	10	9.426	66.5	69/77	67/68	70.25	9.72	.9701	
4.0	10	9.385	67	71/79	68/69	71.75	8.39	.9701	

$$\gamma = \frac{V_w P_{bar} (T_d + 460)}{V_d \left(P_{bar} + \frac{\Delta H}{13.6}\right) (T_w + 460)}$$

$$\Delta H@ = \frac{0.0317\ \Delta H}{P_{bar}(T_d + 460)} \left[\frac{(T_w + 460)\ \theta}{V_w} \right]^2$$

P_{bar} = Barometric Pressure

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ARMSTRONG ENVIRONMENTAL, INC.

DRY GAS METER #: 8

DATE: 2-6-95

ΔH	VW	TW	VD	TDT	TDO	ΔTD	θ
.5 (5FT.3)	990.0	65/65	851.353	62	61		
	985.0	66/66	846.591	67	62		
	5	65.5	4.762		→	63	11.75
1.0 (5FT3)	995.0	66/66	856.092	64	63		
	990.0	66/66	851.353	71	64		
	5	66	4.739		→	65.5	8.31
1.5 (10 FT3)	1005.0	66/66	865.589	67	64		
	995.0	66/66	856.092	73	66		
	10	66	9.497		→	67.5	13.64
2.0 (10FT3)	1015.0	66/66	875.086	69	66		
	1005.0	66/66	865.589	75	67		
	10	66	9.497		→	69.25	11.97
3.0 (10FT3)	1025.0	66/66	884.512	69	67		
	1015.0	67/67	875.086	77	68		
	10	66.5	9.426		→	70.25	9.72
4.0 (10FT3)	1035.0	67/67	893.900	71	68		
	1025.0	67/67	884.512	79	69		
	10	67	9.388		→	71.75	8.39

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Temperature Meter Calibration Form

2-6-95

Meter # 8

	Emtech Ⅰ Thermocouple Checker	Meter Reading
P1	32 F + 460 = 492 R	29 + 460 = 489 R
P2	212 F + 460 = 672 R	209 + 460 = 669 R
P3	752 F + 460 = 1212 R	747 + 460 = 1207 R

Divide smaller number by larger number in degrees R and multiply by 100.
Subtract that number from 100 to get % variation.
Variation limit is +/- 2%.

	% Variation
P1	.6
P2	.4
P3	.4

SUMMARY OF POST METER BOX CALIBRATION

METER BOX NUMBER : 8
CALIBRATION DATE: 02/20/95
CALIBRATED BY: Dan Barrera
BAROMETRIC PRESSURE (inch Hg): 30

```
*****************************************************************
*                                                               *
*      DELTA H = ORFICE PRESSURE                                *
*      VW = VOLUME OF WET GAS METER                             *
*      TW = AVERAGED TEEMPERATURE OF WET METER                  *
*      VD = VOLUME OF DRY GAS METER                             *
*      TD = AVERAGED TEMPERATURE OF DRY GAS METER               *
*      TIME = DURATION OF EACH POINT RUN                        *
*                                                               *
*****************************************************************
```

POINT 1
DELTA H = 1 VW = 10 TW = 64
VD = 9.481 TD = 62.25 TIME = 16.72 TEST METER Y = .9701
METER BOX Y = 1.017294
METER BOX H = 1.553083

POINT 2
DELTA H = 1 VW = 10 TW = 64
VD = 9.504 TD = 64.25 TIME = 16.65 TEST METER Y = .9701
METER BOX Y = 1.018718
METER BOX H = 1.53423

POINT 3
DELTA H = 1 VW = 10 TW = 64.5
VD = 9.51 TD = 65.5 TIME = 16.77 TEST METER Y = .9701
METER BOX Y = 1.01953
METER BOX H = 1.555688

AVERAGE Y = 1.018514
AVERAGE H = 1.547667

Post-Test
Meter Box Calibration

Dry Gas Meter #: 8
Calibrated by: Don Carrera
Date: 2-20-95
Barometric Pressure: 30.0

Orifice ΔH	Test Meter Volume V_w	Dry Gas Meter Volume V_d	Temperature: Test Meter T_w	Temperature: Dry Gas Meter Inlet T_{di}	Temperature: Dry Gas Meter Outlet T_{do}	Temperature: Dry Gas Meter Ave T_d	Time θ	Y	ΔH@
1.0	10	9.481	64	61/67	59/62	625	16.02	.9701	
1.0	10	9.504	64	64/68	62/67	625	16.05	.9701	
1.0	10	9.510	62.5	65/70	63/64	655	16.77	.9701	

$$Y = \frac{V_w P_{bar} (T_d + 460)}{V_d (P_{bar} + \frac{\Delta H}{13.6}) (T_w + 460)}$$

$$\Delta H@ = \frac{0.0317 \Delta H}{P_{bar}(T_d + 460)} \left[\frac{(T_w + 460) \theta}{V_w}\right]^2$$

P_{bar} = Barometric Pressure

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AKMSTRONG ENVIRONMENTAL, INC.

DRY GAS METER #: 8

DATE: 2-20-95

ΔH	VW	TW	VD	TDT	TDO	ΔTD	θ
1.0(10FT^3)	270.0	64/64	713.293	61	59		
	260.0	64/64	703.812	67	62		
	10	64	9.481		→	62.25	16.72
1.0(10FT^3)	280.0	64/64	722.797	64	62		
	270.0	64/64	713.293	68	63		
	10	64	9.504		→	64.25	16.65
1.0(10FT^3)	297.0	64/64	738.969	75	63		
	287.0	65/65	729.459	70	64		
	10	64.5	9.510		→	65.5	16.77

Temperature Meter Calibration Form

2-20-95

Meter # 8

	Emtech I Thermocouple Checker	Meter Reading
P1	32 F + 460 = 492 R	30 + 460 = 490 R
P2	212 F + 460 = 672 R	209 + 460 = 669 R
P3	752 F + 460 = 1212 R	745 + 460 = 1205 R

Divide smaller number by larger number in degrees R and multiply by 100.
Subtract that number from 100 to get % variation.
Variation limit is +/- 2%.

	% Variation
P1	.4
P2	.4
P3	.6

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APPENDIX F

ir Products and Chemicals, Inc.
PECIALTY GAS DEPARTMENT
2722 S. WENTWORTH AVENUE
HICAGO, IL 60620

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Certificate of Analysis - EPA Protocol Gas Standard

ERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Order No: 36A-006058-05
Batch No: 861-18185

ustomer:
ARMSTRONG ENVIRONMENTAL
7715 SOVEREIGN ROW
DALLAS TX 75247

Notes:

Cylinder No: S09132377BAL
Cylinder Pressure*: 2000 psig
Certification Date: 05/07/94
Expiration Date: 05/07/97

PO: 1372 Rel:

*** Certified Concentration *** ********* Reference Standards ********* ********** Analytical Instrumentation **********

Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
ROPANE	200 ±1.0 PPM	S09128591BAL	GM18	201.1000 PPM	Gow-Mac 750	59405U	04/14/94	GC-FID

Balance Gas: Nitrogen

* Standard should not be used below 150 psig

Analyst: James Lazo
James Lazo

Approved By: Robert McNear
Robert McNear

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AIR PRODUCTS
4822 INDUSTRY LANE
DURHAM, NC 27713

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-23474 CYLINDER #:SG9113709 CYL. PRESSURE: 2000PSIG

EXPIRATION DATE:4-7-96 LAST ANALYSIS DATE: 4-7-93

BATCH# 05868
CUSTOMER: AIR PRODUCTS
DALLAS, TX. 75233

P.O.#
METHOD: EPA PROTOCOL # 1 3.0.4. G-1

STANDARD:

SRM #: 2646

CYL #: FF27134

CONC.: 1001 PPM
VALID DATE:7-18-92
EXPIR. DATE:7-18-96

INSTRUMENT:

COMPONENT: BECKMAN THC

MODEL #: 400

SERIAL #: 1003052

LAST CAL.: 4-2-93

COMP: C3H8
MEAN CONC: 816 PPM

REPLICATE CONC.
DATE: 4-7-93 DATE:
816 PPM
817 PPM
815 PPM

COMP:
MEAN CONC:

REPLICATE CONC.
DATE: DATE:

COMP:
MEAN CONC:

REPLICATE CONC.
DATE: DATE:

BALANCE GAS: NITROGEN

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Air Products and Chemicals, Inc.
SPECIALTY GAS DEPARTMENT
12722 S. WENTWORTH AVENUE
CHICAGO, IL 60628

232

Certificate of Analysis - EPA Protocol Gas Standard

PERFORMED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS (PROCEDURE #G1)

Customer:
ARMSTRONG ENVIRONMENTAL
7715 SOVEREIGN ROW
DALLAS TX 75247

Notes:

Order No: 36A-005987-
Batch No: 861-18143

Cylinder No: SG9132491BA
Cylinder Pressure*: 2000 psig
Certification Date: 05/04/94
Expiration Date: 05/04/97

PO: 1371 Rel:

*** Certified Concentration ***			********* Reference Standards *********			********** Analytical Instrumentation **********			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration		Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
PROPANE	31.9 ±.13 PPM	SG9128572BAL	GMIS	30.2600 PPM		Gow-Mac 750	59405U	04/25/94	GC-FID

Balance Gas: Nitrogen

* Standard should not be used below 150 psig

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Analyst: James Laas

Approved By: Robert McNear

APPENDIX G

Production Calculations

Run 1,2,3 3/4" Plywood February 8, 1995

8.5 press cycles/hr [see attached charts] x 2 presses x 30 panels/press = 510 panels/hr. 7.1 min/cycle

510 panels/hr x 61.3 ft^2, 3/8" basis/panel = 31263 ft^2/hr

Run 1,2 3/4" Plywood February 9, 1995

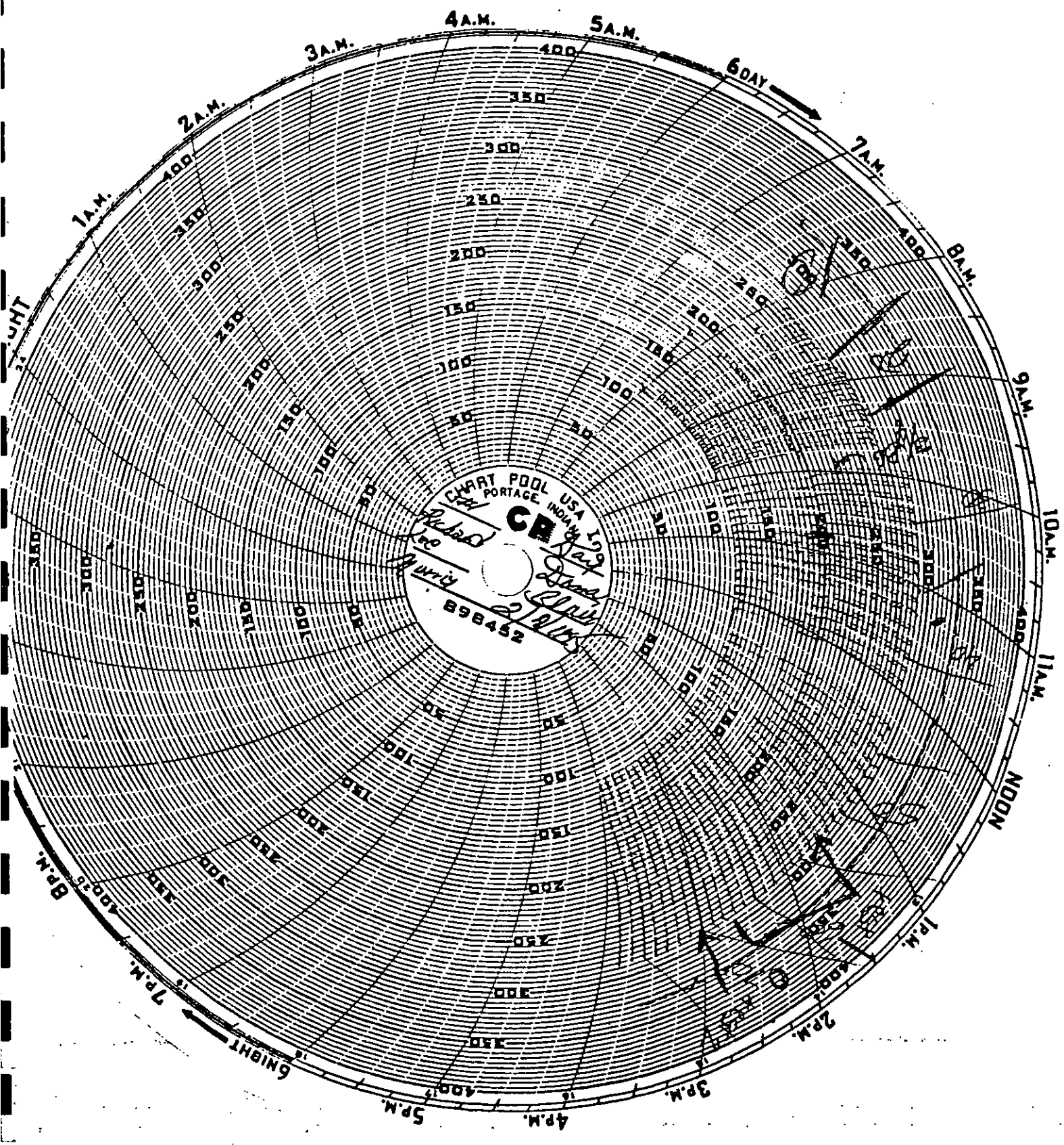
8 press cycles/hr [see attached charts] x 2 presses x 30 panels/press = 480 panels/hr. 7.5 min/cycle

480 panels/hr x 61.3 ft^2, 3/8" basis/panel = 29424 ft^2/hr

Run 1,2,3 5/8" Plywood February 9, 1995

11.5 press cycles/hr [see attached charts] x 2 presses x 30 panels/press = 690 panels/hr. 5.2 min/cycle

690 panels/hr x 50.7 ft^2, 3/8" basis/panel = 34983 ft^2/hr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PORTAGE, INDIANA
CP
898452
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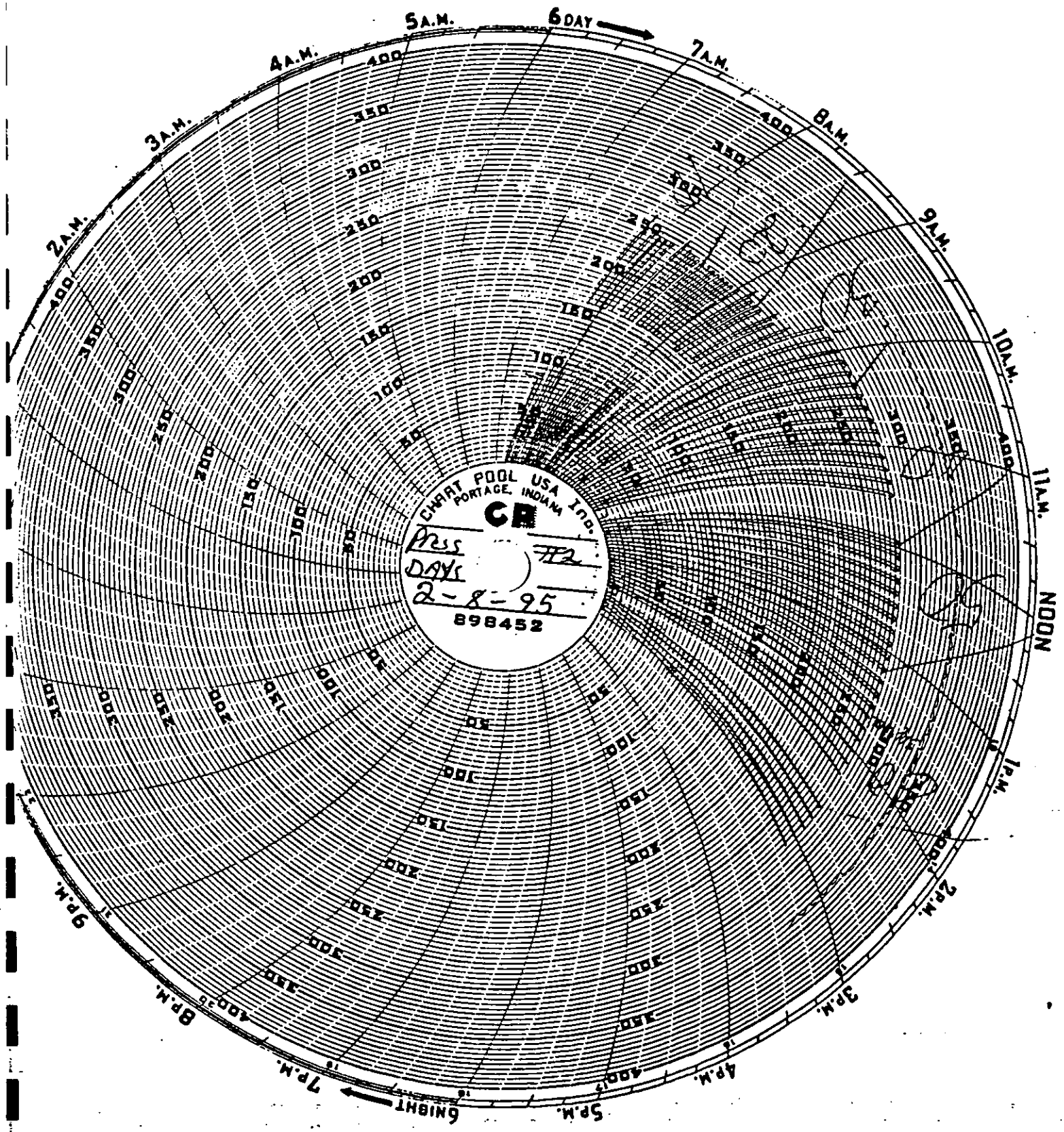
5A.M.
3A.M.
6DAY
2A.M.
7A.M.
1A.M.
8A.M.
9A.M.
10A.M.
11A.M.
NOON
1P.M.
2P.M.
3P.M.
4P.M.
5P.M.
6NIGHT
7P.M.
8P.M.

235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PORTAGE, INDIANA
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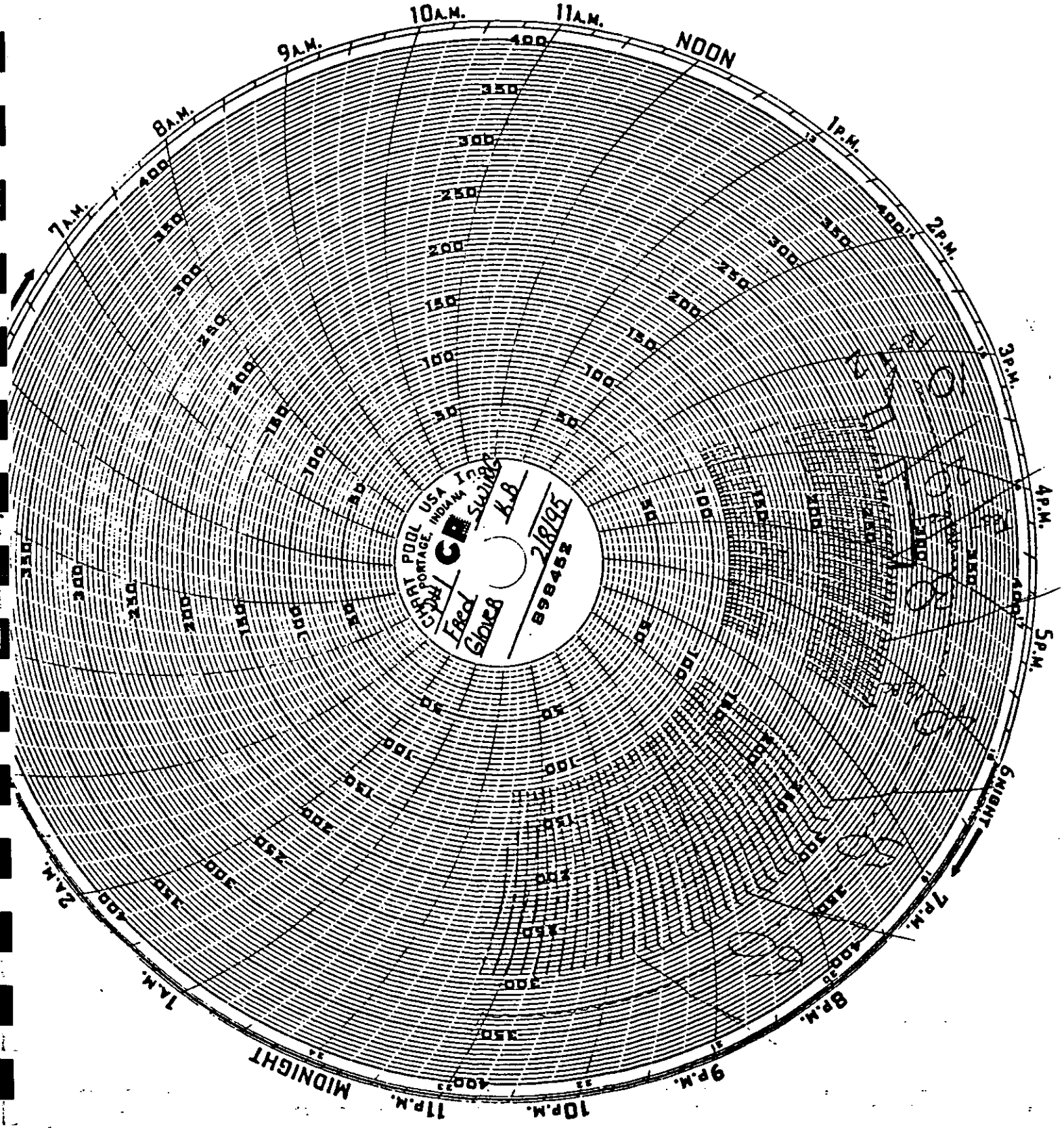
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Swing
K.B.
2/8/95
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237

NOON
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CHART POOL USA Inc.
PORTAGE, INDIANA
2-8-95
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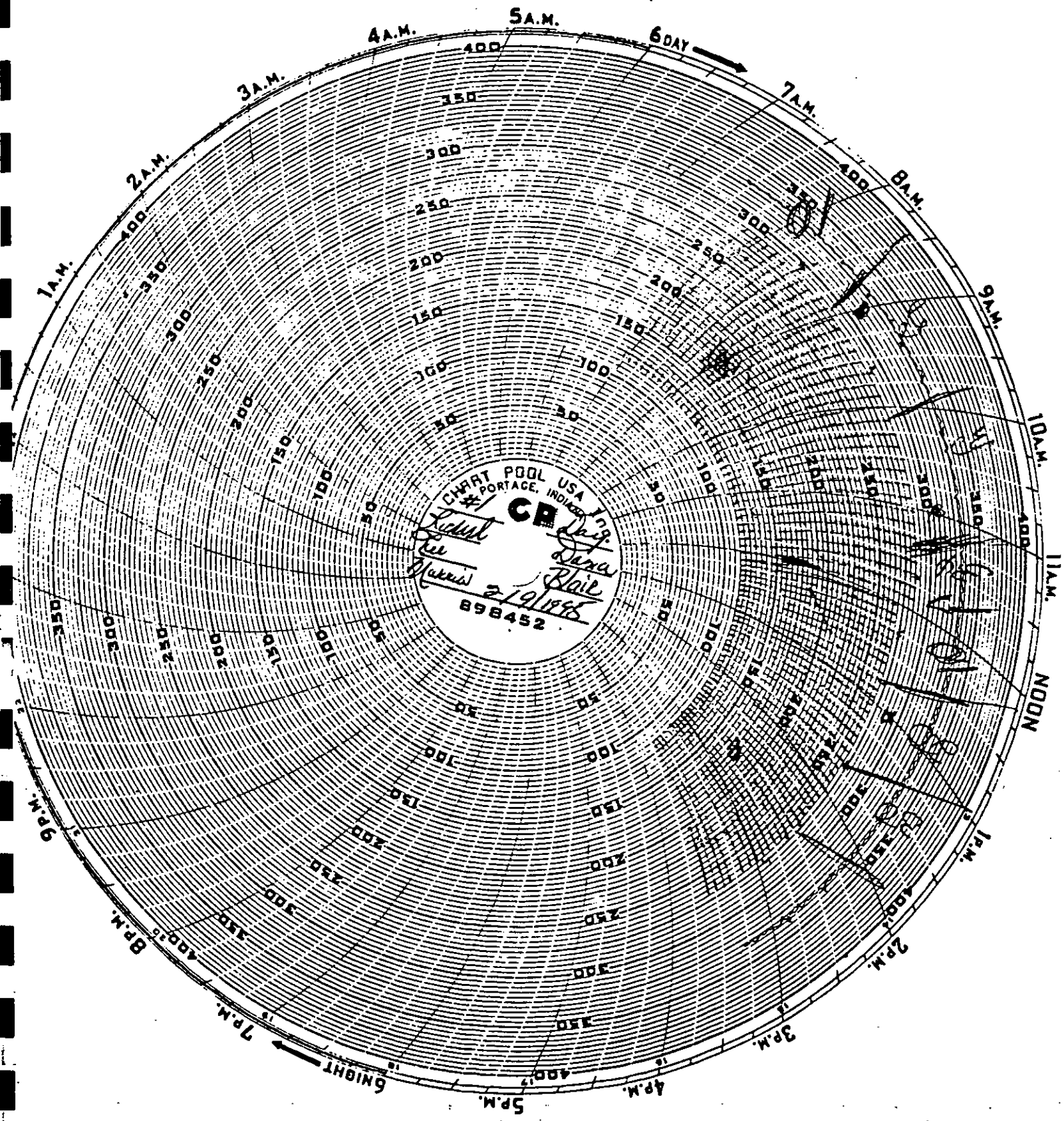
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Harris
Dwg.
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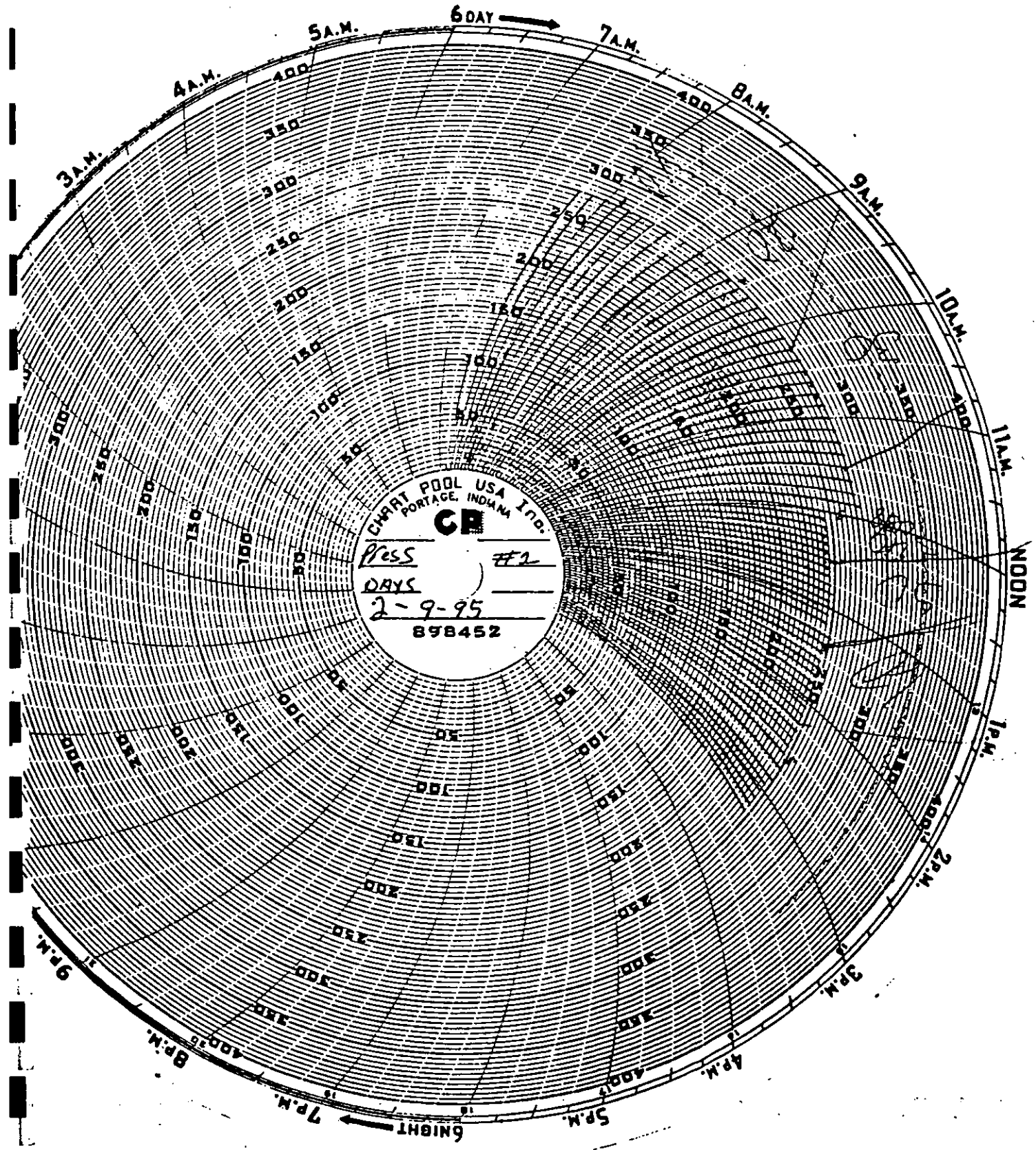
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4P.M.
5P.M.
6 NIGHT
7P.M.
8P.M.
9P.M.
3A.M.
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CHART POOL USA Inc.
PORTAGE, INDIANA
CP
Press #2
DAYS
2-9-95
898452

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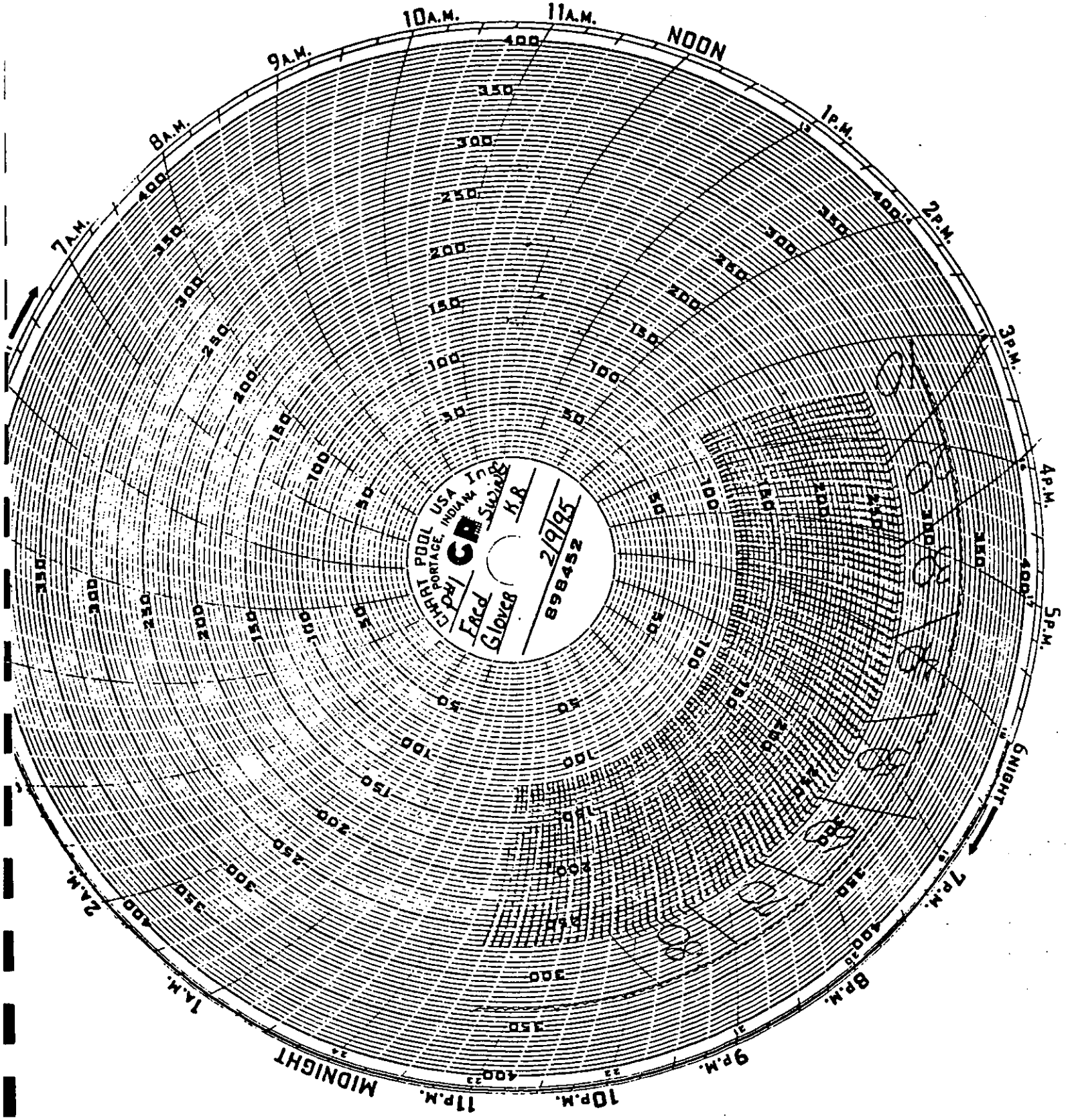
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11P.M.
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2A.M.
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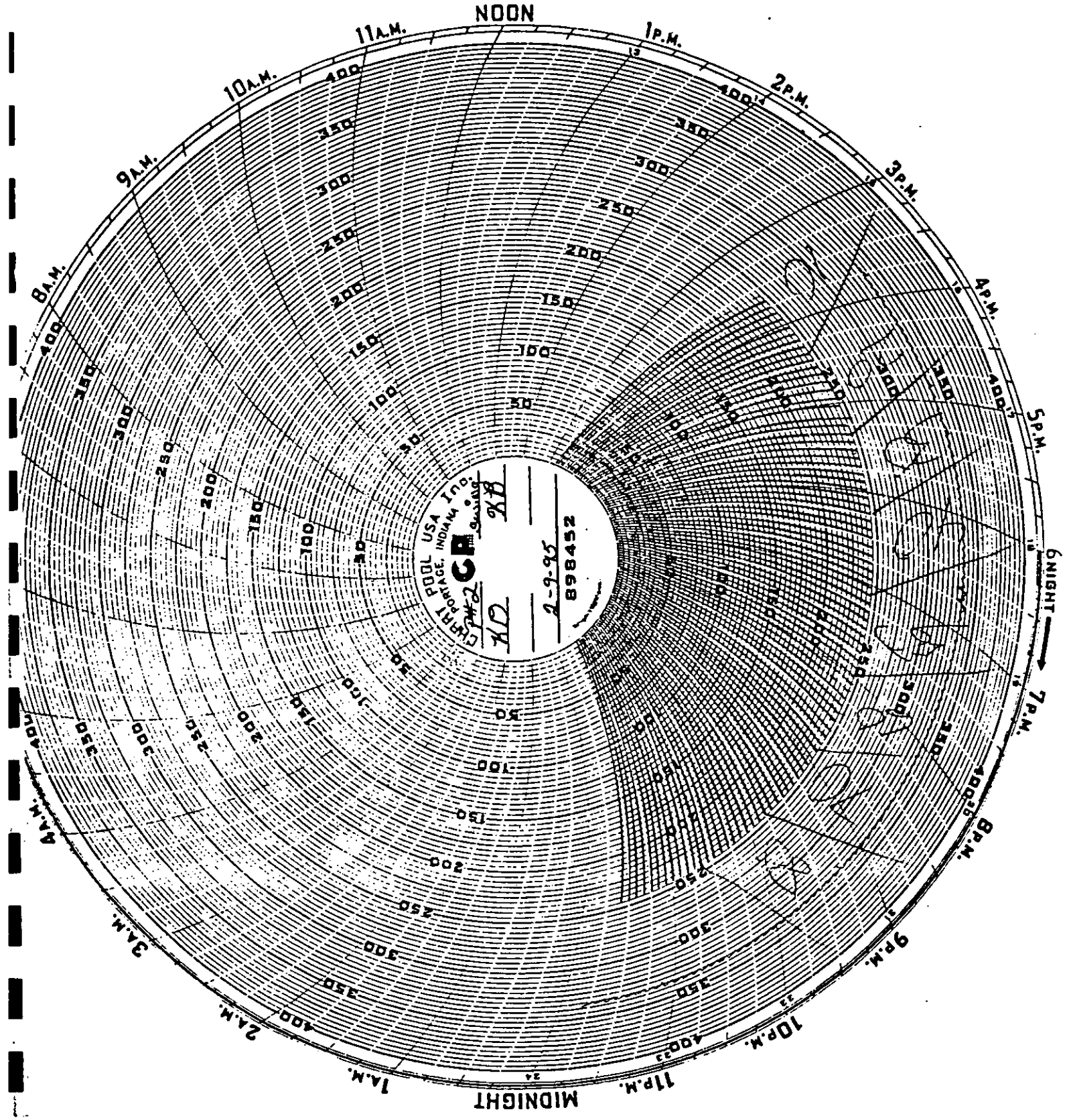
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CHART POOL USA Inc.
PORTAGE, INDIANA
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