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Planning and Standards
Research Triangle Park, NC 27711

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AIR



Air Emissions From Reinforced Plastics Composite Manufacturing Process LASCO Panel Products: Volume II



FINAL REPORT

AIR EMISSIONS FROM
REINFORCED PLASTICS COMPOSITE
MANUFACTURING PROCESS
LASCO PANEL PRODUCTS

VOLUME II OF III
APPENDIX A.2

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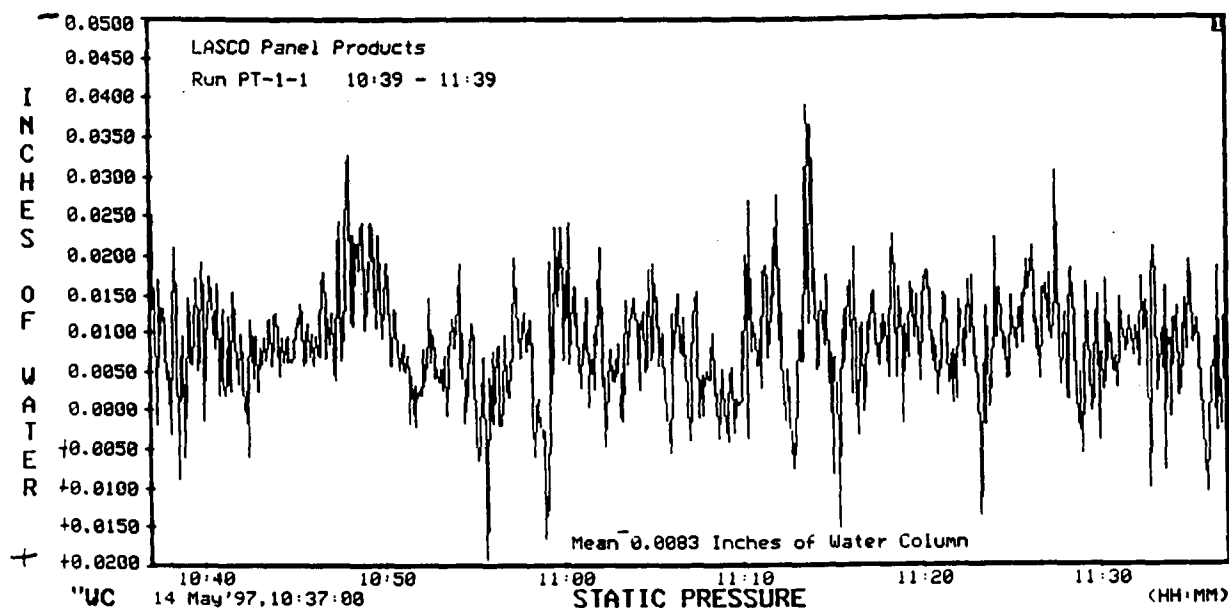
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Appendix A.2
Instrumental Methods
Raw Field Data

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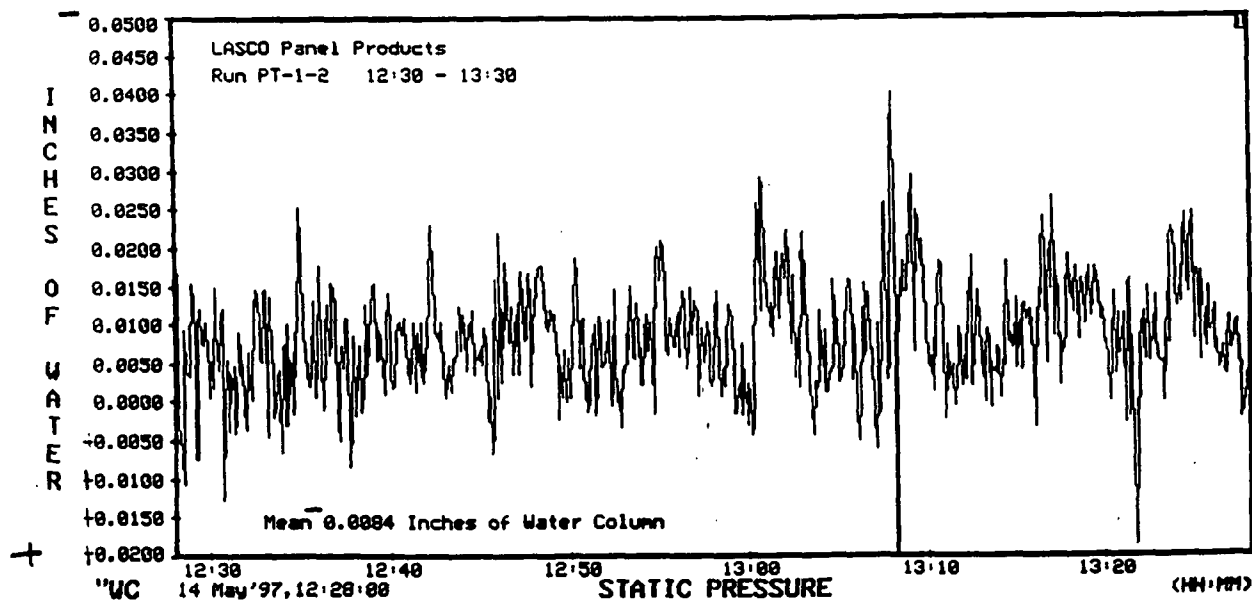
TTE Static Pressures

The following are static pressures recorded continuously inside the TTE. The scale was zero to 0.05 inches negative, the negative portion of the scale was set above the zero on all graphs.



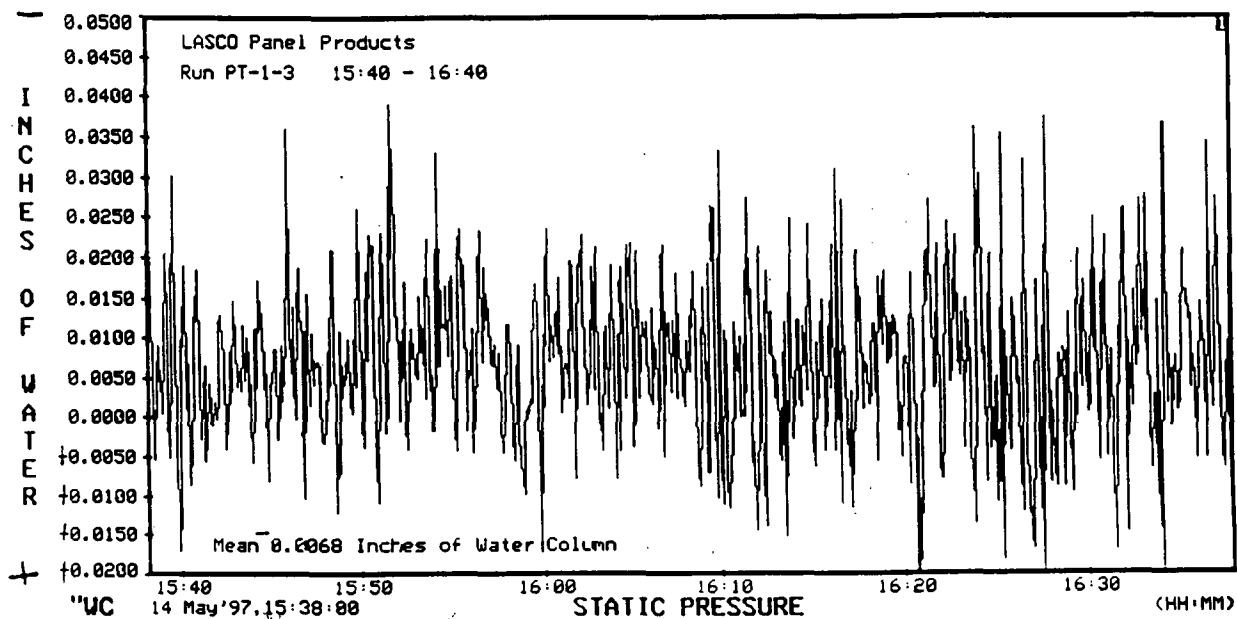
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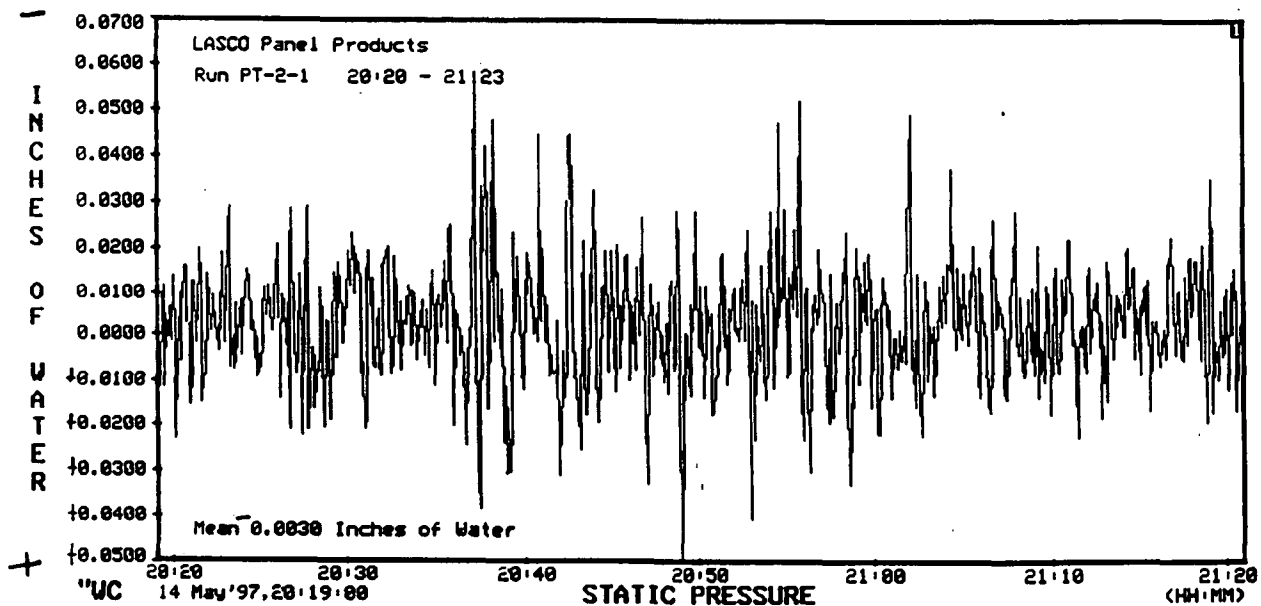
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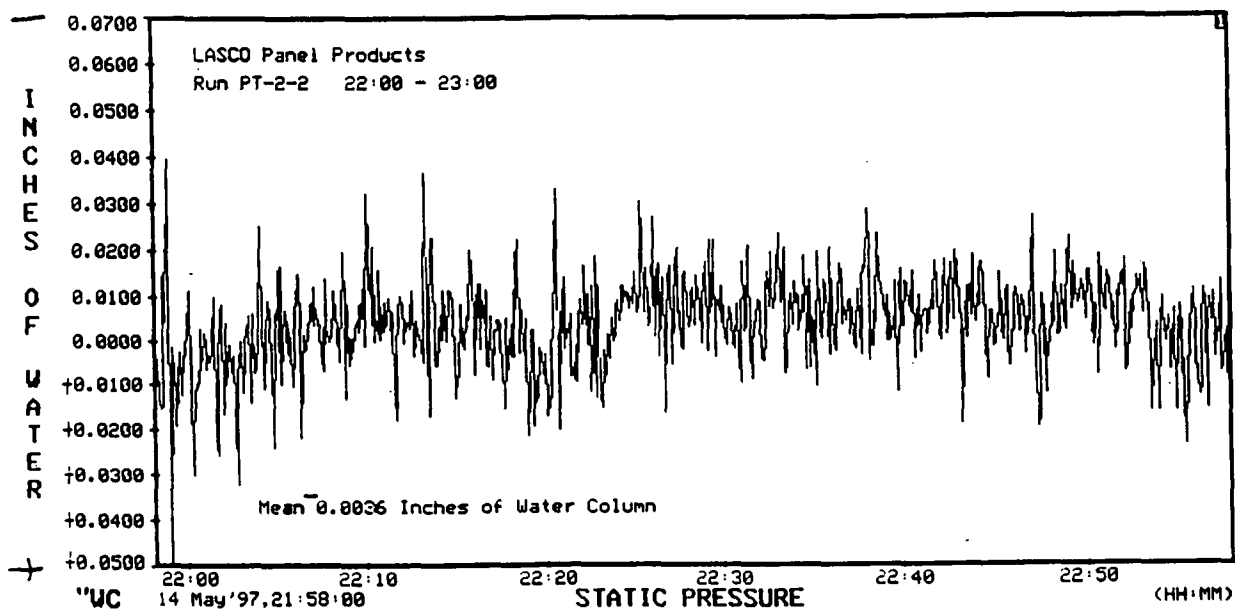
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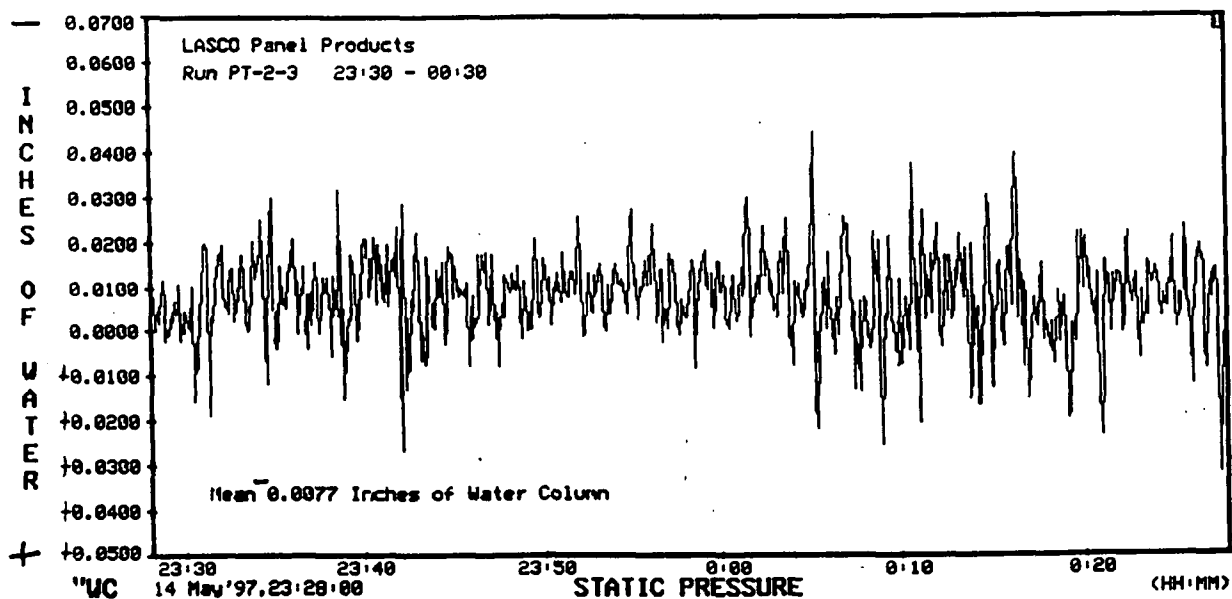
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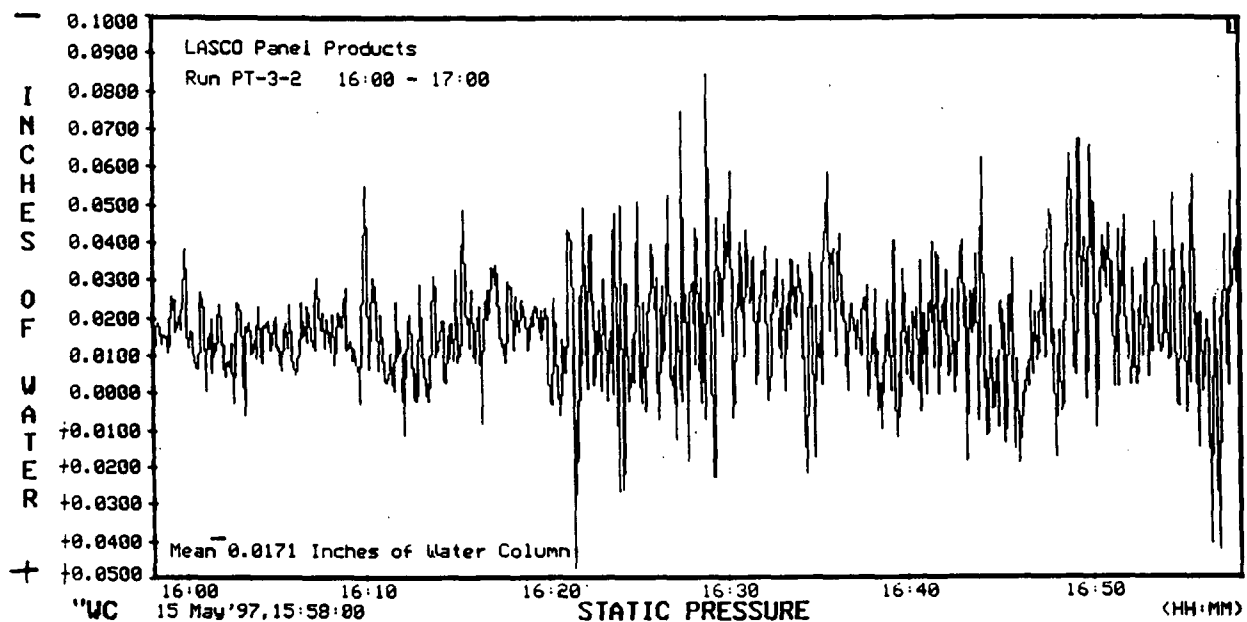
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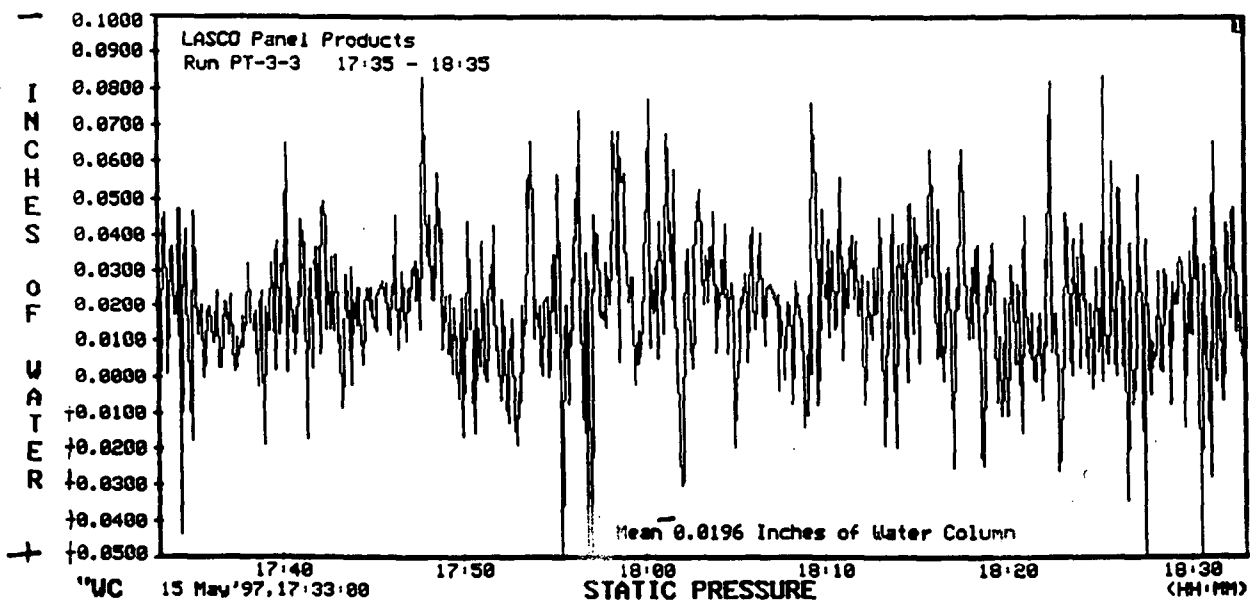
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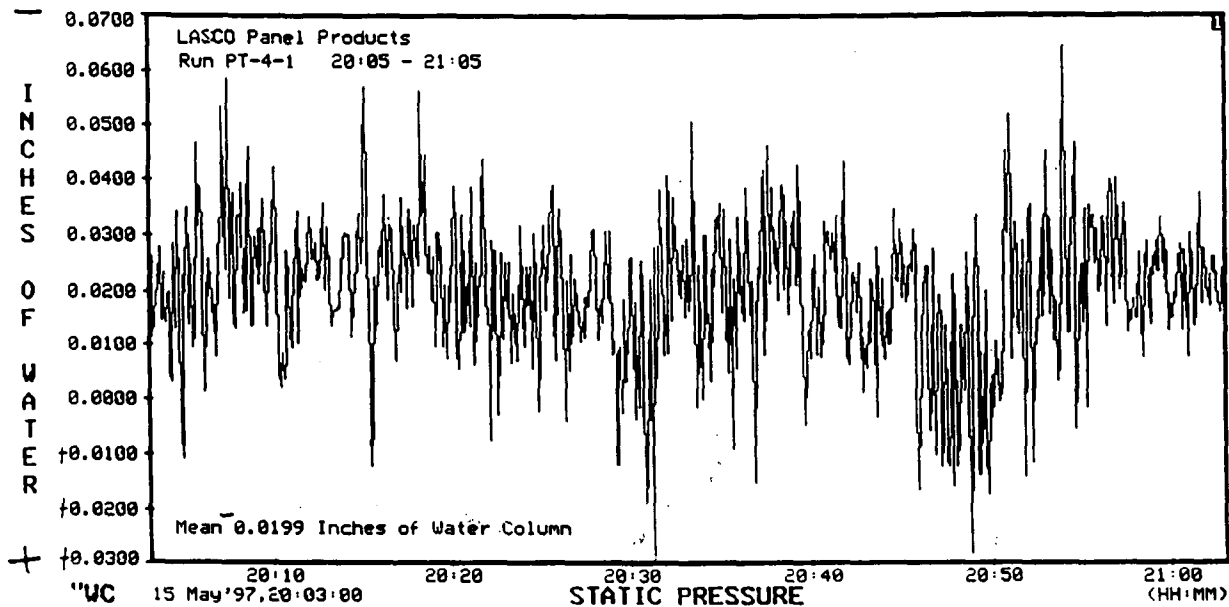
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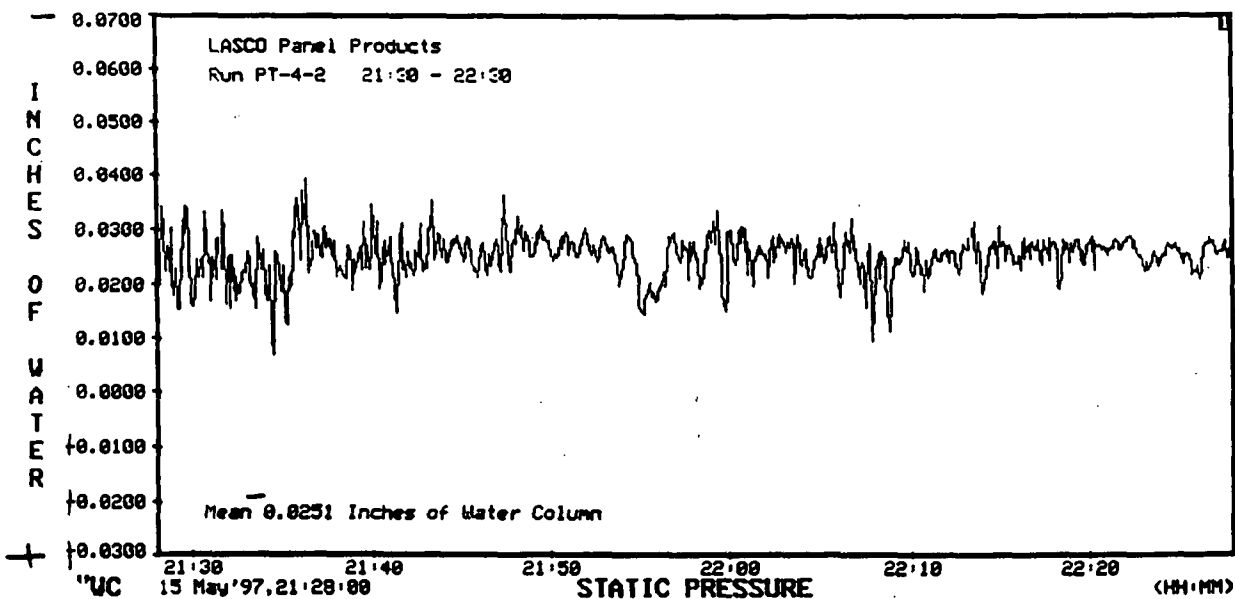
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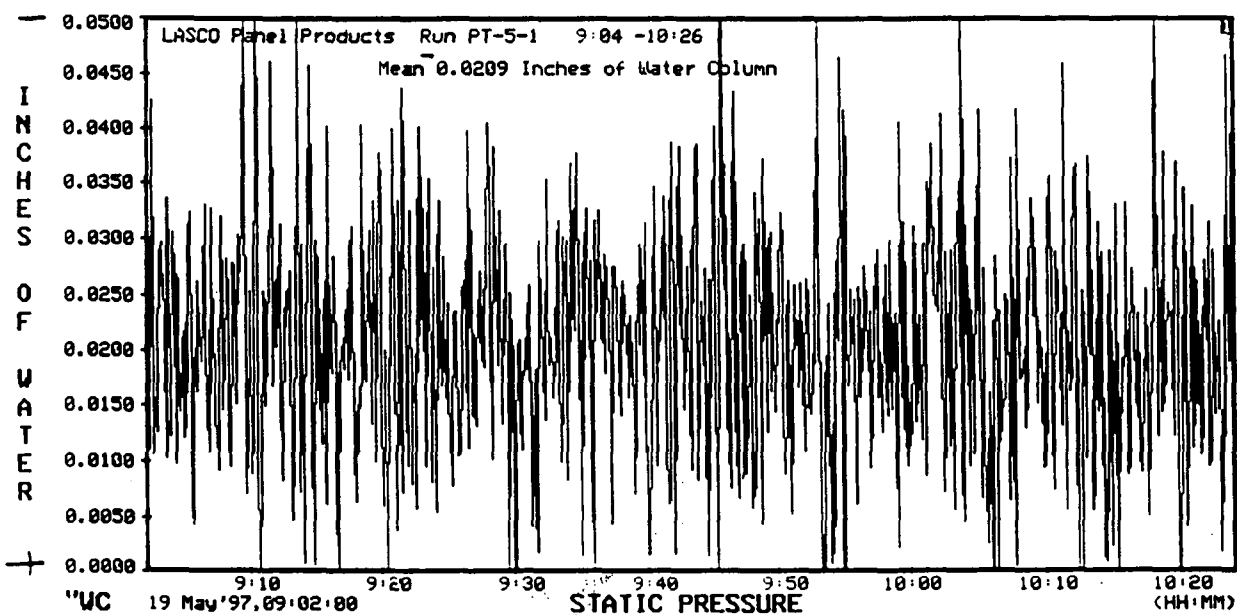
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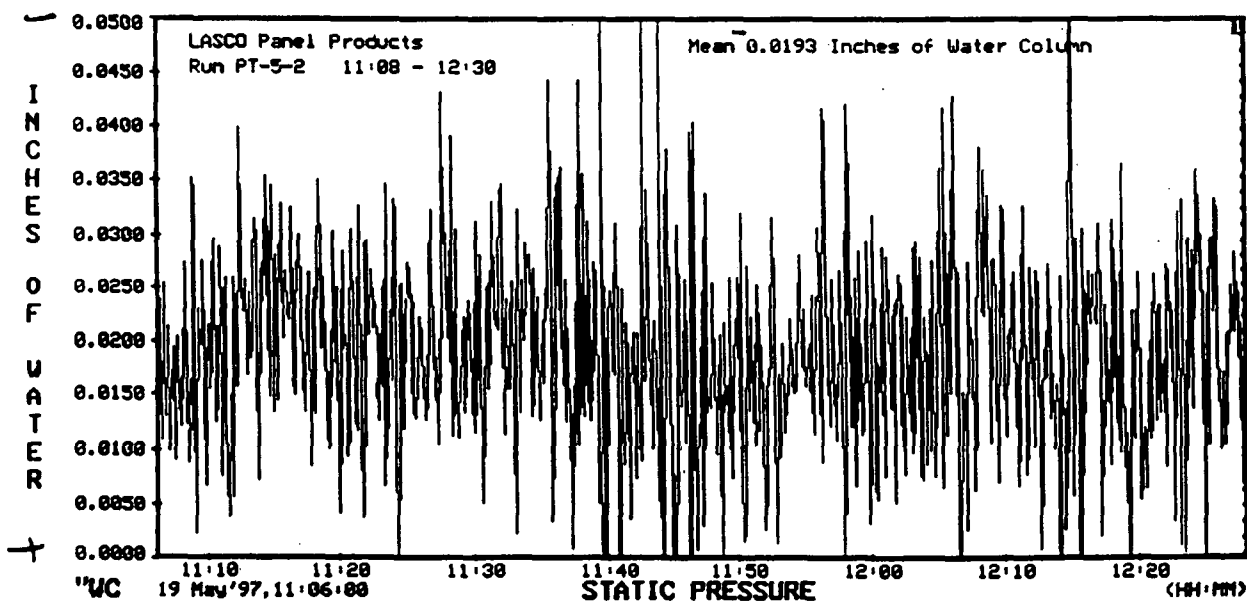
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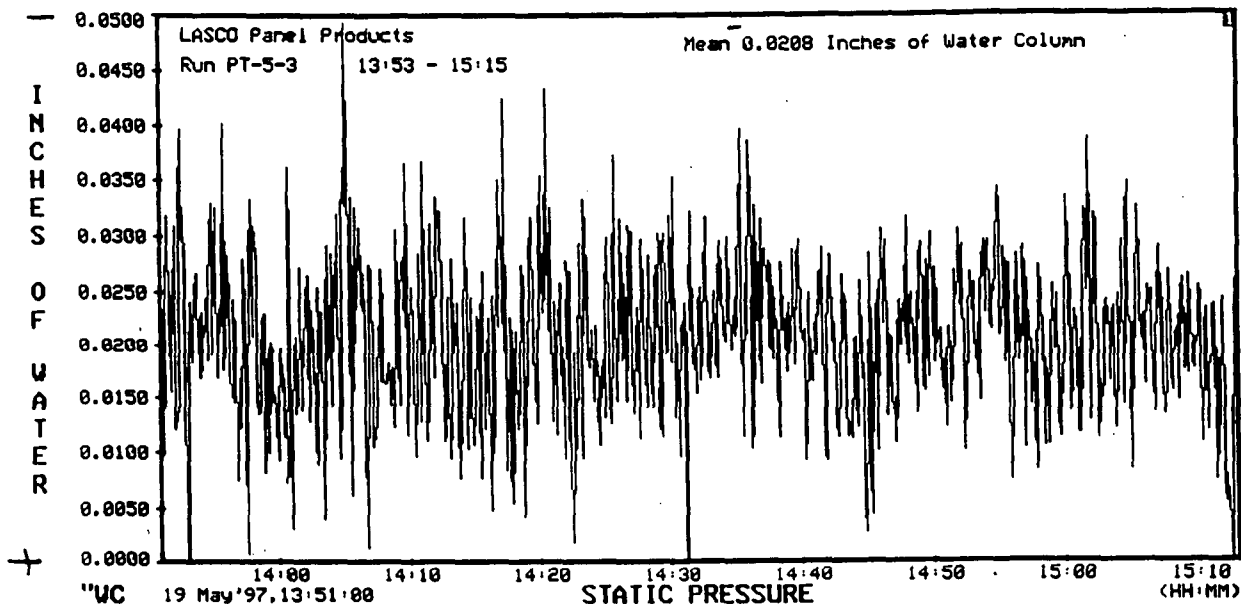
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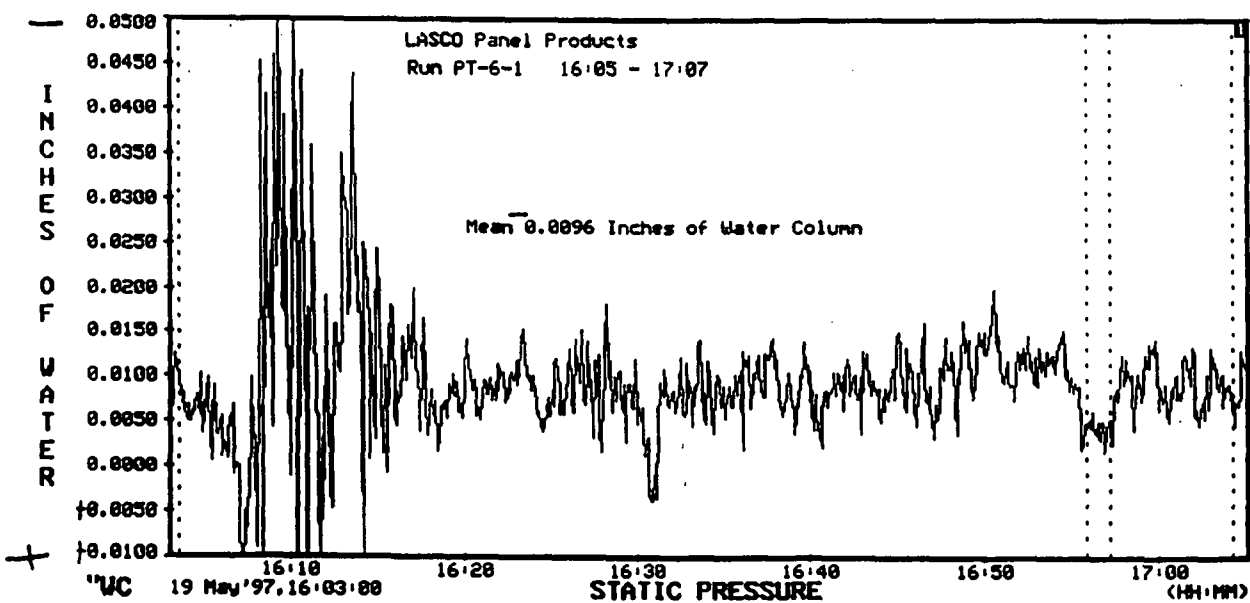
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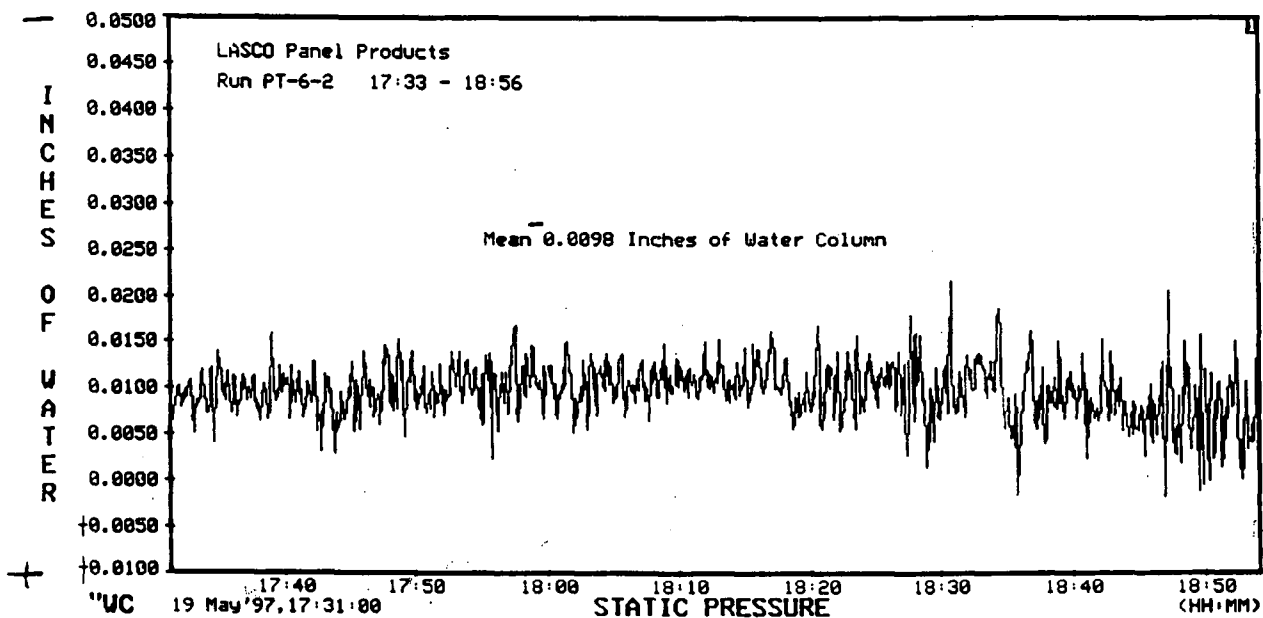
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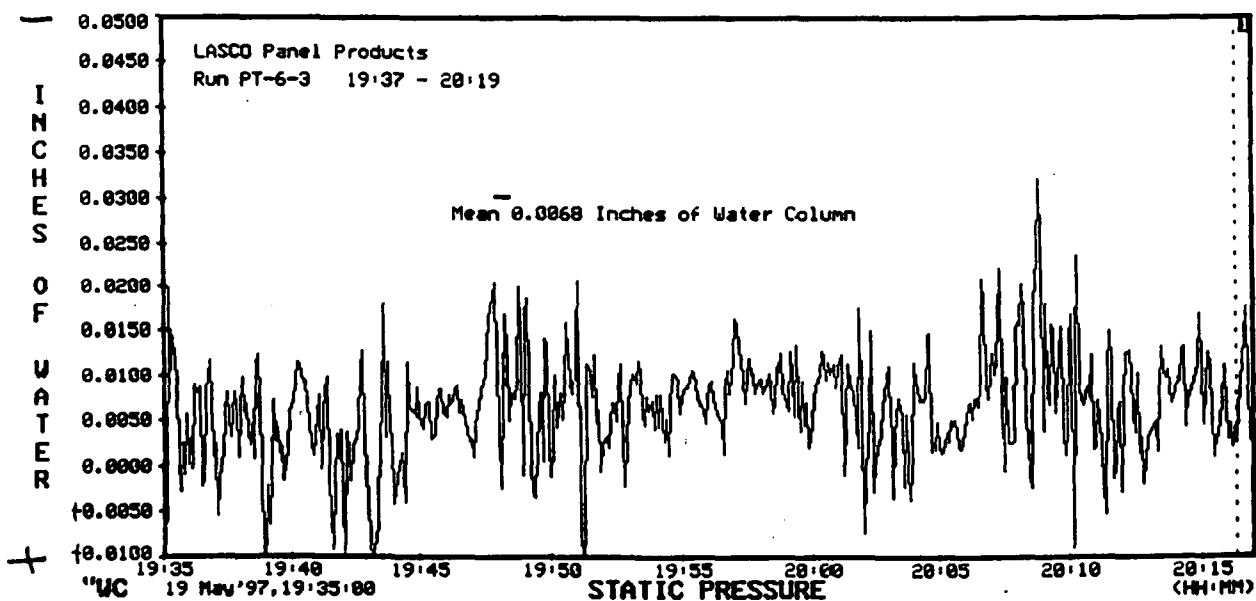
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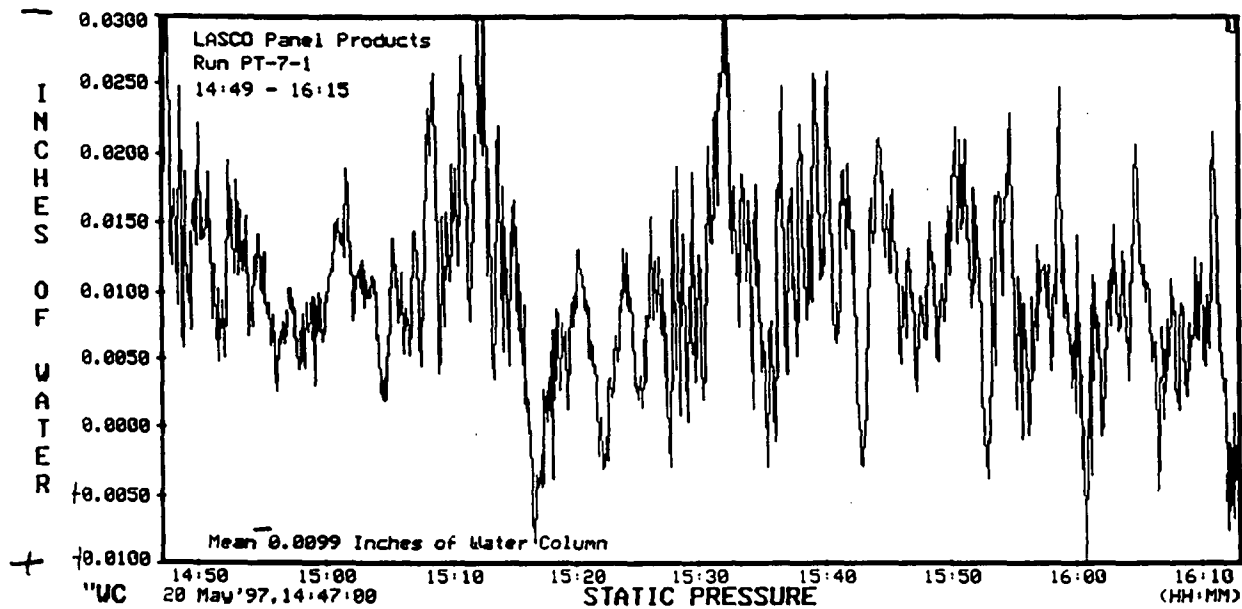
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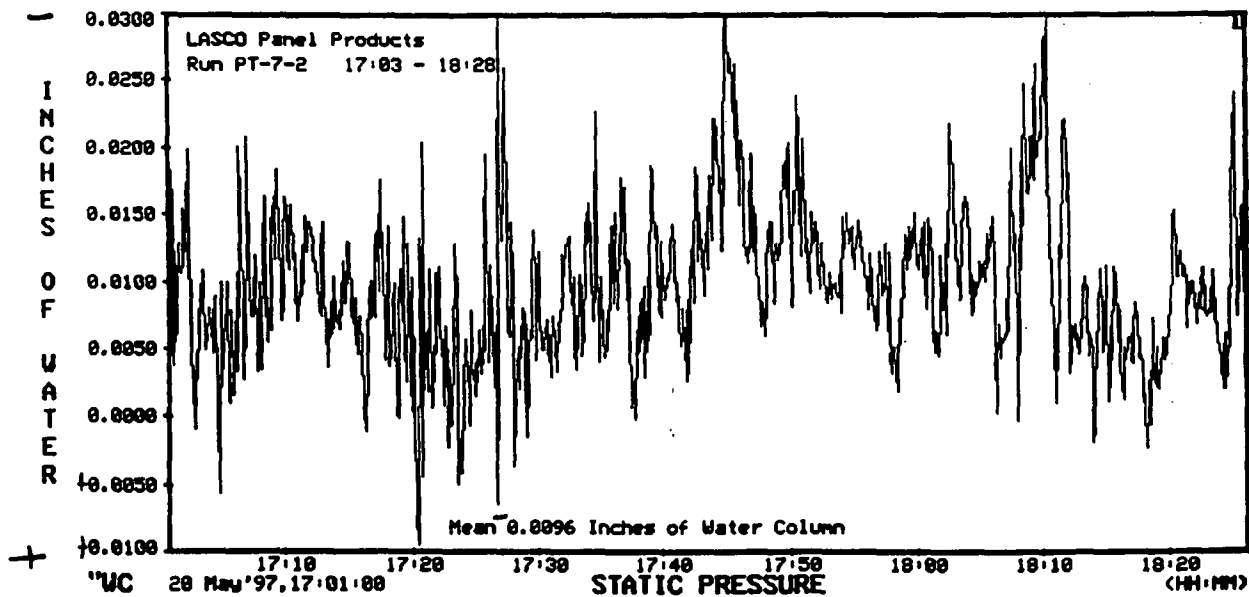
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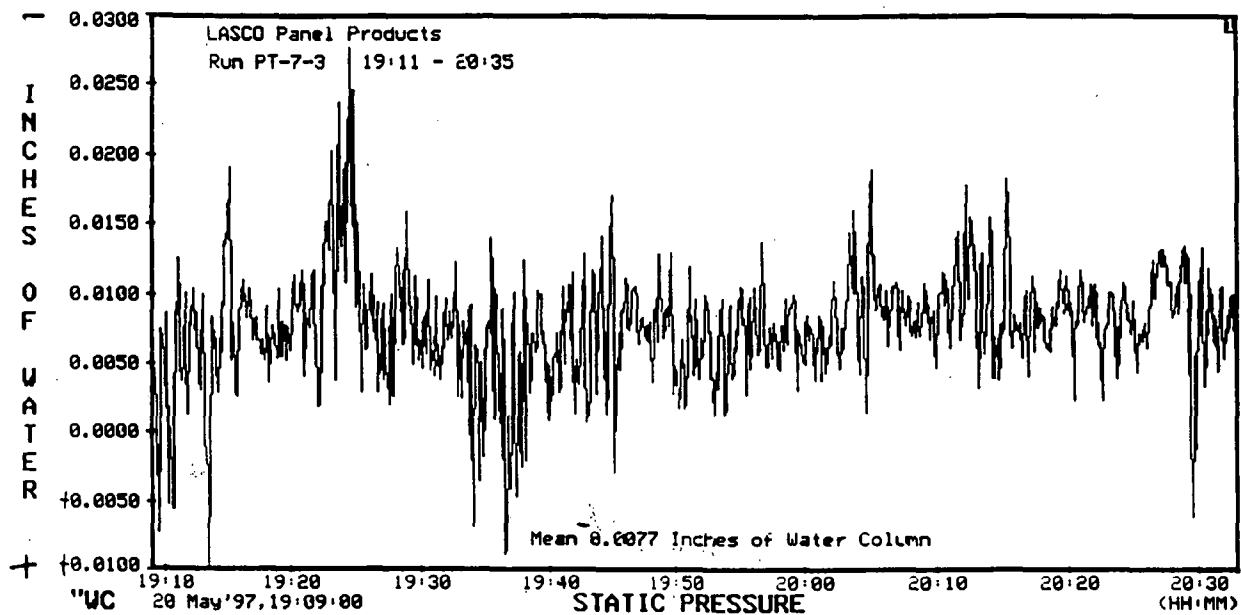
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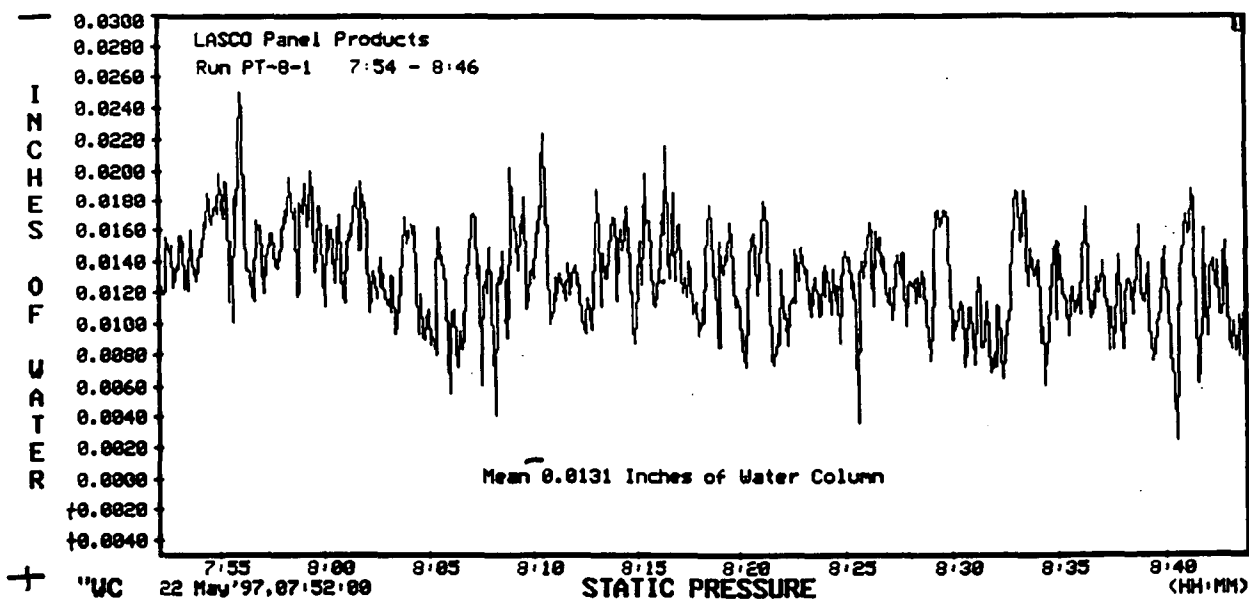
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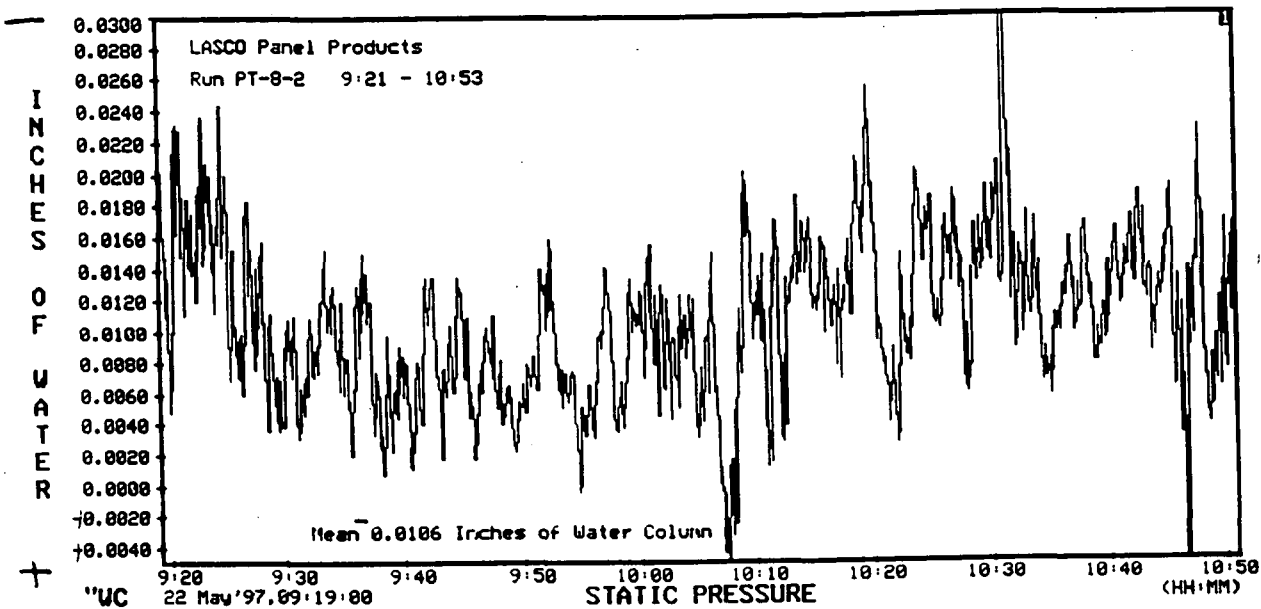
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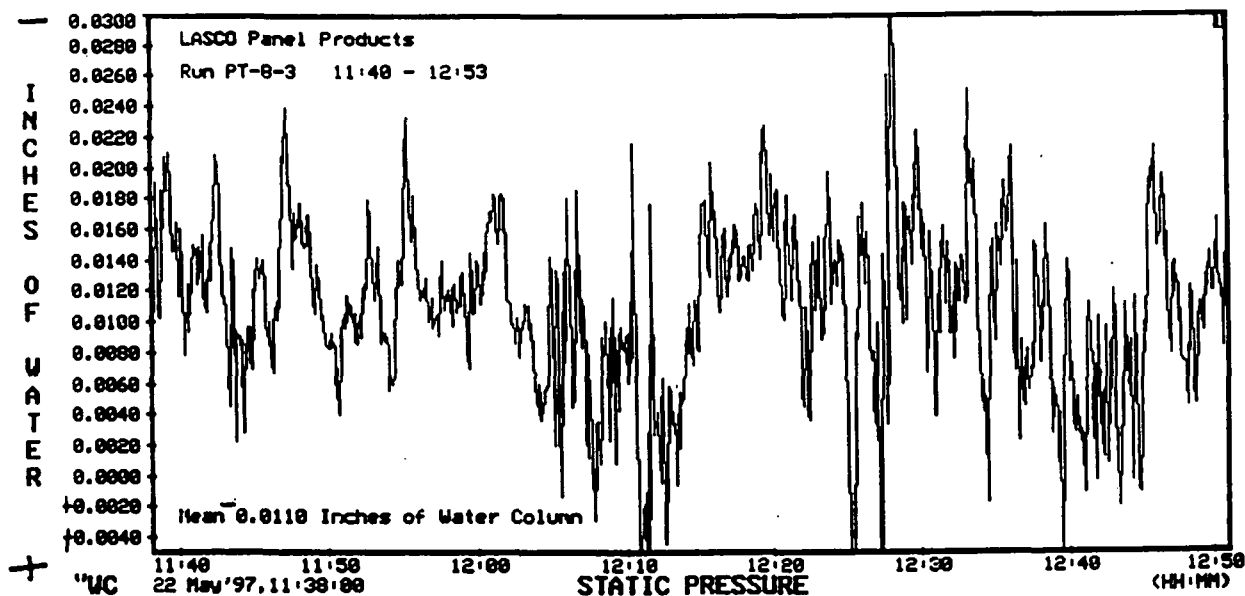
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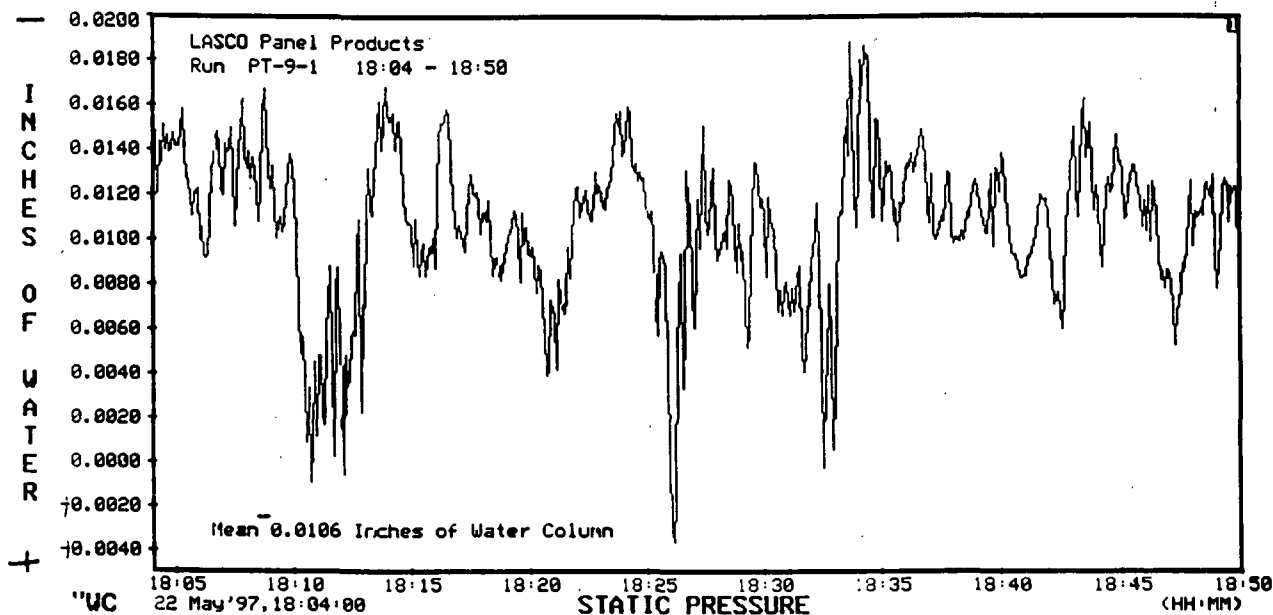
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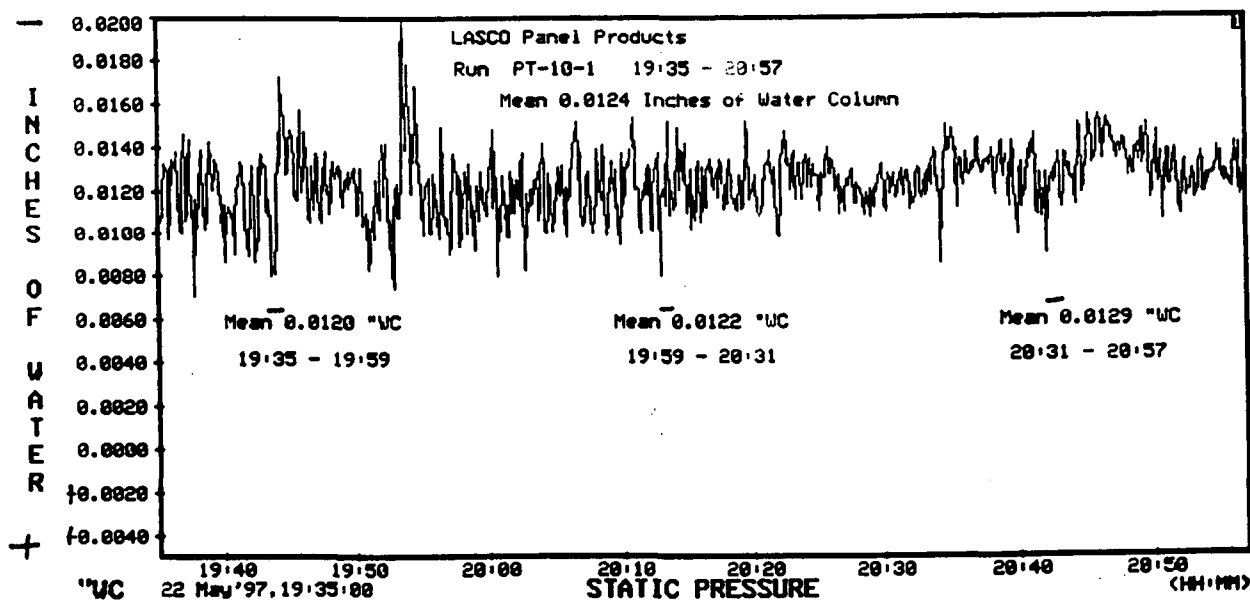
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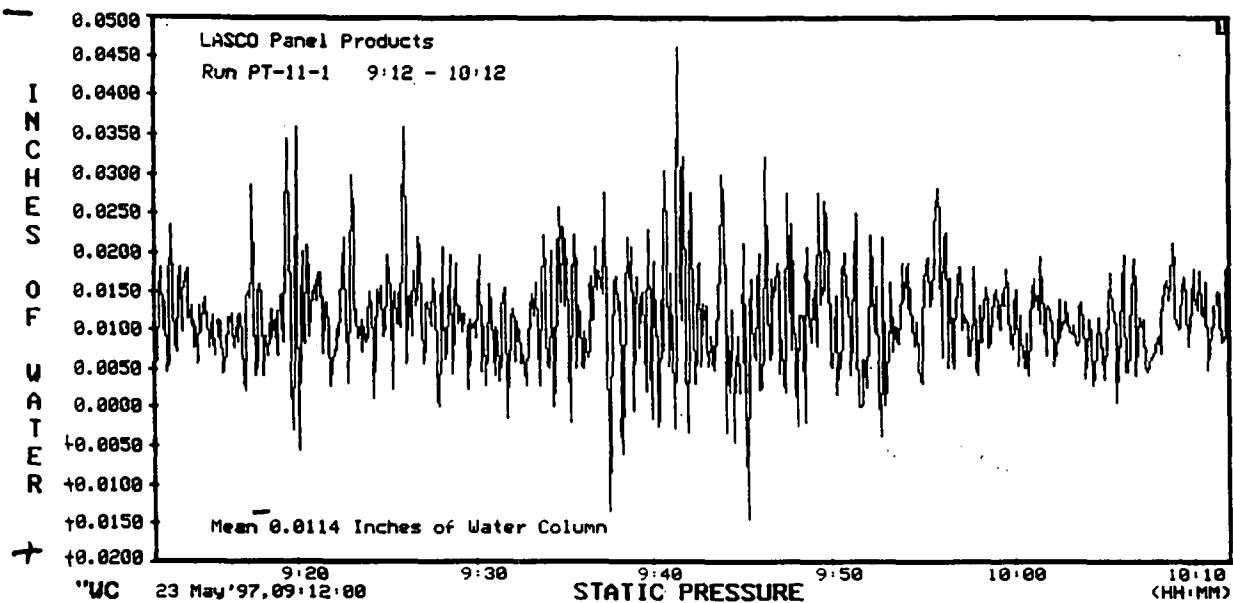
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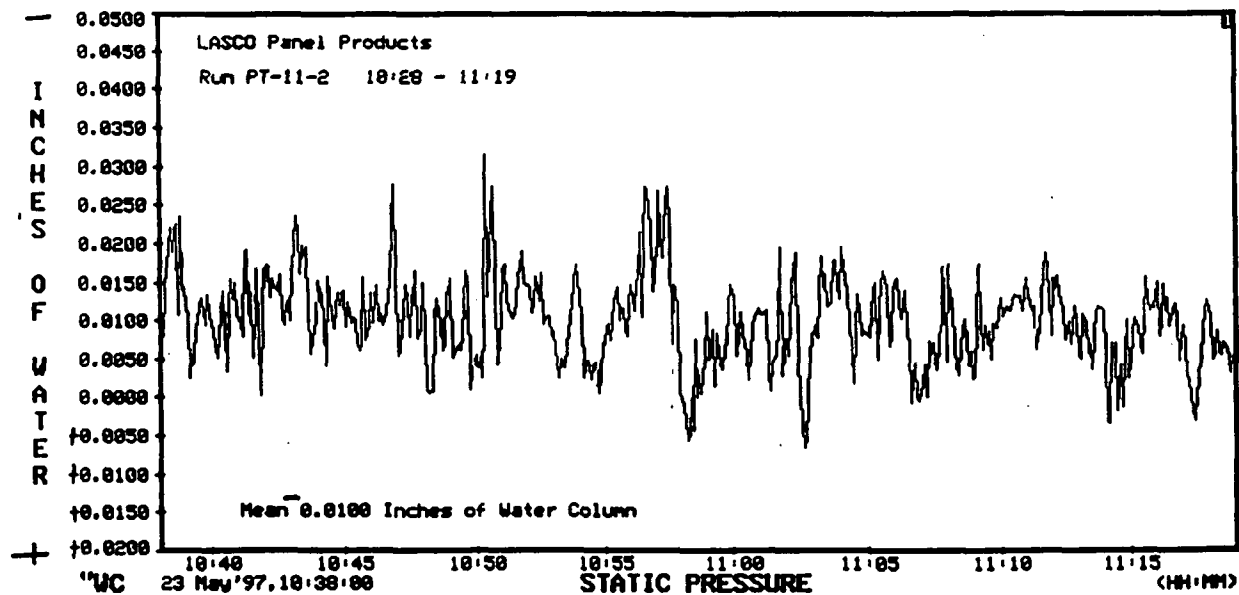
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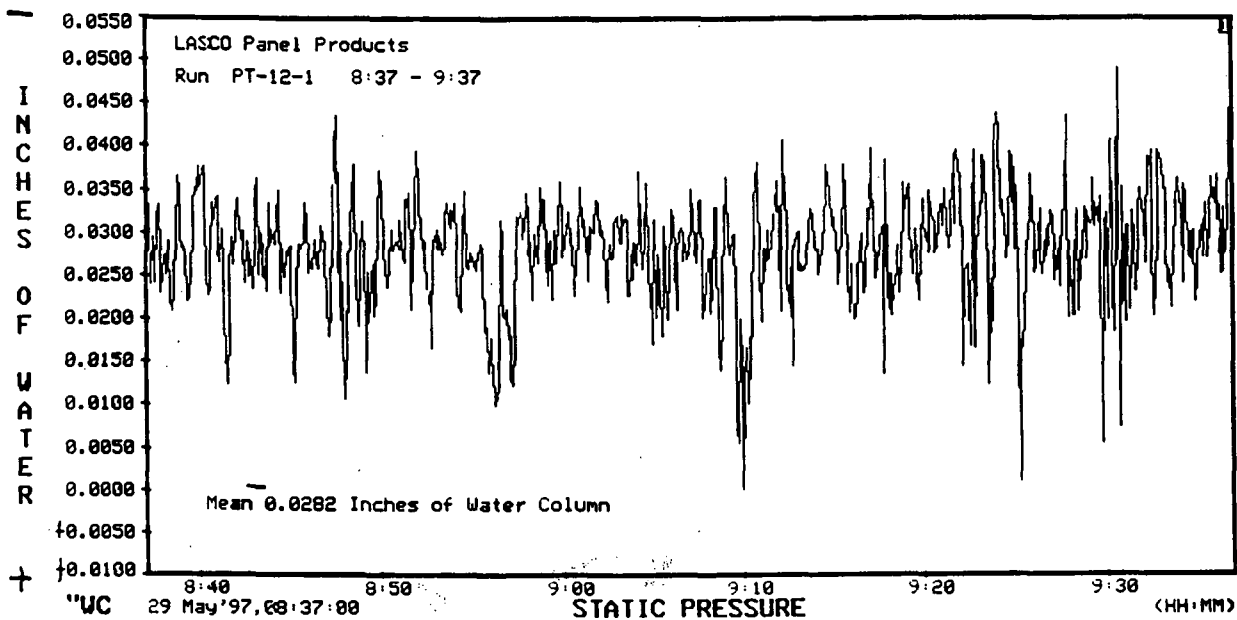
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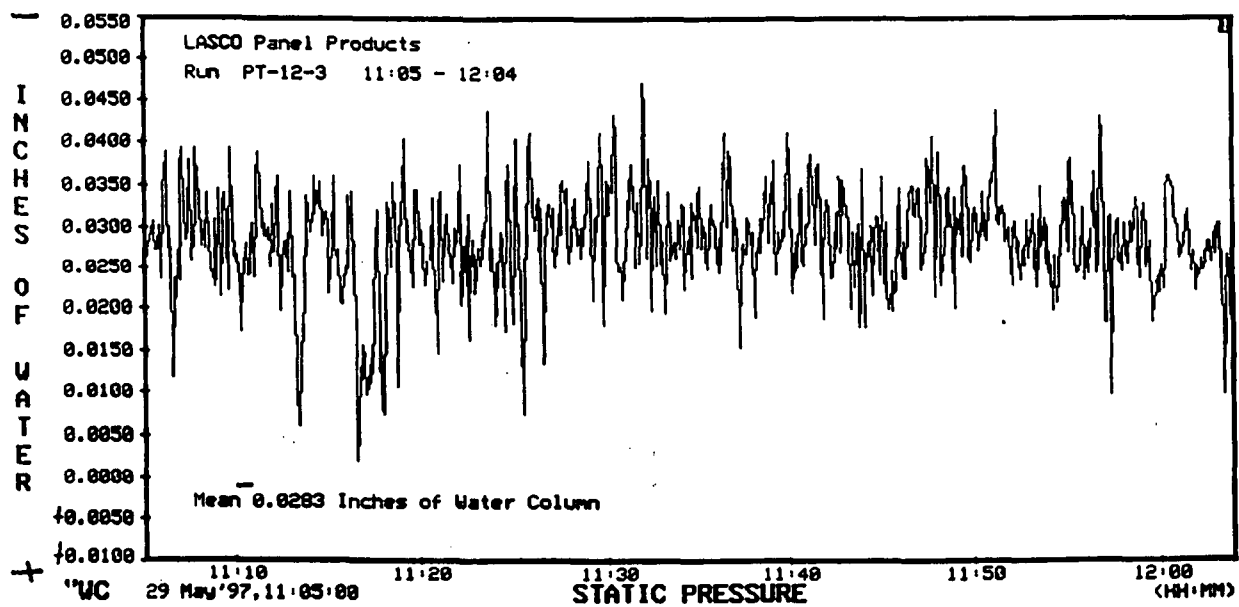
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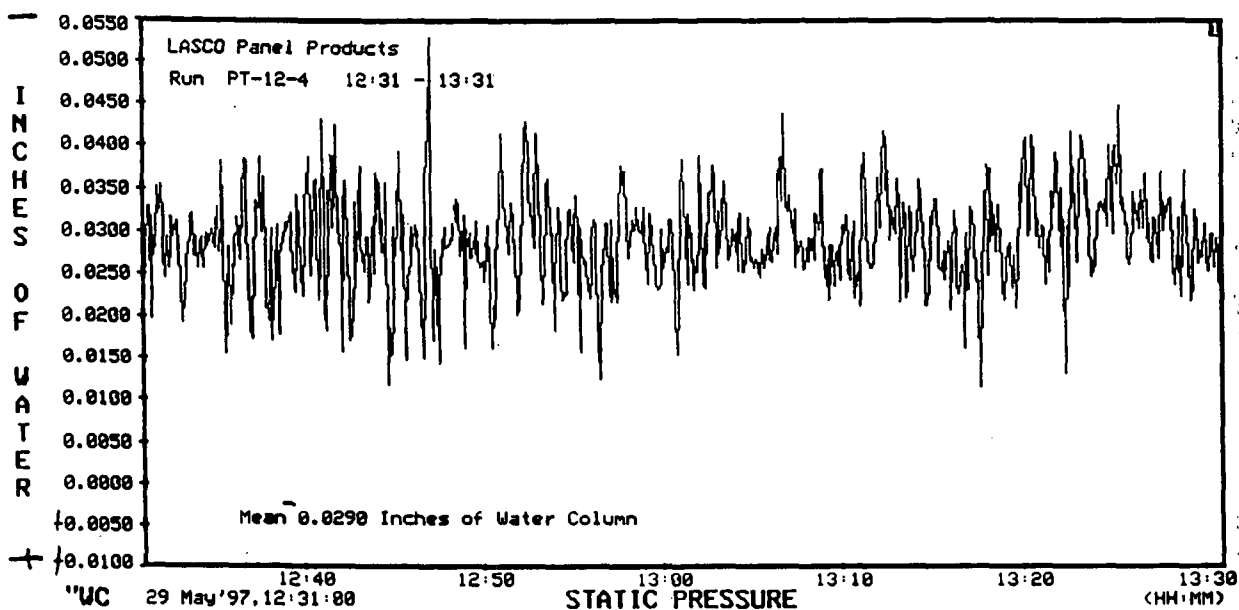
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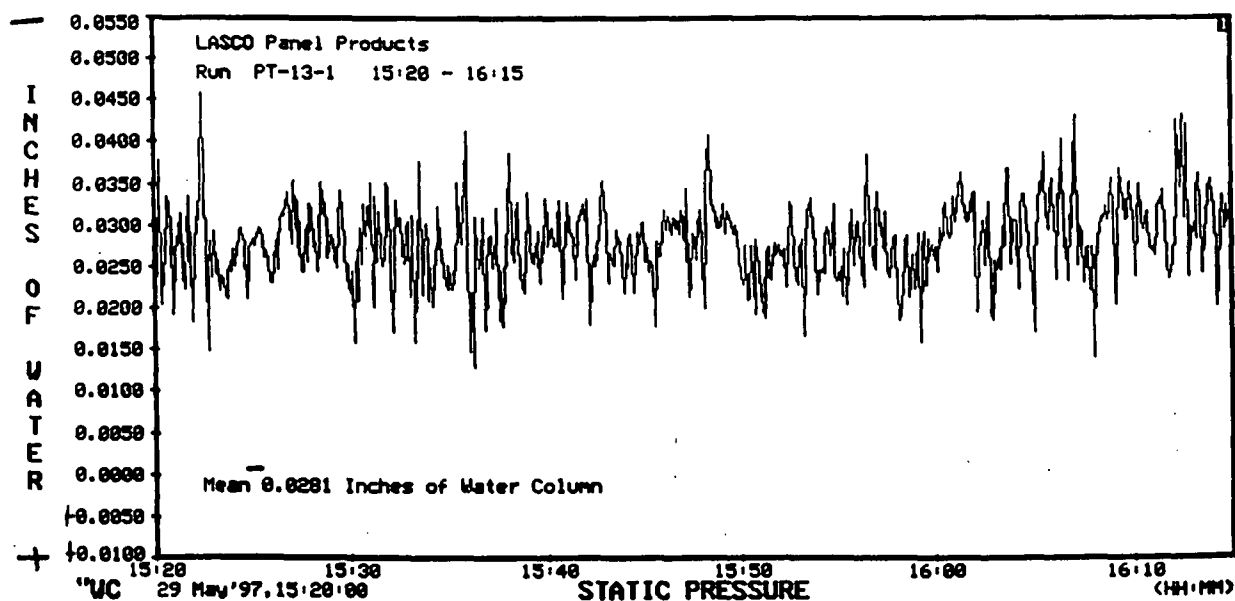
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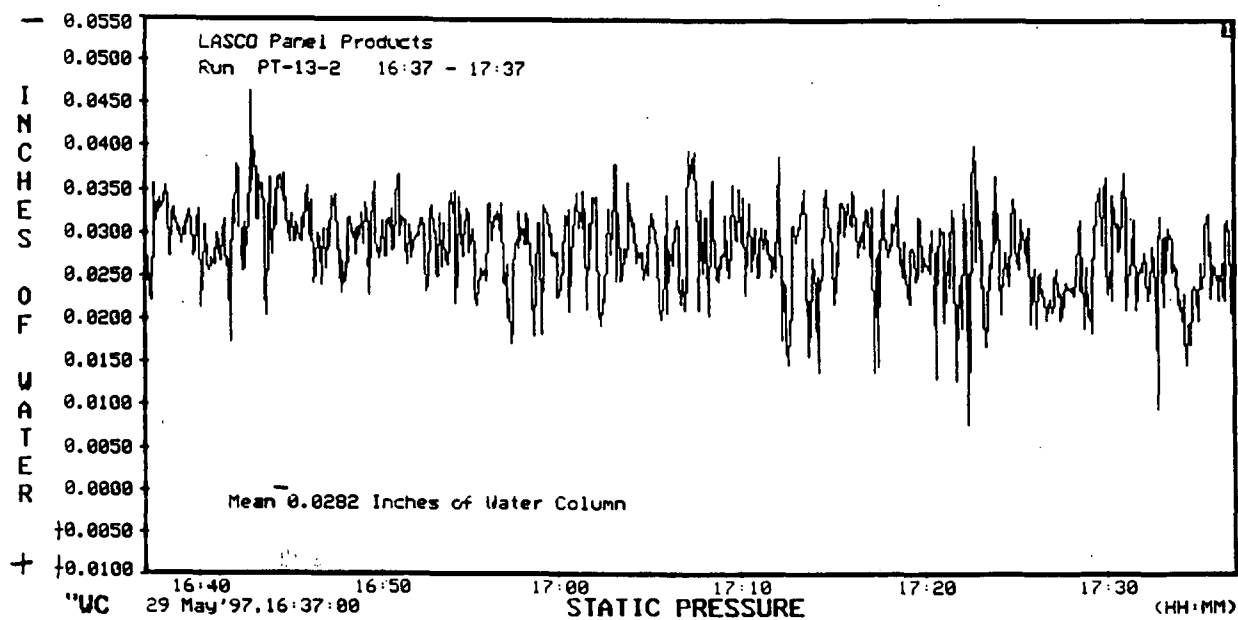
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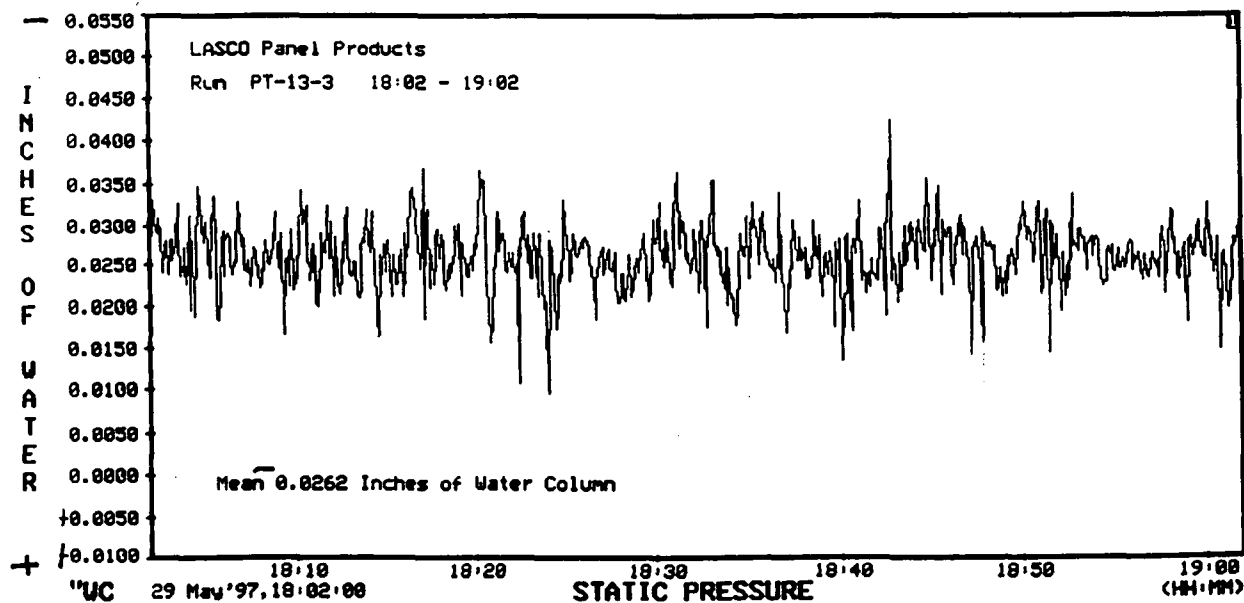
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Graph 1 Trace 1 29-PT.DTA Point Line 29 May 1997



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Graph 1 Trace 1 29-PT.DTA Point Line 29 May 1997

APPENDIX A.2.2

Method 25A Calibration Data



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: MAIN EXHAUST Monitor: ppm or %
 Date: 5-13-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 28.80

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation, "Direct System"		Calibration Error, ** % of Span-GAS	Sampling System Bias, *** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.1	0.2	0.9	1.9		0.1
AAL710	270.5	26.8	26.2	270.5	264.5	0.00	0.6
AAL18513	463.3	45.7	44.7	461.4	451.3	0.41	1.0
ALMO28161	886.7	87.9	85.4	887.7	862.4		2.5

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.014)}{(0.0990)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): 27 s, 27 s, 27 s Average = 27 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: ROOM EXHAUST Monitor: ppm or %
 Date: 5-13-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 28.80

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	-1.2	-1.2		0.0
ALM026680	84.08	15.5	15.1	85.2	82.9	1.33	0.4
AAL710	26 270.5	48.9	48.0	271.4	266.4	0.33	0.9
ALM02	463.3	83.2	81.0	462.6	450.3		2.2
AAL18513							

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.224)}{(0.17937)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): 29 s, 29 s, 29 s Average = 29 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: Auxiliary Exhaust Monitor: ppm or %
 Date: 5-13-97 Span Value: 100
 Operator: P. Siegel Chart Scale: 0-500 ppm
 Project #: S405.003 Pbar, in. Hg.: 29.80

Cylinder #	Cal. Gas Conc., ppm or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	-0.6	-0.6		0.0
ALM021680	84.08	15.4	15.2	84.4	83.3	0.38	0.2
AAL716	270.5	49.3	49.0	271.4	269.7	0.41	0.3
AAL18513	463.3	84.0	83.0	462.8	457.2		1.0

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.106)}{(0.1813)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$** \text{ Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$*** \text{ Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

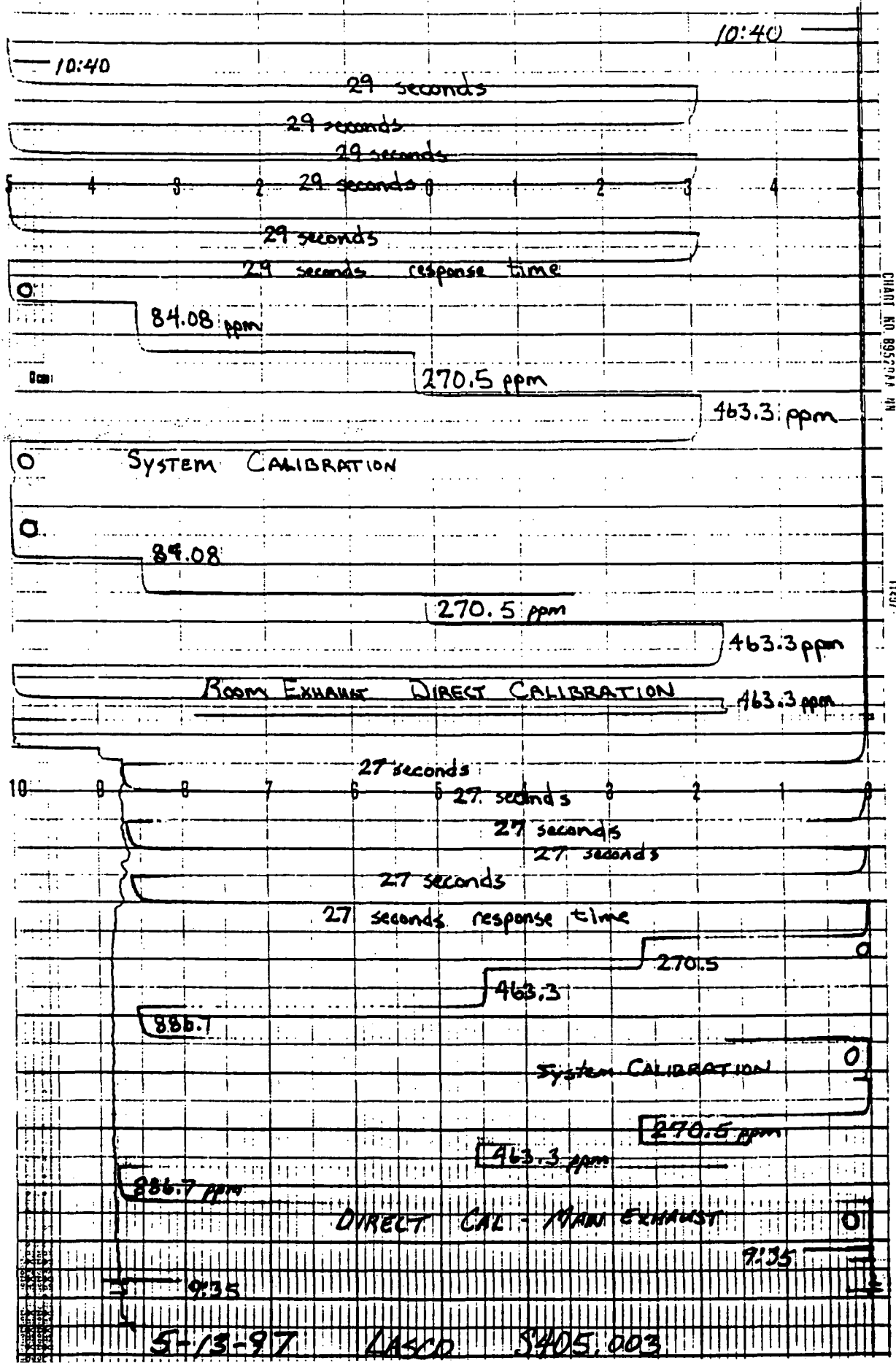
Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

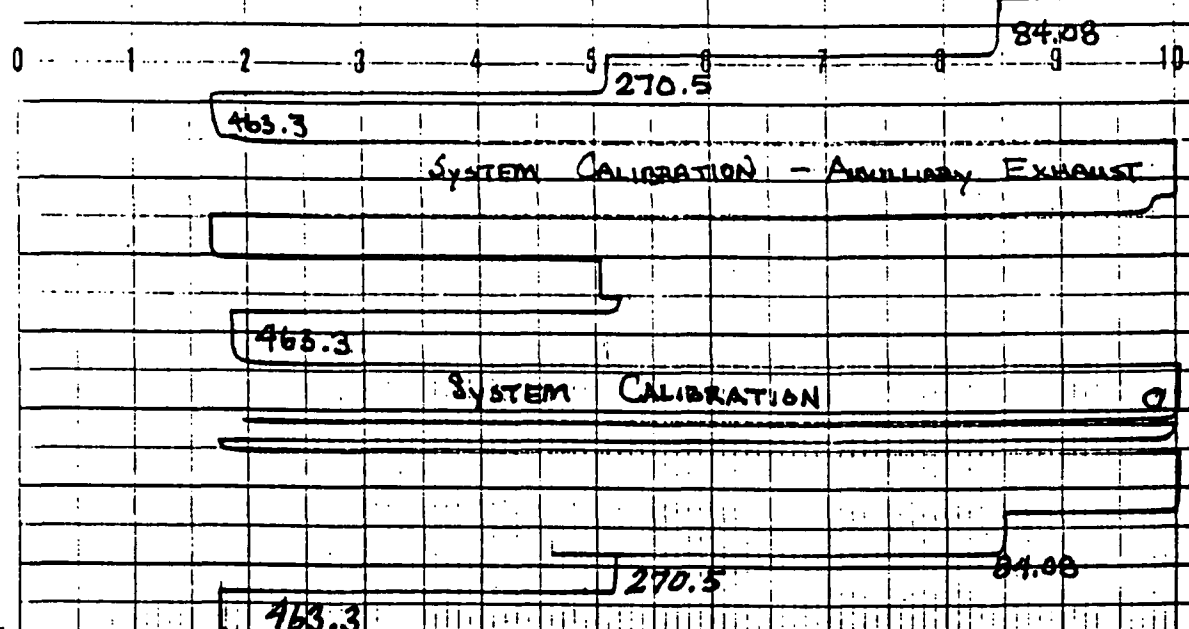
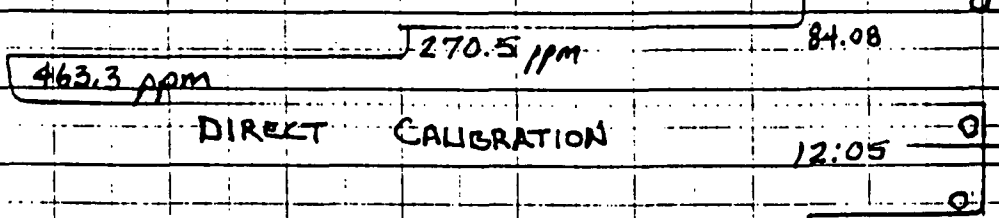
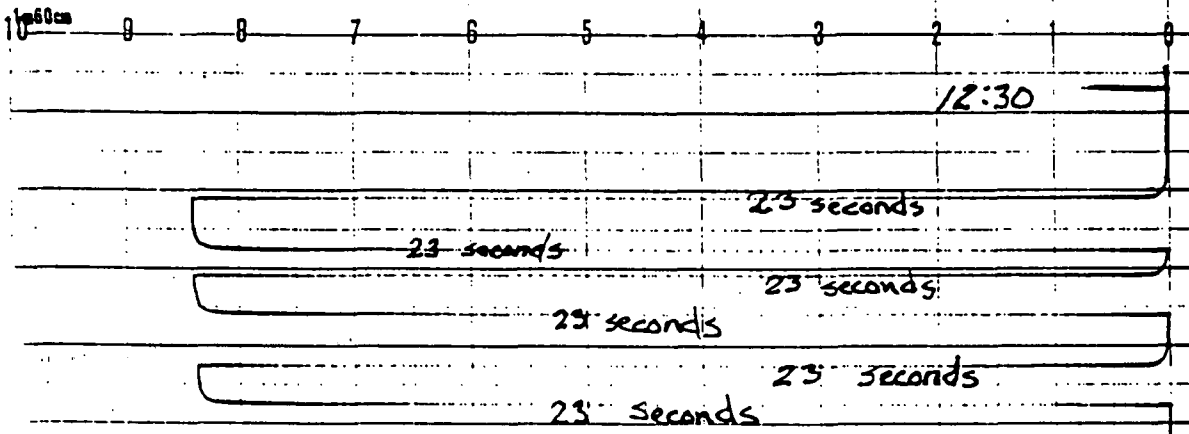
Rise time to 95% of response for high cal. gas injected through the system

(return to zero after each injection): 20 s, 23 s, 23 s Average = 23 s

Precision, % scale = difference in chart division response for two repeated

injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)





463.3 ppm 270.5 ppm 84.08

DIRECT CALIBRATION 12:05

84.08

270.5

463.3

SYSTEM CALIBRATION - AUXILIARY EXHAUST

463.3

SYSTEM CALIBRATION

270.5

84.08

463.3

AUXILIARY EXHAUST

5-13-97 14300 5405.003

LASCO Panel Products

Condition 1 - Main Exhaust

Total Hydrocarbons (THC)

14-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-0.4	-0.4
270.5 ppm	270.7	274.5
463.3 ppm	457.8	465.5
886.7 ppm	874.0	889.3

Correlation 0.9999852
Slope 0.9849099
Intercept 1.5133616

Correlation 0.9999908
Slope 1.0024036
Intercept 1.1262325

Sampling System Bias
0.00%
0.38%
0.77%
1.53%

Calibration Error

0.82%
0.01%

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-2	
886.7 ppm	895	0.77%
1737.0 ppm	1735	

Correlation 0.9999766
Slope 1.0000828
Intercept 1.3608936

10:20 Post Cal 17 Drift 0.38%
1755 0.40%

10:39-11:39 Run 1-1 2967 Corrected 2965 ppm THC

11:51 Post Cal 17 Drift 0.38%
1716 0.38%

12:30-13:30 Run 1-2 2732 Corrected 2730 ppm THC

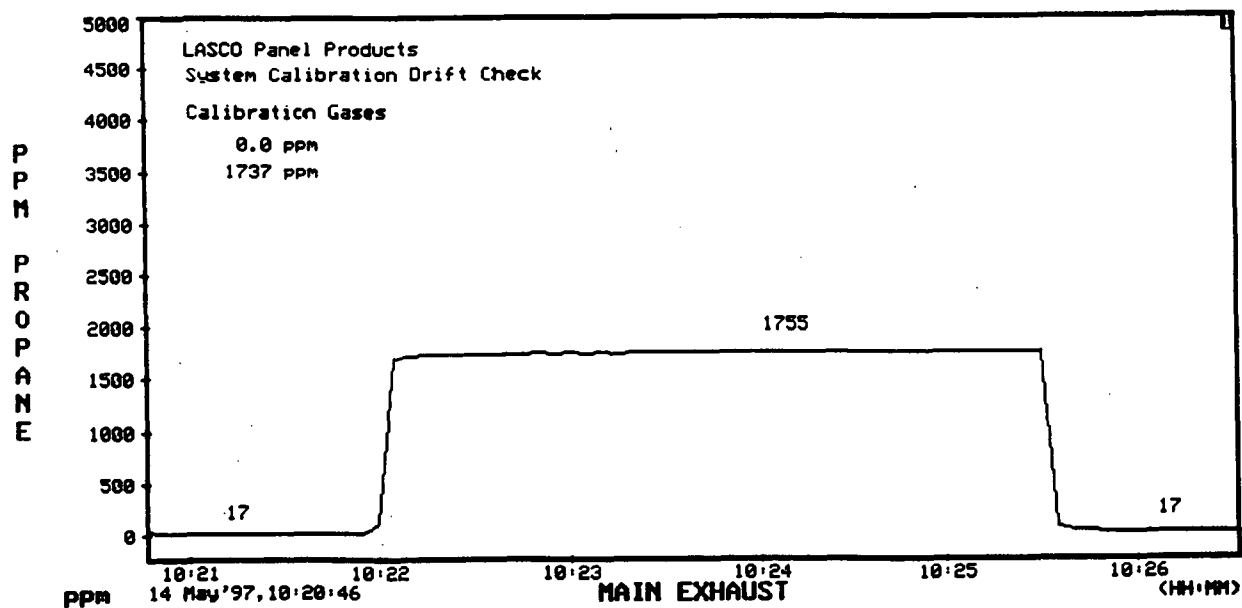
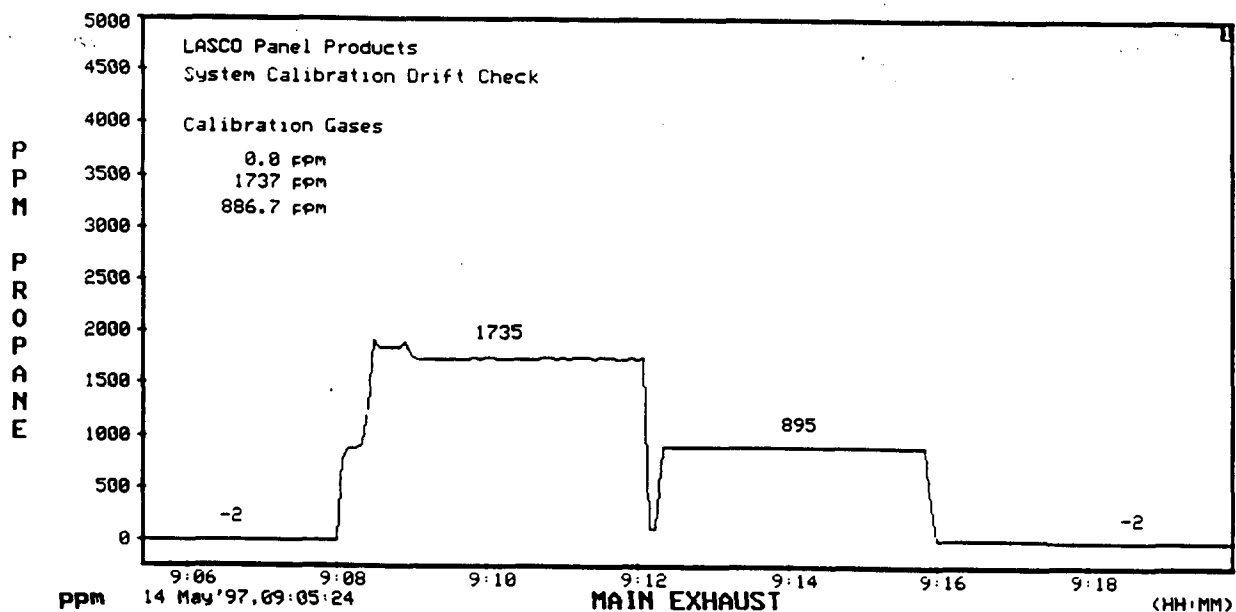
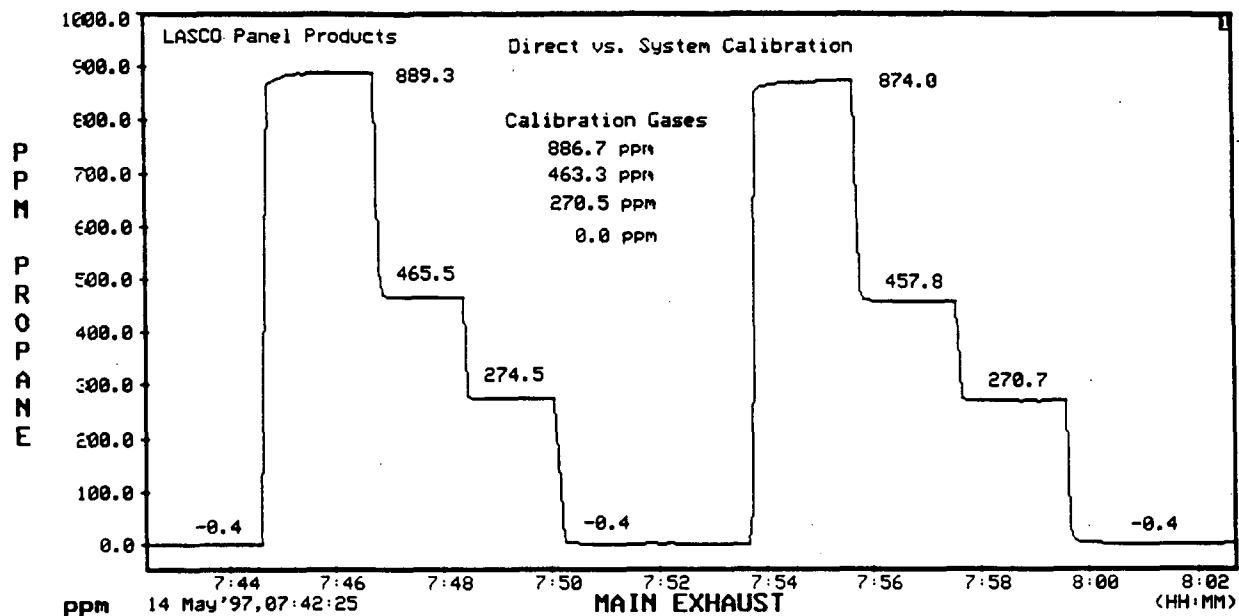
Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-2	
1737.0 ppm	1697	0.58%
2418.0 ppm	2385	

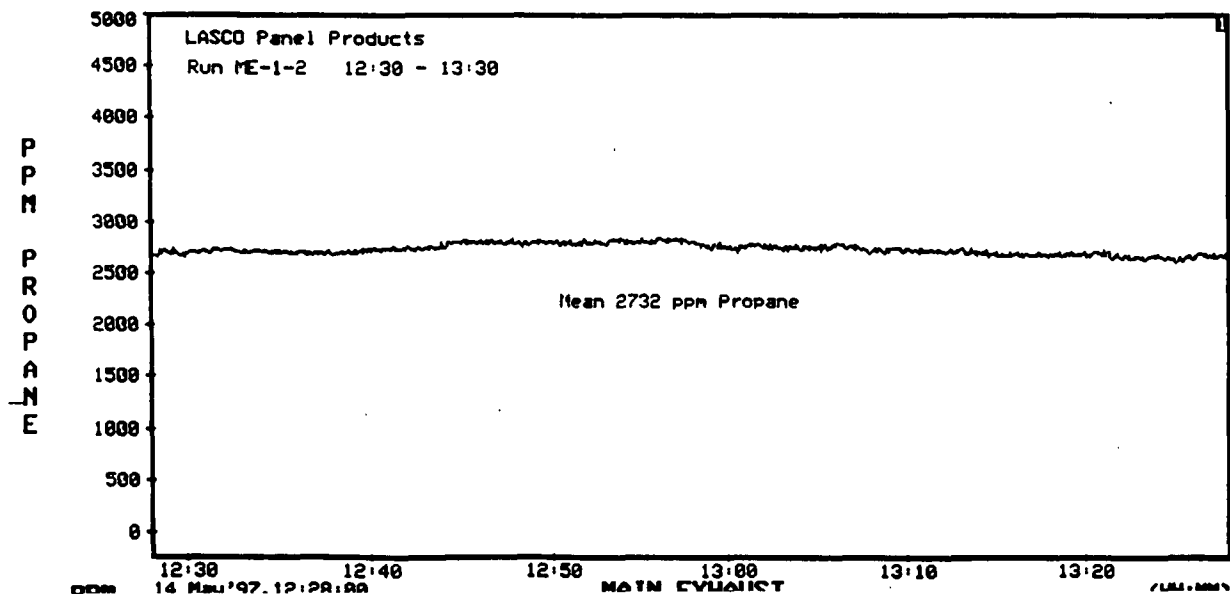
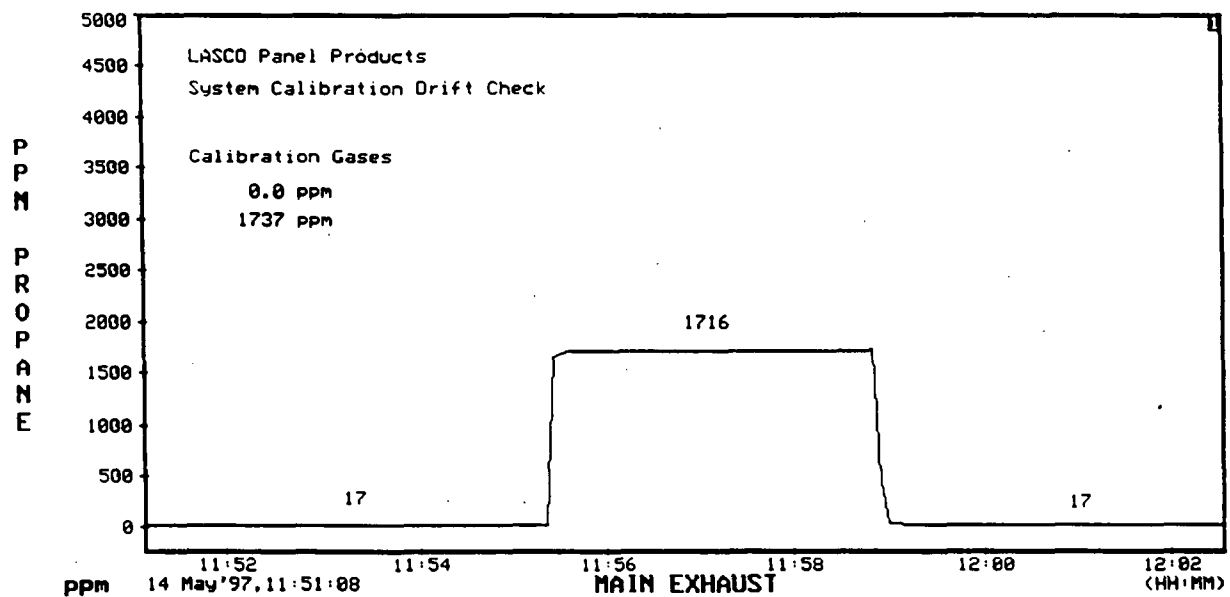
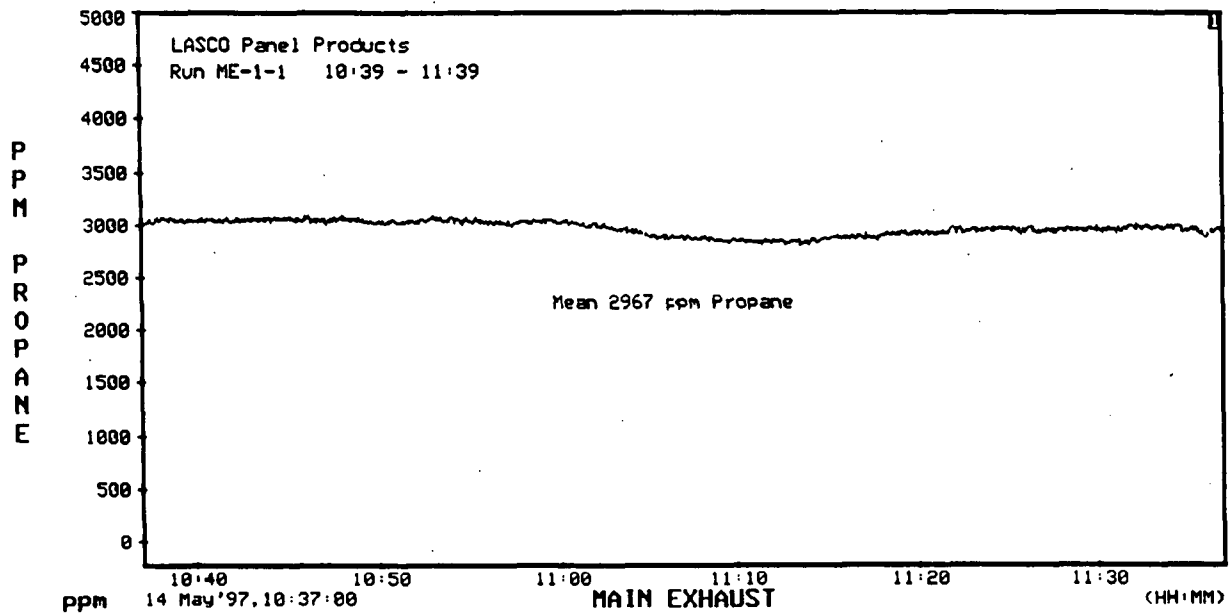
Correlation 0.9999743
Slope 0.9853986
Intercept -4.777032

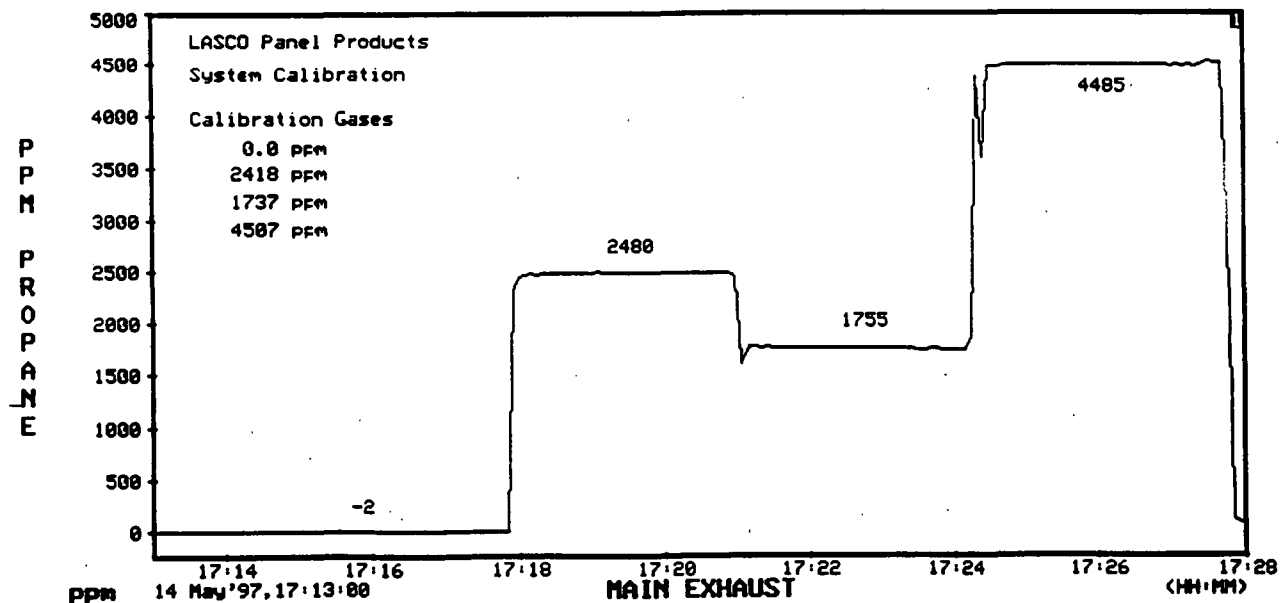
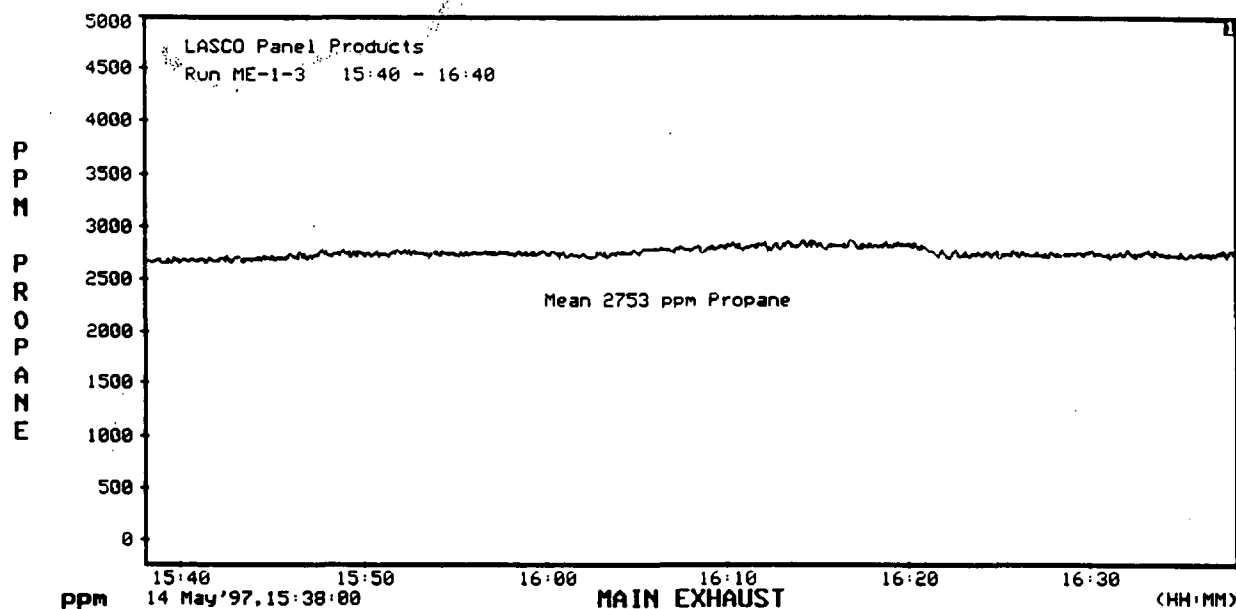
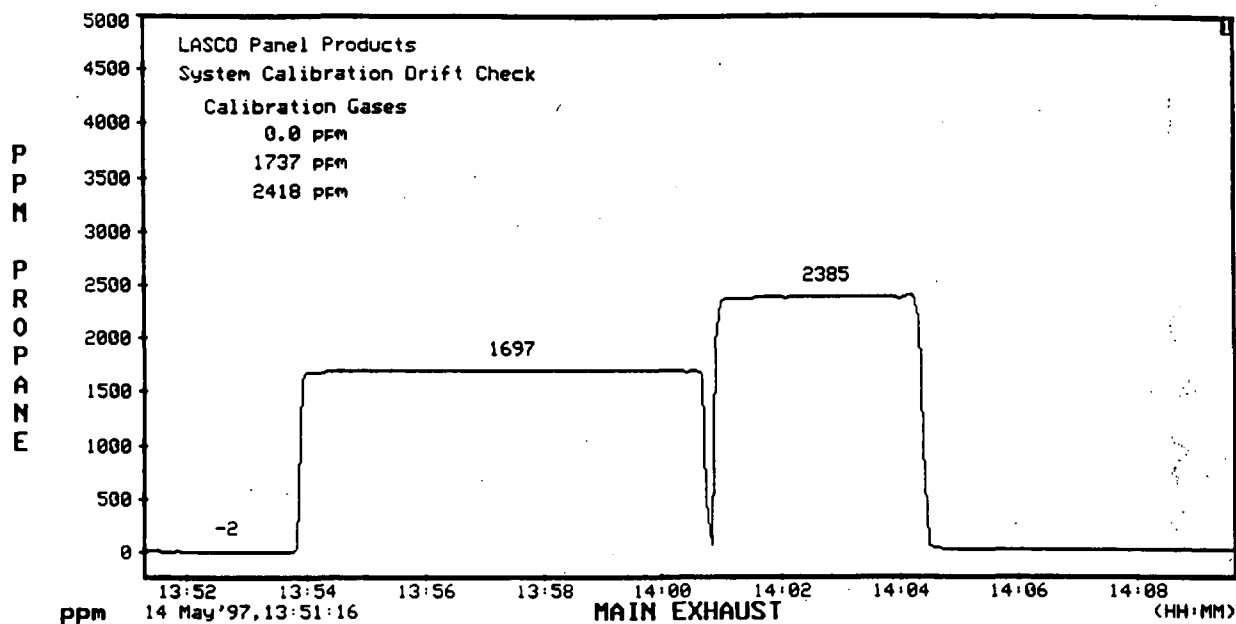
15:40-16:40 Run 1-3 2753 Corrected 2799 ppm THC

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-2	
1737.0 ppm	1755	0.14%
2418.0 ppm	2480	2.03%
4507.0 ppm	4485	

Correlation 0.99982
Slope 0.9962339
Intercept 22.1554







LASCO Panel Products

Condition 1 - Room Exhaust

Total Hydrocarbons (THC)

14-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	0.1	0.1
84.1 ppm	85.8	85.8
270.5 ppm	276.1	276.1
463.3 ppm	462.2	464.3

Correlation	0.9999003
Slope	0.9989028
Intercept	1.7993421

Sampling System Bias	
	0.00%
	0.00%
	0.00%
	0.38%

Correlation	0.9999364
Slope	1.0031608
Intercept	1.4536884

Calibration Error	
	0.02%
	1.21%

9:00	Post Cal	0.1	Drift	0.00%
		460.1		0.38%

10:15	Post Cal	4.3	Drift	0.76%
		468.5		1.15%

10:39-11:39	Run 1-1	381.9	Corrected	380.5	ppm THC
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11:46	Post Cal	2.2	Drift	0.38%
		458.0		0.76%

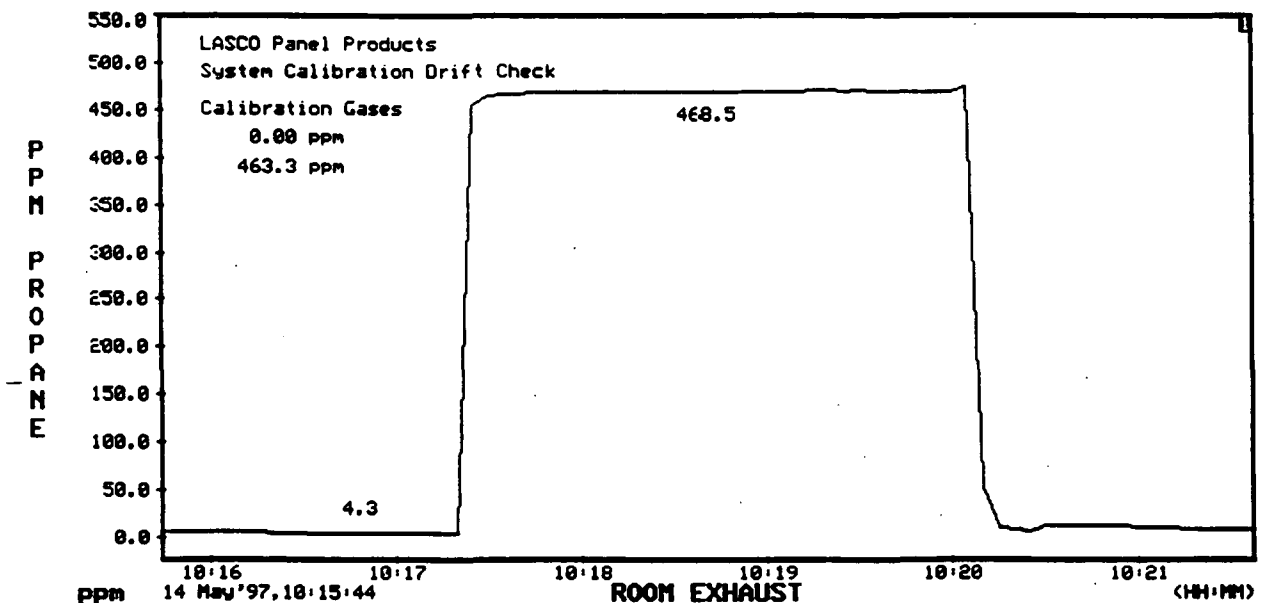
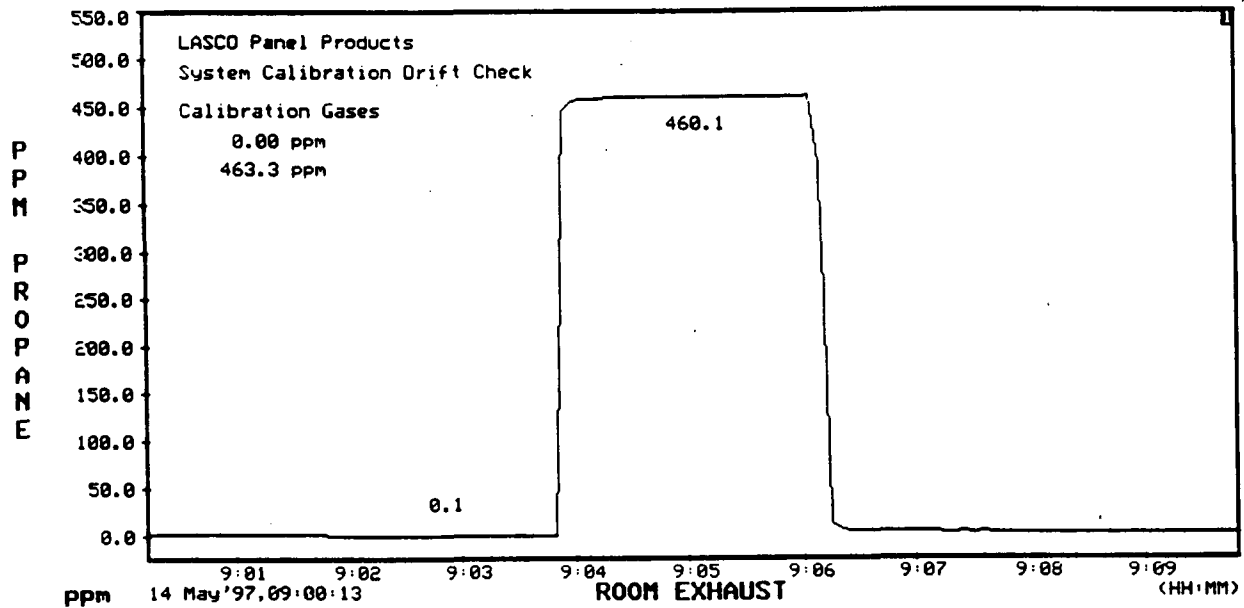
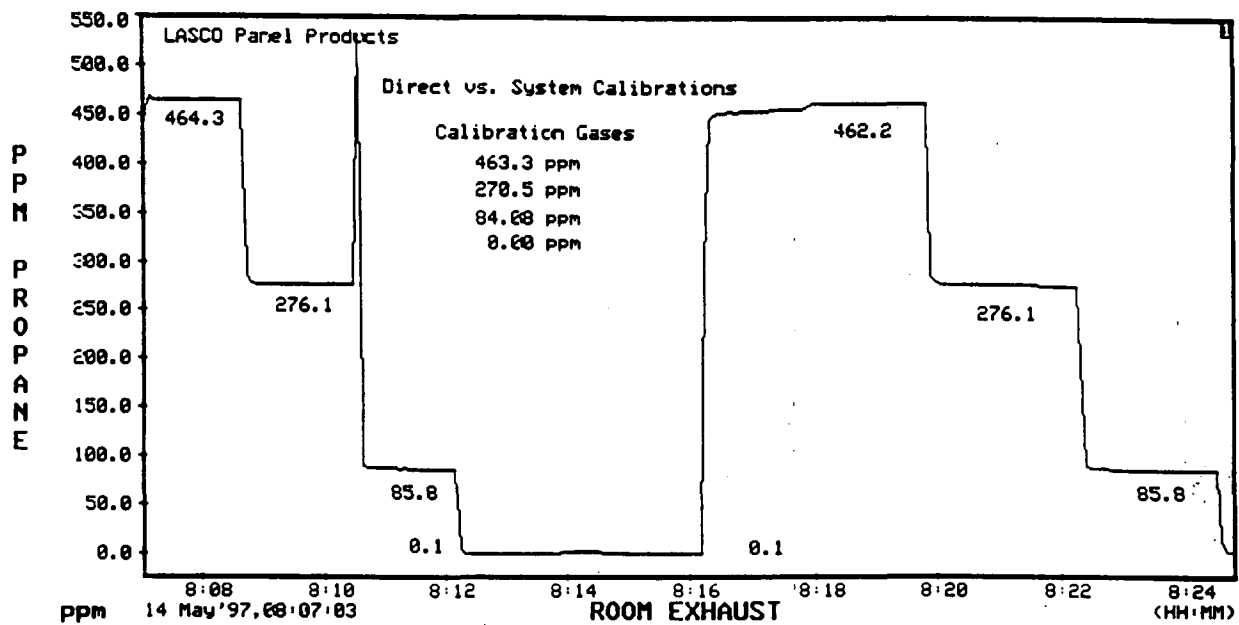
12:30-13:30	Run 1-2	354.6	Corrected	353.2	ppm THC
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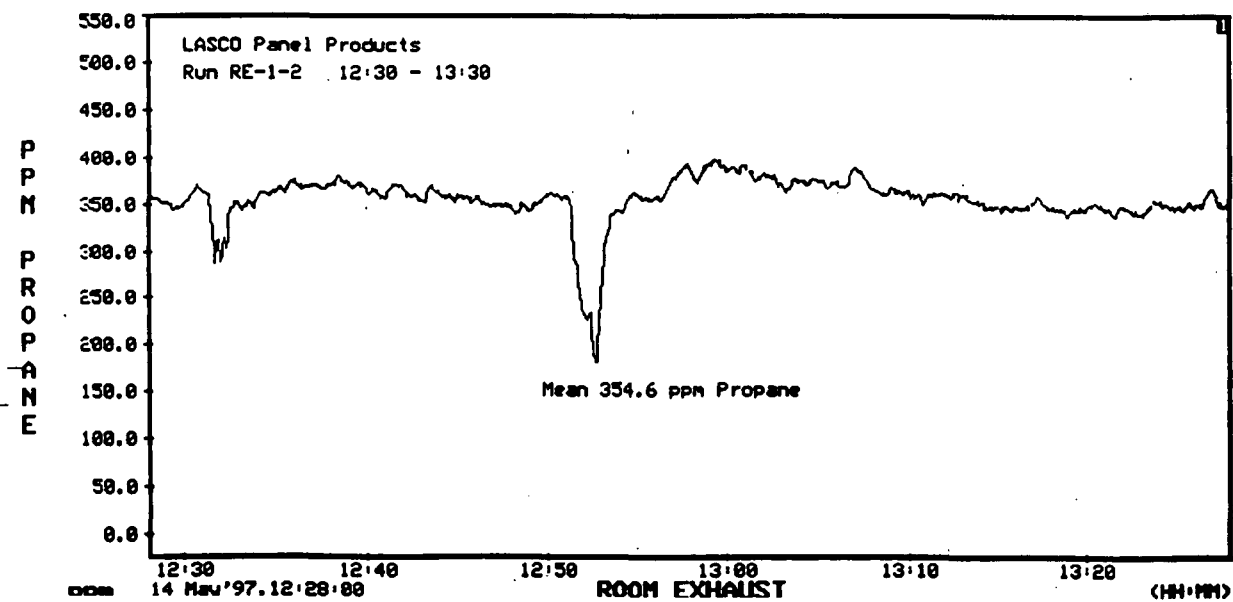
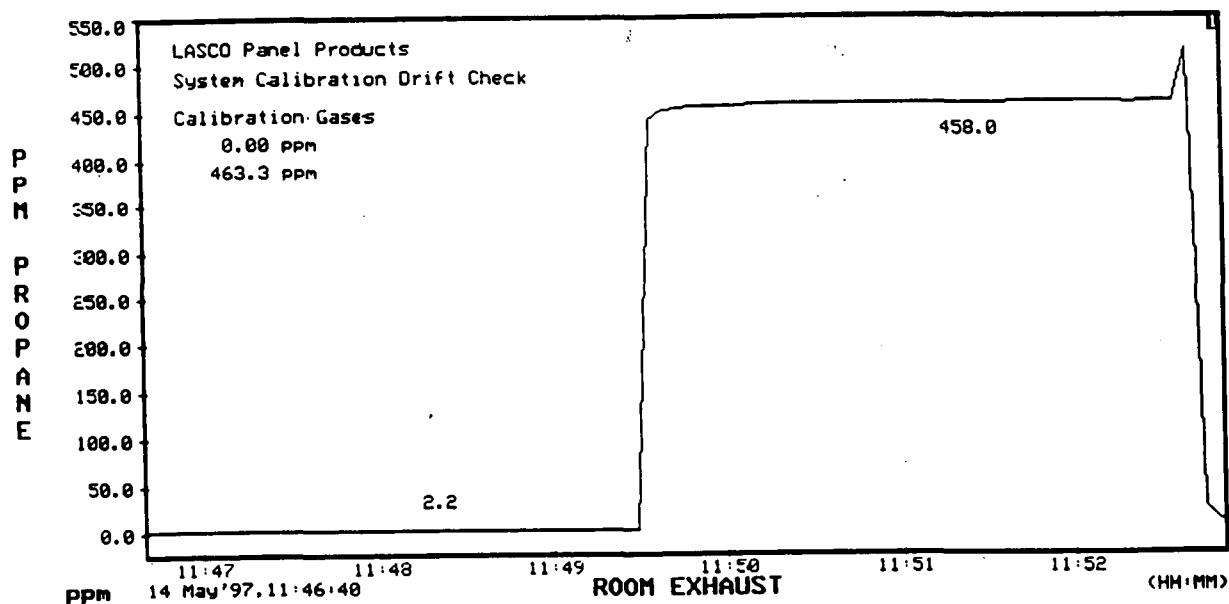
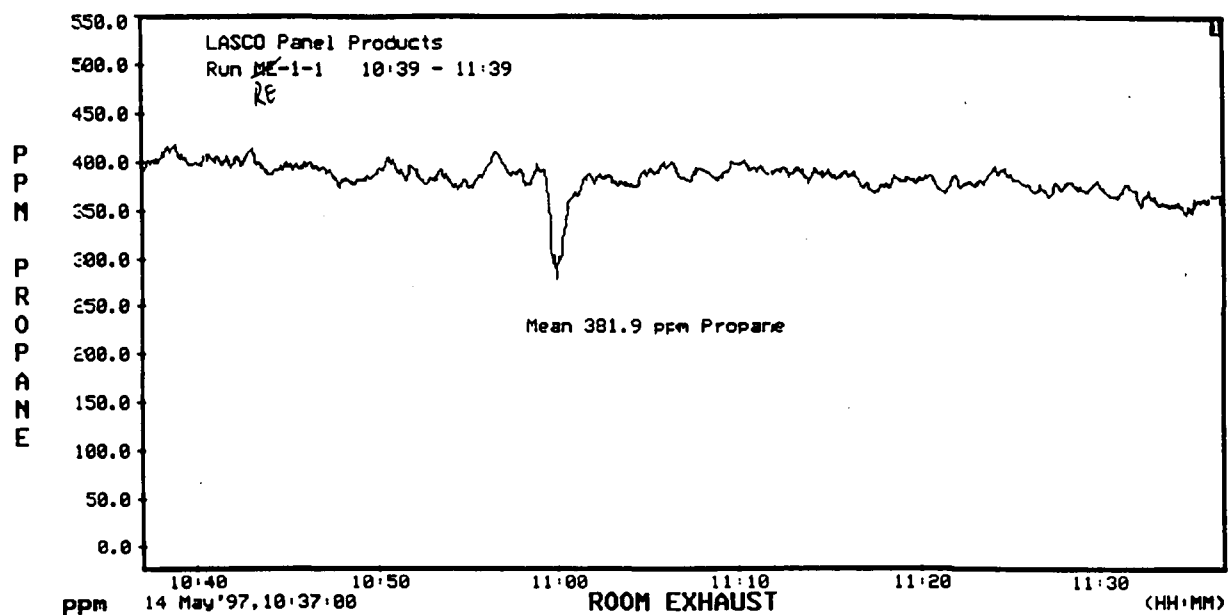
13:42	Post Cal	0.1	Drift	0.00%
		462.2		0.00%

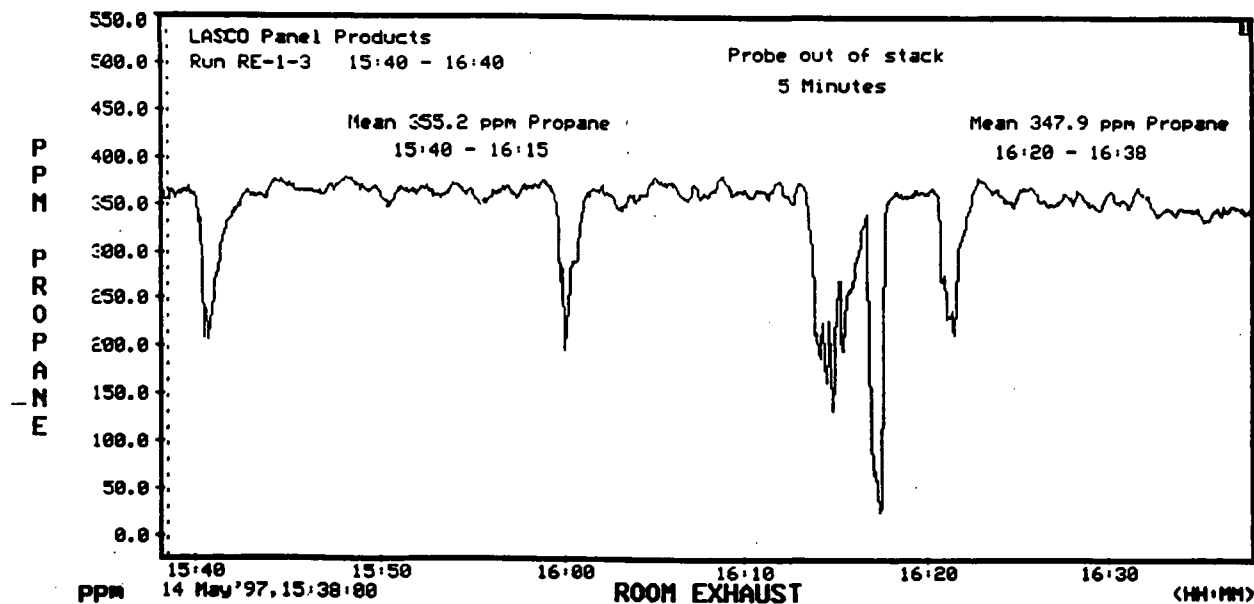
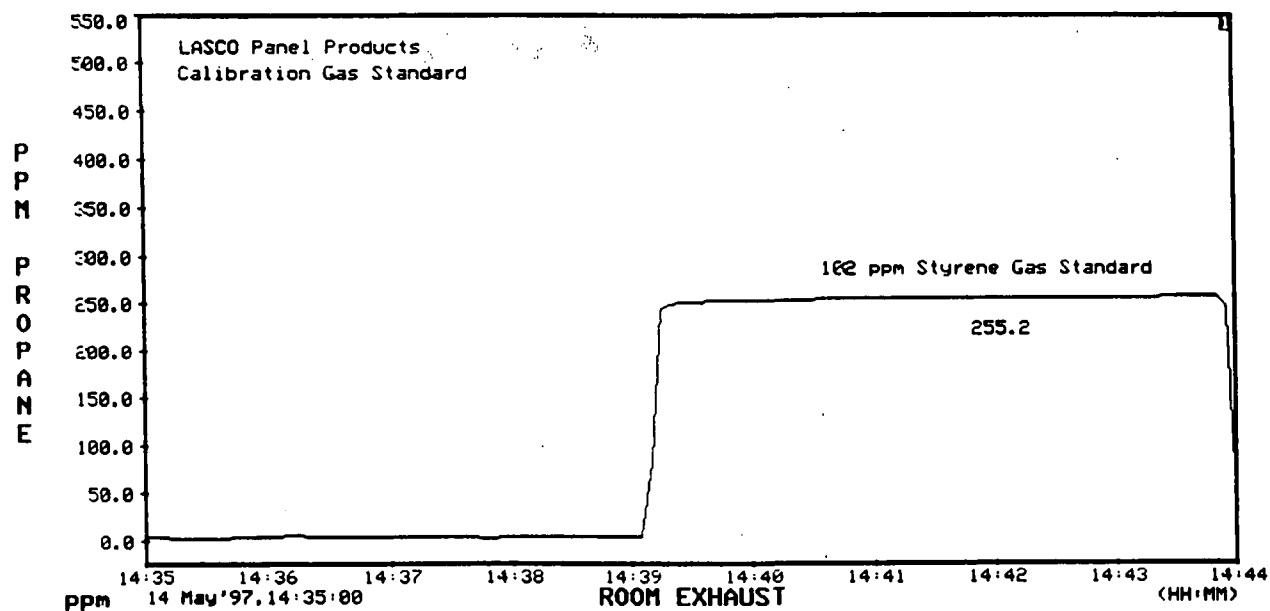
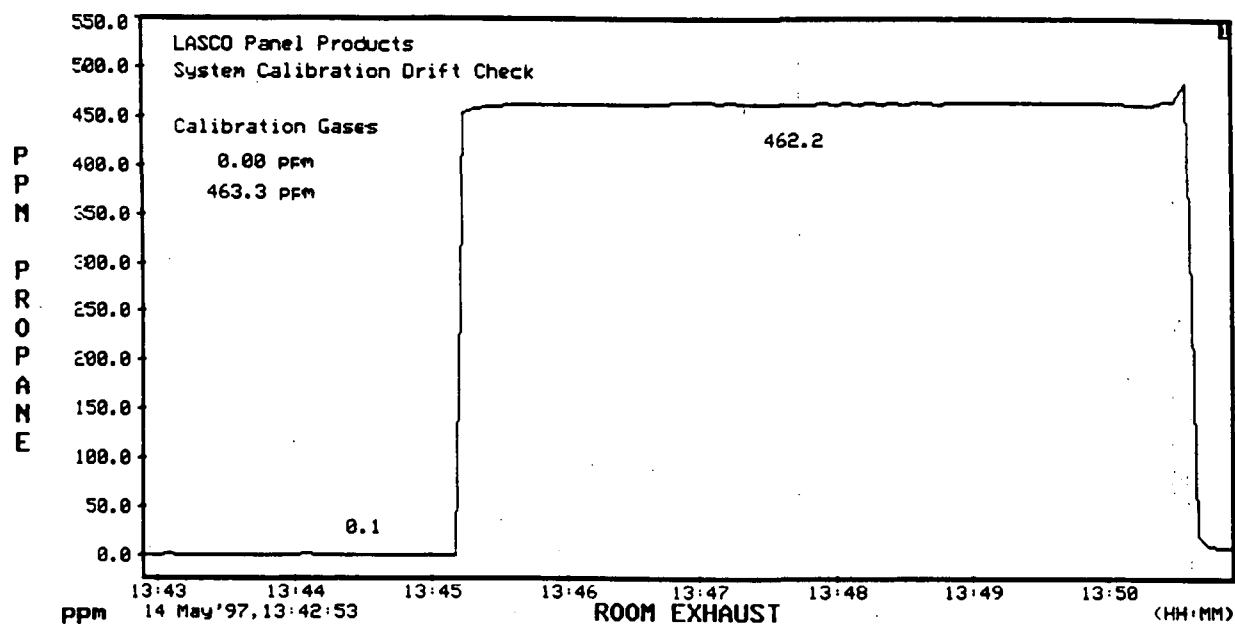
15:40-16:40	Run 1-3	352.7	Corrected	351.3	ppm THC
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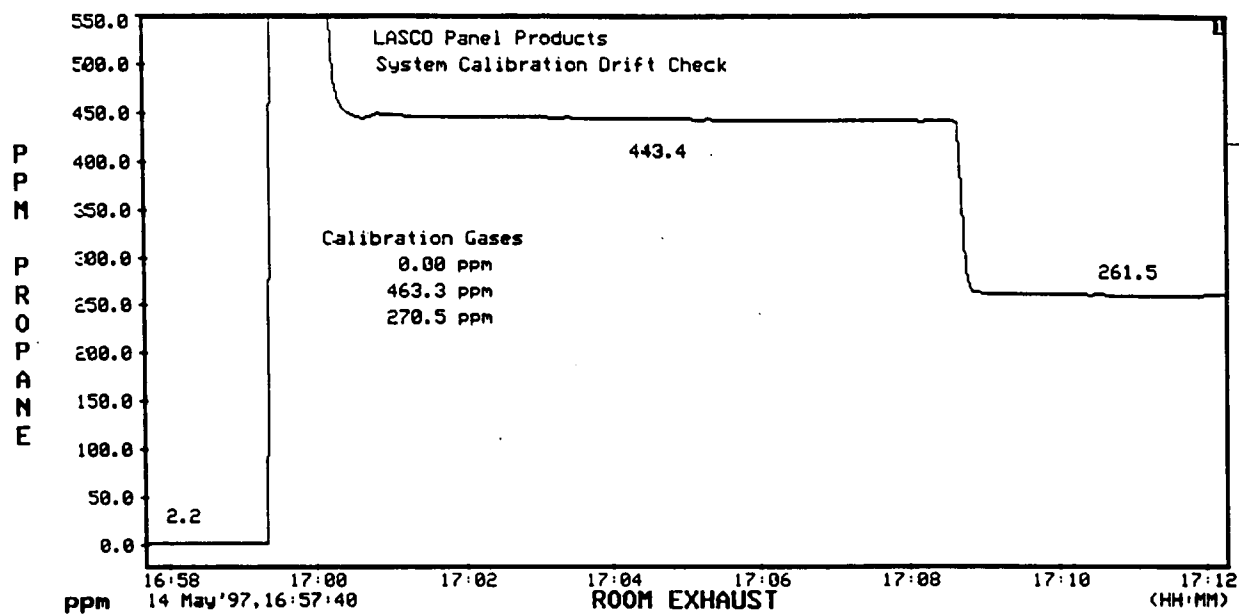
Calibration Gases	System Calibration	Calibration Error
0.0 ppm	2.2	
270.5 ppm	261.5	
463.3 ppm	443.4	0.44%

Correlation	0.9999903
Slope	0.9527059
Intercept	2.6681283









Key:

Graph 1 Trace 1

14-RE-2.DTA

Point

Line

14 May 1997

INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: MAIN EXHAUST Monitor: ppm or %
 Date: 5-14-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 28.96

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span-GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.1	0.1	0.2	0.2		0.0
AAL710	270.5	27.3	27.0	270.7	267.7	0.07	0.3
AAL18513	463.3	46.6	45.9	462.5	455.6	0.17	0.7
ALM028161	886.7	89.3	87.7	887.0	871.1		1.6

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.075)}{(0.10059)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

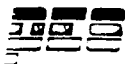
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 27 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
 Location: MAIN EXHAUST
 Date: 5-14-97
 Operator: P. SIEGEL
 Project #: S405.003
 Time, Pretest: _____ Post-test: _____
 Run #: _____

Parameter: SO₂, CO₂, O₂, NO_x, THC
 Monitor: ppm or %
 Span Value: 100
 Chart Scale: 0-5000 ppm Propane
 Pbar, in. Hg.: 28.80 11:00
 Ambient Temp., F: 70°F

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		9:10	10:20	11:50	13:55	9:10	10:20	11:50	13:55		
	0	0.1	0.3	0.1	0.1						
	886.7	17.9									
	1737	34.9	34.9	34.1	33.9						
	2418				47.2						

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} -)}{()}$$

$$\text{Correlation Coefficient} = \underline{\hspace{2cm}}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
 sample data. Post-test is used if drift exceeds limits and if post-test
 yields higher concentrations.

APPENDIX A.2.3

Condition 1 Method 25A



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: MAIN EXHAUST Monitor: ppm or %
 Date: 5-14-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-5000 ppm Propane
 Project #: 5405.003 Pbar, in. Hg.: _____
 Time, Pretest: 10:20 Post-test: 17:20 Ambient Temp., F: _____
 Run #: ME-1-1, ME-1-2, ME-1-3

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift*** % of Span
		17:20	13:55	11:50	10:20	17:20	13:55	11:50	10:20		
	0	0.1	0.1	0.1	0.3	-14	-14	-14	-4		0.2
	1737	35.0	33.9	34.1	34.9	1735	1680	1690	1730	0.12	1.1
	2418	49.3	47.2			2451	2346			1.36	2.1
	4507	90.0				4490					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.377)}{(0.01996)}$$

$$\text{Correlation Coefficient} = \underline{0.99992}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or 100 ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: MAIN EXHAUST
Date: 5-14-97

Parameter: SO₂, CO₂, O₂, NO_x* (THC), CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.377)}{(0.01996)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
ME-1-1	10:39 - 10:49	61	3037	Calibrations are
	-10:59	61	3037	from 17:20 - this
	-11:09	60	2987	is used to adjust
	-11:19	57.5	2862	the data.
	-11:29	58.5	2912	
	-11:39	59	2937	AVG = 2962 ppm Propane
ME-1-2	12:30 - 12:40	54	2687	
	-12:50	55	2737	
	-13:00	56	2787	
	-13:10	55	2737	
	-13:20	54	2687	
	-13:30	53	2636	AVG = 2712 ppm Propane
ME-1-3	15:40 - 15:50	53.5	2661	
	-16:00	55	2737	
	-16:10	55	2737	
	-16:20	56	2787	
	-16:30	55.5	2762	
	-16:40	55	2737	AVG = 2737 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel
Checked By: _____

Date: 5-14-97
Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
 Location: MAIN EXHAUST
 Date: 5-14-97
 Operator: P. SIEGEL
 Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x (THC)
 Monitor: ppm or %
 Span Value: 100
 Chart Scale: 0 - 5000 ppm Propane
 Pbar, in. Hg.: 28.80

Cylinder #	Cal. Gas Conc., <u>ppm or %</u>	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span <u>GAS</u>	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	0.6	0.6		0.0
ALM005428	1737	34.7	33.9	1728	1688	0.52	0.8
ALM066778	2418	48.8	47.9	2429	2384	0.45	0.9
AAL3345	4507	90.5	88.2	4505	4390		2.3

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.012)}{(0.02009)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

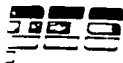
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject: gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 27 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, (THC)
Location: MAIN EXHAUST Monitor: ppm or %
Date: 5-14-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-5000 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 28.84
Time, Pretest: 19:45 Post-test: 00:45 Ambient Temp., F: _____
Run #: ME-2-1, ME-2-2, ME-2-3

Cyl. #	Cal. Gas Conc., <u>ppm or %</u>	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		19:45	21:40	23:15	00:45	19:45	21:40	23:15	00:45		
	0	0.0	0.1	0.2	0.1	-4	1	6	1		0.2
	1737	33.9				1726				0.63	
	2418	47.9	46.9	47.2	46.7	2441	2390	2405	2380	0.95	1.2
	4507	88.2				4499					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.083)}{(0.01959)}$$

$$\text{Correlation Coefficient} = \underline{0.99996}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCOParameter: SO₂, CO₂, O₂, NO_x, THC, COLocation: MAIN EXHAUSTOperator: P. SIEGELDate: 5-14-97Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.083)}{(0.01959)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments Jum 1
ME-2-1	20:20-20:30	52	2651	Process down
	- 20:40	51	2599	20:37-20:40
	- 20:50	47	2395	
	- 21:00	49.5	2523	
	- 21:10	50	2548	
	- 21:23	50	2548	AVG = 2544 ppm Propane
ME-2-2	22:00-22:10	49.5	2523	
	- 22:20	49.5	2523	
	- 22:30	51	2599	
	- 22:40	50	2548	
	- 22:50	49.5	2523	
	- 23:00	50.5	2574	AVG = 2548 ppm Propane
ME-2-3	23:30-23:40	47.5	2421	
	- 23:50	47	2395	
	- ⁰⁰ 24 :00	46	2344	
	- ⁰⁰ 24 :10	45.5	2319	
	- ⁰⁰ 24 :20	47	2395	
	- 00:30	46.5	2370	AVG = 2374 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-20-97

Checked By: _____ Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: Room EXHAUST Monitor: ppm or %
Date: 5-14-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: 5405.003 Pbar, in. Hg.: 28.96

Cylinder #	Cal. Gas Conc., ppm or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	-2.0	-2.0		0.0
ALM026680	84.08	17.8	17.6	85.6	84.7	1.81	0.2
AAL710	270.5	55.7	55.6	272.3	271.8	0.67	0.1
AAL18513	463.3	94.2	93.7	462.0	459.5		0.5

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.413)}{(0.20302)}$$

$$\text{Correlation Coefficient} = \underline{0.99995}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 29 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
(Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: Room EXHAUST Monitor: ppm or %
 Date: 5-14-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 28.80 11:00
 Time, Pretest: 8:10 Post-test: 16:55 Ambient Temp., F: 70°F
 Run #: RE-1-1, RE-1-2, RE-1-3

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		8:10	10:15	11:45	13:45	8:10	10:15	11:45	13:45		
	0	0.0	1.0	0.5	0.3	-1.9	3.0	0.5	-0.5		1.0
	84.08	17.6				85.1				1.21	
	270.5	55.6				273.1				0.96	
	463.3	93.7	95.0	92.8	94.0	461.6	468.0	457.1	463.1		1.3

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.392)}{(0.20215)}$$

$$\text{Correlation Coefficient} = \underline{0.99994}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate

— sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: ROOM EXHAUST Monitor: ppm or %
Date: 5-14-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: 5405.003 Pbar, in. Hg.: _____
Time, Pretest: _____ Post-test: _____ Ambient Temp., F: _____
Run #: _____

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		16:55	13:45	11:45	8:10	16:55	13:45	11:45	8:10		
	0	0.3	0.3	0.5	0.0						0.3
	84.08				17.6						
	270.5	52.3			55.6						3.3
	463.3	89.2	94.0	92.8	93.7						4.5

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b$$

$$x = \text{ppm}$$

$$y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - \quad)}{(\quad)}$$

$$\text{Correlation Coefficient} = \underline{\hspace{2cm}}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: Room EXHAUST
Date: 5-14-97

Parameter: SO₂, CO₂, O₂, NO_x* (THC) CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.392)}{(0.20215)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
RE-1-1	10:39-10:49	80	394	Run times are
	-10:59	77	379	~2 minutes ahead
	-11:09	76	374	of the datalogger
	-11:19	78	384	
	-11:29	77	379	
	-11:39	74	364	AVG = 379 ppm Propane
RE-1-2	12:30-12:40	72	354	
	-12:50	73	359	
	-13:00	69	339	
	-13:10	77	379	
	-13:20	72	354	
	-13:30	70	344	AVG = 355 ppm Propane
RE-1-3	15:40-15:50	72	354	
	-16:00	73	359	
	-16:10	72	354	
	-16:20	73	359	
	-16:30	72	354	
	-16:40	71	349	AVG = 355 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: P. Siegel
Checked By: _____

Date: 5-14-97
Date: _____

APPENDIX A.2.4

Condition 2 Method 25A

LASCO Panel Products

Condition 2 - Main Exhaust

Total Hydrocarbons (THC)

14-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-2	-2
1737.0 ppm	1697	1735
2418.0 ppm	2385	2442
4507.0 ppm	4408	4504

Correlation	0.9999832	Correlation	0.9999751
Slope	0.9790131	Slope	1.0004054
Intercept	1.9470266	Intercept	3.3722138

Sampling System Bias	Calibration Error
0.00%	0.35%
0.76%	0.81%
1.14%	
1.92%	

20:20-21:20 Run 2-1 2502 Corrected 2554 ppm THC

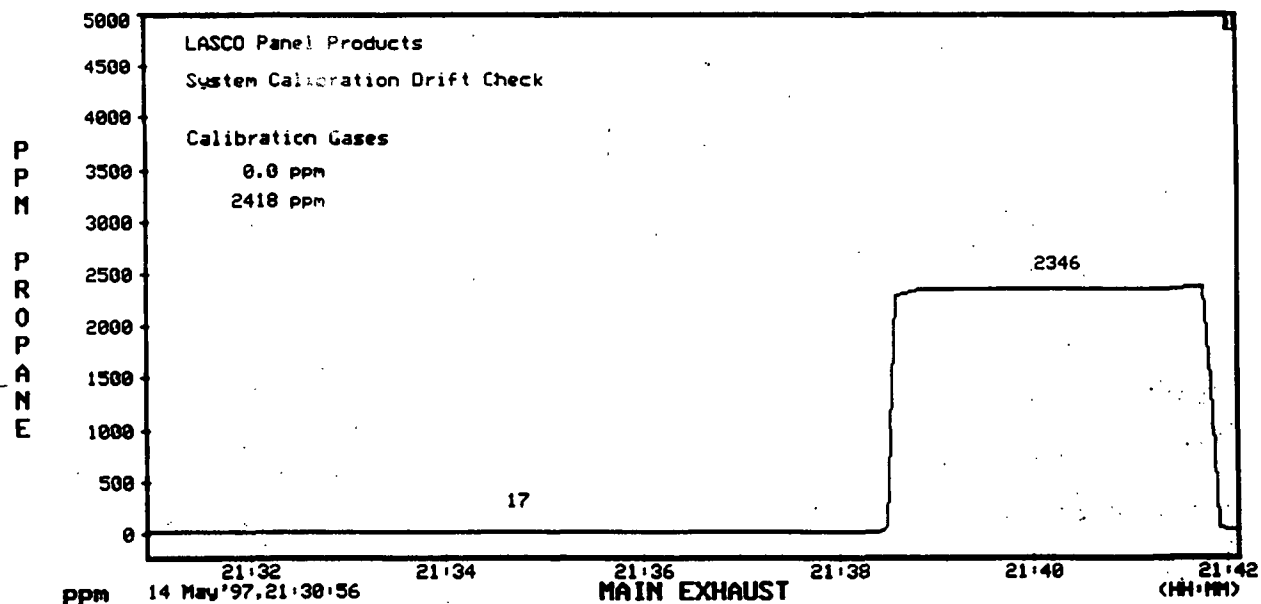
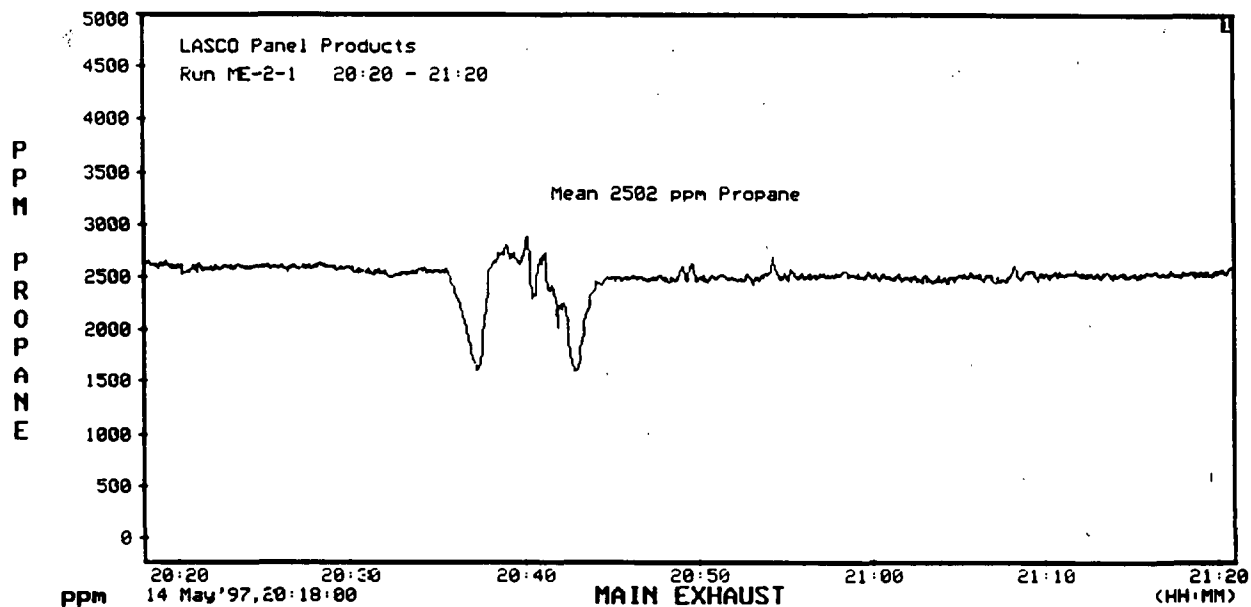
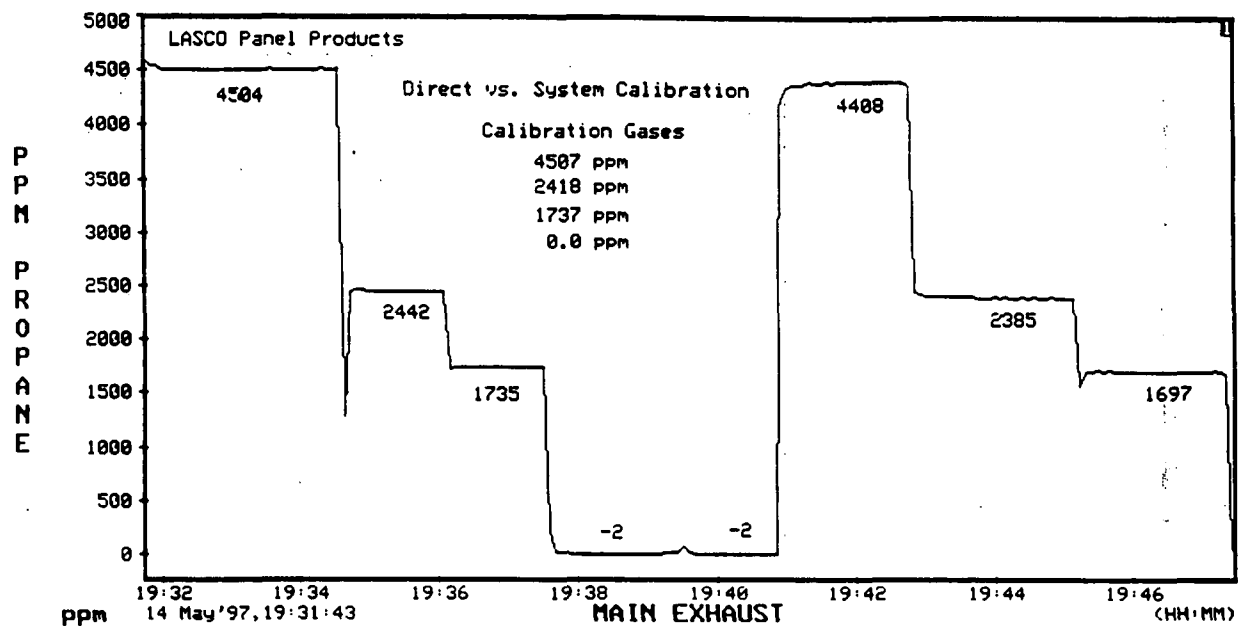
21:30 Post Cal 17 Drift 0.38%
2346 0.78%

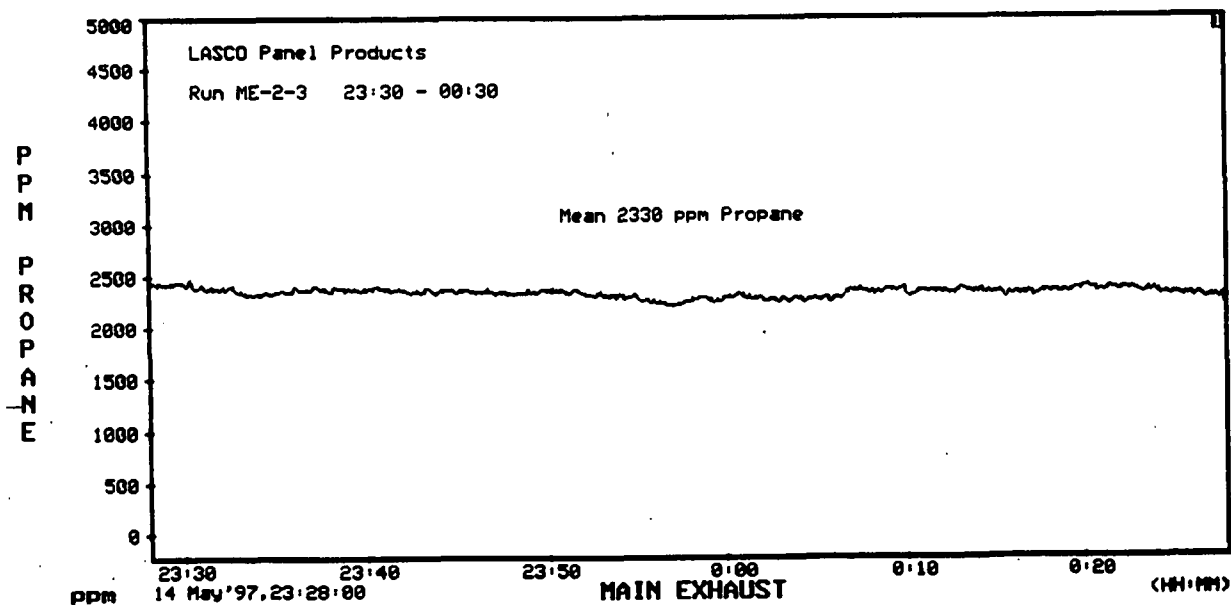
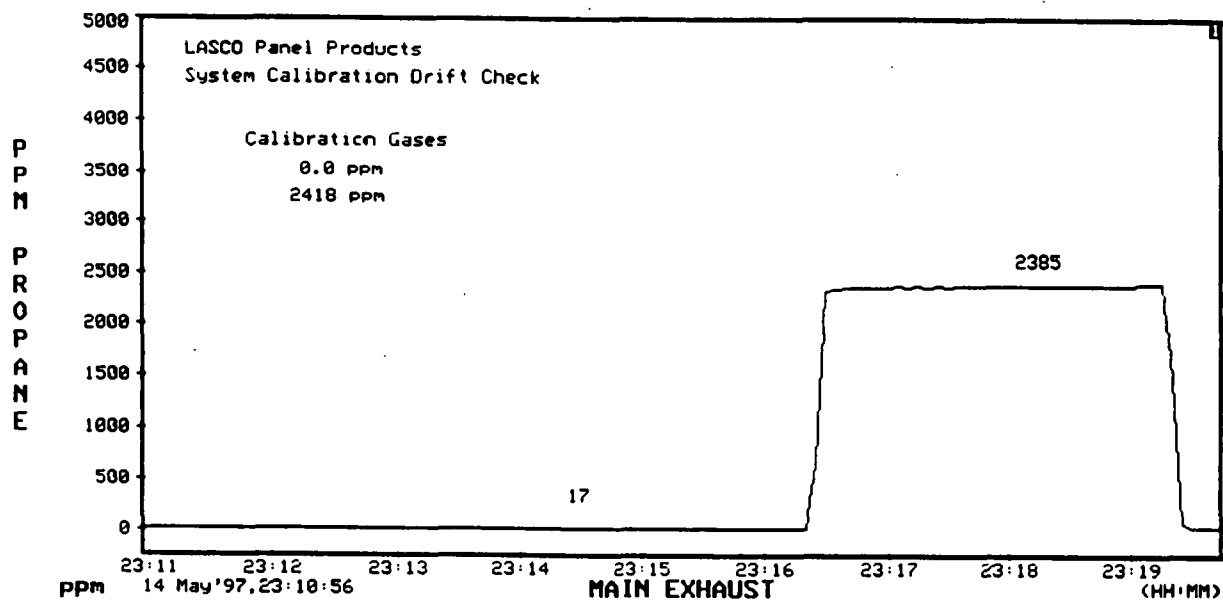
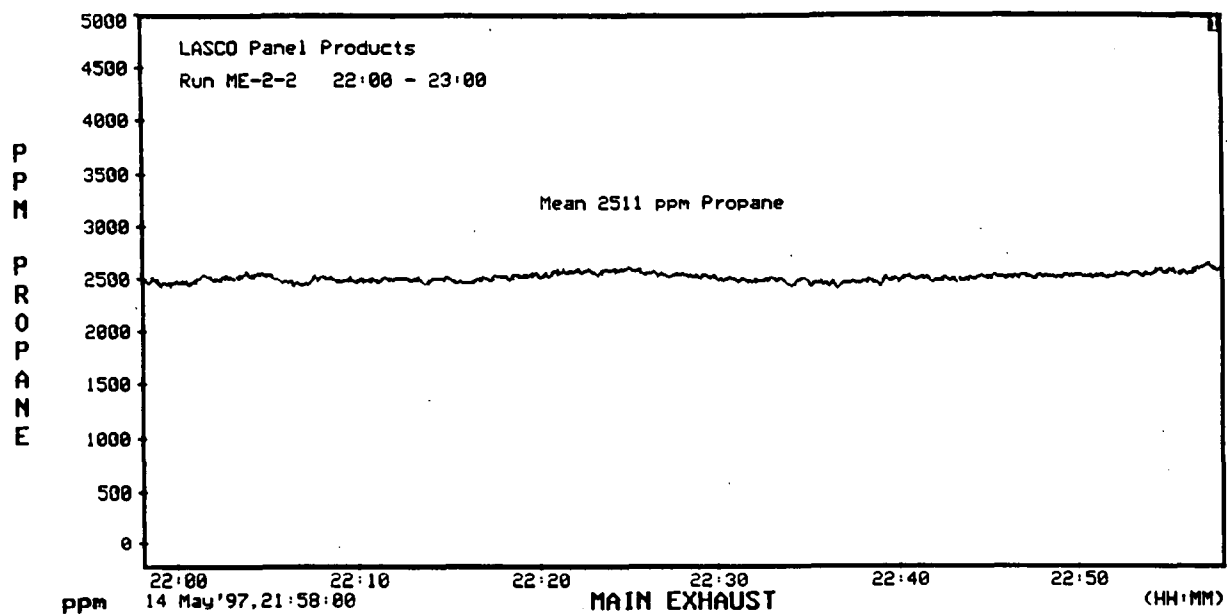
22:00-23:00 Run 2-2 2511 Corrected 2563 ppm THC

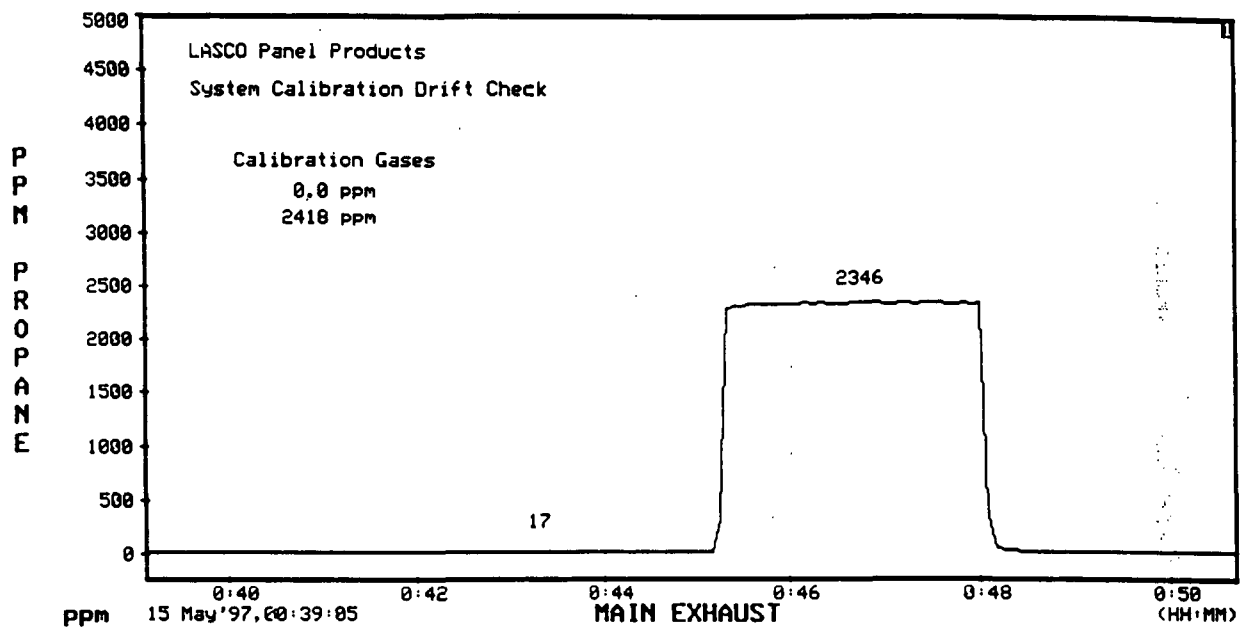
23:10 Post Cal 17 Drift 0.38%
2385 0.00%

23:30-00:30 Run 2-3 2330 Corrected 2378 ppm THC

0:39 Post Cal 17 Drift 0.38%
2346 0.78%







LASCO Panel Products

Condition 2 - Room Exhaust

Total Hydrocarbons (THC)

14-May-97

Calibration Gases 0.0 ppm 84.1 ppm 270.5 ppm 463.3 ppm	System Calibration -0.2 86.8 270.1 458.0	Direct Calibration -0.2 89.1 274.7 467.1
Correlation 0.9999561 Slope 0.9868021 Intercept 1.9035815 Sampling System Bias 0.00% 0.38% 0.77% 1.52%		Correlation 0.9999519 Slope 1.0054633 Intercept 2.0879183 Calibration Error 2.92% 0.23%

20:20-21:23 Run 2-1 321.7 Corrected 324.1 ppm THC

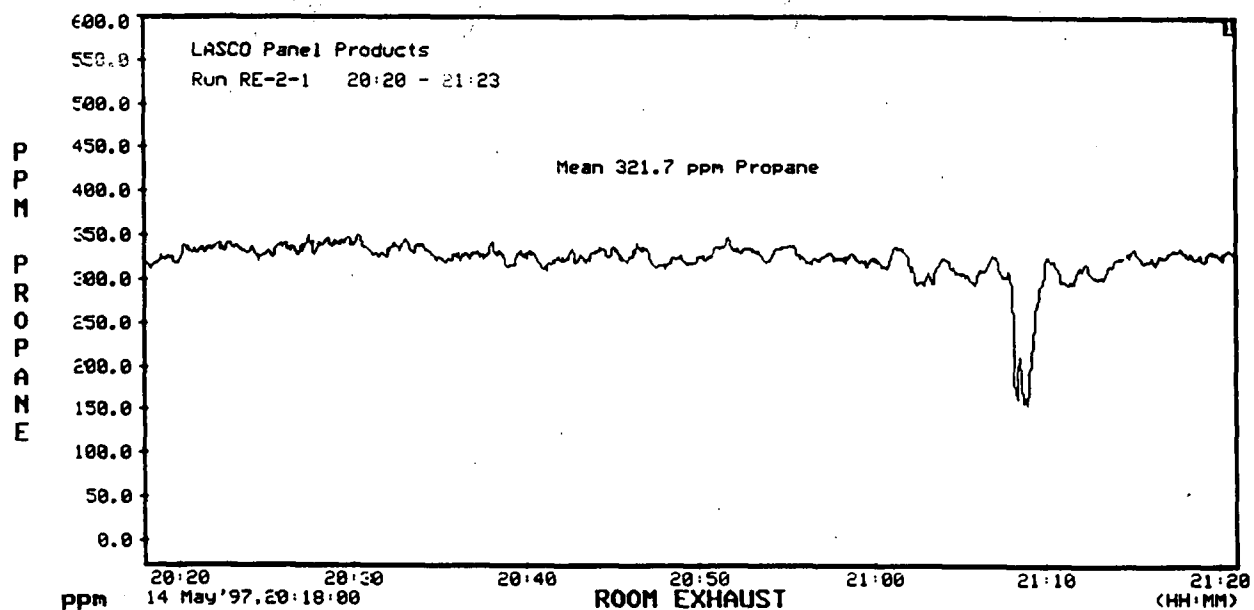
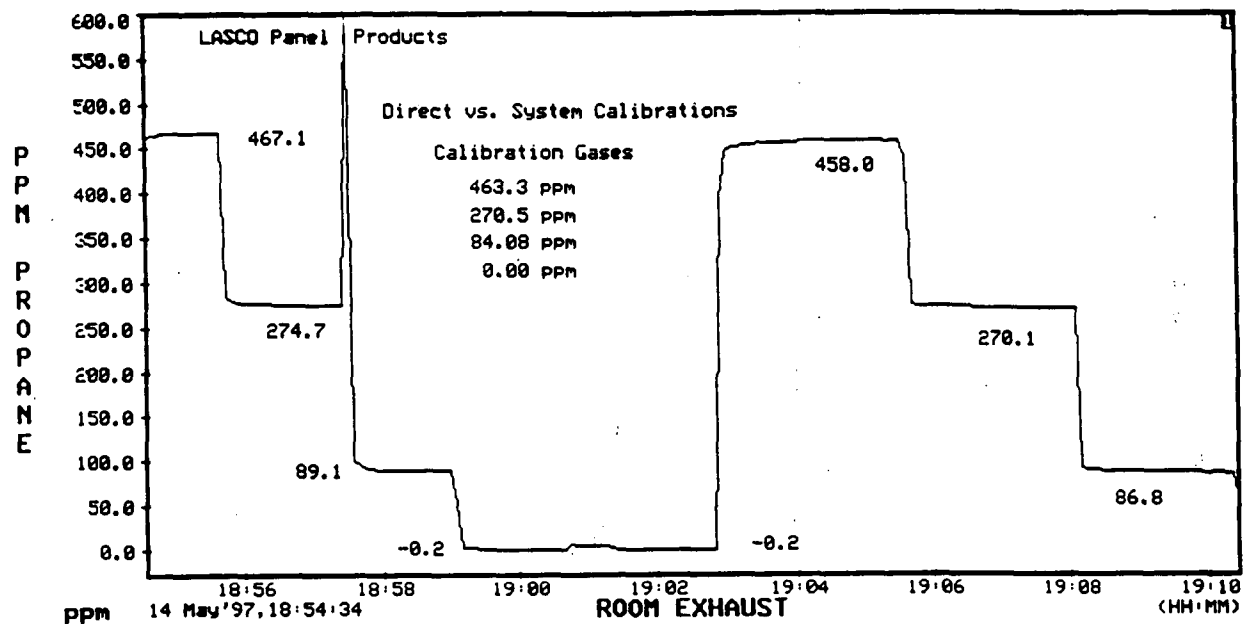
Calibration Gases 0.0 ppm 270.5 ppm 463.3 ppm	System Calibration 2.1 286.1 476.3	Calibration Error 1.70%
Correlation 0.9998523 Slope 1.025233 Intercept 4.0613468		

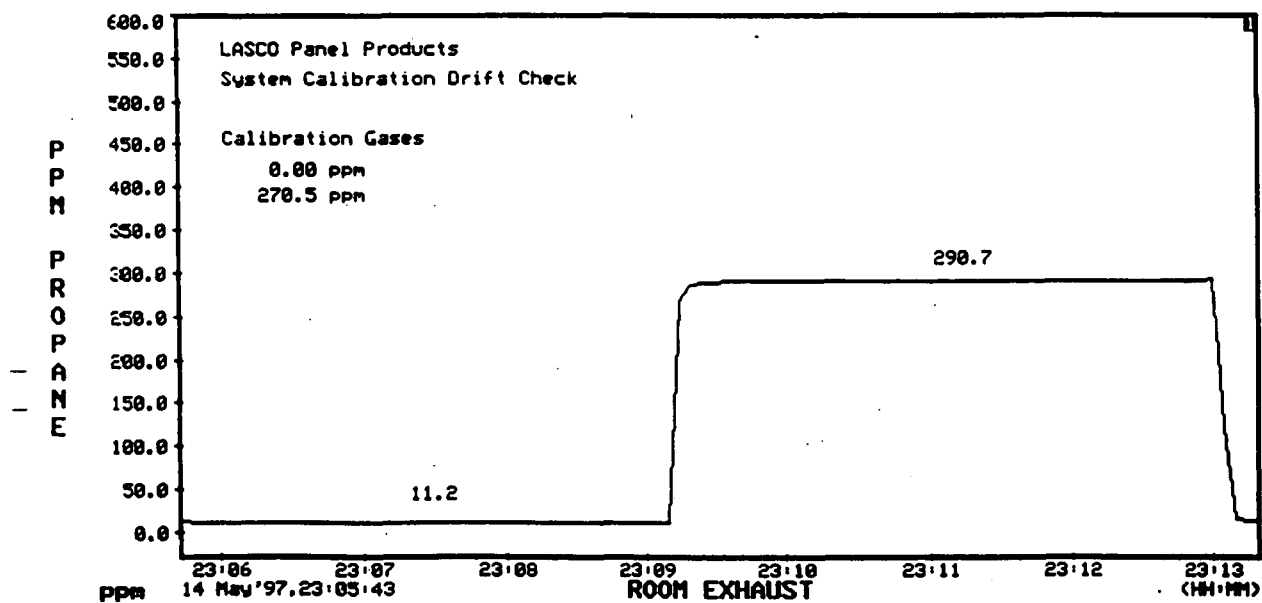
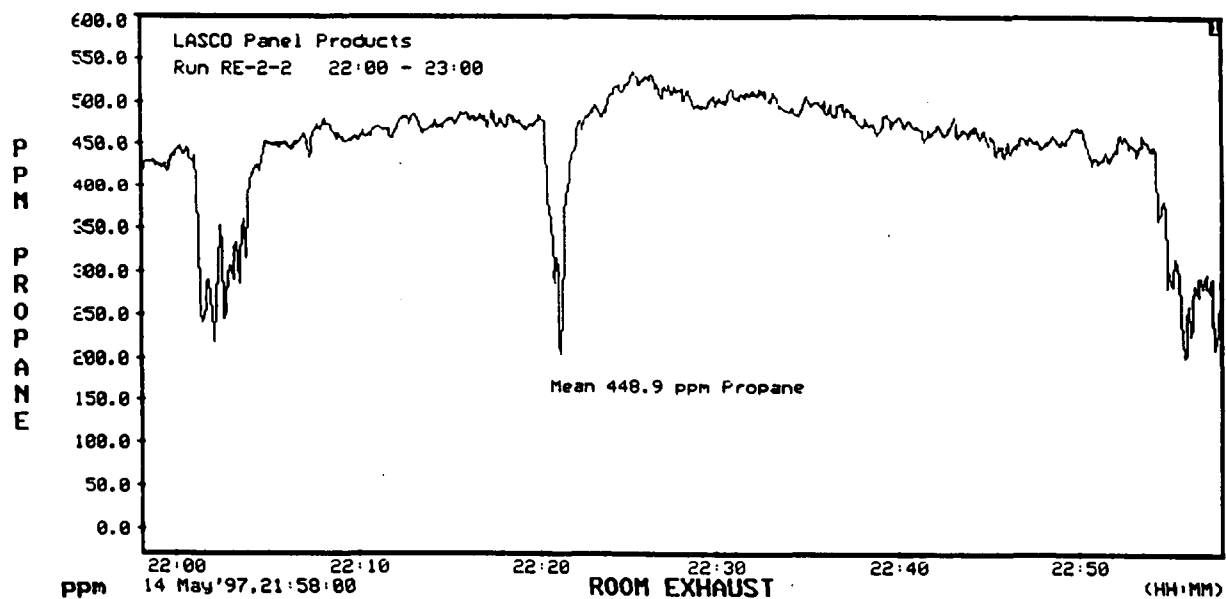
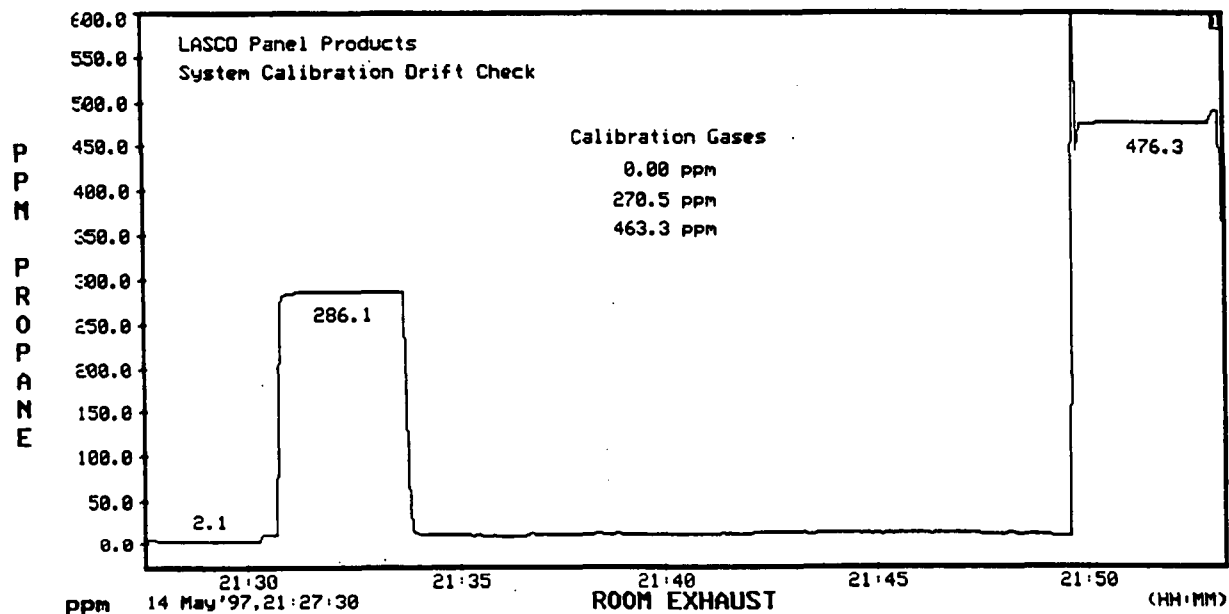
22:00-23:00 Run 2-2 448.9 Corrected 433.9 ppm THC

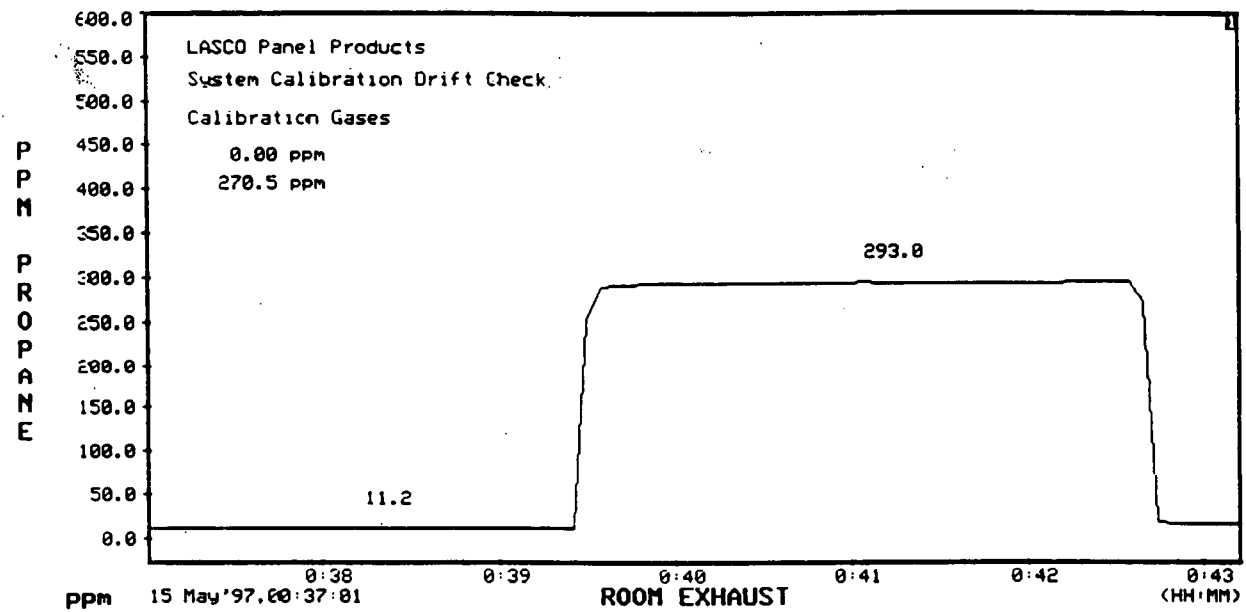
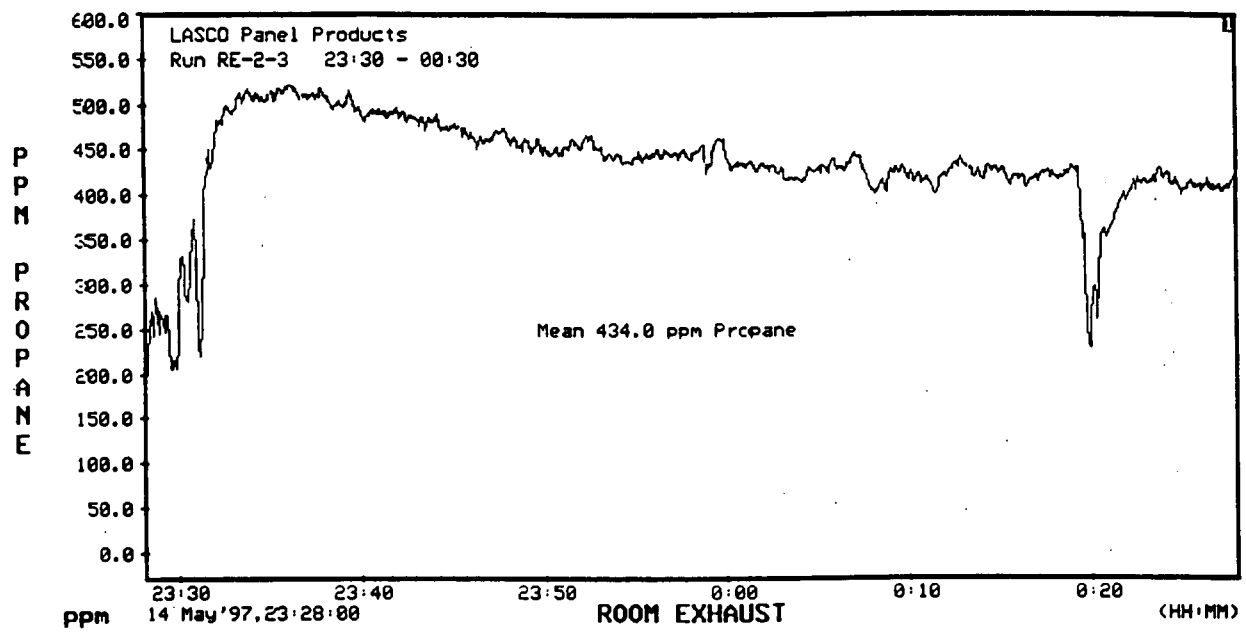
23:05 Post Cal 11.2 Drift 1.52%
290.7 0.77%

23:00-00:30 Run 2-3 434.0 Corrected 419.4 ppm THC

0:37 Post Cal 11.2 Drift 1.52%
293.0 1.15%









INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: Room EXHAUST
Date: 5-14-97
Operator: P. SIEGEL
Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x, (THC)
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-500 ppm Propane
Pbar, in. Hg.: 28.84 (20:30)

Cylinder #	Cal. Gas Conc., ppm or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	-2.1	-2.1		0.0
ALM026680	84.08	18.0	17.4	86.3	83.4	2.64	0.6
AAL710	270.5	55.6	54.3	271.0	264.6	0.18	1.3
AAL18513	463.3	94.6	92.6	462.6	452.8		2.0

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.421)}{(0.20359)}$$

$$\text{Correlation Coefficient} = \underline{0.99996}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

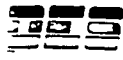
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 29 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
(Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: Room EXHAUST Monitor: ppm or %
Date: 5-14-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 28.84
Time, Pretest: 19:10 Post-test: 00:40 Ambient Temp., F: _____
Run #: RE-2-1, RE-2-2, RE-2-3

Cyl. #	Cal. Gas Conc., <u>ppm or %</u>	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		19:10	21:25	23:05	00:40	19:10	21:25	23:05	00:40		
	0	0.0	1.0	2.2	2.3	-1.5	8.5	9.5	10.0		2.3
	80.84 0.8	17.4				85.8				2.05	
	270.5	54.3	57.6	58.7	59.0	270.8	287.3	292.8	294.4	0.11	4.7
	463.3	92.6	96.7			462.8					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.297)}{(0.19943)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: ROOM EXHAUST
Date: 5-14-97

Parameter: SO₂, CO₂, O₂, NO_x*, (THC), CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.297)}{(0.19943)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments JUN 5
RE-2-1	20:20-20:30	67	334.5	Process down
	-20:40	67	334.5	20:37-20:40
	-20:50	65.5	326.9	
	-21:00	66	329.5	
	-21:10	63	314.4	
	-21:23	62	309.4	AVG = 324.9 ppm Propane
RE-2-2	22:00-22:10	83	414.7	
	-22:20	95	474.9	
	-22:30	99	494.9	
	-22:40	102	510.0	
	-22:50	93	464.8	
	-23:00	88	439.8	AVG = 466.5 ppm Propane
RE-2-3	23:30-23:40	77	384.6	
	-23:50	98	489.9	
	-00:00	90	449.8	
	-00:10	87	434.8	
	-00:20	85	424.7	
	-00:30	83	414.7	AVG = 433.1 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: P. Siegel Date: 5-20-97
Checked By: _____ Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: Auxiliary Exhaust
Date: 5-14-97
Operator: P. SIEGEL
Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x, THC
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-500 ppm Propane
Pbar, in. Hg.: 28.96

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	-0.3	-0.3		0.0
ALM026680	84.08	17.0	16.8	84.6	83.6	0.62	0.2
AAL710	270.5	54.2	53.0	270.2	264.2	0.11	1.2
AAL18513	463.3	92.9	90.0	463.4	448.9		2.9

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.056)}{(0.20036)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 23 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
(Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: AUXILIARY EXHAUST Monitor: ppm or %
Date: 5-14-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 28.80 (11:00)
Time, Pretest: 8:45 Post-test: 17:35 Ambient Temp., F: 70°F
Run #: AF-1-1, AF-1-2, AF-1-3

Cyl. #	Cal. Gas Conc., ppm or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		8:45	12:05	14:05	17:35	8:45	12:05	14:05	17:35		
	0	0.0	0.0	-2/0.0	0.0	-1.4	-1.4	-11.7/-1.4	-1.4		
	84.08 16.8					85.2				1.33	
	270.5	53.0	53.7	51.9/54.0	50.0	271.7	275.3	266.1/276.9	256.3	0.44	
	463.3	90.0				462.4					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.272)}{(0.19405)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
— sample data. Post-test is used if drift exceeds limits and if post-test
yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: AUXILLIARY FAN
Date: 5-14-97

Parameter: SO₂, CO₂, O₂, NO_x*, THC, CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.272)}{(0.19405)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
JUN 3				
AF-1-1	10:39-10:49	0.1	0	Ambient Air at
	-10:59	0.1	0	Auxilliary Fan
	-11:09	0.1	0	
	-11:19	0.1	0	
	-11:29	0.1	0	
	-11:39	0.1	0	
AF-1-2	12:30-12:40	0.2	0	
	-12:50	0.2	0	
	-13:00	0.1	0	
	-13:10	0.2	0	
	-13:20	0.3	0	
	-13:30	0.2	0	
AF-1-3	15:40-15:50	0.1	0	
	-16:00	0.1	0	
	-16:10	0.1	0	
	-16:20	2.0	N/A	Analyzer jumped
	-16:30	2.5	NA	with voltage change
	-16:40	2.5	NA	

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-14-97
Checked By: _____ Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
 Location: Auxiliary Fan
 Date: 5-14-97
 Operator: P. SIEGEL
 Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x (THC)
 Monitor: ppm or %
 Span Value: 100
 Chart Scale: 0-500 ppm Propane
 Pbar, in. Hg.: 28.84

Cylinder #	Cal. Gas Conc., ppm or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	-1.3	-1.3		0.0
ALMD26680	84.08	17.4	17.0	85.3	83.3	1.45	0.4
AAL710	270.5	54.8	54.0	271.4	267.4	0.33	0.8
AAL18513	463.3	93.2	92.0	462.6	456.6		1.2

- * Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.2707)}{(0.20091)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 23 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, (THC)
Location: EXHAUST (Auxiliary) Monitor: ppm or %
Date: 5-14-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 28.84
Time, Pretest: 19:20 Post-test: 00:50 Ambient Temp., F: _____
Run #: AF-2-1, AF-2-2, AF-2-3

Cyl. #	Cal. Gas Conc., (ppm or %)	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift*** % of Span
		19:20	21:45	23:25	00:50	19:20	21:45	23:25	00:50		
	0	0.0	2.3	2.5	2.6	-0.1	10.7	11.7	12.2		2.3
	84.08	17.0				84.8				0.86	
	270.5	54.0	59.1	58.5	60.0	271.2	296.9	293.9	301.5	0.26	5.1
	463.3	92.0				462.7					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.176)}{(0.19844)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$** \text{ Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$*** \text{ Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: AUXILIARY FAN
Date: 5-14-97

Parameter: SO₂, CO₂, O₂, NO_x* (THC), CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.176)}{(0.19844)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
				JUN 3
AF-2-1	20:20-20:30	0	0	Process down
	-20:40	0	0	20:37-20:40
	-20:50	0	0	Sampling Ambient
	-21:00	0	0	AIR BY FAN
	-21:10	0	0	
	-21:23	0	0	
AF-2-2	22:00-22:10	3.0	0	sampling ambient
	-22:20	3.0	0	air
	-22:30	3.0	0	
	-22:40	3.0	0	
	-22:50	3.0	0	
	-23:00	3.0	0	
AF-2-3	23:30-23:40	2.7	0	sampling ambient
	-23:50	2.7	0	air by fan
	-00:00	2.7	0	
	-00:10	2.7	0	
	-00:20	2.7	0	
	-00:30	2.7	0	

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel
Checked By: _____

Date: 5-20-97
Date: _____

APPENDIX A.2.5

Condition 3 Method 25A

LASCO Panel Products

Condition 3 - Main Exhaust

Total Hydrocarbons (THC)

15-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-2.0	-2.0
1737.0 ppm	1697.0	1735.0
2418.0 ppm	2385.0	2461.0
4507.0 ppm	4389.0	4523.0

Correlation 0.9999668
Slope 0.9747434
Intercept 6.4432425

Correlation 0.9999486
Slope 1.0051356
Intercept 2.628915

Sampling System Bias
0.00%
0.76%
1.52%
2.68%

Calibration Error

0.78%
1.15%

14:25-15:25 Run 3-1 727.0 Corrected 739.2 ppm THC

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-2.0	
1737.0 ppm	1659.0	0.45%
2418.0 ppm	2327.0	

Correlation 0.9999841
Slope 0.9618267
Intercept -4.1300292

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	274.5	0.82%
463.3 ppm	465.5	0.01%
886.7 ppm	889.3	

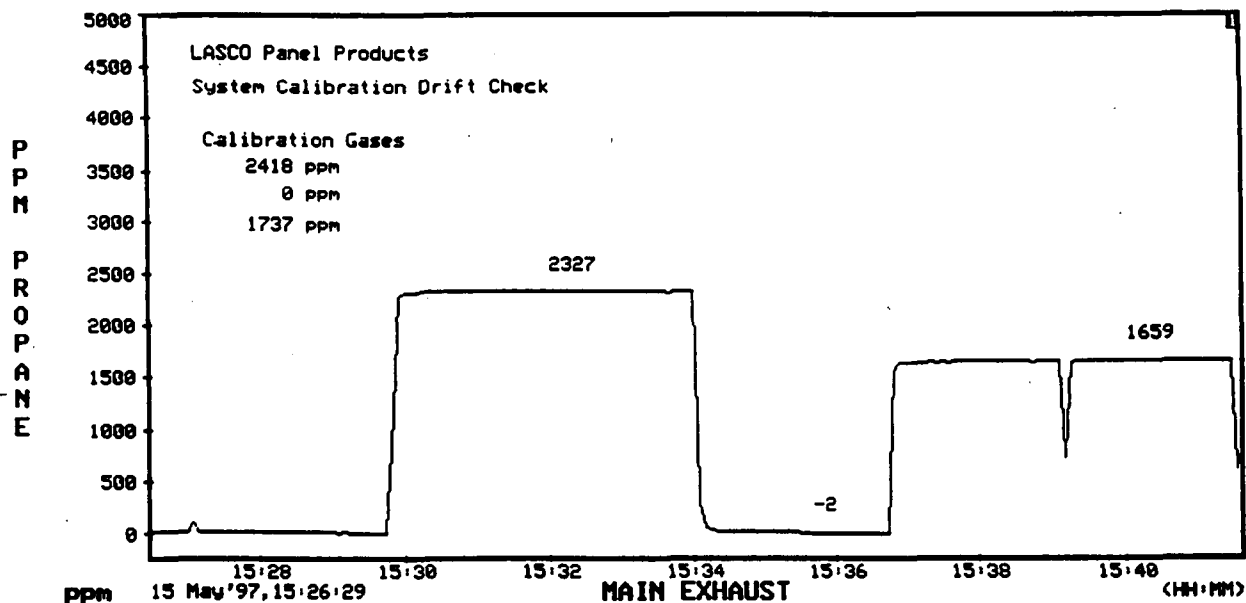
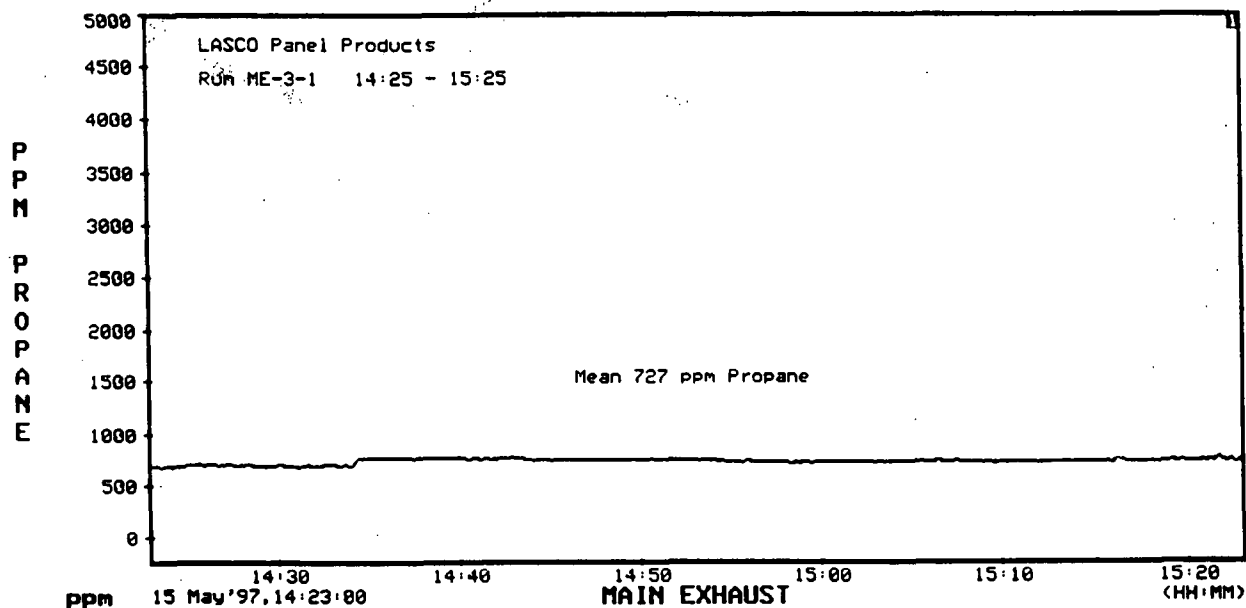
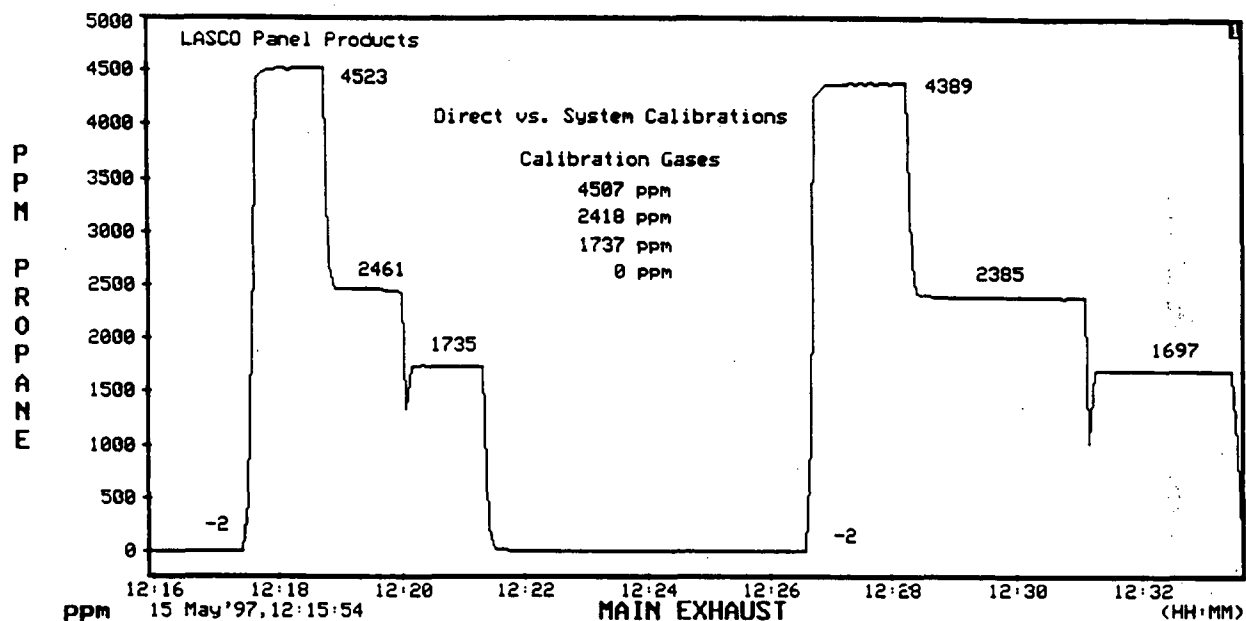
Correlation 0.9999908
Slope 1.0024036
Intercept 1.1262325

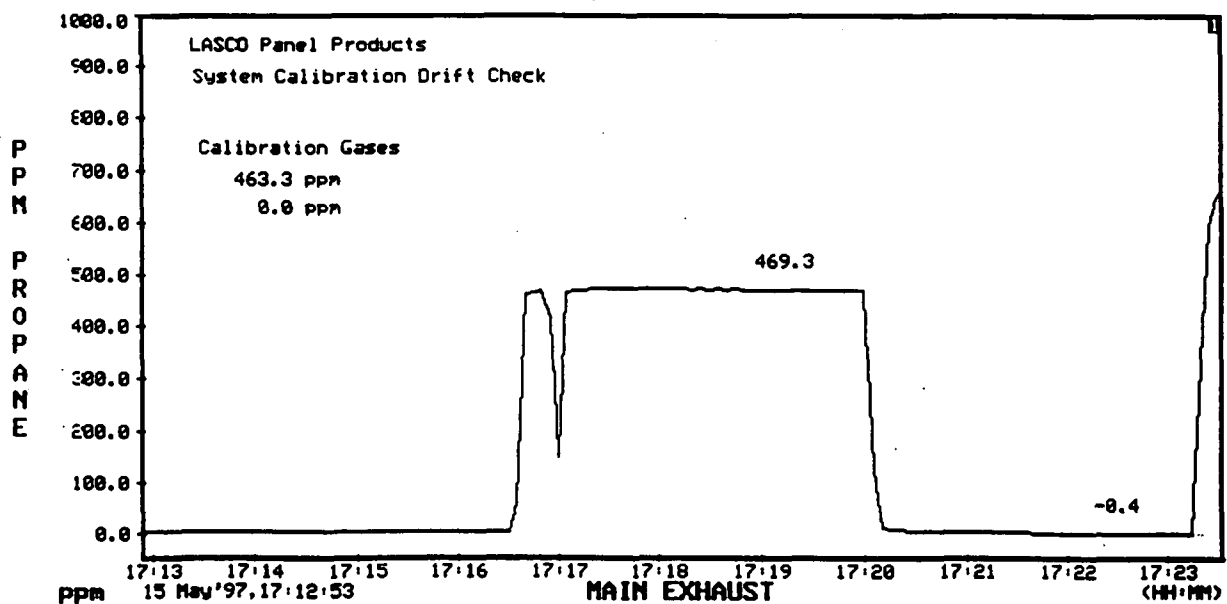
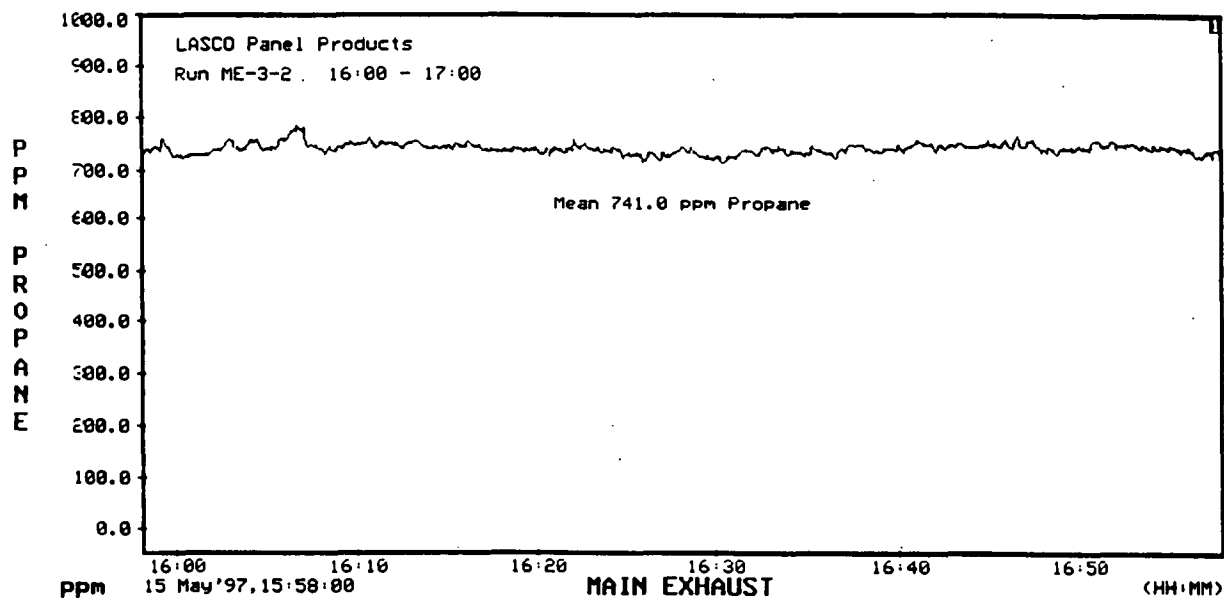
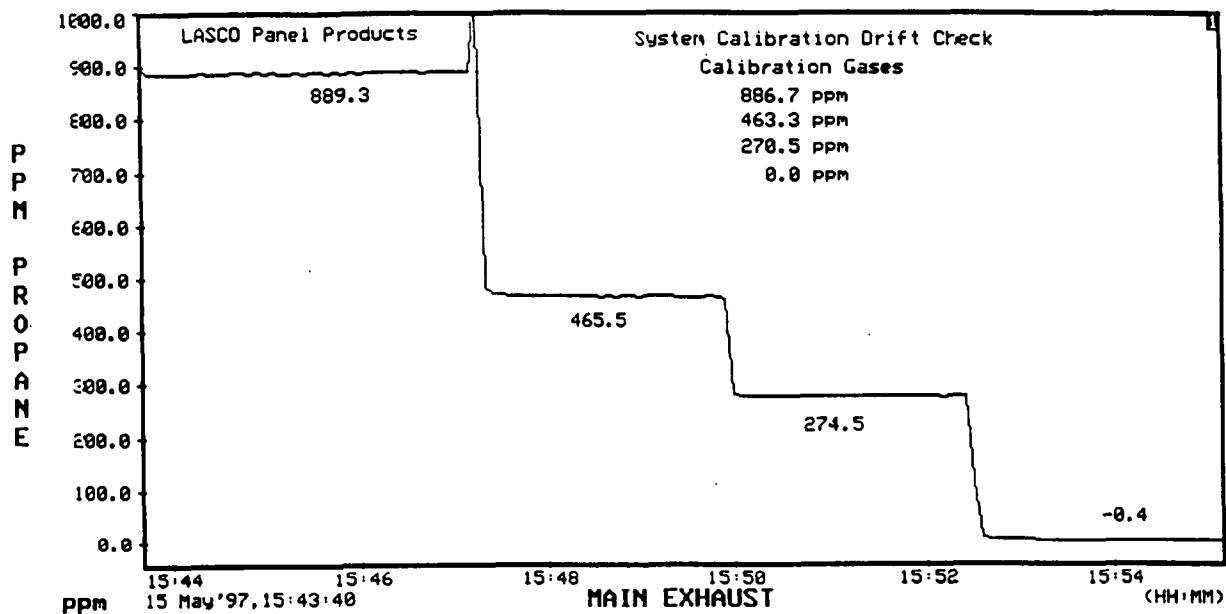
16:00-17:00 Run 3-2 741.0 Corrected 738.1 ppm THC

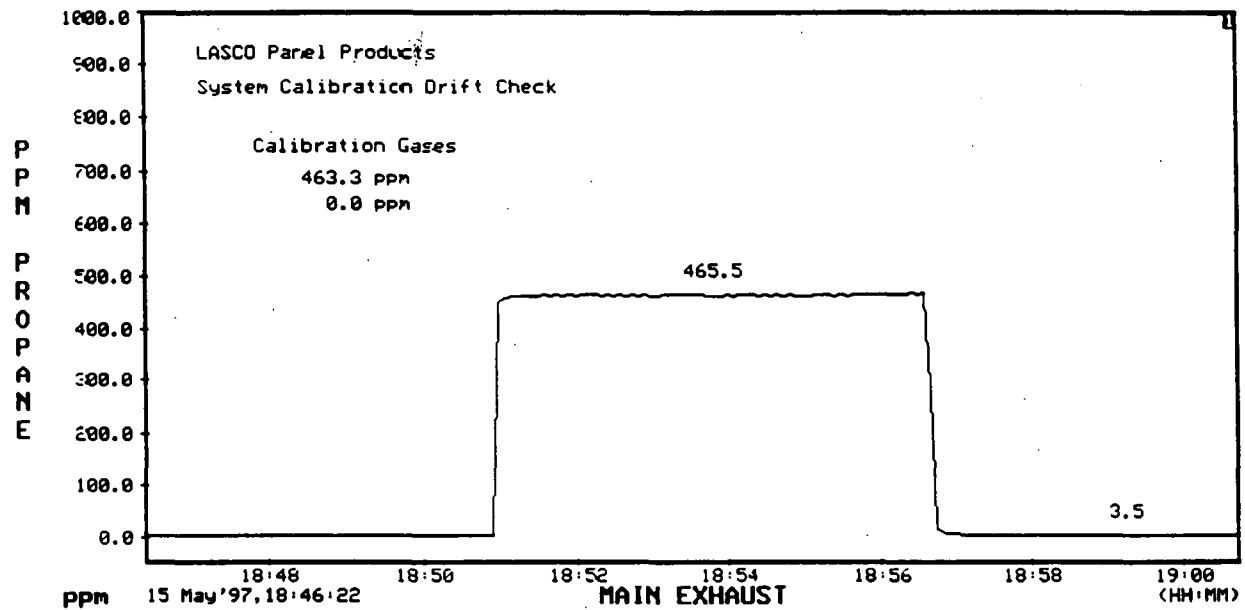
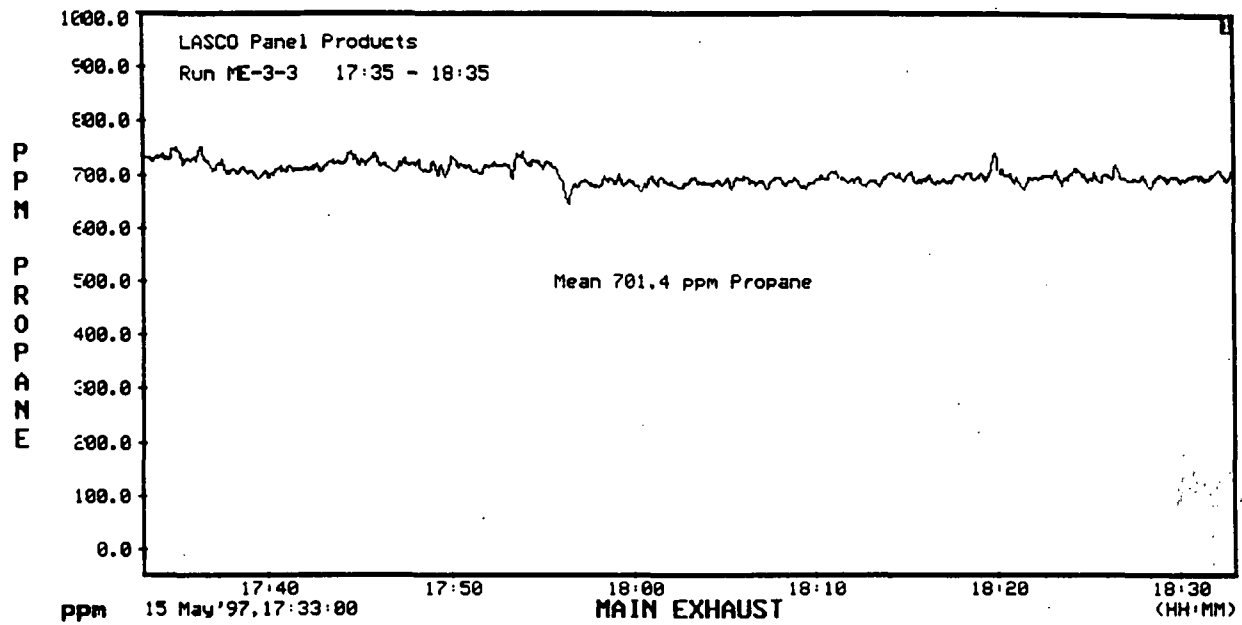
17:12 Post Cal -0.4 Drift 0.00%
 469.3 0.38%

17:35-18:35 Run 3-3 701.4 Corrected 698.6 ppm THC

18:46 Post Cal 3.5 Drift 0.39%
 465.5 0.00%







LASCO Panel Products

Condition 3 - Room Exhaust

Total Hydrocarbons (THC)

15-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	0.1	0.1
84.1 ppm	87.9	87.9
270.5 ppm	280.3	282.4
463.3 ppm	468.5	474.7

Correlation	0.9998842	Correlation	0.9999334
Slope	1.0118497	Slope	1.025507
Intercept	2.3070858	Intercept	1.5895922

Sampling System Bias	Calibration Error
0.00%	0.10%
0.00%	1.23%
0.38%	
1.13%	

14:25-15:25 Run 3-1 115.8 Corrected 112.2 ppm THC

15:27 Post Cal 8.5 Drift 1.53%
 297.0 3.04%

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	8.50	
84.1 ppm	92.10	0.62%
270.5 ppm	280.30	1.16%
463.3 ppm	466.40	

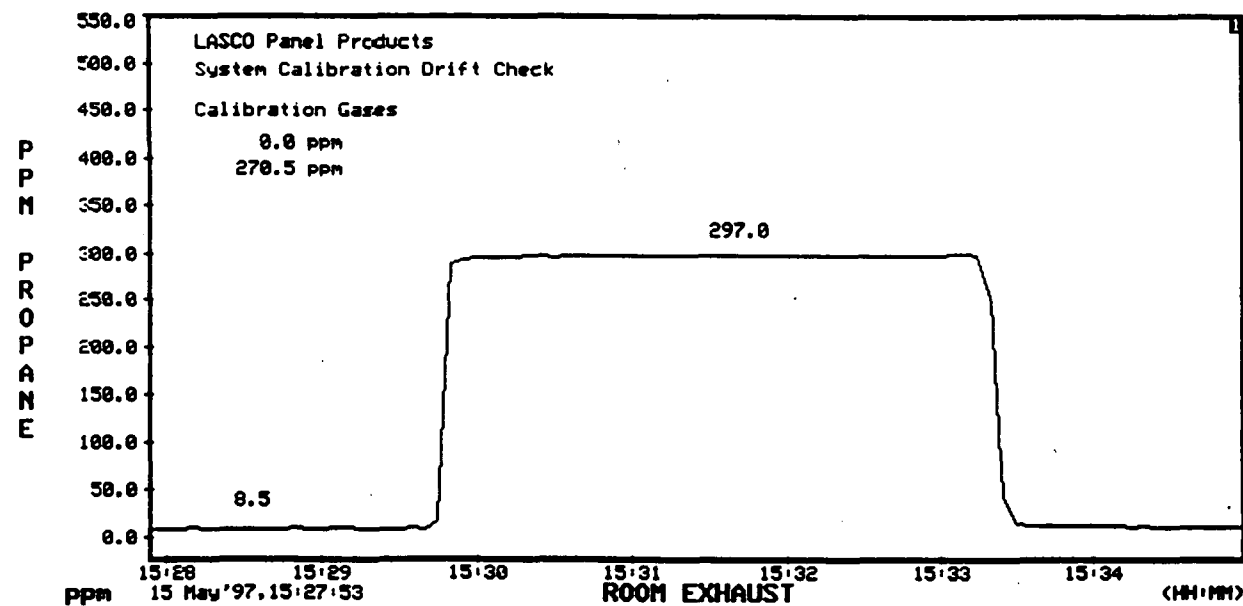
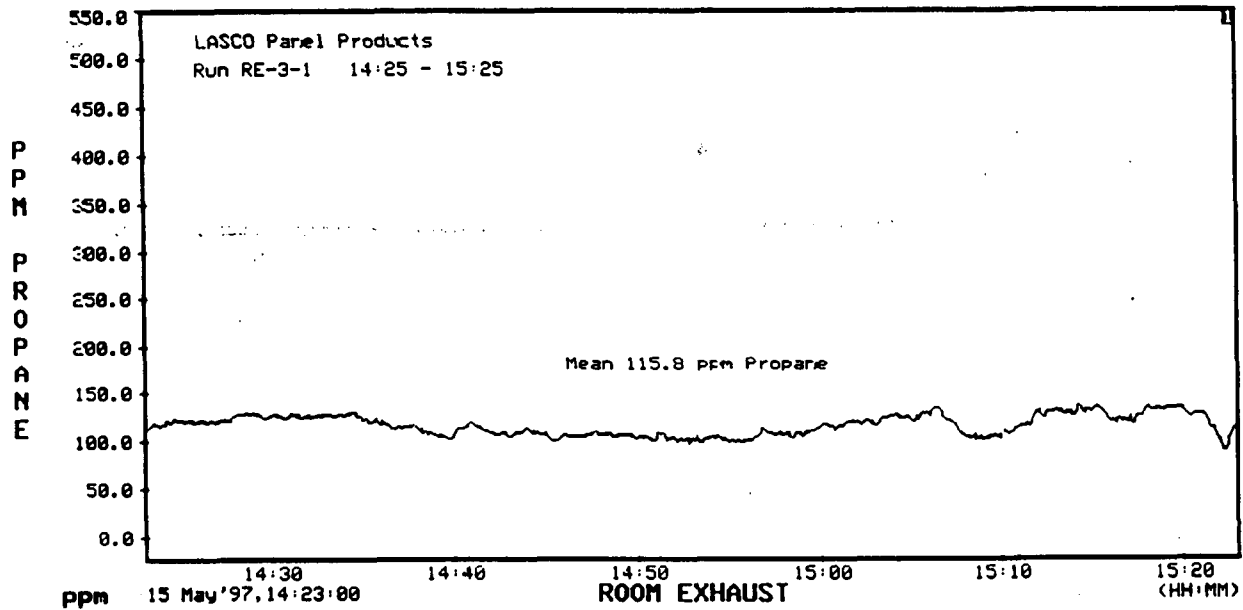
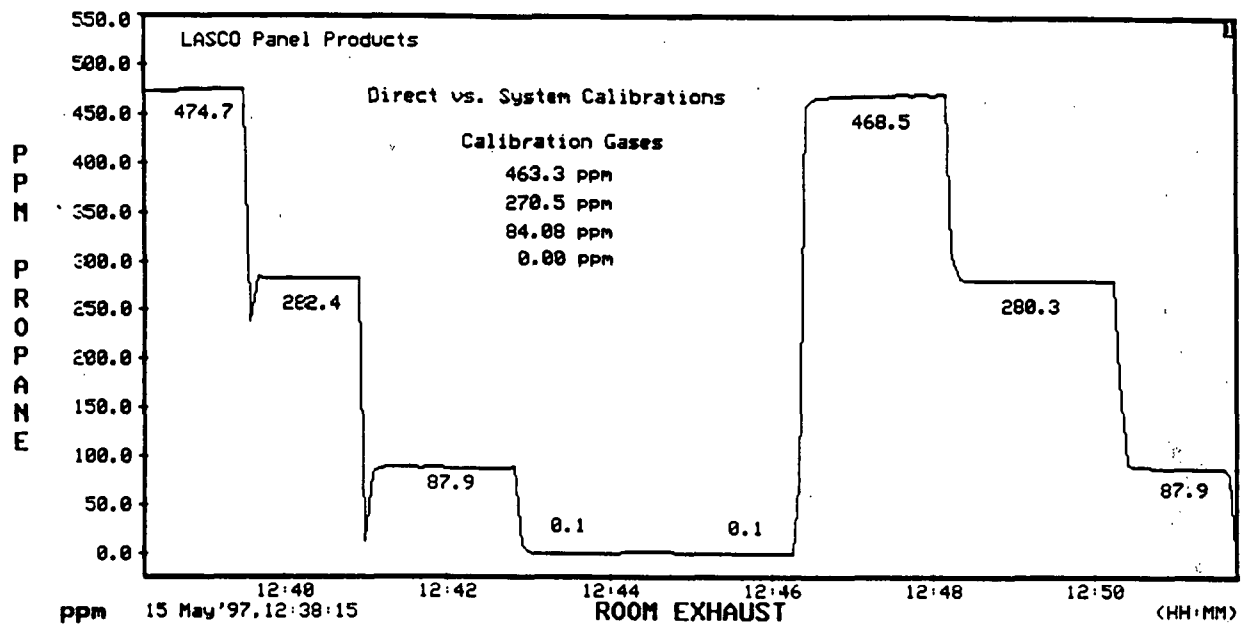
Correlation	0.999946
Slope	0.9901762
Intercept	9.3636755

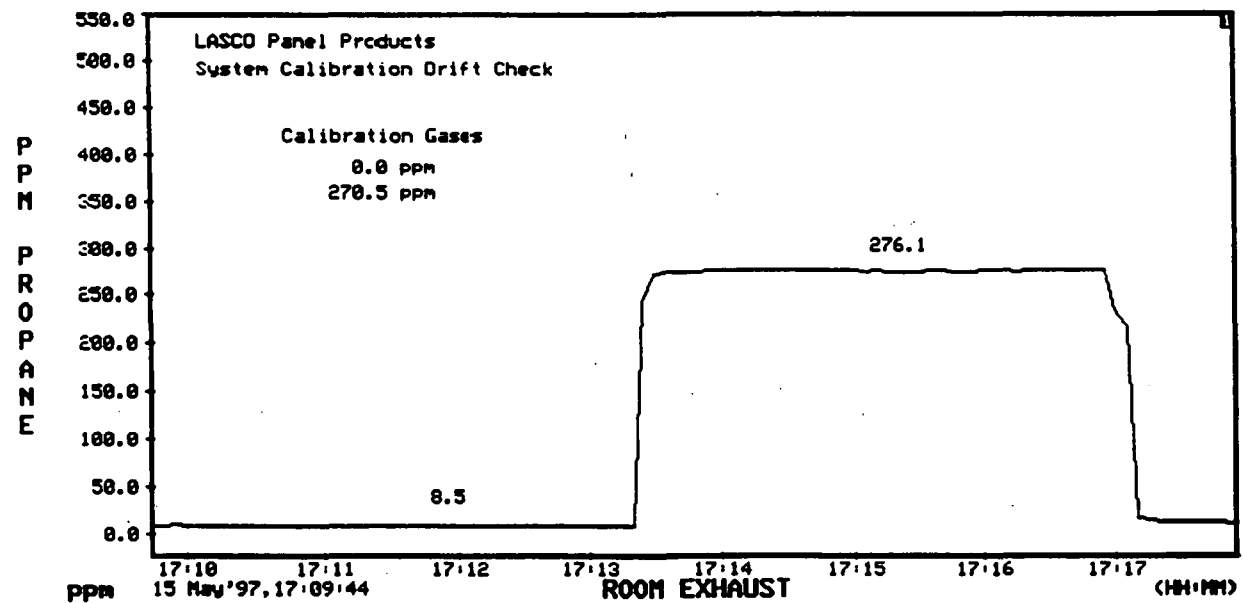
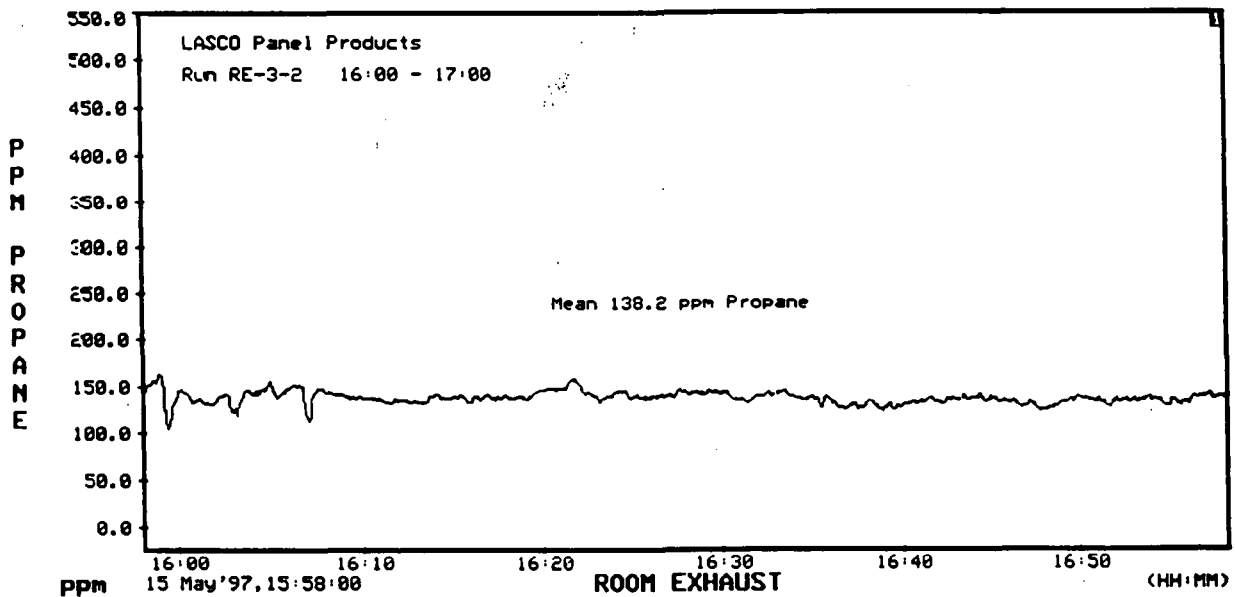
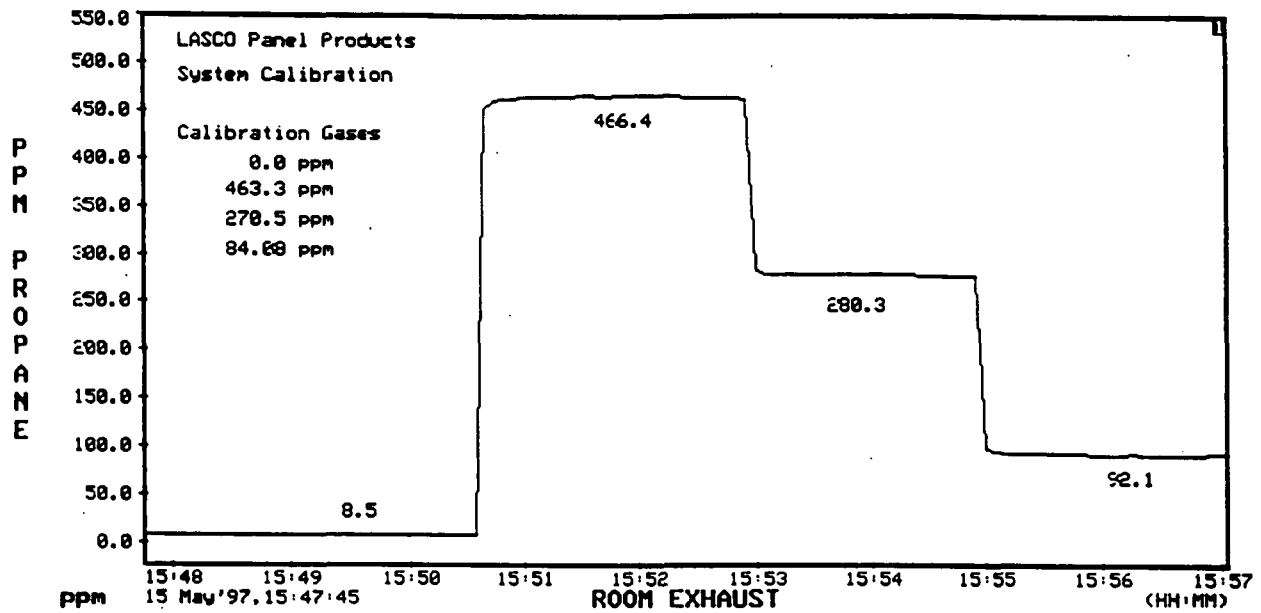
16:00-17:00 Run 3-2 138.2 Corrected 130.1 ppm THC

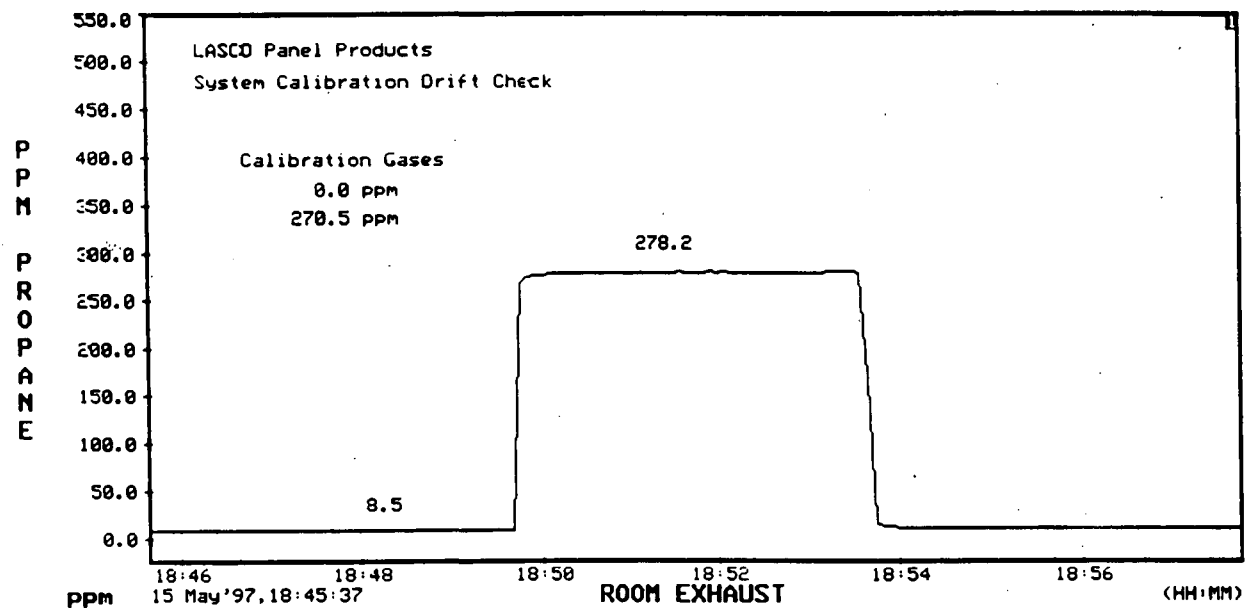
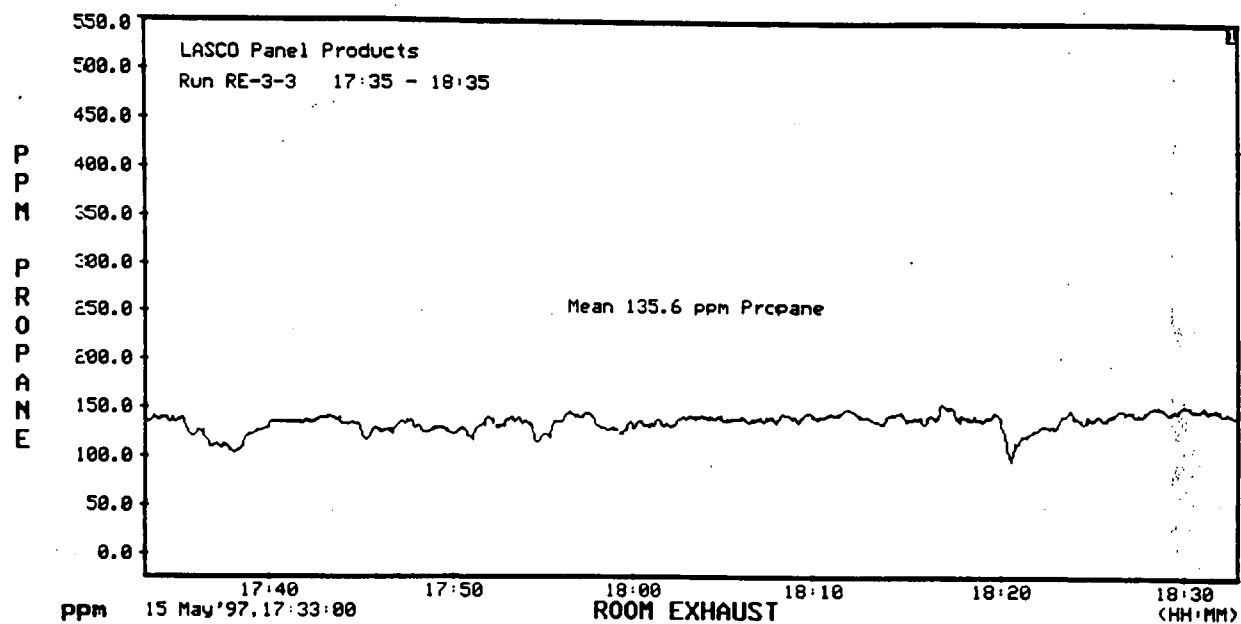
17:09 Post Cal 0.5 Drift 1.45%
 276.1 0.76%

17:35-18:35 Run 3-3 135.6 Corrected 127.5 ppm THC

18:45 Post Cal 8.5 Drift 0.00%
 278.2 0.38%









INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC

Location: MAIN EXHAUST Monitor: ppm or %

Date: 5-15-97 Span Value: 100

Operator: P. SIEGEL Chart Scale: 0-5000 ppm Propane

Project #: S405.003 Pbar, in. Hg.: 28.90

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	1.6	1.6		0.0
	1737	34.8	33.9	1726	1681	0.63	0.9
	2418	49.0	47.7	2429	2365	0.45	PT 5/1.3
	4507	90.9	88.0	4505	4362		2.9

- * Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.033)}{(0.02018)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

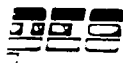
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 100 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 27 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
(Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: MAIN EXHAUST
Date: 5-15-97
Operator: P. SIEGEL
Project #: S405.003
Time, Pretest: 12:25 Post-test: 15:30
Run #: ME-3-1

Parameter: SO₂, CO₂, O₂, NO_x, THC
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-5000 ppm Propane
Pbar, in. Hg.: 28.90 (13:00)
Ambient Temp., F: 55 °F

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)		Concentration Predicted By Equation*		Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		12:25	15:30	12:25	15:30		
	0	0.0	0.1	-5	0		0.10
	1737	33.9		1730		0.40	
	2418	47.7	46.3	2437	2365	0.79	0.56
	4507	88.0		4499			

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.0912)}{(0.01954)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

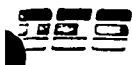
Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate

— sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: MAIN EXHAUST Monitor: ppm or %
 Date: 5-15-97 Span Value: 100
 Operator: R. SIEGEL Chart Scale: 0-1000 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 28.90
 Time, Pretest: 15:40 Post-test: 18:45 Ambient Temp., F: 55
 Run #: ME-3-2, ME-3-3

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)			Concentration Predicted By Equation*			Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		15:40	17:15	18:45	15:40	17:15	18:45		
	0	0.1	0.3	0.3	0.9	2.9	2.9		0.2
	270.5	46.3 27.1			270.2			0.11	
	463.3	46.3	47.0	46.1	461.7	468.7	459.7	0.35	0.9
	886.7	89.0			887.6				

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.006)}{(0.10026)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC, CO
Location: MAIN EXHAUST Operator: P. SIEGEL
Date: 5-15-97 Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.0912)}{(0.01954)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
ME-3-1	14:25-14:35	13.9	707	Range 0-500 ppm
	-14:45	14.8	753	Propane.
	-14:55	14.8	753	
	-15:05	14.5	737	
	-15:15	14.2	722	
	-15:25	14.2	722	AVG = 732 ppm Propane
ME-3-2	16:00-16:10	74.5	743.0	Range 0-1000 ppm
	-16:20	74.5	743.0	Propane
	-16:30	73.5	733.0	
	-16:40	73	728.0	@ P _{bar} 29.10
	-16:50	74	738.0	
	-17:00	74.5	743.0	AVG = 738.0 ppm Propane
ME-3-3	17:35-17:45	72.5	723.0	
	-17:55	72	718.1	
	-18:05	70	698.1	
	-18:15	68.5	683.1	
	-18:25	69	688.1	
	-18:35	69.5	693.1	AVG = 700.6 ppm Propane

CD-0
0.10026

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-20-97
Checked By: _____ Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: Room EXHAUST Monitor: ppm or %
 Date: 5-15-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 28.90

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span <u>GAS</u>	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	-1.7	-1.7		0.0
	84.08	18.0	18.0	85.1	85.1	1.21	0.0
	270.5	56.9	56.3	272.7	248.8	0.81	0.406 ^{PTS}
	463.3	96.1	95.0	461.8	456.5		1.1

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.362)}{(0.20731)}$$

$$\text{Correlation Coefficient} = \underline{0.99996}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

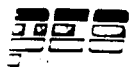
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 29 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x (THC)
 Location: ROOM EXHAUST Monitor: ppm or %
 Date: 5-15-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 28.90 (13.00)
 Time, Pretest: 12:40 Post-test: 15:30 Ambient Temp., F: 55°F
 Run #: RE-3-1

Cyl. #	Cal. Gas Conc., <u>ppm or %</u>	Calibrations (Chart Divisions)			Concentration Predicted By Equation*		Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		12:40	15:30	17:15	12:40	15:30		
	0	0.0	2.0		-2.2	7.5		1.94
	84.08	18.0			85.7		1.93	
	270.5	58.3	59.7		272.7	289.3	0.81	3.32
	463.3	95.0			461.7			

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.457)}{(0.20477)}$$

$$\text{Correlation Coefficient} = \underline{0.99994}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
 sample data. Post-test is used if drift exceeds limits and if post-test
 yields higher concentrations.



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x (THC)
Location: Room EXHAUST Monitor: ppm or %
Date: 5-15-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.10 @ 18:00
Time, Pretest: 15:45 Post-test: 18:45 Ambient Temp., F: 55 °F
Run #: RE-3-2 RE-3-3

Cyl. #	Cal. Gas Conc., <u>ppm or %</u>	Calibrations (Chart Divisions)			Concentration Predicted By Equation*			Analyzer Calibration Error,** % of Span	Drift*** % of Span
		15:45	17:15	18:45	15:45	17:15	18:45		
	0	1.8	1.9	1.8	-1.5	-1.0	-1.5		0.1
	84.08	19.0			84.9			0.98	
	270.5	56.3	55.3	56.1	272.5	267.4	271.5	0.74	1.0
	463.3	94.0			462.0				

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 2.103)}{(0.1989/)}$$

$$\text{Correlation Coefficient} = \underline{0.99997}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x*, THC, CO
Location: Boom EXHAUST Operator: P. SIEGEL
Date: 5-15-97 Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.457)}{(0.20477)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
				JUN 5
RE-3-1	14:25-14:35	25	71.0 120	RANGE 0-500 ppm
	-14:45	23	61.3 110	Propane
	-14:55	21.5	53.9 103	
	-15:05	23	61.3 110	
	-15:15	24	66.1 115	
	-15:25	24.5	68.6 117	AVG = 113 ppm Propane
RE-3-2	16:00-16:10	29	135.2	
	-16:20	28	130.2	
	-16:30	28.5	132.7	
	-16:40	28.5	132.7	Phar 29.10
	-16:50	27	125.2	
	-17:00	27	125.2	AVG = 130.2 ppm Propane
RE-3-3	17:35-17:45	26	120.1	
	-17:55	26	120.1	
	-18:05	27	125.2	
	-18:15	28 PTS	130.2	
	-18:25	27	125.2	
	-18:35	29	135.2	AVG = 126.0 ppm Propane

CD-2.
0.19891

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-15-97
Checked By: _____ Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: AUXILIARY FAN
Date: 5-15-97
Operator: P. SIEGEL
Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x, THC
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-500 ppm Propane
Pbar, in. Hg.: 28.90 (13:00)

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	-0.8	-0.8		0.0
	84.08	17.5	17.7	84.6	85.6	0.62	0.2
	270.5	55.8	56.0	271.4	272.4	0.33	0.2
	463.3	95.0	95.7	462.7	466.1		0.7

- * Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.163)}{(0.20498)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

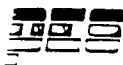
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 23 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
(Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: AUXILIARY FAN
Date: 5-15-97
Operator: P. SIEGEL
Project #: S405.003
Time, Pretest: 12:55 Post-test: 18:55
Run #: AF-3-1, AF-3-2, AF-3-3

Parameter: SO₂, CO₂, O₂, NO_x, THC
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-500 ppm Propane
Pbar, in. Hg.: 28.90
Ambient Temp., F: 55°F

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		12:55	15:35	17:20	18:55	12:55	15:35	17:20	18:55		
	0	0.0	2.8	2.2	2.2	-0.8	12.8	9.9	9.9		2.8
	84.08	17.7				85.0				1.09	
	270.5	56.0	60.2	57.9	59.1	270.6	291.0	279.8	285.7	0.04	4.2
	463.3	95.7				463.1					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b$$

x = ppm

y = chart divisions

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.165)}{(0.20631)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate

— sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.

CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
 Location: AUXILIARY FAN
 Date: 5-15-97

Parameter: SO₂, CO₂, O₂, NO_x*, (THC) CO
 Operator: P. SIEGEL
 Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.165)}{(0.20631)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
AF-3-1	14:25 - 14:35	0		
	-14:45	0		
	-14:55	0		
	-15:05	0		
	-15:15	0		
	-15:25	2.8		AVG = 0
AF-3-2	16:00 - 16:10	3.0		
	-16:20	2.8		
	-16:30	2.7		
	-16:40	2.7		Phar 29.10
	-16:50	2.7		
	-17:00	2.7		AVG = 0
AF-3-3	17:35 - 17:45	2.5		
	-17:55	2.5		
	-18:05	2.5		
	-18:15	2.5		
	-18:35	2.5		
	-18:45	2.5		AVG = 0

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul Siegel
 Checked By: _____

Date: 5-15-97
 Date: _____

APPENDIX A.2.6

Condition 4 Method 25A

LASCO Panel Products

Condition 4 - Main Exhaust

Total Hydrocarbons (THC)

15-May-97

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	270.7	0.55%
463.3 ppm	461.6	1.80%
866.7 ppm	889.3	

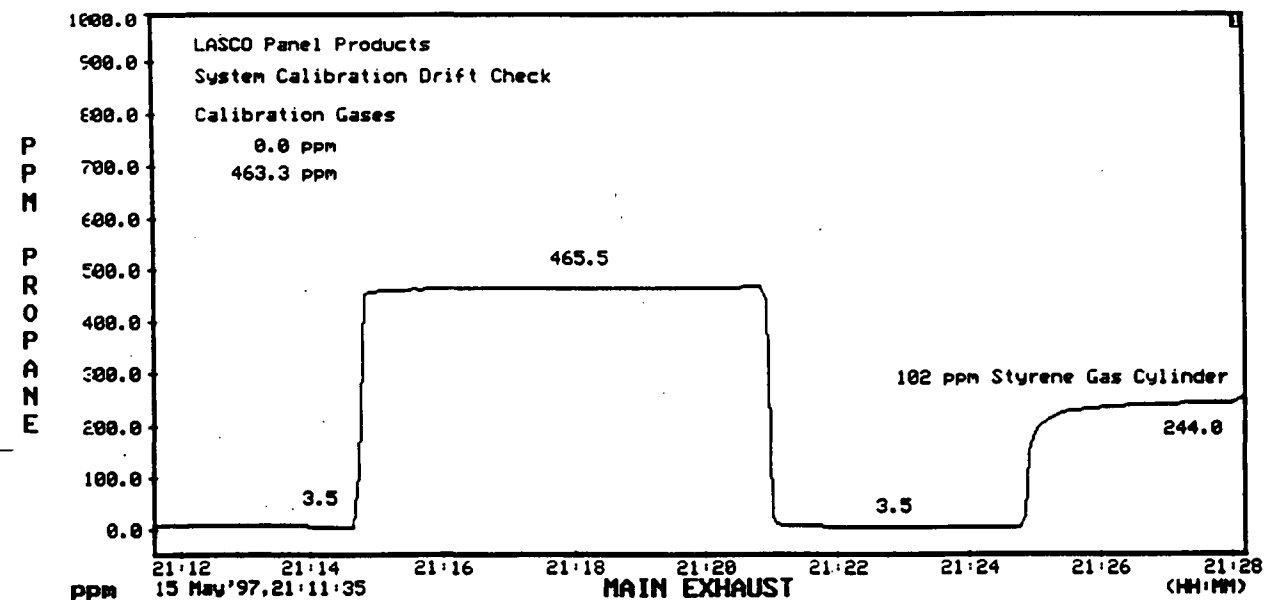
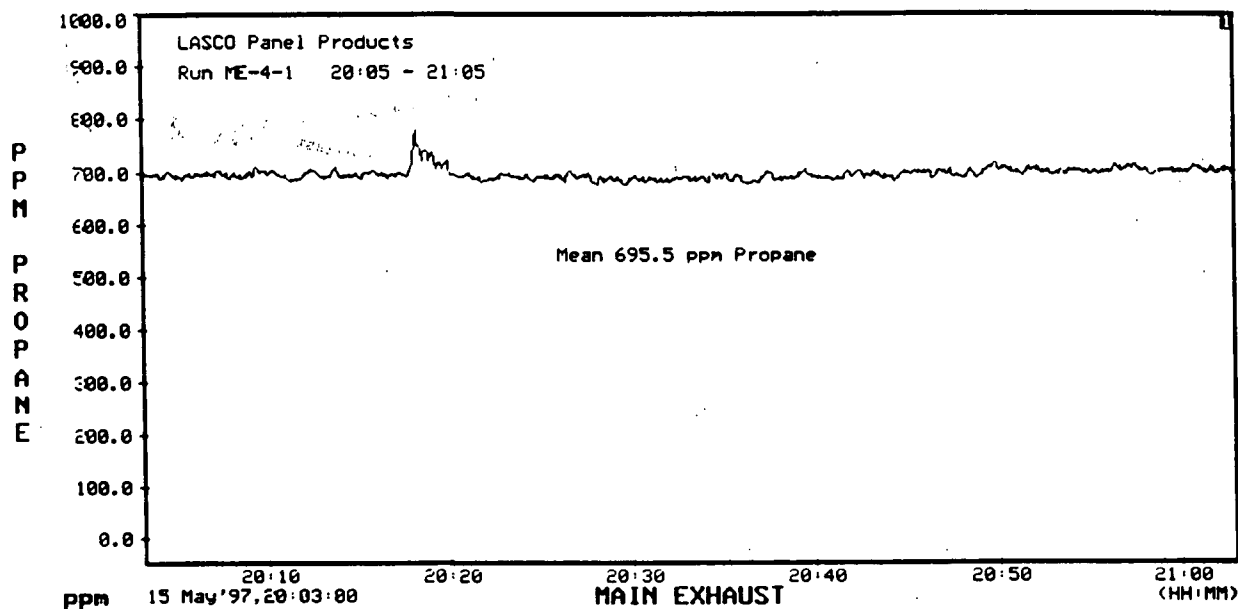
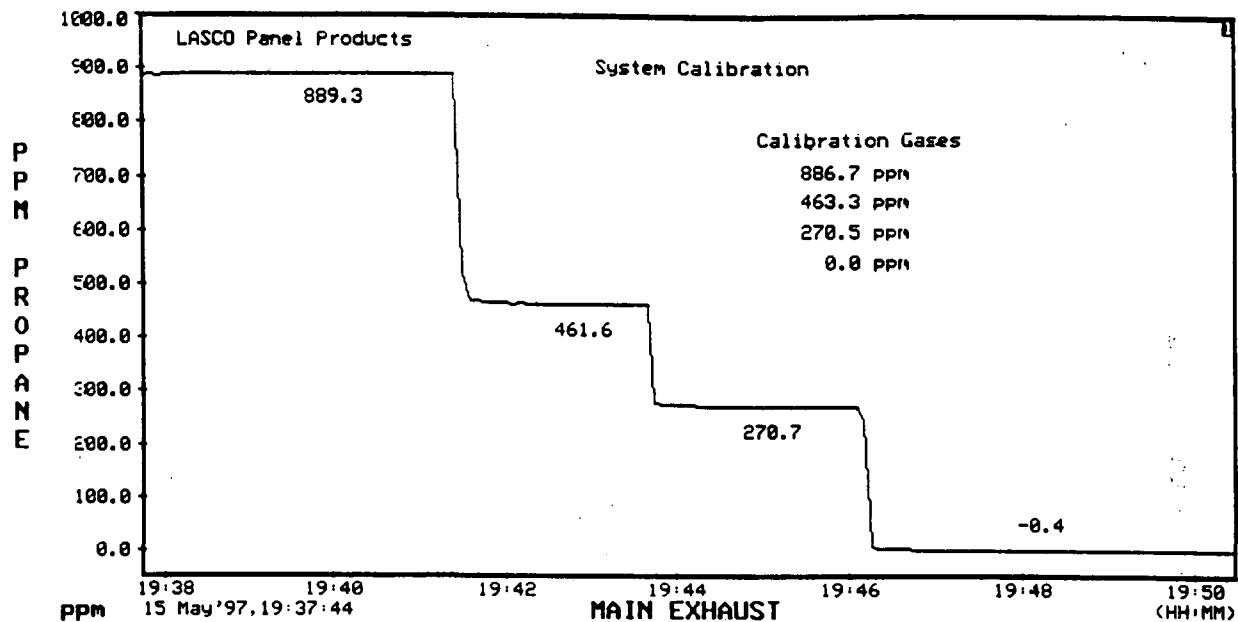
Correlation	0.9998496
Slope	1.0265221
Intercept	-5.4371408

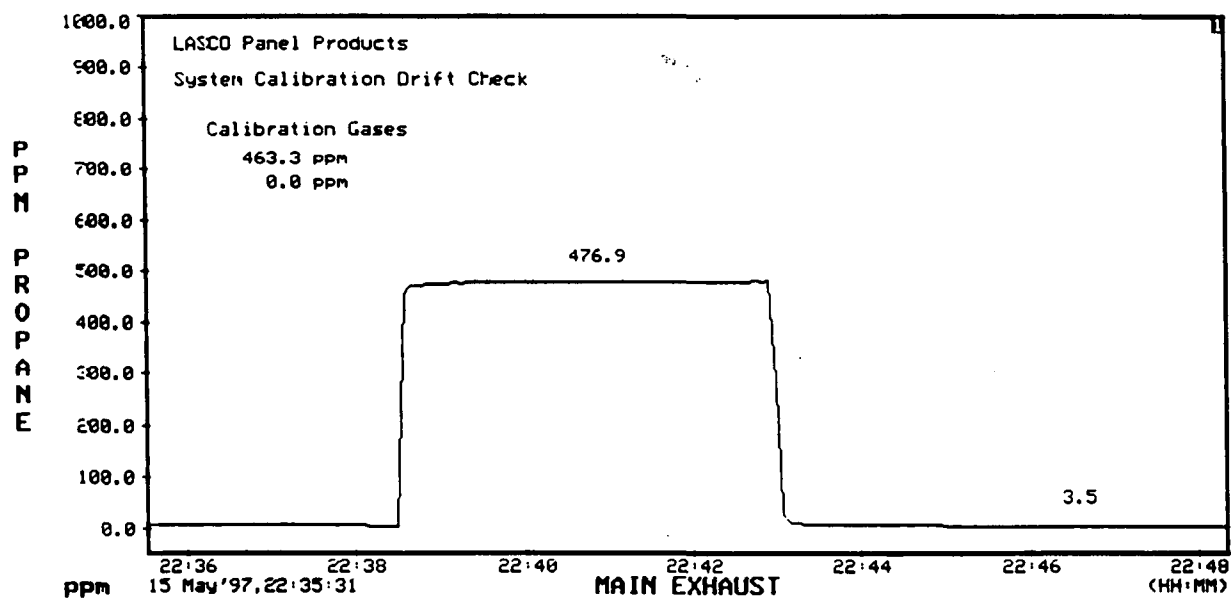
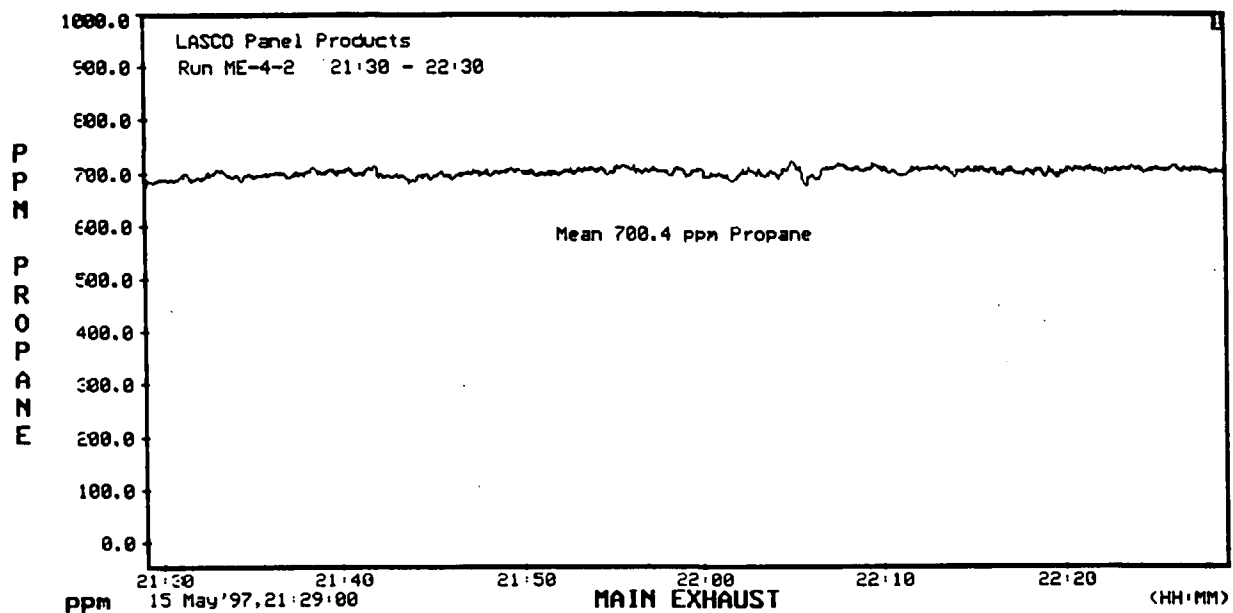
20:05-21:05	Run 4-1	695.5	Corrected	682.8	ppm THC
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21:11	Post Cal	3.5	Drift	0.39%
		465.5		0.39%

21:30-22:30	Run 4-2	700.4	Corrected	687.6	ppm THC
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22:35	Post Cal	3.5	Drift	0.39%
		476.9		1.53%





LASCO Panel Products

Condition 4 - Room Exhaust

Total Hydrocarbons (THC)

15-May-97

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	8.5	
84.1 ppm	94.2	0.95%
270.5 ppm	280.3	0.42%
463.3 ppm	470.5	

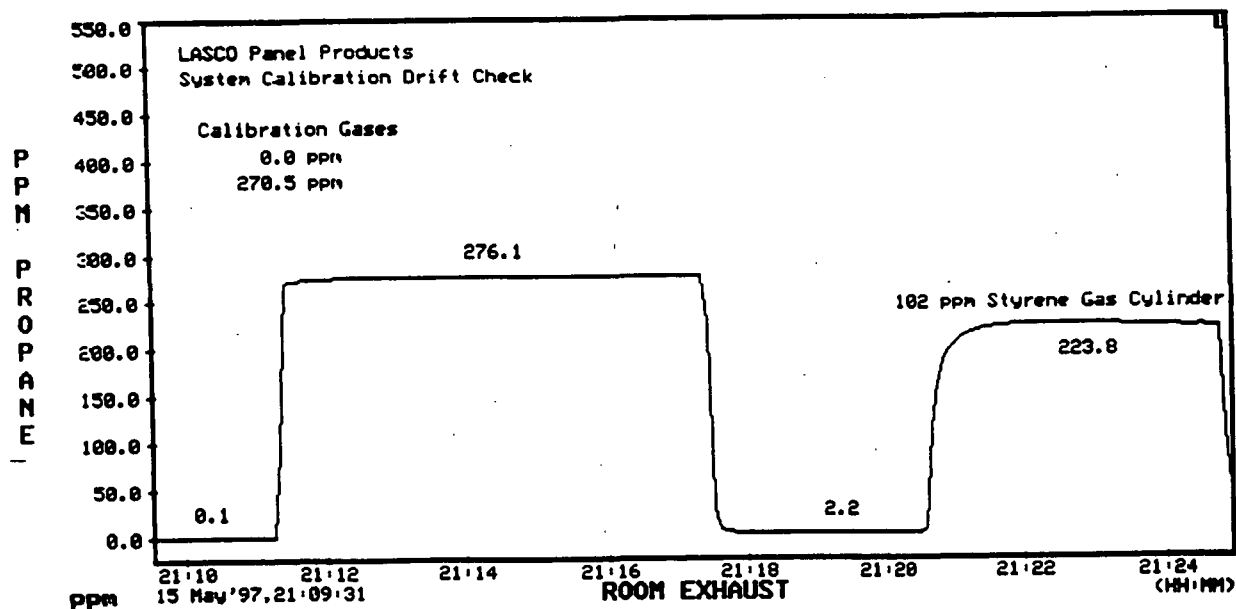
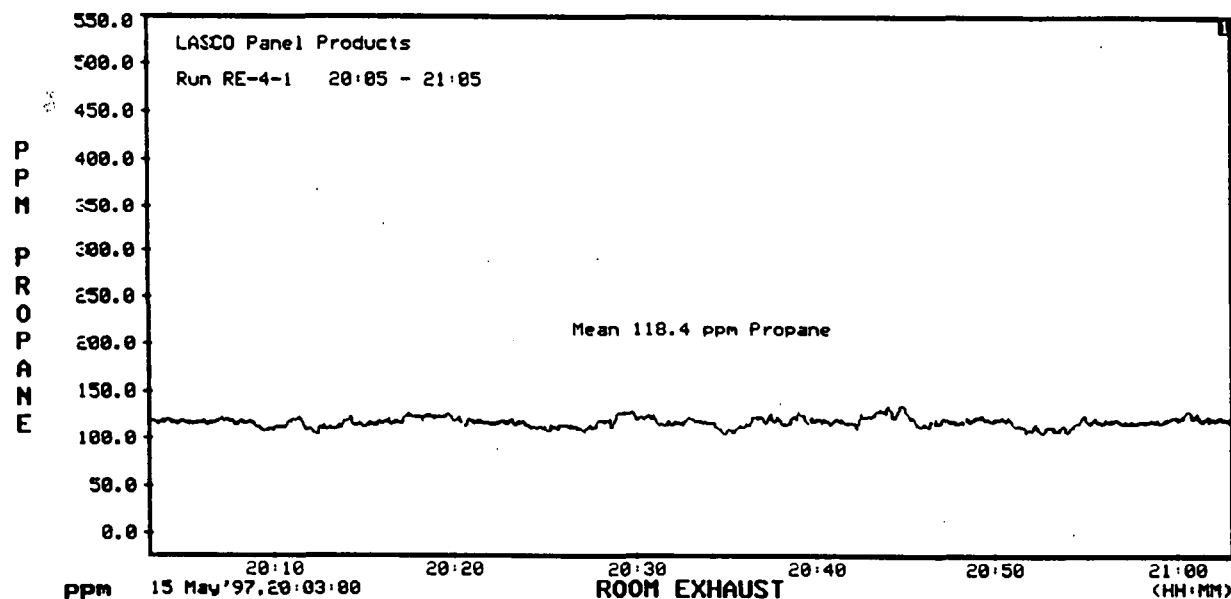
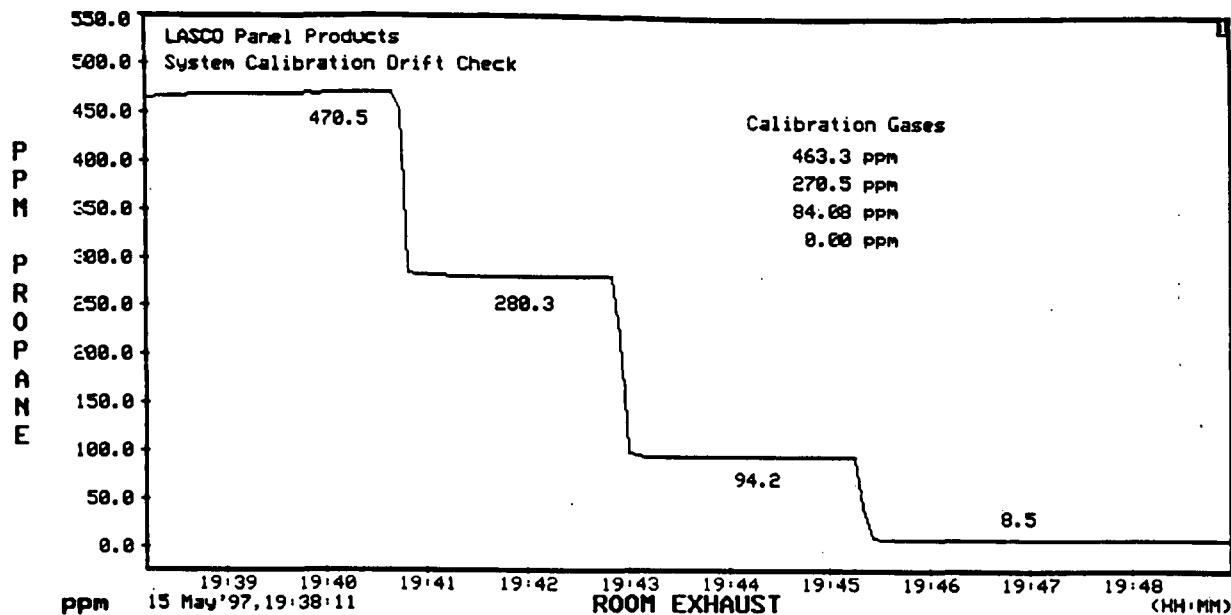
Correlation	0.999985
Slope	0.9965088
Intercept	9.6188518

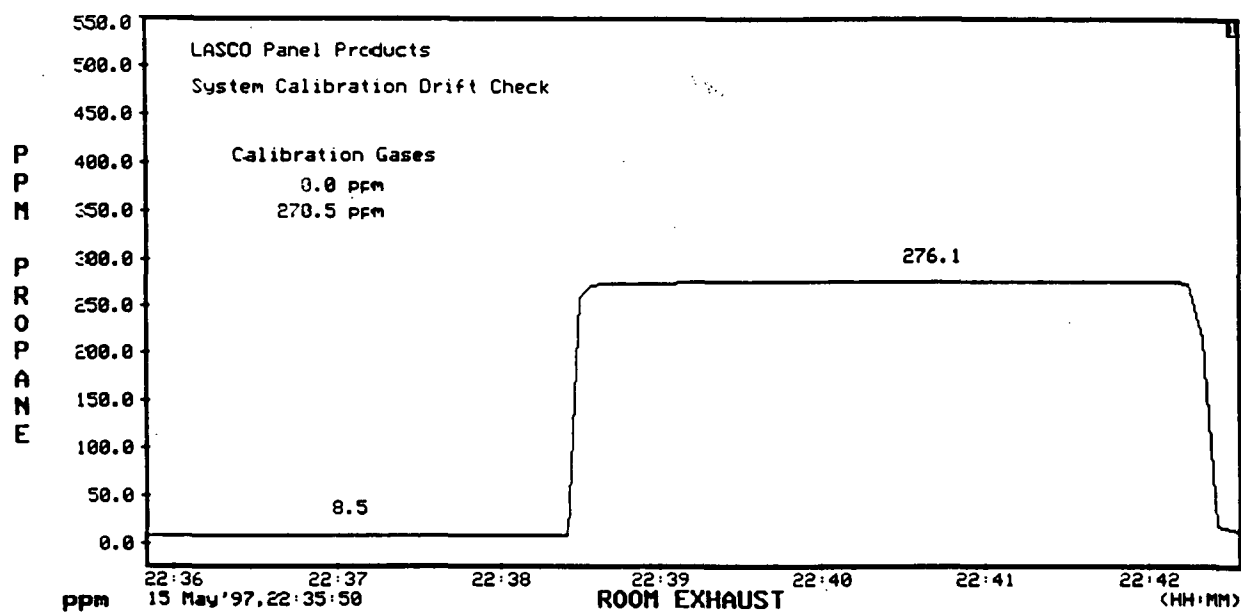
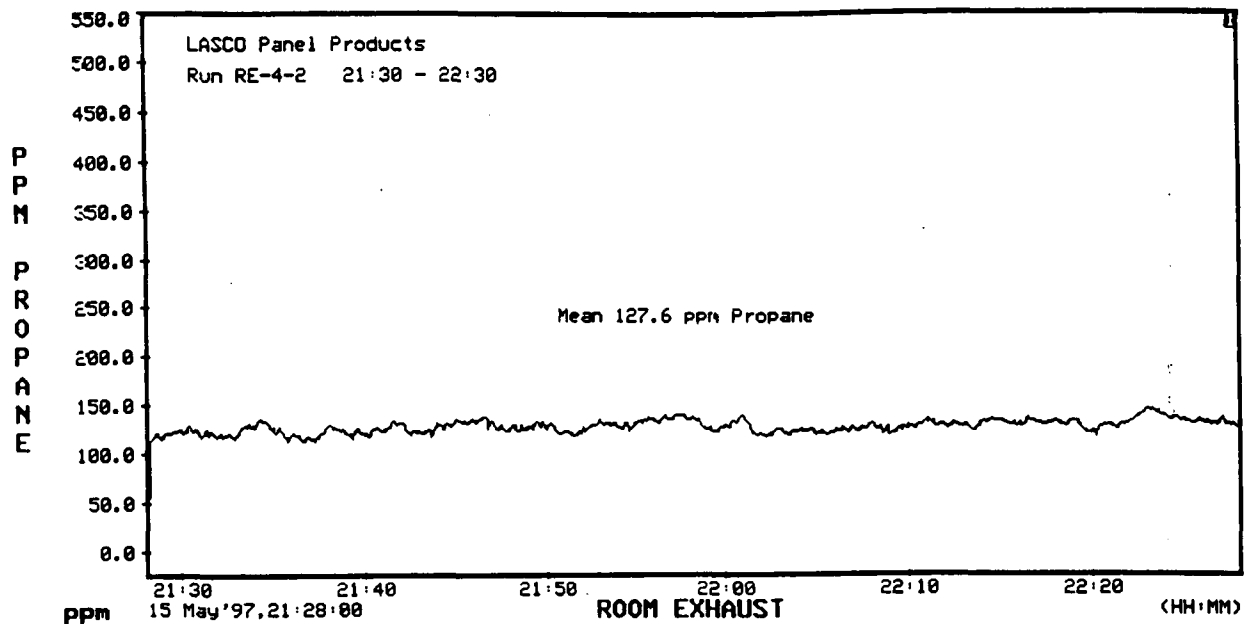
20:05-21:05	Run 4-1	118.4	Corrected	109.2	ppm THC
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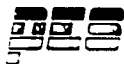
21:09	Post Cal	2.2	Drift	1.15%
		276.1		0.76%

21:30-22:30	Run 4-2	127.6	Corrected	118.4	ppm THC
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18:57	Post Cal	8.5	Drift	0.00%
		276.1		0.76%







DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: MAIN EXHAUST Monitor: ppm or %
Date: 8-5-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.20 (20:00)
Time, Pretest: 19:35 Post-test: 22:35 Ambient Temp., F: 50°F
Run #: ME-4-1, ME-4-2

Cyl. #	Cal. Gas Conc., (ppm) or %	Calibrations (Chart Divisions)			Concentration Predicted By Equation*			Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		19:35	21:10	22:35	19:35	21:10	22:35		
	0	0.0	0.4	0.9	1.2	5.1	10.1		0.9
	270.5	27.0			270.1			0.15	
	463.3	46.2	46.2	47.4	461.4	461.4	473.3	0.41	1.2
	886.7	89.0			887.8				

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.116)}{(0.10039)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: MAIN EXHAUST
Date: 5-15-97

Parameter: SO₂, CO₂, O₂, NO_x*, THC, CO
Operator: P. SIEGEL
Project #: S405.003

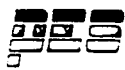
$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.116)}{(0.16038)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
ME-4-1	20:05-20:15	69	689	Sum 1
	-20:25	70	699	
	-20:35	69	689	
	-20:45	69	689	
	-20:55	69.5	694	
	-21:05	70	699	AVG = 693 ppm Propane
ME-4-2	21:30-21:40	69	689	
	-21:50	70	699	
	-22:00	70	699	
	-22:10	70	699	
	-22:20	71	708.5	
	-22:30	71	708	AVG = 700 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-15-97
Checked By: _____ Date: _____



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: Room EXHAUST Monitor: ppm or %
Date: 5-15-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.20 (20:00)
Time, Pretest: 19:35 Post-test: 22:35 Ambient Temp., F: 50°F
Run #: RE-4-1, RE-4-2

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)			Concentration Predicted By Equation*			Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		19:35	21:10	22:35	19:35	21:10	22:35		
	0	1.4	0.0	1.8	-1.9	-8.9	0.1		1.8
	84.08	19.0			85.5			1.69	
	270.5	56.6	55.6	55.5	272.3	267.3	266.8	0.67	1.1
	463.3	44.8			462.0				

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 1.784)}{(0.20133)}$$

$$\text{Correlation Coefficient} = \underline{0.99996}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

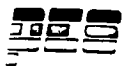
Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: Room EXHAUST
Date: 5-15-97

Parameter: SO₂, CO₂, O₂, NO_x*, (THC), CO
Operator: P. SIEGEL
Project #: 3405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 1.784)}{(0.20133)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
RE-4-1	20:05-20:15	23.5	107.9	TUM 5
	-20:25	24	110.3	
	-20:35	23.5	107.9	
	-20:45	24	110.3	
	-20:55	24	110.3	
	-21:05	24	110.3	AVG = 109.5 ppm Propane
RE-4-2	21:30-21:40	24.5	112.8	
	-21:50	25	115.3	
	-22:00	26	120.3	
	-22:10	25	115.3	
	-22:20	26	120.3	
	-22:30	26.5	122.8	AVG = 117.8 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-15-97
Checked By: _____ Date: _____



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x (THC)
Location: AUXILIARY FAN Monitor: ppm or %
Date: 5-15-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.20 (20:00)
Time, Pretest: 19:51 Post-test: 22:45 Ambient Temp., F: 50 °F
Run #: AF-4-1, AF-4-2

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)			Concentration Predicted By Equation*			Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		19:51	21:20	22:45	19:51	21:20	22:45		
	0	2.1	2.1	2.1	-1.0	-1.0	-1.0		0
	84.08	19.0			85.4			1.57	
	270.5	55.2	55.3	54.2	270.4	270.9	265.3	0.04	1.1
	463.3	92.9			463.1				

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 2.299)}{(0.19563)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
— sample data. Post-test is used if drift exceeds limits and if post-test
yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO

Parameter: SO₂, CO₂, O₂, NO_x*, THC, CO

Location: AUXILIARY FAN

Operator: P. SIEGEL

Date: 5-15-97

Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 2.299)}{(0.19563)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
				Jun 3
AF-4-1	20:05 - 20:15	2.2	-0.5	Sampling Ambient
	-20:25	2.2	-0.5	Air by Fan
	-20:35	2.1		
	-20:45	2.1		
	-20:55	2.0		
	+21:05	2.0		
AF-4-2	21:30 - 21:40	NA		
	-21:50	2.9		
	-22:00	2.5		
	-22:10	2.4		
	-22:20	2.3		
	-22:30	2.3		

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel

Date: 5-15-97

Checked By: _____

Date: _____

APPENDIX A.2.7

Condition 5 Method 25A

LASCO Panel Products

Condition 5 - Main Exhaust

Total Hydrocarbons (THC)

19-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-0.4	-0.4
270.5 ppm	270.7	278.4
463.3 ppm	461.6	473.1
886.7 ppm	881.6	904.5

Correlation 0.9999966
Slope 0.9942047
Intercept 0.5978049

Correlation 0.9999945
Slope 1.0197358
Intercept 0.7795344

Sampling System Bias
0.00%
0.77%
1.15%
2.29%

Calibration Error

0.65%
0.03%

9:04-10:26 Run 5-1 473.8 Corrected 476.0 ppm THC

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	278.4	1.15%
463.3 ppm	465.5	1.48%
886.7 ppm	908.4	

Correlation 0.9999227
Slope 1.0231749
Intercept -1.53875

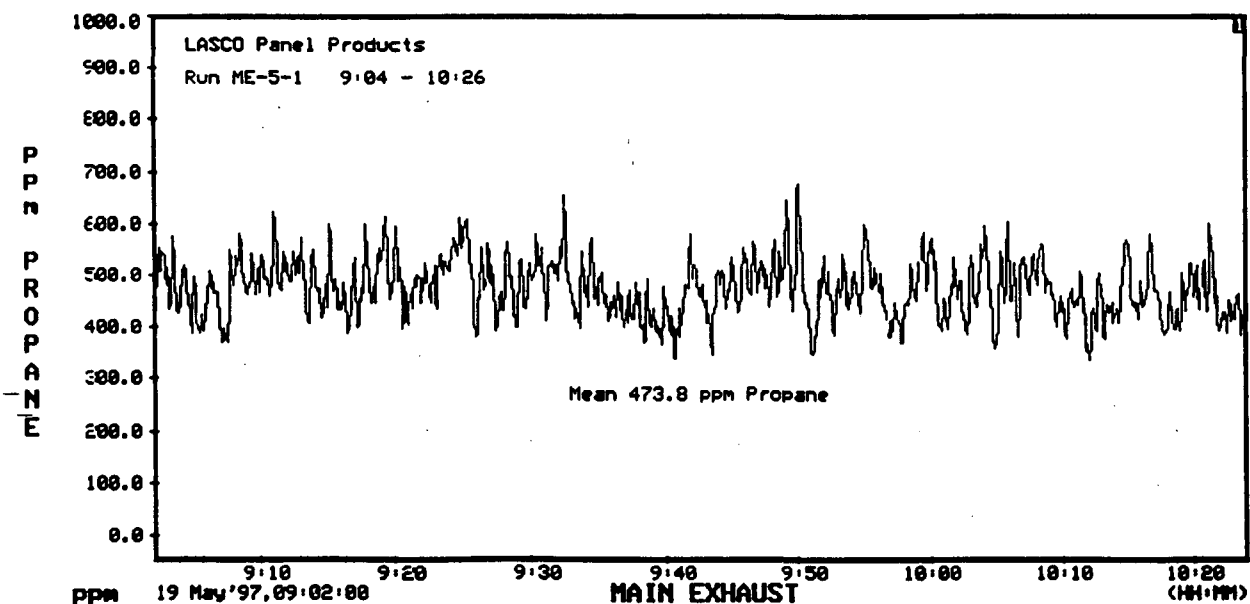
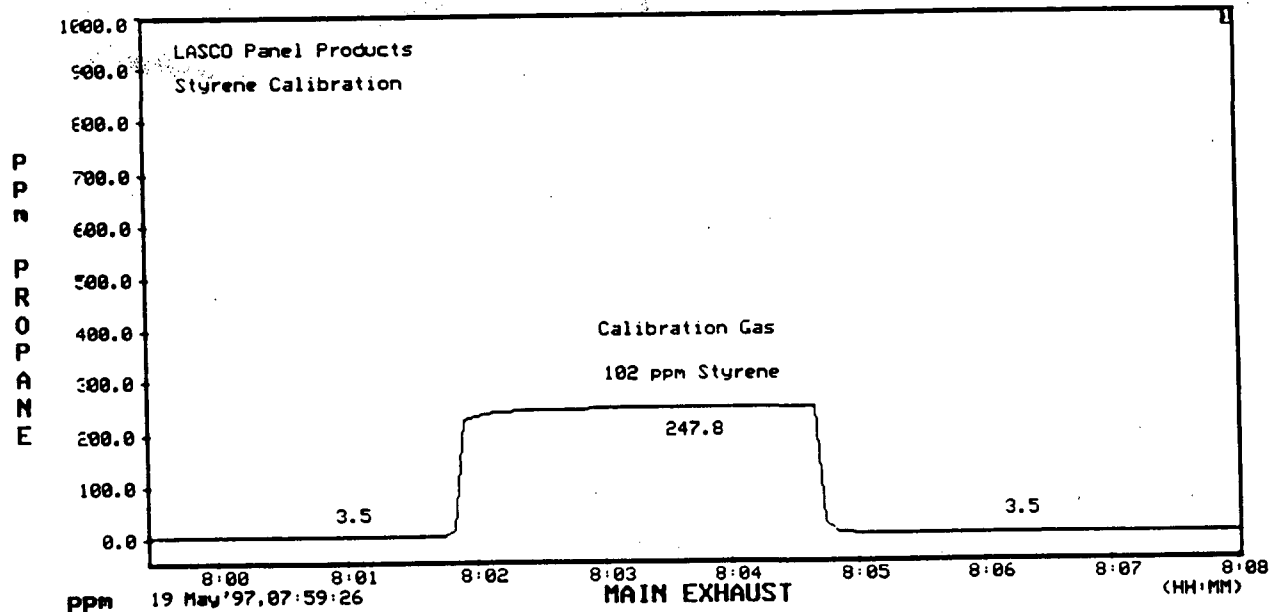
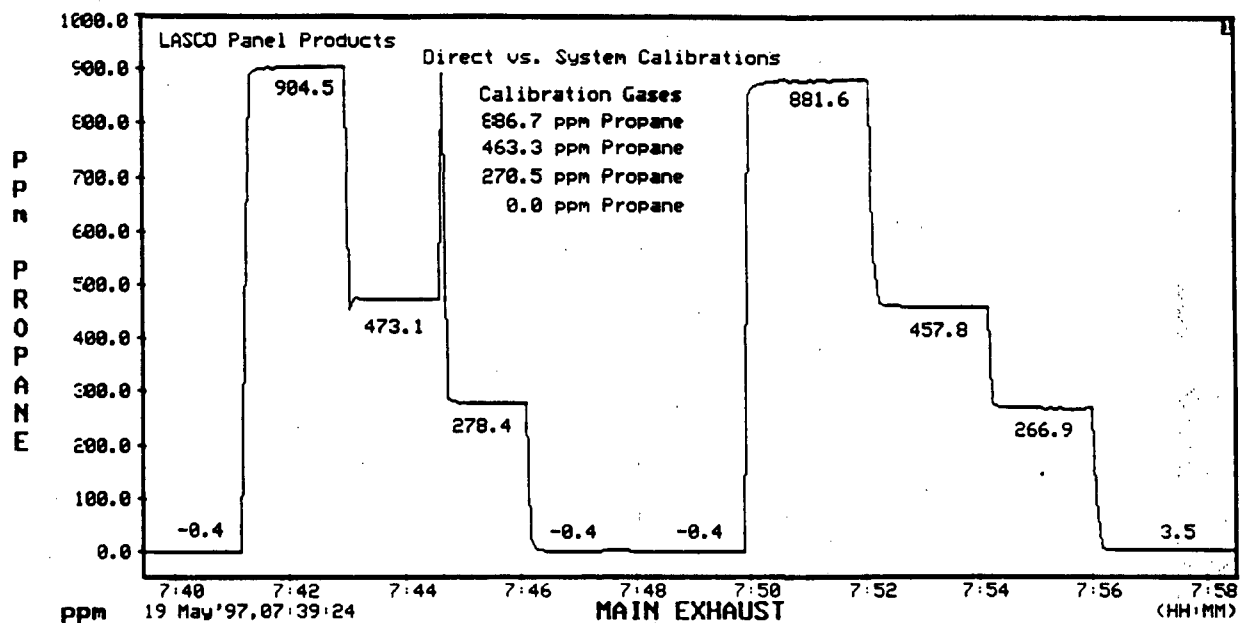
11:08-12:30 Run 5-2 435.3 Corrected 426.9 ppm THC

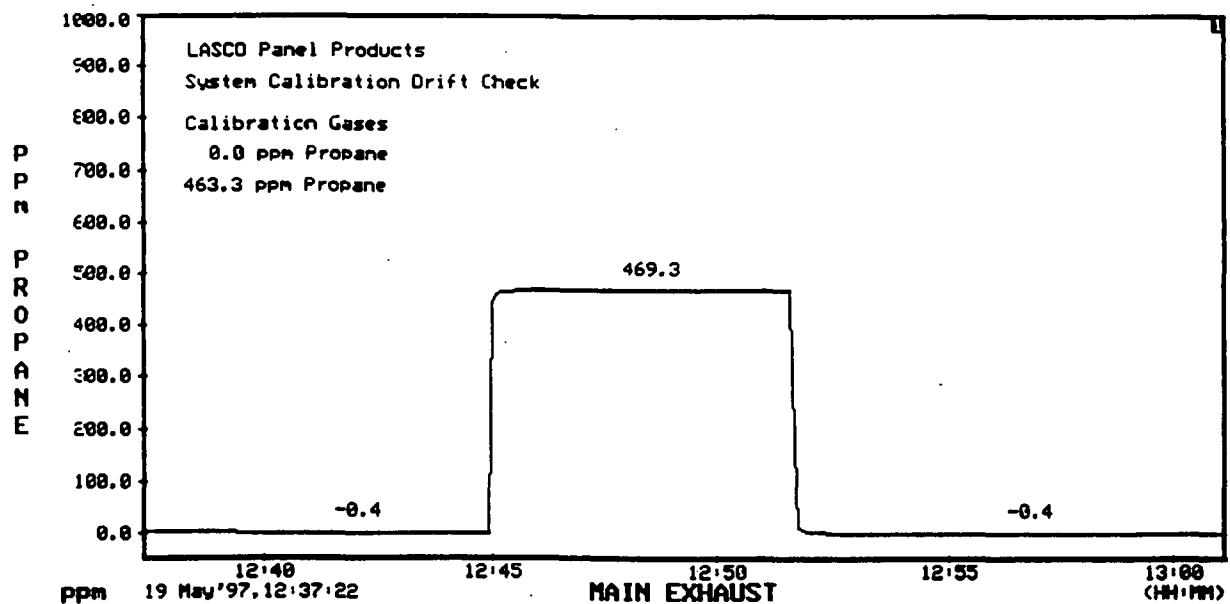
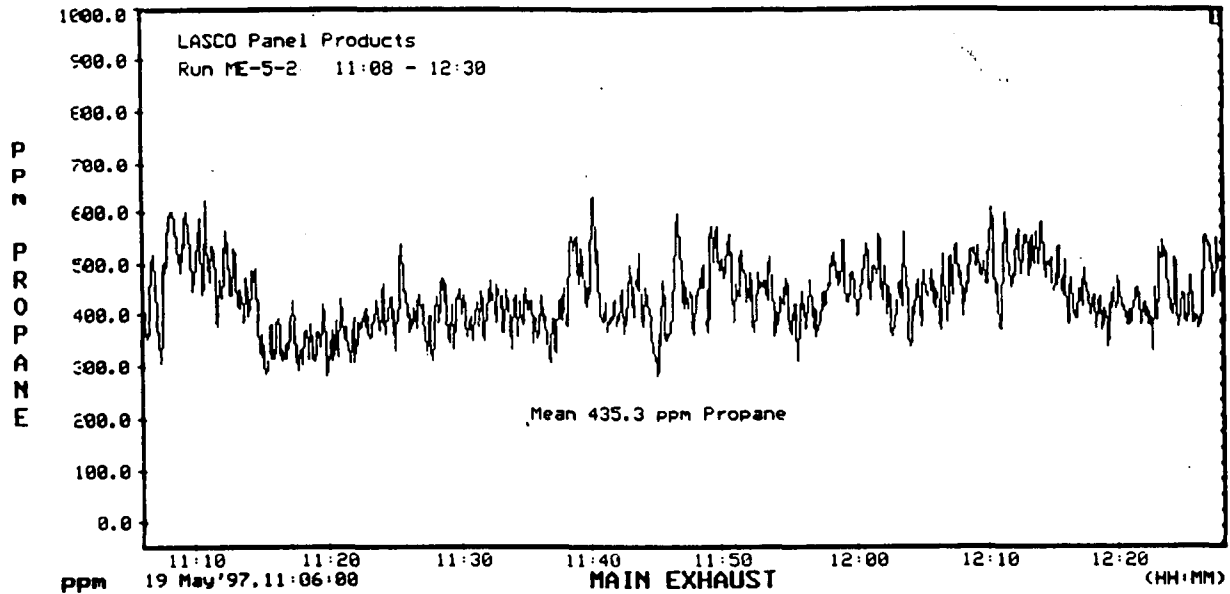
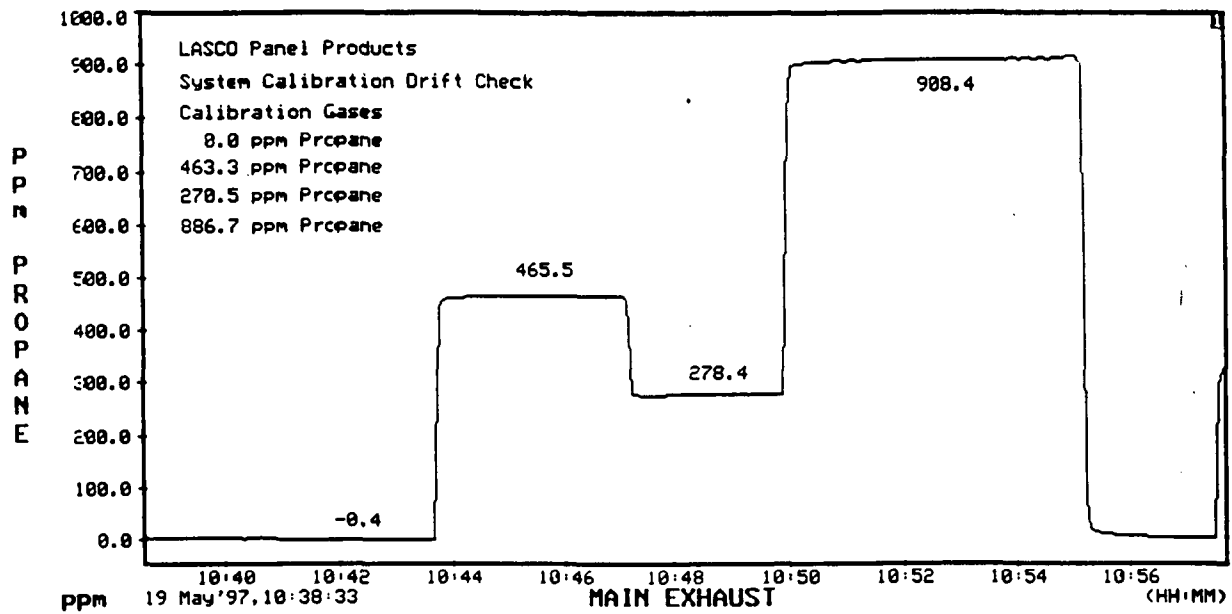
12:37 Post Cal -0.4 Drift 0.00%
 469.3 0.38%

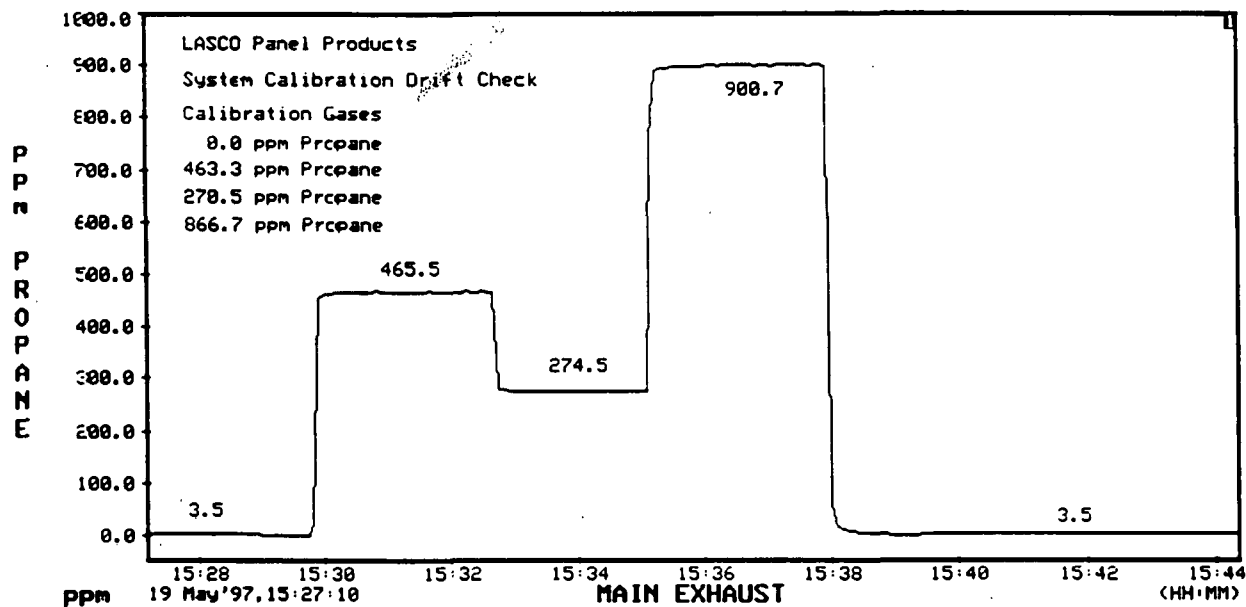
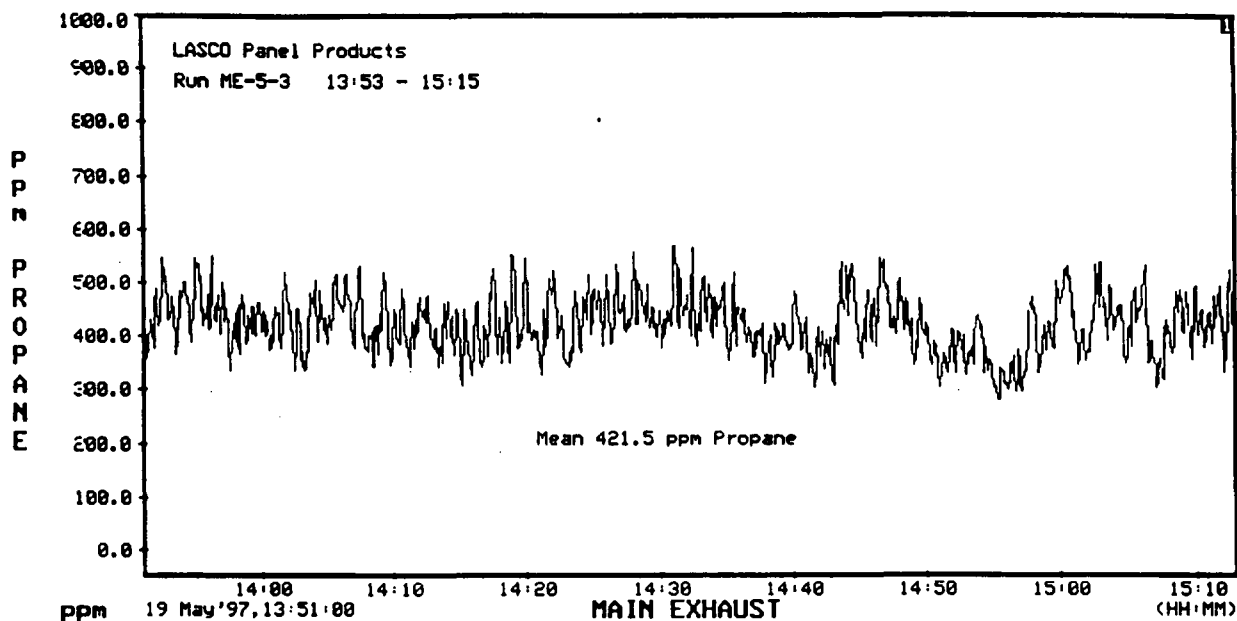
13:53-15:15 Run 5-3 421.5 Corrected 413.5 ppm THC

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	3.5	
270.5 ppm	274.5	0.84%
463.3 ppm	465.5	2.28%
886.7 ppm	900.7	

Correlation 0.9997496
Slope 1.0353339
Intercept -3.212978







LASCO Panel Products

Condition 5 - Room Exhaust

Total Hydrocarbons (THC)

19-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-0.4	-0.4
270.5 ppm	270.7	274.5
463.3 ppm	461.6	469.3
886.7 ppm	881.6	896.9

Correlation 0.9999966
Slope 0.9942047
Intercept 0.5978049

Correlation 0.9999988
Slope 1.0116984
Intercept 0.2106758

Sampling System Bias
0.00%
0.38%
0.77%
1.53%

Calibration Error

0.23%
0.08%

9:04-10:26 Run 5-1 113.4 Corrected 113.5 ppm THC

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	255.5	0.51%
463.3 ppm	434.9	0.04%
886.7 ppm	832.0	

Correlation 0.9999966
Slope 0.93818
Intercept 0.4198472

11:08-12:30 Run 5-2 123.2 Corrected 130.9 ppm THC

15:16 Post Cal -0.4 Drift 0.00%
431.1 0.38%

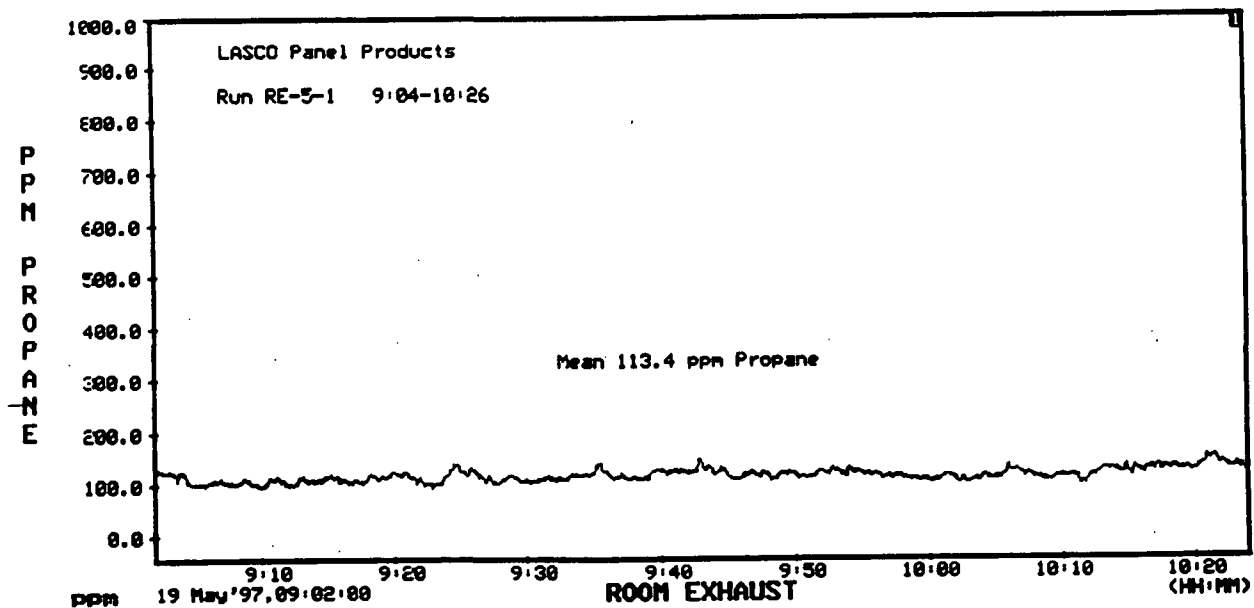
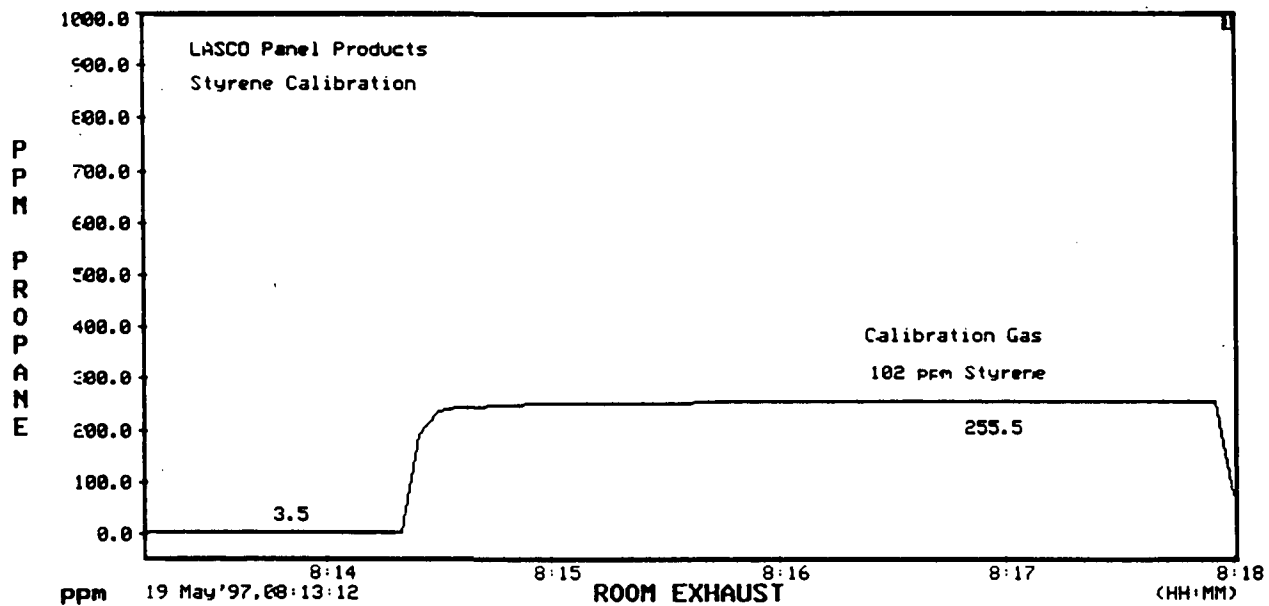
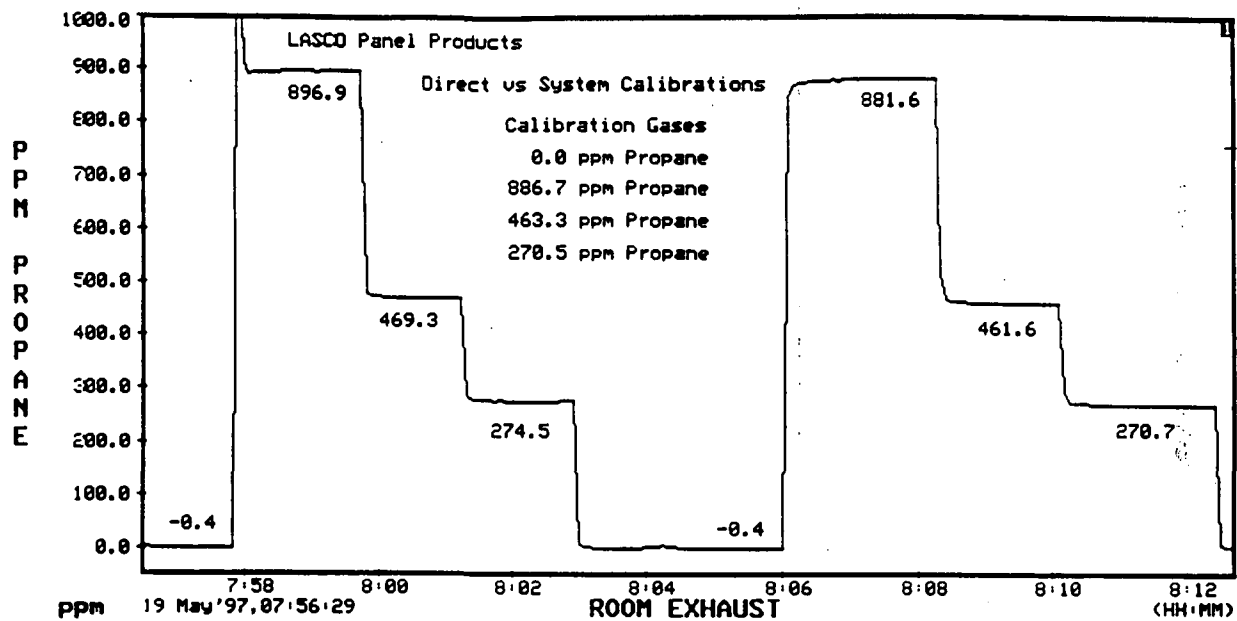
Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	247.8	0.64%
463.3 ppm	419.6	0.59%
886.7 ppm	809.1	

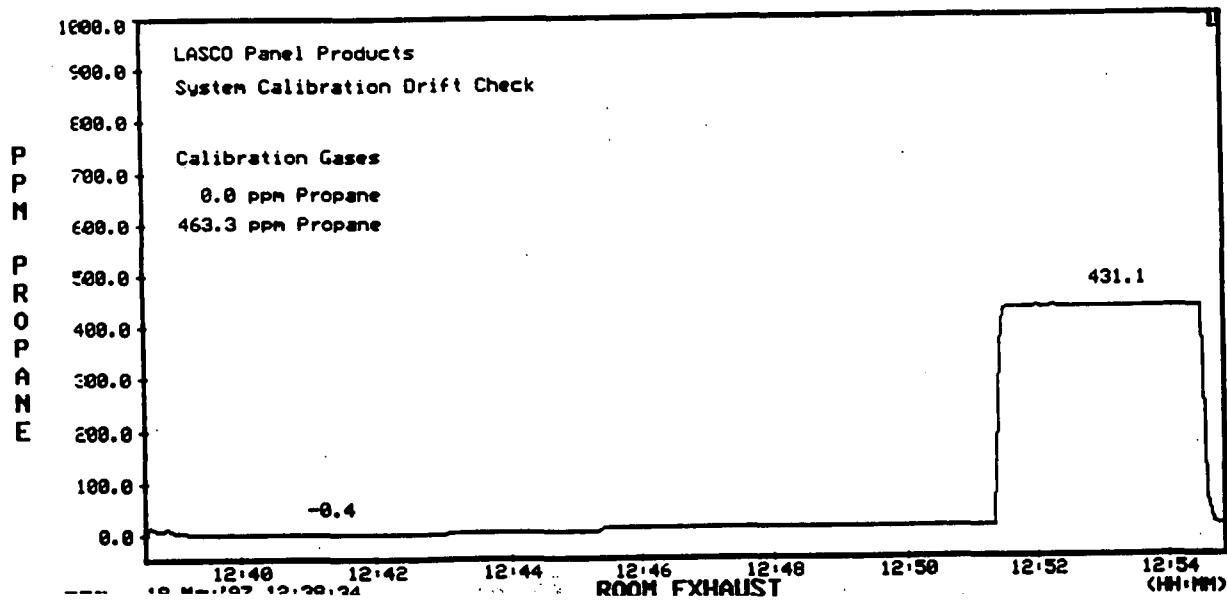
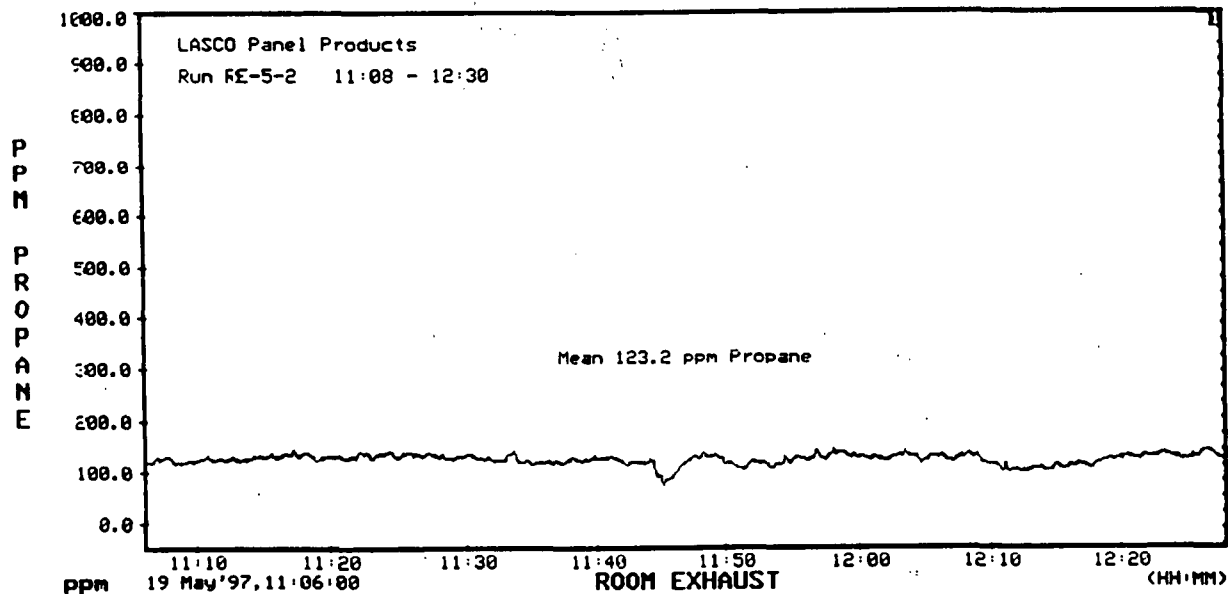
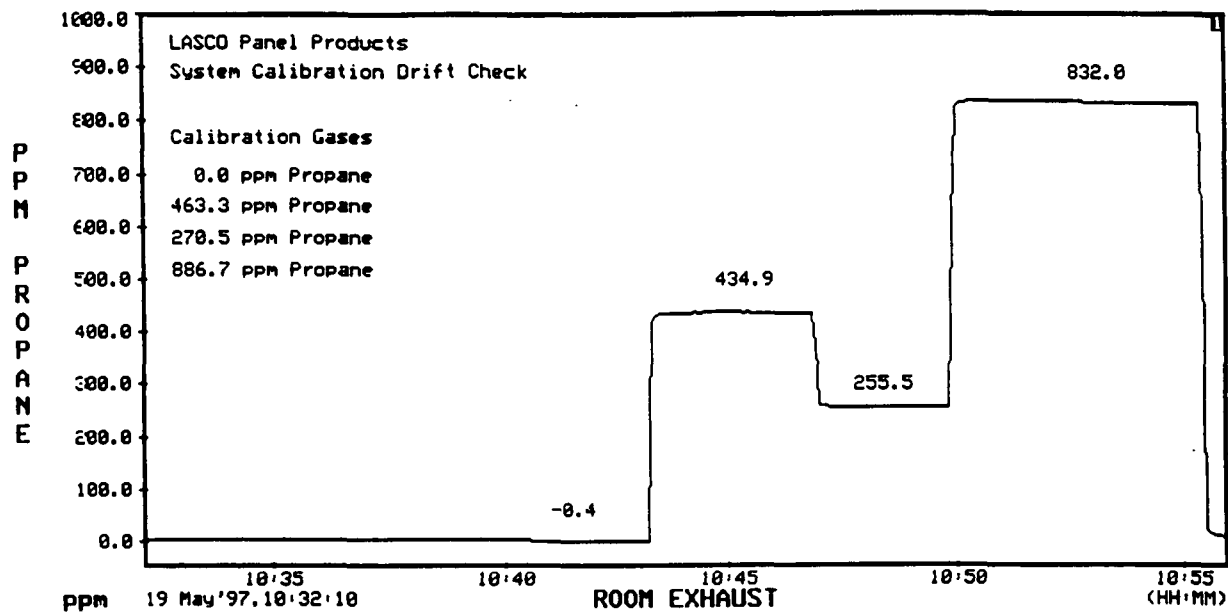
Correlation 0.9999866
Slope 0.9121195
Intercept -0.497395

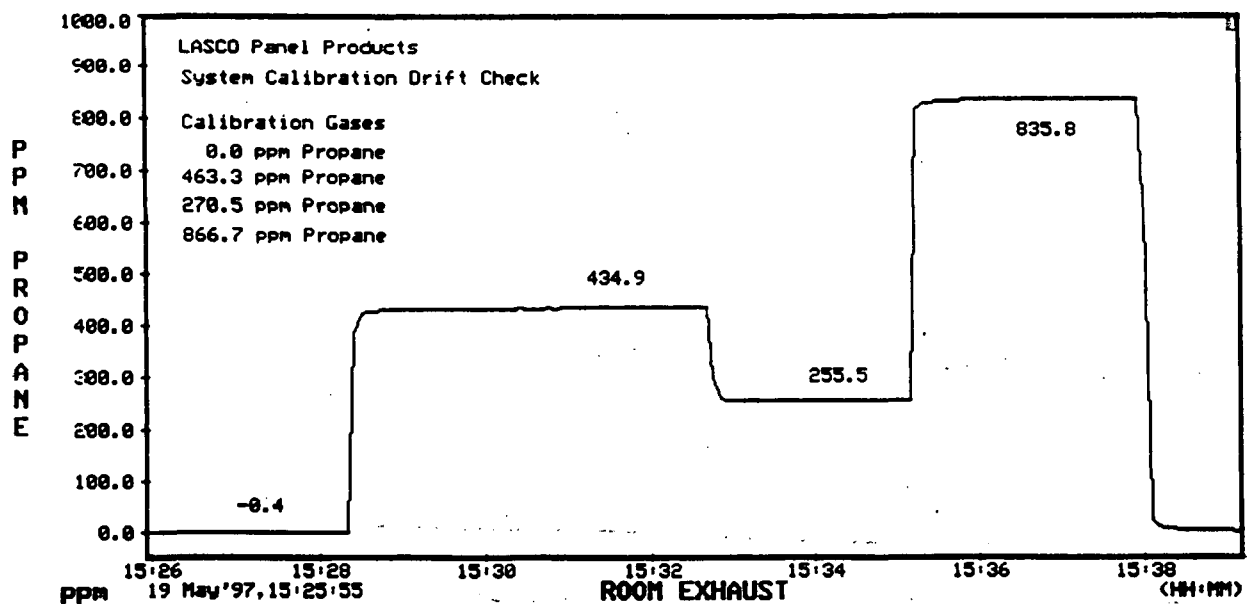
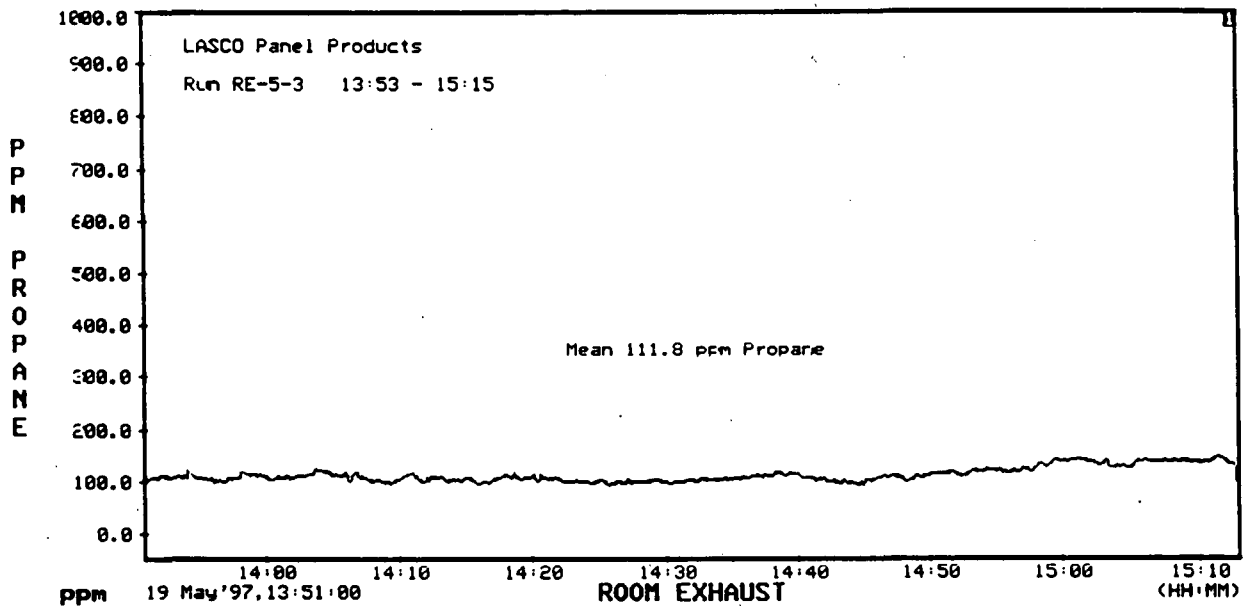
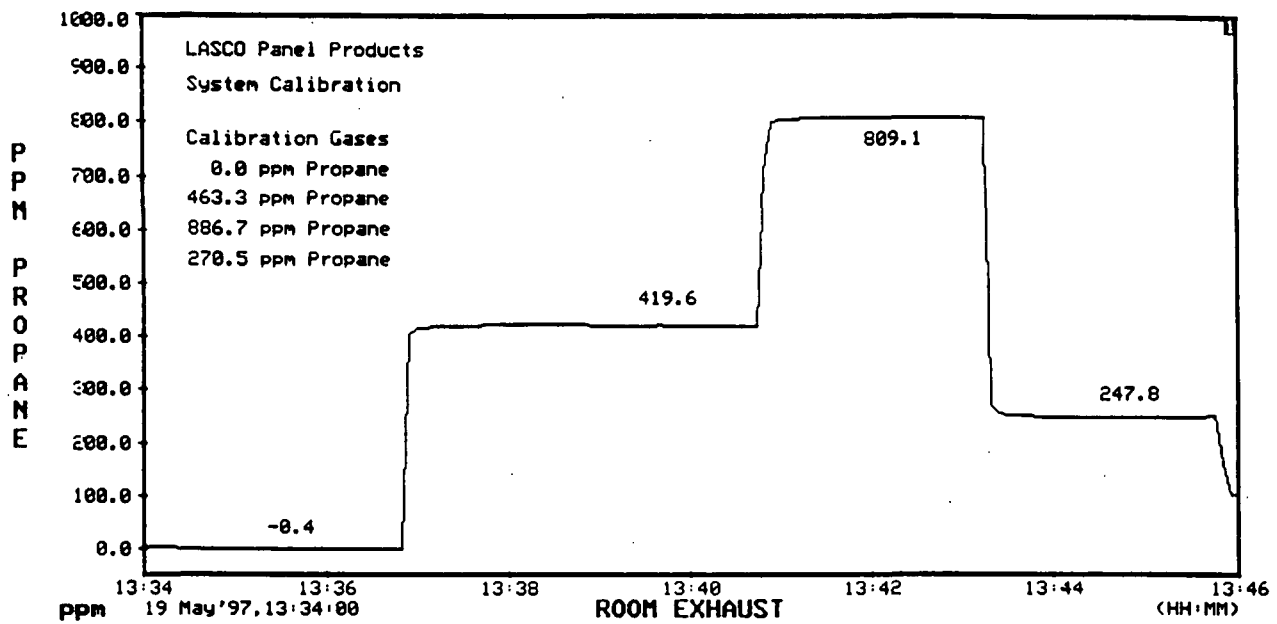
13:53-15:15 Run 5-3 111.8 Corrected 123.1 ppm THC

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	255.5	0.37%
463.3 ppm	434.9	0.32%
886.7 ppm	835.8	

Correlation 0.999996
Slope 0.9425626
Intercept -0.4056875







LASCO Panel Products

Condition 5 - Auxiliary Fan

Total Hydrocarbons (THC)

19-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-0.4	-0.4
270.5 ppm	270.7	274.5
463.3 ppm	461.6	465.5
886.7 ppm	885.5	896.9

Correlation	0.9999983	Correlation	0.9999895
Slope	0.9987028	Slope	1.011169
Intercept	-0.2494544	Intercept	-0.524837

Sampling System Bias	Calibration Error
0.00%	0.55%
0.38%	0.52%
0.39%	
1.14%	

9:04-10:26 Run 5-1 148.3 Corrected 148.7 ppm THC

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	3.5	
270.5 ppm	247.8	0.33%
463.3 ppm	423.5	0.08%
886.7 ppm	809.1	

Correlation	0.9999978
Slope	0.9088789
Intercept	2.765449

11:08-12:30 Run 5-2 132.1 Corrected 142.3 ppm THC

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-0.4	-0.4
270.5 ppm	263.1	274.5
463.3 ppm	454.0	465.5
886.7 ppm	877.8	896.9

Correlation	0.9999764	Correlation	0.9999895
Slope	0.9912136	Slope	1.011169
Intercept	-2.9403925	Intercept	-0.524837

Sampling System Bias	Calibration Error
0.00%	0.55%
1.14%	0.52%
1.15%	
1.91%	

LASCO Panel Products

Condition 5 - Auxiliary Fan

Total Hydrocarbons (THC)

13:53-15:15 Run 5-3

144.8	Corrected	149.1	ppm THC
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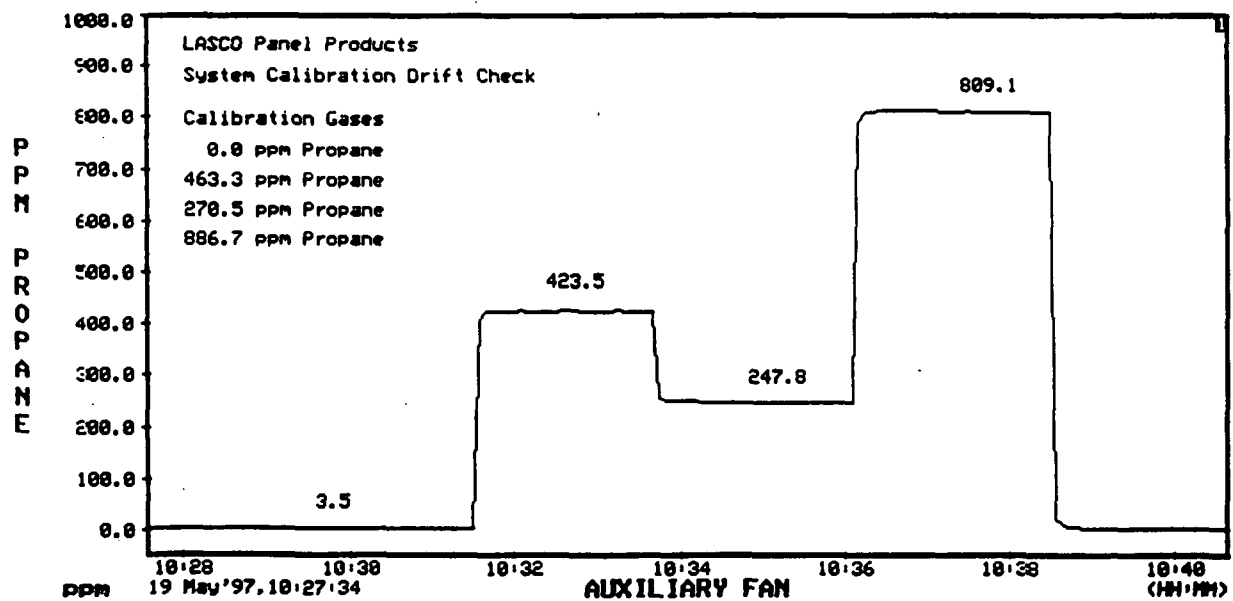
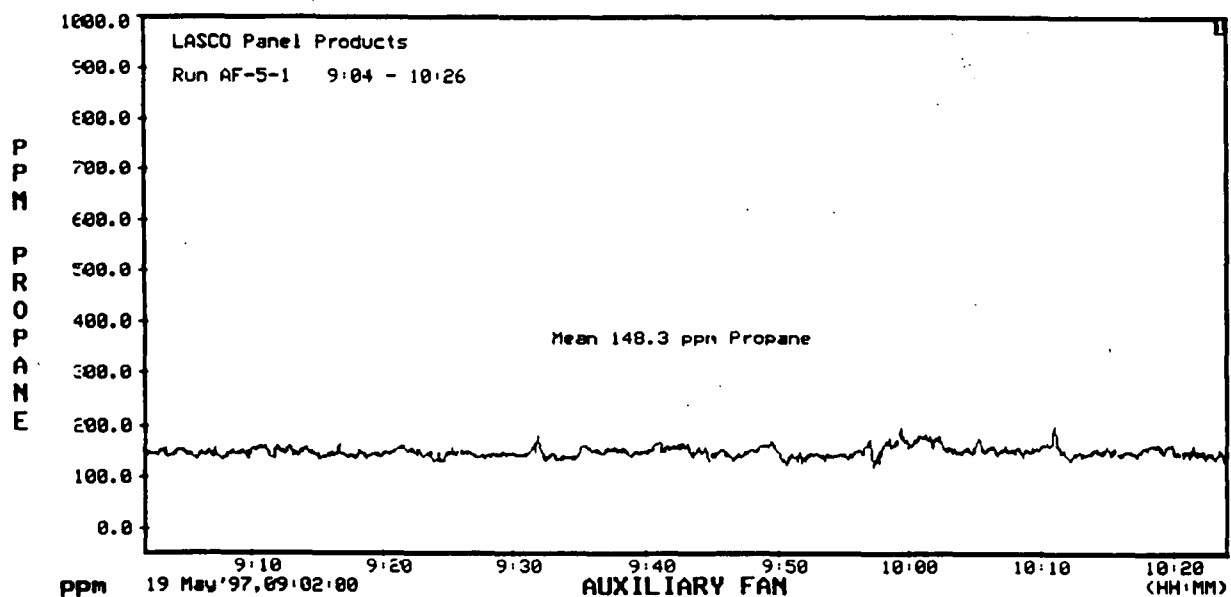
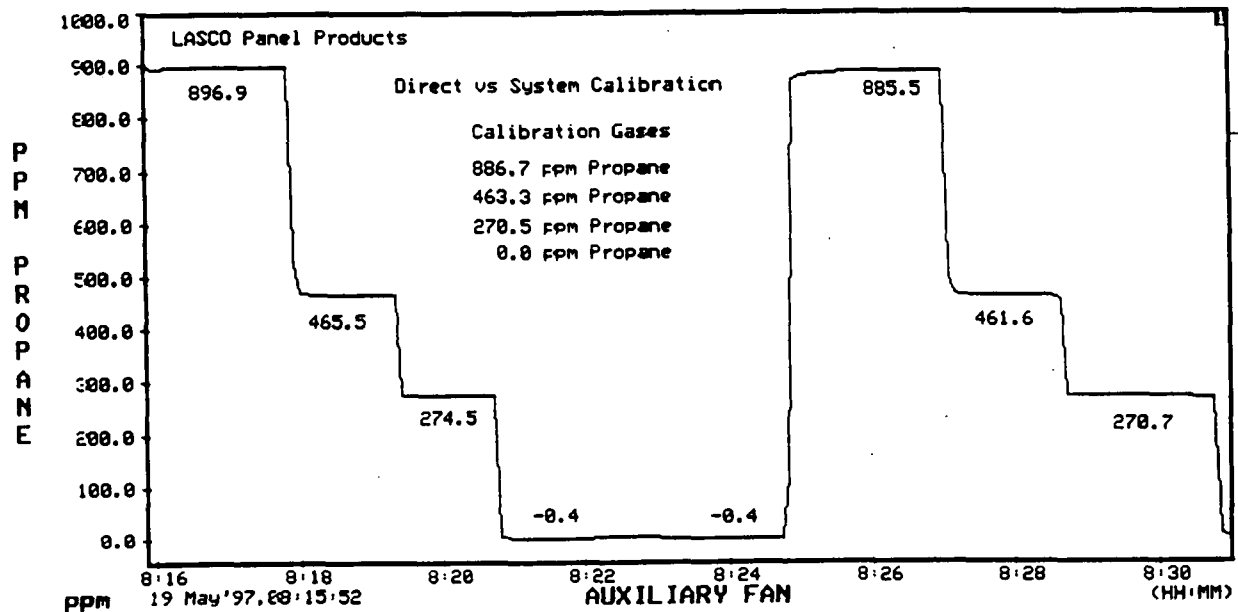
15:16

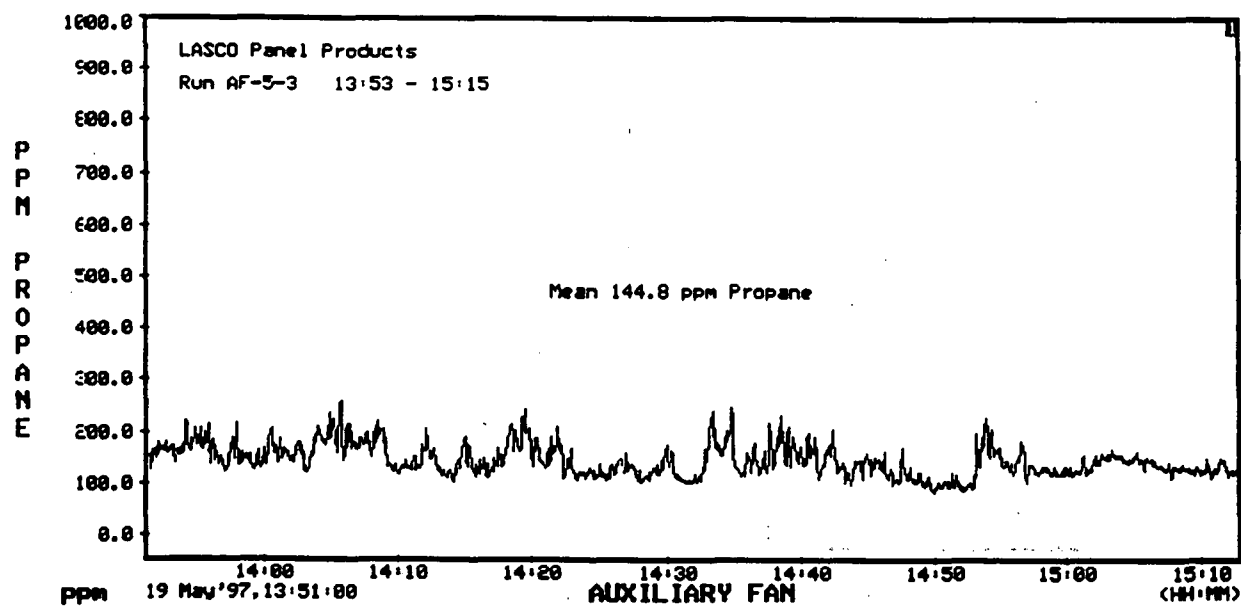
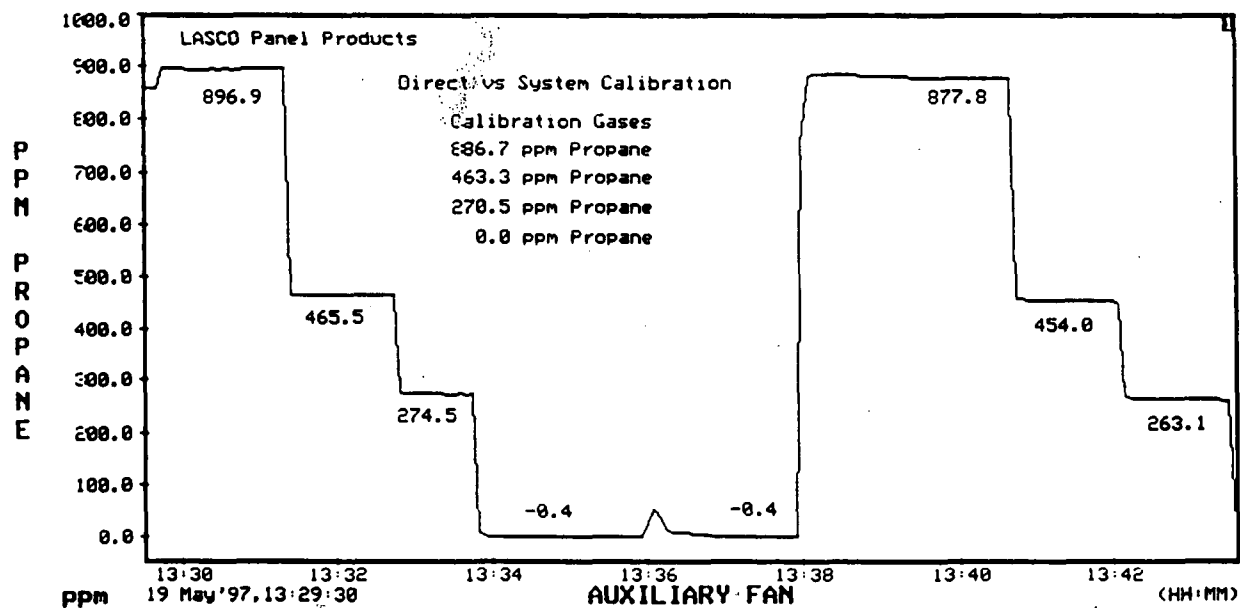
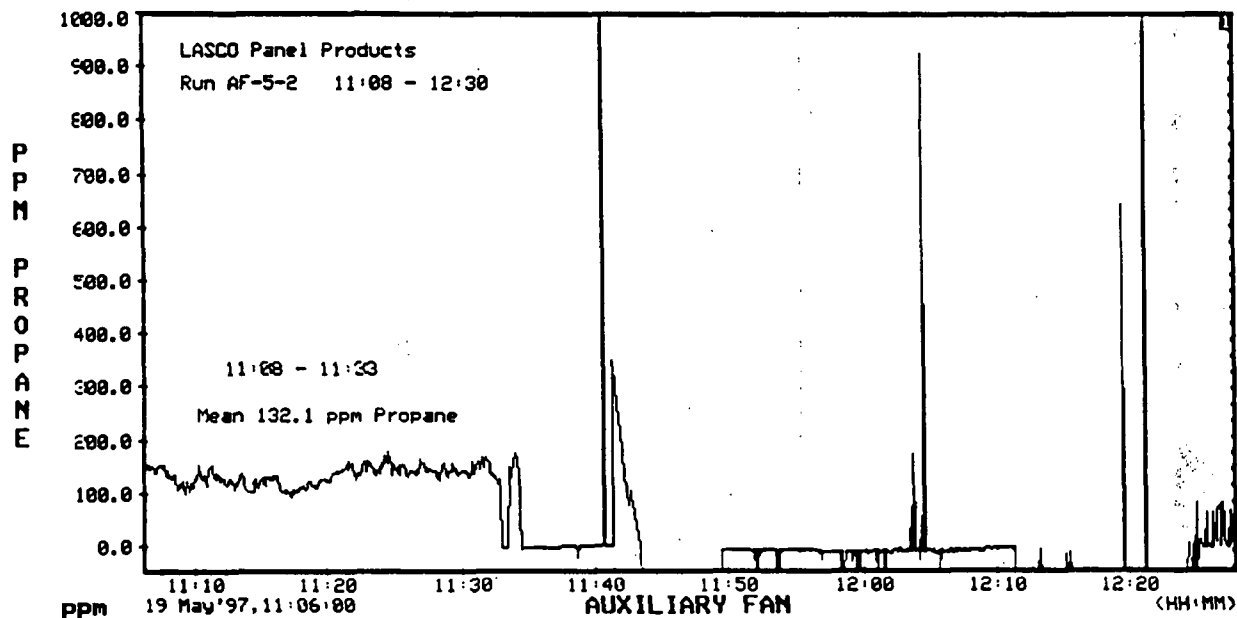
Post Cal	-0.4	Drift	0.00%
	461.6		0.76%

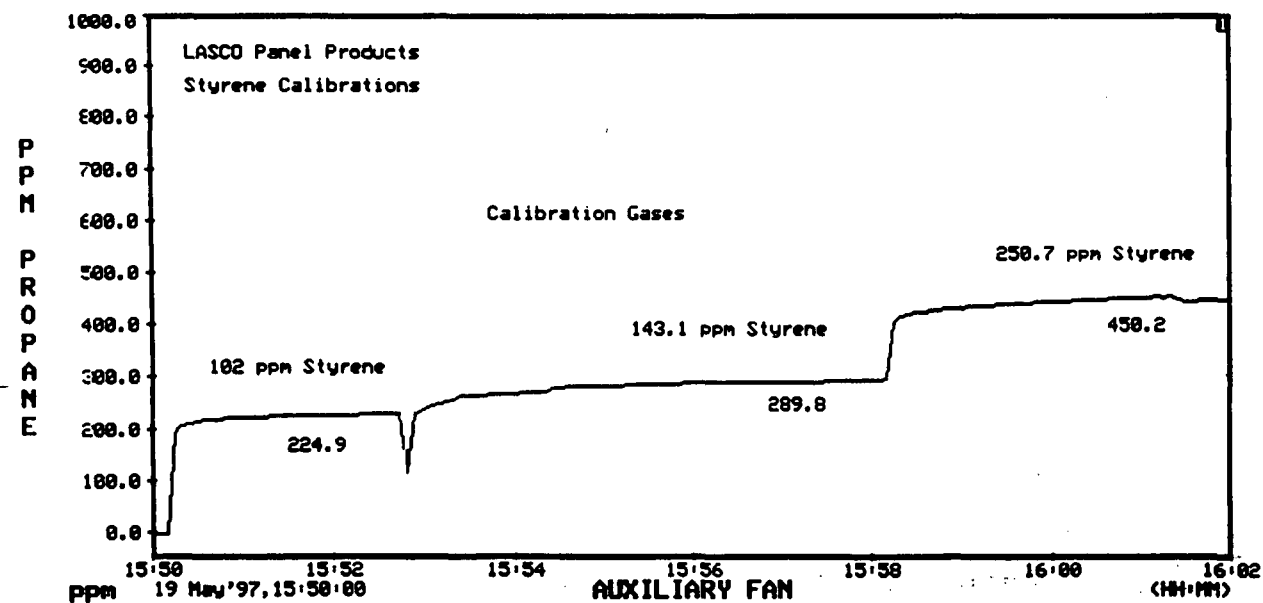
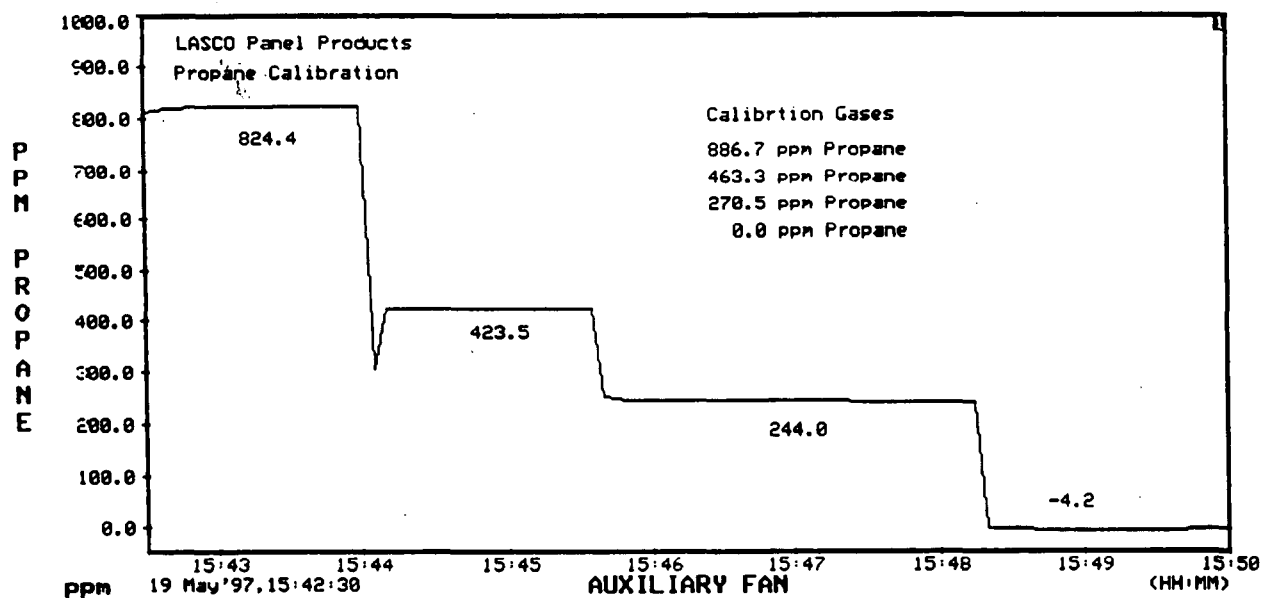
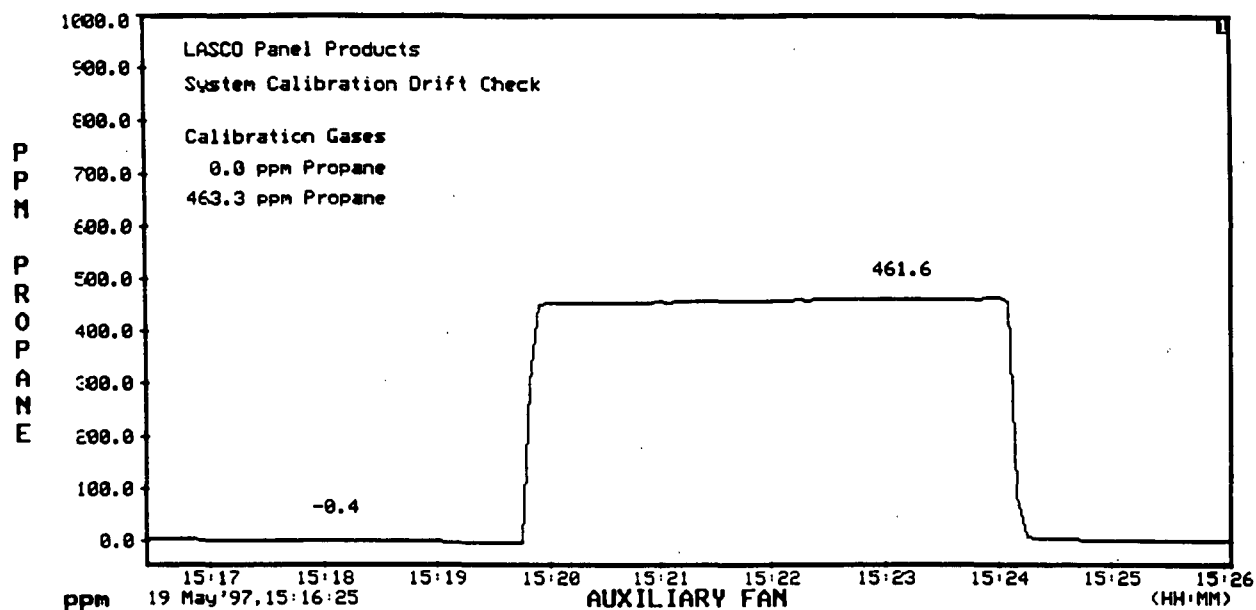
Calibration Gases	System Calibration
0.0 ppm	-4.2
270.5 ppm	244.0
463.3 ppm	423.5
886.7 ppm	824.4

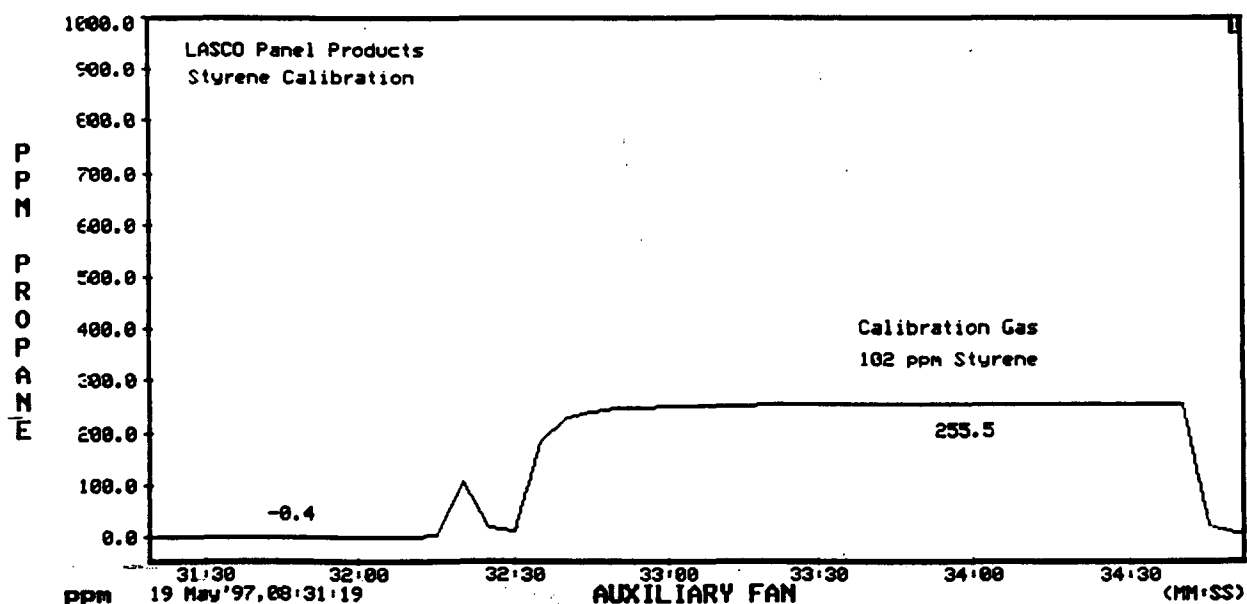
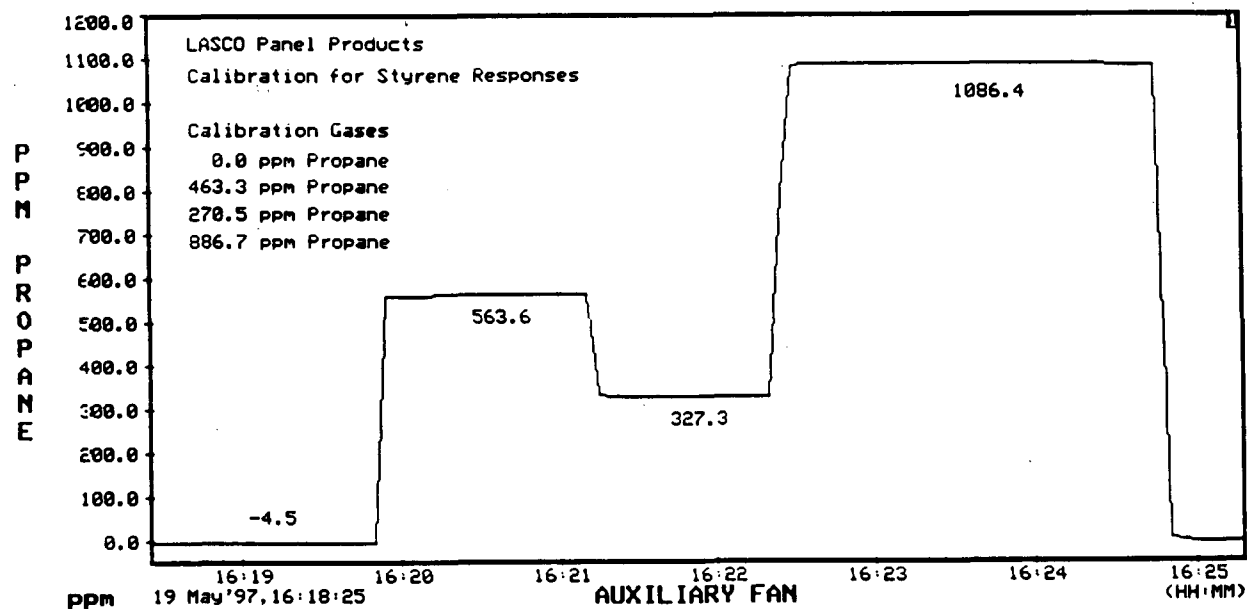
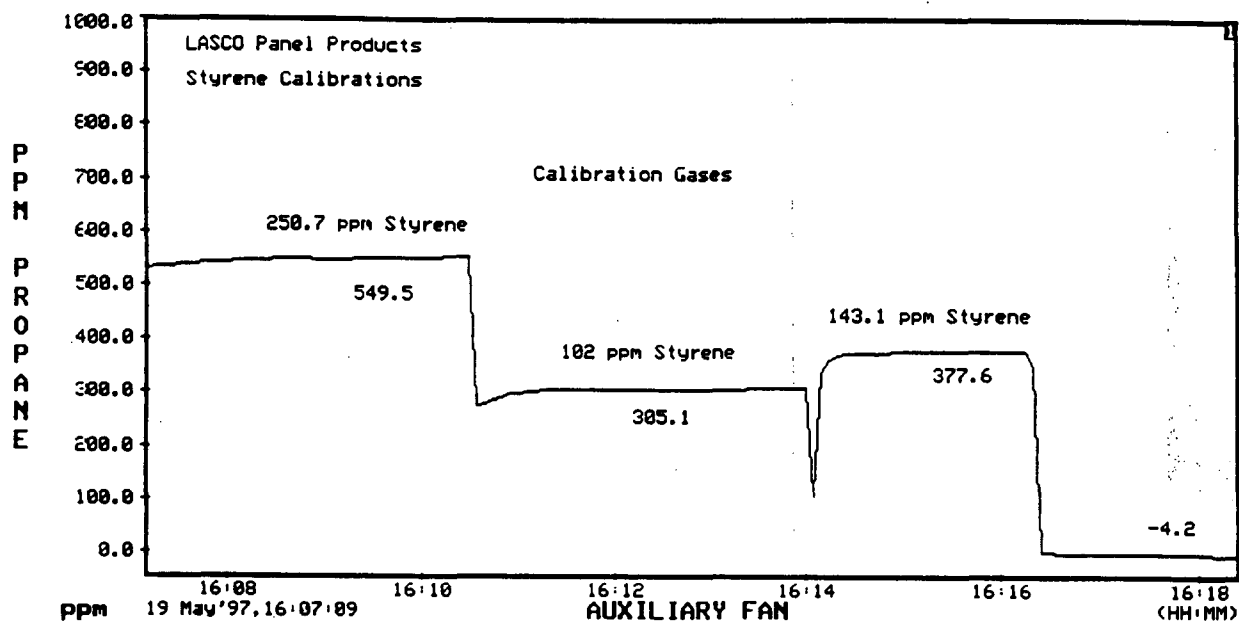
Calibration Error
0.80%
0.65%

Correlation	0.999967
Slope	0.935221
Intercept	-6.9564121









APPENDIX A.2.8

Condition 6 Method 25A



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: MAIN EXHAUST Monitor: ppm or %
 Date: 5-19-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 28.85

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.1	0.1	0.5	0.5		0.0
AAL710	270.5	27.9	88 27.0	272.9	263.4	0.89	0.9
AAL18513	463.3	47.1	45.9	459.9	448.1	0.73	1.2
ALM028161	886.7	90.9	88.1	888.0	860.6		2.8

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.0524)}{(0.10231)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

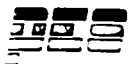
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 27 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: MAIN EXHAUST Monitor: ppm or %
 Date: 5-19-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 28.84
 Time, Pretest: 7:50 Post-test: 15:50 Ambient Temp., F: 75 °F
 Run #: ME-5-1, ME-5-2, ME-5-3

Cyl. #	Cal. Gas Conc., ppm or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		7:50	10:44	12:40	15:30	7:50	10:44	12:40	15:30		
	0	0.1	0.2	0.1	0.3	0.1	1.2	0.1	2.2		0.2
	270.5	27.0	27.3		17.7	271.3	274.3		177.6	0.30	
	463.3	45.9	46.2	47.0	46.7	461.8	464.9	472.9	469.8	0.32	1.1
	886.7	88.1			90.0	887.2			906.4		

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.086)}{(0.09920)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
 — sample data. Post-test is used if drift exceeds limits and if post-test
 yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO

Parameter: SO₂, CO₂, O₂, NO_x* THC, CO

Location: MAIN EXHAUST

Operator: P. SIEGEL

Date: 5-19-97

Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.086)}{(0.09920)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments Jum 1
ME-5-1	9:04 - 9:14	48	483.0	
	-9:24	48	483.0	
	-9:34	48	483.0	
	-9:44	45	452.8	
	-9:54	50	503.2	
	-10:04	48	483.0	
	-10:14	47	472.9	
	-10:26	45	452.8	AVG = 476.7 ppm Propane
ME-5-2	11:08 - 11:18	45	452.8	
	-11:28	36	362.0	
	-11:38	39	392.3	
	-11:48	40	402.4	
	-11:58	43	432.6	
	-12:08	44	442.7	
	-12:18	47	472.9	
	-12:28	43	432.6	
	-12:30			AVG = 423.8 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: P. T. Siegel Date: 5-19-97
Checked By: _____ Date: _____



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: MAIN EXHAUST
Date: 5-19-97

Parameter: SO₂, CO₂, O₂, NO_x, THC, CO
Operator: P. SIEGEL
Project #: 5405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.086)}{(0.09920)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
ME-5-3	13:53 - 14:03	44	442.7	Jun 1
	- 14:13	43	432.6	
	- 14:23	40	402.4	
	- 14:33	43	432.6	
	- 14:43	42	422.5	
	- 14:53	41	412.4	
	- 15:03	36	362.0	
	- 15:15	42	422.5	AVG = 416.2 ppm Repet

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: P. Siegel
Checked By: _____

Date: 5-19-97
Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
 Location: Room EXHAUST
 Date: 5-19-97
 Operator: P. SIEGEL
 Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x (THC)
 Monitor: ppm or %
 Span Value: 100
 Chart Scale: 0-1000 ppm Propane
 Pbar, in. Hg.: 28.85

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.1	-1.7	-0.7		0.1
AAL710	270.5	28.0	27.6	273.6	269.7	1.15	0.4
AAL18513	463.3	47.2	46.6	462.4	456.5	0.19	0.6
ALM028161	886.7	90.3	89.0	886.2	873.4		1.3

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.176)}{(0.10169)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

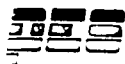
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Rise-time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 29 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: Room EXHAUST
Date: 5-19-97
Operator: P. SIEGEL
Project #: S405.003
Time, Pretest: 8:10 Post-test: 15:30
Run #: RE-5-1, RE-5-2, RE-5-3

Parameter: SO₂, CO₂, O₂, NO_x, THC
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-1000 ppm
Pbar, in. Hg.: 28.85 (8:00)
Ambient Temp., F: 75°F

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)					Concentration Predicted By Equation*					Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		8:10	10:44	12:50	13:33	15:30	8:10	10:44	12:50	13:33	15:30		
	<u>0</u>	<u>0.1</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>-1.5</u>	<u>-2.5</u>	<u>-2.5</u>	<u>-2.5</u>	<u>-2.5</u>		<u>0.1</u>
	<u>270.5</u>	<u>27.6</u>	<u>25.9</u>		<u>25.0</u>	<u>25.8</u>	<u>273.1</u>	<u>256.1</u>		<u>247.1</u>	<u>255.1</u>	<u>0.96</u>	
	<u>463.3</u>	<u>46.6</u>	<u>44.0</u>	<u>43.6</u>	<u>42.4</u>	<u>43.8</u>	<u>462.8</u>	<u>436.8</u>	<u>432.8</u>	<u>420.9</u>	<u>434.8</u>	<u>0.11</u>	<u>2.6</u>
	<u>886.7</u>	<u>89.0</u>	<u>84.8</u>		<u>81.3</u>	<u>84.0</u>	<u>866.2</u>	<u>844.2</u>		<u>809.3</u>	<u>836.3</u>		

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b$$

x = ppm

y = chart divisions

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.254)}{(0.10014)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

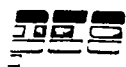
Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: Room Exhaust
Date: 5-19-97

Parameter: SO₂, CO₂, O₂, NO_x, THC, CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.254)}{(0.10024)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
RE-5-1	9:04 - 9:14	11.0	107.3	JUN 5
	- 9:24	11.0	107.3	
	- 9:34	11.5	112.3	
	- 9:44	12.0	117.3	
	- 9:54	12.0	117.3	
	- 10:04	11.5	112.3	
	- 10:14	11.5	112.3	
	- 10:26	12.5	122.3	AVG = 113.6 ppm Propane
RE-5-2	11:08 - 11:18	12.5	122.3	
	- 11:28	13.5	132.3	
	- 11:38	13.0	127.3	
	- 11:48	12.5	122.3	
	- 11:58	12.0	117.3	
	- 12:08	13.0	127.3	
	- 12:18	12.0	117.3	(14:00 Pbm = 28.65)
	- 12:30	12.0	117.3	AVG = 122.9 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

- ** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-19-97
Checked By: _____ Date: _____



Parameter: SO₂, CO₂, O₂, NO_x*, THC, CO

Operator: P. JEGEL

Project #: 8405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.254)}{(0.10014)}$$

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

**** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).**

Date: 5-19-97
Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
 Location: AUXILIARY FAN
 Date: 5-19-97
 Operator: P. SIEGEL
 Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x, THC
 Monitor: ppm or %
 Span Value: 100
 Chart Scale: 0-1000 ppm Propane
 Pbar, in. Hg.: 28.85

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span-GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	0.8	0.8		0.0
AAL710	270.5	27.3	27.0	270.3	267.4	0.07	0.3
AAL18513	463.3	46.7	46.0	461.9	455.0	0.30	0.7
ALM028161	886.7	89.8	88.7	887.5	876.6		1.1

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.079)}{(0.10127)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

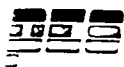
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 23 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: AUXILIARY FAN
Date: 5-19-97
Operator: P. SIEGEL
Project #: S405.003
Time, Pretest: 8:20 Post-test: 10:30
Run #: AF-5-1, AF-5-2

Parameter: SO₂, CO₂, O₂, NO_x, THC
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-1000ppm Propane
Pbar, in. Hg.: 28.85 (8:00)
Ambient Temp., F: 75°F

Cyl. #	Cal. Gas Conc., <u>ppm or %</u>	Calibrations (Chart Divisions)			Concentration Predicted By Equation*		Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		8:20	10:30	13:40	8:20	10:30		
	0	0.0	0.1	0.0	0.3	1.3		0.1
	270.1	27.0	24.9		271.0	249.9	0.33	2.11
	463.3	46.0	42.2		461.4	423.3	0.41	3.81
	886.7	88.5	81.0		887.4	812.2		

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.031)}{(0.09976)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate

sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: AUXILIARY FAN
Date: 5-19-97

Parameter: SO₂, CO₂, O₂, NO_x, THC, CO
Operator: P. SIEGEL
Project #: S405.003

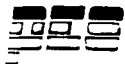
$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.031)}{(0.09976)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
AF-5-1	9:04 - 9:14	14.5	145.7	JUN 3
	-9:24	14.5	145.7	
	-9:34	14.5	145.7	
	-9:44	14.5	145.7	
	-9:54	15.0	150.7	
	-10:04	15.0	150.7	
	-10:14	15.5	155.7	
	-10:26	15.0	150.7	AVG = 148.8 ppm Propane
AF-5-2	11:08 - 11:18	13	130.6	
	-11:28	13	130.6	
	-11:38	14	140.6	AVG = 133.9 ppm Propane
	-11:48	N-A		HEATER WENT
	-11:58			OUT IN JUM
	-12:08			ANALYZER
	-12:18			
	-12:28			
	-12:30	↓		

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-19-97
Checked By: _____ Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
 Location: AUXILIARY FAN
 Date: 5-19-97
 Operator: P. SIEGEL
 Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x, THC
 Monitor: ppm or %
 Span Value: 100
 Chart Scale: 0-1000 ppm Propane
 Pbar, in. Hg.: 28.65 (15:00)

CAE
 JUM
 2882
 13:53
 15:15

Cylinder #	Cal. Gas Conc., <u>ppm or %</u>	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span <u>GAS</u>	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	1.4	1.4		0.0
AAL710	270.5	27.3	26.3	271.0	261.1	0.18	1.0
AAL18513	463.3	46.4	45.3	459.7	448.8	0.78	2.911
ALMO28161	886.7	89.8	88.0	888.4	870.6		1.8

- * Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.137)}{(0.10123)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 23 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: AUXILIARY FAN Monitor: ppm or %
Date: 5-19-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
Project #: 8405.003 Pbar, in. Hg.: 28.65
Time, Pretest: 13:30 Post-test: 15:20 Ambient Temp., F: 75°F
Run #: AF-5-3

Cyl. #	Cal. Gas Conc., <u>ppm or %</u>	Calibrations (Chart Divisions)		Concentration Predicted By Equation*		Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		13:30	15:20	13:30	15:20		
	0	0.0	0.0	3.4	3.4		0.0
	270.5	26.3		268.2		0.85	
	463.3	45.3	46.0	459.5	466.5	0.82	0.7
	886.7	88.0		889.4			

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.339)}{(0.09933)}$$

$$\text{Correlation Coefficient} = \underline{0.99995}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Maximum zero drift = $\underline{\hspace{1cm}}$ $\%$ of span or $\underline{\hspace{1cm}}$ ppm or $\%$ (circle one)

Maximum calibration drift = $\underline{\hspace{1cm}}$ $\%$ of span or $\underline{\hspace{1cm}}$ ppm or $\%$ (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate

sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: AUXILIARY FAN
Date: 5-19-97

Parameter: SO₂, CO₂, O₂, NO_x*, (THC), CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} + 0.339)}{(0.09933)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
AF-5-3	13:53-14:03	17	174.6	Jum 2882 CAE
	-14:13	18	184.6	
	-14:23	14	144.4	
	-14:33	13	134.3	
	-14:43	15	154.4	
	-14:53	13	134.3	
	-15:03	13	134.3	
	-15:15	14	144.4	AVG = 150.7 ppm Propene

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-19-97
Checked By: _____ Date: _____

LASCO Panel Products

Condition 6 - Main Exhaust

Total Hydrocarbons (THC)

19-May-97

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	3.5	0.84%
270.5 ppm	274.5	2.28%
463.3 ppm	465.5	
866.7 ppm	900.7	

Correlation	0.9997496
Slope	1.0353339
Intercept	-3.2129775

16:05-17:05	Run 6-1	888.2	Corrected	861.0	ppm THC
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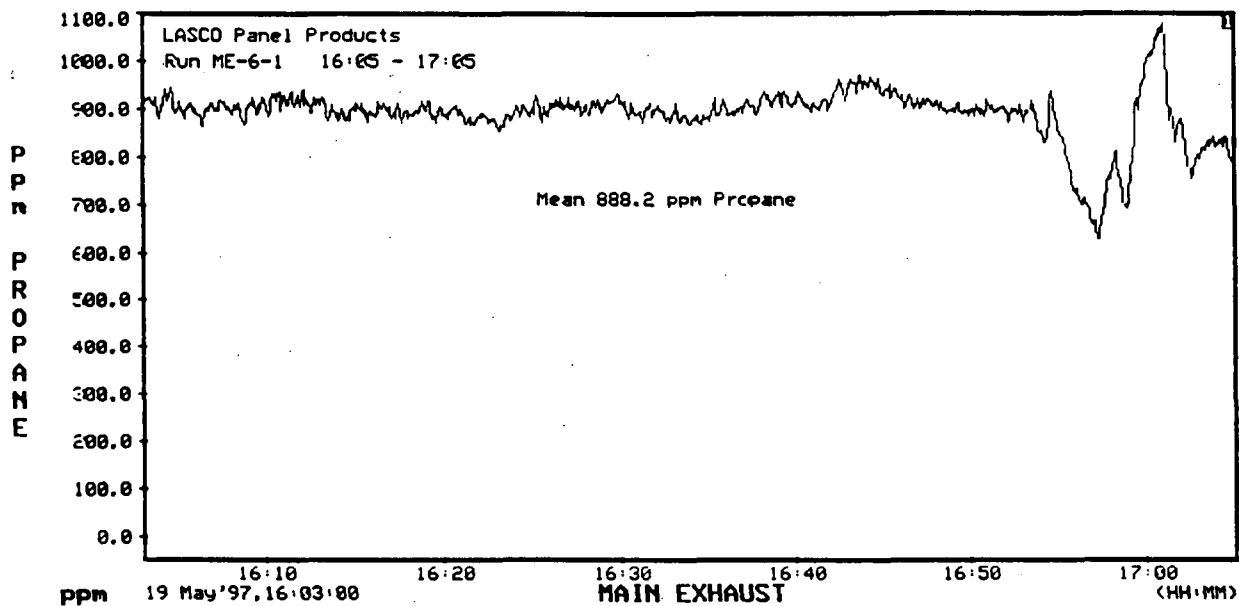
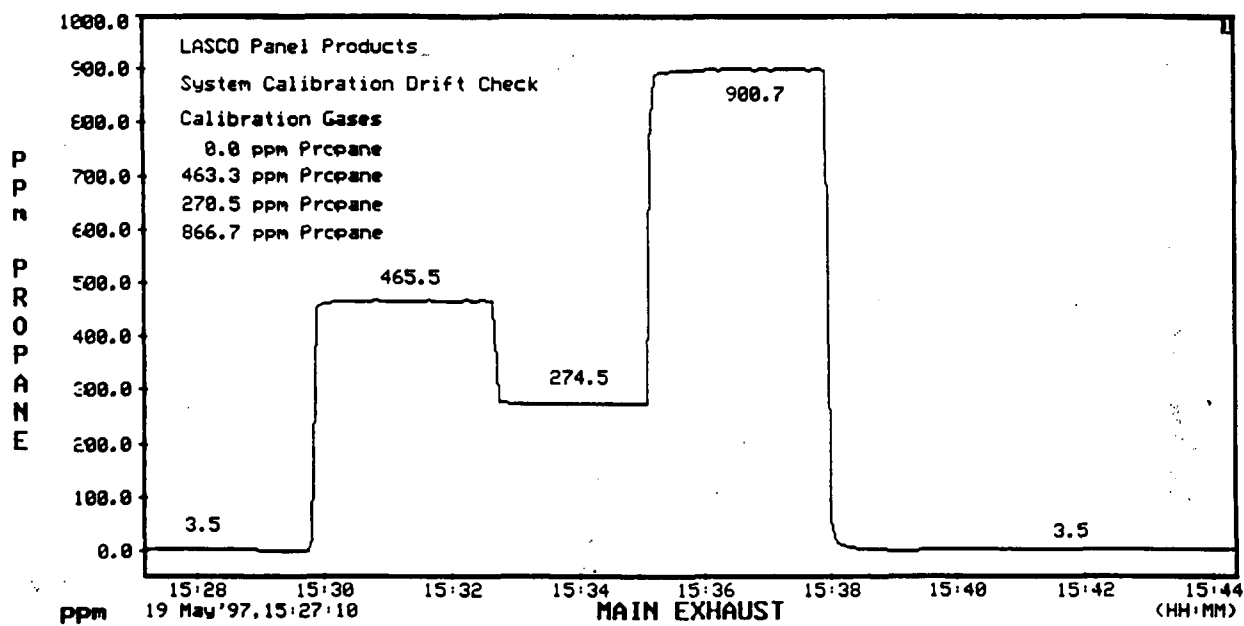
17:08	Post Cal	3.5	Drift	0.00%
		469.3		0.38%

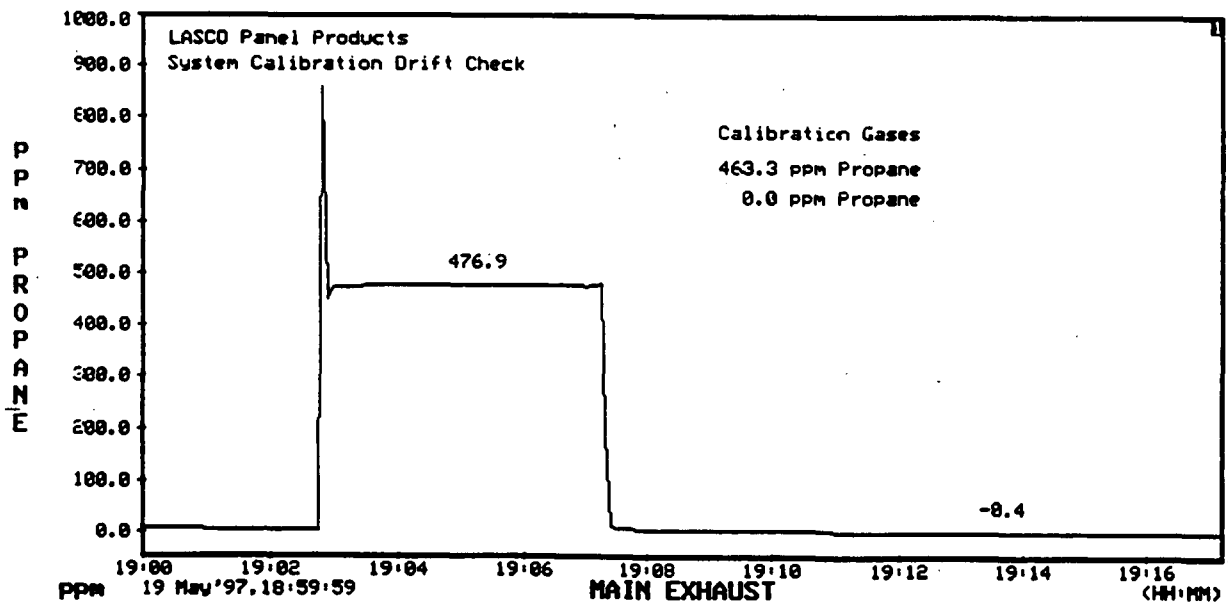
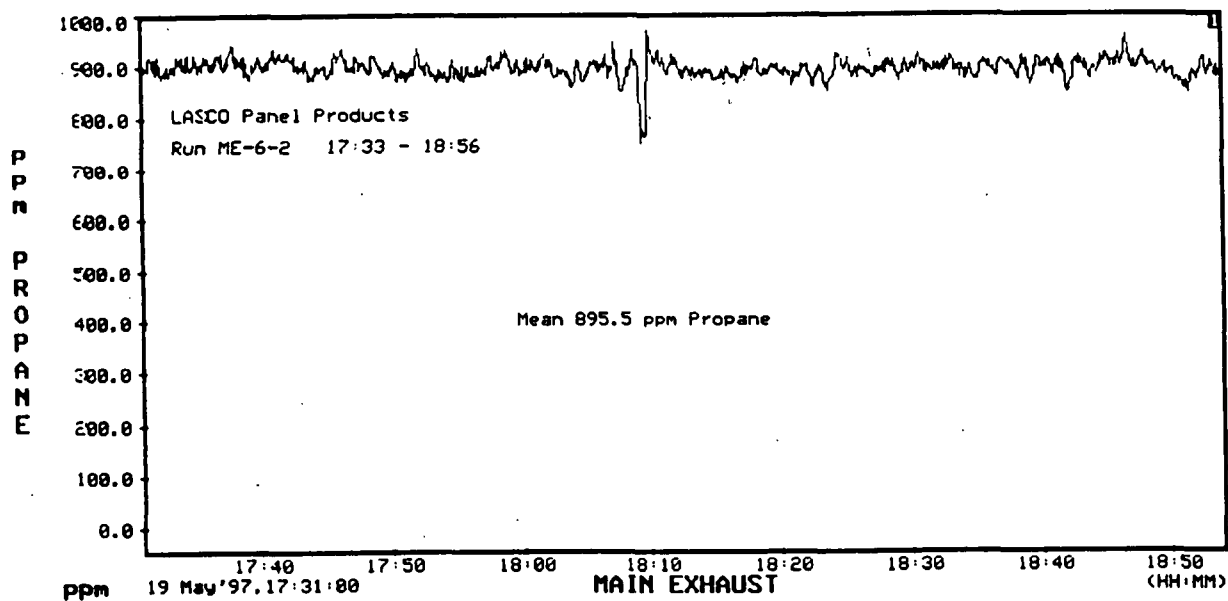
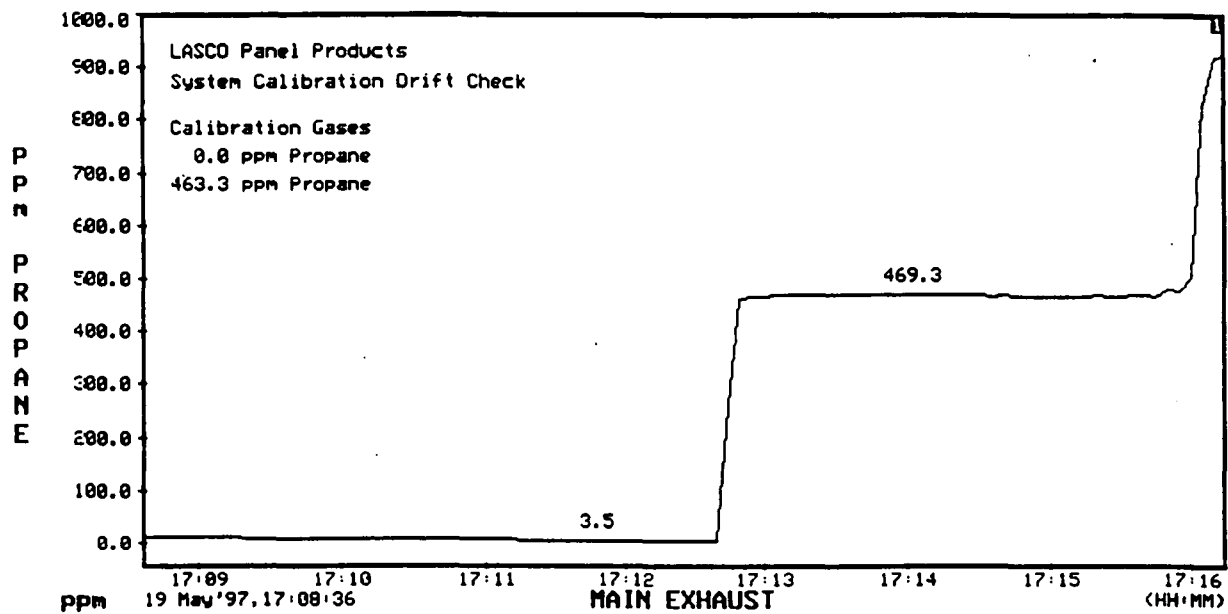
17:33-18:56	Run 6-2	895.5	Corrected	868.0	ppm THC
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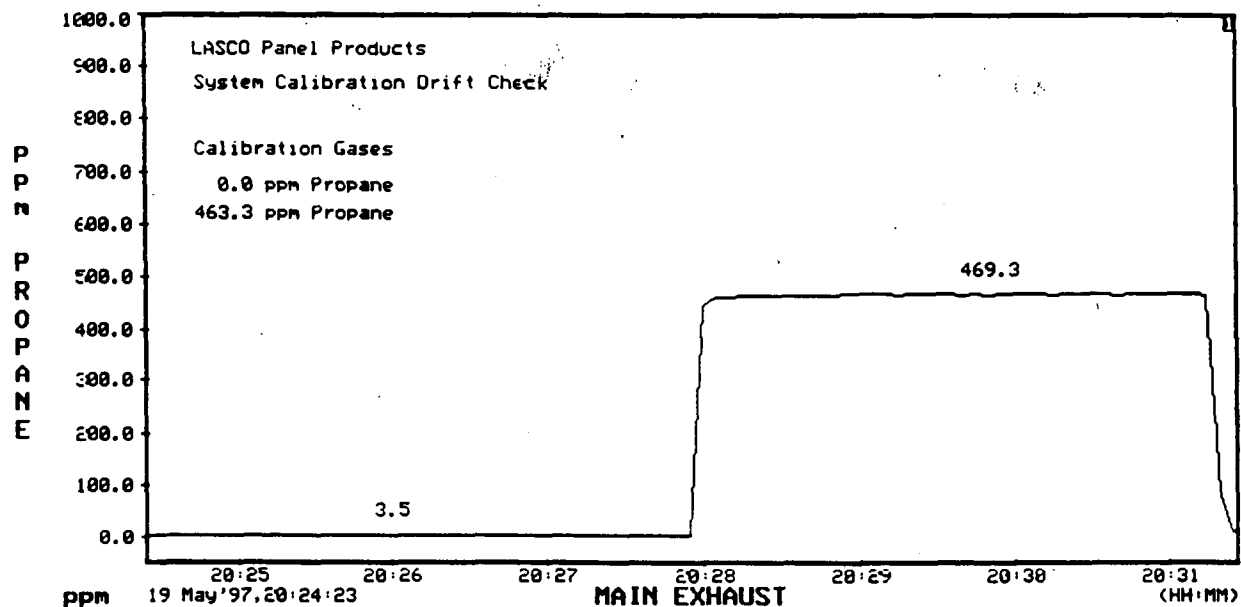
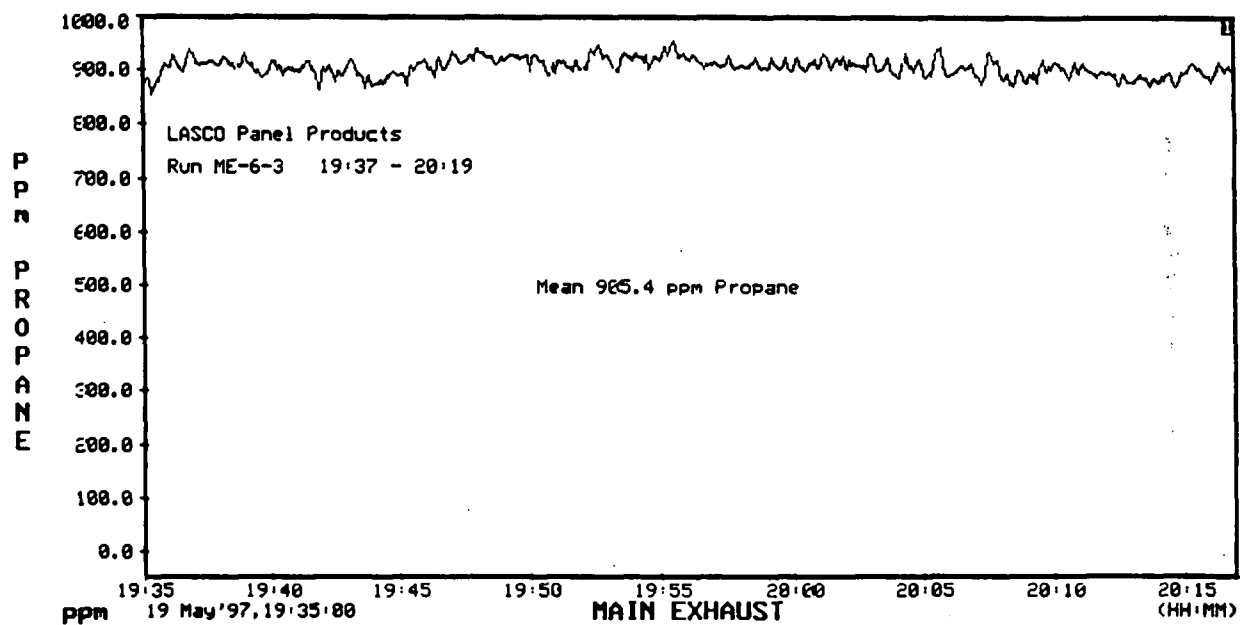
18:57	Post Cal	-0.4	Drift	0.39%
		476.9		1.14%

19:37-20:19	Run 6-3	905.4	Corrected	877.6	ppm THC
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15:16	Post Cal	3.5	Drift	0.00%
		469.3		0.38%







LASCO Panel Products

Condition 6 - Room Exhaust

Total Hydrocarbons (THC)

19-May-97

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	255.5	0.37%
463.3 ppm	434.9	0.32%
886.7 ppm	835.8	

Correlation	0.999996
Slope	0.9425626
Intercept	-0.4056875

16:05-17:07	Run 6-1	154.4	Corrected	164.2	ppm THC
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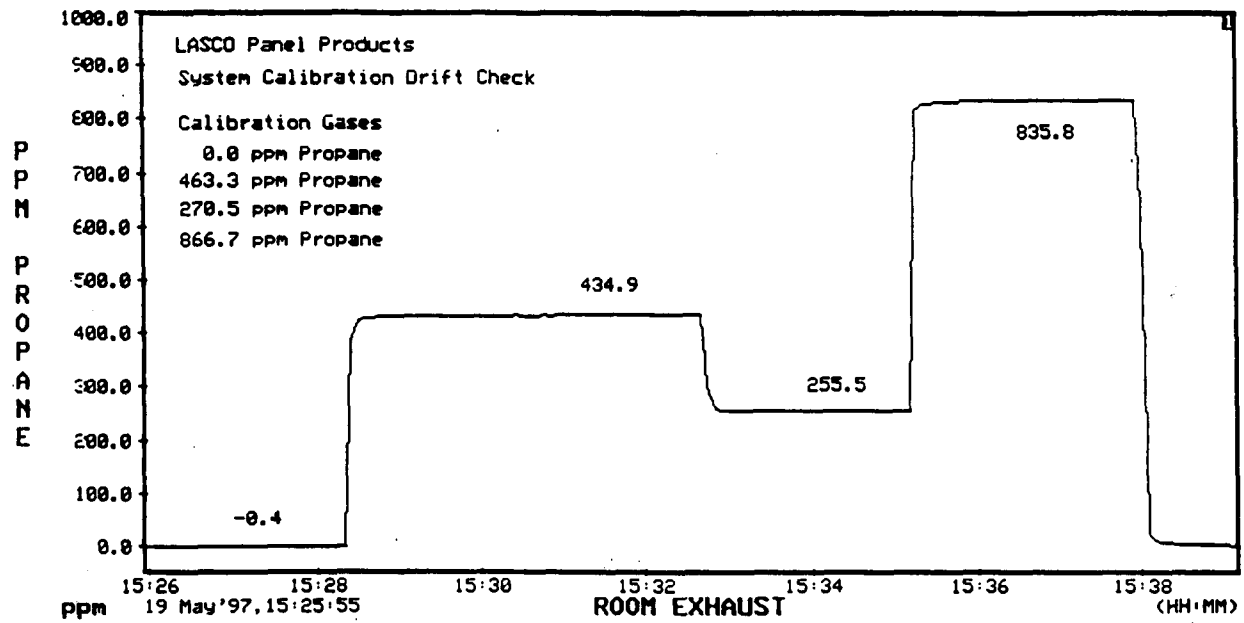
17:08	Post Cal	-0.4	Drift	0.00%
		431.1		0.38%

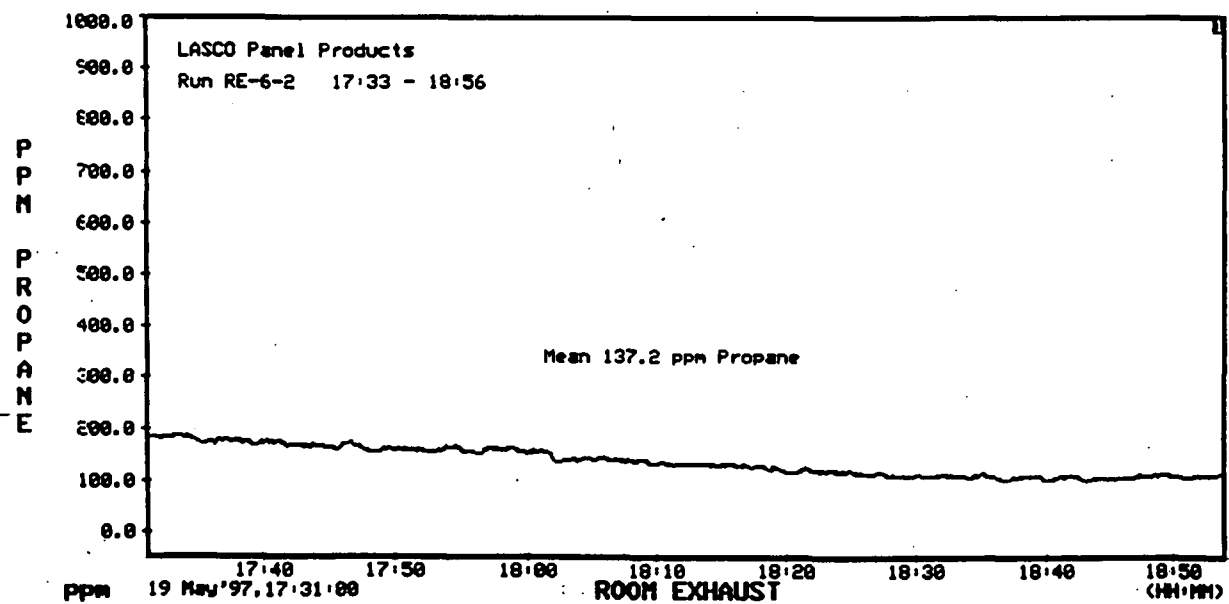
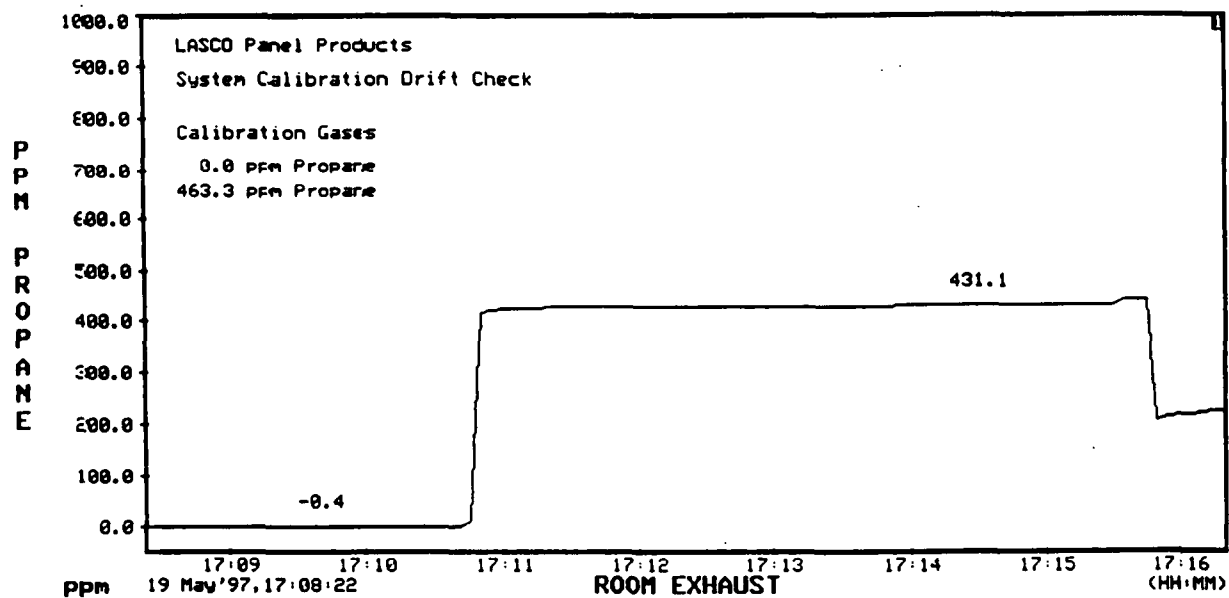
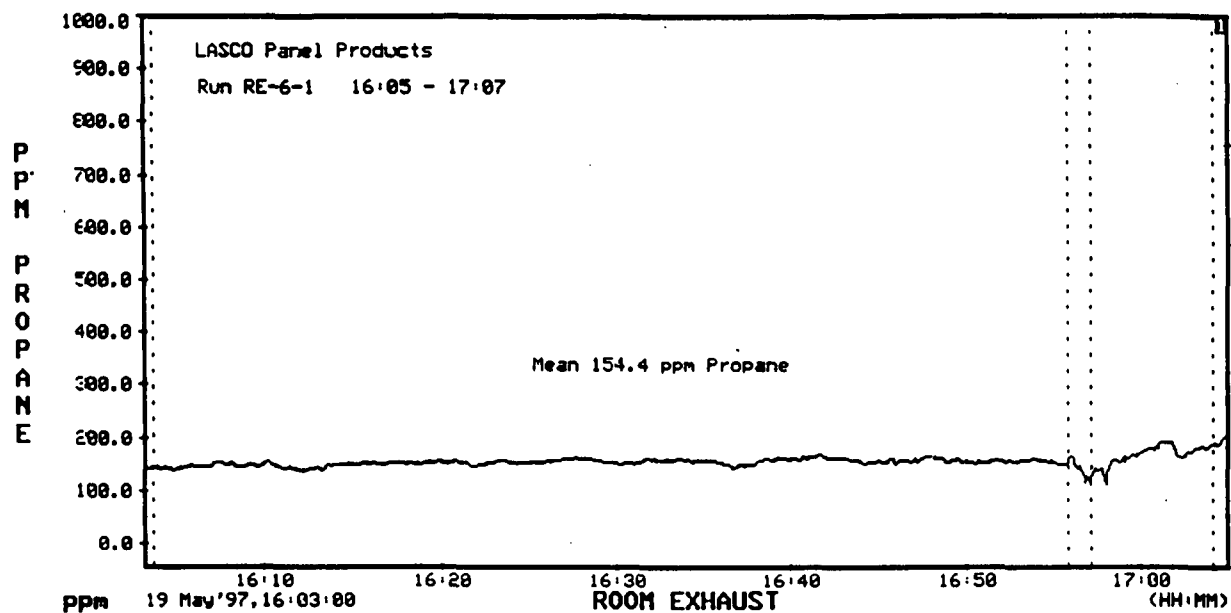
17:33-18:56	Run 6-2	137.2	Corrected	146.0	ppm THC
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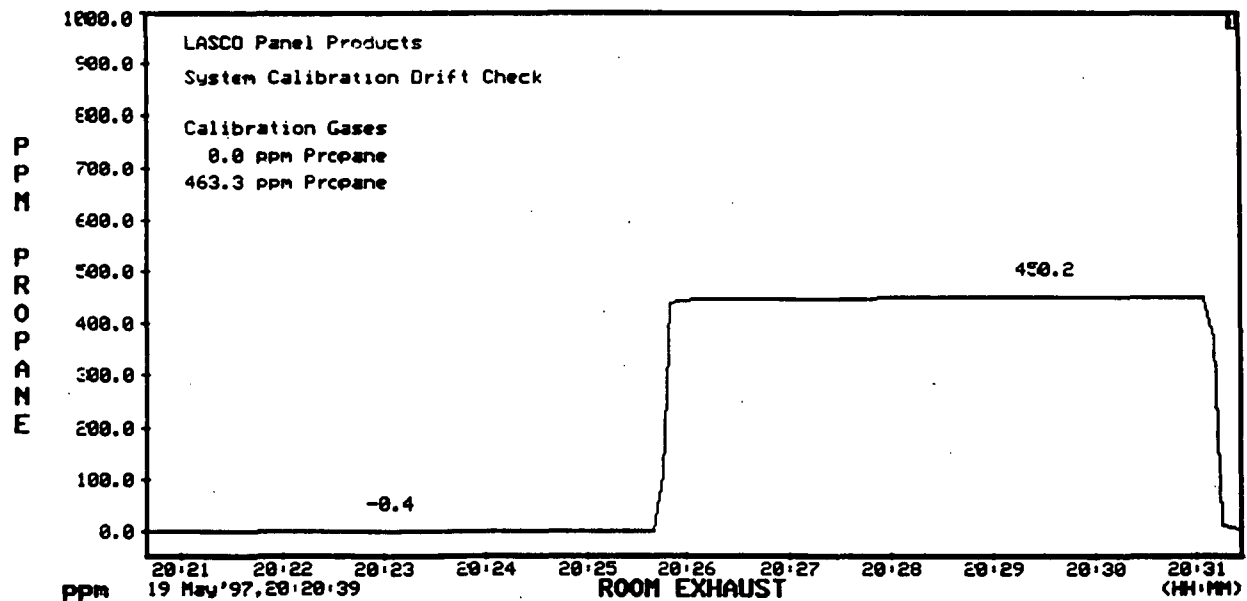
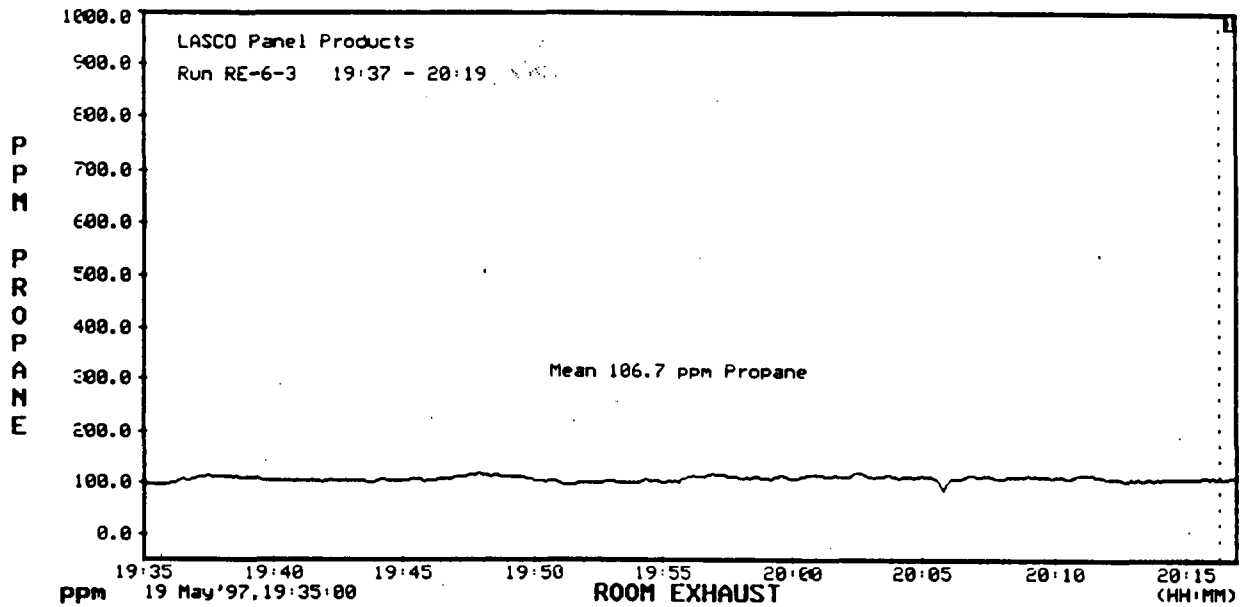
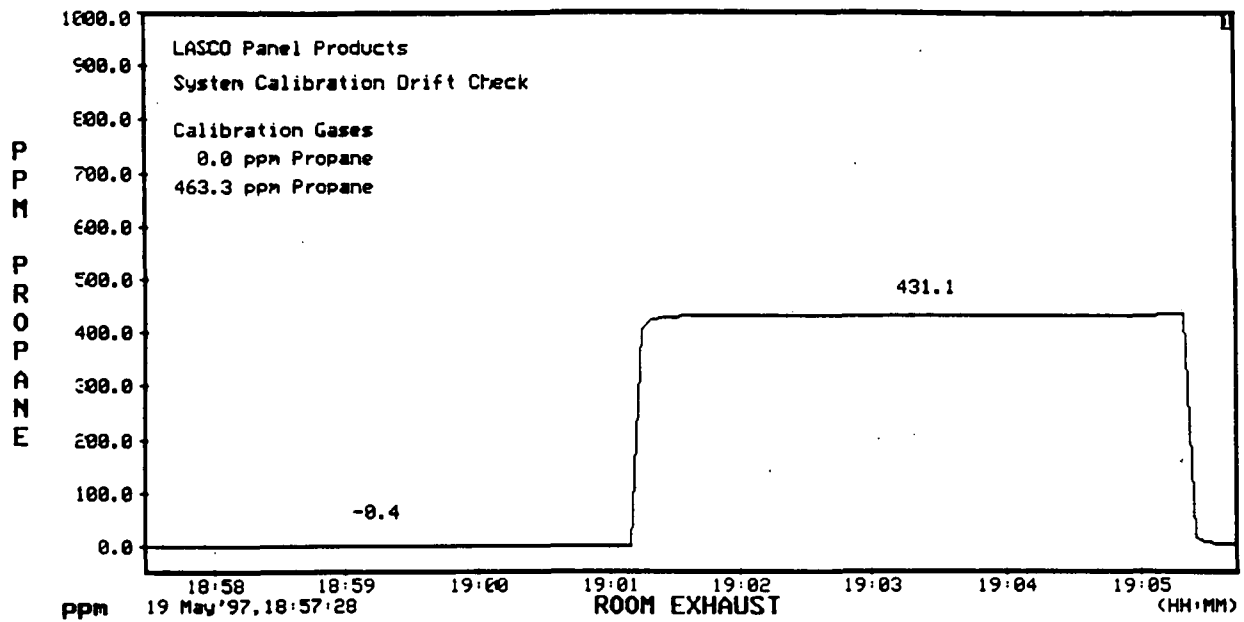
18:57	Post Cal	-0.4	Drift	0.00%
		431.1		0.38%

16:05-17:07	Run 6-3	106.7	Corrected	113.6	ppm THC
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15:16	Post Cal	-0.4	Drift	0.00%
		450.2		1.53%









DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: MAIN EXHAUST Monitor: ppm or %
 Date: 5-19-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 28.78 @ 16:45
 Time, Pretest: 15:30 Post-test: _____ Ambient Temp., F: 75°F
 Run #: ME-6-1, ME-6-2, ME-6-3

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		15:30	17:10	19:00	20:25	15:30	17:10	19:00	20:25		
	0.0	0.3	0.8	0.8	0.5	1.1	6.1	6.1	3.1		0.3
	270.5	27.6				271.1				0.22	
	463.3	46.7	46.8	47.3	46.7	460.0	461.0	465.9	460.0	0.71	0.6
	886.7	90.0				888.2					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.185)}{(0.10112)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

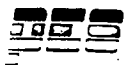
Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
 — sample data. Post-test is used if drift exceeds limits and if post-test
 yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: MAIN EXHAUST
Date: 5-19-97

Parameter: SO₂, CO₂, O₂, NO_x, THC, CO
Operator: P. SIEGEL
Project #: S405.003

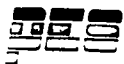
$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.185)}{(0.10112)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
				JUN 1
ME-6-1	16:05-16:15	91.5	903.1	
	-16:25	89.5	883.3	
	-16:35	90	888.2	
	-16:45	91	898.1	
	-16:55	91	898.1	
	-17:07	80	789.3	AVG= 876.7 ppm Propane
ME-6-2	17:33-17:43	90.5	893.2	
	-17:53	90	888.2	
	-18:03	89.5	883.3	
	-18:13	90	888.2	
	-18:23	89.5	883.3	
	-18:33	89.5	883.3	
	-18:43	90.0	888.2	
	-18:53	90.0	888.2	AVG= 887.0 ppm Propane
ME-6-3	19:37-19:47	90.5	893.2	
	-19:57	91	898.1	
	-20:07	91.5	903.1	
	-20:19	89.5	883.3	AVG= 894.4 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-19-97
Checked By: _____ Date: _____



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: Room EXHAUST
Date: 5-19-97

Parameter: SO₂, CO₂, O₂, NO_x*, (THC) CO
Operator: P. SIEGEL
Project #: 8405.003

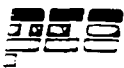
$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.049)}{(0.09466)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
RE-b-1	16:05 - 16:15	14.5	152.7	JUN 5
	- 16:25	15	157.9	
	- 16:35	15.7	165.3	
	- 16:45	16	168.5	
	- 16:55	16	168.5	
	- 17:07	17	179.1	AVG = 165.3 ppm Propene
RE-b-2	17:33 - 17:43	18	189.6	
	- 17:53	17	179.1	
	- 18:03	16	168.5	
	- 18:13	15	157.9	
	- 18:23	13.5	142.1	
	- 18:33	12	126.2	
	- 18:43	11.5	121.0	
	- 18:53	11.0	115.7	AVG = 150.0 ppm Propene
RE-b-3	19:37 - 19:47	10.5	110.4	
	- 19:57	10.5	110.4	
	- 20:07	11.0	115.7	
	- 20:19	11.0	115.7	AVG = 113.1 ppm Propene

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: P. T. Siegel Date: 5-19-97
Checked By: _____ Date: _____



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: Room Exhaust
Date: 5-19-97
Operator: P. SIEGEL
Project #: S405.003
Time, Pretest: 15:30 Post-test: _____
Run #: RE-6-1, RE-6-2, RE-6-3

Parameter: SO₂, CO₂, O₂, NO_x, THC
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-1000 ppm Propane
Pbar. in. Hg.: 28.78 @ 16:45
Ambient Temp., F: 75°F

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		15:30	17:10	19:00	20:25	15:30	17:10	19:00	20:25		
	0	0.0	0.0	0.0	0.0	-0.5	-0.5	-0.5	-0.5		0.0
	270.5	25.8				272.0				0.55	
	463.3	43.8	43.3	43.8	45.0	462.2	456.9	462.2	474.8	0.24	1.2
	886.7	84.0				886.8					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.049)}{(0.09466)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate

sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.

APPENDIX A.2.9

Condition 7 Method 25A

LASCO Panel Products

Condition 7 - Main Exhaust

Total Hydrocarbons (THC)

20-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-4.2	-4.2
270.5 ppm	266.9	270.7
463.3 ppm	457.8	465.5
886.7 ppm	881.6	896.9

Correlation 0.9999983
Slope 0.9985874
Intercept -4.0277298

Sampling System Bias
0.00%
0.38%
0.77%
1.53%

Correlation 0.9999989
Slope 1.0160811
Intercept -4.414859

Calibration Error

0.10%
0.09%

14:49-16:15 Run 7-1 712.5 Corrected 717.5 ppm THC

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	274.5	0.68%
463.3 ppm	465.5	0.27%
886.7 ppm	893.1	

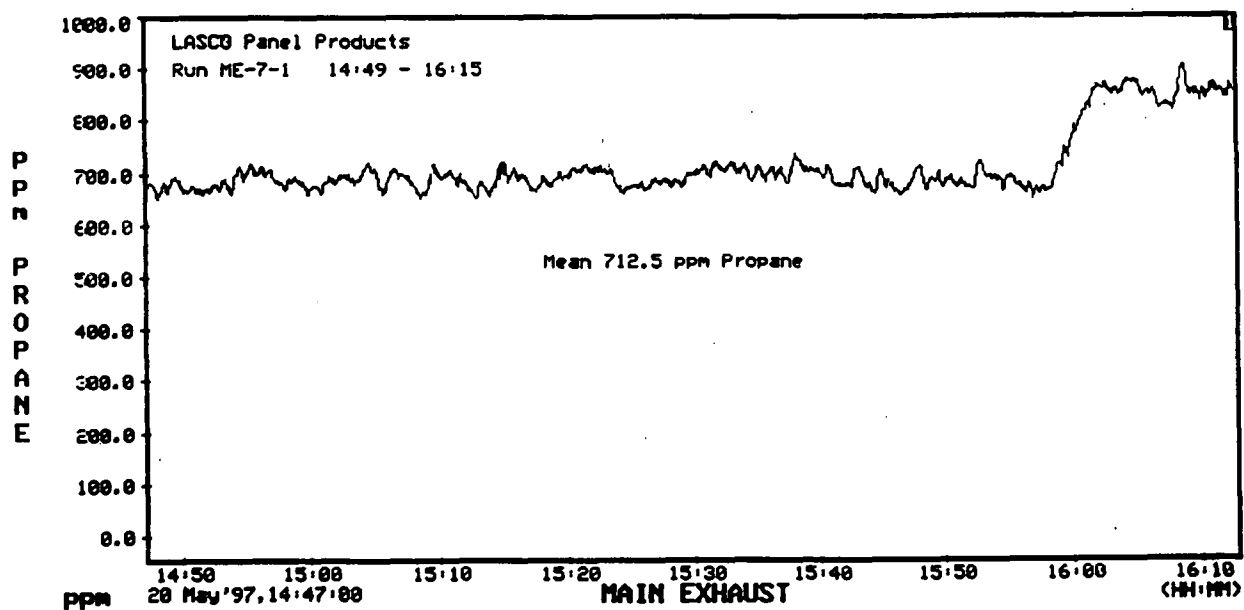
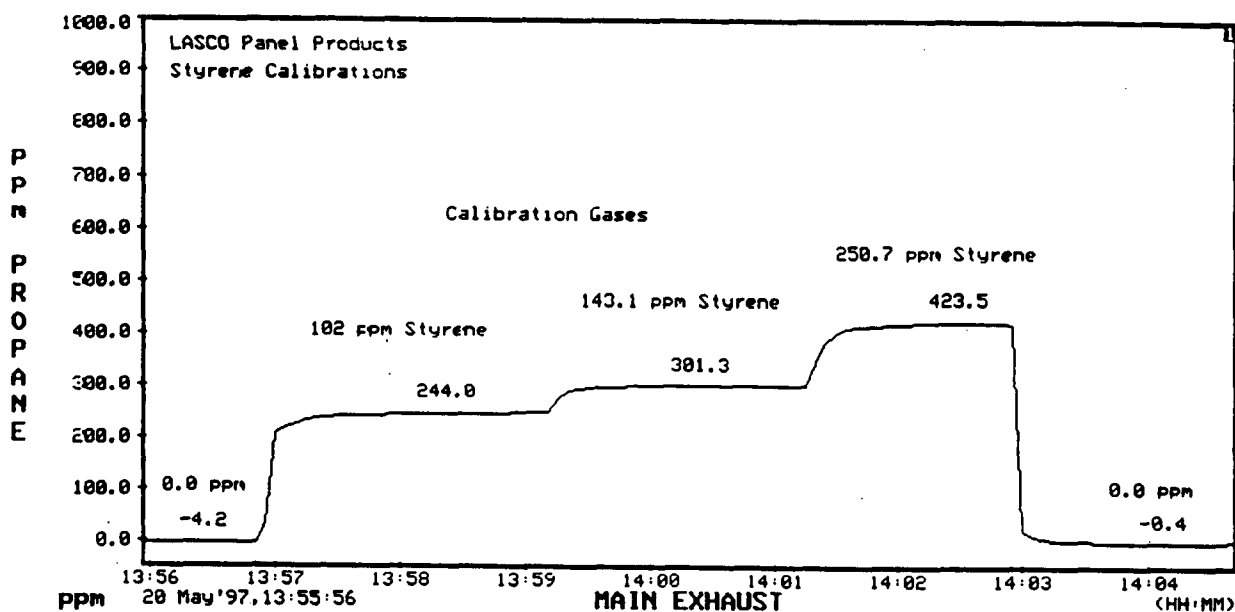
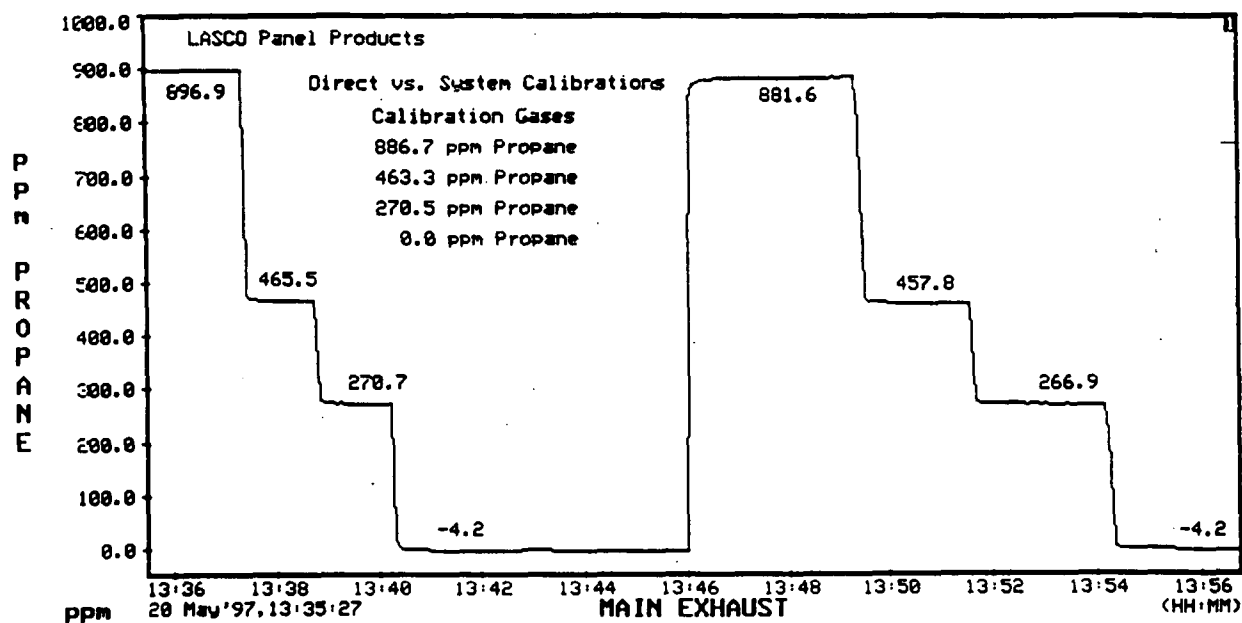
Correlation 0.9999935
Slope 1.0067863
Intercept 0.3006978

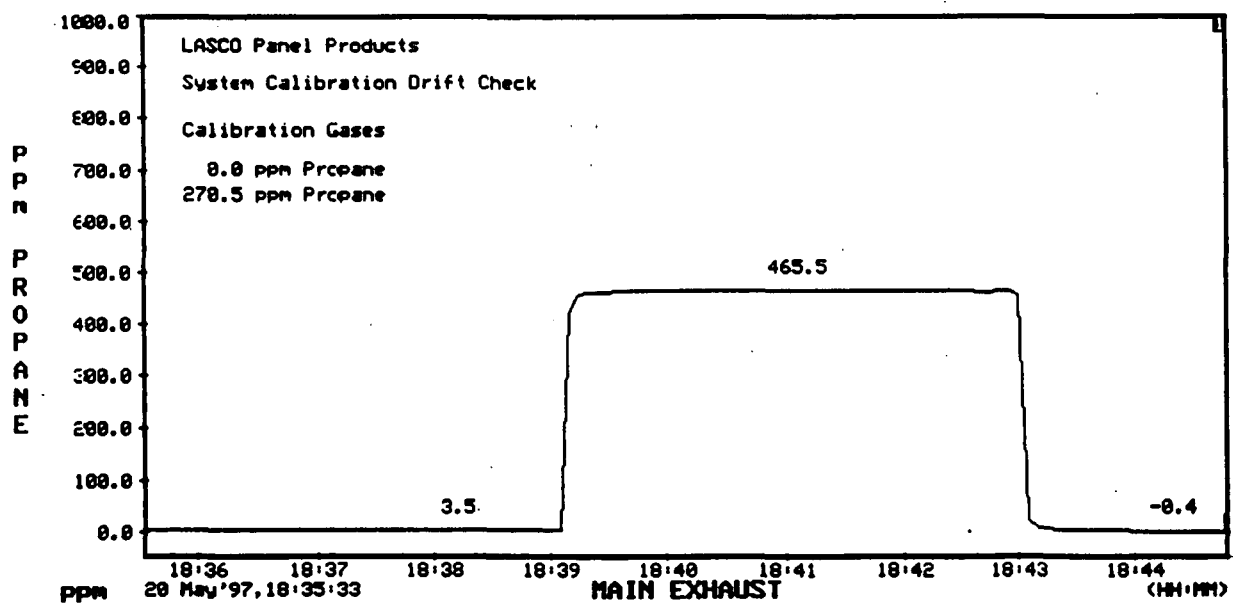
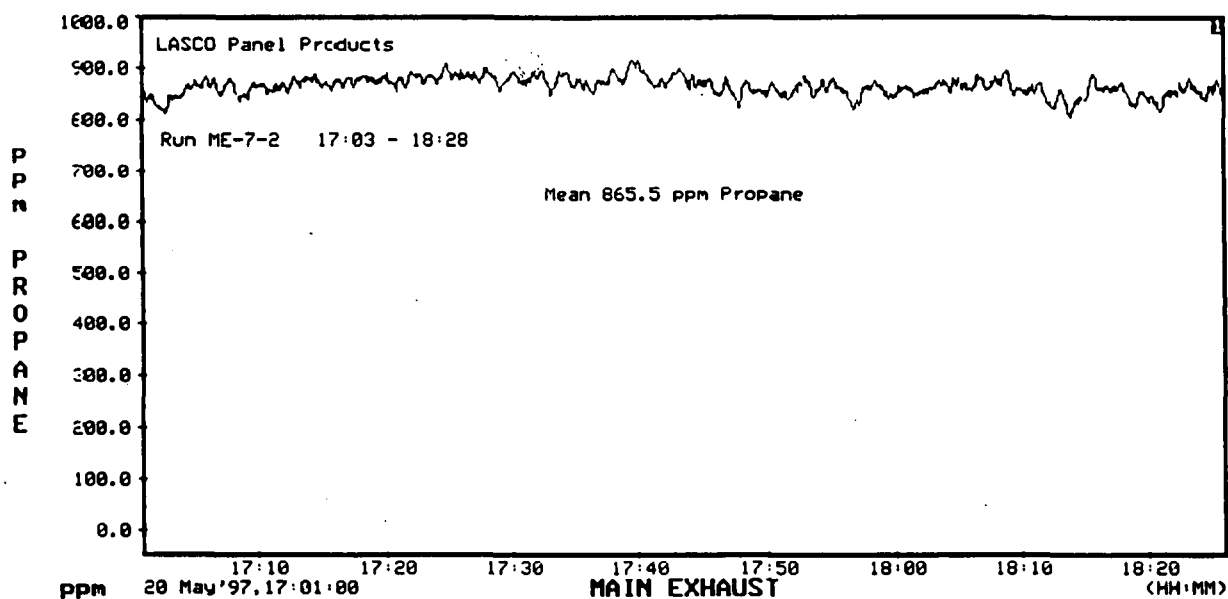
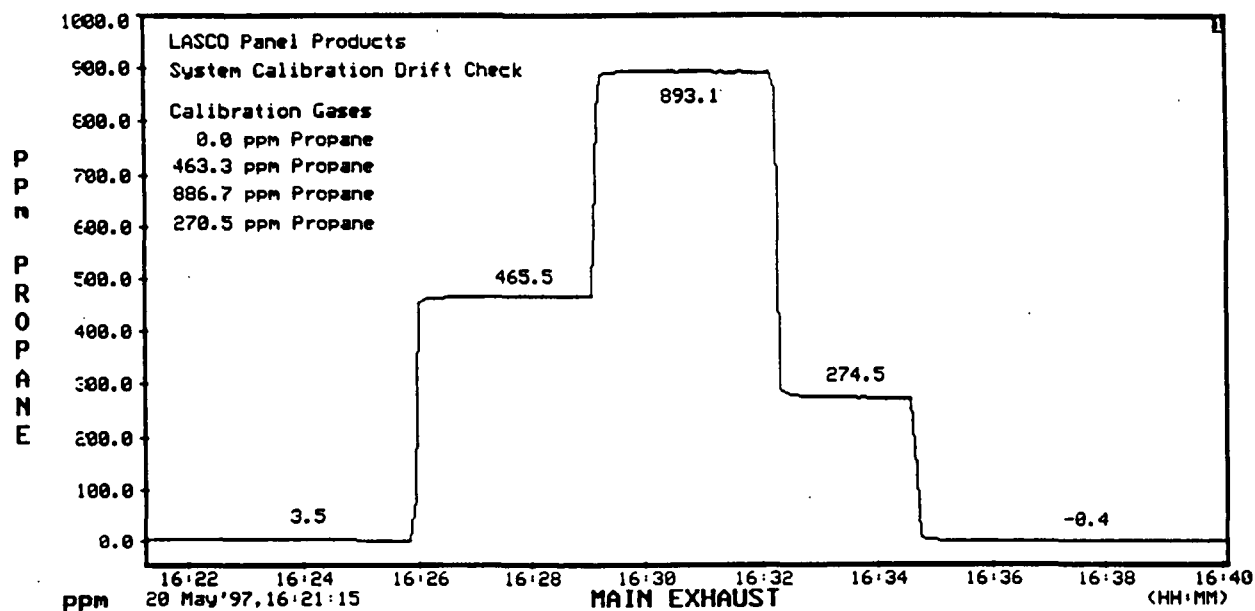
17:03-18:28 Run 7-2 865.5 Corrected 859.4 ppm THC

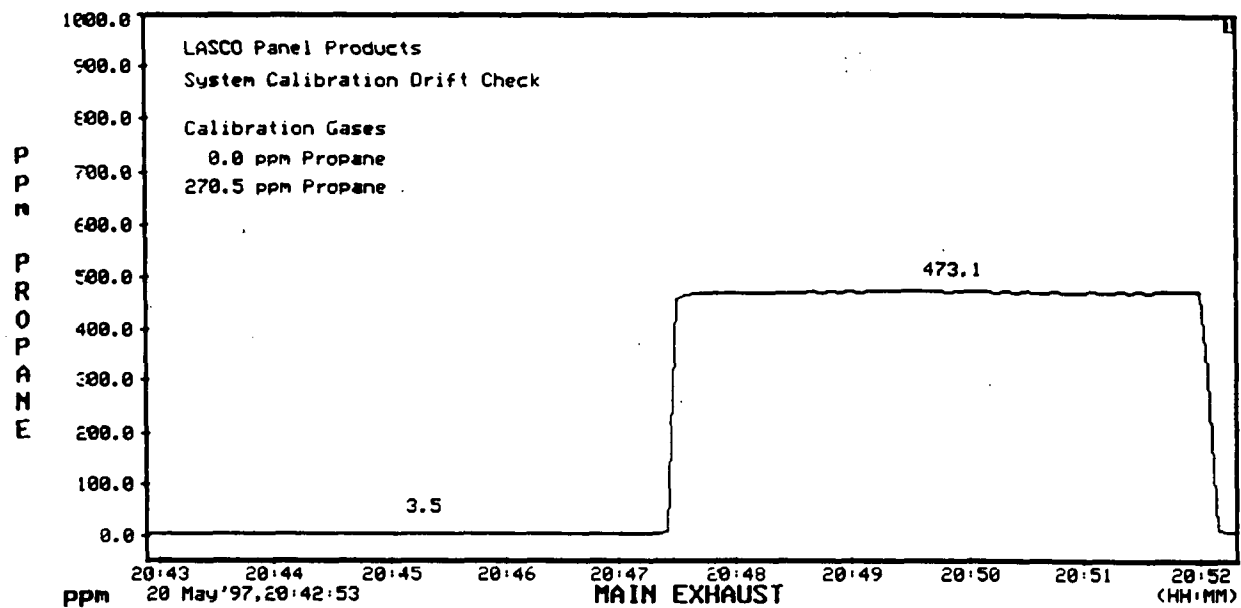
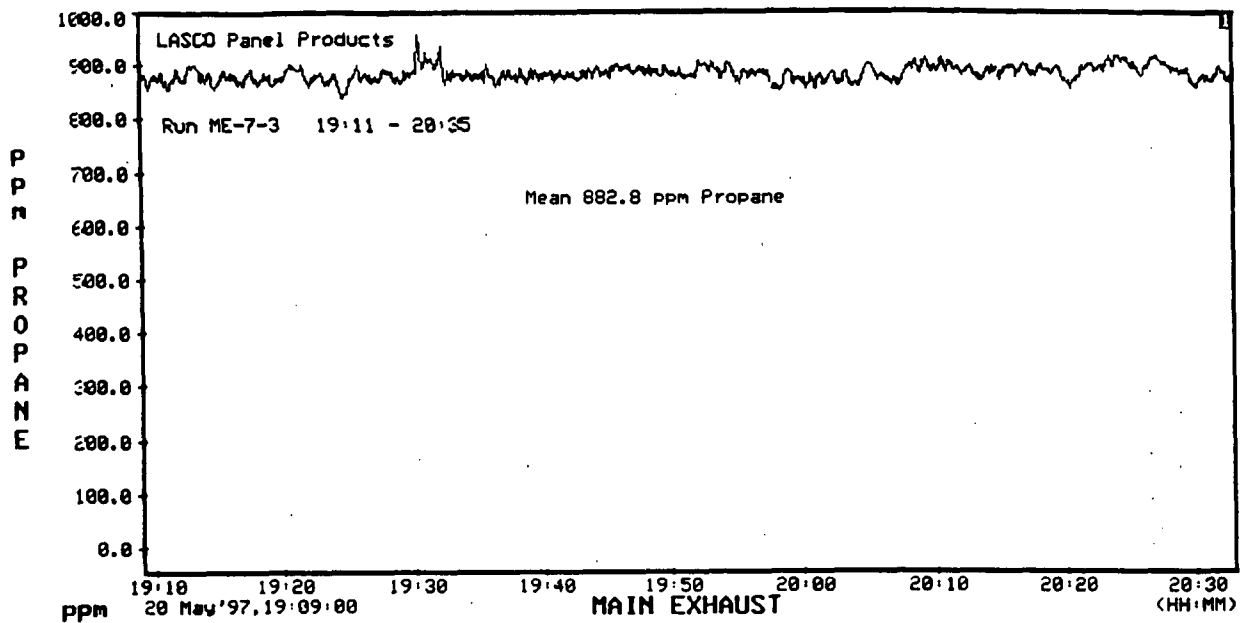
18:35 Post Cal 3.5 Drift 0.39%
465.5 0.00%

19:11-20:35 Run 7-3 882.8 Corrected 876.6 ppm THC

20:42 Post Cal 3.5 Drift 0.39%
473.1 0.76%







LASCO Panel Products

Condition 7 - Room Exhaust

Total Hydrocarbons (THC)

20-May-97

Calibration Gases 0.0 ppm 84.1 ppm 270.5 ppm 463.3 ppm	System Calibration 0.1 85.8 271.9 462.2	Direct Calibration 0.1 85.8 276.1 466.4
Correlation 0.9999857 Slope 0.9967115 Intercept 1.2023939 Sampling System Bias 0.00% 0.00% 0.76% 0.76%		Correlation 0.9999642 Slope 1.0073998 Intercept 1.1169561 Calibration Error 0.02% 0.91%

14:49-16:15 Run 7-1 99.0 Corrected 98.1 ppm THC

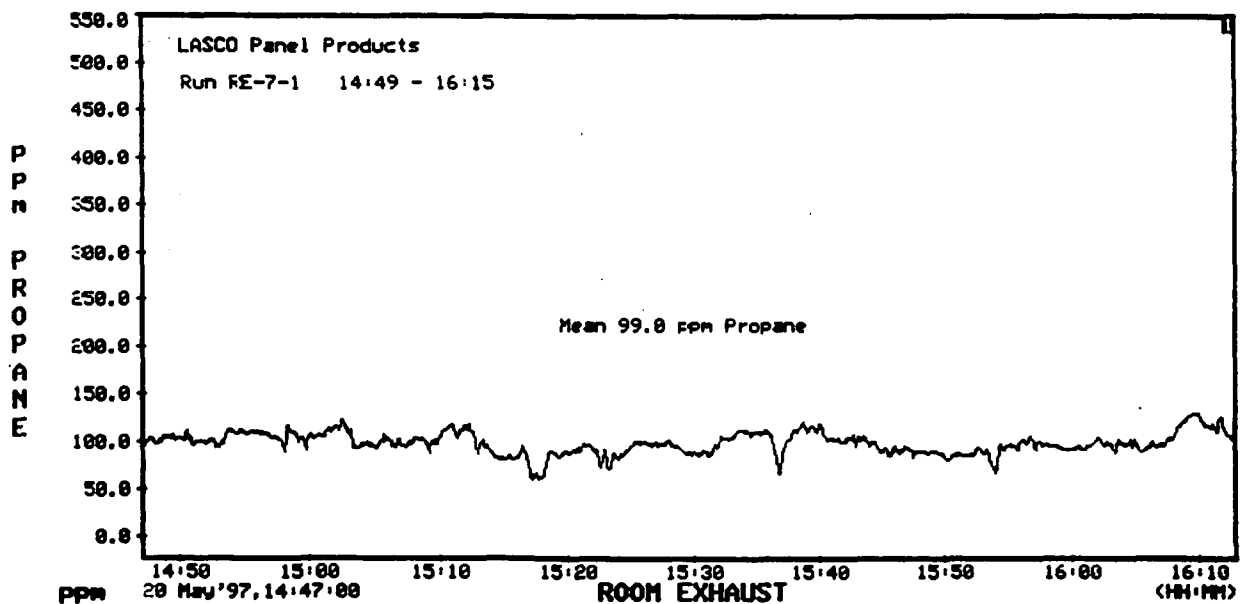
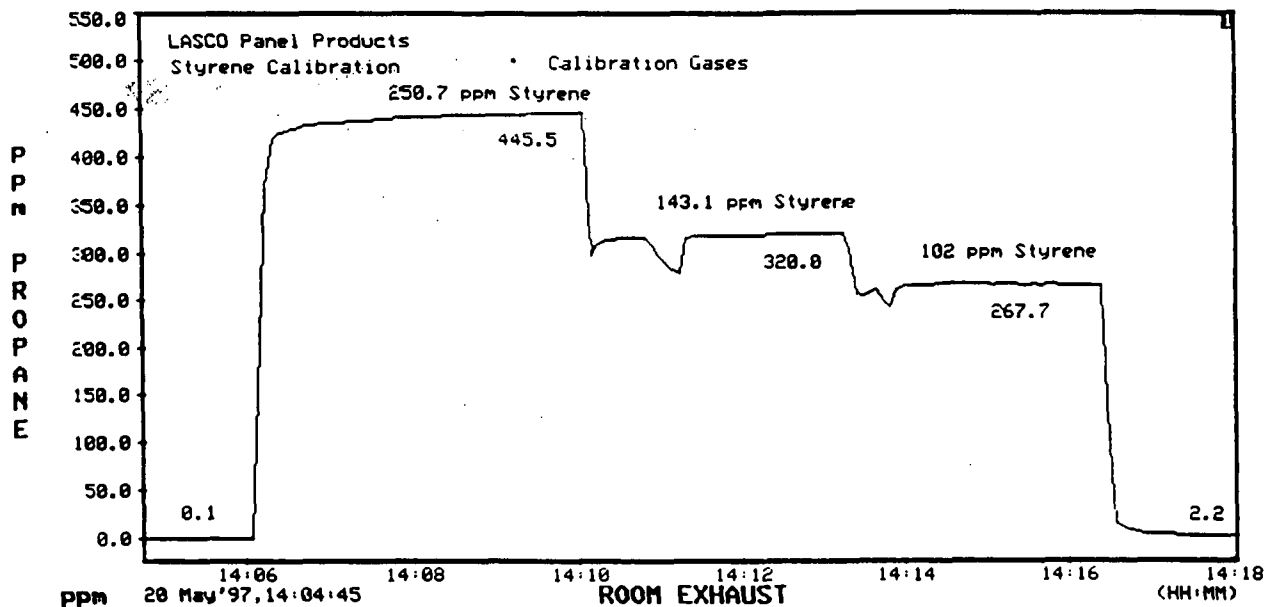
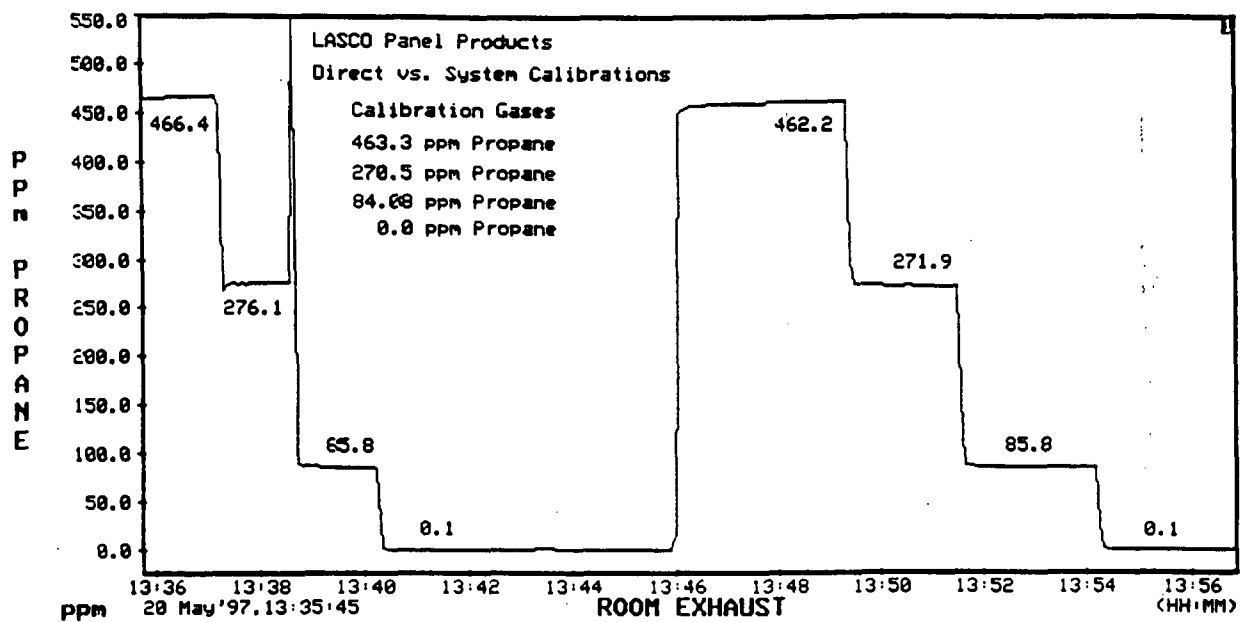
Calibration Gases 0.0 ppm 84.1 ppm 270.5 ppm 463.3 ppm	System Calibration 0.1 87.9 282.4 481.0	Calibration Error 0.06% 0.35%
Correlation 0.9999944 Slope 1.0382807 Intercept 0.5527431		

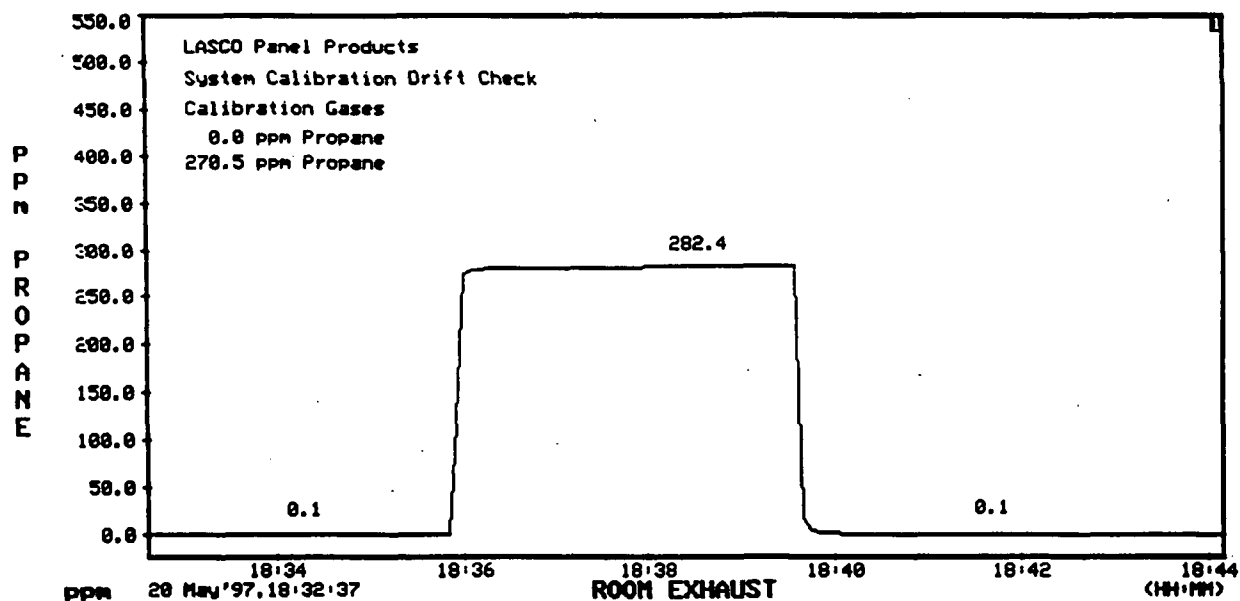
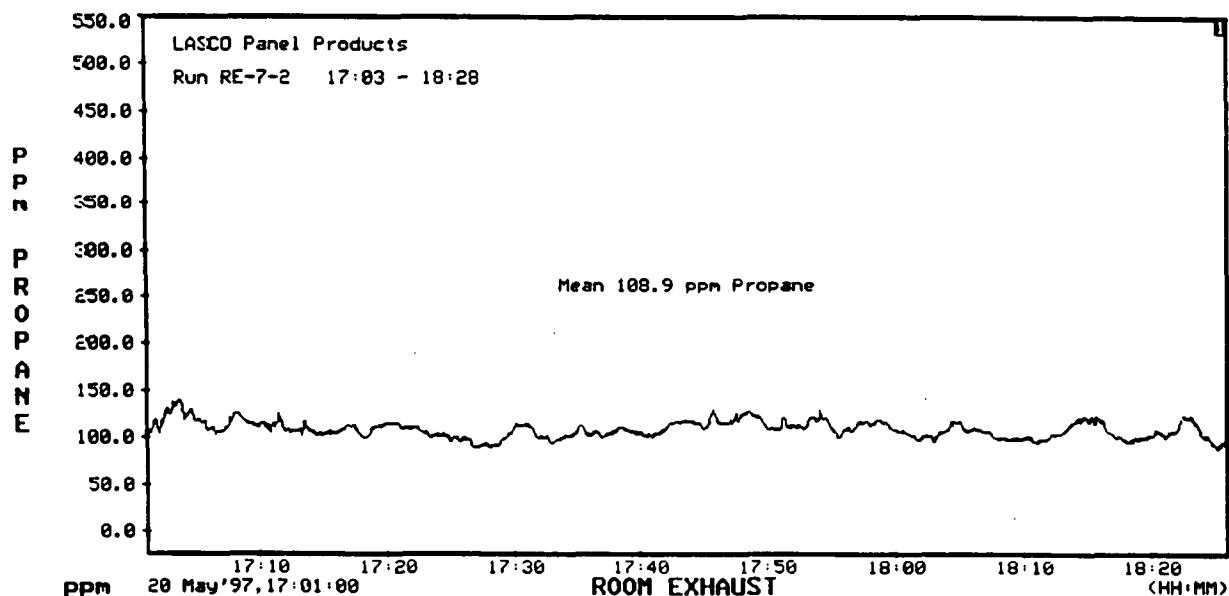
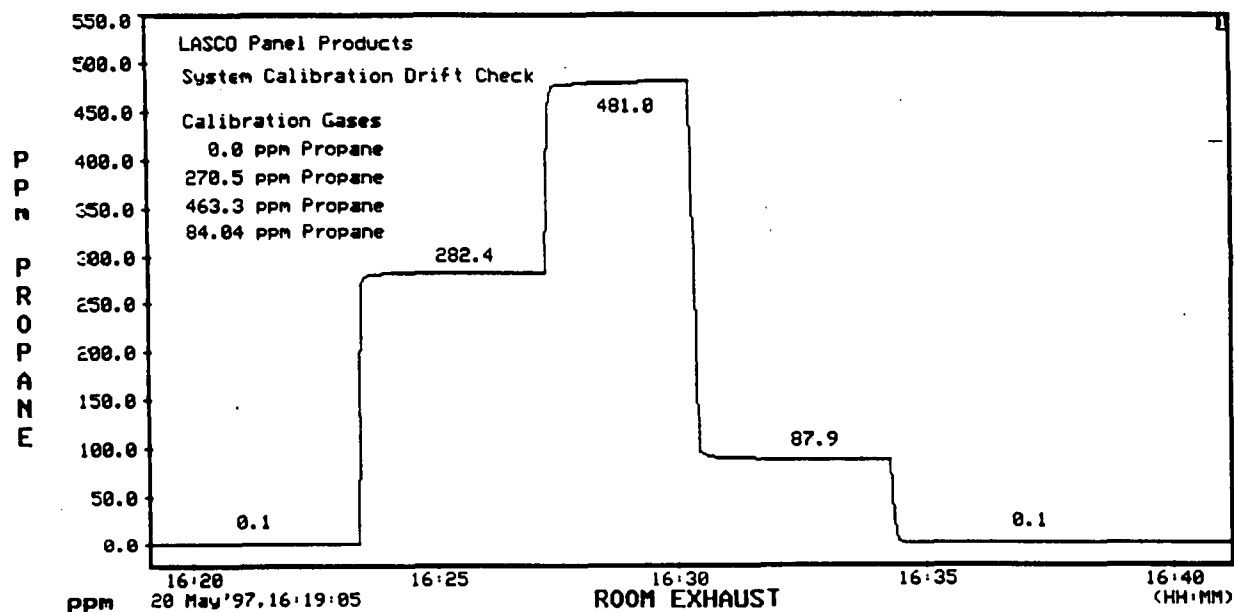
17:03-18:28 Run 7-2 108.9 Corrected 104.4 ppm THC

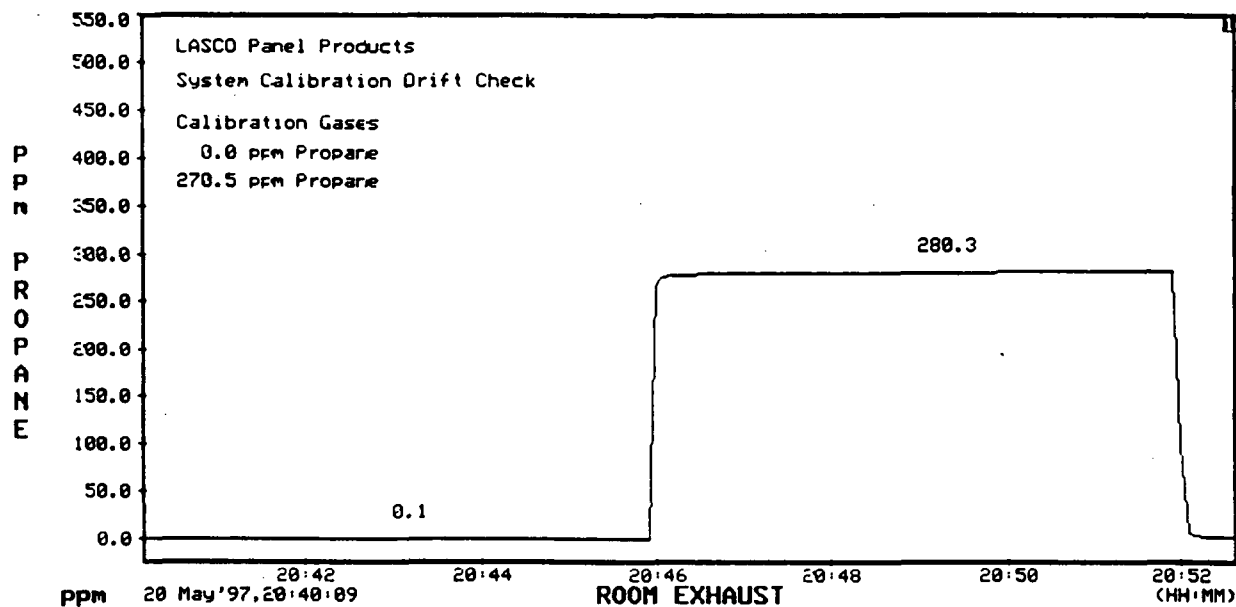
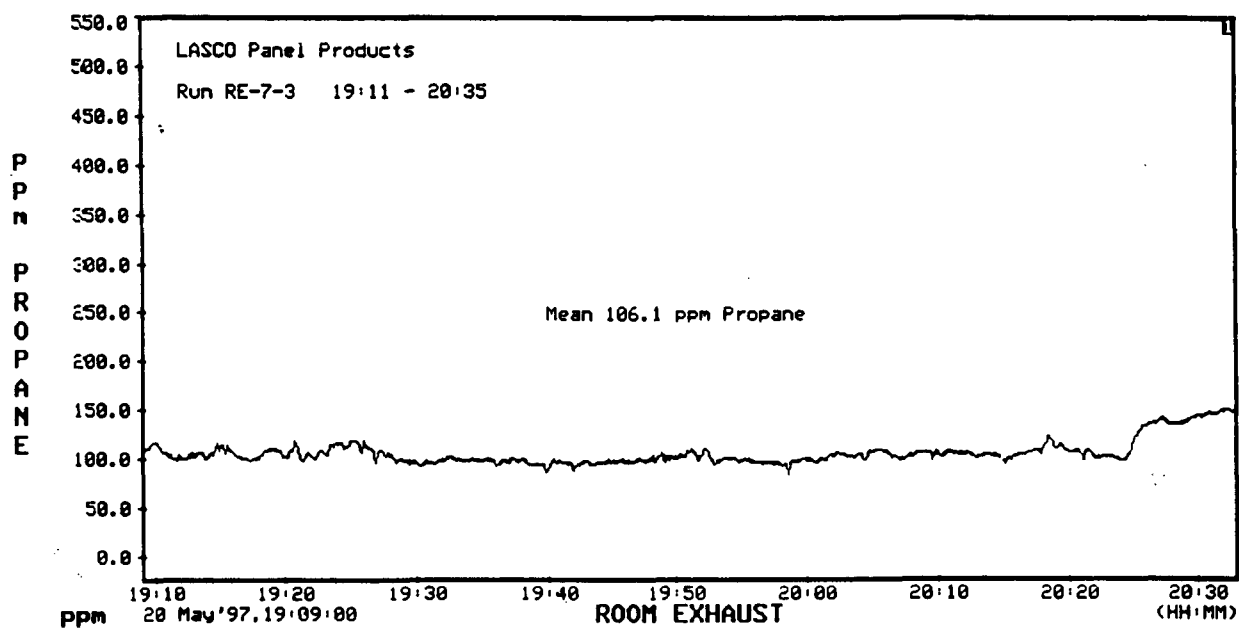
18:32 Post Cal 0.1 Drift 0.00%
 282.4 0.00%

19:11-20:35 Run 7-3 106.1 Corrected 101.7 ppm THC

20:40 Post Cal 0.1 Drift 0.00%
 280.3 0.38%









INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
 Location: MAIN EXHAUST
 Date: 5-20-97
 Operator: P. SIEGEL
 Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x, THC
 Monitor: ppm or %
 Span Value: 100
 Chart Scale: 0-1000 ppm Propane
 Pbar, in. Hg.: 28.92

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span-GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	0.6	0.6		0.0
AAL710	270.5	27.3	27.0	269.5	266.5	0.37	0.3
AAL18513	463.3	47.0	46.0	463.5	453.6	0.04	1.0
ALM028161	886.7	90.0	88.3	886.9	870.2		1.7

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.064)}{(0.10155)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

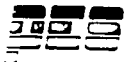
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 27 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: MAIN EXHAUST
Date: 5-20-97
Operator: P. SIEGEL
Project #: S405.003
Time, Pretest: 13:50 Post-test: _____
Run #: ME-7-1, ME-7-2

Parameter: SO₂, CO₂, O₂, NO_x, THC
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-1000 ppm Propane
Pbar, in. Hg.: 28.92 (14:30)
Ambient Temp., F: 70°F

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)			Concentration Predicted By Equation*			Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		13:50	16:20	18:35	13:50	16:20	18:35		
	0	0.0	0.0	0.1	0.0	0.0	1.0		
	270.5	27.0	27.1		271.3	272.3		0.30	
	463.3	46.0	46.2	46.2	462.1	464.2	464.2	0.26	
	886.7	88.3	89.4		887.1	898.2			

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b$$

$$x = \text{ppm}$$

$$y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.0025)}{(0.09954)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: MAIN EXHAUST
Date: 5-20-97

Parameter: SO₂, CO₂, O₂, NO_x, THC, CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} + 0.0025)}{(0.09954)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
ME-7-1	14:49 - 14:59	78.68	683.1	Sum 1
	-15:09	78.5	688.2	
	-15:19	78.5	688.2	
	-15:29	79.69	693.2	
	-15:39	70	703.2	
	-15:49	68.5	688.2	
	-15:59	68.0	683.1	
	-16:09	82.0	823.8	
	-16:15	86.5	869.0	AVG = 724.4 ppm Propane
ME-7-2	17:03 - 17:13	86.0	864.0	
	-17:23	88.0	884.1	
	-17:33	88.5	889.1	
	-17:43	88.0	884.1	
	-17:53	86.5	869.0	
	-18:03	86.0	864.0	
	-18:13	87.0	874.0	
	-18:23	85.0	854.0	
	-18:28	85.5	859.0	AVG = 871.3 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel
Checked By: _____

Date: 5-20-97
Date: _____



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x*, THC CO
Location: MAIN EXHAUST Operator: P. SIEGEL
Date: 5-20-97 Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.0025)}{(0.09954)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments Sum 1
ME-7-3	19:11 - 19:21	88	884.1	
	- 19:31	88	884.1	
	- 19:41	88	884.1	
	- 19:51	88.5	889.1	
	- 20:01	88.5	889.1	
	- 20:11	87.5	879.1	
	- 20:21	89.5	899.2	
	- 20:31	89.5	899.2	
	- 20:35	87.5	879.1	AVG = 887.5 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-20-97
Checked By: _____ Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x (THC)
 Location: BOOM EXHAUST Monitor: ppm or %
 Date: 5-20-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 28.92

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,*		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System	Direct System	Direct System		
	0	0.1	0.1	-2.4	-2.4		0.0
ALM028660	84.08	18.0	17.7	86.1	84.6	2.40	0.3
AAL710	270.5	55.7	55.1	272.4	269.5	0.70	0.6
AAL18513	463.3	94.0	93.0	461.8	456.9		1.0

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.592)}{(0.20227)}$$

$$\text{Correlation Coefficient} = \underline{0.99994}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 29 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: ROOM EXHAUST Monitor: ppm or %
Date: 5-20-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 28.92 (14:30)
Time, Pretest: 13:50 Post-test: _____ Ambient Temp., F: 70°F
Run #: RE-7-1, RE-7-2

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)			Concentration Predicted By Equation*			Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		13:50	16:20	18:35	13:50	16:20	18:35		
	0	0.1	0.0	0.0	-2.2	-2.7	-2.7		
	84.08	17.7	18.1		85.7	87.7		1.93	
	270.5	55.1	57.0	56.9	272.5	282.0	281.5	0.21	
	463.3	93.0	97.0		461.8	481.8			

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.537)}{(0.20021)}$$

$$\text{Correlation Coefficient} = \underline{0.99995}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
sample data. Post-test is used if drift exceeds limits and if post-test
yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: Room EXHAUST
Date: 5-20-97

Parameter: SO₂, CO₂, O₂, NO_x*, THC, CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.537)}{(0.20021)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
RE-7-1	14:49 - 14:59	21.5	104.7	JUN 5
	-15:09	21.0	102.2	
	-15:19	19.0	92.2	
	-15:29	18.5	89.7	
	-15:39	20.0	97.2	
	-15:49	20.0	97.2	
	-15:59	19.0	92.2	
	-16:09	21.0	102.2	
	-16:15	24.0	117.2	AVG = 99.4 ppm Propane
RE-7-2	17:03 - 17:13	24.0	117.2	
	-17:23	22.0	107.2	
	-17:33	21.0	102.2	
	-17:43	21.5	104.7	
	-17:53	23.5	114.7	
	-18:03	22.5	109.7	
	-18:13	21.5	104.7	
	-18:23	22.0	107.2	
	-18:28	21.0	102.2	AVG = 107.8 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: P. T. Siegel Date: 5-20-97
Checked By: . Date:



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: ROOM EXHAUST
Date: 5-20-97

Parameter: SO₂, CO₂, O₂, NO_x* (THC) CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.537)}{(0.20021)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
				JUN 5
RE-7-3	19:11 - 19:21	21.5	104.7	
	- 19:31	22.0	107.2	
	- 19:41	20.0	97.2	
	- 19:51	20.0	97.2	
	- 20:01	20.0	97.2	
	- 20:11	21.5	104.7	
	- 20:21	21.5	104.7	
	- 20:31	25.0	122.2	
	- 20:35	30.0	147.2	AVG = 109.1 ppm Prepare

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated-By: P. T. Siegel
Checked By: _____

Date: 5-20-97
Date: _____

APPENDIX A.2.10

Condition 8 Method 25A

LASCO Panel Products

Condition 8 - Main Exhaust

Total Hydrocarbons (THC)

22-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-0.4	-0.4
270.5 ppm	266.9	274.5
463.3 ppm	457.8	465.5
886.7 ppm	881.6	896.9

Correlation 0.9999937
Slope 0.9949005
Intercept -1.5840611

Sampling System Bias
0.00%
0.76%
0.77%
1.53%

Correlation 0.9999895
Slope 1.011169
Intercept -0.524837

Calibration Error

0.55%
0.52%

7:54-8:46 Run 8-1 608.1 Corrected 612.8 ppm THC

8:50 Post Cal -0.4 Drift 0.00%
465.5 0.77%

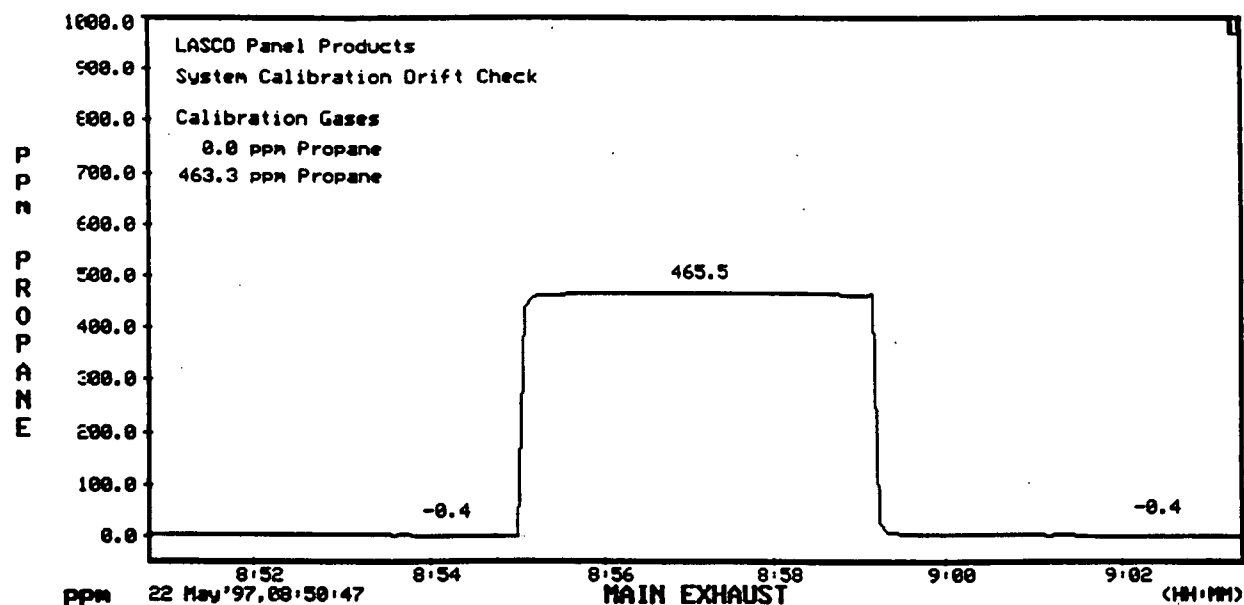
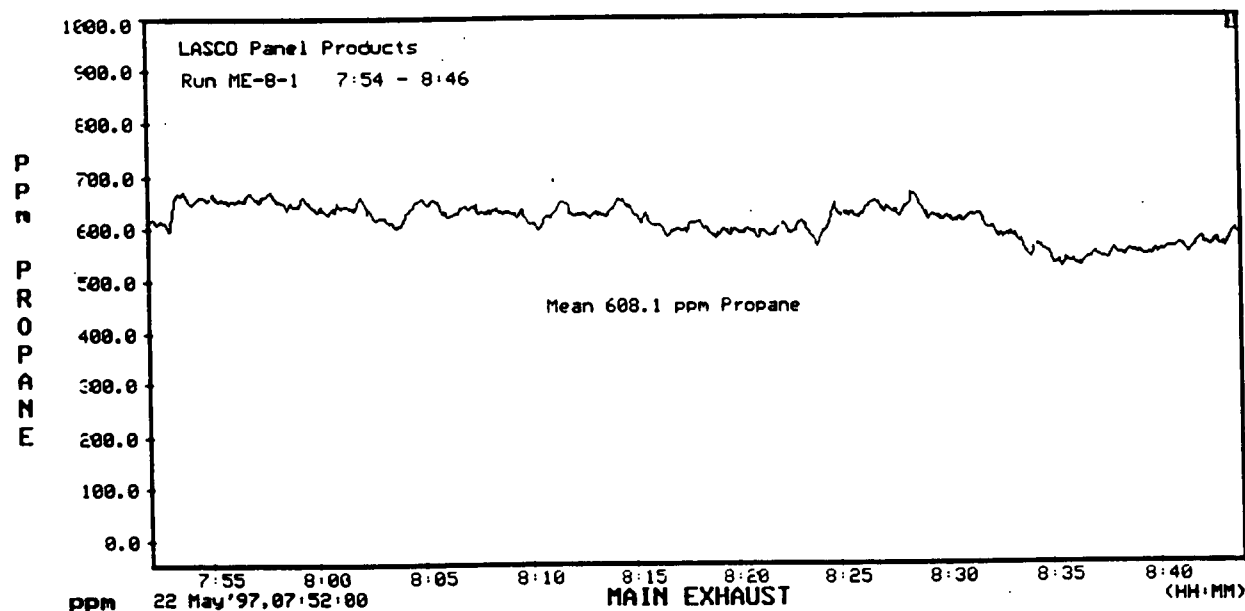
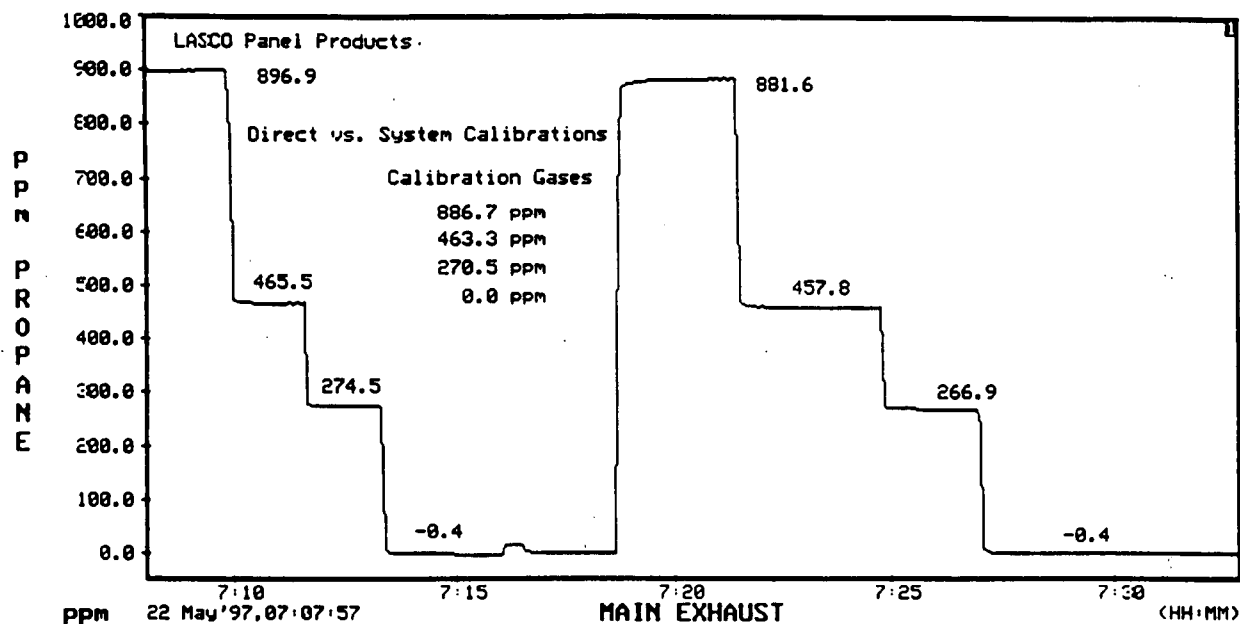
9:21-10:53 Run 8-2 617.5 Corrected 622.3 ppm THC

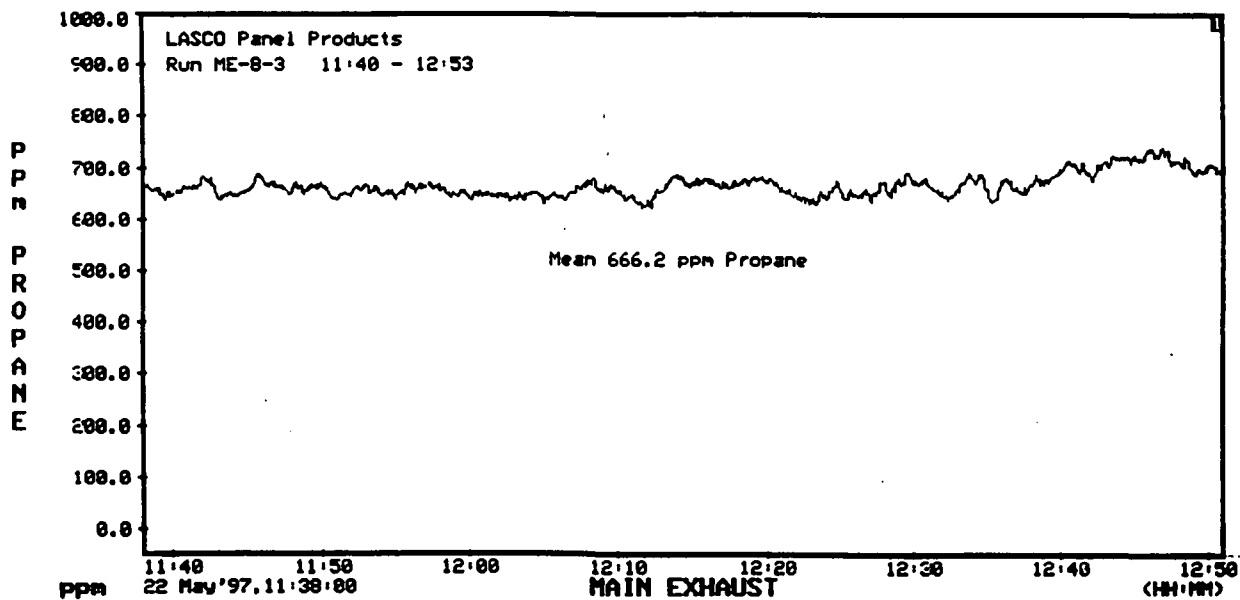
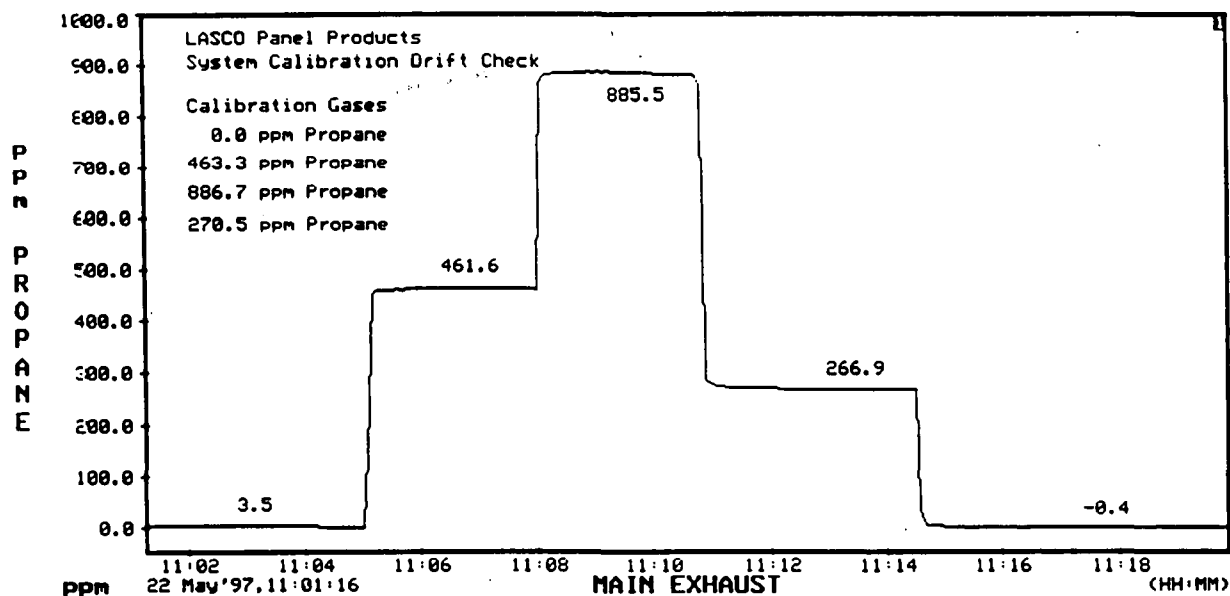
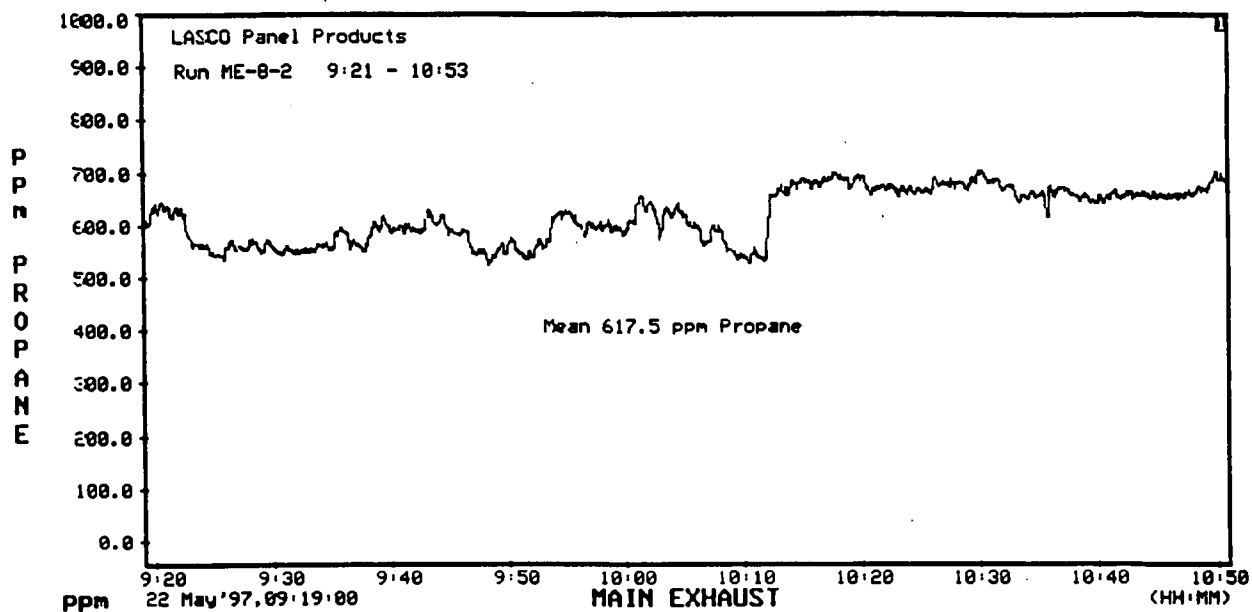
Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	266.9	0.70%
463.3 ppm	461.6	0.01%
886.7 ppm	885.5	

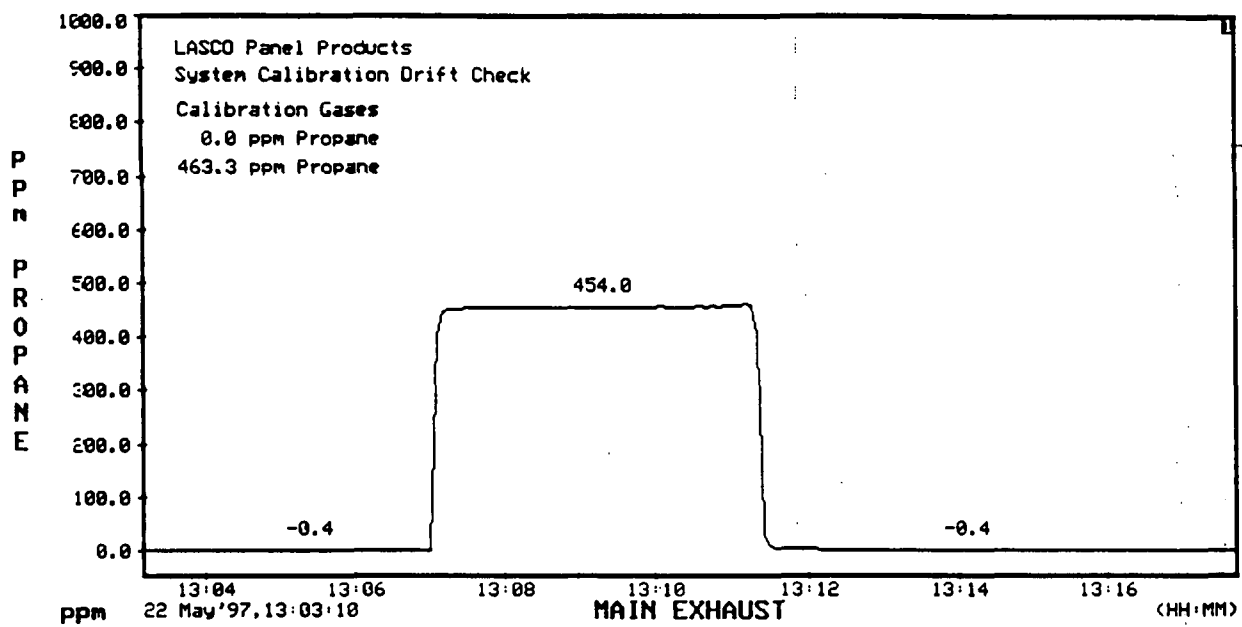
Correlation 0.9999934
Slope 0.9999279
Intercept -1.6958077

11:40-12:53 Run 8-3 666.2 Corrected 667.9 ppm THC

13:03 Post Cal -0.4 Drift 0.00%
454.0 0.76%







LASCO Panel Products
Condition 8 - Room Exhaust
Total Hydrocarbons (THC)

22-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	0.1	0.1
84.1 ppm	85.8	87.9
270.5 ppm	271.9	280.3
463.3 ppm	462.2	474.7

Correlation	0.9999857	Correlation	0.9999749
Slope	0.9967115	Slope	1.0244207
Intercept	1.2023939	Intercept	1.2866947
Sampling System Bias 0.00% 0.38% 1.53% 2.27%			
Calibration Error 0.56% 0.69%			

7:54-8:46	Run 8-1	185.6	Corrected	185.0	ppm THC
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8:50	Post Cal	0.1	Drift	0.00%
		267.7		0.76%

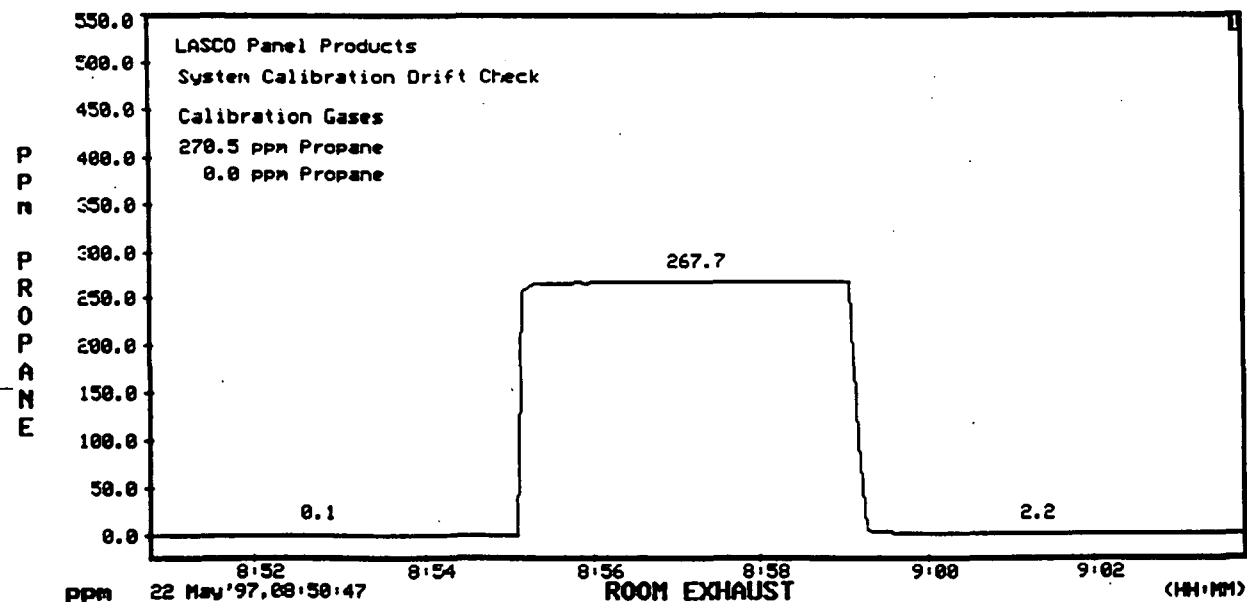
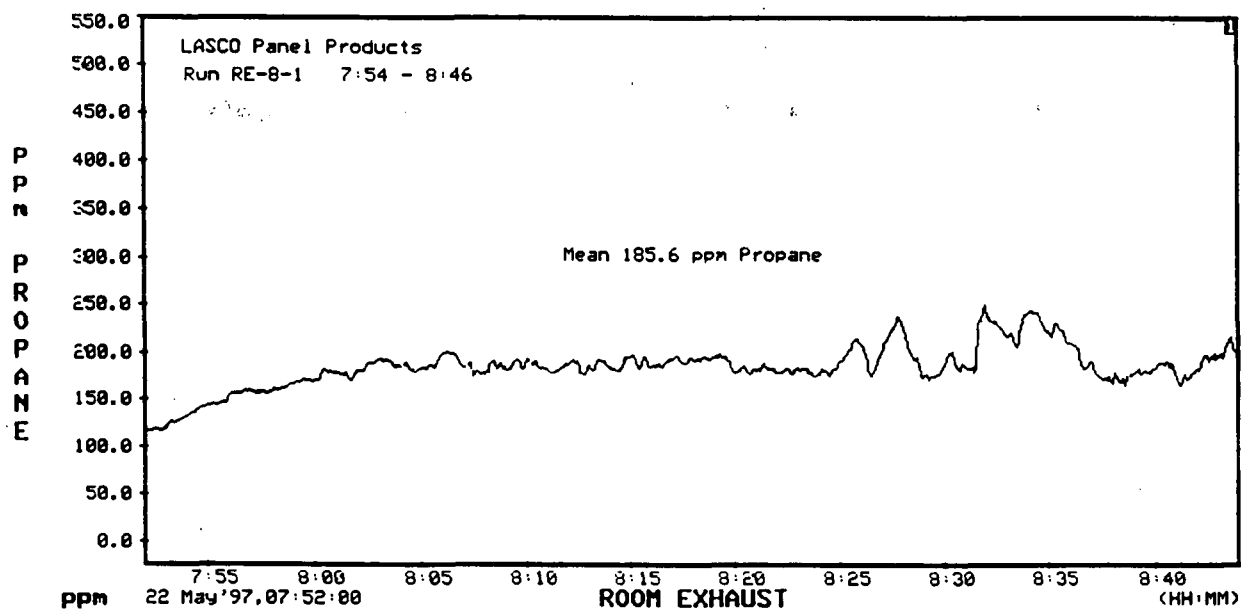
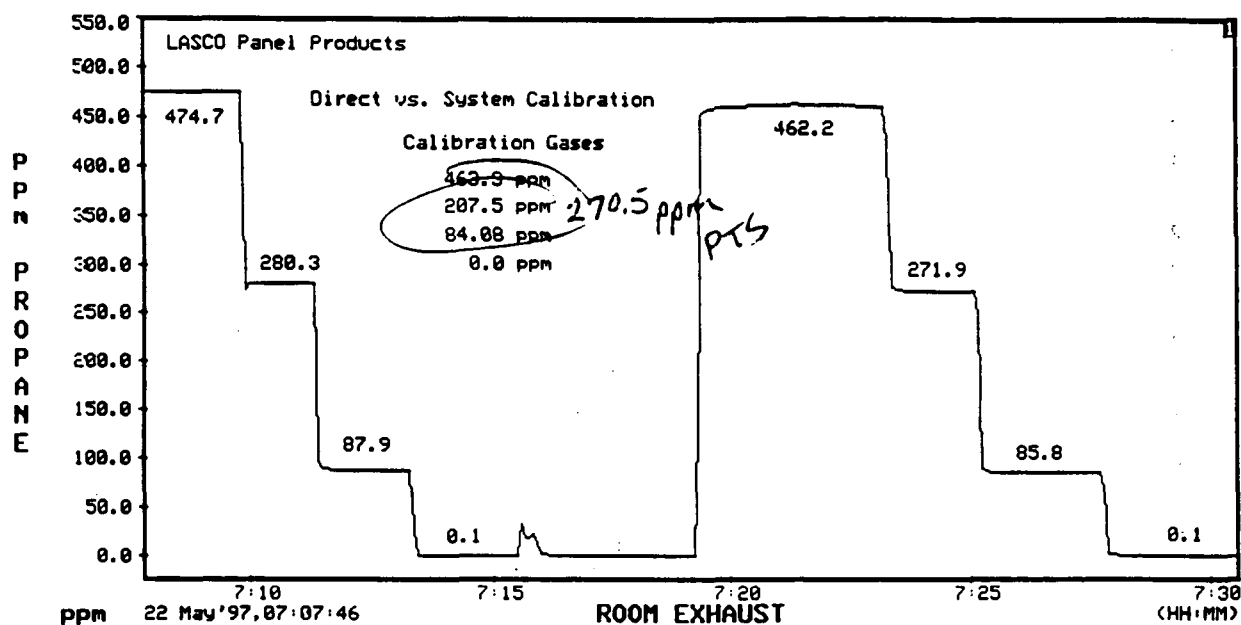
9:21-10:53	Run 8-2	175.5	Corrected	174.9	ppm THC
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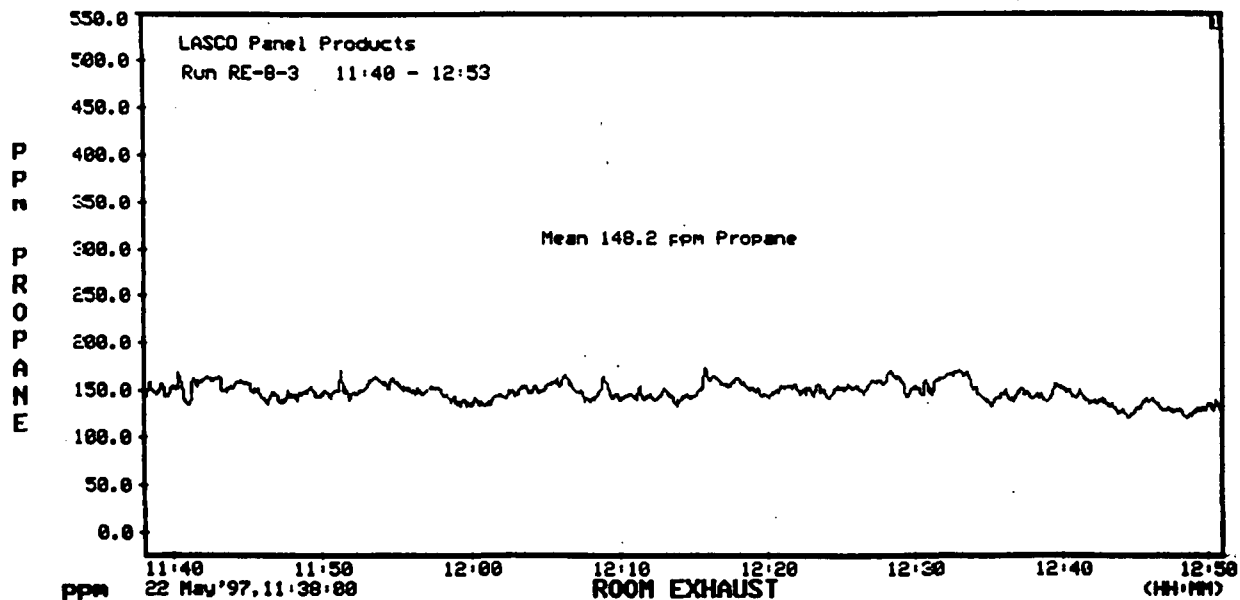
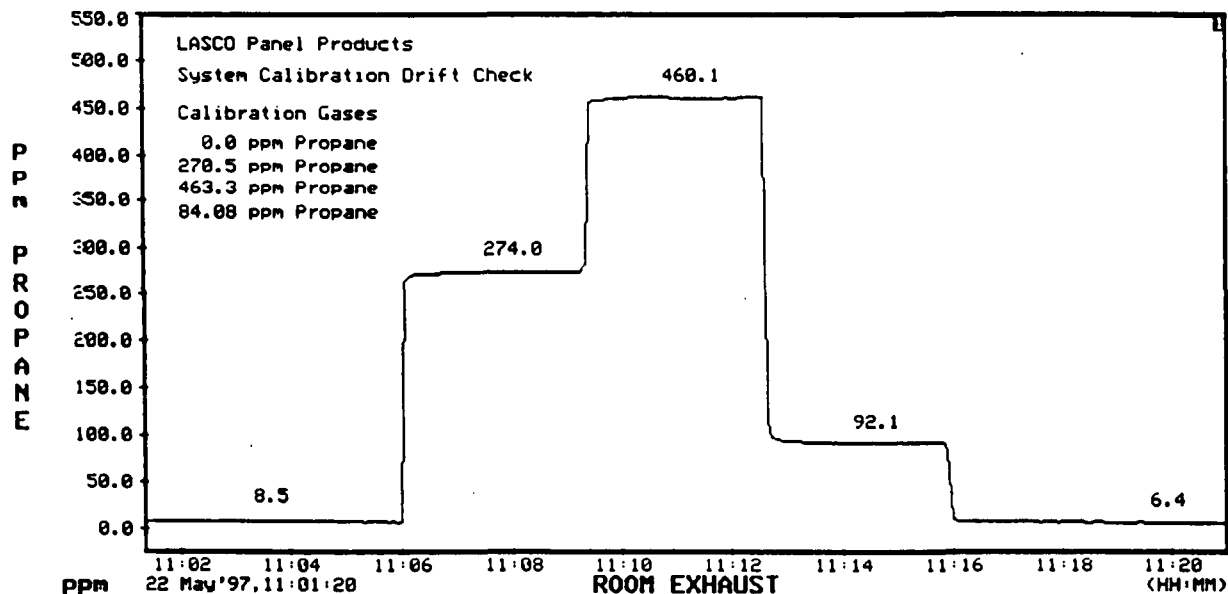
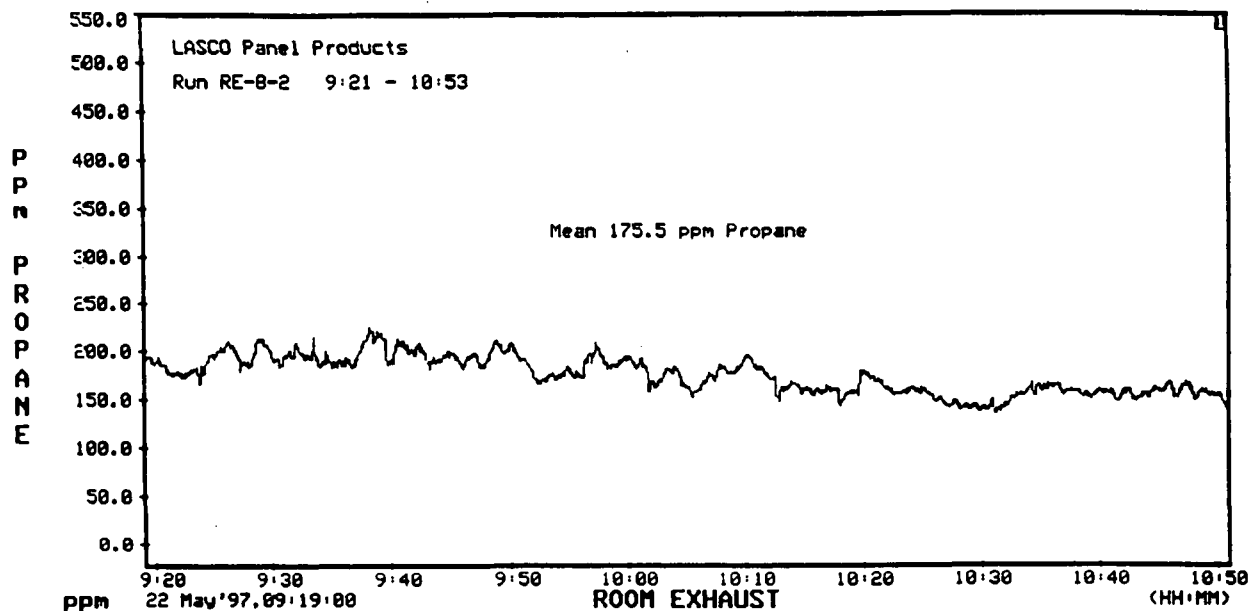
Calibration Gases	System Calibration	Calibration Error
0.0 ppm	6.4	
84.1 ppm	92.1	1.99%
270.5 ppm	274.0	0.49%
463.3 ppm	460.1	

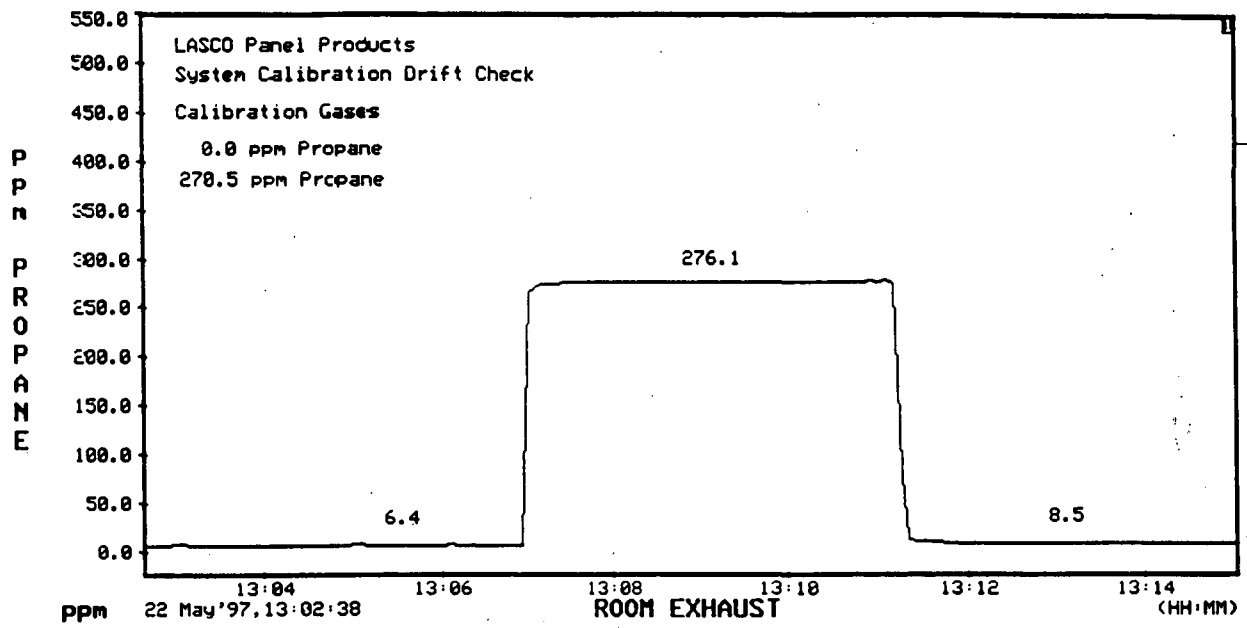
Correlation	0.999963
Slope	0.9775074
Intercept	8.2790644

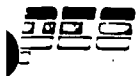
11:40-12:53	Run 8-3	148.2	Corrected	143.1	ppm THC
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13:03	Post Cal	6.4	Drift	0.00%
		276.1		0.38%









DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: MAIN EXHAUST Monitor: ppm or %
Date: 5-22-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.50
Time, Pretest: 7:15 Post-test: 11:00 Ambient Temp., F: 55°F
Run #: ME-8-1, ME-8-2,

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)			Concentration Predicted By Equation*			Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		7:15	9:00	11:00	7:15	9:00	11:00		
0	0.0	0.0	0.1	0.1	-0.4	0.6	0.6		0.1
270.5	27.0	27.0			271.5			0.34	
463.3	46.0	46.0	46.3	46.0	462.8	465.8	462.8	0.11	0.3
886.7	88.1	88.1			886.7				

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.041)}{(0.09931)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate

sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: MAIN EXHAUST Monitor: ppm or %
Date: 5-22-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.35 (12:00)
Time, Pretest: 11:00 Post-test: 13:05 Ambient Temp., F: 70°F (12:00)
Run #: ME-8-3

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)		Concentration Predicted By Equation*		Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		11:00	13:05	11:00	13:05		
	0	0.0	0.1	1.1	2.1		0.1
	270.5	27.0		270.8		0.11	
	463.3	46.0	45.4	460.6	454.6	0.58	0.6
	886.7	88.8		888.0			

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.111)}{(0.10012)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
— sample data. Post-test is used if drift exceeds limits and if post-test
yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO

Parameter: SO₂, CO₂, O₂, NO_x*, (THC) CO

Location: MAIN EXHAUST

Operator: P. SIEGEL

Date: 5-22-97

Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.041)}{(0.09931)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
ME-8-1	7:54-8:04	64.0	644.0	
	-8:14	62.5	628.9	
	-8:24	60.5	608.8	
	-8:34	61.0	613.8	
	-8:46	56.0	563.5	AVG= 611.8 ppm Propane
ME-8-2	9:21-9:31	59.0	593.7	
	-9:41	55.5	558.4	
	-9:51	58.0	583.6	
	-10:01	57.0	573.5	
	-10:11	60.0	603.8	
	-10:21	62.0	623.9	
	-10:31	67.0	674.2	
	-10:41	66.5	669.2	
	-10:53	66.5	669.2	AVG= 616.6 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-22-97

Checked By: _____ Date: _____

Parameter: SO₂, CO₂, O₂, NO_x*, THC, CO

Operator: P. SIEGEL

Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.111)}{(0.10012)}$$

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

**** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).**

Calculated By: Paul T. Surge Date: 5-22-97
Checked By: _____ Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: ROOM EXHAUST
Date: 5-22-97
Operator: P. SIEGEL
Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x, THC
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-500 ppm Propane
Pbar, in. Hg.: 29.50

Cylinder #	Cal. Gas Conc., ppm or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span-GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	-2.1	-2.1		0.0
ALM028660	84.08	18.1	17.9	85.5	84.5	1.69	0.2
AAL710	270.5	56.8	55.0	272.7	264.0	0.81	1.8
AAL18513	463.3	95.9	93.3	461.8	449.2		2.6

- * Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.425)}{(0.20676)}$$

$$\text{Correlation Coefficient} = \underline{0.99995}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

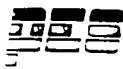
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 29 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
(Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: Room EXHAUST Monitor: ppm or %
Date: 5-22-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.50
Time, Pretest: 7:15 Post-test: 11:00 Ambient Temp., F: 55 °F
Run #: RE-8-1, RE-8-2

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)			Concentration Predicted By Equation*			Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		7:15	9:00	11:00	7:15	9:00	11:00		
0	0.0	0.0	0.2	1.8	-2.5	-1.5	6.5		2.00
84.08	17.9	17.9			86.7			3.12	
270.5	55.0	55.0	54.0	55.0	271.5	266.5	271.5	0.37	1.00
463.3	93.3	93.3			462.3				

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.505)}{(0.20074)}$$

$$\text{Correlation Coefficient} = \underline{0.99994}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
sample data. Post-test is used if drift exceeds limits and if post-test
yields higher concentrations.



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: ROOM EXHAUST
Date: 5-22-97
Operator: P. SIEGEL
Project #: S405.003
Time, Pretest: 11:00 Post-test: 13:05
Run #: RE-8-3

Parameter: SO₂, CO₂, O₂, NO_x, THC
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-500 ppm Propane
Pbar, in. Hg.: 29.35 (12:00)
Ambient Temp., F: 70 °F (12:00)

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)		Concentration Predicted By Equation*		Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		11:00	13:05	11:00	13:05		
	0	1.7	1.7	-1.6	-1.6		0.0
	84.08	19.0		86.4		2.76	
	270.5	55.0	55.9	269.6	274.2	0.33	0.9
	463.3	93.1		463.4			

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 2.006)}{(0.19657)}$$

$$\text{Correlation Coefficient} = \underline{0.99997}$$

$$** \text{ Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$*** \text{ Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
— sample data. Post-test is used if drift exceeds limits and if post-test
yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: Room EXHAUST
Date: 5-22-97

Parameter: SO₂, CO₂, O₂, NO_x, THC, CO
Operator: P. SIEGEL
Project #: 9405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.505)}{(0.20074)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments Jum 5
RE-8-1	7:54 - 8:04	30.0	146.9	
	- 8:14	39.0	191.8	
	- 8:24	38.0	186.8	
	- 8:34	39.0	191.8	
	- 8:46	40.0	196.7	AVG = 182.8 ppm Propane
RE-8-2	9:21 - 9:31	38.0	186.8	
	- 9:41	40.0	196.7	
	- 9:51	39.5	194.3	
	- 10:01	38.0	186.8	
	- 10:11	36.0	176.8	
	- 10:21	34.0	166.9	
	- 10:31	32.0	156.9	
	- 10:41	30.5	149.4	
	- 10:53	32.0	156.9	AVG = 174.6 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-22-96
Checked By: _____ Date: _____



Parameter: SO₂, CO₂, O₂, NO_x*, (THC) CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 2.006)}{(0.19657)}$$

[illegible]

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

**** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).**

Calculated By: Paul T. Seigal Date: 5-22-97
Checked By: _____ Date: _____

APPENDIX A.2.11

Condition 9 and 10 Method 25A

LASCO Panel Products

Condition 9 - Main Exhaust

Total Hydrocarbons (THC)

22-May-97

Calibration Gases	System Calibration
0.0 ppm	-4.2
270.5 ppm	263.1
463.3 ppm	450.2
886.7 ppm	870.2

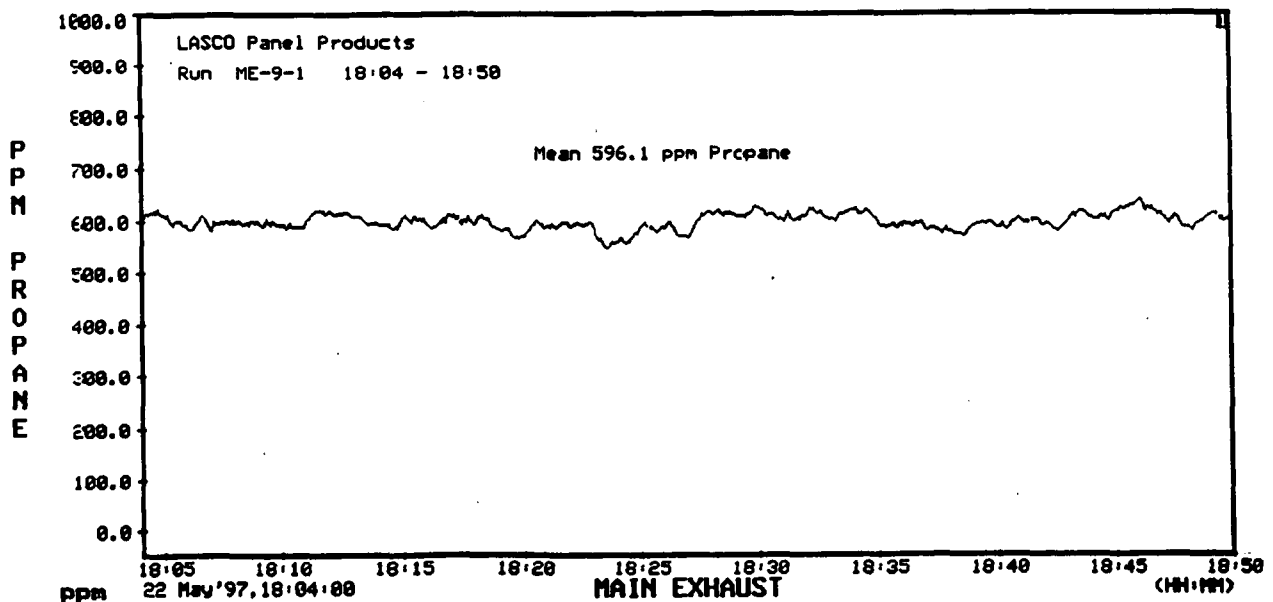
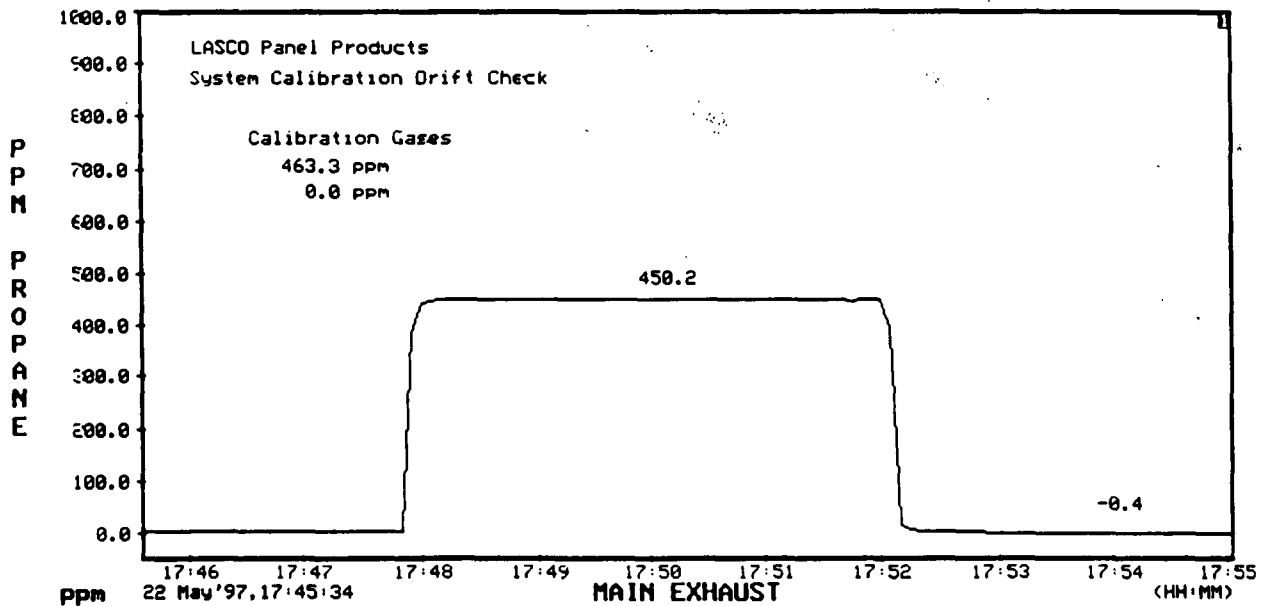
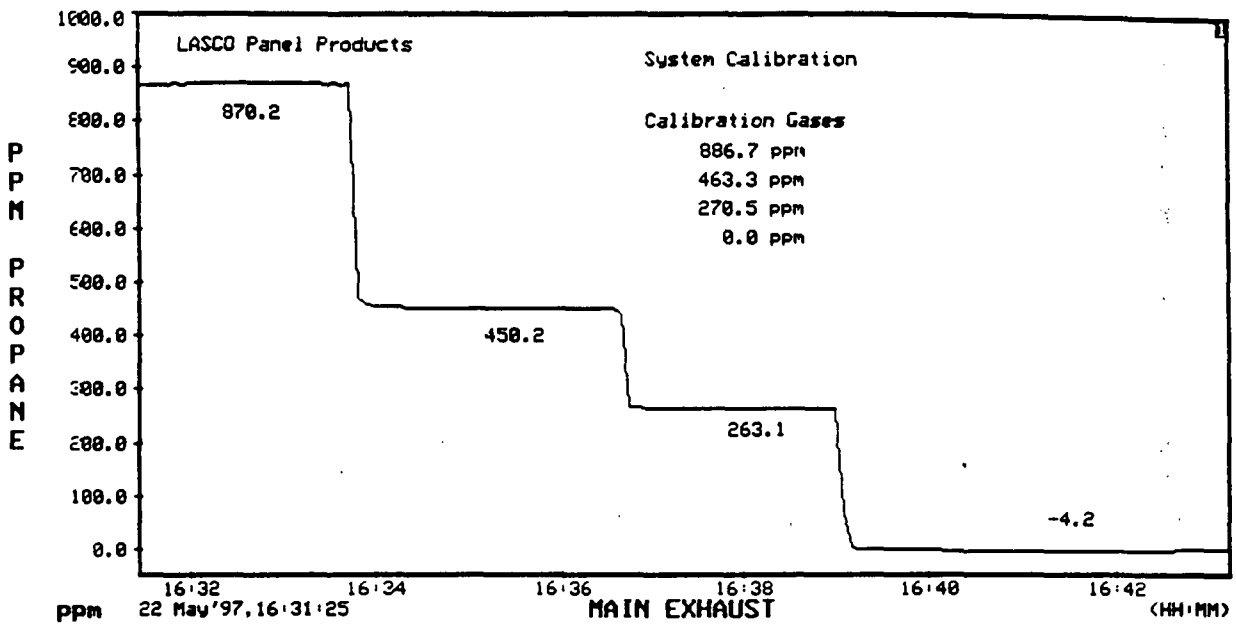
Calibration Error
0.36%
0.43%

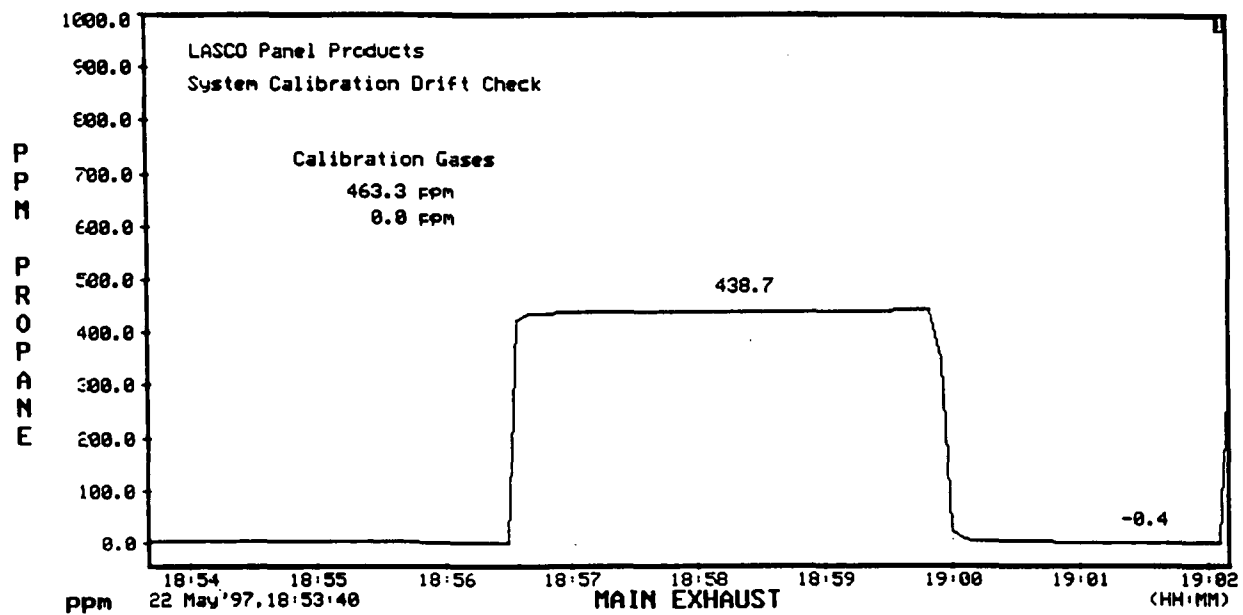
Correlation	0.9999934
Slope	0.9856057
Intercept	-4.4685045

17:45	Post Cal	-0.4	Drift	0.38%
		450.2		0.00%

18:04-18:50	Run 9-1	596.1	Corrected	609.3	ppm THC
-------------	---------	-------	-----------	-------	---------

18:53	Post Cal	-0.4	Drift	0.38%
		438.7		1.15%





LASCO Panel Products

Condition 9 - Room Exhaust

Total Hydrocarbons (THC)

22-May-97

Calibration Gases	System Calibration
0.0 ppm	-0.2
84.1 ppm	85.7
270.5 ppm	272.8
463.3 ppm	463.7

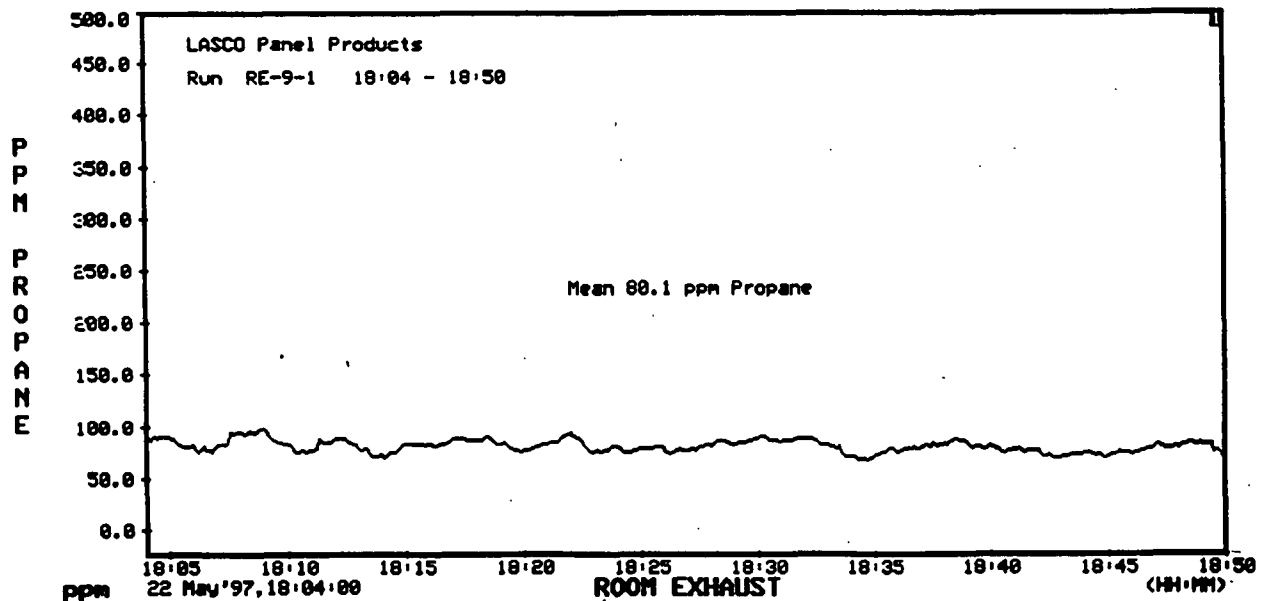
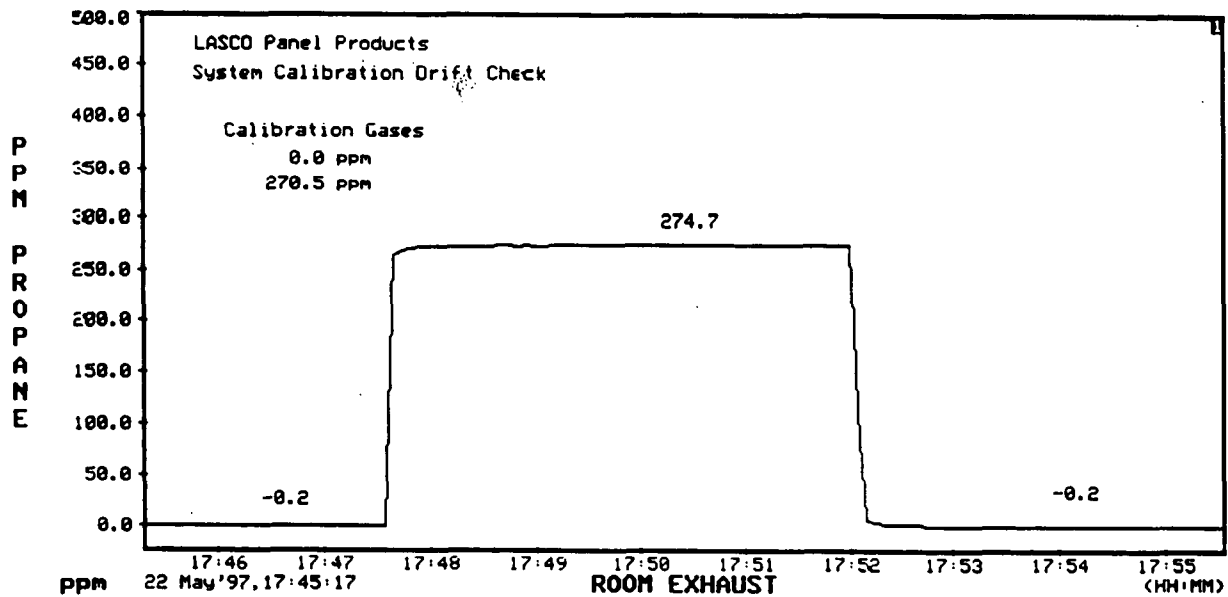
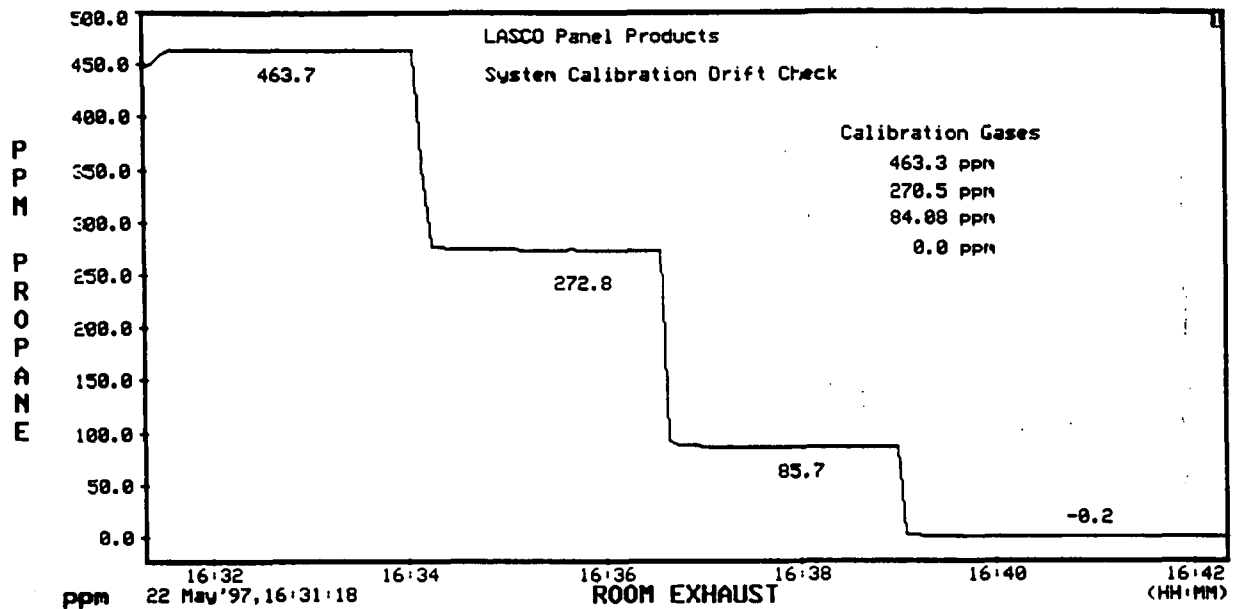
Calibration Error
0.81%
0.45%

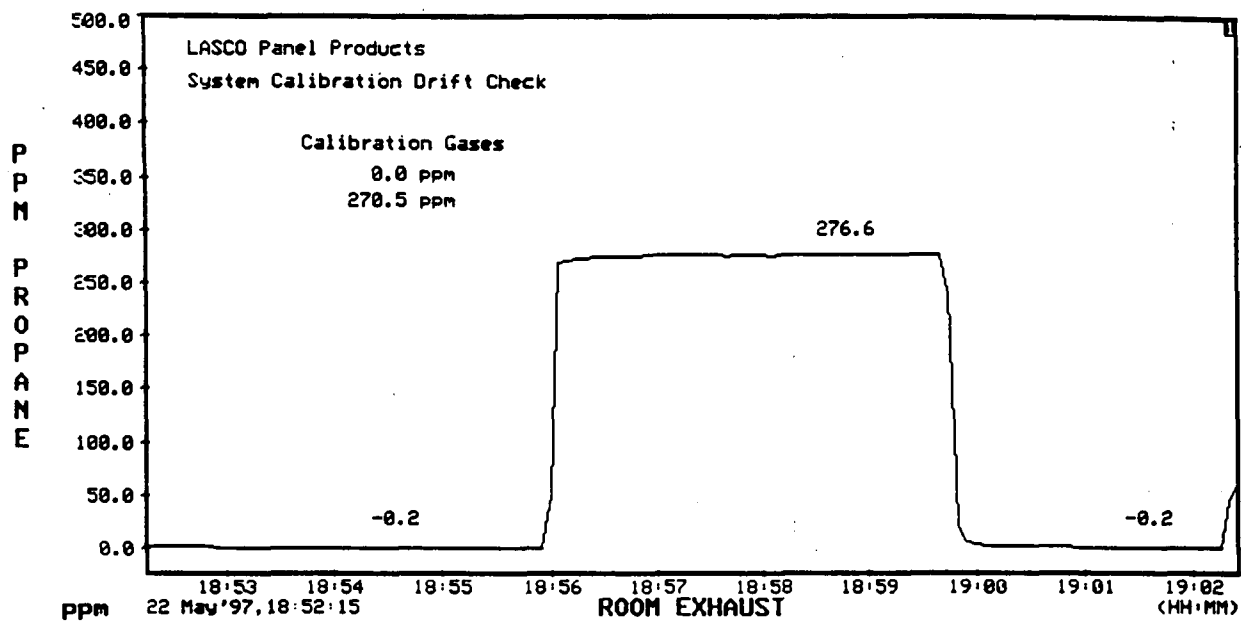
Correlation	0.9999852
Slope	1.0007933
Intercept	0.8678023

17:45	Post Cal	-0.2	Drift	0.00%
		274.7		0.38%

18:04-18:50	Run 9-1	80.1	Corrected	79.2	ppm THC
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18:52	Post Cal	-0.2	Drift	0.00%
		276.6		0.76%





LASCO Panel Products

Condition 10 - Main Exhaust

Total Hydrocarbons (THC)

22-May-97

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-4.2	
270.5 ppm	263.1	0.36%
463.3 ppm	450.2	0.43%
886.7 ppm	870.2	

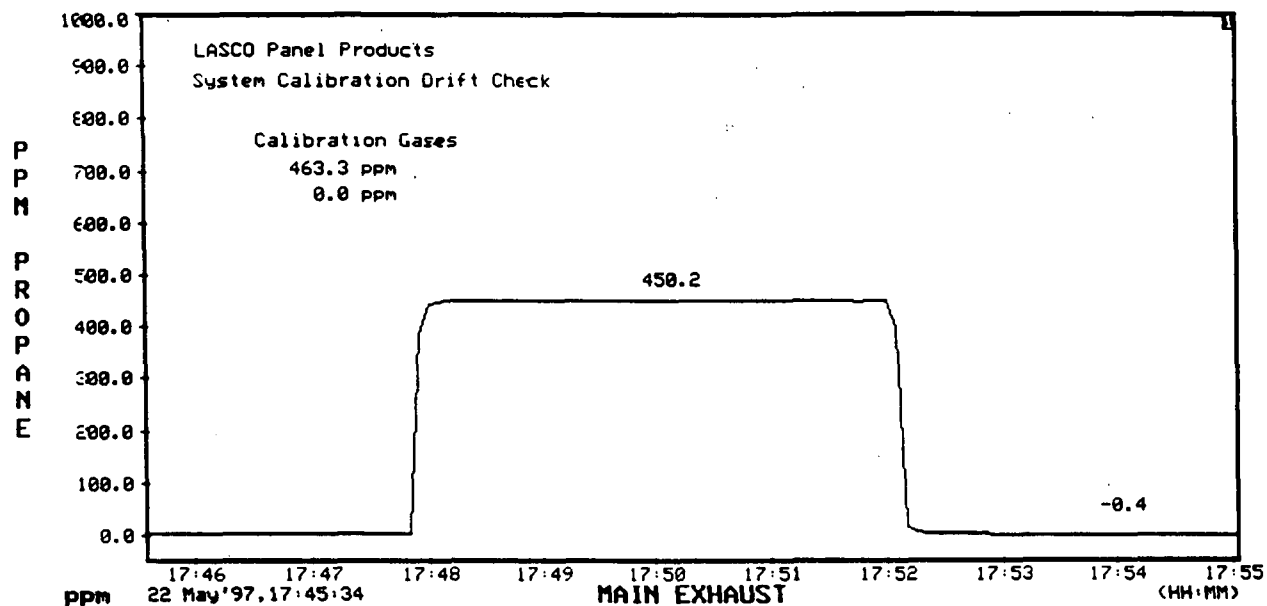
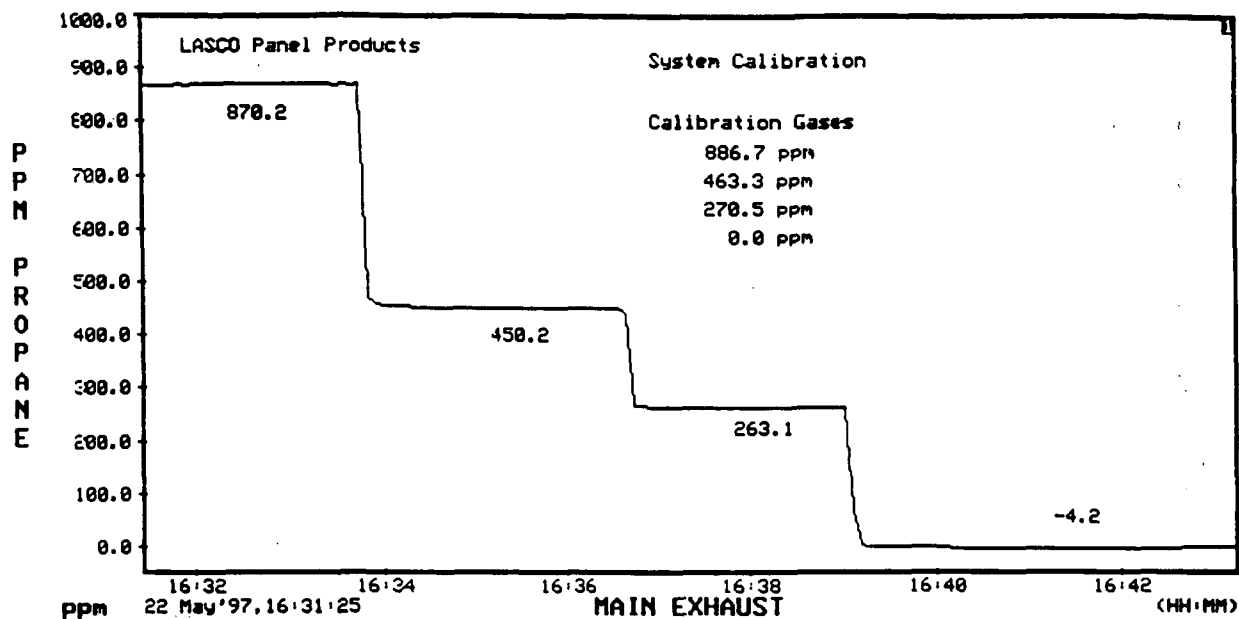
Correlation	0.9999934
Slope	0.9856057
Intercept	-4.4685045

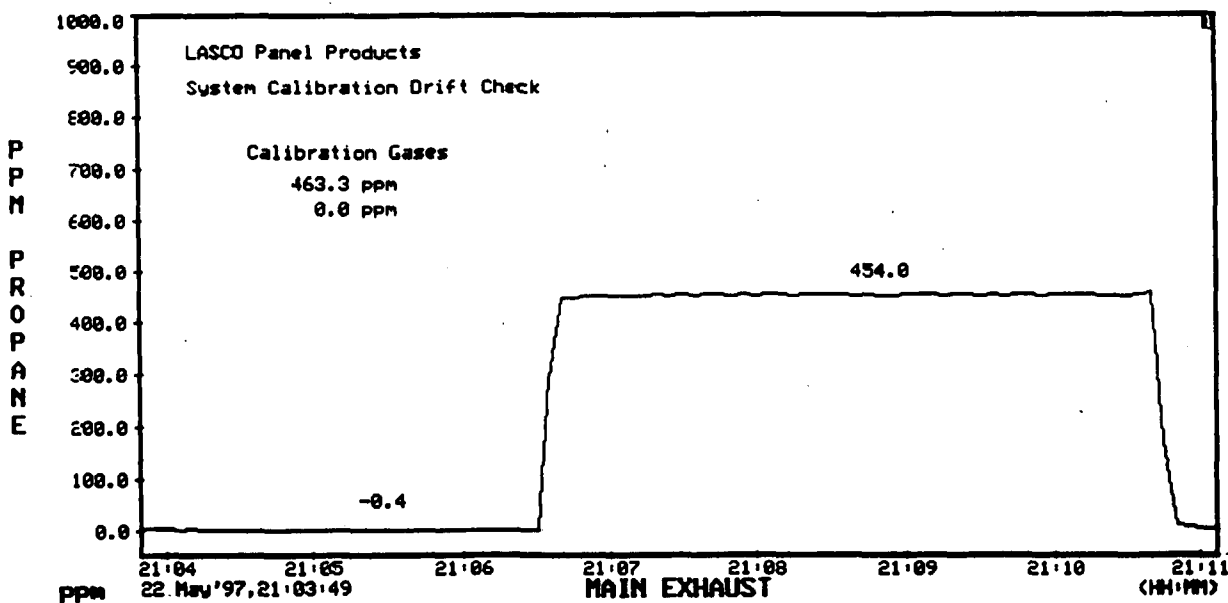
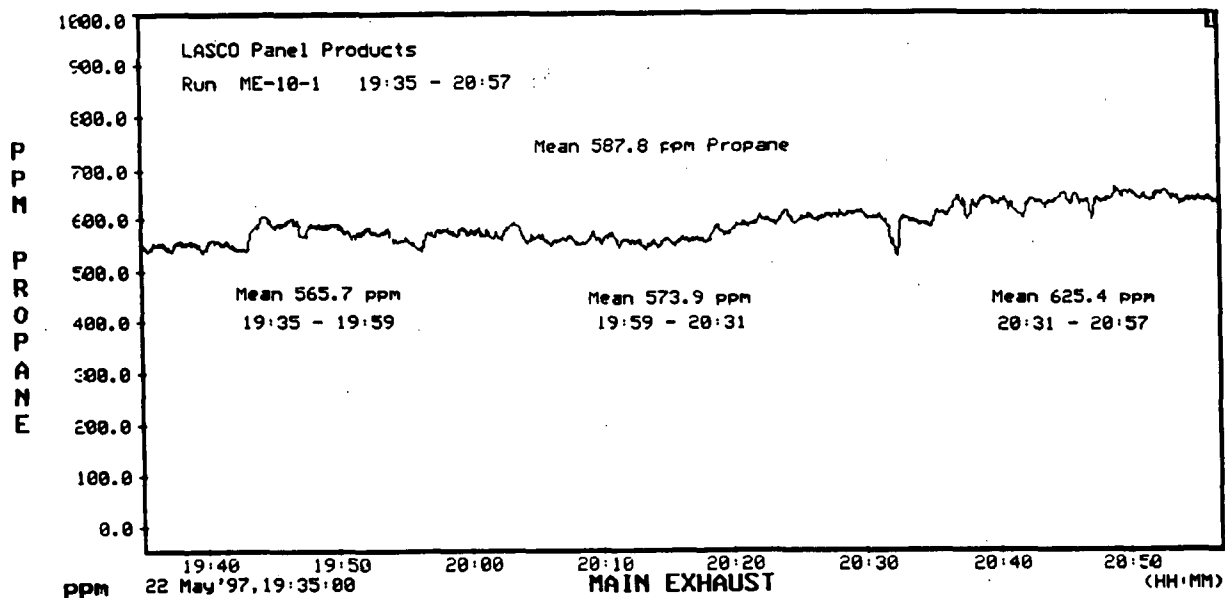
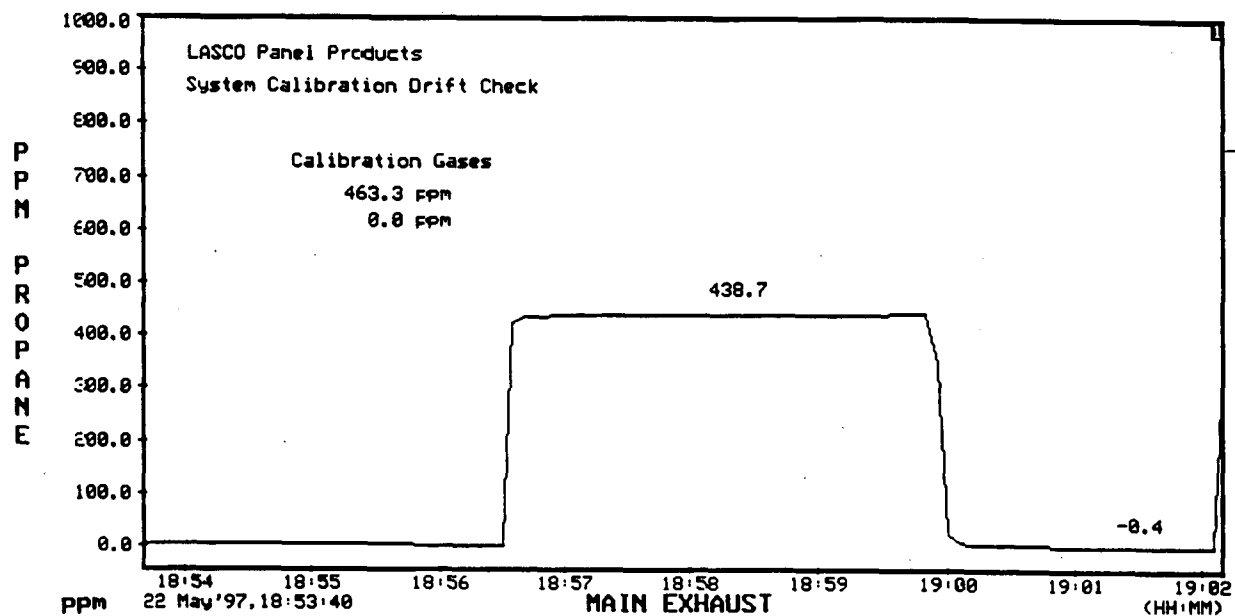
17:45	Post Cal	-0.4	Drift	0.38%
		450.2		0.00%

18:53	Post Cal	-0.4	Drift	0.38%
		438.7		1.15%

19:35-20:57 Run 10-1	587.8	Corrected	600.9	ppm THC
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21:03	Post Cal	-0.4	Drift	0.38%
		454.0		0.38%





LASCO Panel Products

Condition 10 - Room Exhaust

Total Hydrocarbons (THC)

22-May-97

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.2	0.81%
84.1 ppm	85.7	0.45%
270.5 ppm	272.8	
463.3 ppm	463.7	

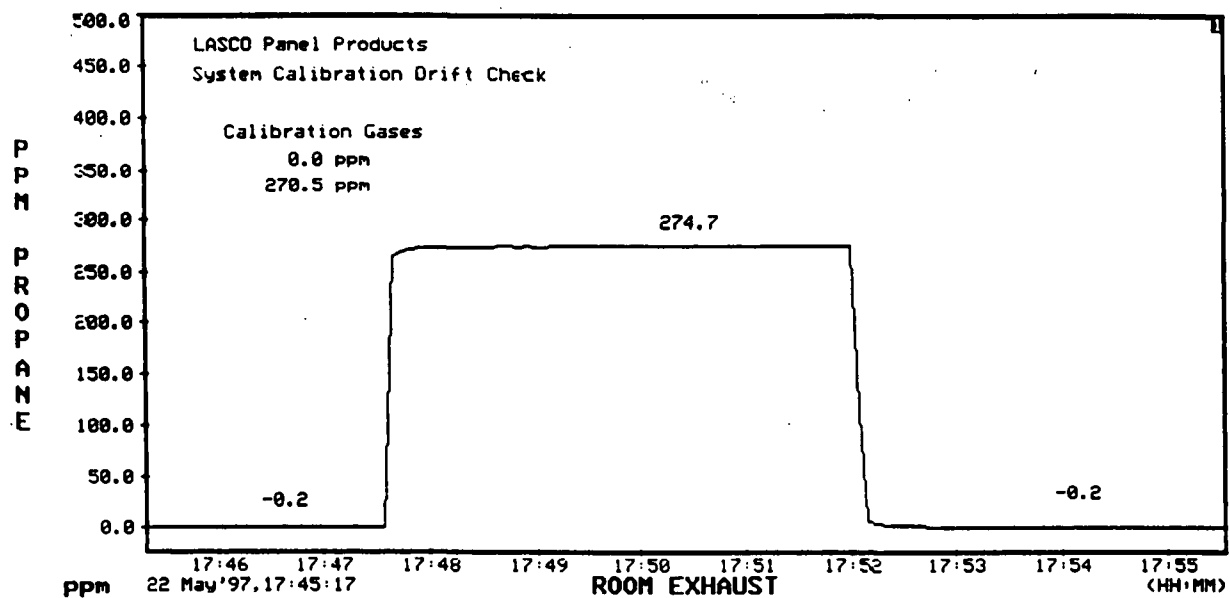
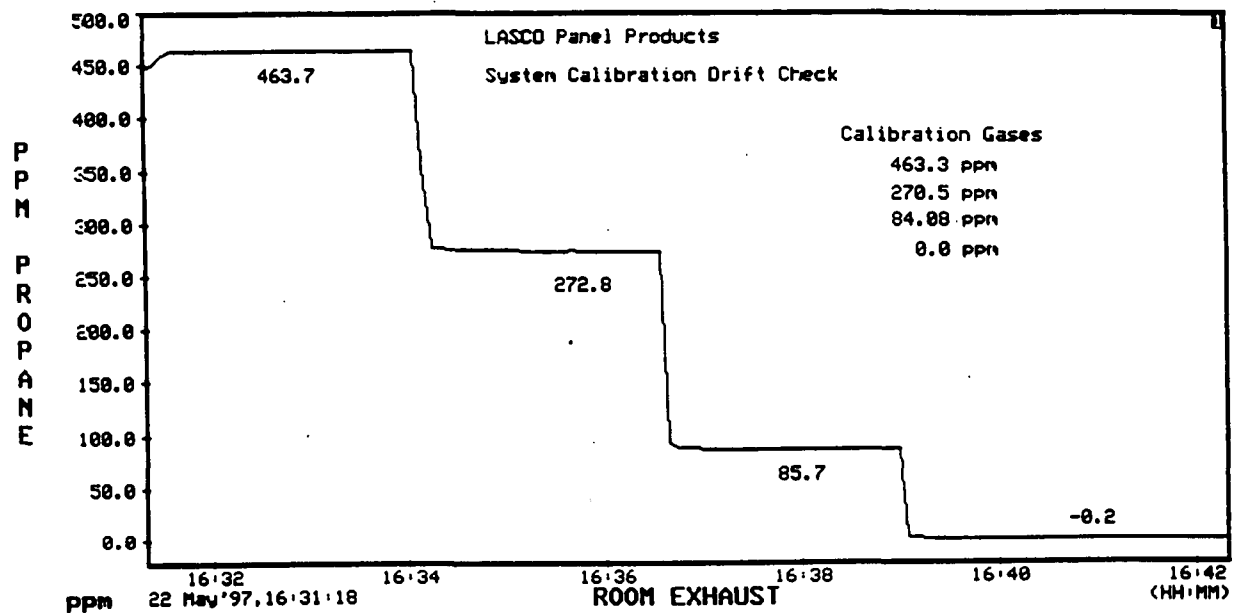
Correlation	0.9999852
Slope	1.0007933
Intercept	0.8678023

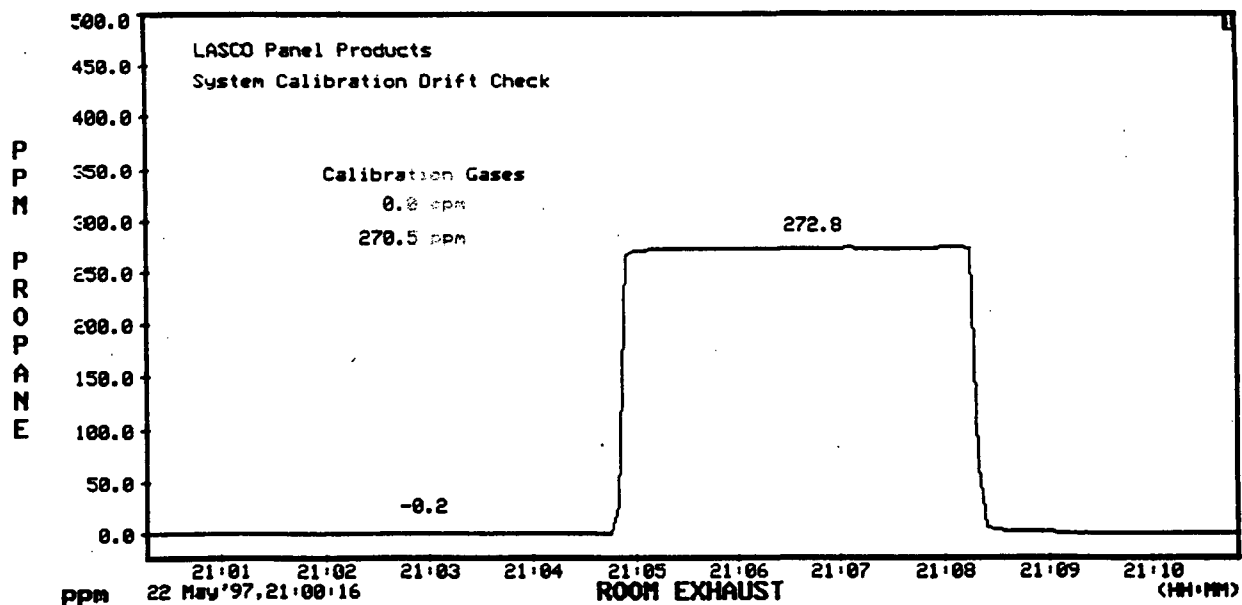
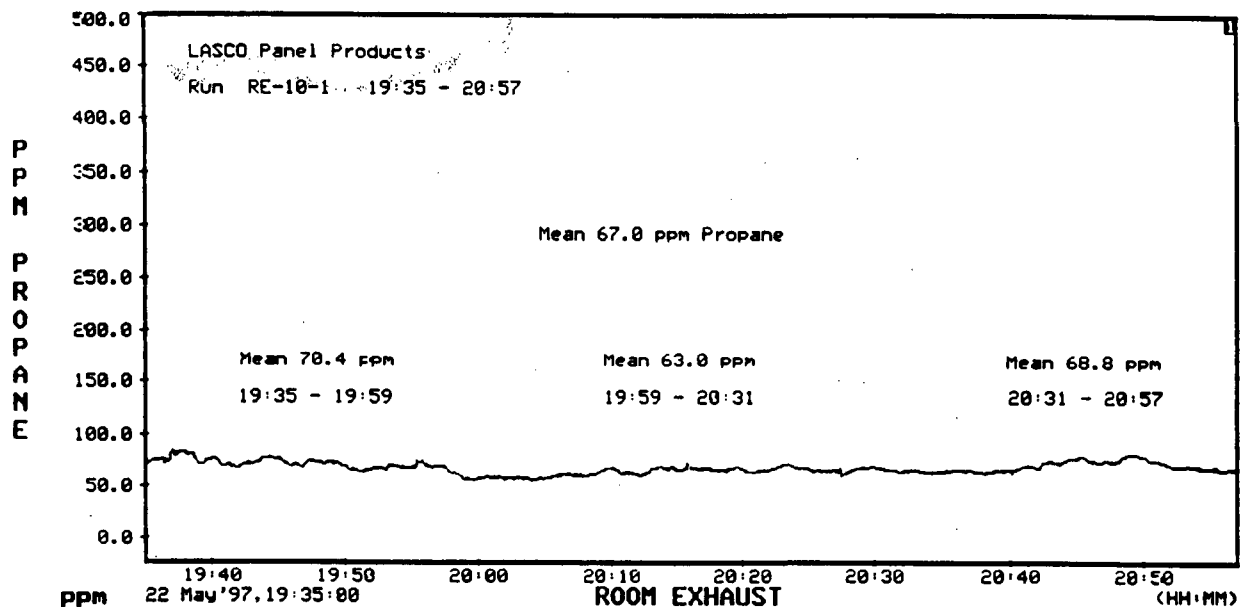
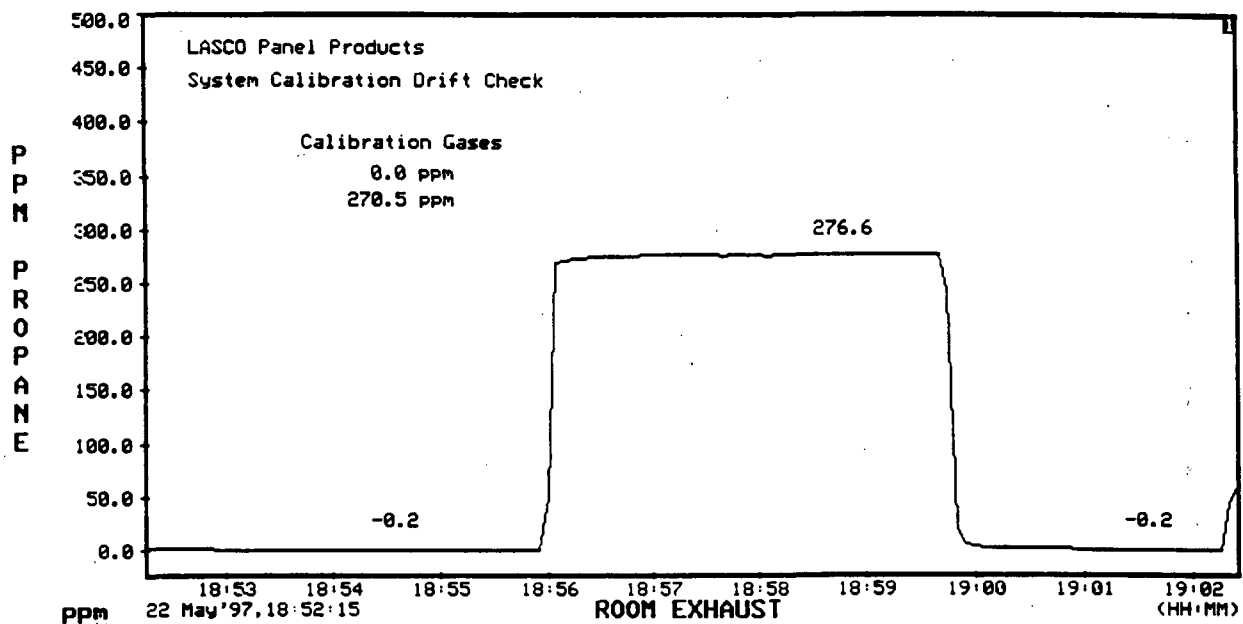
17:45	Post Cal	-0.2	Drift	0.00%
		274.7		0.38%

18:52	Post Cal	-0.2	Drift	0.00%
		276.6		0.76%

19:35-20:57 Run 10-1	67.0	Corrected	66.1	ppm THC
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21:00	Post Cal	-0.2	Drift	0.00%
		272.8		0.00%







INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
 Location: MAIN EXHAUST
 Date: 5-22-97
 Operator: P. SIEGEL
 Project #: 5405.003

Parameter: SO₂, CO₂, O₂, NO_x, THC
 Monitor: ppm or %
 Span Value: 100
 Chart Scale: 0-1000 ppm Propane
 Pbar, in. Hg.: 29.50 (7:30)

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	1.4	1.4		0.0
AAL710	270.5	27.2	27.0	269.2	267.3	0.48	0.2
AAL18513	463.3	46.8	46.0	462.2	454.4	0.24	0.8
ALMO2816	886.7	90.0	88.1	887.6	868.9		1.9

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.141)}{(0.10155)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

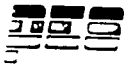
Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 27 s

Precision, % scale = difference in chart division response for two repeated

injections of the gas concentrations = _____ - _____ = _____ %

(Clock time =)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: MAIN EXHAUST Monitor: ppm or %
Date: 5-22-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
Project #: S405.003 Pbar, in. Hg.: ~~29.28~~ 29.28 (18:00)
Time, Pretest: 16:30 Post-test: 21:00 Ambient Temp., F: 70 °F
Run #: ME-9-1, ME-10-1

Cyl. #	Cal. Gas Conc., <u>ppm or %</u>	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		16:30	17:45	18:55	21:00	16:30	17:45	18:55	21:00		
	0	0.0	0.0	0.1	0.1	2.2	2.2	3.2	3.2		0.1
	270.5	26.2				269.1				0.52	
	463.3	45.0	45.0	43.9	45.0	460.6	460.6	449.4	460.6	0.58	1.1
	886.7	87.0				888.5					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} + 0.218)}{(0.09816)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
— sample data. Post-test is used if drift exceeds limits and if post-test
yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: MAIN EXHAUST
Date: 5-22-97

Parameter: SO₂, CO₂, O₂, NO_x* THO, CO
Operator: P. SIEGEL
Project #: S405.003

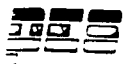
$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.218)}{(0.09816)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
				JUN 1
ME-9-1	18:04 - 18:14	59.5	608.4	
	-18:24	59.5	608.4	
	-18:34	59.0	603.3	
	-18:44	59.5	608.4	
	-18:50	60.0	613.5	AVG = 608.4 ppm Propane
ME-10-1	19:35 - 19:45	55.0	562.5	
	-19:55	58.0	593.1	
	-19:59	56.5	577.8	
	19:59 - 20:09	56.5	577.8	(20:01 ANDY'S TIME)
	-20:19	55.5	567.6	
	-20:29	58.5	598.2	20:31 change -
	-20:39	60.0	613.5	over to new
	-20:49	64.5	659.3	resin
	-20:57	64.0	654.2	611.8 AVG = 597 ppm Propane
	(20:59 ANDY'S TIME)			

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-22-97
Checked By: _____ Date: _____



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: Room EXHAUST Monitor: ppm or %
Date: 5-22-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.28 (18:00)
Time, Pretest: 16:30 Post-test: 21:00 Ambient Temp., F: 70° F
Run #: ME-9-1, ME-10-1

Cyl. #	Cal. Gas Conc., <u>ppm or %</u>	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		16:30	17:45	18:55	21:00	16:30	17:45	18:55	21:00		
	0	0.0	0.0	0.0	0.0	-1.8	-1.8	-1.8	-1.8		0.0
	84.08	17.7				85.8				2.05	
	270.5	55.2	55.3	55.8	55.0	271.4	271.9	274.4	270.4	0.33	0.8
	463.3	93.8				462.5					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.363)}{(0.20205)}$$

$$\text{Correlation Coefficient} = \underline{0.99997}$$

$$** \text{ Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$*** \text{ Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

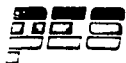
Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
— sample data. Post-test is used if drift exceeds limits and if post-test
yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: Room EXHAUST
Date: 5-22-97

Parameter: SO₂, CO₂, O₂, NO_x, ~~THC~~, CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.363)}{(0.20205)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
RE-9-1	18:04-18:14	18.5	89.8	JUN 5
	-18:24	16.5	79.9	
	-18:34	16.5	79.9	
	-18:44	16.5	79.9	
	-18:50	15.5	74.9	AVG = 80.9 ppm Propane
ME-10-1	19:35-19:45	15.0	72.4	
	-19:55	14.5	70.0	
	-19:59	14.0	67.5	
	19:59-20:09	12.0	57.6	(20:01 ANDY'S TIME)
	-20:19	13.0	62.5	
	-20:29	13.5	65.0	20:31 Change-
	-20:39	13.0	62.5	over to new
	-20:49	15.0	72.4	resin
	-20:57	15.0	72.4	AVG = 66.9 ppm Propane
	(20:59 ANDY'S TIME.)			

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: P. T. Siegel
Checked By: _____

Date: 5-22-97
Date: _____

APPENDIX A.2.12

Condition 11 Method 25A

LASCO Panel Products

Condition 11 - Main Exhaust

Total Hydrocarbons (THC)

23-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-4.2	-4.2
270.5 ppm	270.7	274.5
463.3 ppm	461.6	469.3
886.7 ppm	889.3	908.4

Correlation 0.9999932
Slope 1.0067724
Intercept -3.5186578

Correlation 0.9999901
Slope 1.0286487
Intercept -4.731321

Sampling System Bias
0.00%
0.38%
0.77%
1.91%

Calibration Error

0.35%
0.53%

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	270.7	0.43%
463.3 ppm	465.5	0.33%
886.7 ppm	896.9	

Correlation 0.999991
Slope 1.0123942
Intercept -1.9711902

09:12-10:12 Run 11-1 552.3 Corrected 547.5 ppm THC

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	270.7	0.30%
463.3 ppm	465.5	0.08%
886.7 ppm	893.1	

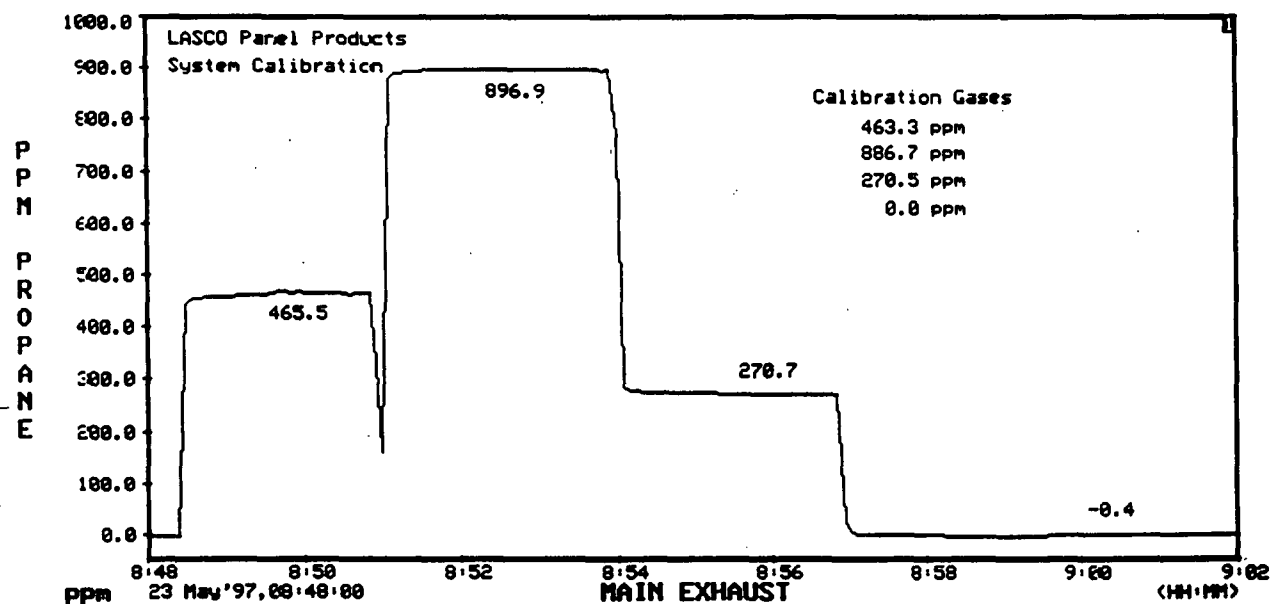
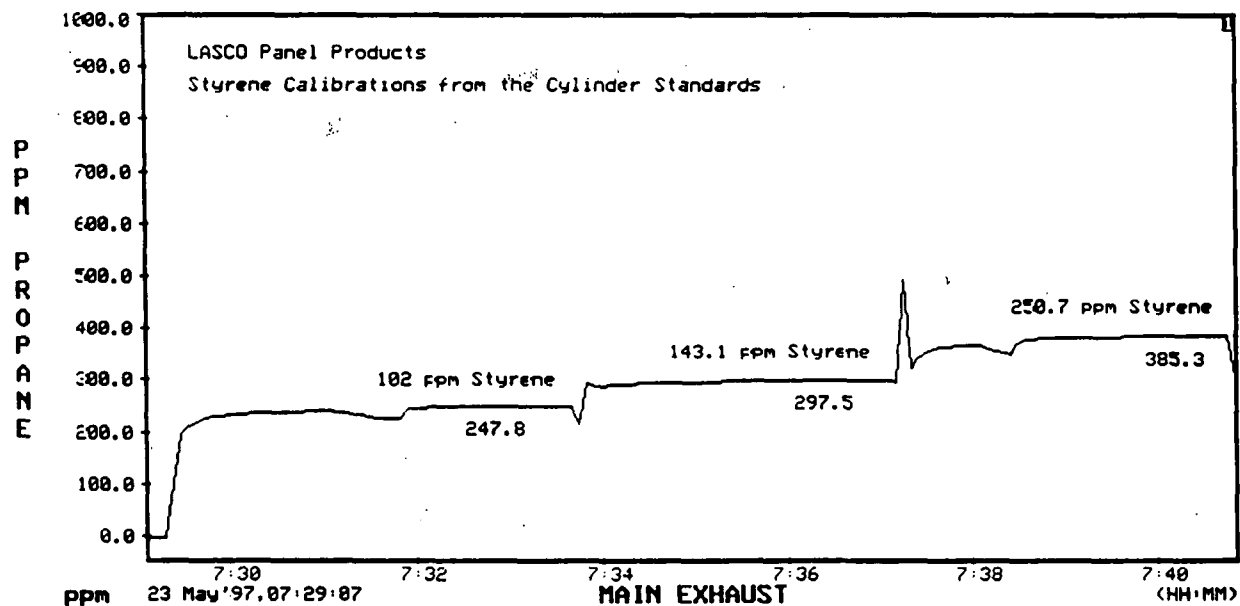
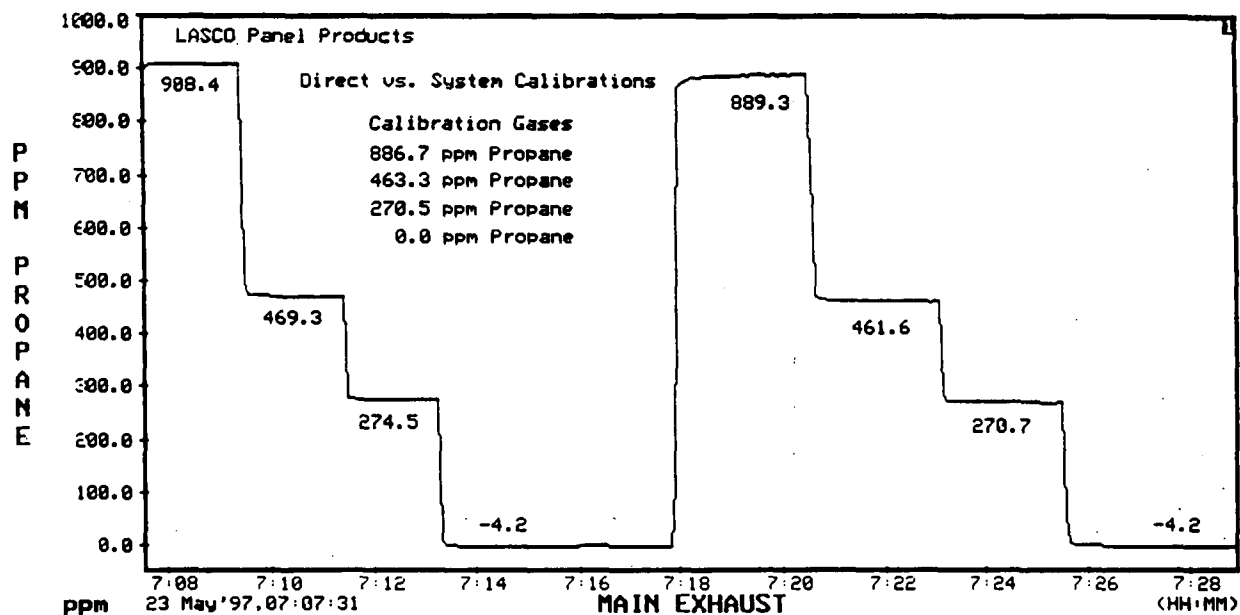
Correlation 0.9999982
Slope 1.0080115
Intercept -1.1456555

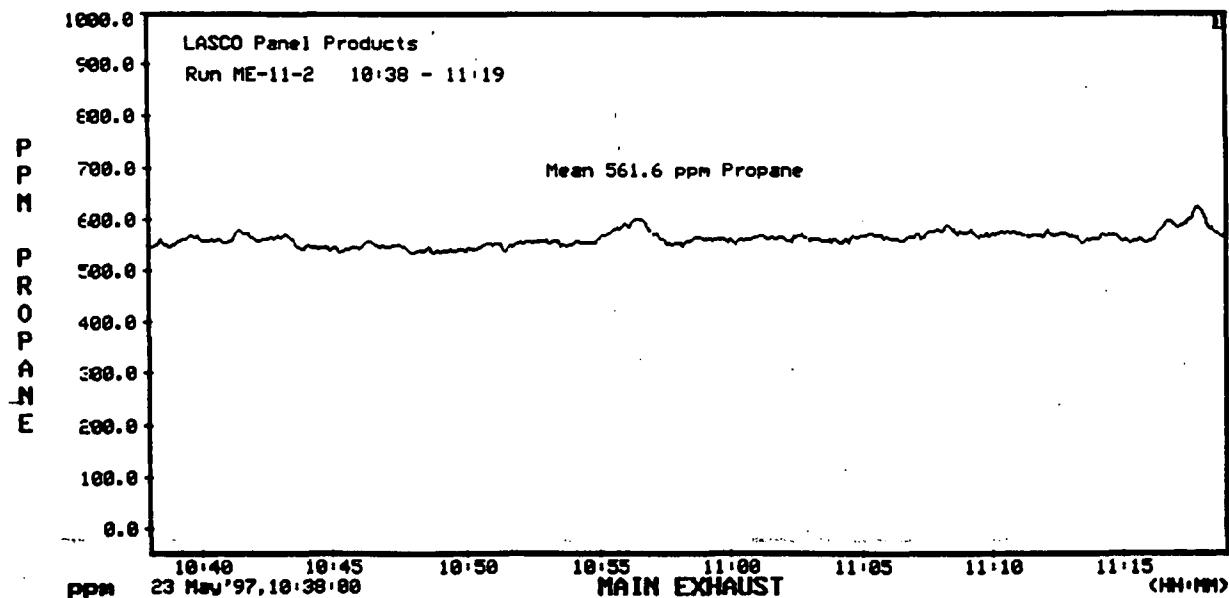
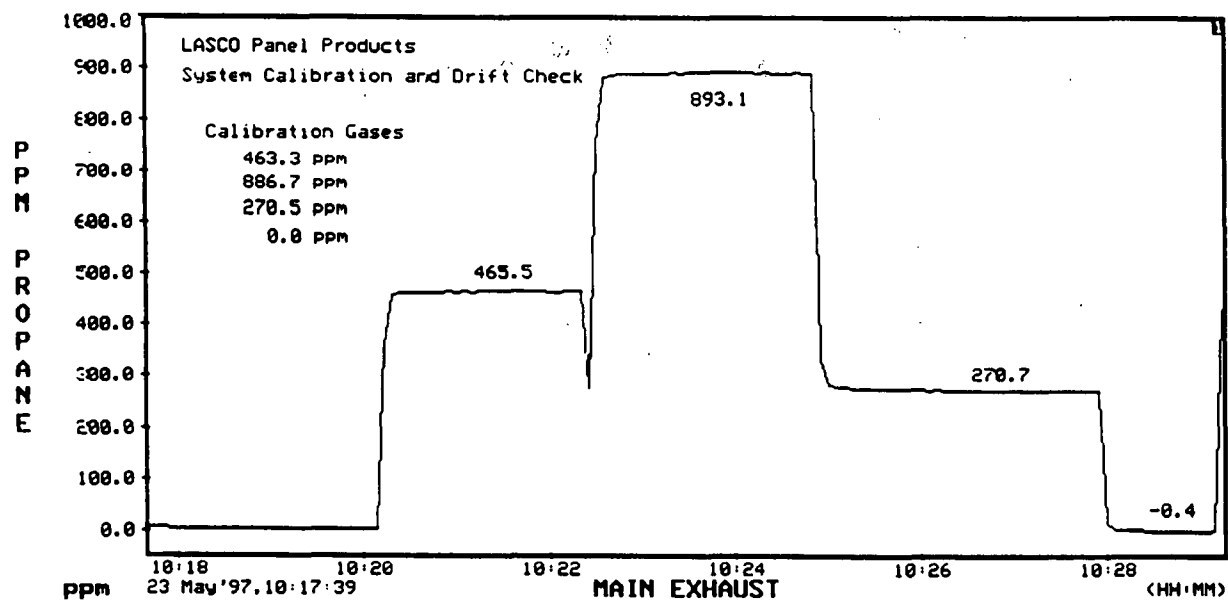
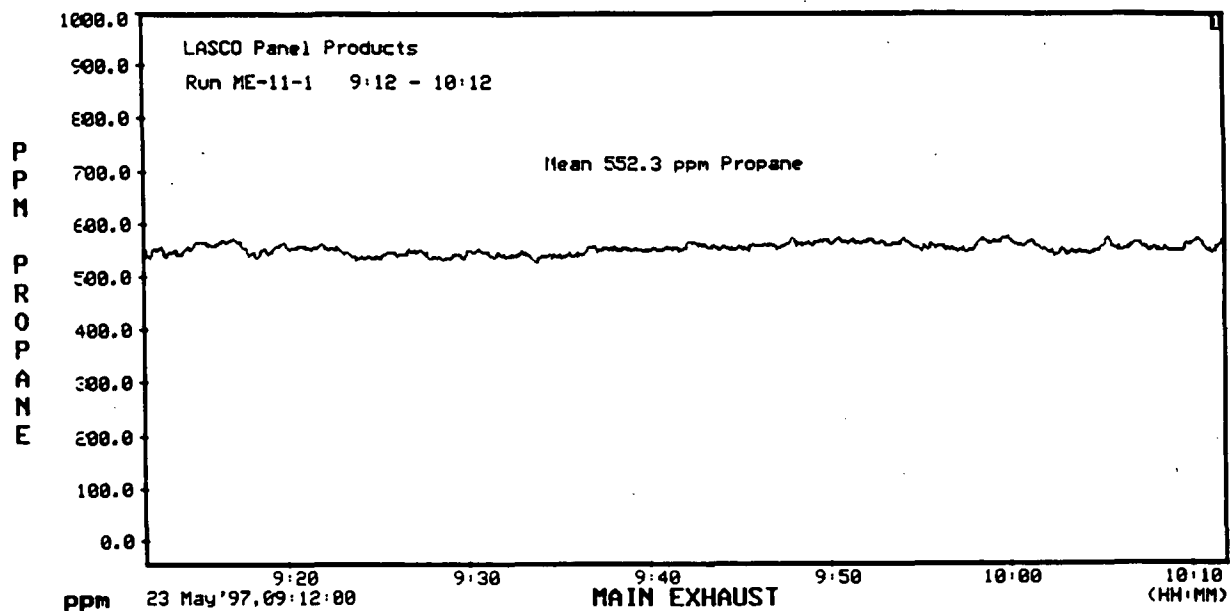
10:38-11:19 Run 11-2 561.6 Corrected 558.3 ppm THC

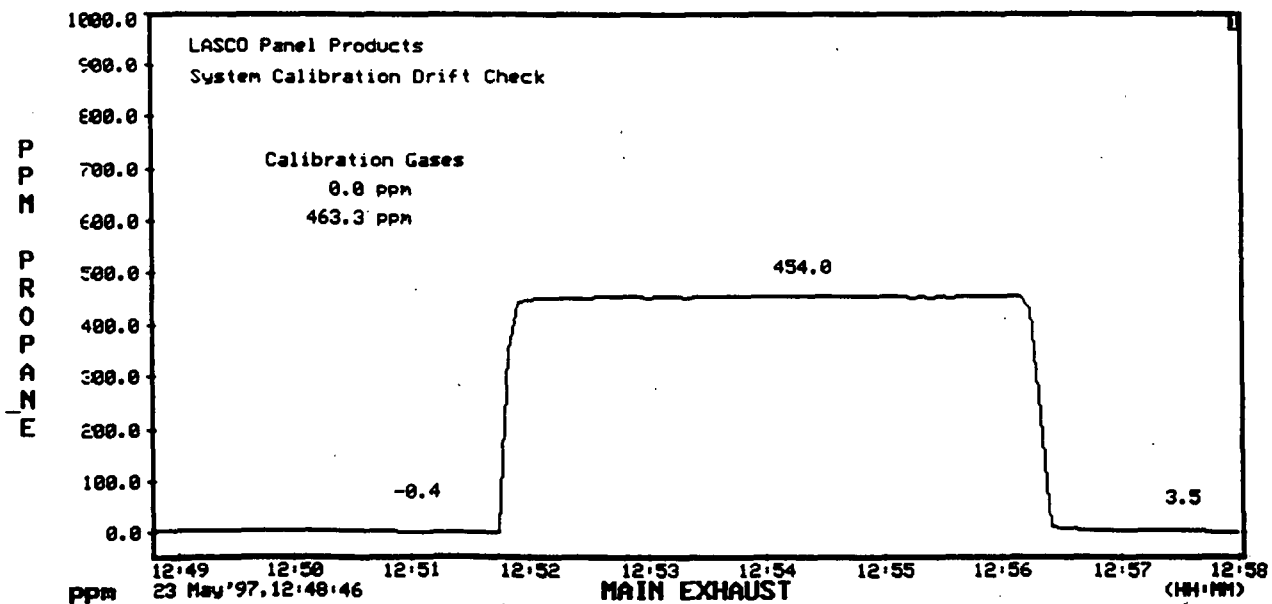
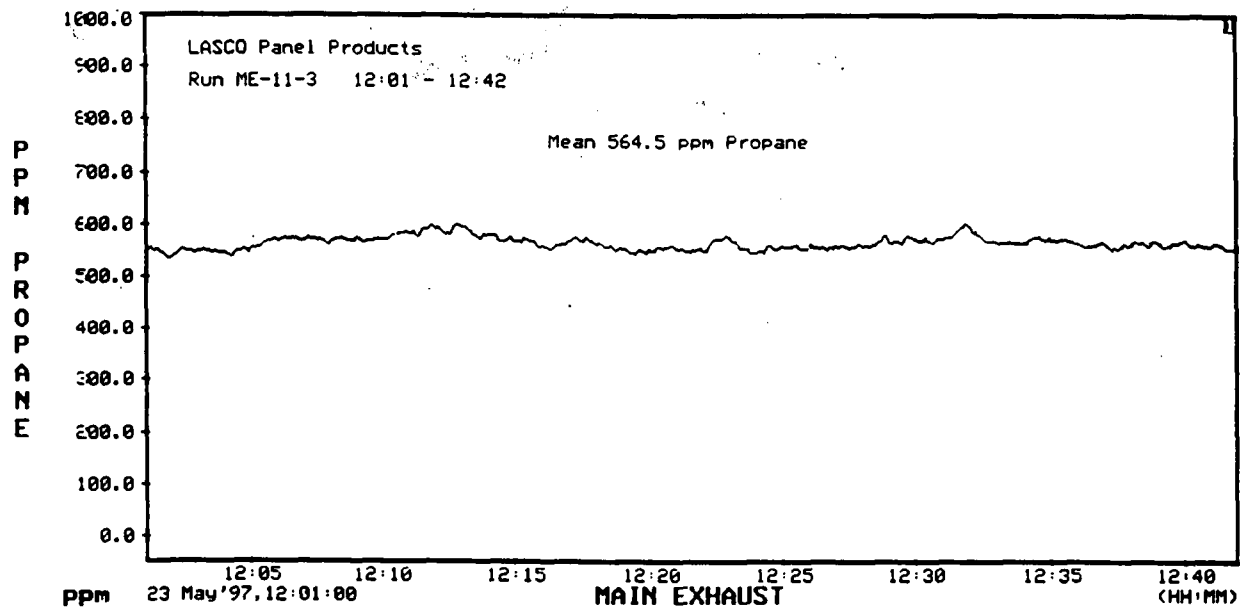
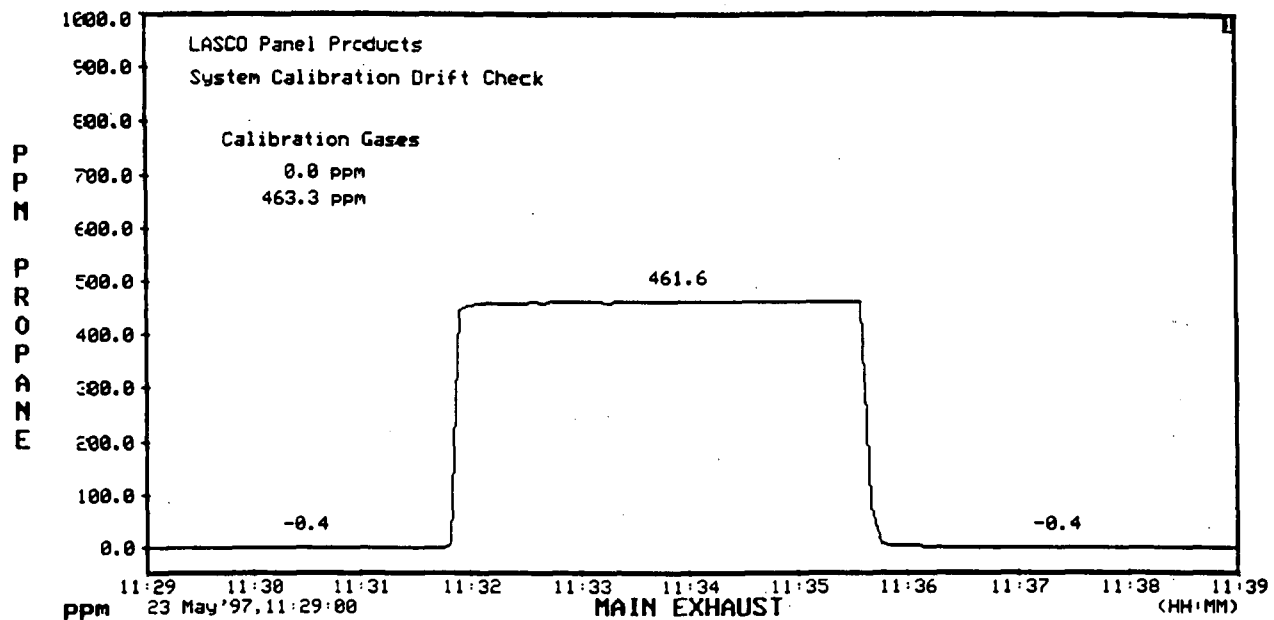
11:29 Post Cal -0.4 Drift 0.00%
461.6 0.39%

12:01-12:42 Run 11-3 564.5 Corrected 561.2 ppm THC

12:48 Post Cal 3.5 Drift 0.39%
454.0 1.15%







LASCO Panel Products

Condition 11 - Room Exhaust

Total Hydrocarbons (THC)

23-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-0.2	-0.2
84.1 ppm	83.8	85.7
270.5 ppm	269.0	276.6
463.3 ppm	458.0	471.4

Correlation 0.9999922
Slope 0.9890624
Intercept 0.4164193

Correlation 0.9999947
Slope 1.0183712
Intercept 0.1486426

Sampling System Bias
0.00%
0.38%
1.52%
2.68%

Calibration Error

0.09%
0.36%

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.2	
84.1 ppm	85.7	1.75%
270.5 ppm	269.0	0.53%
463.3 ppm	456.1	

Correlation 0.999966
Slope 0.9834181
Intercept 1.5705042

09:12-10:12 Run 11-1 115.9 Corrected 116.3 ppm THC

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	1.7	
84.1 ppm	87.6	0.38%
270.5 ppm	276.6	0.68%
463.3 ppm	467.5	

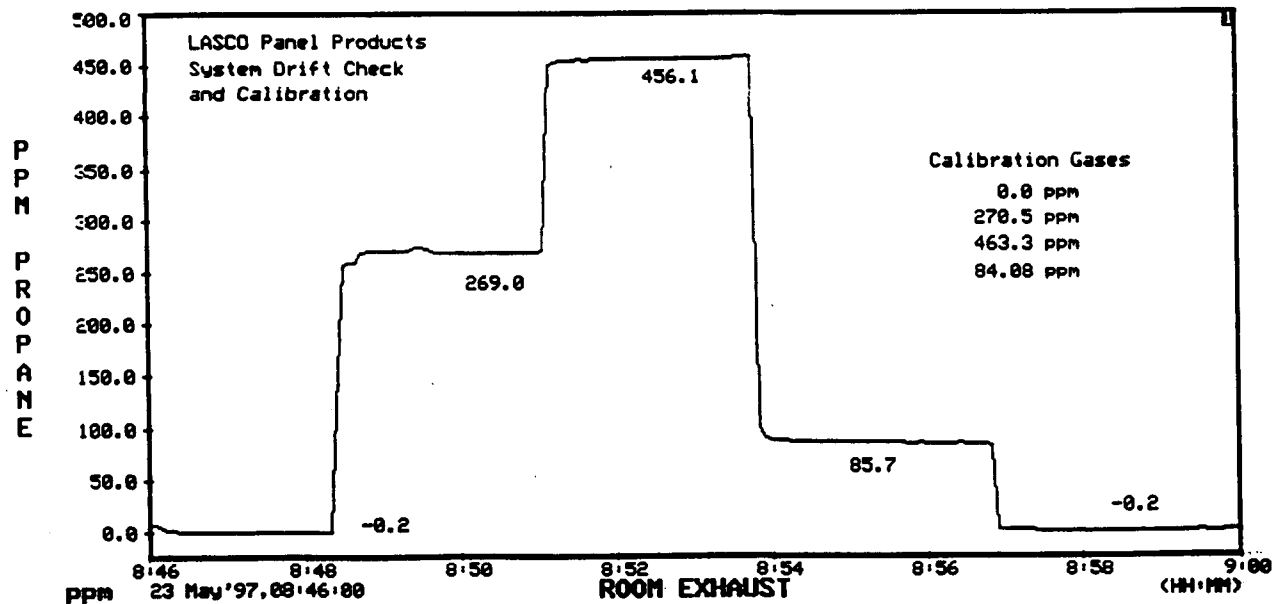
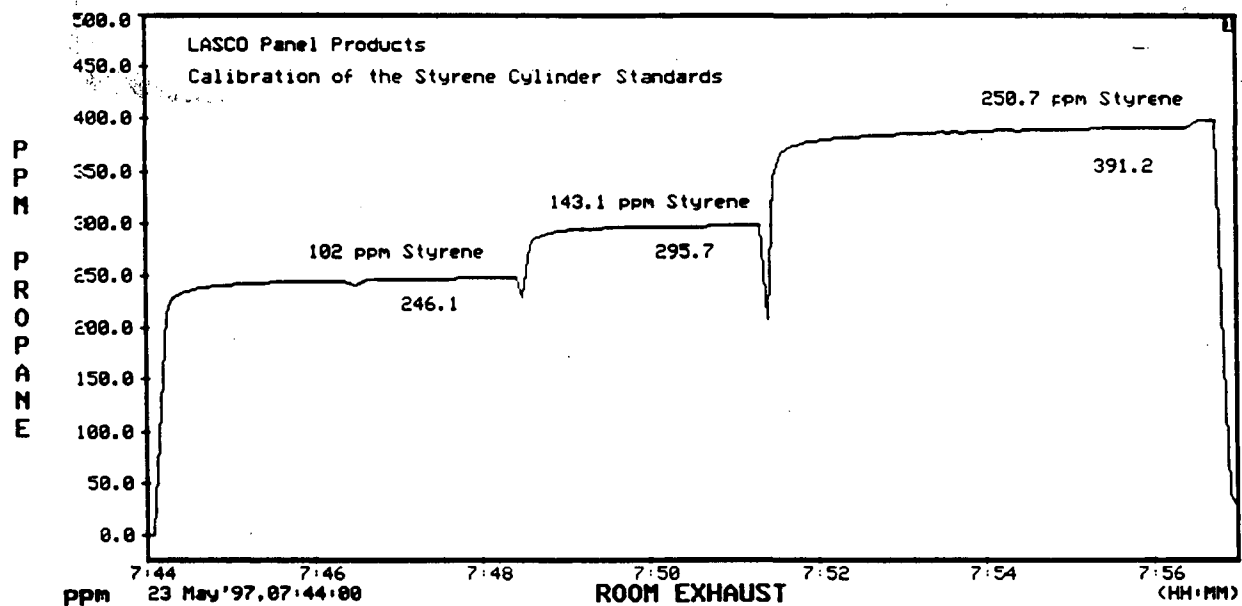
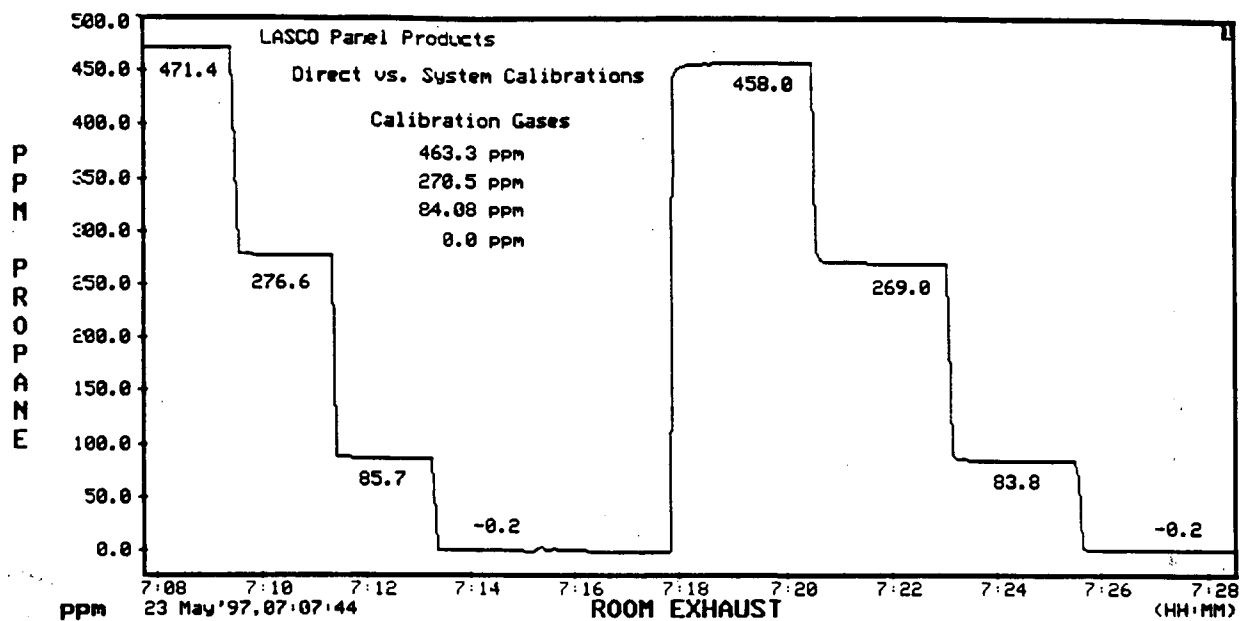
Correlation 0.9999773
Slope 1.0056284
Intercept 2.7291519

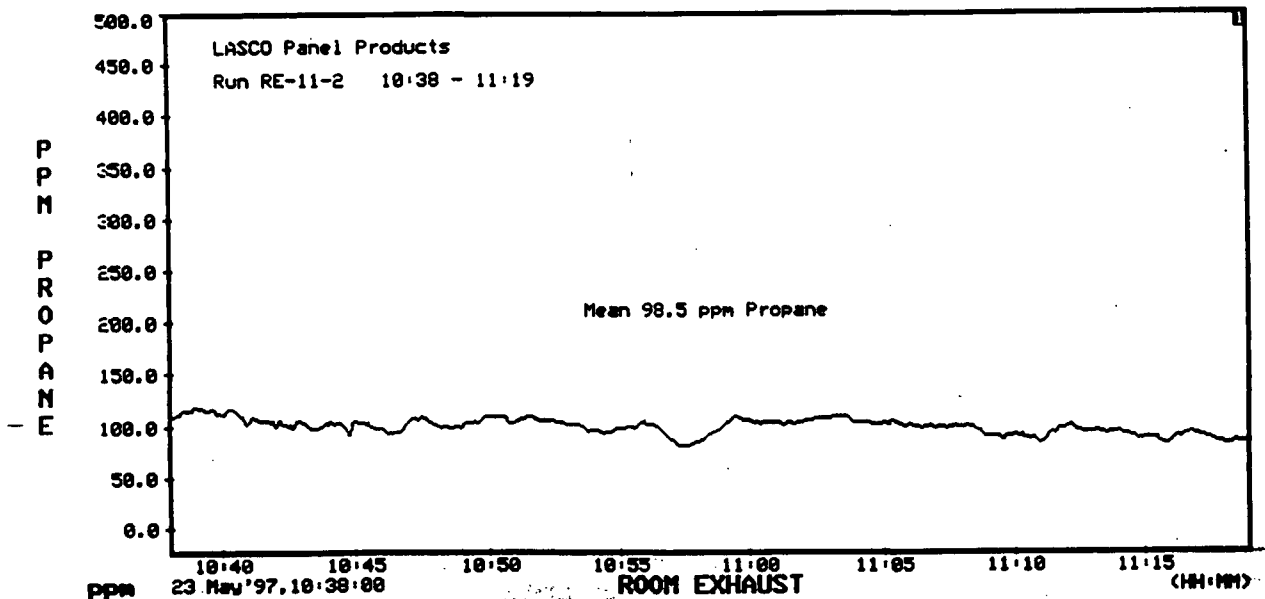
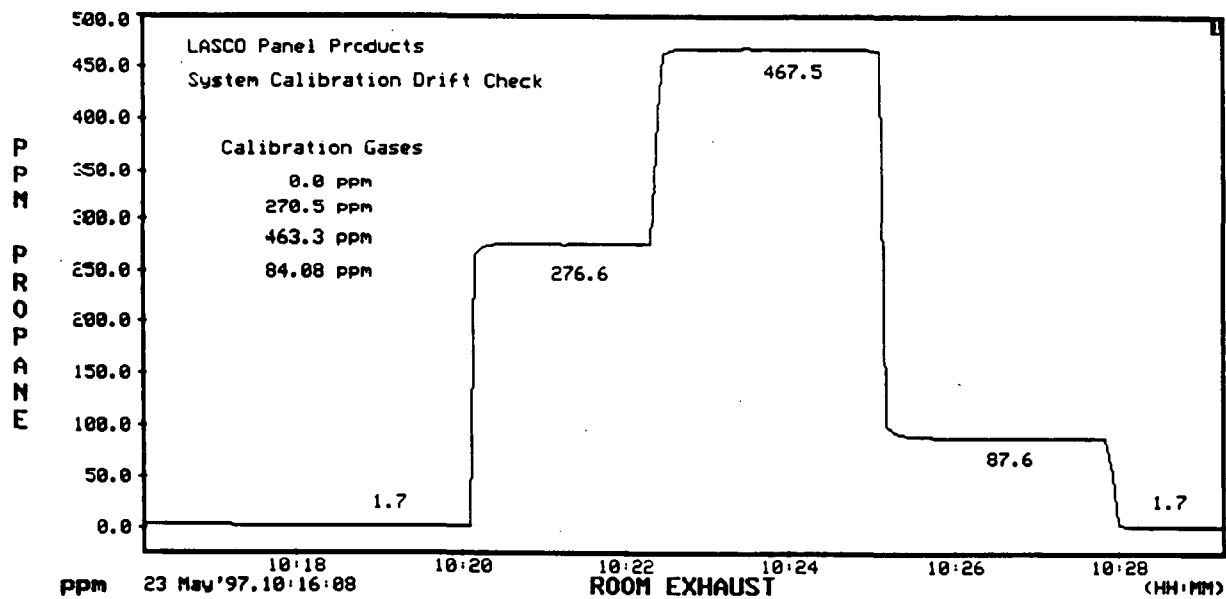
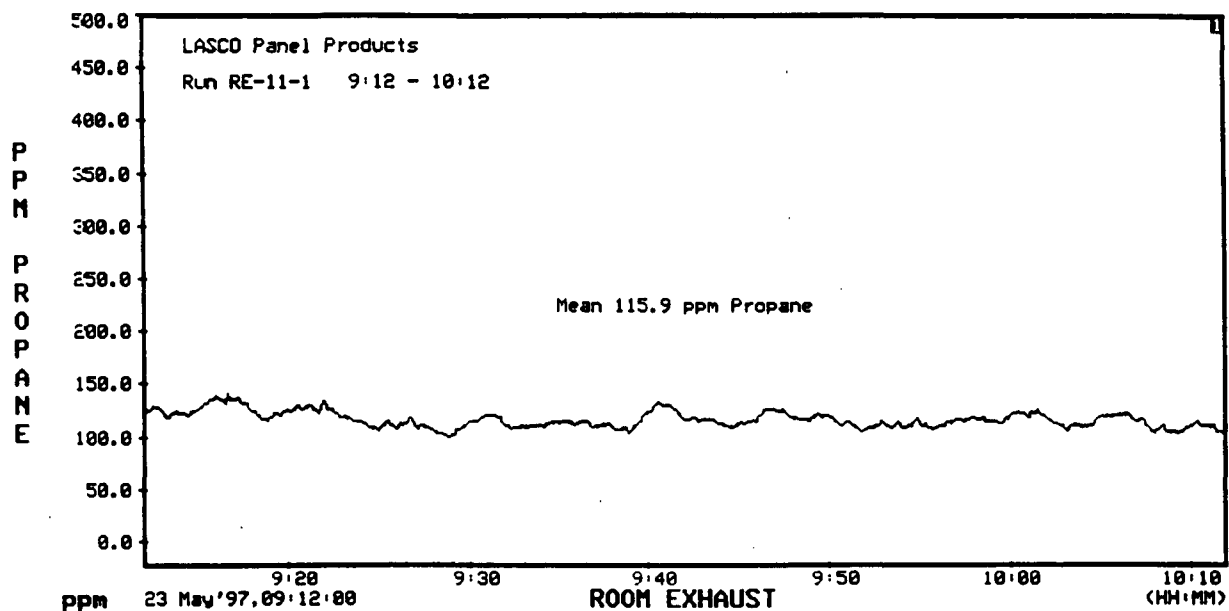
10:38-11:19 Run 11-2 98.5 Corrected 95.2 ppm THC

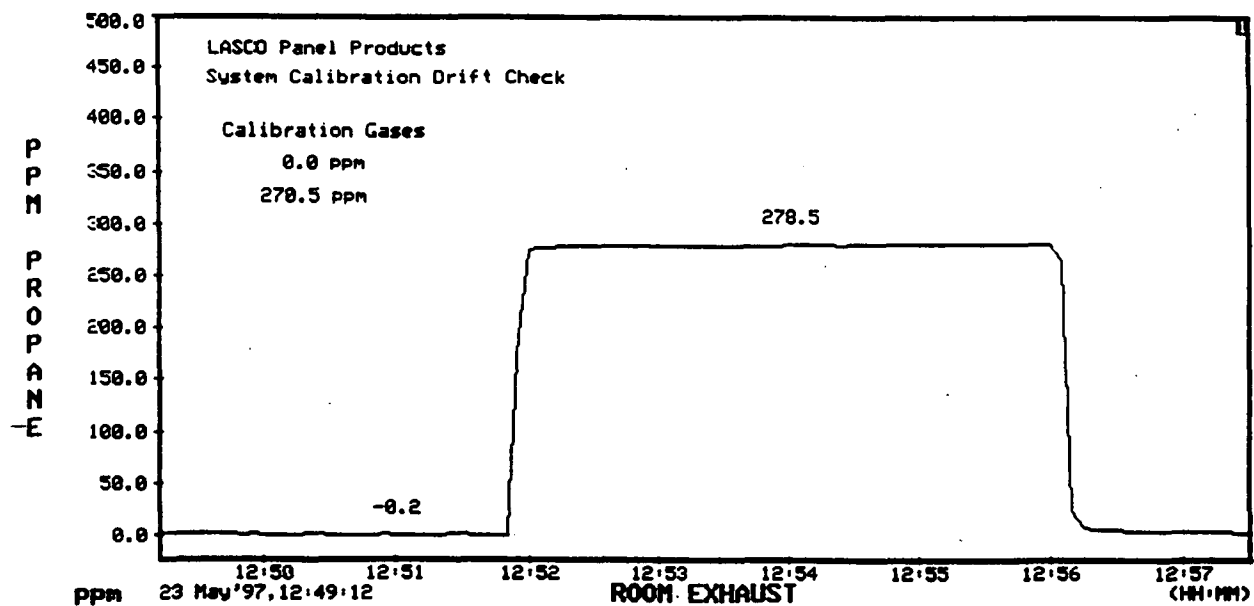
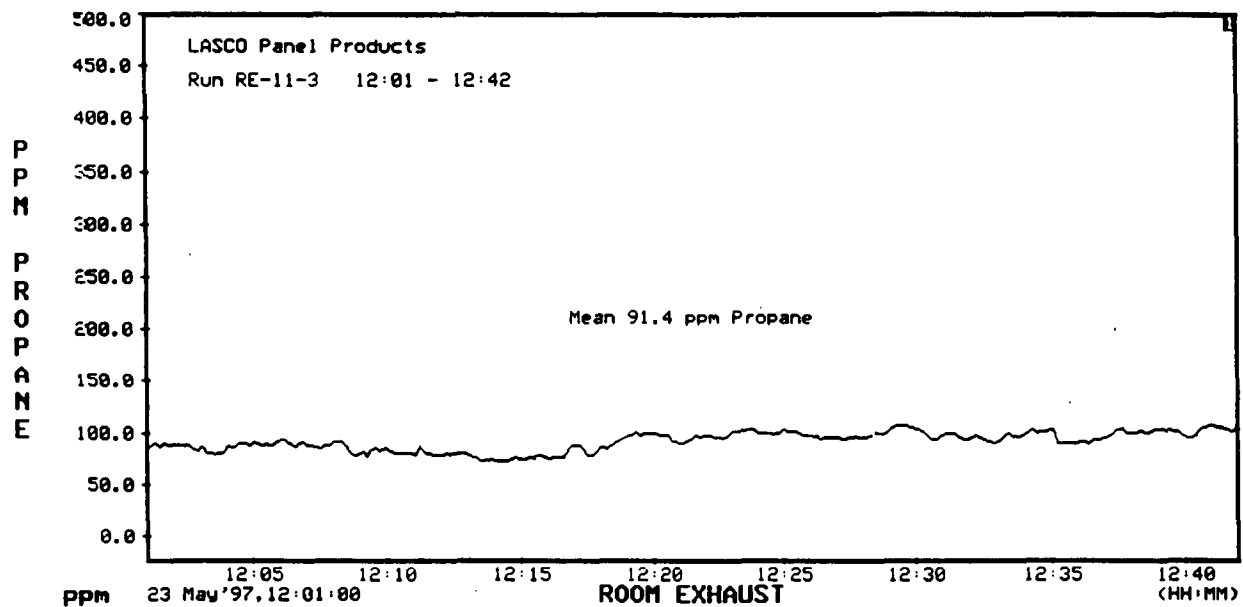
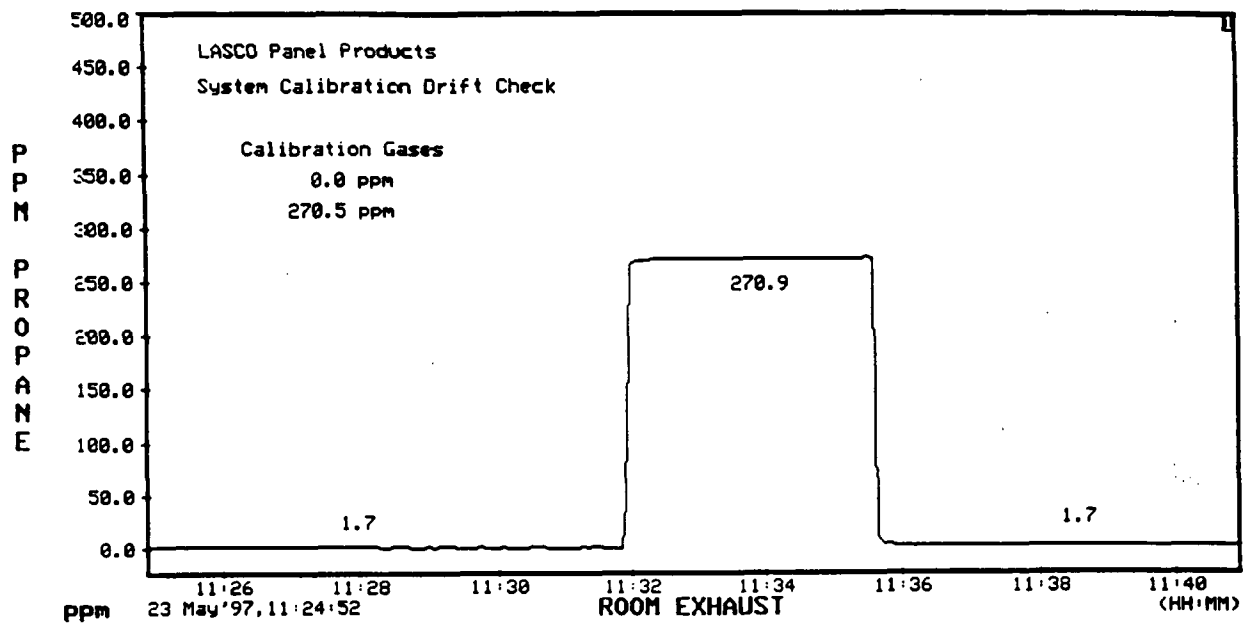
11:24 Post Cal 1.7 Drift 0.00%
270.9 1.14%

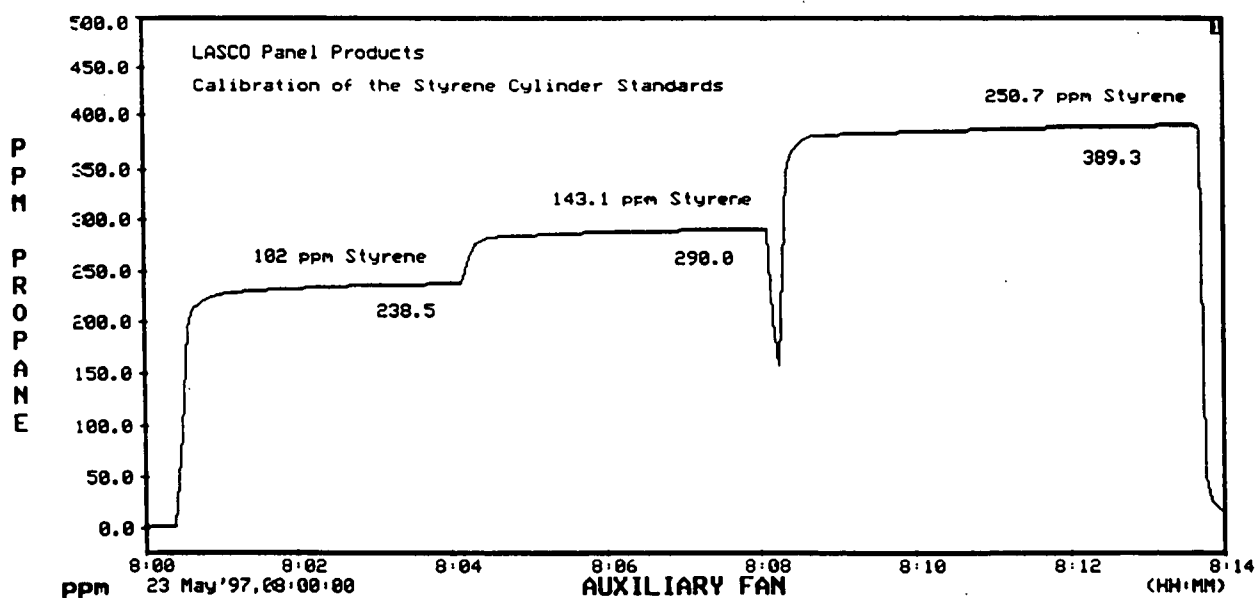
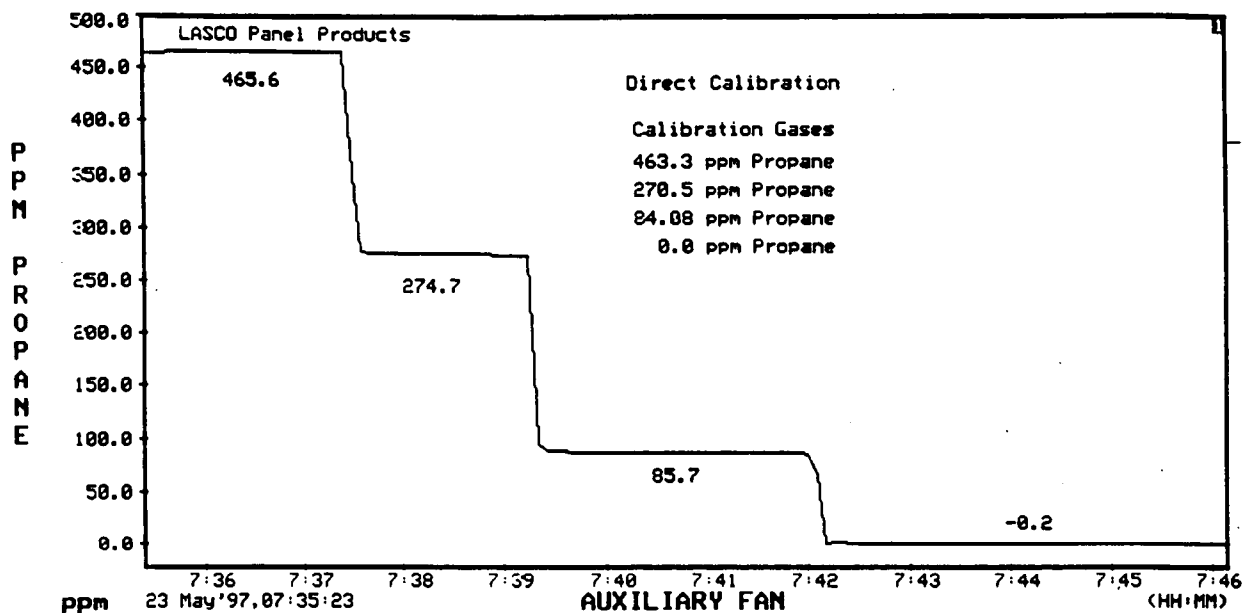
12:01-12:42 Run 11-3 91.4 Corrected 88.2 ppm THC

12:49 Post Cal -0.2 Drift 0.38%
278.5 0.38%











INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
 Location: MAIN EXHAUST
 Date: 5-23-97
 Operator: P. SIEGEL
 Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x, THC
 Monitor: ppm or %
 Span Value: 100
 Chart Scale: 0-1000 ppm Propane
 Pbar, in. Hg.: 29.48 (8:30)

Cylinder #	Cal. Gas Conc., ppm or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	1.8	1.8		0.0
AAL710	270.5	27.5	27.0	270.0	265.2	0.18	0.5
AAL18513	463.3	47.0	46.0	460.2	450.5	0.67	1.0
ALMO28161	886.7	90.9	89.0	888.4	869.9		1.9

- * Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.183)}{(0.10252)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

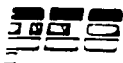
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 27 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: MAIN EXHAUST Monitor: ppm or %
Date: 5-23-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.48
Time, Pretest: 8:50 Post-test: 12:50 Ambient Temp., F: 65°F
Run #: ~~ME-11-1, ME-11-2, ME-11-3~~ ME-11-1, ME-11-2, ME-11-3

Cyl. #	Cal. Gas Conc., <u>ppm or %</u>	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		8:50	10:15	11:25	12:50	8:50	10:15	11:25	12:50		
	0	0.0	0.2	0.0	0.2	2.3	4.3	2.3	4.3		0.2
	270.5	27.1	27.1			269.5	269.5			0.37	
	463.3	46.4	46.1	46.0	45.1	459.9	456.9	455.9	447.0	0.73	1.3
	886.7	89.9	89.1			888.8	880.9				

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} + 0.235)}{(0.10141)}$$

$$\text{Correlation Coefficient} = \underline{0.99997}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: MAIN EXHAUST
Date: 5-23-97

Parameter: SO₂, CO₂, O₂, NO_x, THC, CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} + 0.235)}{(0.10141)}$$

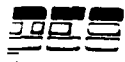
Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
PS ME-11-1	9:12 - 9:22	55.0	544.7	Sum 1
	-9:32	54.0	534.8	
	-9:42	54.5	539.7	
	-9:52	56.0	554.5	
	-10:02	56.0	554.5	
	-10:12	55.5	549.6	AVG = 546.3 ppm Propane
	-10:15			
PS ME-11-2	10:38 - 10:48	55.5	549.6	
	-10:58	56.5	555.0	
	-11:08	56.5	559.4	
	-11:18	57.0	564.4	
	-11:19			AVG = 554.5 ppm Propane
PS ME-11-1	12:01 - 12:11	55.5	549.6	Phan = 29.25 "Hg
	-12:21	57.0	564.4	
	-12:31	55.5	549.6	
	-12:41	57.0	564.4	AVG = 557.0 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: P. Siegel
Checked By: _____

Date: 5-23-97
Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
 Location: Room EXHAUST
 Date: 5-23-97
 Operator: P. SIEGEL
 Project #: 5405.003

Parameter: SO₂, CO₂, O₂, NO_x, THC
 Monitor: ppm or %
 Span Value: 100
 Chart Scale: 0-500 ppm Propane
 Pbar, in. Hg.: 29.48

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	-1.6	-1.6		0.0
ALM028660	8084.08	17.8	17.2	85.3	82.4	1.45	0.6
AAL710	270.5	56.0	54.6	271.9	265.0	0.52	1.4
AAL18513	463.3	95.0	92.2	462.3	448.6		2.8

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.325)}{(0.20480)}$$

$$\text{Correlation Coefficient} = \underline{0.99997}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 29 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, (THC)
Location: Room Exhaust Monitor: ppm or %
Date: 5-23-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.48
Time, Pretest: 8:50 Post-test: 12:50 Ambient Temp., F: 65°F
Run #: RE-11-1, RE-11-2, RE-11-3

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		8:50	10:15	11:25	12:50	8:50	10:15	11:25	12:50		
	0	0.1	0.3	0.1	0.1	-1.7	-0.7	-1.7	-1.7		0.2
	84.08	17.4	18.0			85.7	88.7			1.93	
	270.5	54.2	55.8	54.9	56.1	271.5	279.6	275.1	281.1	0.37	1.6
	463.3	92.0	94.5			462.4	475.0				

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.439)}{(0.19800)}$$

$$\text{Correlation Coefficient} = \underline{0.99997}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate

sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x*, THC, CO
Location: Room EXHAUST Operator: P. SIEGEL
Date: 5-23-97 Project #: 5405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.439)}{(0.19800)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
PTS 11- RE-1	9:12 - 9:22	25.5	126.6	JUN 5
	-9:32	23.0	113.9	
	-9:42	23.0	113.9	
	-9:52	24.0	119.0	
	-10:02	23.0	113.9	
	-10:12	23.0	113.9	AVG = 116.9 ppm Propane
	-10:15			
PTS 11 RE-2	10:38 - 10:48	21.0	103.8	
	-10:58	21.5	106.4	
	-11:08	20.0	98.8	
	-11:18	19.0	93.7	AVG = 100.7 ppm Propane
	-11:19			
PTS 11 RE-3	12:01 - 12:11	18.0	88.7	Phac = 29.25 "Hg
	-12:21	17.5	86.2	
	-12:31	20.0	98.8	
	-12:43	20.0	98.8	AVG = 93.1 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: P. T. Siegel Date: 5-23-97
Checked By: _____ Date: _____

APPENDIX A.2.13

Condition 12 Method 25A

LASCO Panel Products

Condition 12 - Main Exhaust

Total Hydrocarbons (THC)

29-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-4.2	-4.2
270.5 ppm	266.9	270.7
463.3 ppm	457.8	465.5
886.7 ppm	881.6	900.7

Correlation	0.9999983	Correlation	0.9999926
Slope	0.9985874	Slope	1.0204638
Intercept	-4.0277298	Intercept	-5.240394

Sampling System Bias	Calibration Error
0.00%	
0.38%	0.03%
0.77%	0.43%
1.91%	

8:37 - 9:37 Run 12-1 363.5 Corrected 368.0 ppm THC

9:49 Post Cal -0.4 Drift 0.38%
 461.6 0.38%

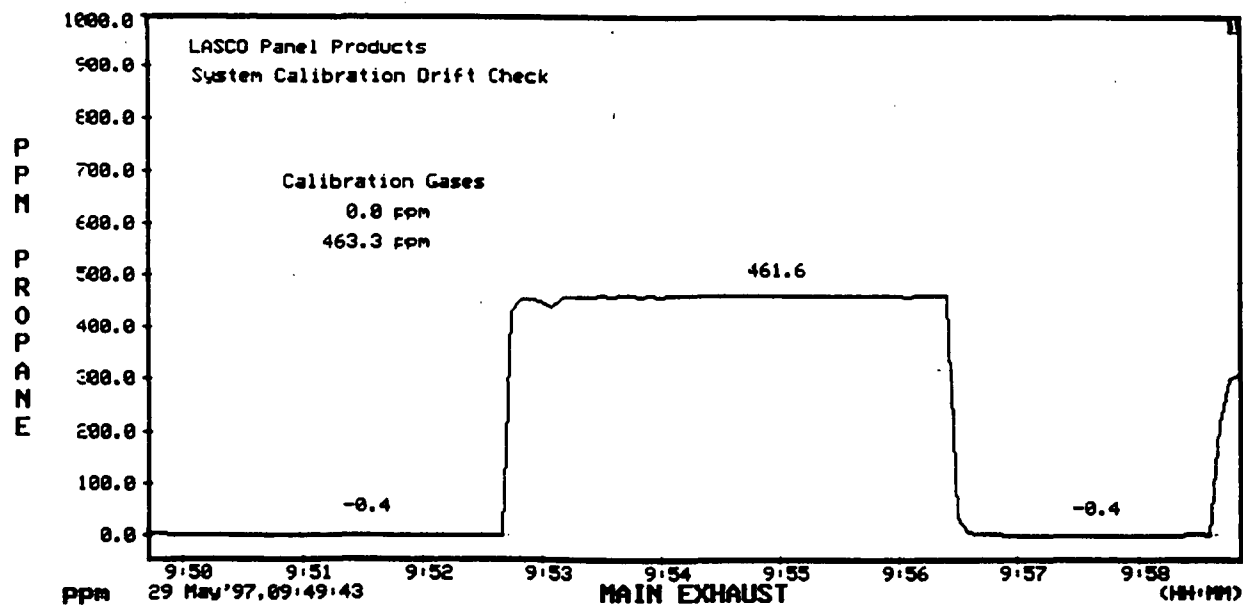
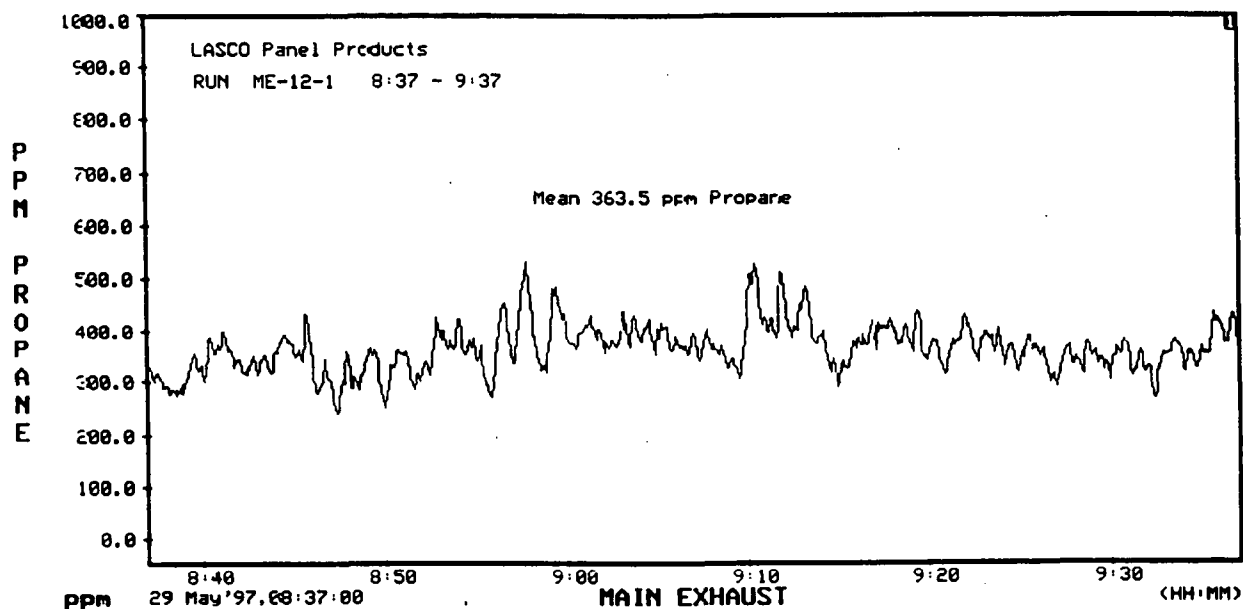
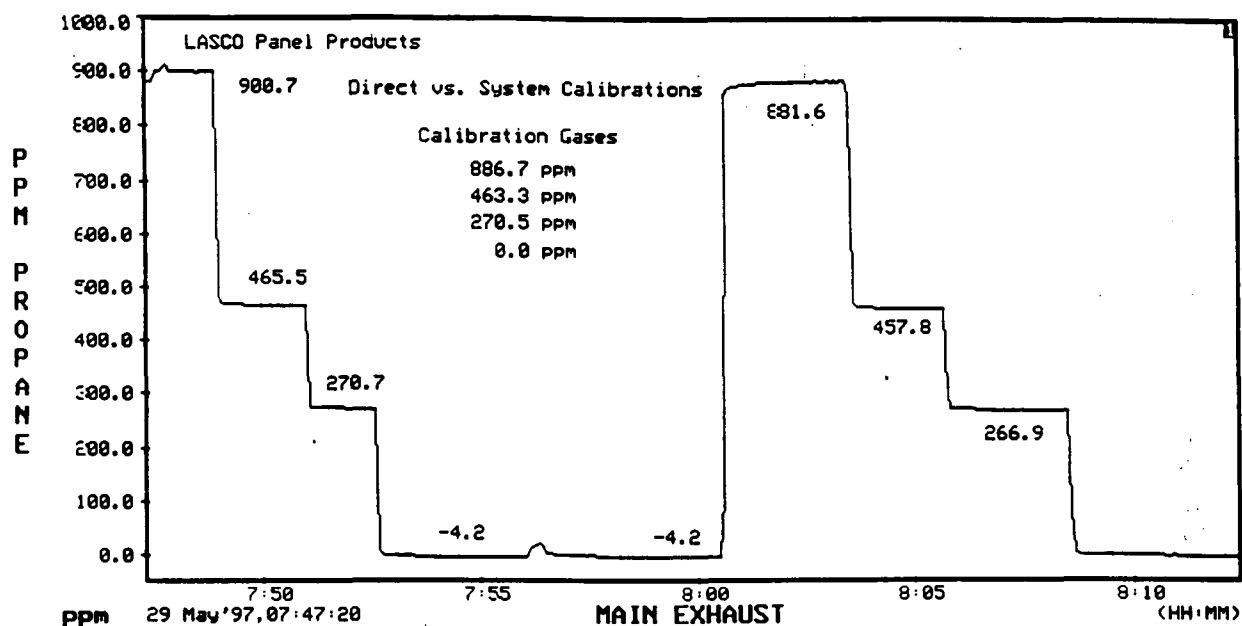
10:41 Post Cal -0.4 Drift 0.38%
 461.6 0.38%

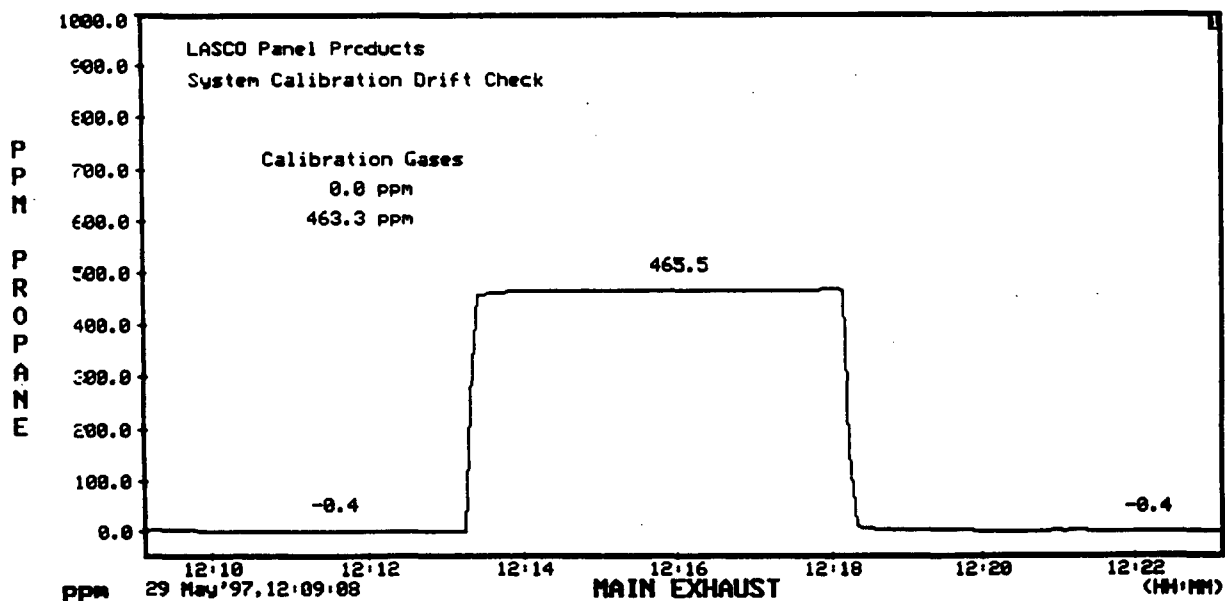
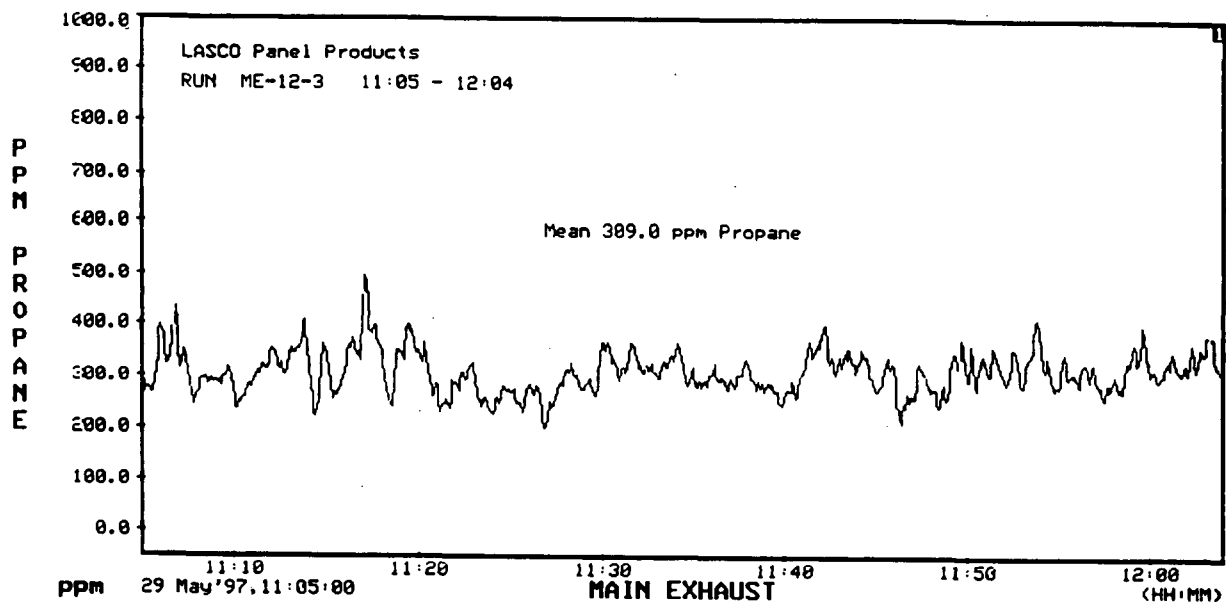
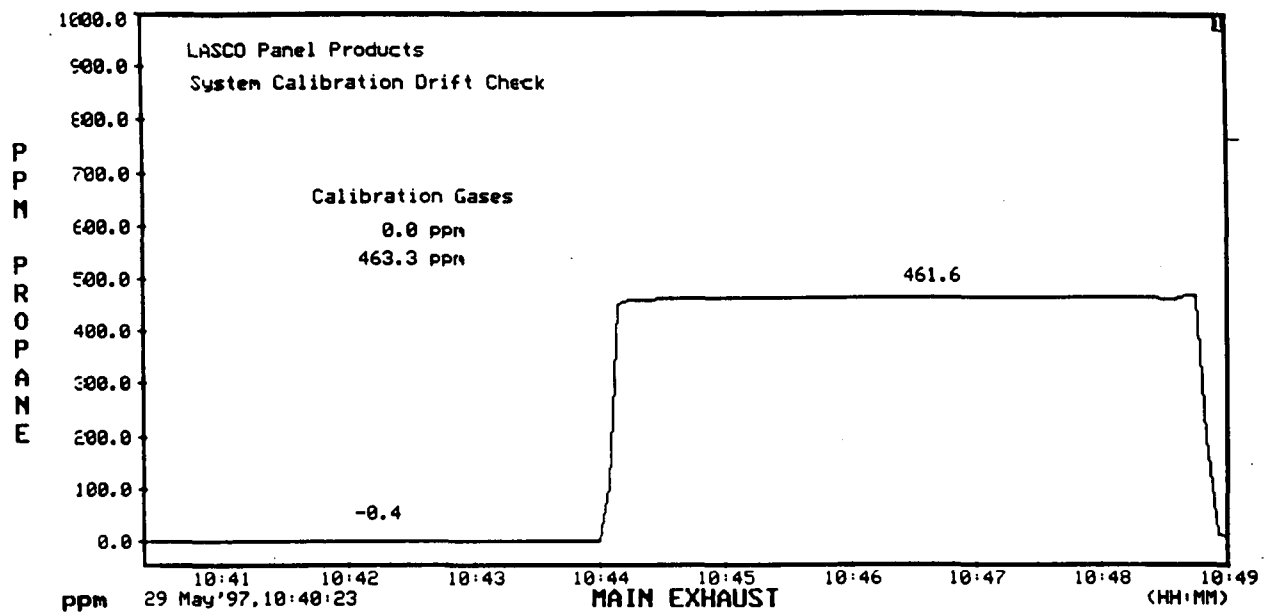
11:05-12:04 Run 12-3 309.0 Corrected 313.5 ppm THC

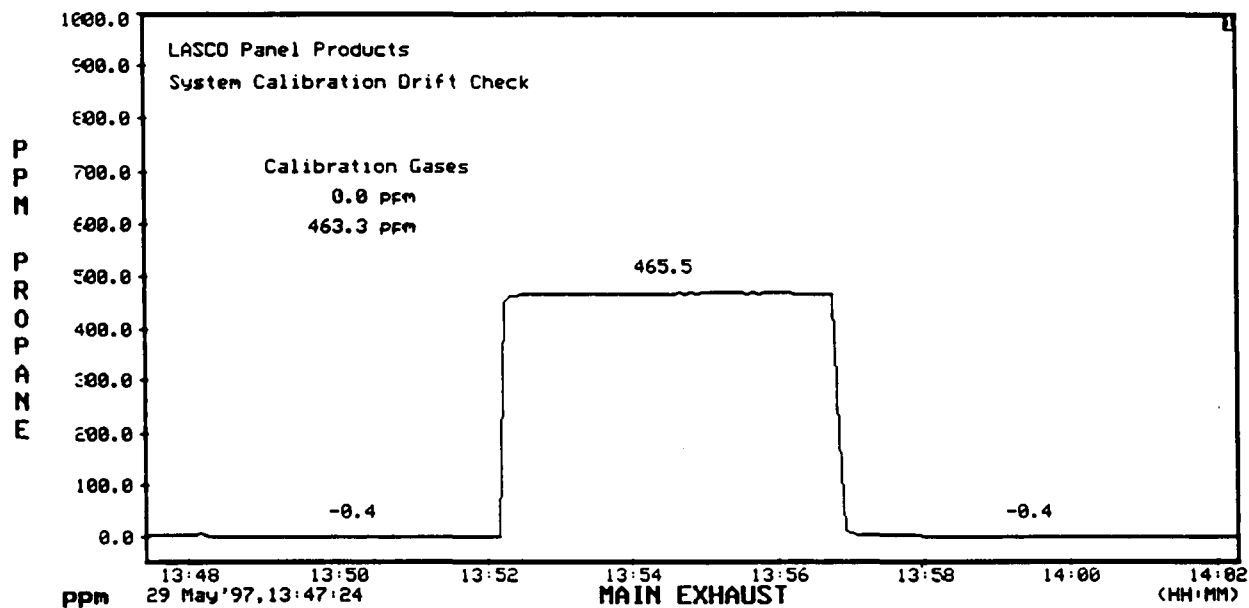
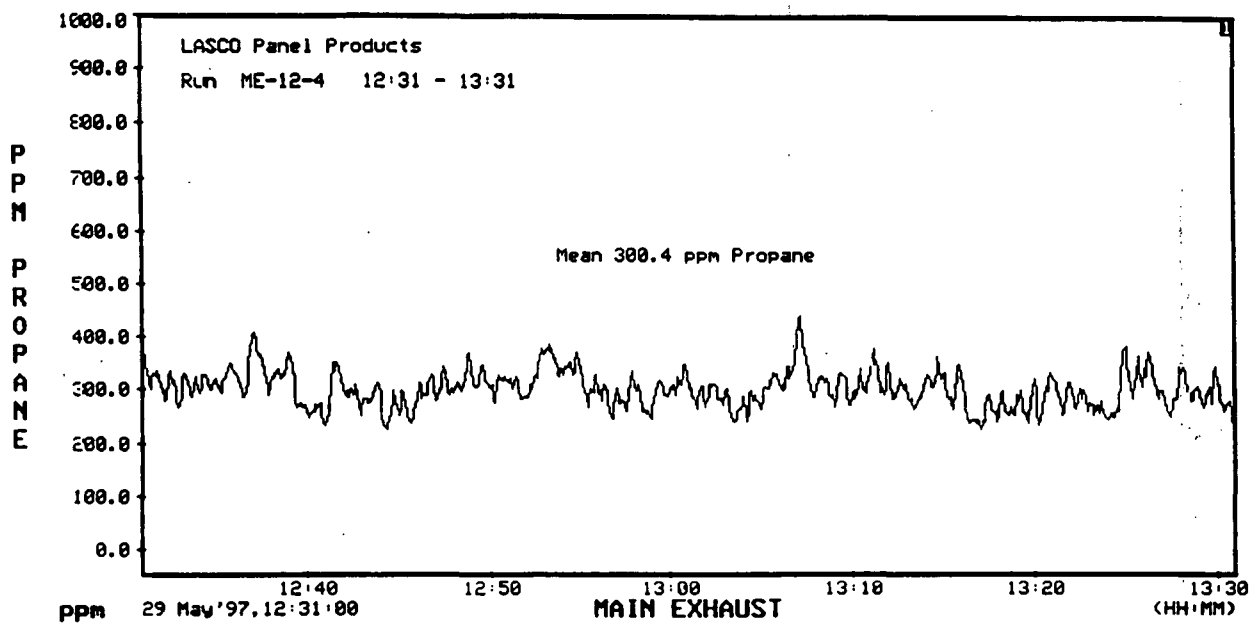
12:09 Post Cal -0.4 Drift 0.38%
 465.5 0.77%

12:31-13:31 Run 12-4 300.4 Corrected 304.9 ppm THC

13:48 Post Cal -0.4 Drift 0.38%
 465.5 0.77%







LASCO Panel Products

Condition 12 - Room Exhaust

Total Hydrocarbons (THC)

29-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	-0.2	-0.2
84.1 ppm	93.4	87.6
270.5 ppm	280.5	280.5
463.3 ppm	463.7	477.1

Correlation 0.9996419
Slope 0.9975143
Intercept 5.3882472

Sampling System Bias
0.00%
1.16%
0.00%
2.68%

Correlation 0.9999892
Slope 1.0301538
Intercept 0.6144493

Calibration Error

0.43%
0.44%

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	7.5	
84.1 ppm	93.4	0.85%
270.5 ppm	280.5	1.01%
463.3 ppm	467.5	

Correlation 0.9999454
Slope 0.9928857
Intercept 9.2096613

8:37 - 9:37 Run 12-1 160.2 Corrected 152.1 ppm THC

9:49 Post Cal 7.5 Drift 0.00%
278.5 0.40%

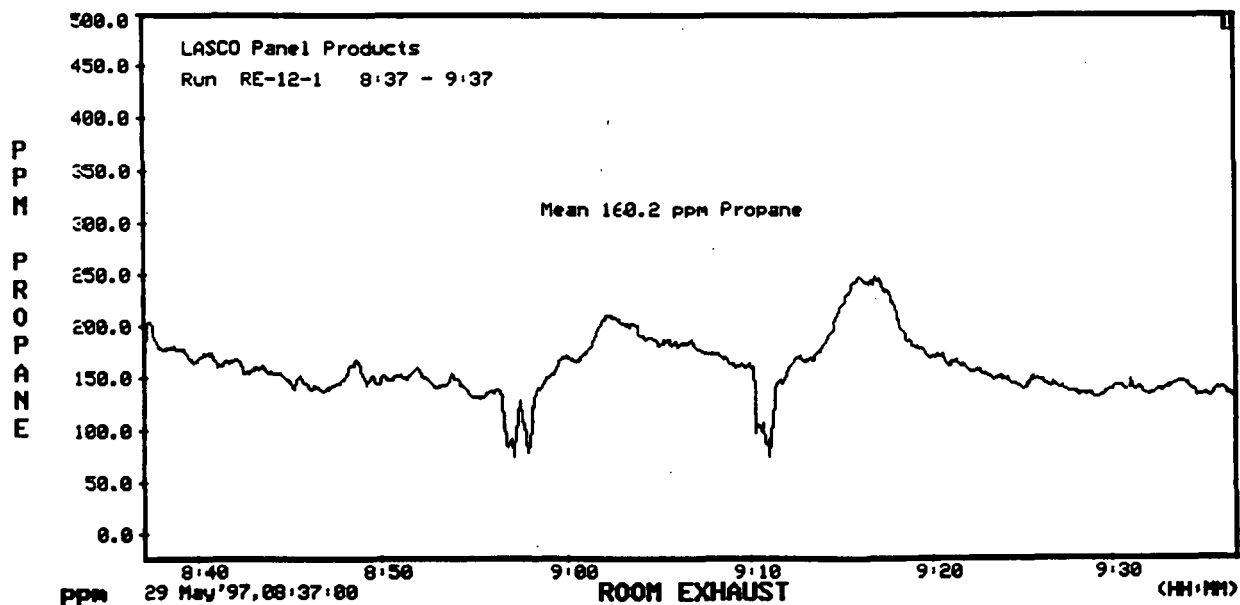
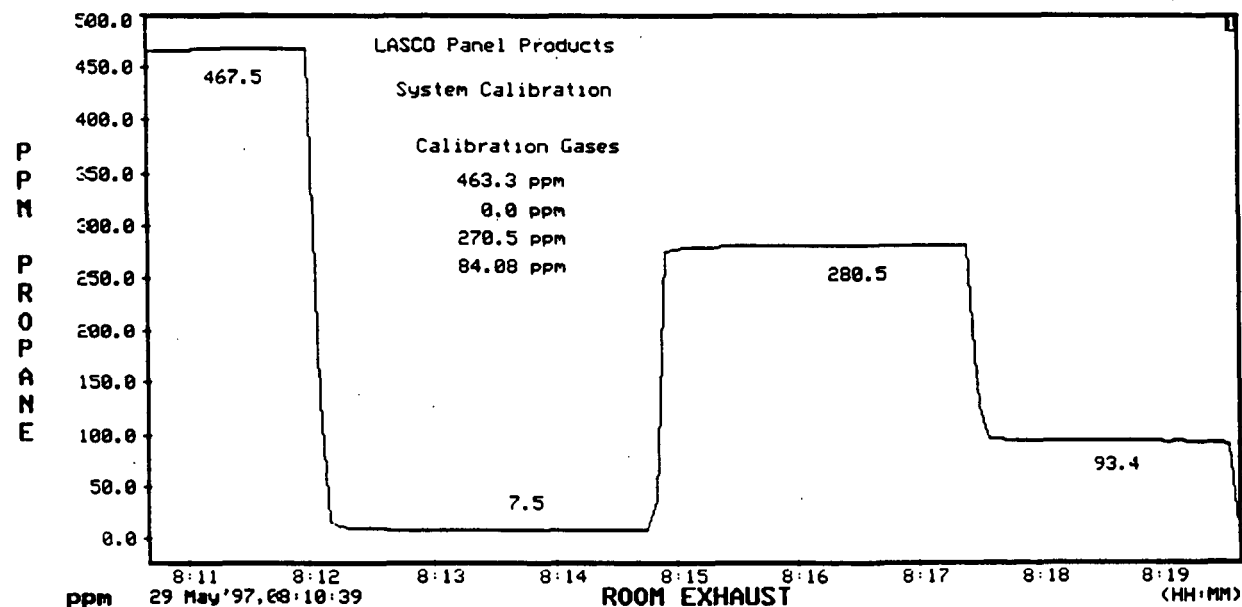
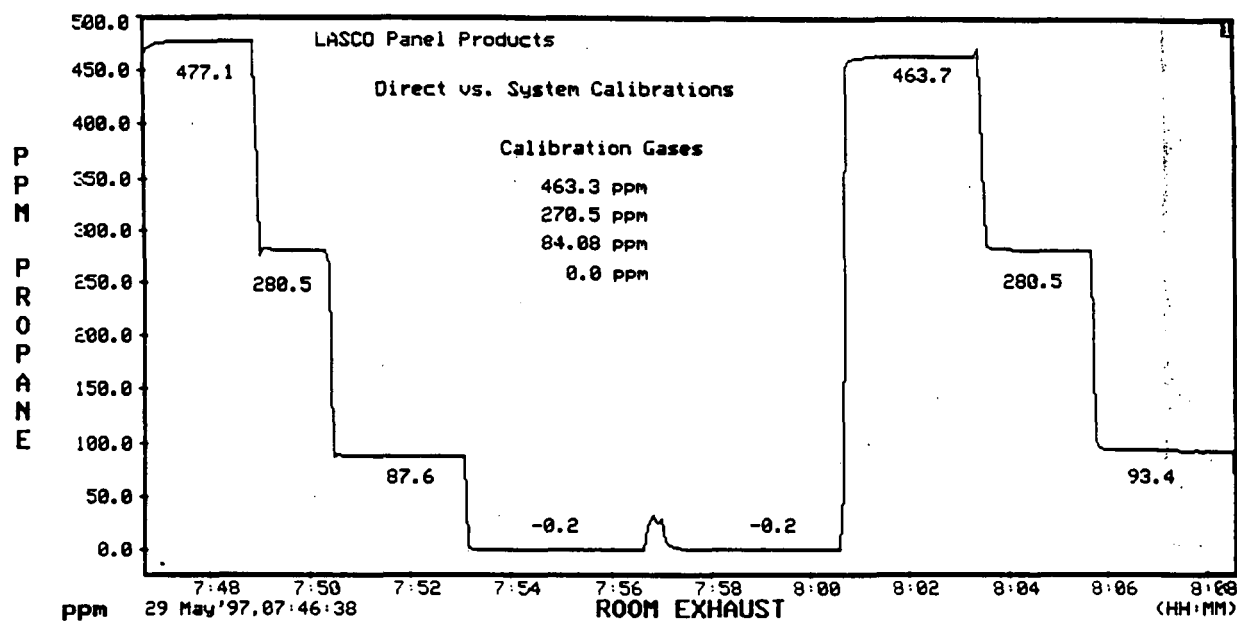
10:41 Post Cal 7.5 Drift 0.00%
276.6 0.78%

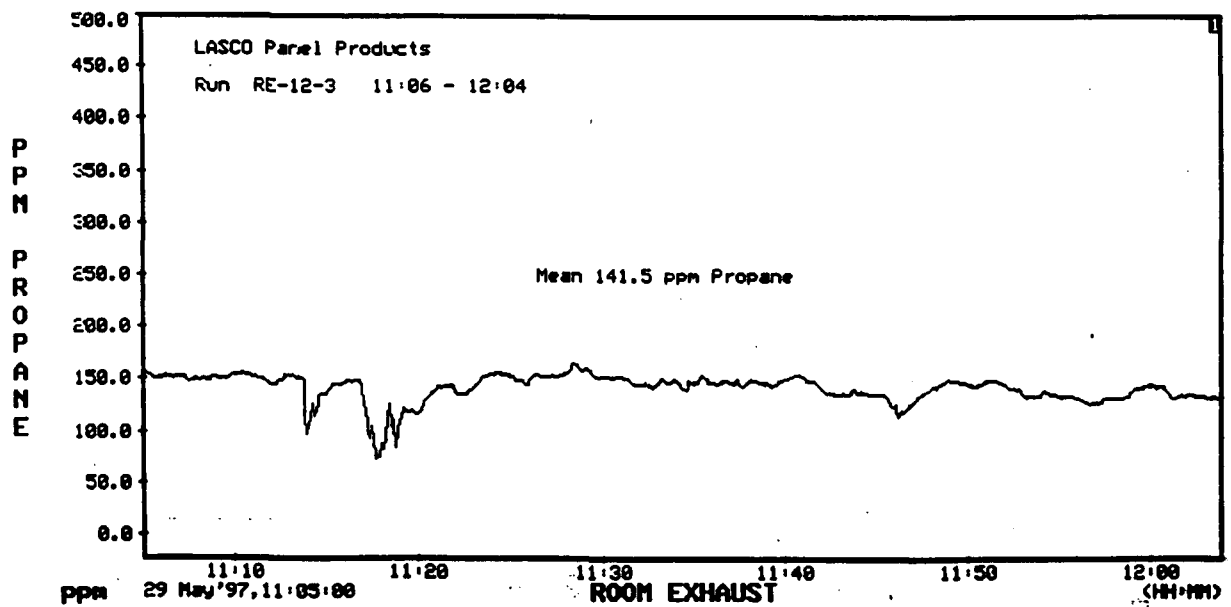
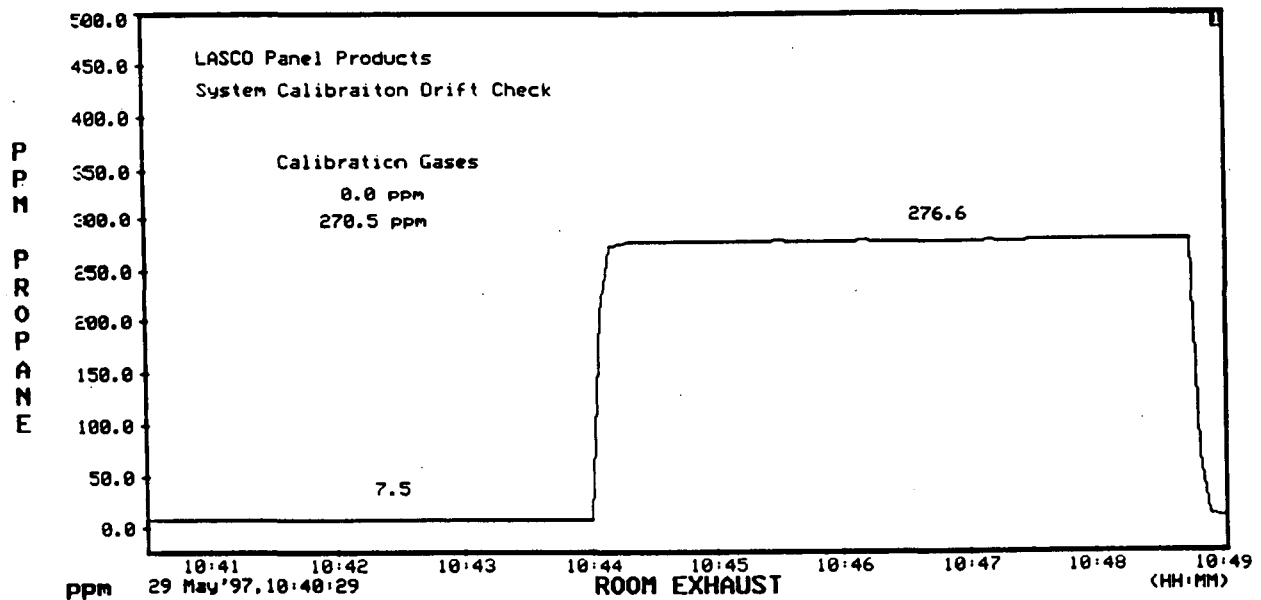
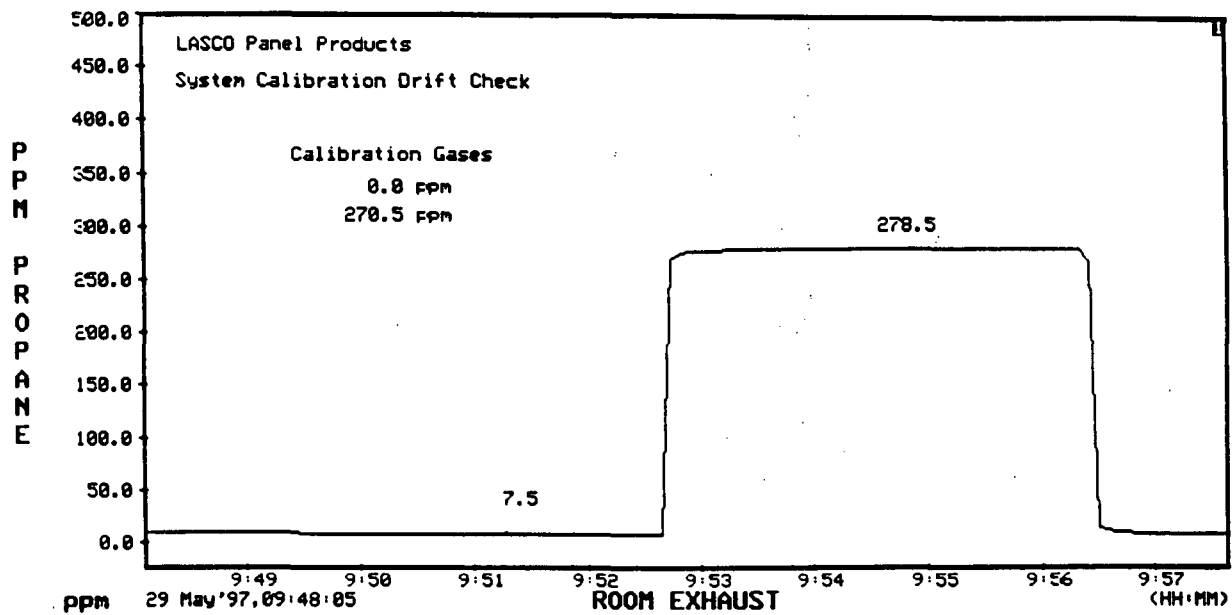
11:06-12:04 Run 12-3 141.5 Corrected 133.2 ppm THC

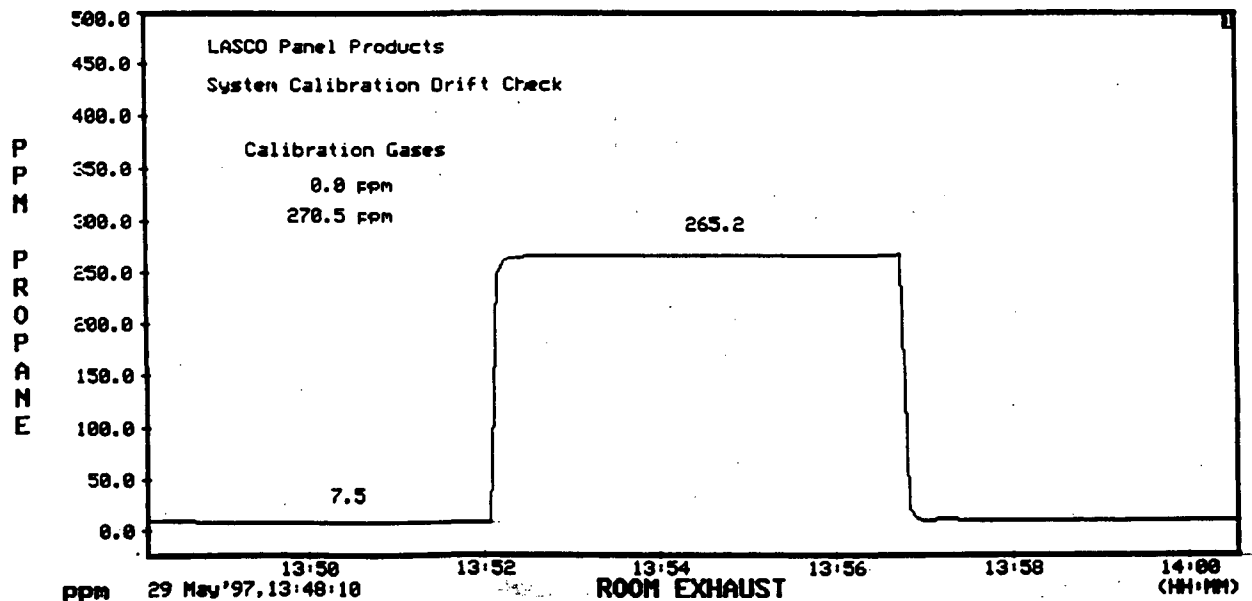
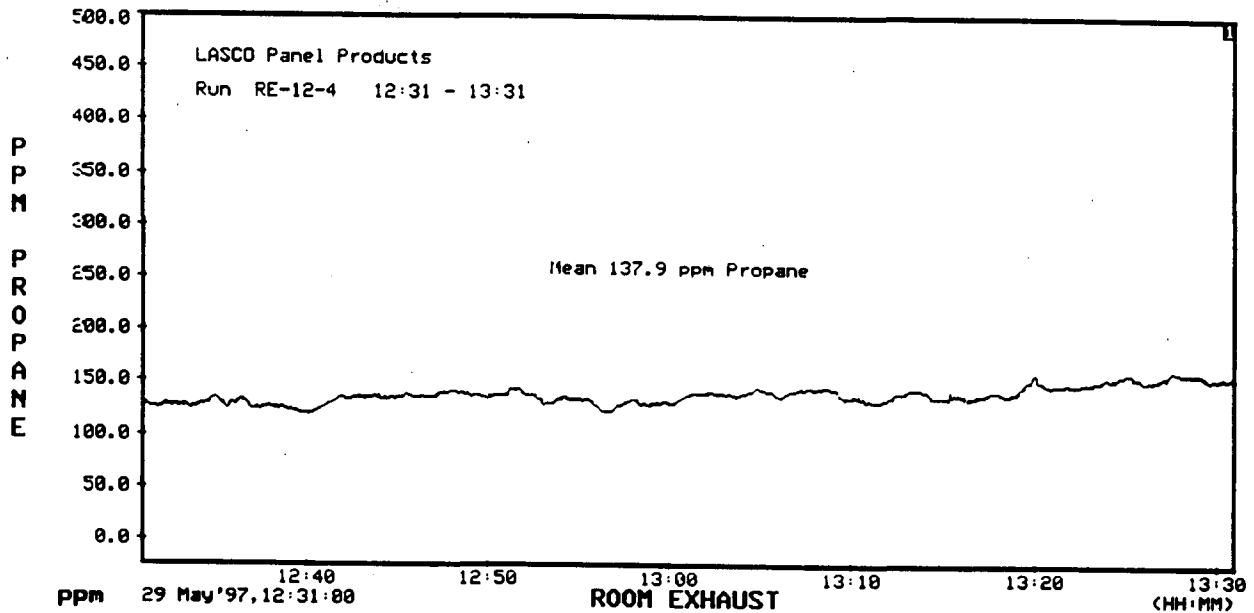
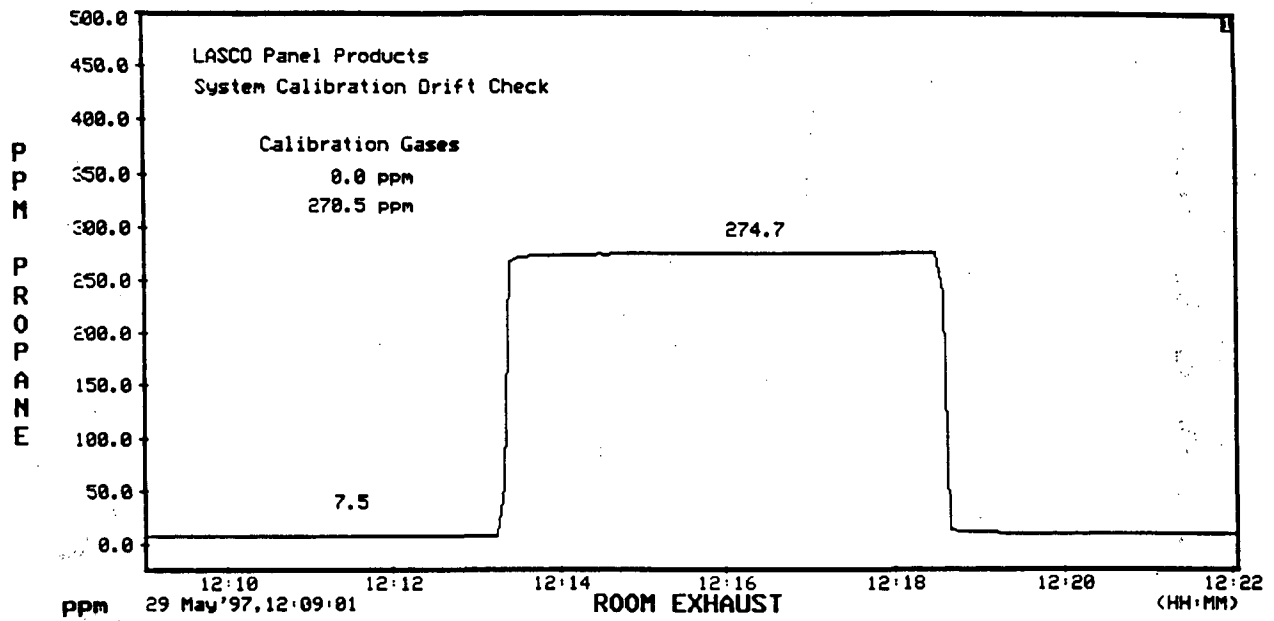
12:09 Post Cal 7.5 Drift 0.00%
274.7 1.16%

12:31-13:31 Run 12-4 137.9 Corrected 129.6 ppm THC

13:48 Post Cal 5.5 Drift 0.40%
265.2 1.90%







LASCO Panel Products

Condition 12 - Auxiliary Fan

Total Hydrocarbons (THC)

29-May-97

Calibration Gases	System Calibration	Direct Calibration
0.0 ppm	1.7	1.7
84.1 ppm	85.7	89.5
270.5 ppm	270.9	280.5
463.3 ppm	458.0	475.2

Correlation	0.999979	Correlation	0.9999831
Slope	0.98521	Slope	1.0214662
Intercept	2.6291198	Intercept	2.8658002

Sampling System Bias	Calibration Error
0.00%	
0.76%	0.87%
1.92%	0.48%
3.44%	

8:37 - 9:37 Run 12-1 182.9 Corrected 183.0 ppm THC

9:42 Post Cal 3.6 Drift 0.38%
 267.1 0.76%

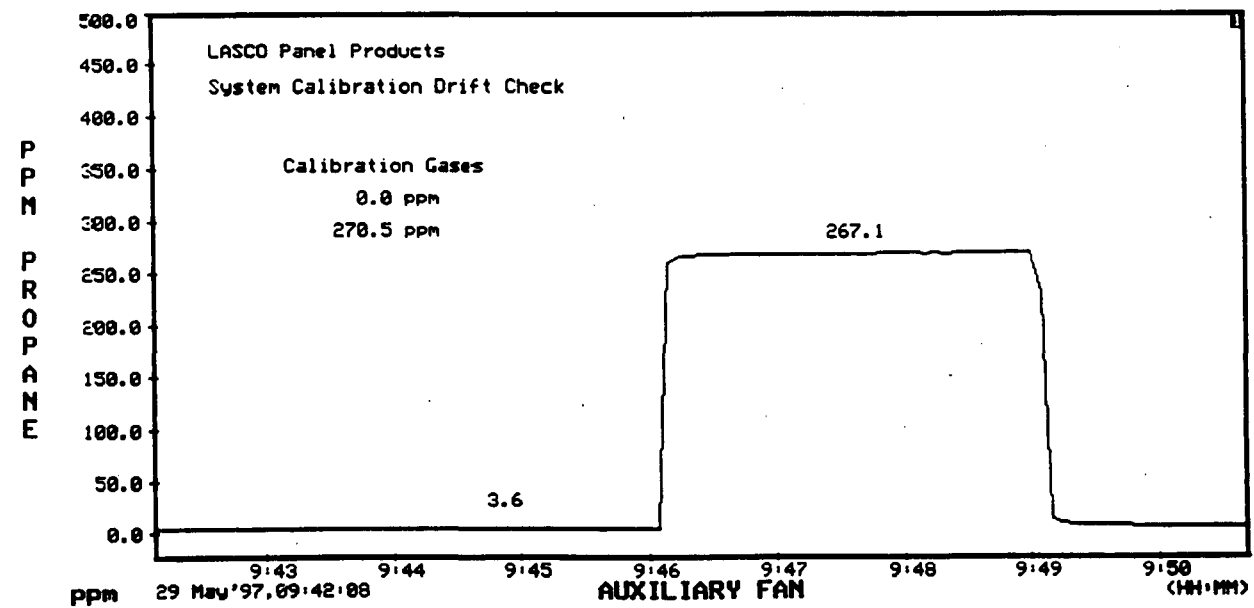
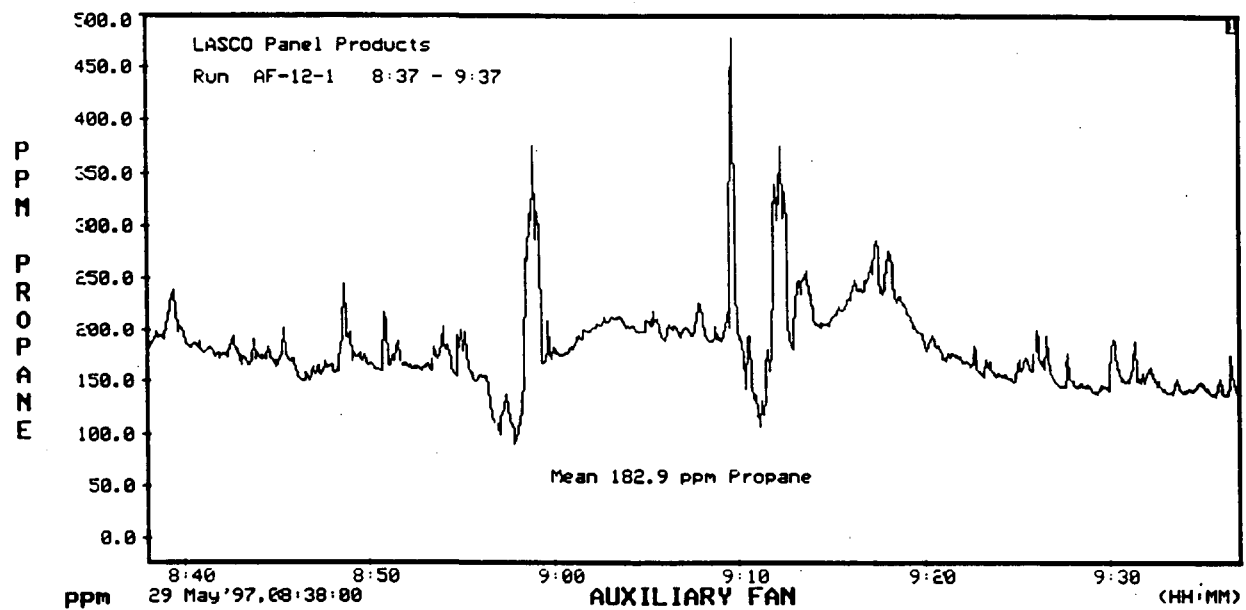
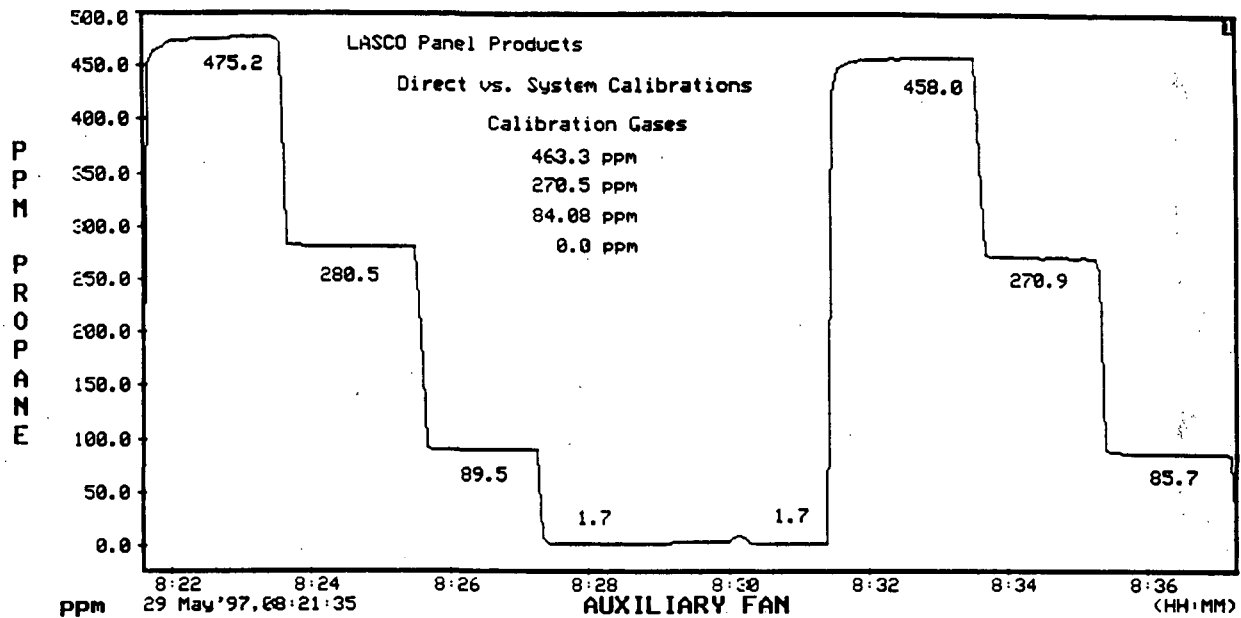
10:50 Post Cal 1.7 Drift 0.00%
 267.1 0.76%

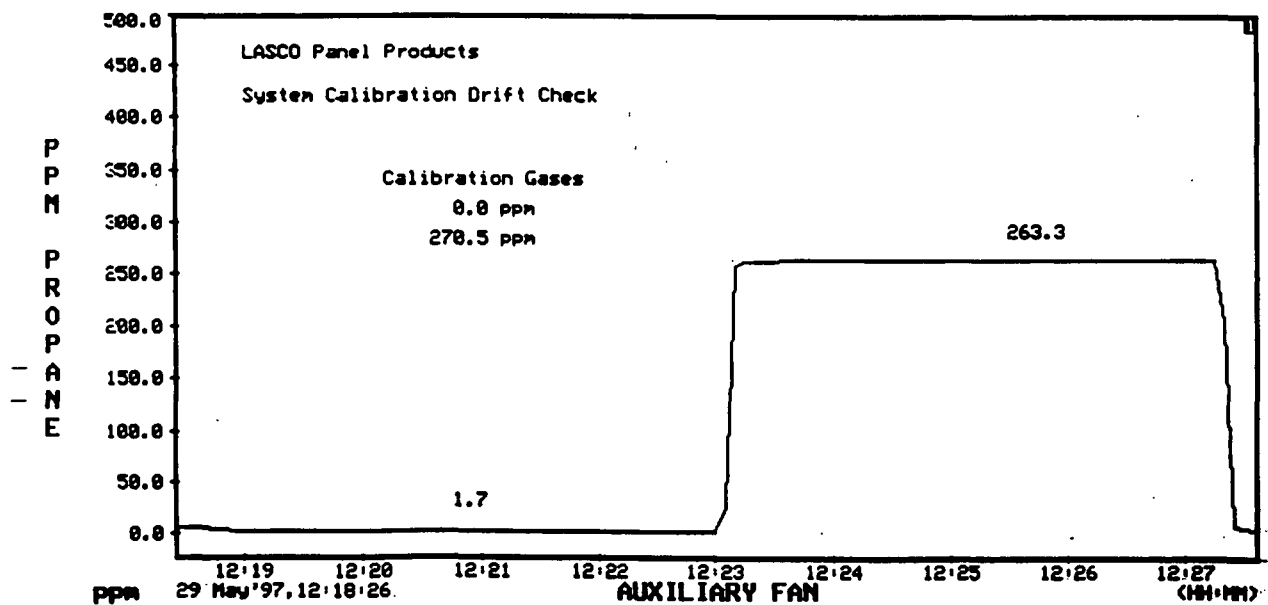
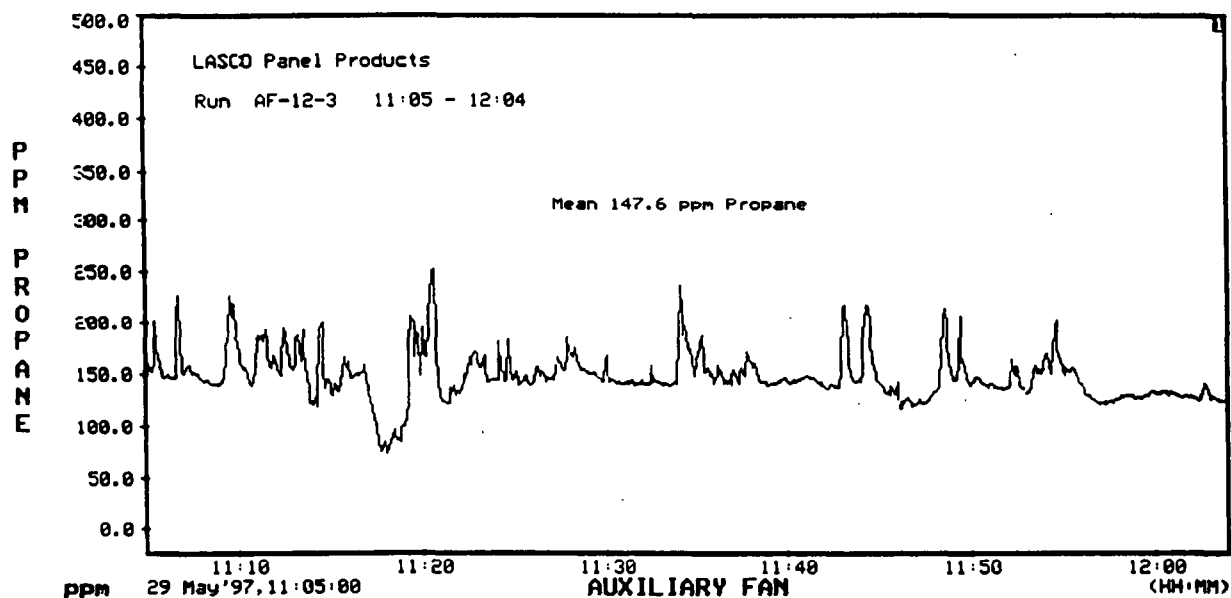
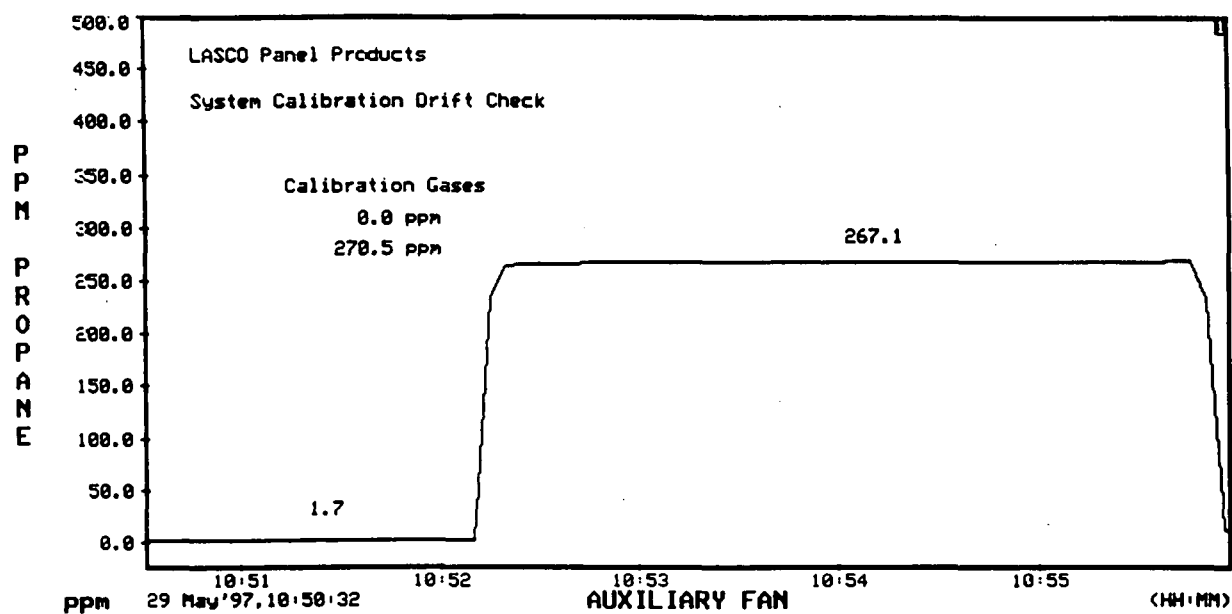
11:05-12:04 Run 12-3 147.6 Corrected 147.1 ppm THC

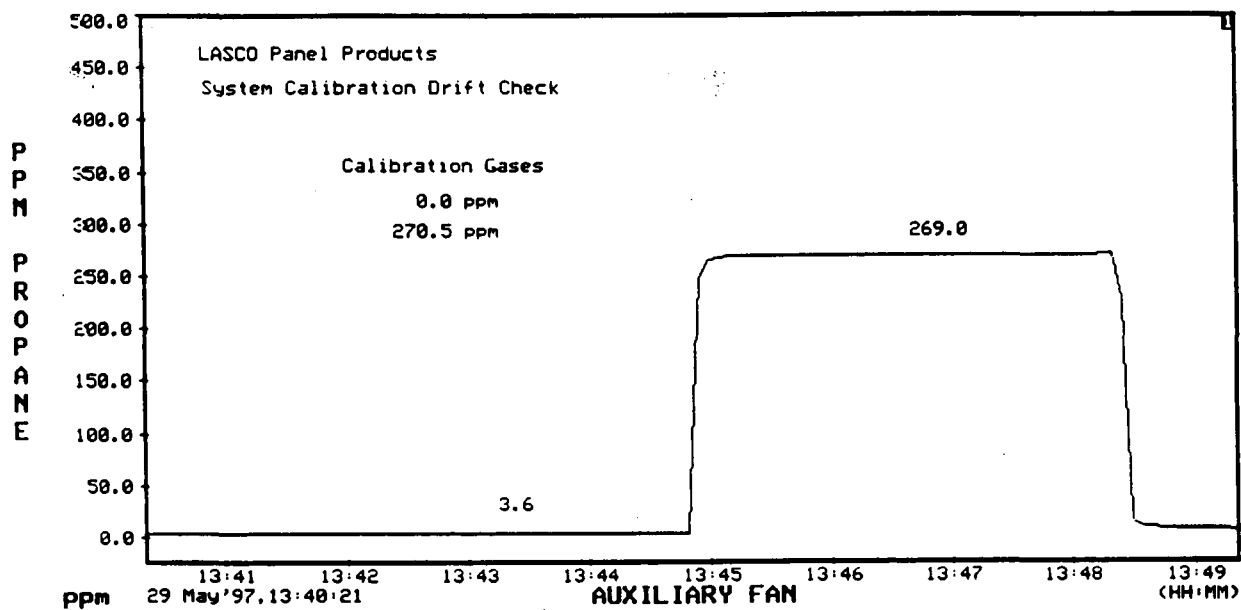
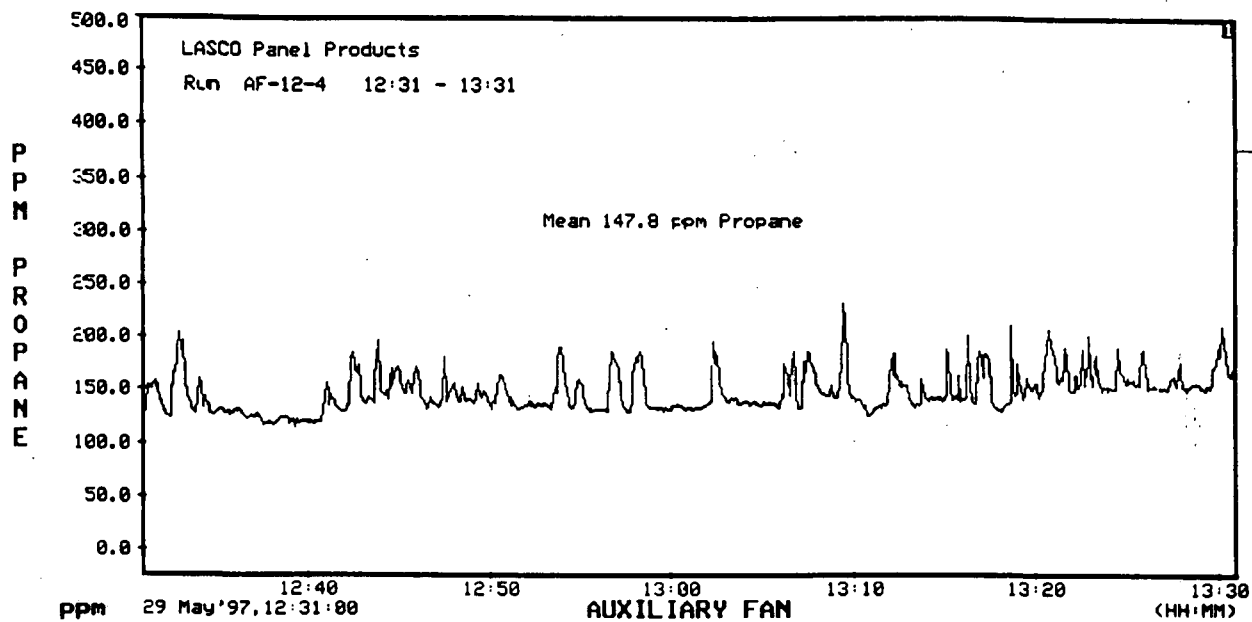
12:19 Post Cal 1.7 Drift 0.00%
 263.3 1.52%

12:31-13:31 Run 12-4 147.8 Corrected 147.4 ppm THC

13:41 Post Cal 3.6 Drift 0.38%
 269.0 0.38%









INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: MAIN EXHAUST Monitor: ppm or %
 Date: 5-29-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 29.30 (8:30)

Cylinder #	Cal. Gas Conc., <u>ppm or %</u>	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	2.0	2.0		0.0
AAL710	270.5	27.1	26.9	268.8	266.8	0.63	0.2
AAL18513	463.3	46.7	45.9	461.7	453.9	0.35	0.8
ALM028161	886.7	90.0	88.0	888.0	868.4		2.0

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.198)}{(0.10157)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$** \text{ Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

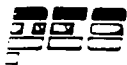
$$*** \text{ Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 20 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 27 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: MAIN EXHAUST Monitor: ppm or %
Date: 5-29-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.30
Time, Pretest: 8:00 Post-test: 13:45 Ambient Temp., F: 60°F
Run #: ME-12-1, ME-12-2, ME-12-3, ME-12-4

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)					Concentration Predicted By Equation*					Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		8:00	9:50	10:40	12:10	13:45	8:00	9:50	10:40	12:10	13:45		
	0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1		0.0
	270.5	26.9					271.1					0.22	
	463.3	45.9	45.9	46.0	46.3	46.3	462.6	462.6	463.6	466.6	466.6	0.15	0.4
	886.7	88.0					886.9						

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b$$

x = ppm

y = chart divisions

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.005)}{(0.09922)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
- sample data. Post-test is used if drift exceeds limits and if post-test
yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO

Parameter: SO₂, CO₂, O₂, NO_x* (THC) CO

Location: MAIN EXHAUST

Operator: P. SIEGEL

Date: 5-29-97

Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.005)}{(0.09922)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments Sum 1
ME-12-1	8:37 - 8:47	33	332.6	
	-8:57	33	332.6	
	-9:07	39	393.0	
	-9:17	34	342.6	
	-9:27	37	372.9	
	-9:37	34	342.6	AVG = 352.7 ppm Propane
ME-12-2	10:07 - 10:17	35	352.7	VOID
	-10:27	33	332.6	
ME-12-3	11:06 - 11:16	30	302.3	(START TIME 11:05)
	-11:26	30	302.3	
	-11:36	30	302.3	
	-11:46	30	302.3	
	-11:56	30	302.3	
	-12:06	31	312.4	AVG = 304.0 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel

Date: 5-29-97

Checked By: _____

Date: _____



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO

Parameter: SO₂, CO₂, O₂, NO_x* (THC) CO

Location: MAIN EXHAUST

Operator: P. SIEGEL

Date: 5-29-97

Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.005)}{(0.09922)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments Sum 1
ME-12-4	12:31-12:41	31	312.4	
	-12:51	29	292.2	
	-13:01	30	302.3	
	-13:11	29	292.2	
	-13:21	28	282.2	
	-13:31	29	292.2	AVG = 295.6 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel
Checked By: _____

Date: 5-29-97
Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
 Location: ROOM EXHAUST
 Date: 5-29-97
 Operator: P. SIEGEL
 Project #: S405.003

Parameter: SO₂, CO₂, O₂, NO_x, THC
 Monitor: ppm or %
 Span Value: 100
 Chart Scale: 0-500 ppm Propane
 Pbar, in. Hg.: 29.30 (8:30)

Cylinder #	Cal. Gas Conc., ppm or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.3	2.0	-1.3	6.9		1.7
ALM028660	84.08	18.1	19.2	84.7	90.0	0.74	1.1
AAL710	270.5	57.0	57.0	272.4	272.4	0.69	0.0
AAL18513	463.3	96.3	94.0	462.1	451.0		2.3

- * Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.561)}{(0.20719)}$$

$$\text{Correlation Coefficient} = \underline{0.99997}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

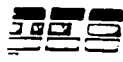
$$\text{*** Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = 29 s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: Room Exhaust Monitor: ppm or %
Date: 5-29-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: S405.003 Pbar, in. Hg.: 29.30 (8:30)
Time, Pretest: 8:00 Post-test: 13:45 Ambient Temp., F: 60°F
Run #: RE-12-1, RE-12-2, RE-12-3, RE-12-4

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)					Concentration Predicted By Equation*					Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		8:00	9:50	10:40	12:10	13:45	8:00	9:50	10:40	12:10	13:45		
	0	2.0	2.0	2.0	2.0	2.0	-1.2	-1.2	-1.2	-1.2	-1.2		0.0
	84.08	19.2					84.4					0.38	
	270.5	57.0	56.4	56.1	55.7	54.0	272.7	269.7	268.2	266.2	257.8	0.81	1.7
	463.3	95.0					461.9						

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 2.244)}{(0.20079)}$$

$$\text{Correlation Coefficient} = \underline{0.99997}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate

— sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x* (THC) CO
Location: Room EXHAUST Operator: P. SIEGEL
Date: 5-29-97 Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 2.244)}{(0.20079)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
RE-12-1	8:37 - 8:47	33	153.2	JUN 5
	- 8:57	29.5	135.7	
	- 9:07	33.5	155.7	
	- 9:17	38	178.1	
	- 9:27	37	173.1	
	- 9:37	28.5	130.8	AVG = 154.4 ppm Propane
RE-12-2	10:07 - 10:17	34	158.2	VOID
	- 10:27	25	113.3	
RE-12-3	11:06 - 11:16	30	138.2	Run's START Time
	- 11:26	26	118.3	11:05
	- 11:36	31	143.2	
	- 11:46	29	133.3	
	- 11:56	28.5	130.8	
	- 12:06	27.5	125.8	AVG = 131.6 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: P. T. Siegel Date: 5-29-97
Checked By: _____ Date: _____

Parameter: SO₂, CO₂, O₂, NO_x*, THC, CO

Operator: P. SIEGEL

Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 2.244)}{(0.20079)}$$

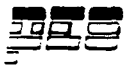
* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

**** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).**

Calculated By: Paul T. Siegel Date: 5-29-97
Checked By: _____ Date: _____

Date: 5-29-97

Date: _____



INITIAL CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: AUXILIARY FAN Monitor: ppm or %
 Date: 5-29-97 Span Value: 100
 Operator: P. SIEMEL Chart Scale: 0-500 ppm Propane
 Project #: 5405.003 Pbar, in. Hg.: 29.30 (8:30)

Cylinder #	Cal. Gas Conc., <u>ppm</u> or %	Chart Divisions		Concentration Predicted by Equation,* Direct System		Calibration Error,** % of Span GAS	Sampling System Bias,*** % of Span
		Direct Injection to Monitor	Injection Through System				
	0	0.0	0.0	-1.6	-1.6		0.0
ALM028660	84.08	17.8	17.0	85.3	81.4	1.45	0.8
AAL710	270.5	56.0	54.8	271.9	266.0	0.52	1.2
AAL18513	463.3	95.0	91.1	462.3	443.2		3.9

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.325)}{(0.20480)}$$

$$\text{Correlation Coefficient} = \underline{0.99997}$$

Calculation concentration predicted by equation using actual chart response obtained from each calibration gas response.

$$** \text{ Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc., ppm} - \text{conc. predicted, ppm}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$*** \text{ Sampling system bias} = \frac{(\text{Direct inject. gas conc.} - \text{System inject. gas conc.}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 5\%$ of span

Minimum detectable limit = 2% of span or 10 ppm or % (circle one)

Rise time to 95% of response for high cal. gas injected through the system (return to zero after each injection): _____ s, _____ s, _____ s Average = _____ s

Precision, % scale = difference in chart division response for two repeated injections of the gas concentrations = _____ - _____ = _____ %
 (Clock time = _____)



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
Location: AUXILIARY FAN Monitor: ppm or %
Date: 5-29-97 Span Value: 100
Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
Project #: 5405.003 Pbar, in. Hg.: 29.30 (8:30)
Time, Pretest: 8:30 Post-test: 13:40 Ambient Temp., F: 60°F
Run #: AF-12-1, AF-12-2, AF-12-3, AF-12-4

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)					Concentration Predicted By Equation*					Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		8:30	9:40	10:50	12:15	13:40	8:30	9:40	10:50	12:15	13:40		
	0	0.0	0.6	0.3	0.1	0.3	-1.5	1.6	0.0	-1.0	0.0		0.6
	84.08	17.0					85.0					1.09	
	270.5	53.8	53.1	53.0	52.2	53.5	272.3	268.7	268.2	264.1	270.8	0.67	1.6
	463.3	91.1					462.1						

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.295)}{(0.19651)}$$

$$\text{Correlation Coefficient} = \underline{0.99997}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate
— sample data. Post-test is used if drift exceeds limits and if post-test
yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: AUXILIARY FAN
Date: 5-29-97

Parameter: SO₂, CO₂, O₂, NO_x*, (THC), CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.245)}{(0.19651)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
				JUN 4
AF-12-1	8:37 - 8:47	36	181.7	
	-8:57	31.5	158.8	
	-9:07	33	166.4	
	-9:17	41	207.1	
	-9:27	38	191.9	
	-9:37	29	146.1	AVG = 175.3 ppm Propane
AF-12-2	10:07 - 10:17	36	181.7	VOID
	-10:27	27	135.9	
AF-12-3	11:06 - 11:16	30	151.2	Ron's start time
	-11:26	30	151.2	11:05
	-11:36	29	146.1	
	-11:46	29	146.1	
	-11:56	28	141.0	
	-12:06 ⁴	26	130.8	AVG = 144.4 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: P. T. Siegel Date: 5-29-97
Checked By: _____ Date: _____



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: AUXILIARY FAN
Date: 5-29-97

Parameter: SO₂, CO₂, O₂, NO_x* (THC) CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 0.295)}{(0.19651)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
AF-12-4	12:31 - 12:41	26	130.8	JUN 4
	- 12:51	28	141.0	
	- 13:01	27	135.9	
	- 13:11	28	141.0	
	- 13:21	28	141.0	
	- 13:31	31	156.3	AVG = 141.0 ppm Prepare

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel

Date: 5-29-97

Checked By: _____

Date: _____

APPENDIX A.2.14

Condition 13 Method 25A

LASCO Panel Products

Condition 13 - Main Exhaust

Total Hydrocarbons (THC)

29-May-97

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.4	
270.5 ppm	270.7	0.30%
463.3 ppm	465.5	0.08%
886.7 ppm	893.1	

Correlation	0.9999982
Slope	1.0080115
Intercept	-1.1456555

15:20-16:15 Run 13-1	194.8	Corrected	194.4	ppm THC
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16:27	Post Cal	-0.4	Drift	0.00%
		457.8		0.77%

16:37-17:37 Run 13-2	184.1	Corrected	183.8	ppm THC
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17:45	Post Cal	-0.4	Drift	0.00%
		457.8		0.77%

18:02-19:02 Run 13-3	188.9	Corrected	188.5	ppm THC
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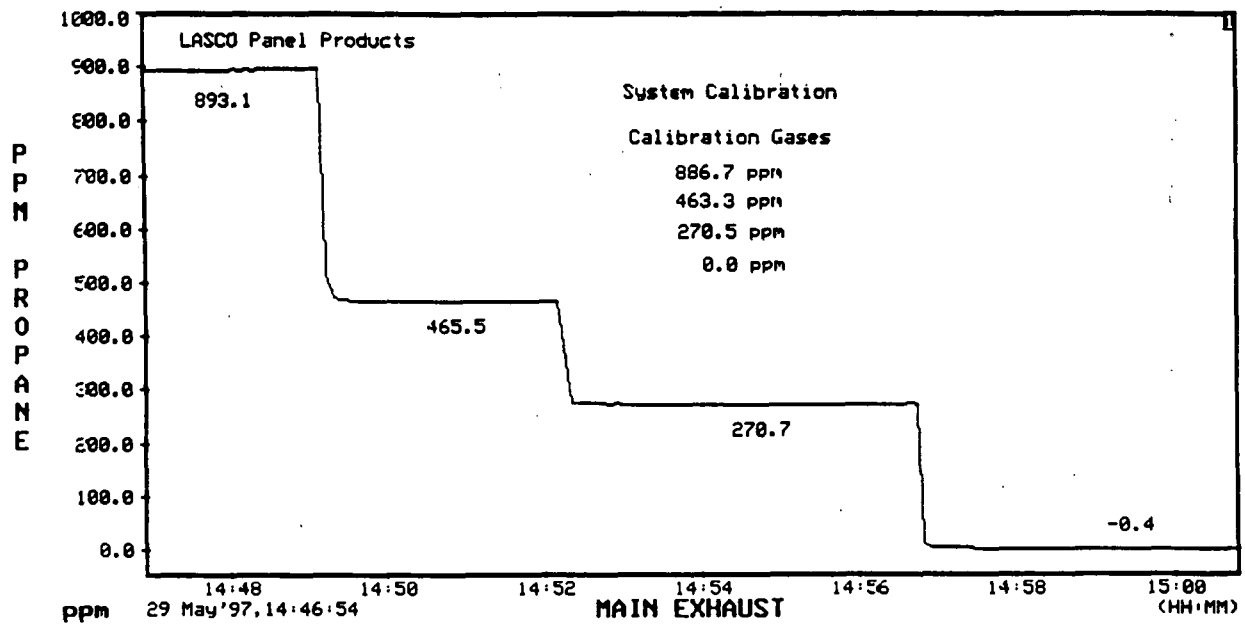
19:16	Post Cal	-4.2	Drift	0.38%
		457.8		0.77%

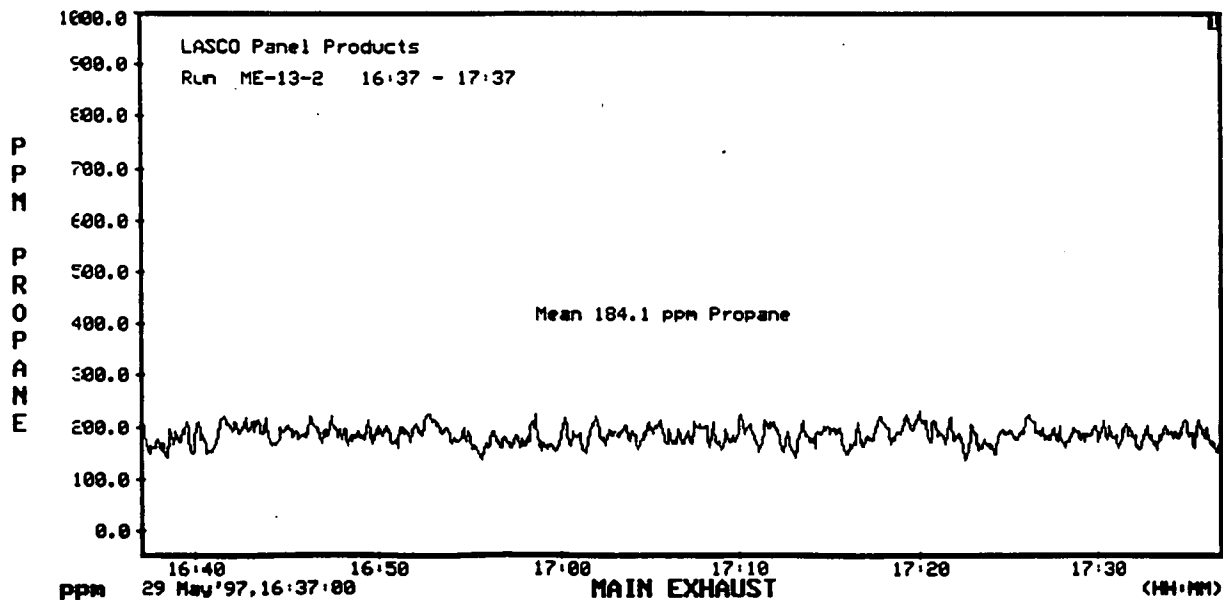
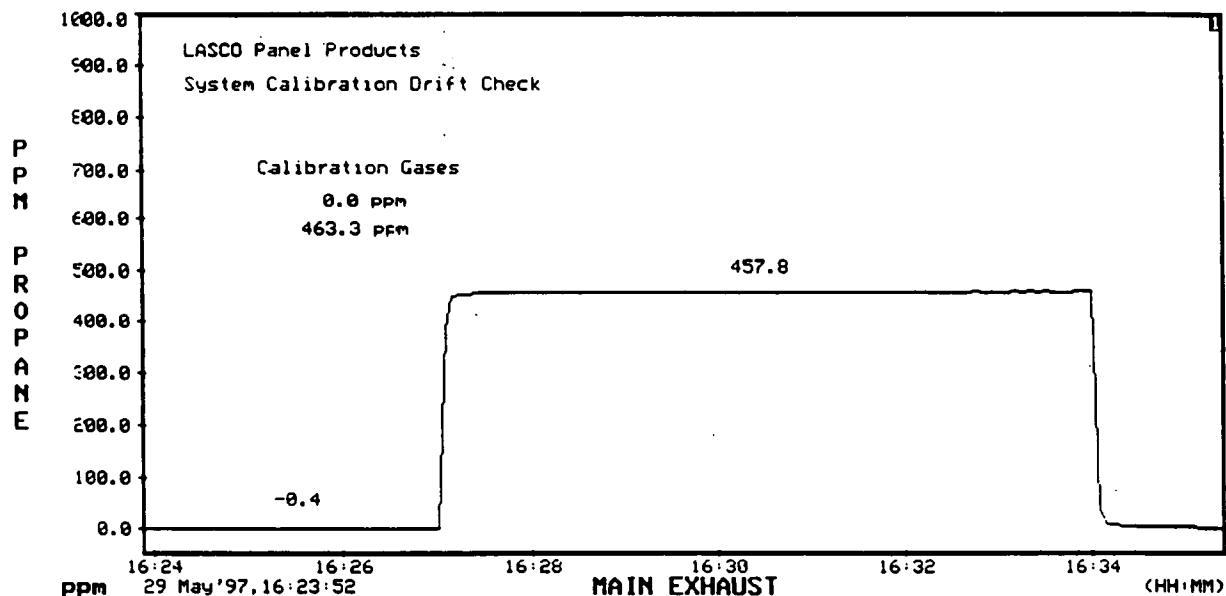
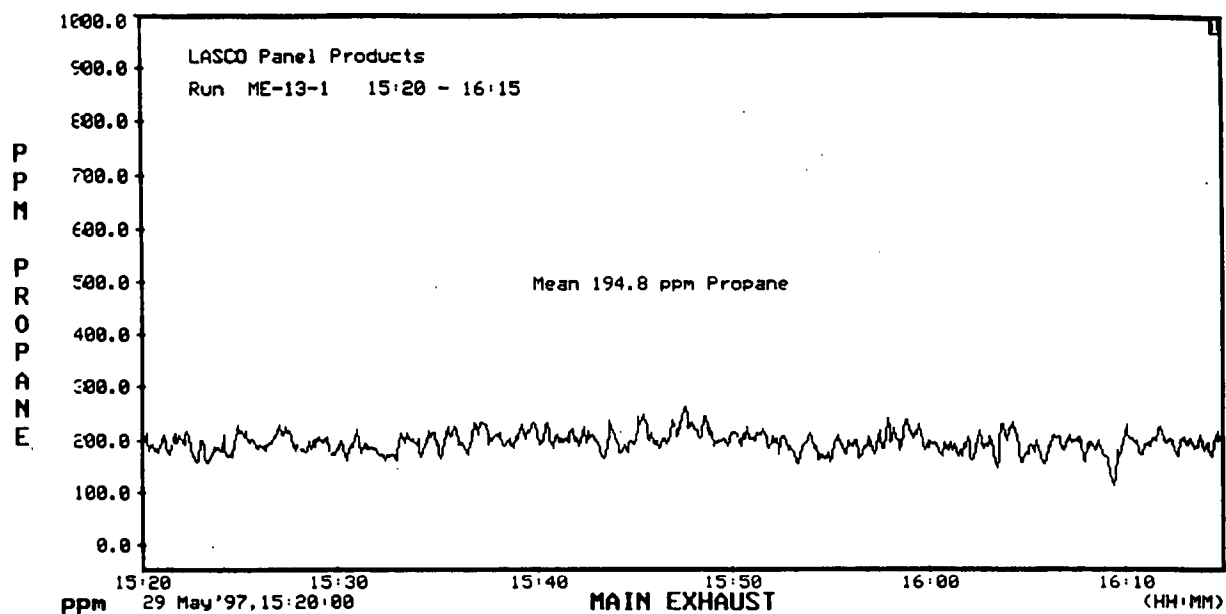
Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-4.2	
270.5 ppm	270.7	0.03%
463.3 ppm	465.5	0.43%
886.7 ppm	900.7	

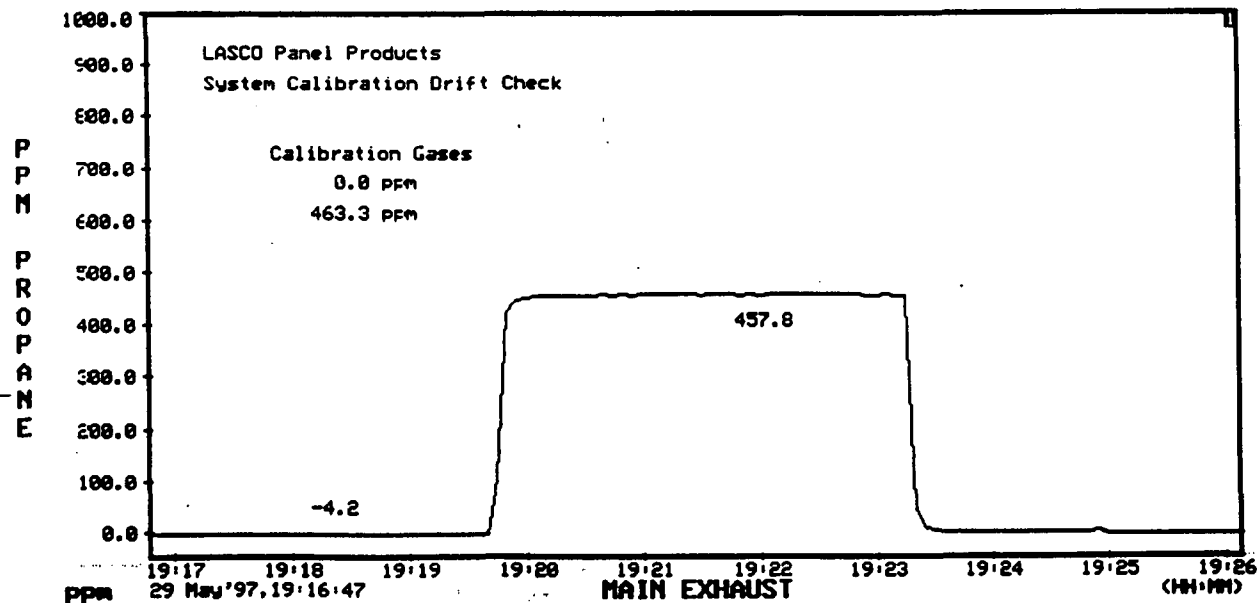
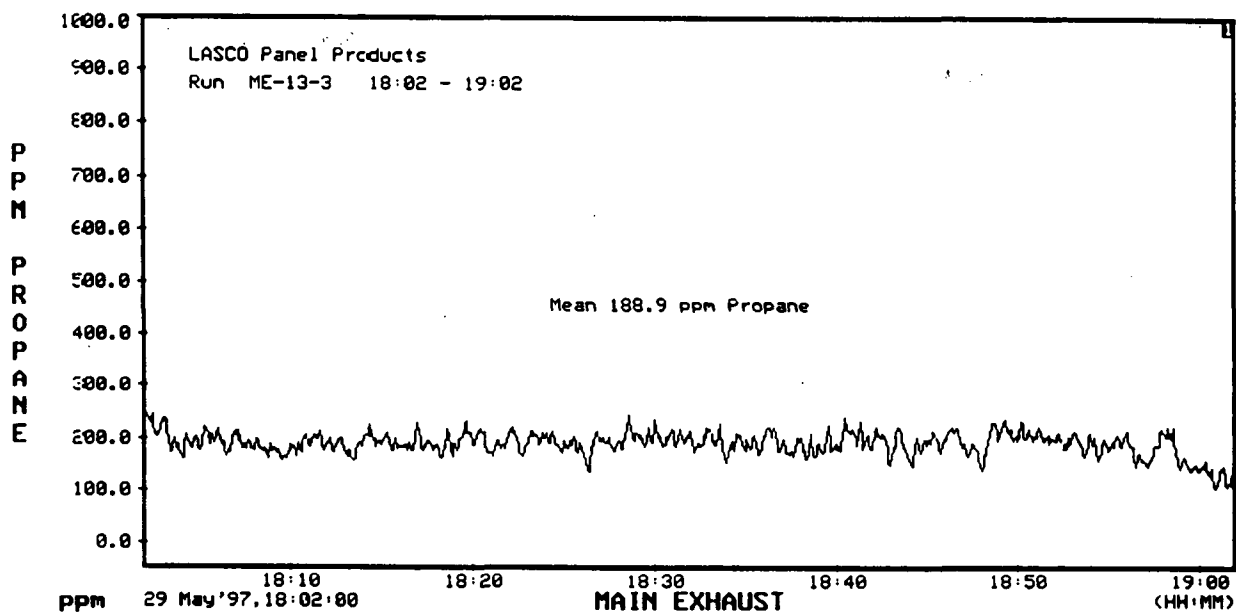
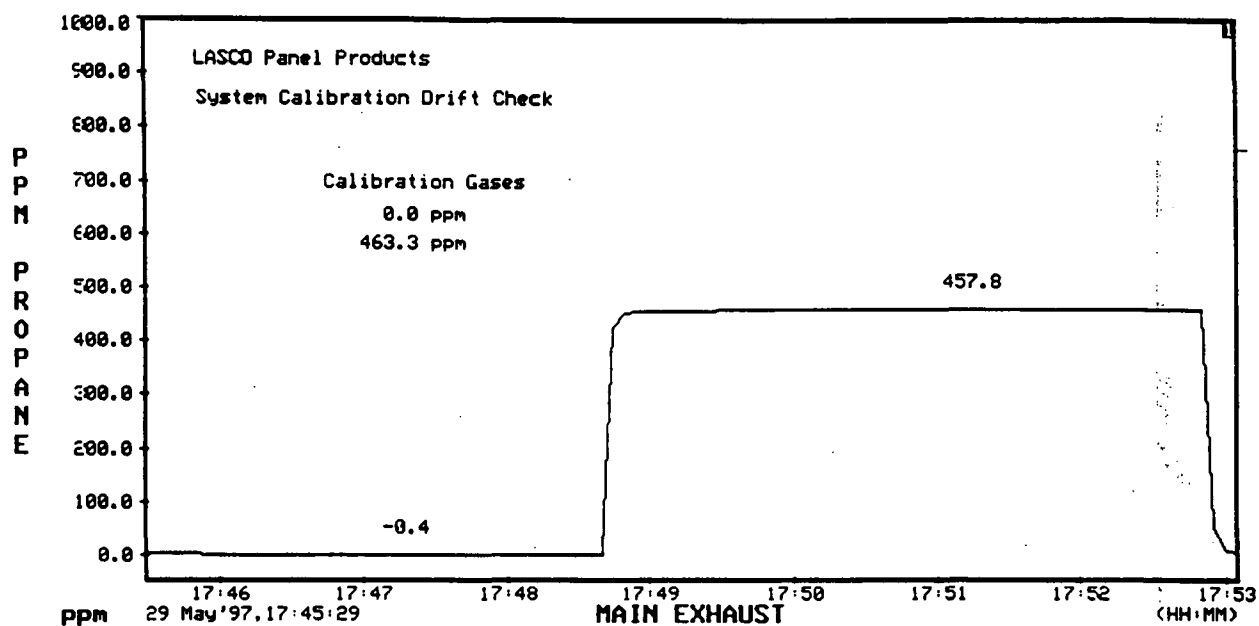
Correlation	0.9999926
Slope	1.0204638
Intercept	-5.2403935

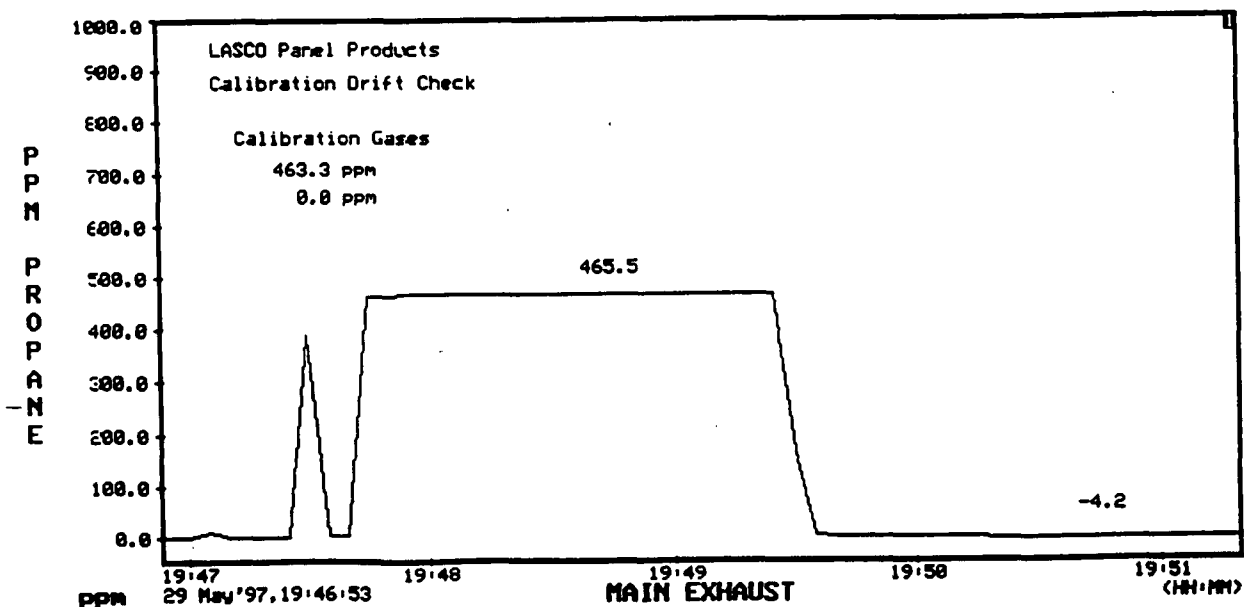
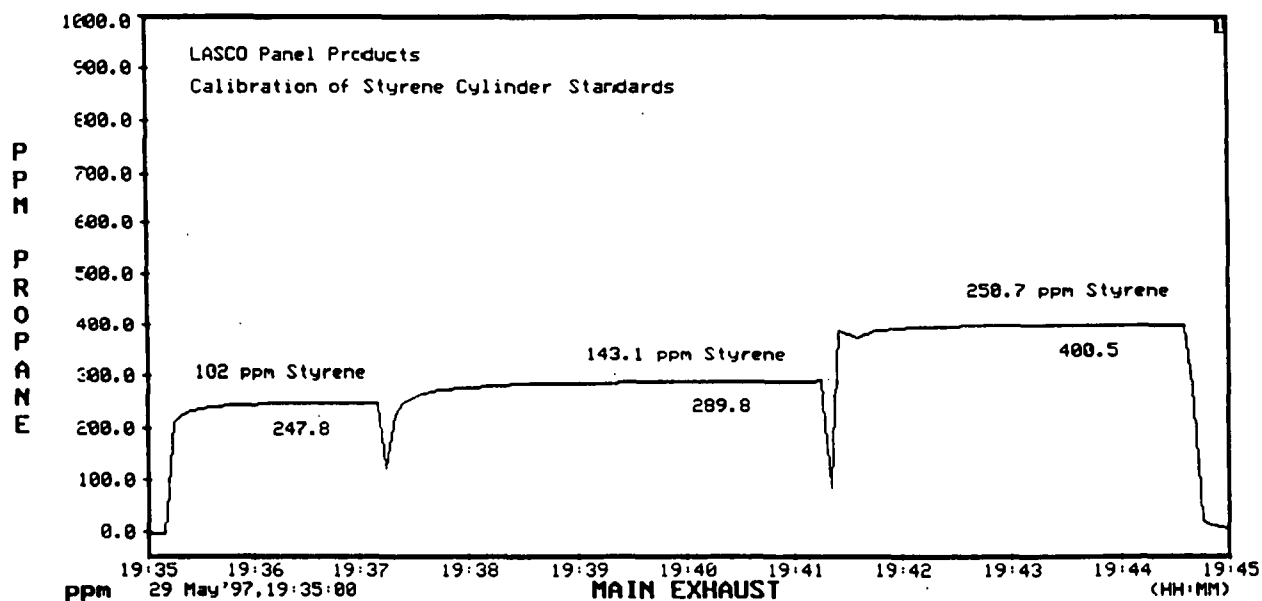
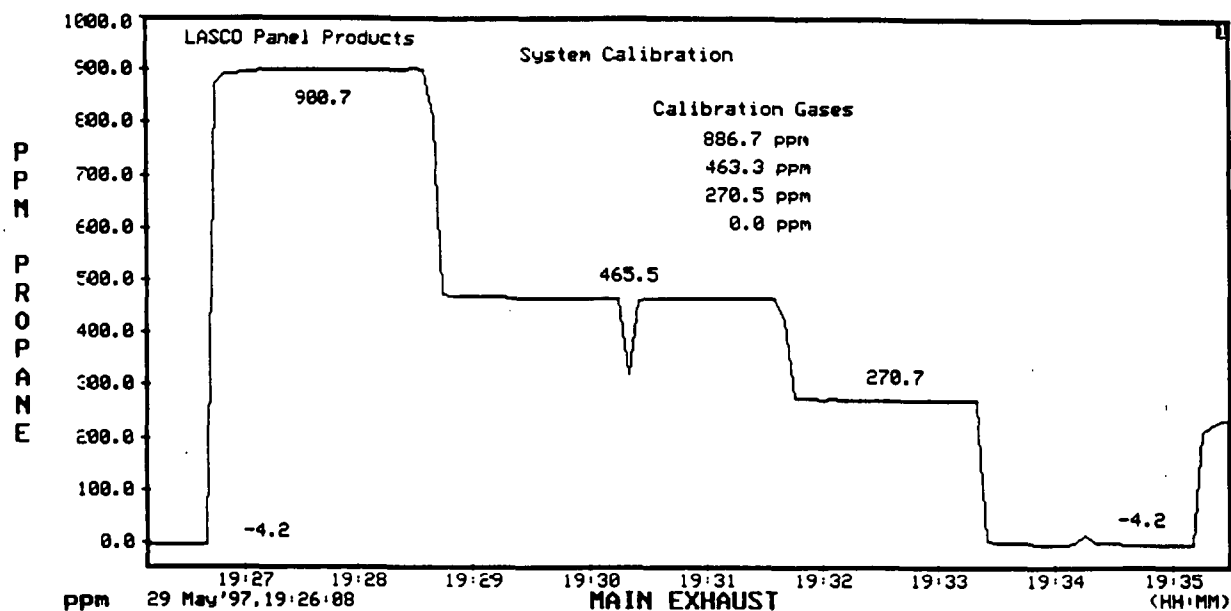
102 ppm Styrene	247.8	Corrected	248.0	ppm THC
143.1 ppm Styrene	289.8	Corrected	289.1	ppm THC
250.7 ppm Styrene	400.5	Corrected	397.6	ppm THC

19:47	Post Cal	-4.2	Drift	0.00%
		465.5		0.00%









LASCO Panel Products

Condition 13 - Room Exhaust

Total Hydrocarbons (THC)

29-May-97

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	5.5	
84.1 ppm	87.6	1.09%
270.5 ppm	265.2	0.11%
463.3 ppm	450.4	

Correlation	0.9999949
Slope	0.9589735
Intercept	6.0936881

15:20-16:15 Run 13-1	102.3	Corrected	100.3	ppm THC
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16:27	Post Cal	7.5	Drift	0.40%
		269.0		0.76%

16:37-17:37 Run 13-2	106.3	Corrected	104.5	ppm THC
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17:51	Post Cal	5.5	Drift	0.00%
		272.8		1.52%

18:02-19:02 Run 13-3	108.6	Corrected	106.9	ppm THC
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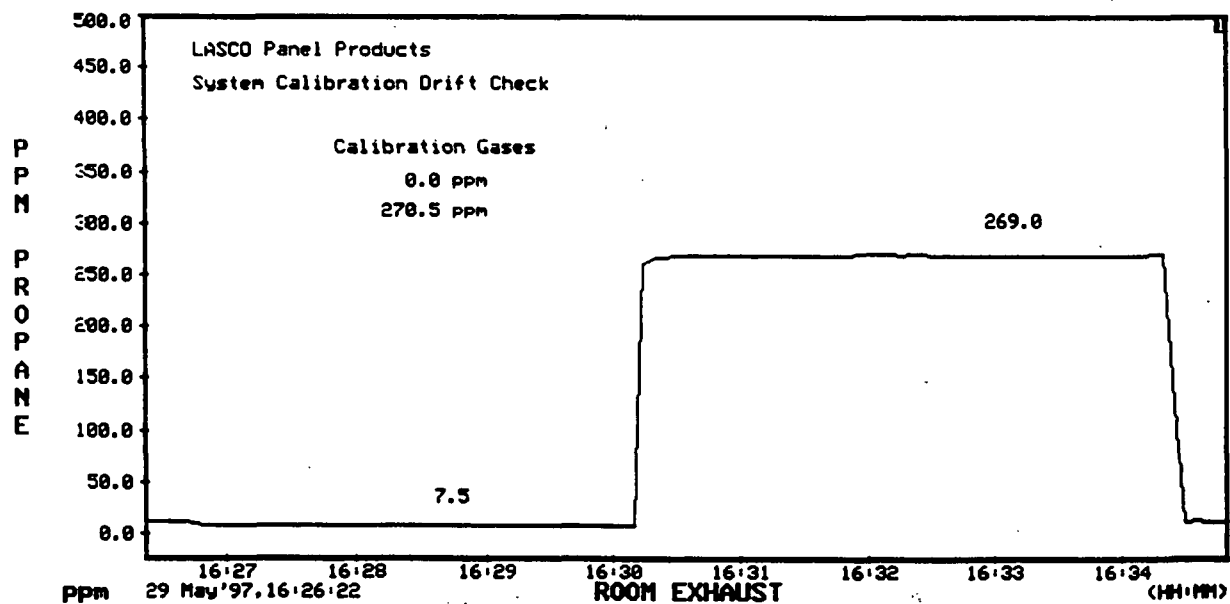
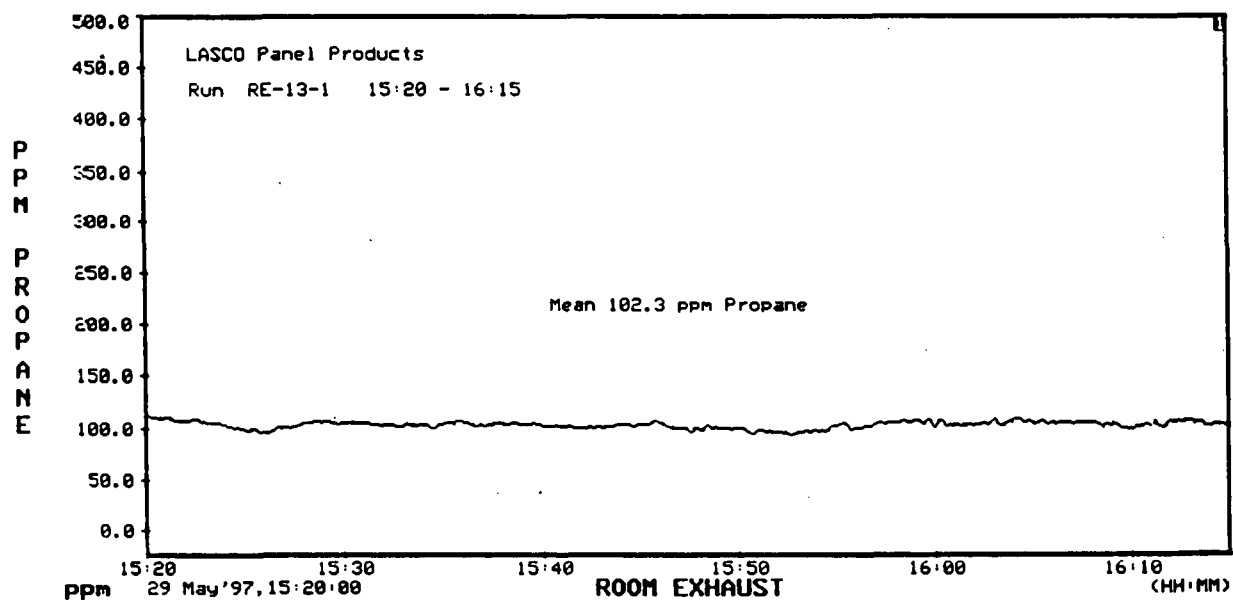
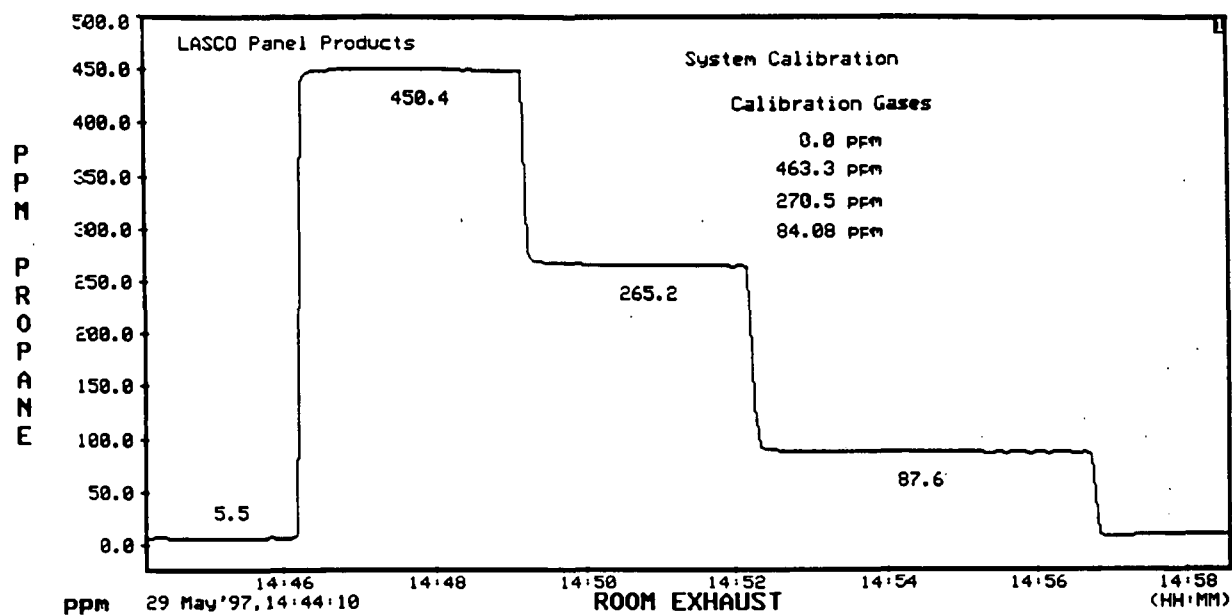
19:16	Post Cal	5.5	Drift	0.00%
		274.7		1.90%

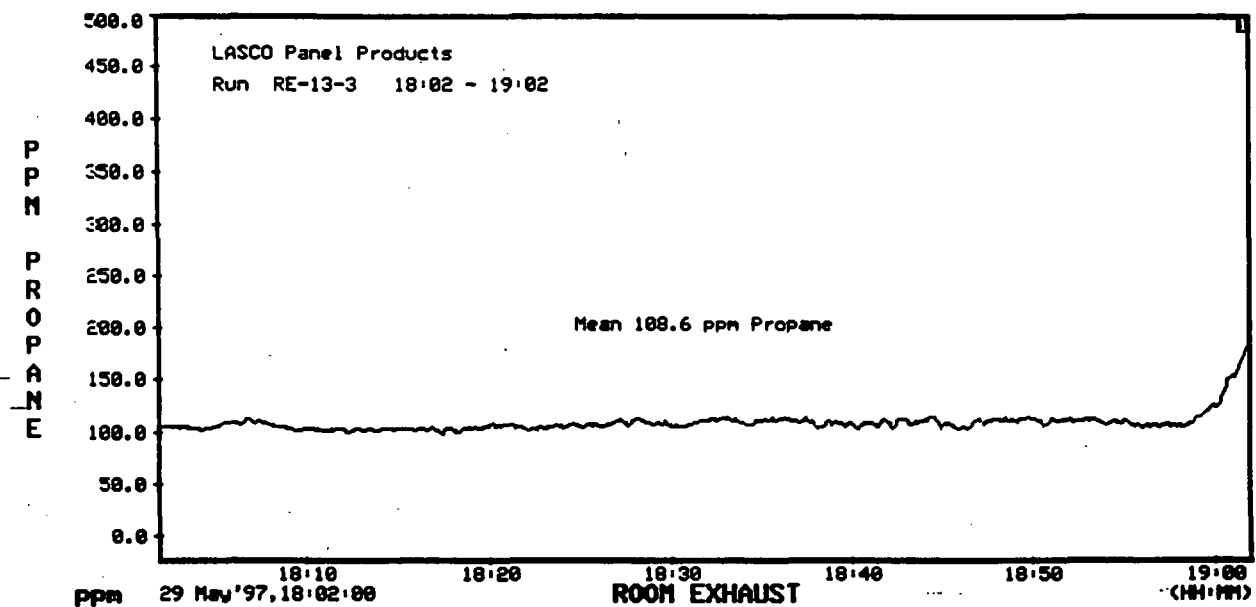
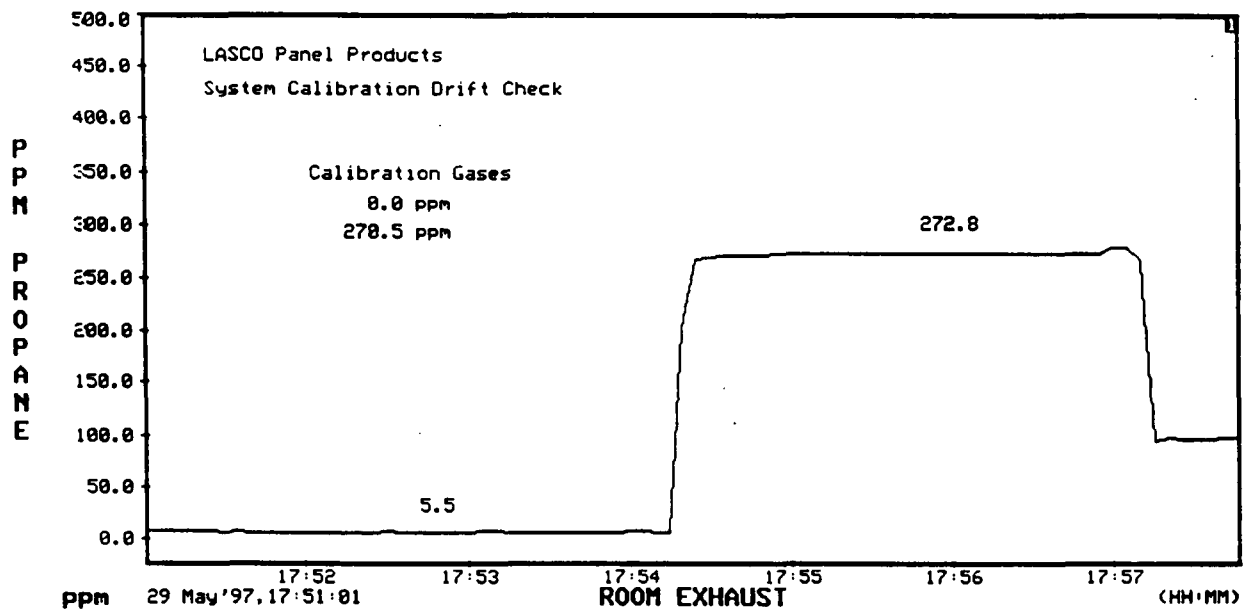
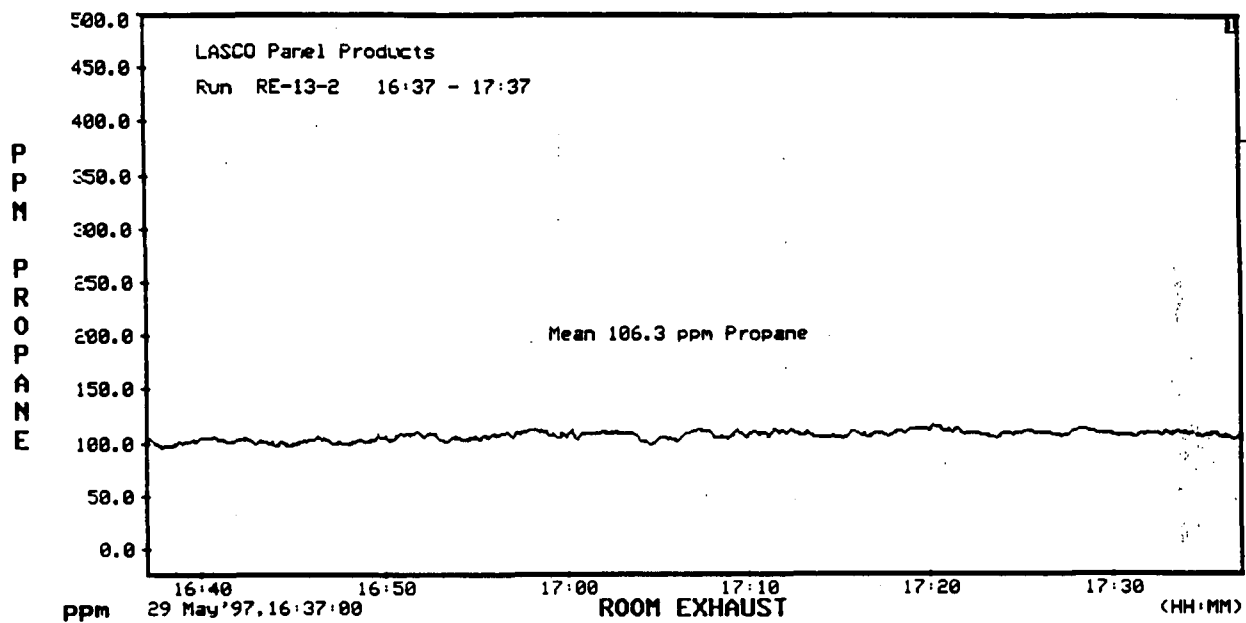
Calibration Gases	System Calibration	Calibration Error
0.0 ppm	5.5	
84.1 ppm	91.5	0.01%
270.5 ppm	282.4	0.91%
463.3 ppm	473.3	

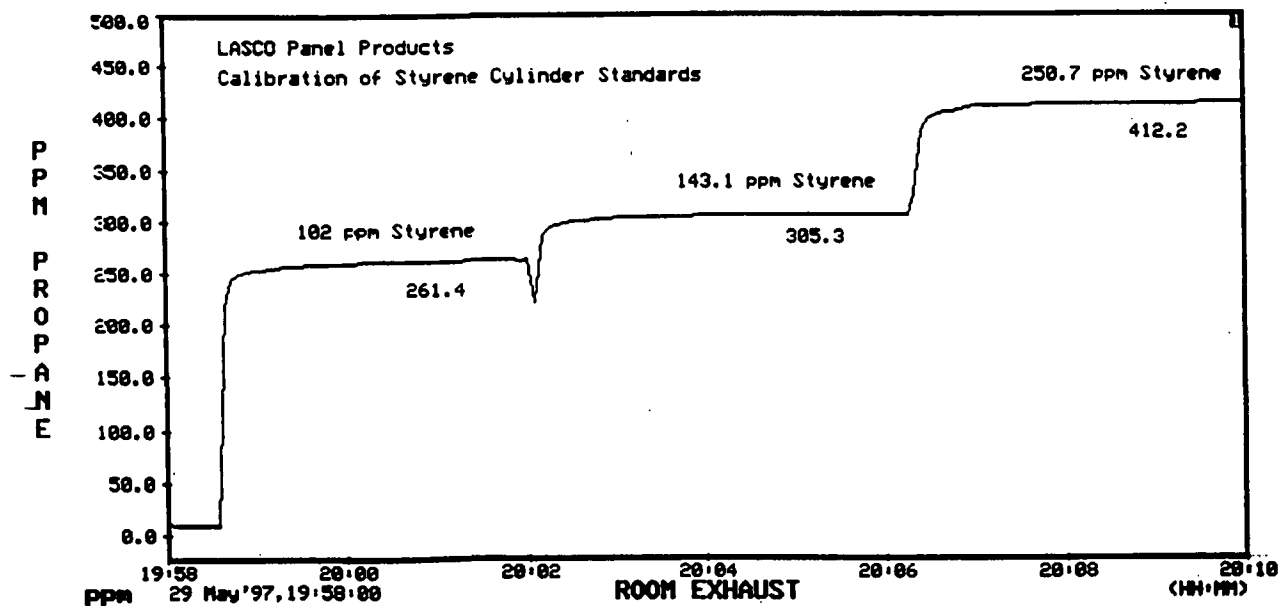
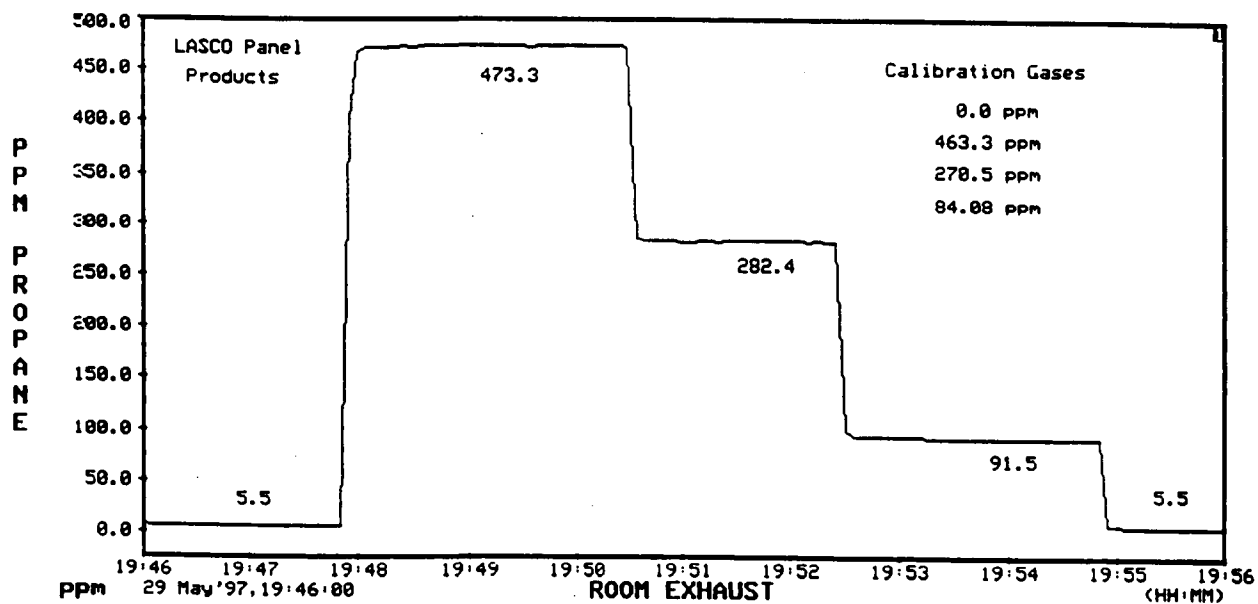
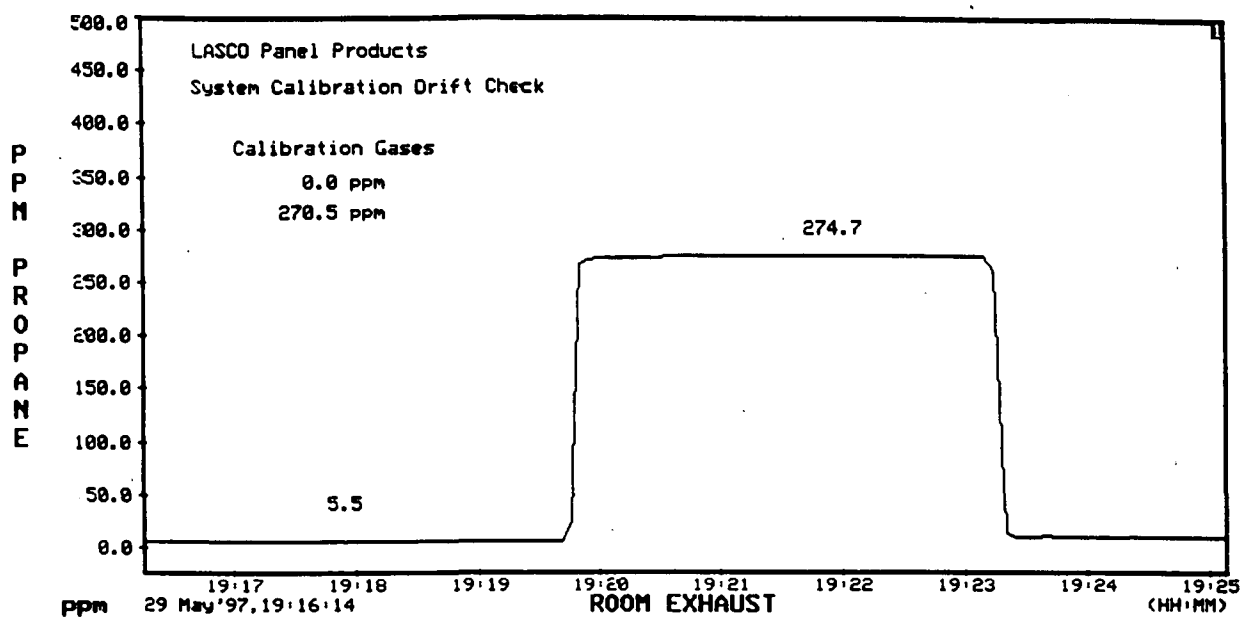
Correlation	0.999964
Slope	1.0106238
Intercept	6.5327507

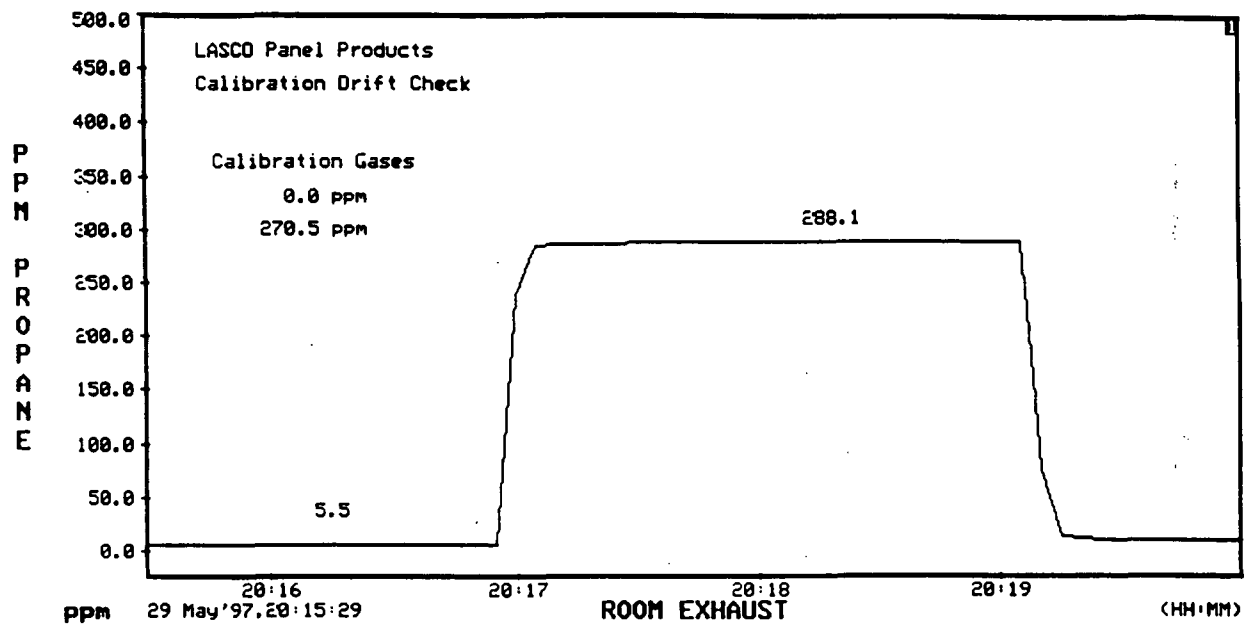
102 ppm Styrene	261.4	Corrected	252.2	ppm THC
143.1 ppm Styrene	305.3	Corrected	295.6	ppm THC
250.7 ppm Styrene	412.2	Corrected	401.4	ppm THC

20:16	Post Cal	5.5	Drift	0.00%
		288.1		1.14%









LASCO Panel Products

Condition 13 - Auxiliary Fan

Total Hydrocarbons (THC)

29-May-97

Calibration Gases	System Calibration	Calibration Error
0.0 ppm	1.7	
84.1 ppm	83.8	0.20%
270.5 ppm	265.2	0.95%
463.3 ppm	446.5	

Correlation	0.9999593
Slope	0.9607363
Intercept	2.8582462

15:20-16:15 Run 13-1	126.6	Corrected	128.8	ppm THC
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16:21	Post Cal	3.6	Drift	0.38%
		270.9		1.14%

16:37-17:37 Run 13-2	121.6	Corrected	123.6	ppm THC
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17:45	Post Cal	3.6	Drift	0.38%
		272.8		1.52%

18:02-19:02 Run 13-3	126.8	Corrected	129.0	ppm THC
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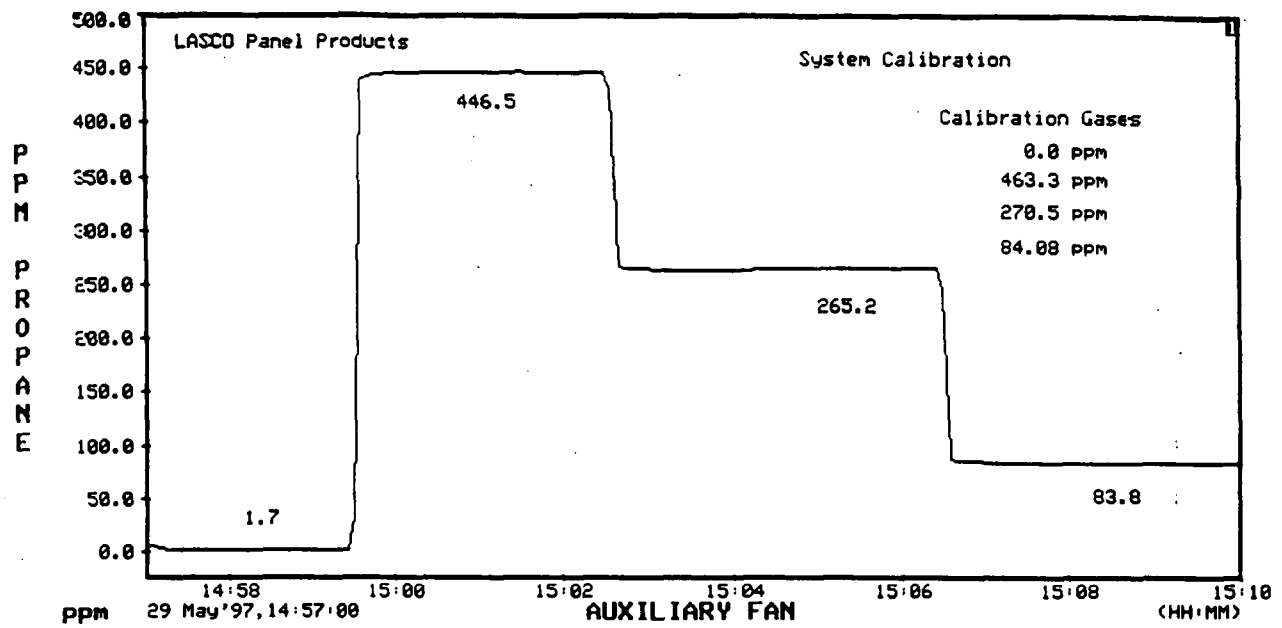
19:23	Post Cal	1.7	Drift	0.00%
		274.7		1.90%

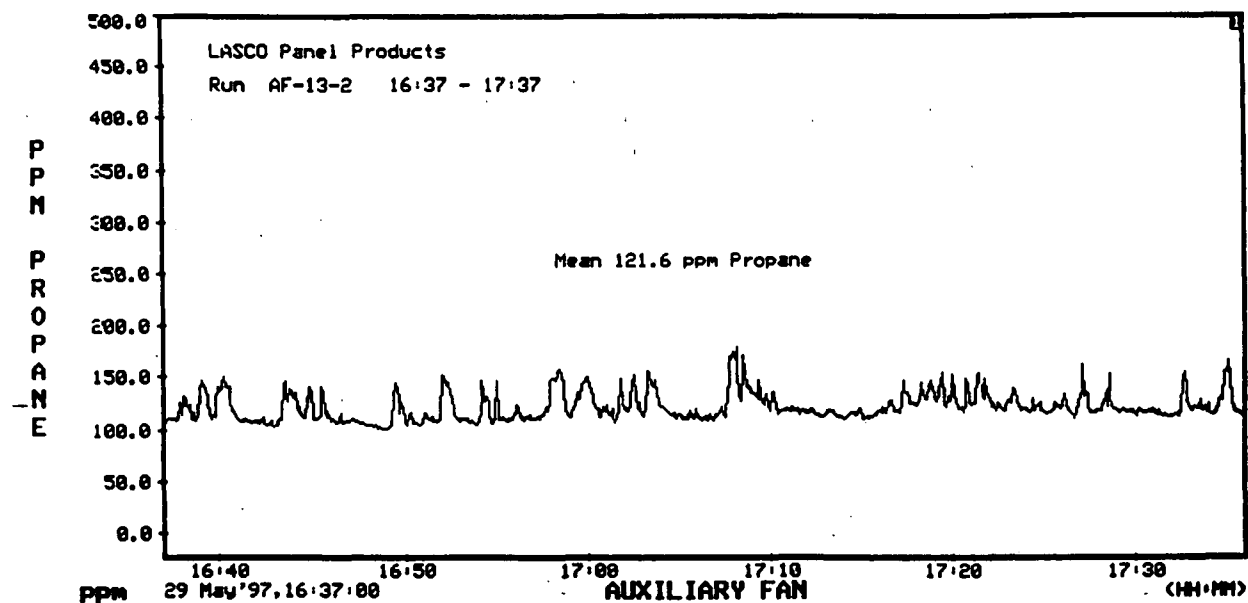
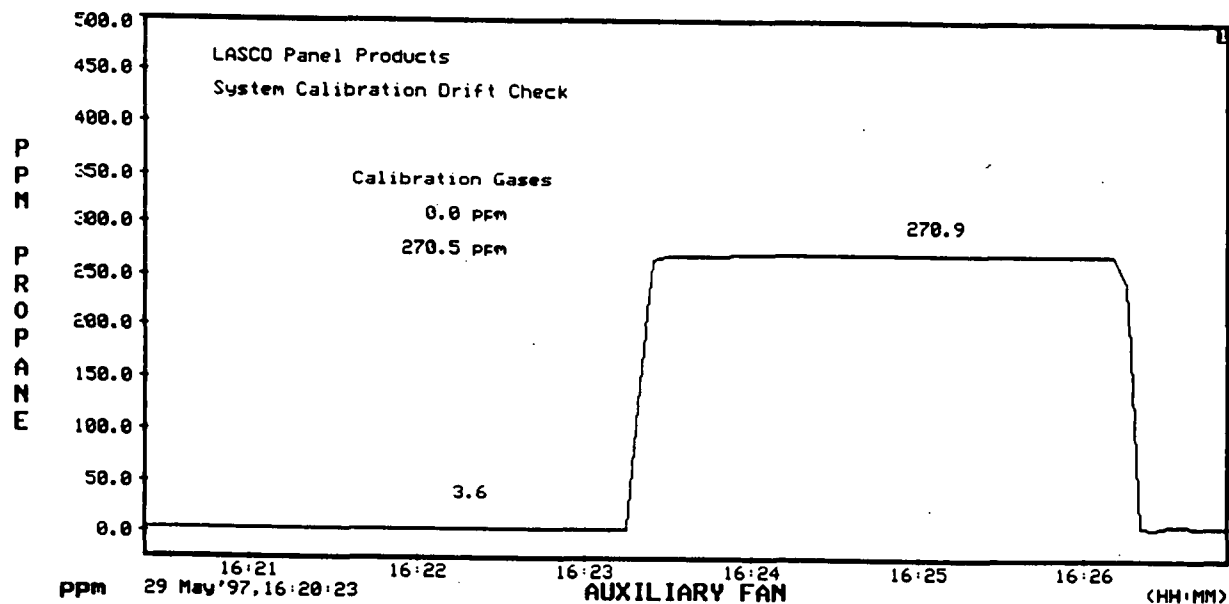
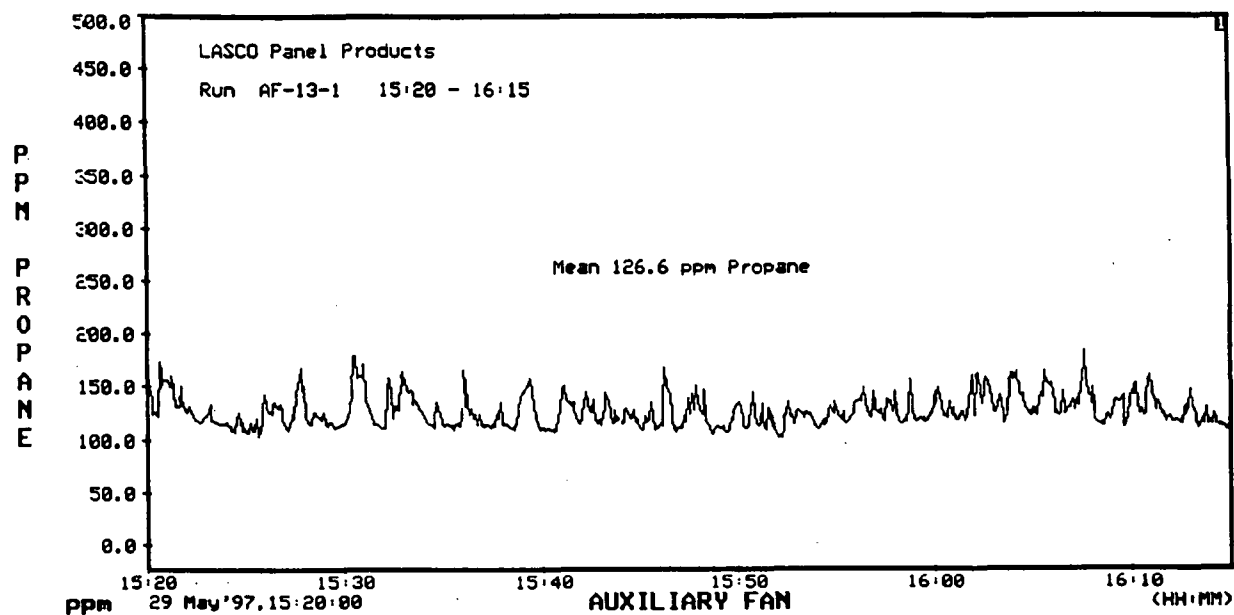
Calibration Gases	System Calibration	Calibration Error
0.0 ppm	-0.2	
84.1 ppm	91.5	1.53%
270.5 ppm	288.1	0.55%
463.3 ppm	488.5	

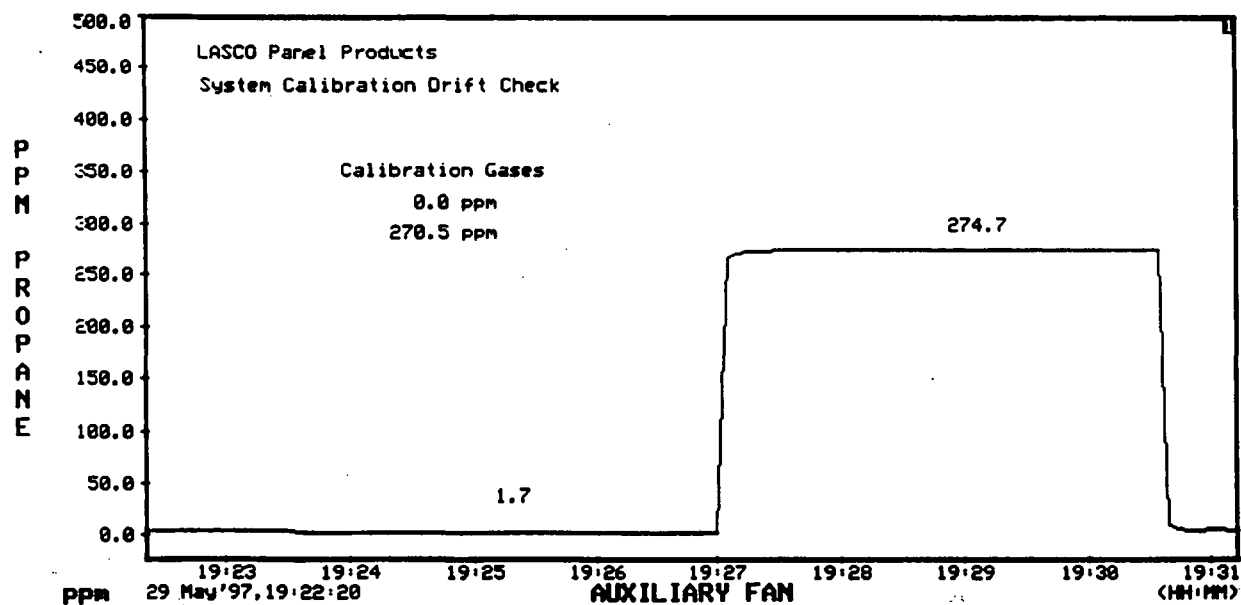
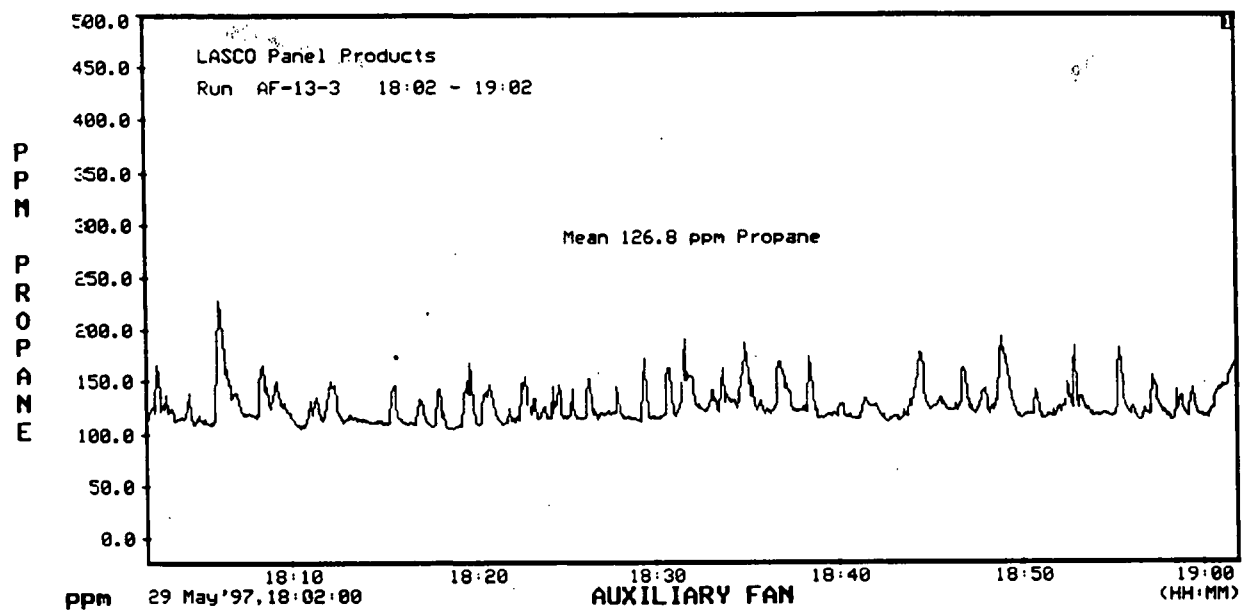
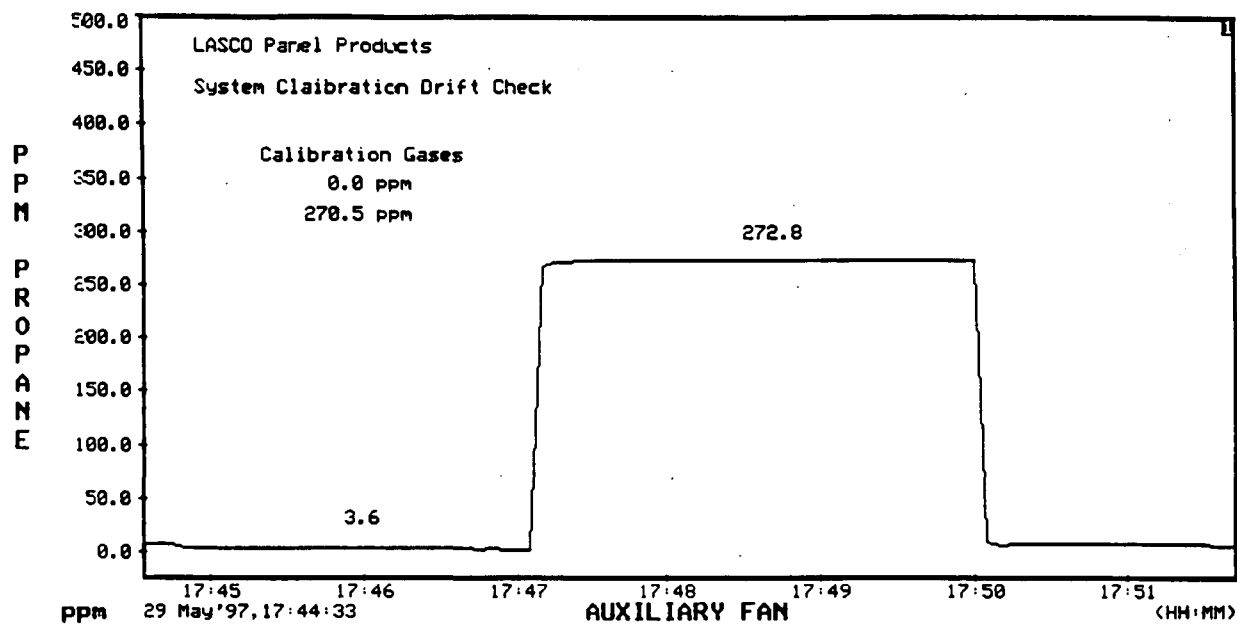
Correlation	0.9999692
Slope	1.0535213
Intercept	1.5614987

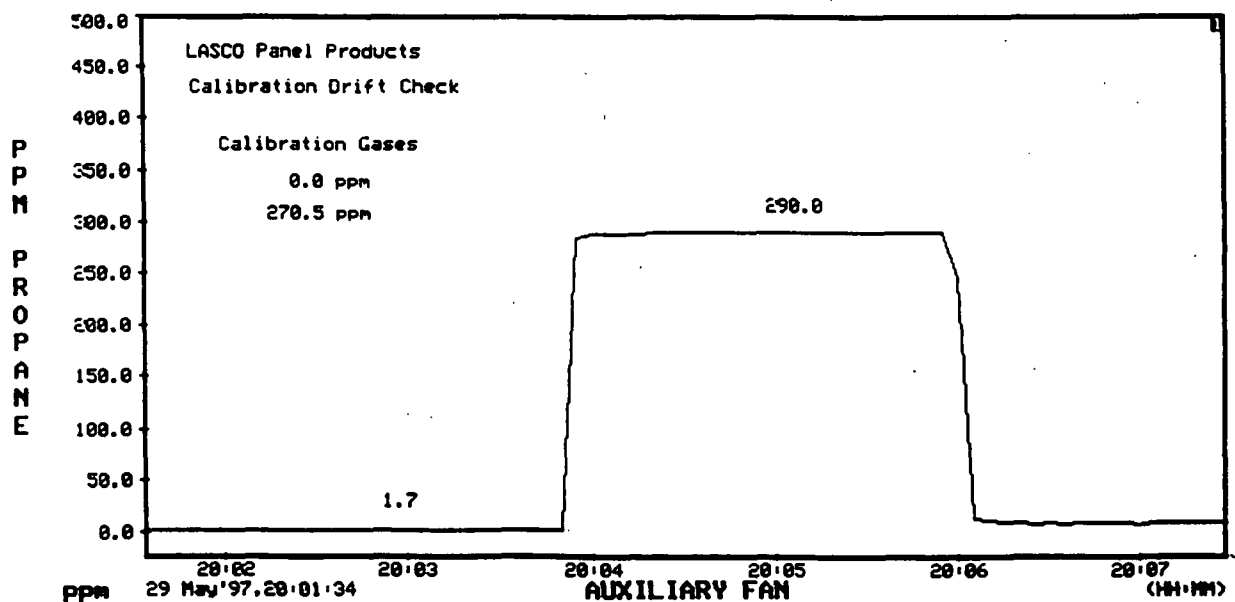
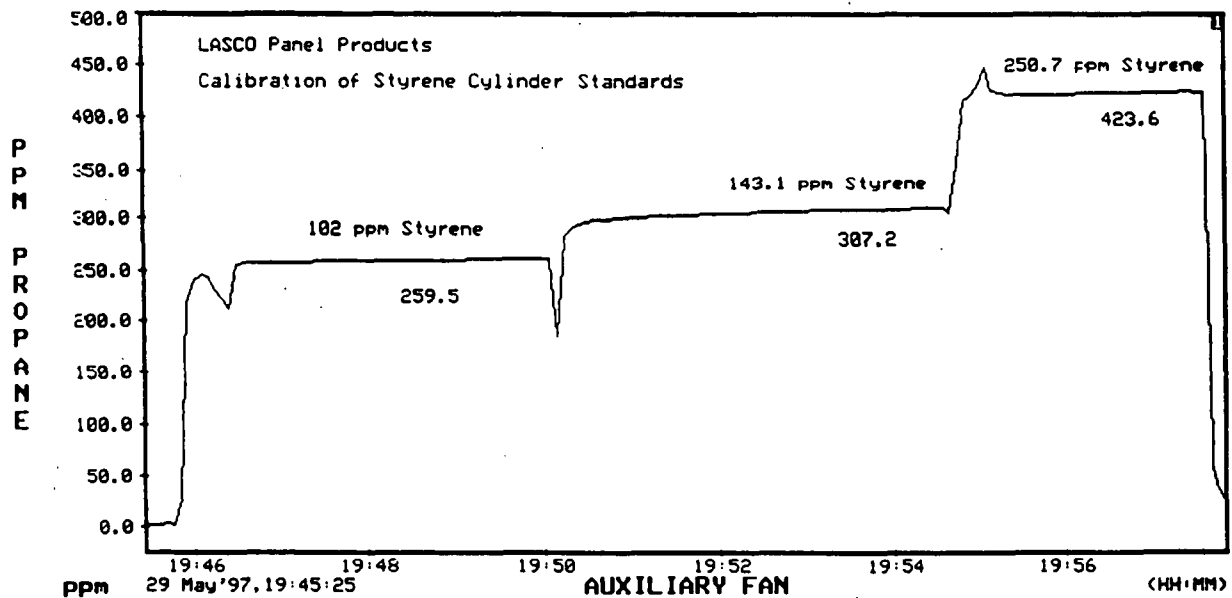
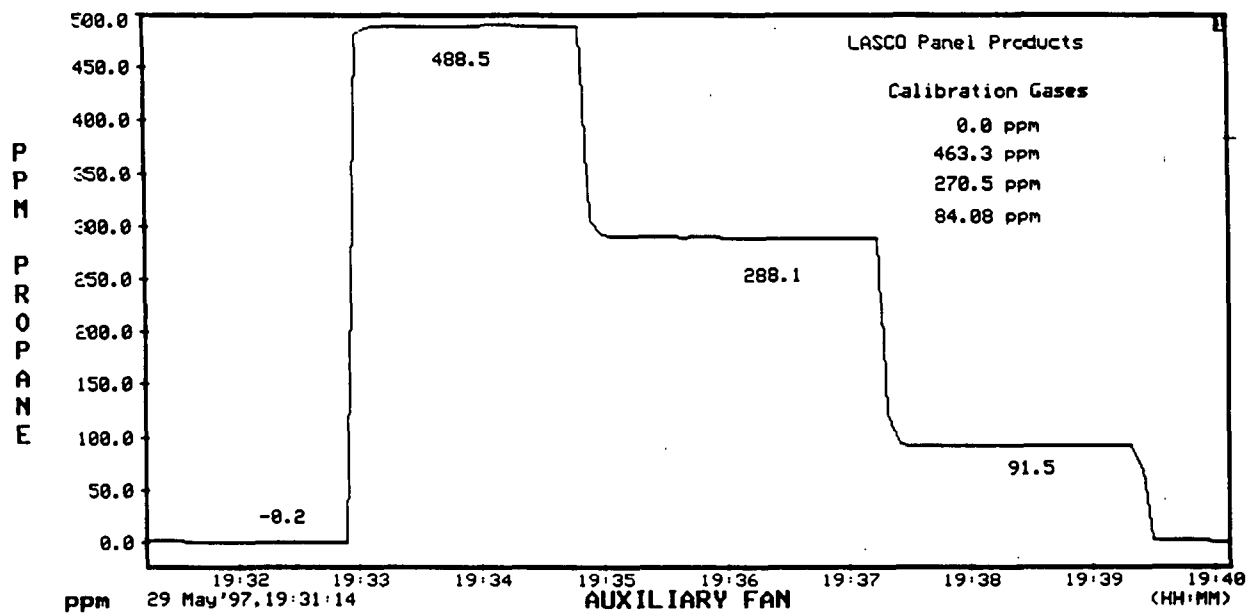
102 ppm Styrene	259.5	Corrected	244.8	ppm THC
143.1 ppm Styrene	307.2	Corrected	290.1	ppm THC
250.7 ppm Styrene	423.6	Corrected	400.6	ppm THC

20:02	Post Cal	1.7	Drift	0.38%
		290.0		0.38%









DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: MAIN EXHAUST Monitor: ppm or %
 Date: 5-29-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-1000 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 29.20 (15:20)
 Time, Pretest: 14:45 Post-test: 19:15 Ambient Temp., F: 65°F
 Run #: ME-13-1, ME-13-2, ME-13-3

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		14:45	16:25	17:45	19:15	14:45	16:25	17:45	19:15		
	0	0.0	0.0	0.0	0.0	1.66	1.7	1.7	1.7		0.0
	270.5	27.1				270.1				0.15	
	463.3	46.3	45.8	45.7	45.3	460.4	455.4	454.4	450.5	0.63	1.0
	886.7	89.5				888.3					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.167)}{(0.10093)}$$

$$\text{Correlation Coefficient} = \underline{0.99998}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: MAIN EXHAUST
Date: 5-29-97

Parameter: SO₂, CO₂, O₂, NO_x*, (THC) CO
Operator: P. SIEGEL
Project #: 8405-003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD + 0.167)}{(0.10093)}$$

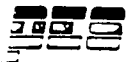
Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
ME-13-1	15:20 - 15:30	19	189.9	Jun 5
	- 15:40	20	199.8	
	- 15:50	20	199.8	
	- 16:00	19	189.9	
	- 16:10	19	189.9	
	- 16:20	19	189.9	AVG = 193.2 ppm Propane
ME-13-2	16:37 - 16:47	18	180.0	
	- 16:57	17.5	175.0	
	- 17:07	18	180.0	
	- 17:17	18	180.0	
	- 17:27	18	180.0	
	- 17:37	18	180.0	AVG = 179.2 ppm Propane
ME-13-3	18:02 - 18:12	18.5	184.9	
	- 18:22	18.5	184.9	
	- 18:32	19.5	194.8	
	- 18:42	19	189.9	
	- 18:52	19	189.9	
	- 19:02	17	170.1	AVG = 185.8 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel
Checked By: _____

Date: 5-29-97



DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO
Location: ROOM EXHAUST
Date: 5-29-97
Operator: P. SIEGEL
Project #: S405.003
Time, Pretest: 14:45 Post-test: 19:15
Run #: RE-13-1, RE-13-2, RE-13-3

Parameter: SO₂, CO₂, O₂, NO_x, THC
Monitor: ppm or %
Span Value: 100
Chart Scale: 0-500 ppm Propane
Pbar, in. Hg.: 29.20 (15.20)
Ambient Temp., F: 65 °F

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		14:45	16:25	17:50	19:15	14:45	16:25	17:50	19:15		
	0	1.8	1.9	1.8	1.7	-0.1	0.5	-0.1	-0.6		0.1
	84.08	18.0				84.2				0.14	
	270.5	53.8	54.5	55.0	55.5	270.4	274.0	276.6	279.2	0.04	1.7
	463.3	90.9				463.3					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 1.810)}{(0.19228)}$$

$$\text{Correlation Coefficient} = \underline{0.99999}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate

sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: Room EXHAUST
Date: 5-29-97

Parameter: SO₂, CO₂, O₂, NO_x, THC, CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(\text{CD} - 1.810)}{(0.19228)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
RE-13-1	15:20 - 15:30	22	105.0	Jun 5
	- 15:40	21	99.8	
	- 15:50	20.5	97.2	
	- 16:00	21	99.8	
	- 16:10	21	99.8	
	- 16:15	21.5	102.4	AVG = 100.7 ppm Propane
RE-13-2	16:37 - 16:47	21	99.8	
	- 16:57	21.5	102.4	
	- 17:07	22	105.0	
	- 17:17	22	105.0	
	- 17:27	22.5	107.6	
	- 17:37	22	105.0	AVG = 104.1 ppm Propane
RE-13-3	18:02 - 18:12	21	99.8	
	- 18:22	21	99.8	
	- 18:32	22	105.0	
	- 18:42	22.5	107.6	
	- 18:52	22.5	107.6	
	- 19:02	25	120.6	AVG = 106.7 ppm Propane

* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

Calculated By: Paul T. Siegel Date: 5-29-97
Checked By: _____ Date: _____

DAILY CEM CALIBRATION AND PERFORMANCE EVALUATION

Plant: LASCO Parameter: SO₂, CO₂, O₂, NO_x, THC
 Location: AUXILIARY FAN Monitor: ppm or %
 Date: 5-29-97 Span Value: 100
 Operator: P. SIEGEL Chart Scale: 0-500 ppm Propane
 Project #: S405.003 Pbar, in. Hg.: 29.20
 Time, Pretest: 15:00 Post-test: 19:25 Ambient Temp., F: 65°F
 Run #: AF-13-1, AF-13-2, AF-13-3

Cyl. #	Cal. Gas Conc., <u>ppm</u> or %	Calibrations (Chart Divisions)				Concentration Predicted By Equation*				Analyzer Calibration Error,** % of Span	Drift,*** % of Span
		15:00	16:20	17:45	19:25	15:00	16:20	17:45	19:25		
	0	0.0	0.6	0.3	0.1	-2.1	1.0	-0.5	-1.6		0.6
	84.08	16.9				85.7				1.93	
	270.5	52.8	53.9	54.0	54.8	272.3	278.0	278.5	282.7	0.67	2.0
	463.3	89.3				462.0					

* Perform linear regression of pretest cal. gas concentration vs. chart divisions to determine the following equation:

$$y = mx + b \quad x = \text{ppm} \quad y = \text{chart divisions}$$

For Data Reduction:

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.403)}{(0.19244)}$$

$$\text{Correlation Coefficient} = \underline{0.99995}$$

$$\text{** Analyzer cal. error, \% cal. gas value} = \frac{(\text{Cal. gas conc.} - \text{conc. predicted}) \times 100}{\text{Cal. gas value, ppm}}$$

Acceptable limit = $\leq 2\%$ of calibration gas value ($\leq 5\%$ for THC)

$$\text{*** Drift, \% Span} = \frac{(\text{Post-test cal. response} - \text{initial cal. response}) \times 100}{\text{Span value}}$$

Acceptable limit $\leq 3\%$ of span

Minimum detectable limit = 2% of span or _____ ppm or % (circle one)

Maximum zero drift = _____ % of span or _____ ppm or % (circle one)

Maximum calibration drift = _____ % of span or _____ ppm or % (circle one)

COMMENTS: Pretest or post-test (circle one) calibration used to quantitate

sample data. Post-test is used if drift exceeds limits and if post-test yields higher concentrations.



CEM DATA REDUCTION - BAG ANALYSIS OR STEADY READINGS

Plant: LASCO
Location: AUXILIARY FAN
Date: 5-29-97

Parameter: SO₂, CO₂, O₂, NO_x* (THC) CO
Operator: P. SIEGEL
Project #: S405.003

$$\text{Pollutant, ppm/\%} = \frac{(\text{Chart Division} - b)}{m} = \frac{(CD - 0.403)}{(0.19244)}$$

Run #	Time** (24-Hr)	Average Chart Division	Concentration ppm	Comments
				JUN 4
AF-13-1	15:20 - 15:30	25	127.8	
	15:30 - 15:40			
	-15:40	24	122.6	
	-15:50			
	-15:50	23	117.4	
	-16:00	24	122.6	
	-16:10	26	133.0	
	¹⁵ -16:20	23	117.4	AVG = 123.5 ppm Propane
AF-13-2	16:37 - 16:47	23	117.4	
	-16:57	23	117.4	
	-17:07	24	122.6	
	-17:17	24	122.6	
	-17:27	25	127.8	
	-17:37	24	122.6	AVG = 121.7 ppm Propane
AF-13-3	18:02 - 18:12	23	117.4	
	-18:22	23	117.4	
	-18:32	24	122.6	
	-18:42	25	127.8	
	-18:52	25	127.8	
	-19:02	25	127.8	AVG = 123.5 ppm Propane

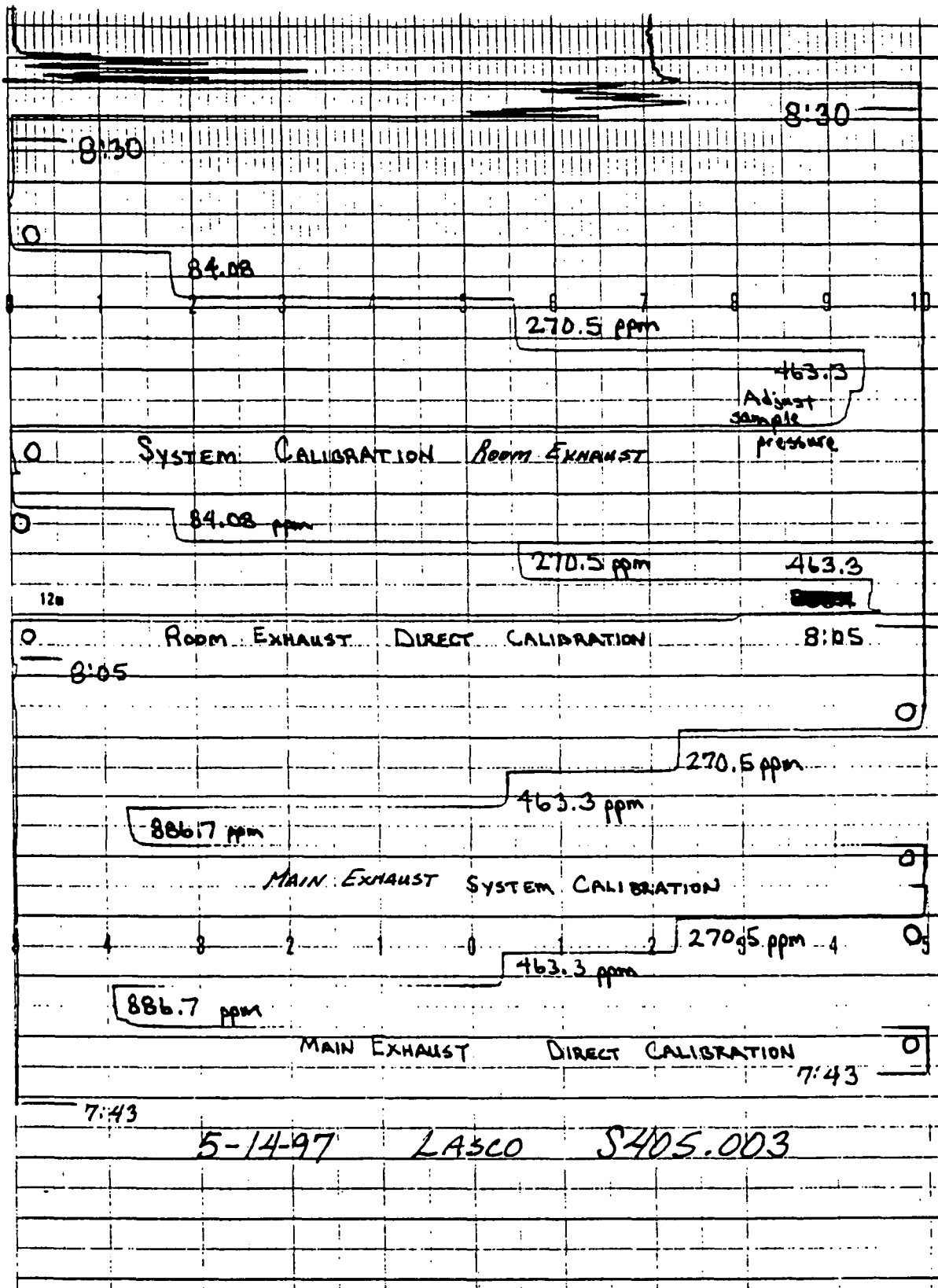
* For NO_x Indicate whether NO, NO + NO₂, or NO₂ for specific interval.

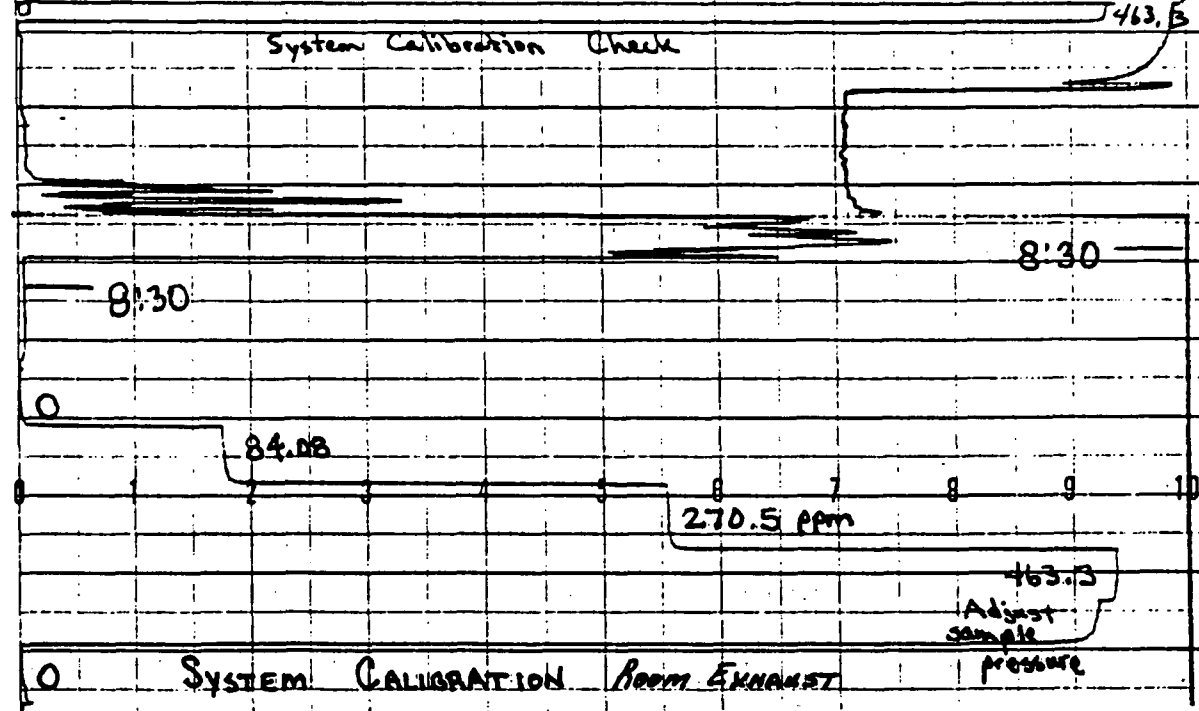
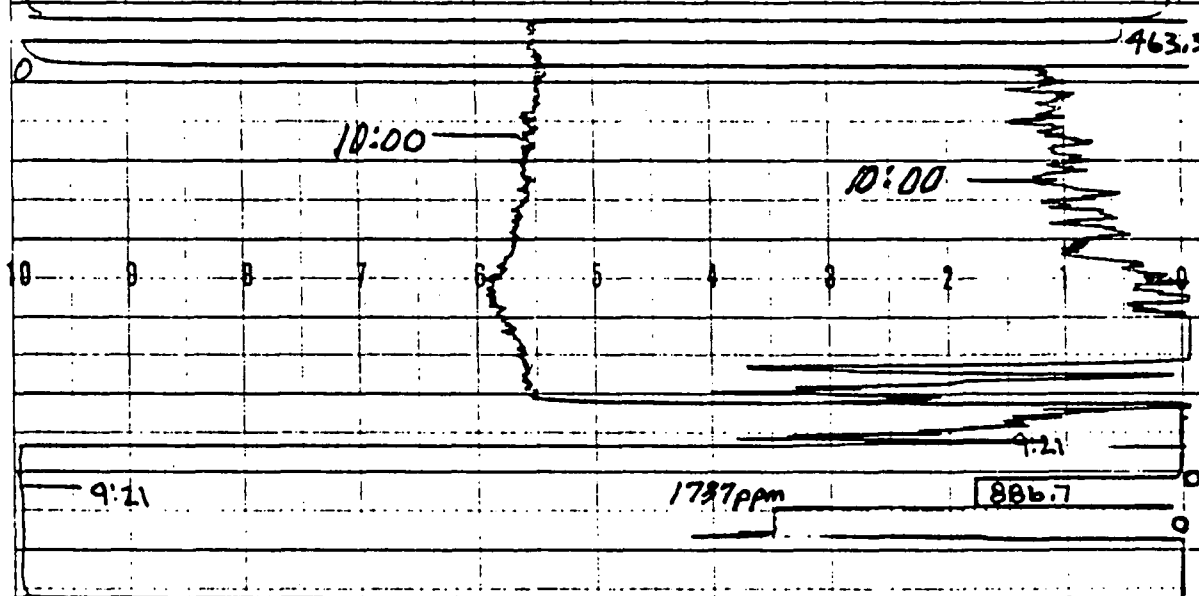
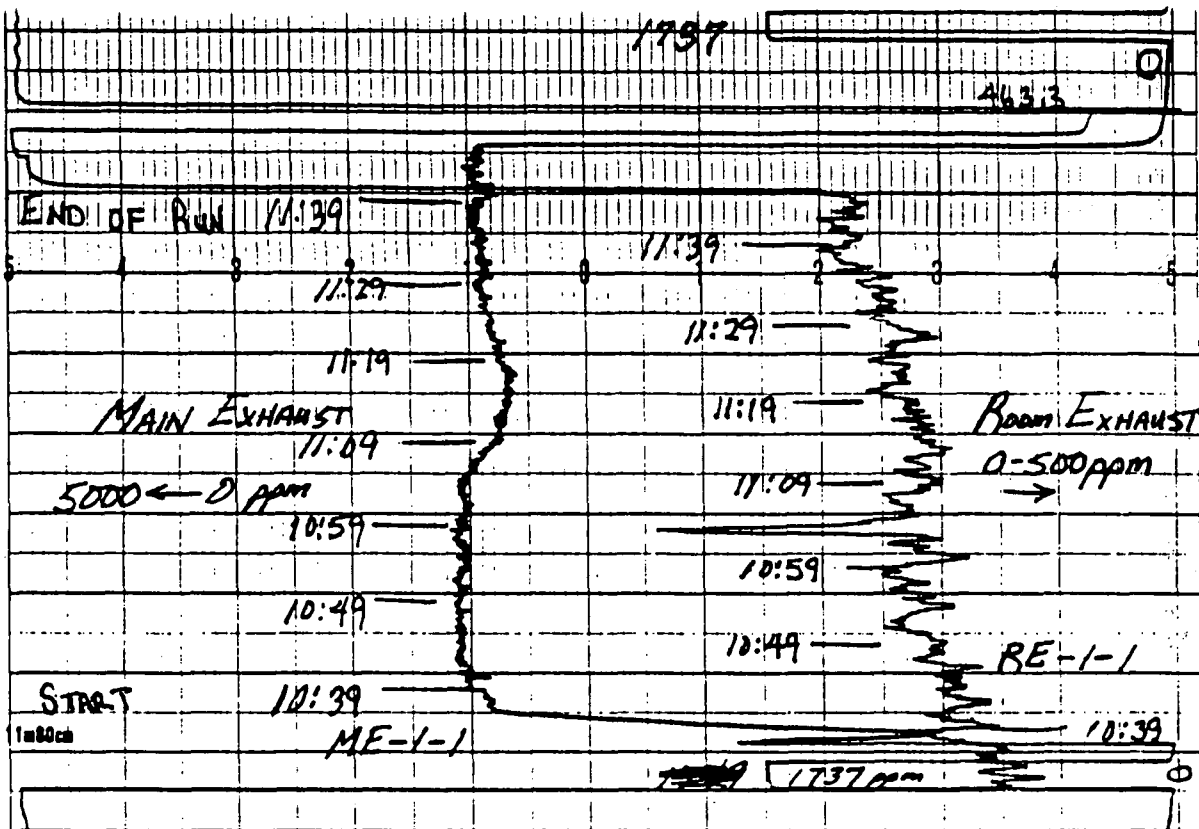
** Indicate whether time interval is from beginning of first time to beginning of second time or to end of second time (circle one, or describe alternate).

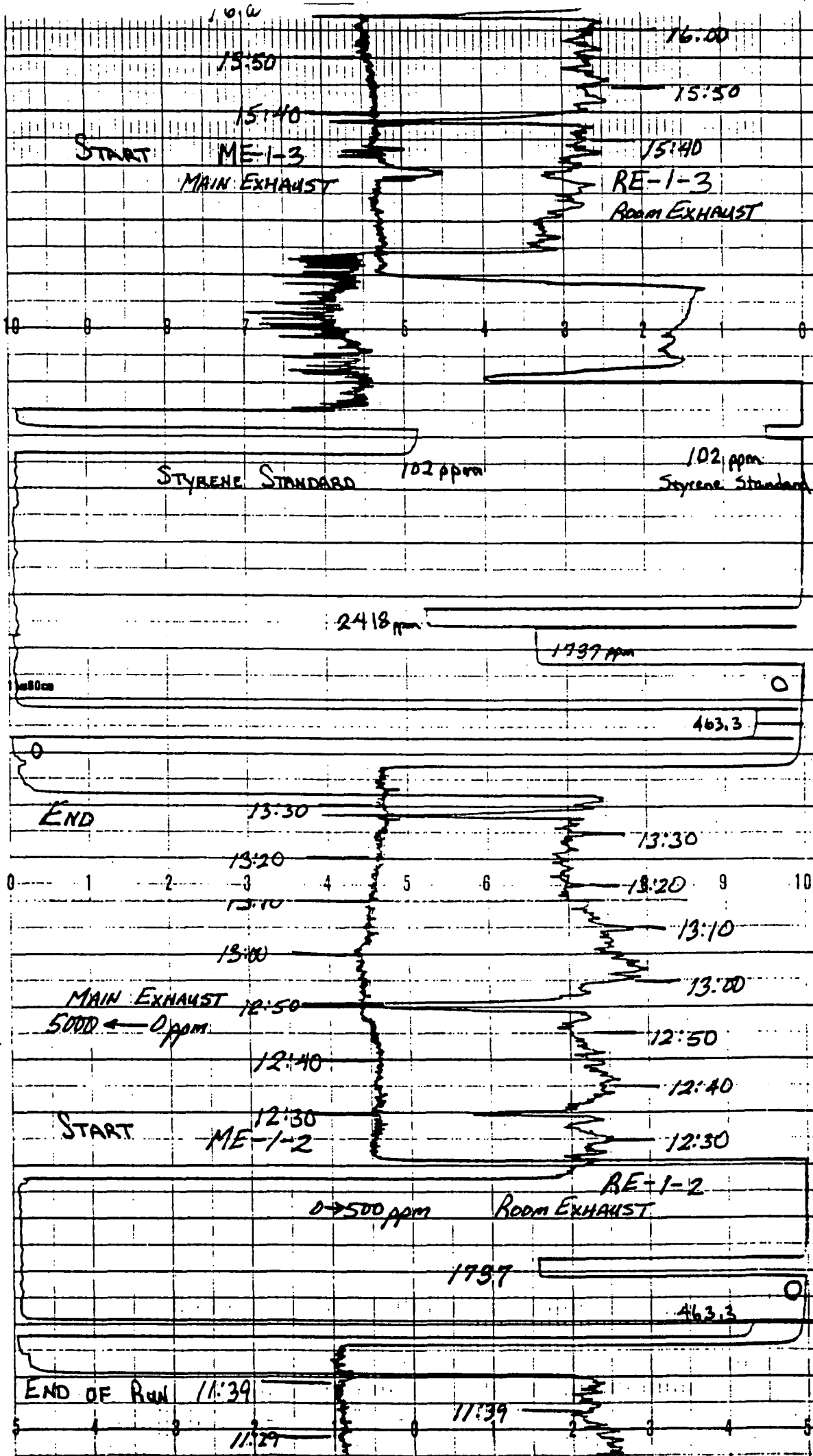
Calculated By: Paul T. Siegel Date: 5-29-97
Checked By: _____ Date: _____

APPENDIX A.2.15

Conditions 1-13 Method 25A Strip Charts







0-17-71

17197

17:47

1507 ppm Propane

1737 ppm

2418 ppm Propane

270.5

463.3

40cm

Room Exhaust Calibration

CHART NO 89529AA NN

5-14-97

16:40

16:30

16:20

16:10

16:00

15:50

15:40

START

ME-1-3

MAIN EXHAUST

16:40

16:30

16:20
Probe Out of Stack

16:10

16:00

15:50

15:40

RE-1-3

Room Exhaust

10

8

8

7

5

4

3

2

1

0

STYRENE STANDARD

102 ppm

102 ppm

Styrene Standard

2418 ppm

1737 ppm

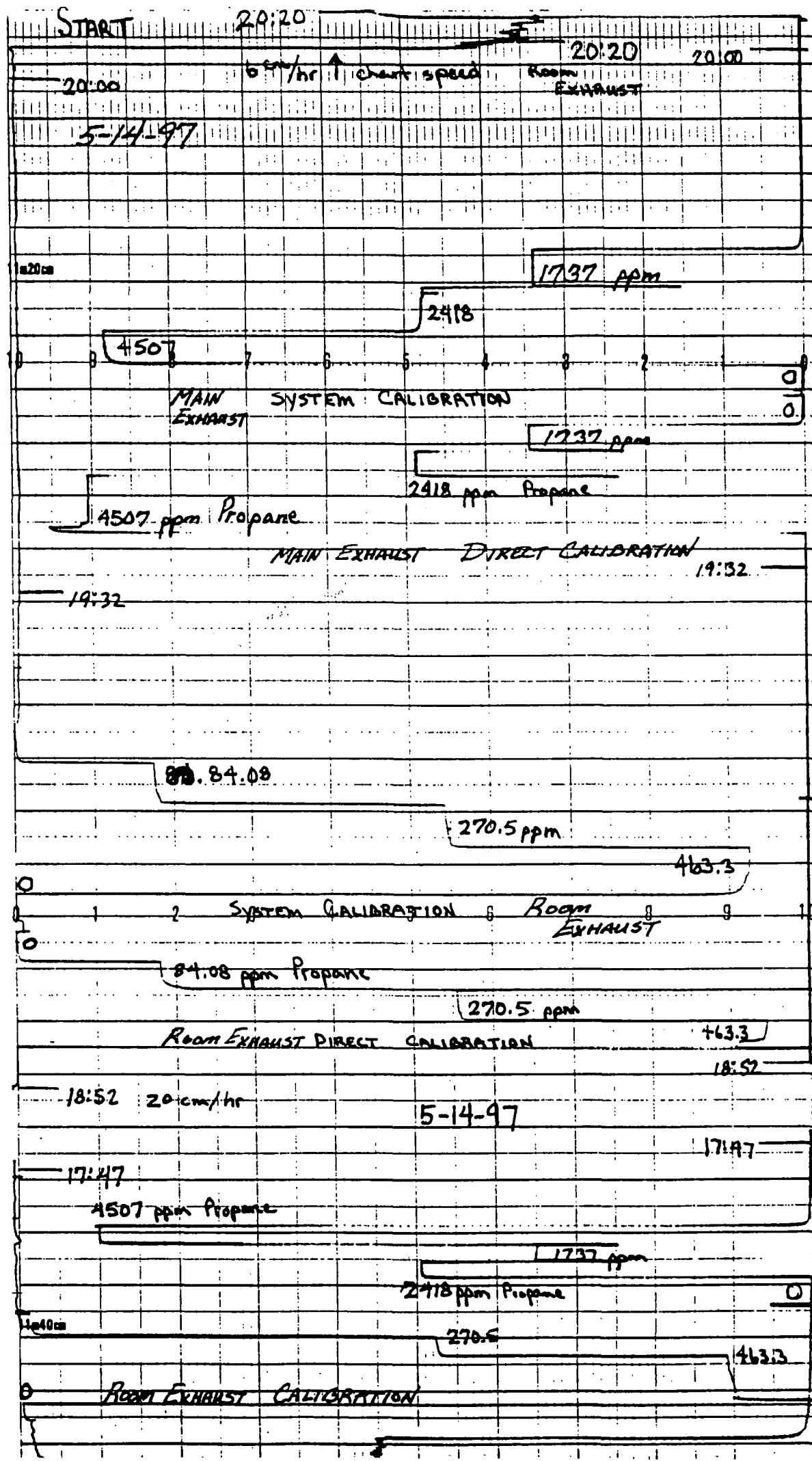
40cm

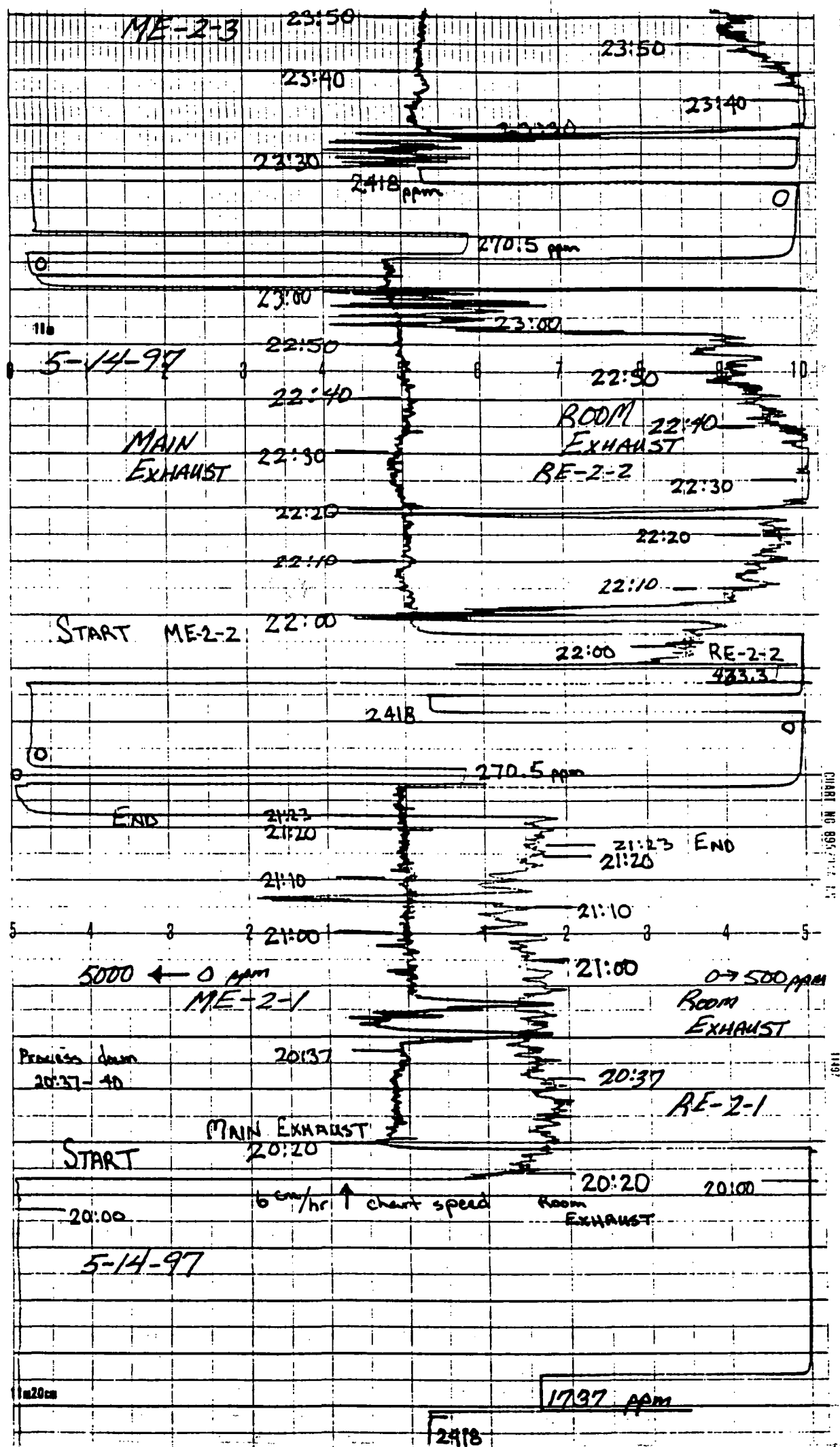
463.3

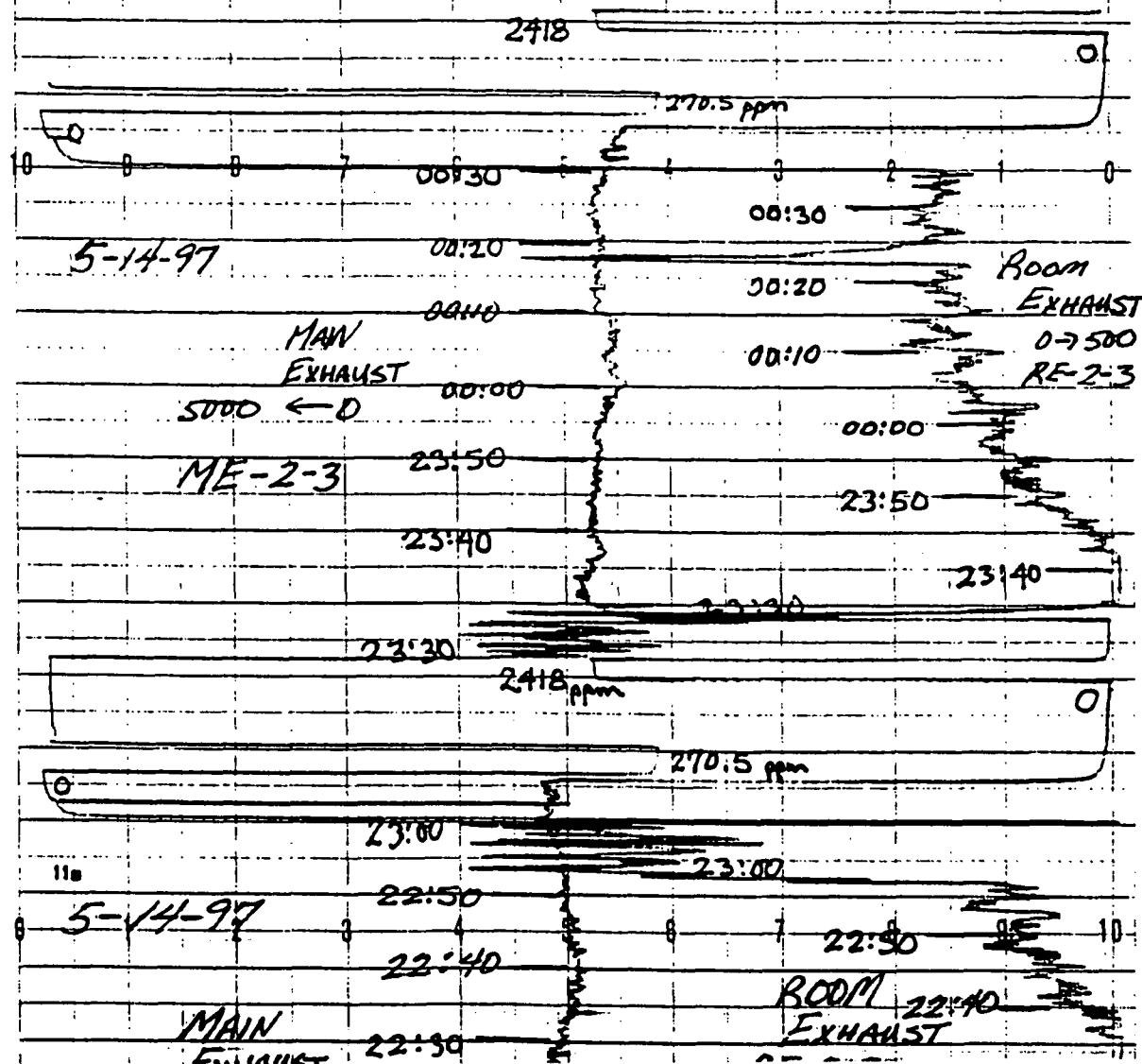
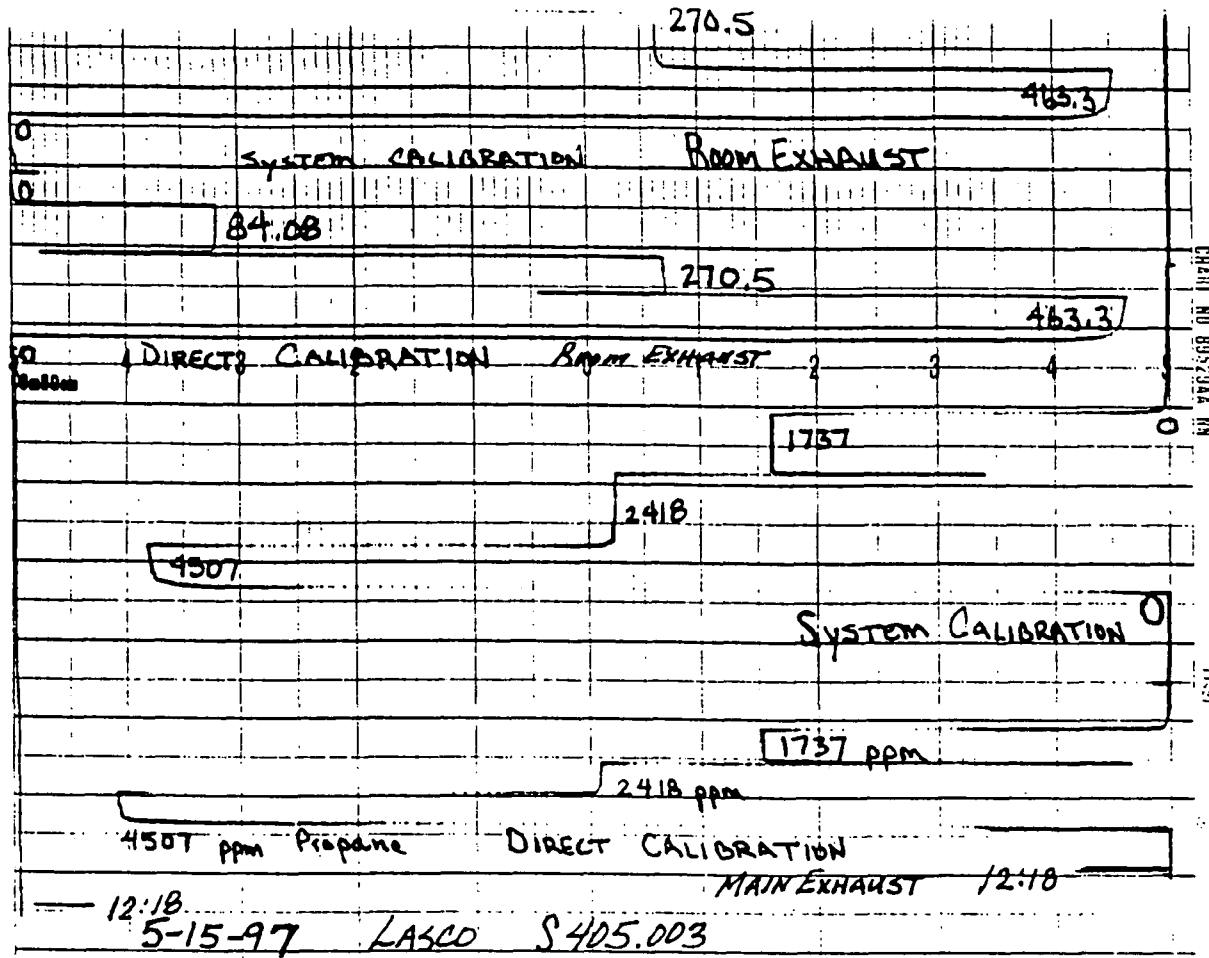
END

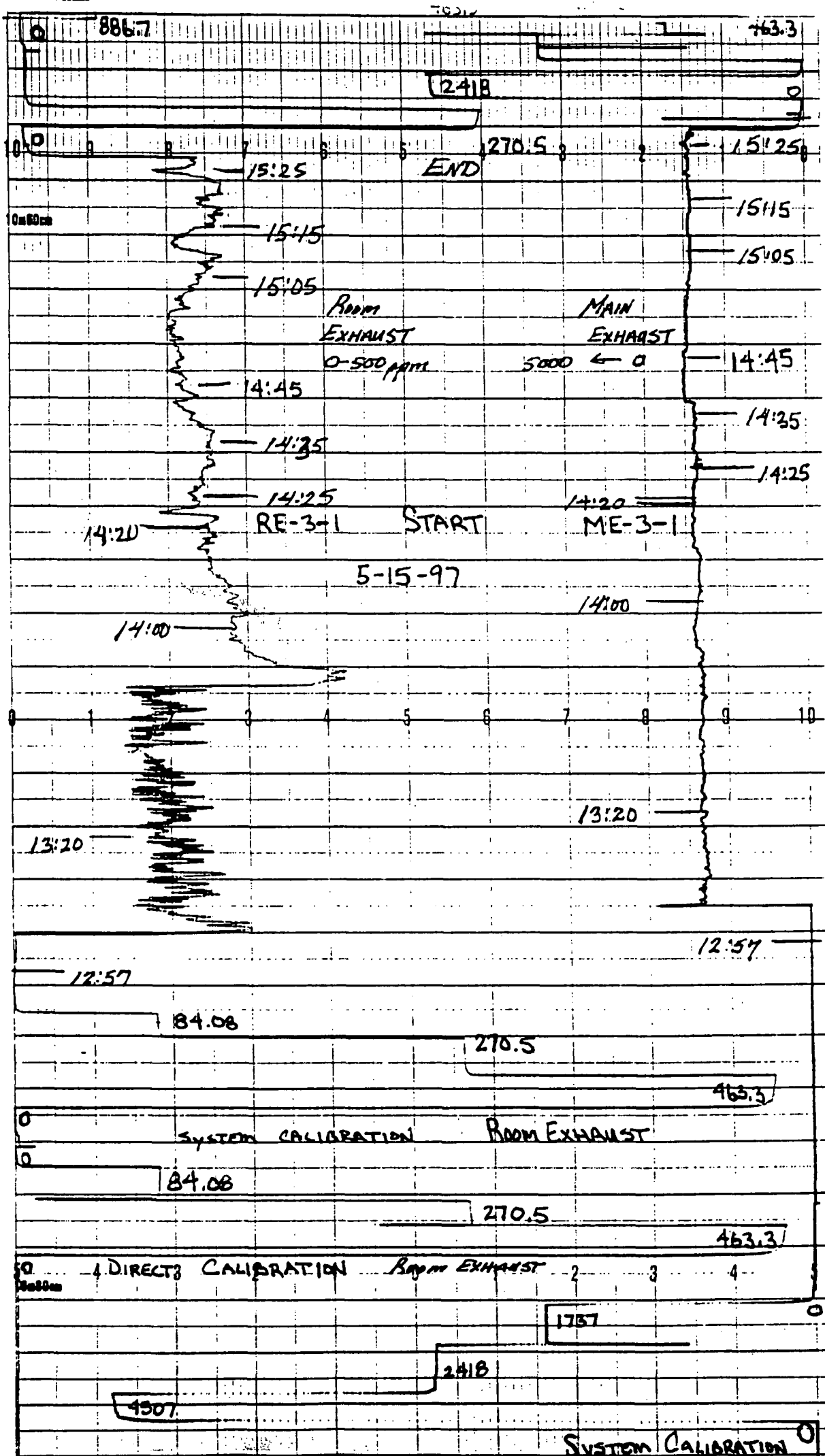
15:30

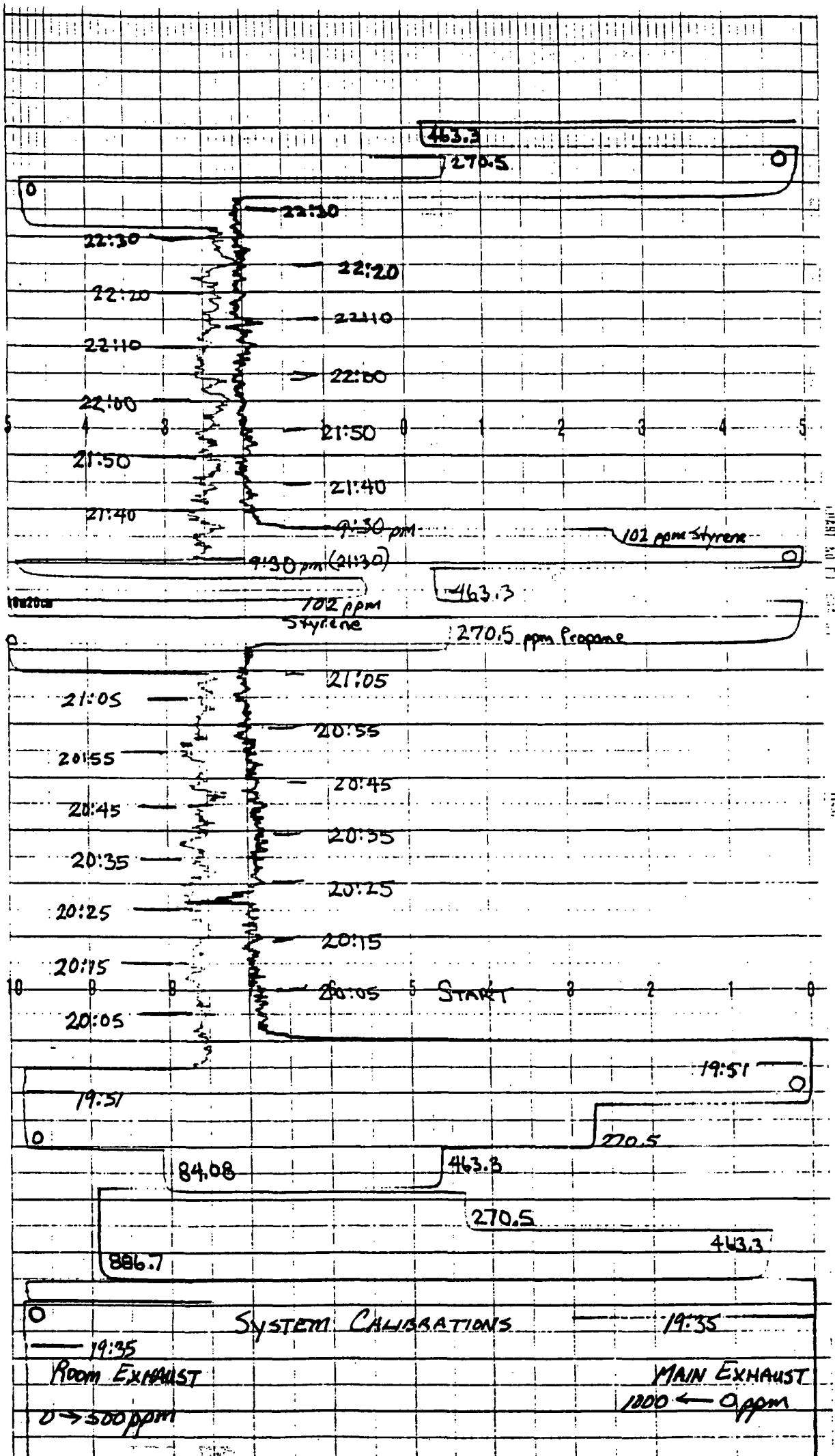
15:30

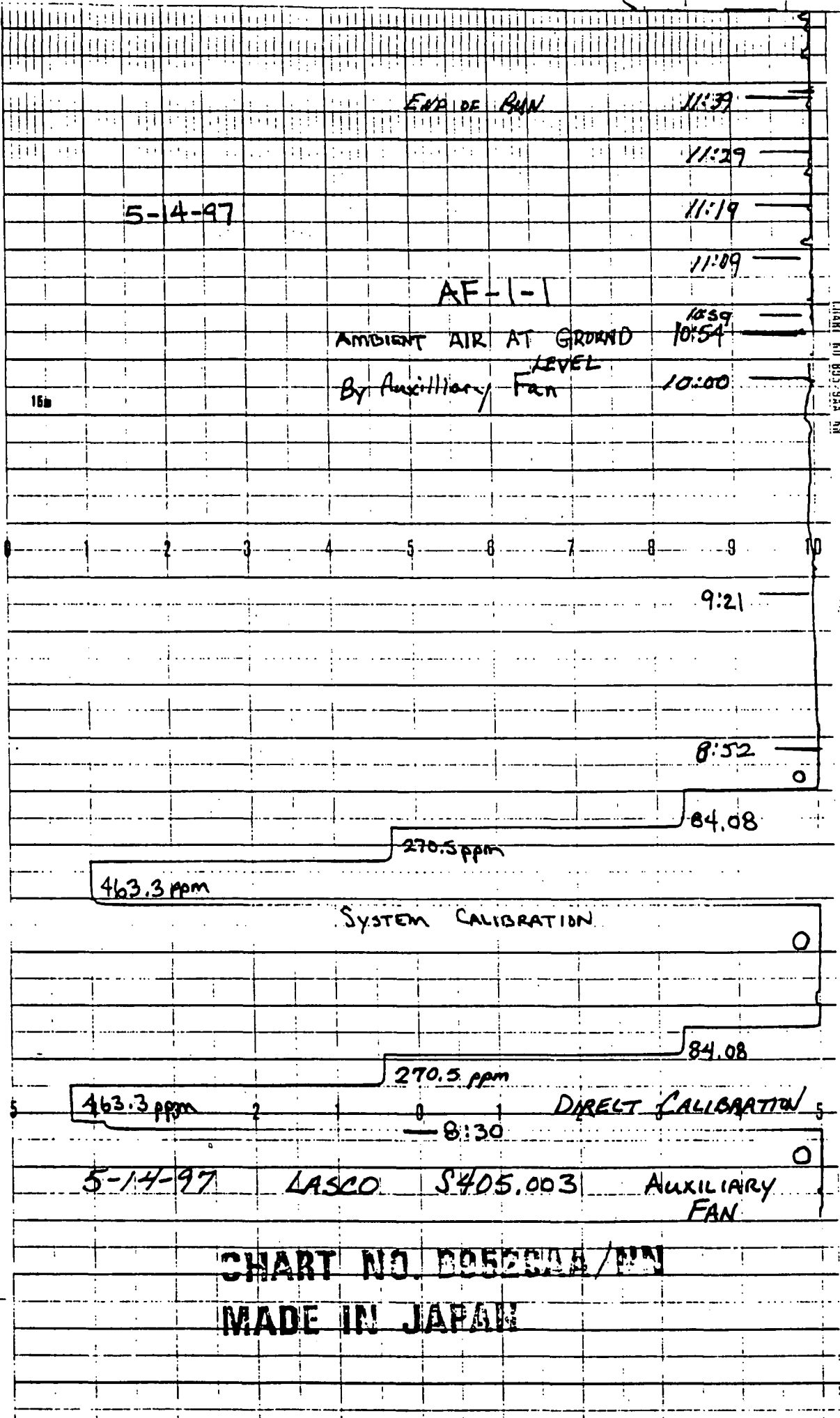












5-14-97

5-14-97

500 ppm ← 0

AUXILIARY FAN

START AF-1-3

16:10

16:00

15:50

15:40

CHART NO 89399A NR

11:57

102 ppm STYRENE STANDARD

270.5 ppm Propane

14m10cm

END

13:30

13:20

13:10

13:00

5-14-97

AUXILIARY FAN

500 ← 0

START AF-1-2

12:30

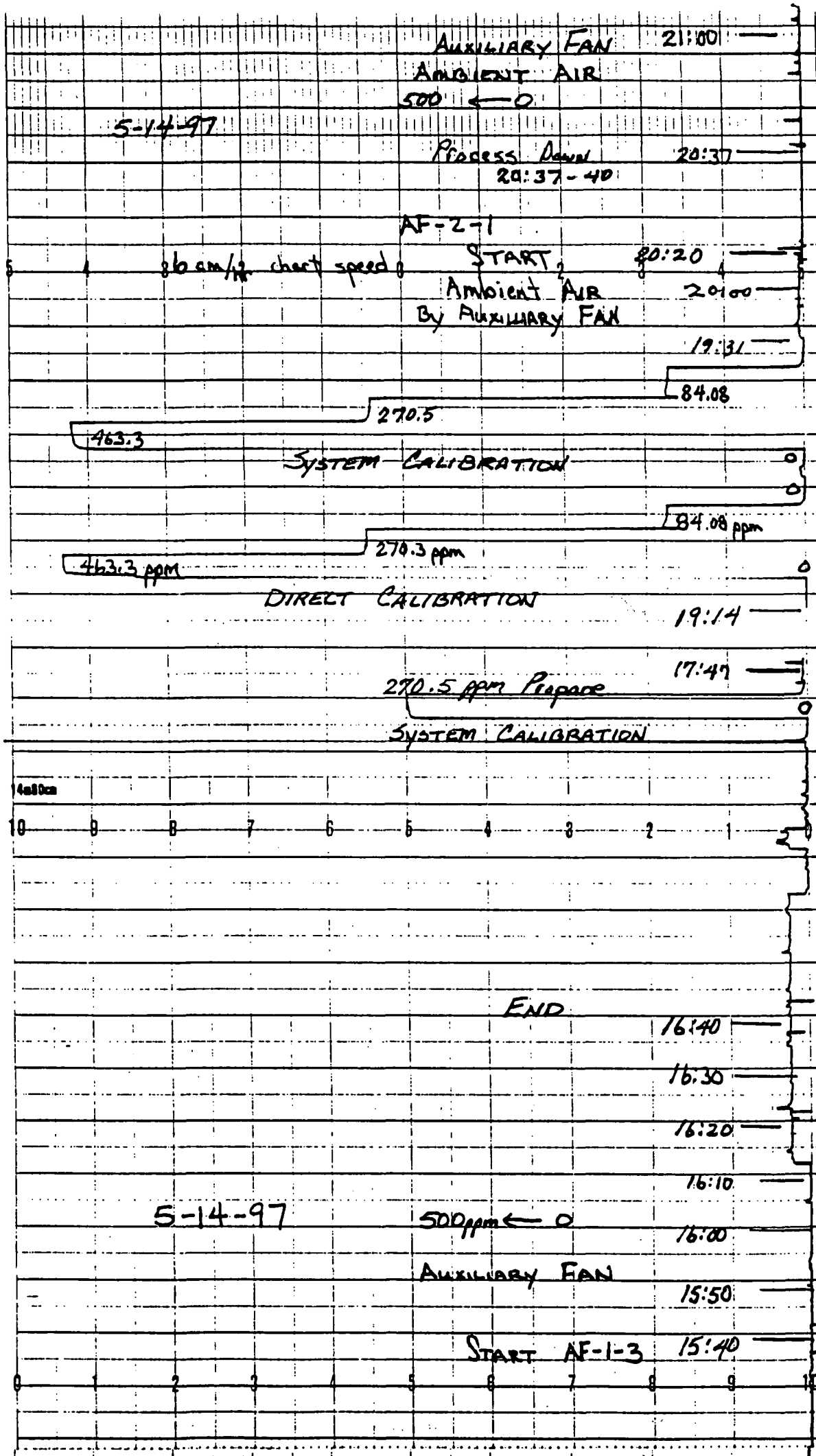
12:40

12:50

270.5

SYSTEM CALIBRATION

0



5-14-97

00:30

AUXILIARY FAN
AMBIENT AIR
500 ← 0 ppm

00:20

00:10

00:00

23:50

START AF-2-3

23:40

270.5 ppm

SYSTEM CALIBRATION

23:00

22:50

5-14-97

AUXILIARY FAN
AMBIENT AIR
500 ppm ← 0 ppm

22:30

22:20

START

AF-2-2

22:00

270.5

SYSTEM CALIBRATION

21:23

21:20

21:10

AUXILIARY FAN
AMBIENT AIR
500 ← 0

21:00

5-14-97

Process Down
20:37-40

20:37

AF-2-1

36 cm/hr chart speed

START

20:20

Ambient Air

20:00

5-15-97

15:15

15:05

AUXILIARY FAN

Ambient Air

500 ← 0 ppm

14:15

14:35

START RUN AF-3

14:25

14:20

14:00

13:20

84.08

270.5

463.3

SYSTEM CALIBRATION

84.08

270.5

463.3

DIRECT CALIBRATION

12:56

5-15-97

LASCO S405.003

AUXILIARY FAN

270.5

SYSTEM CALIBRATION

5-14-97

00:50

AUXILIARY FAN

AMBIENT AIR

500 ← 0 ppm

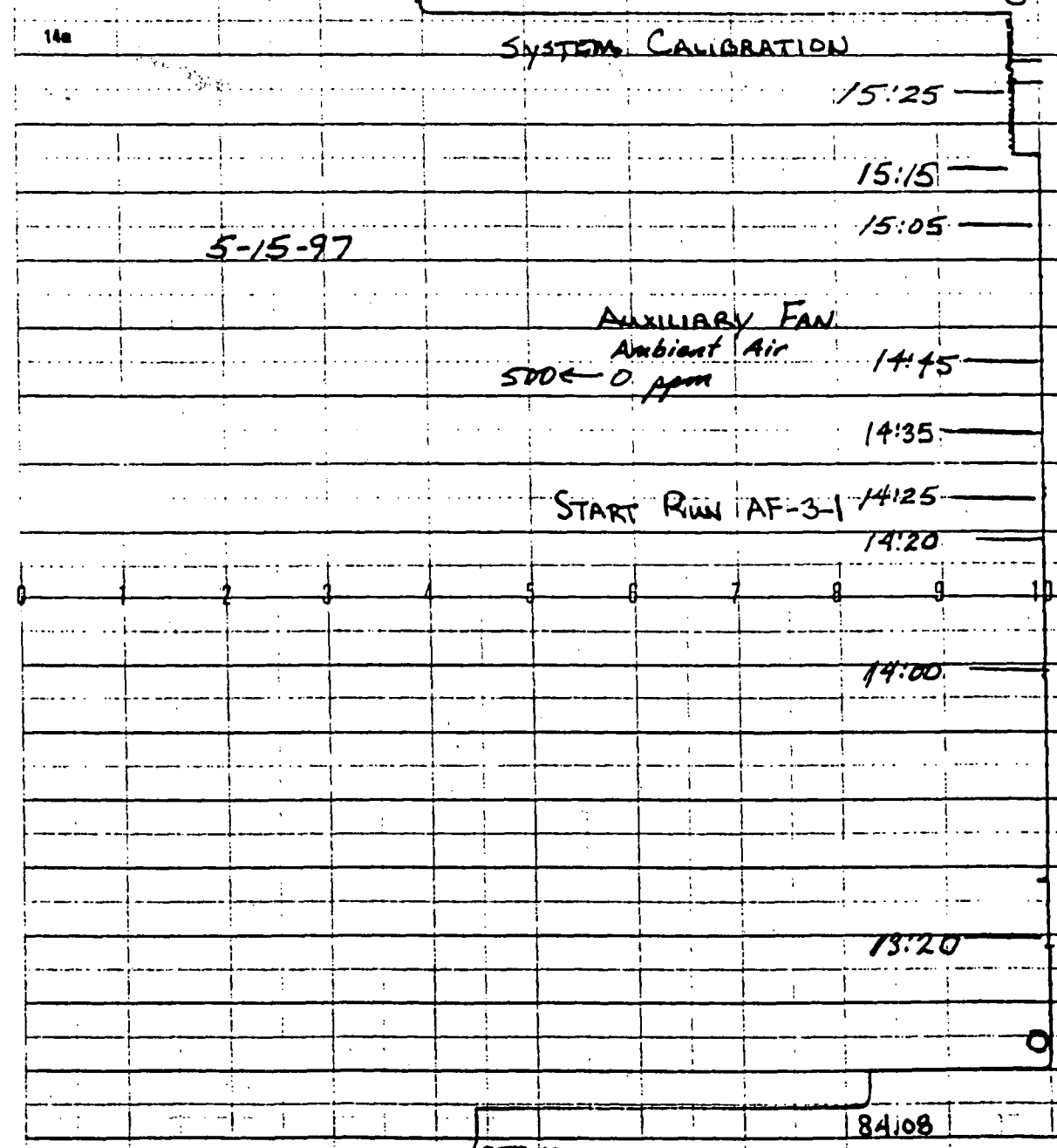
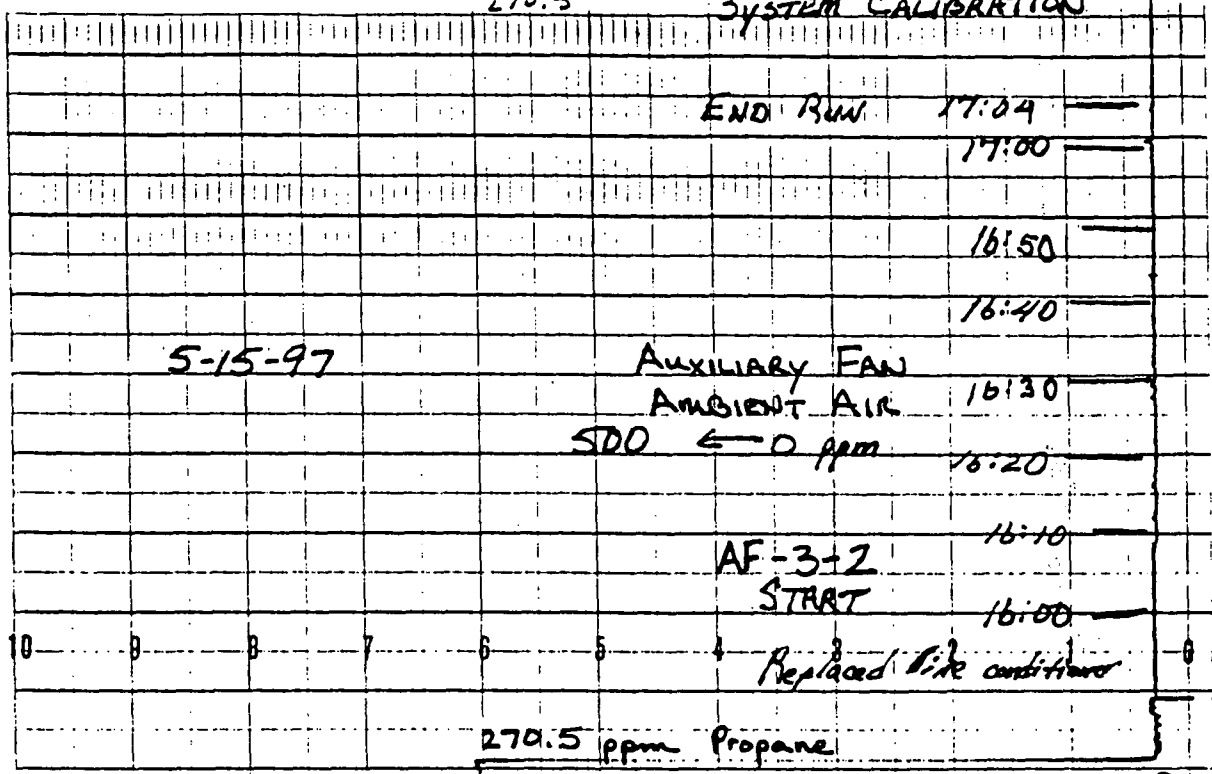
00:20

00:10

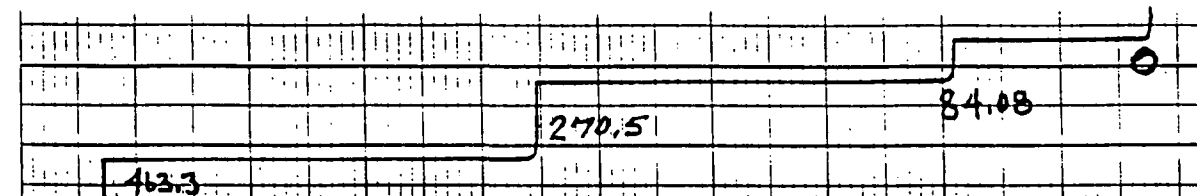
00:00

210.5

SYSTEM CALIBRATION



THART NO 8372954 53



SYSTEM CALIBRATION

AUXILIARY FAN

19:51

19:35

0 1 2 3 4 5 6 7 8 9 10

13m80cm

270.5

SYSTEM CALIBRATION

END

18:40

18:35

18:25

5-15-97

AUXILIARY FAN

AMBIENT AIR

500 ppm ← 0 ppm

18:15

18:05

17:55

AF-3-3

17:45

START 17:35

270.5

SYSTEM CALIBRATION

END RUN

17:04

17:00

16:50

16:40

5-15-97

AUXILIARY FAN

AMBIENT AIR

500 ← 0 ppm

16:30

16:20

16:10

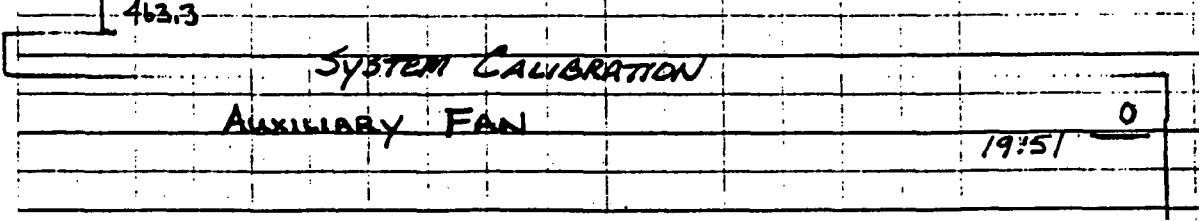
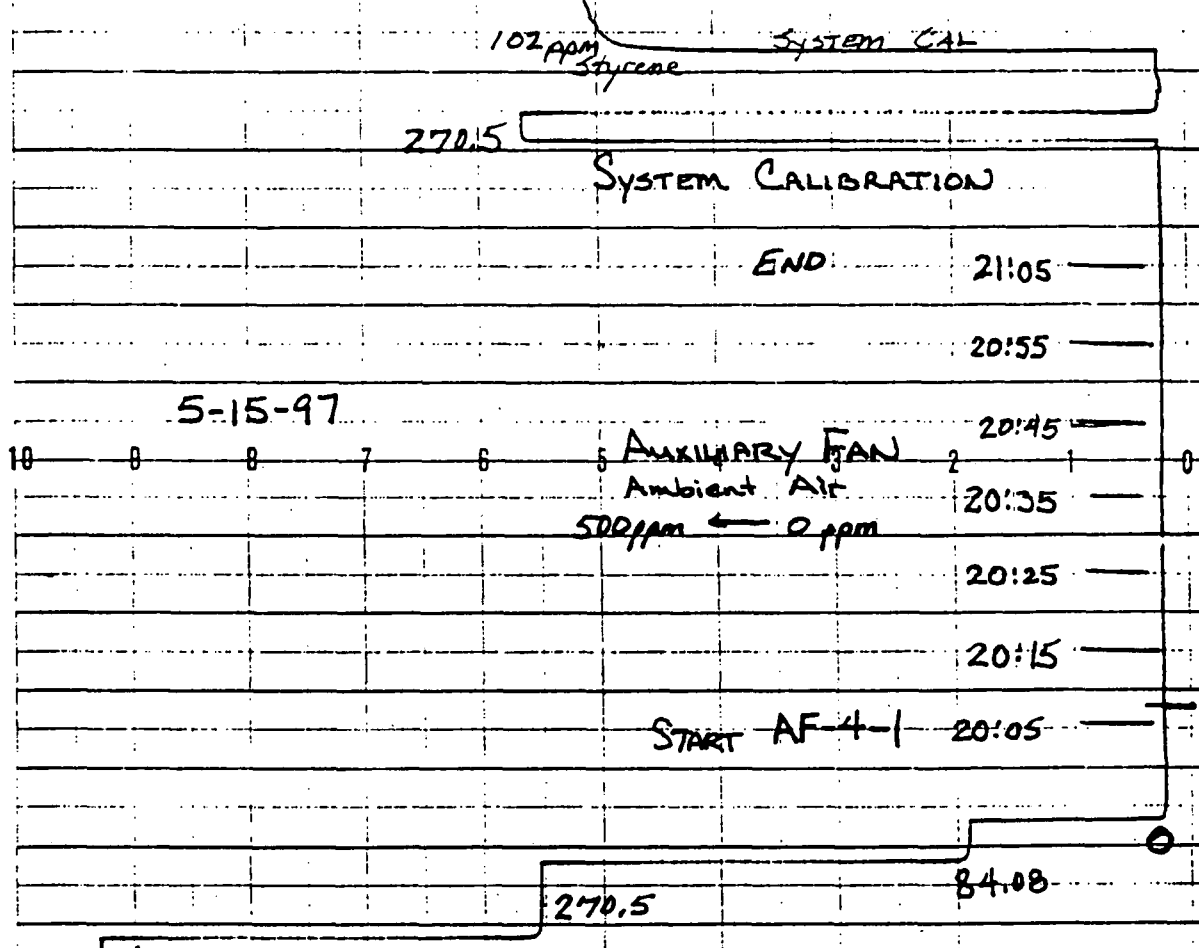
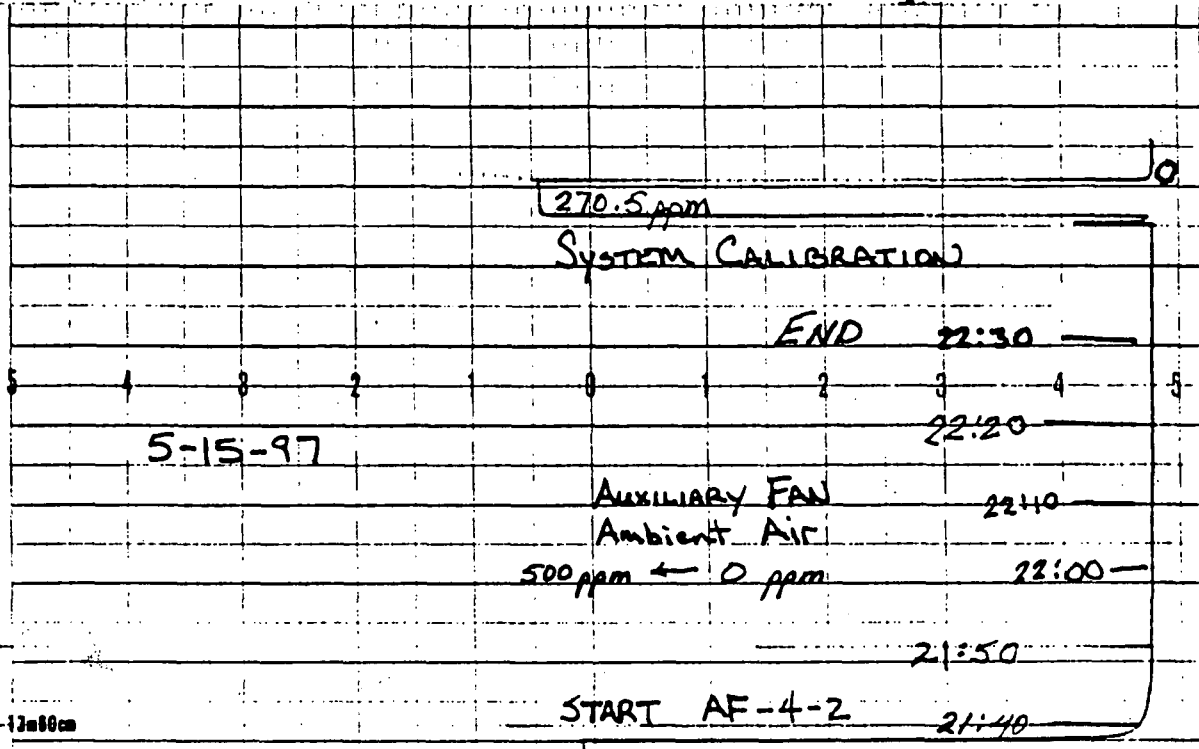
AF-3-2

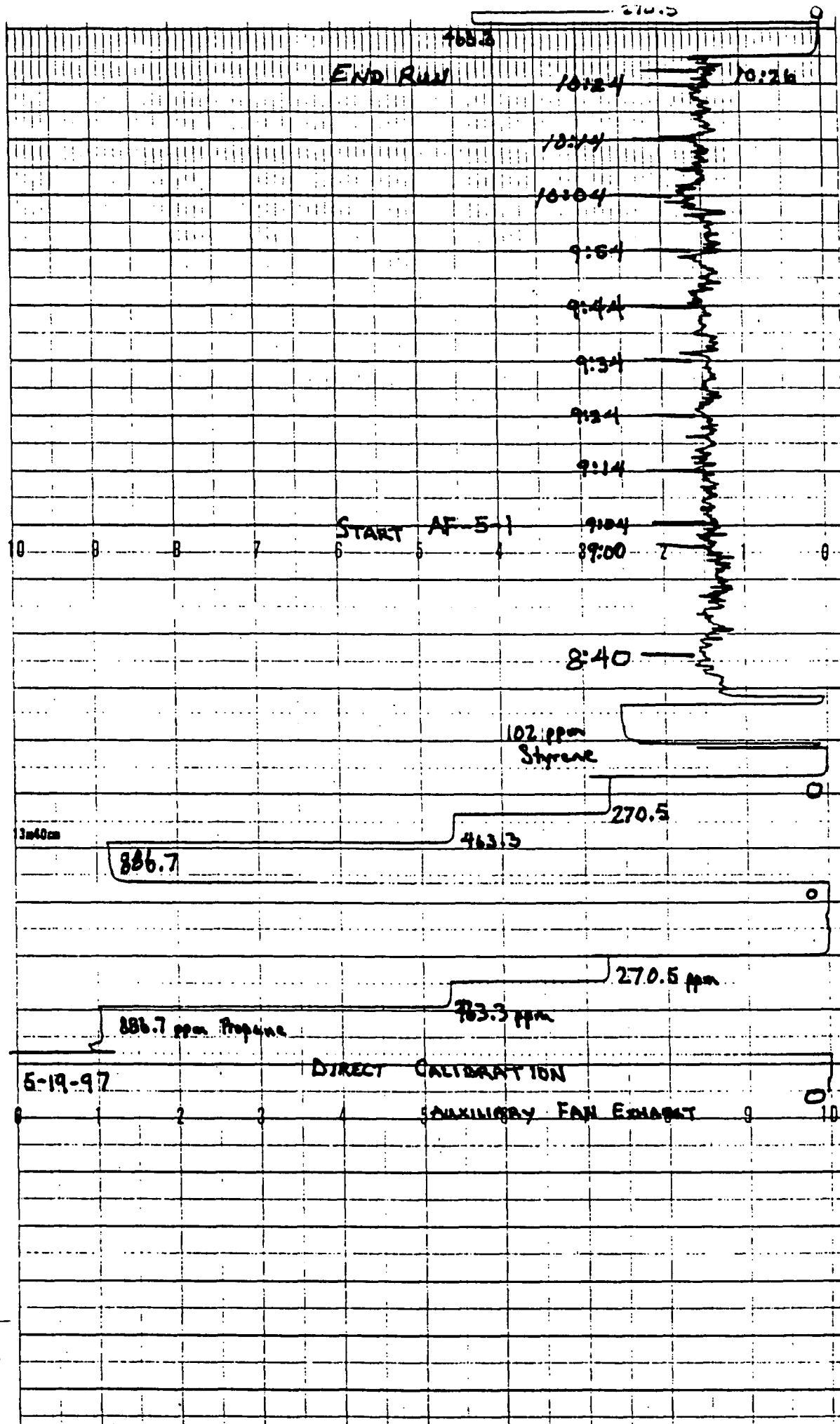
START

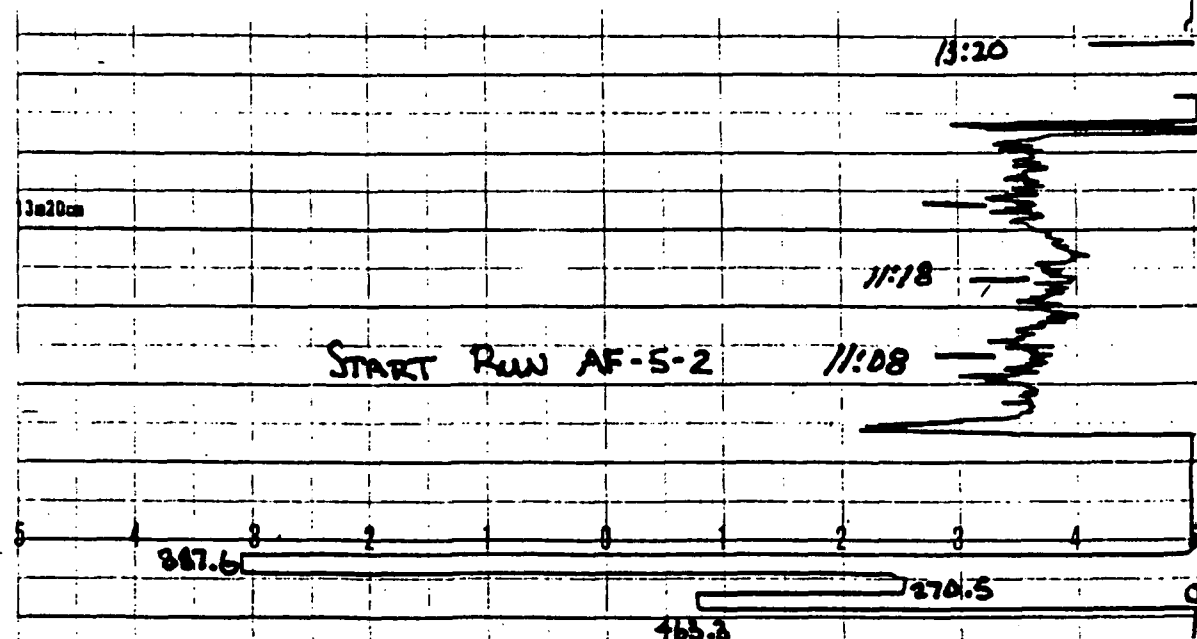
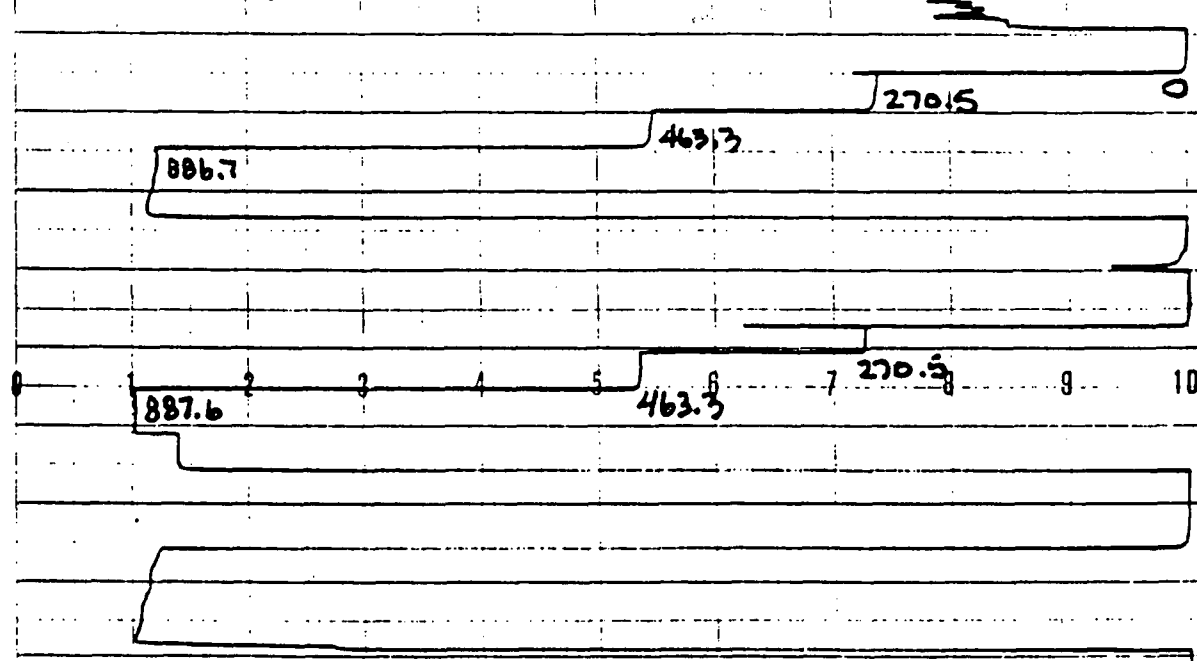
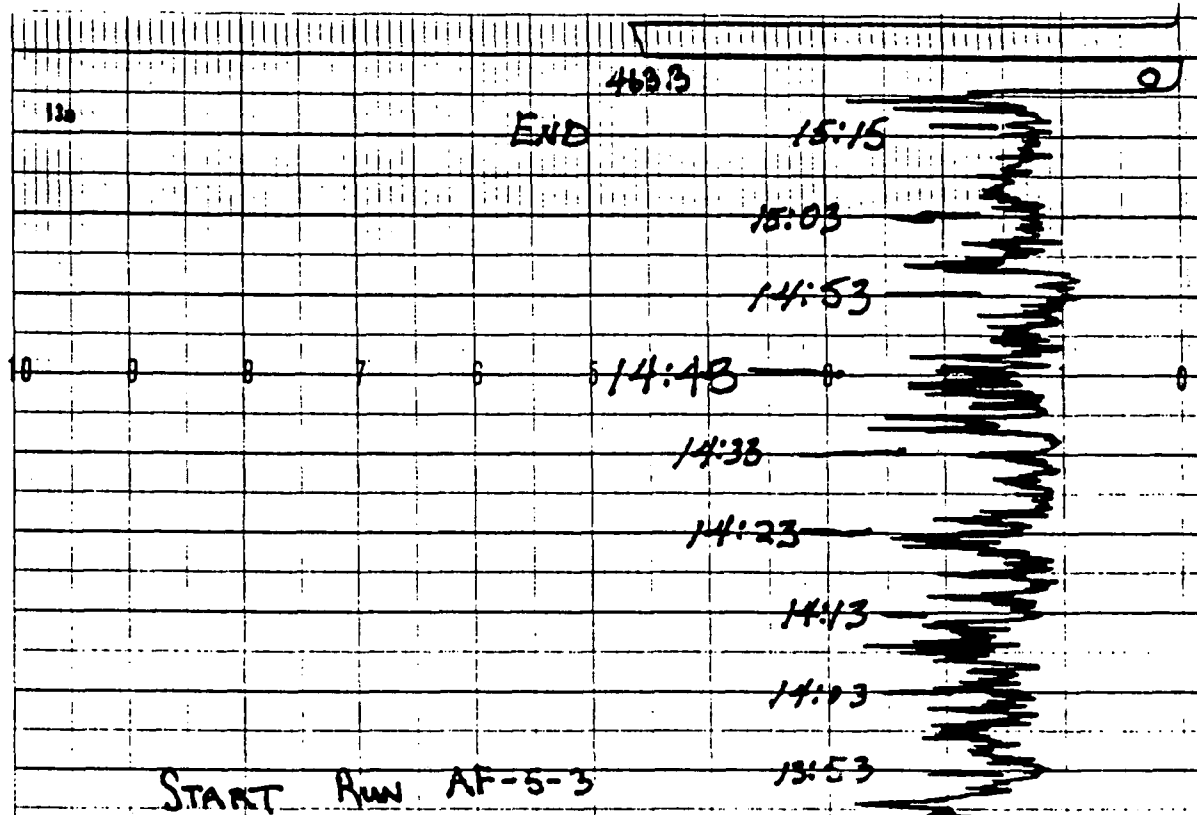
16:00

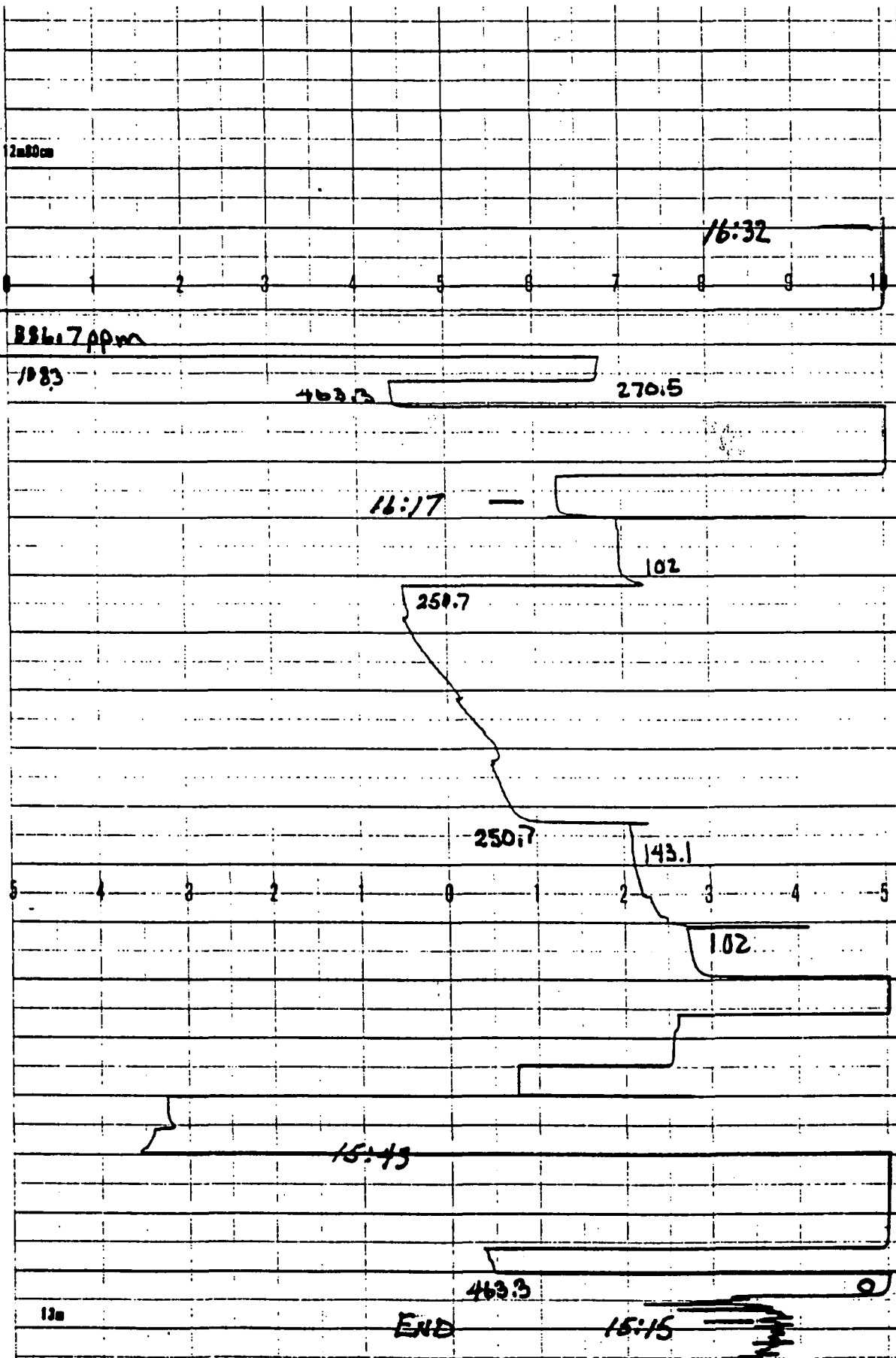
CAUTION: DO NOT TOUCH

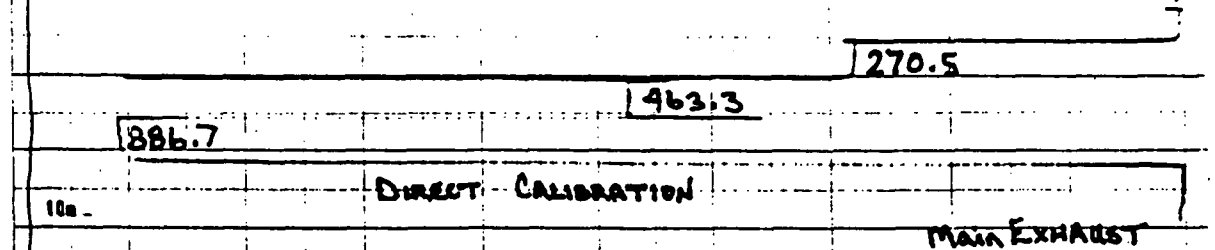
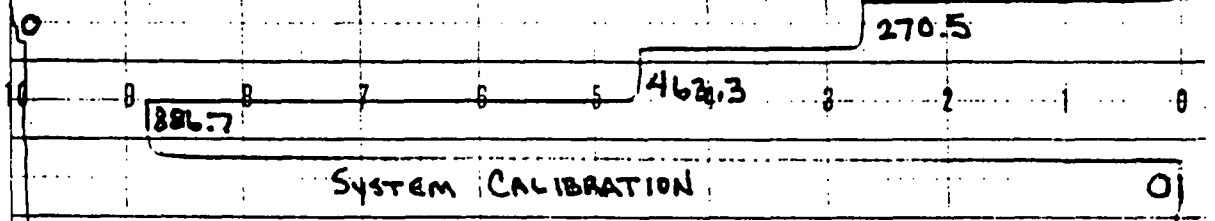
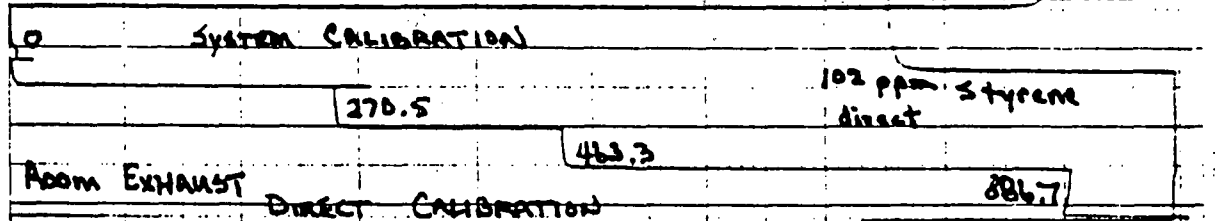
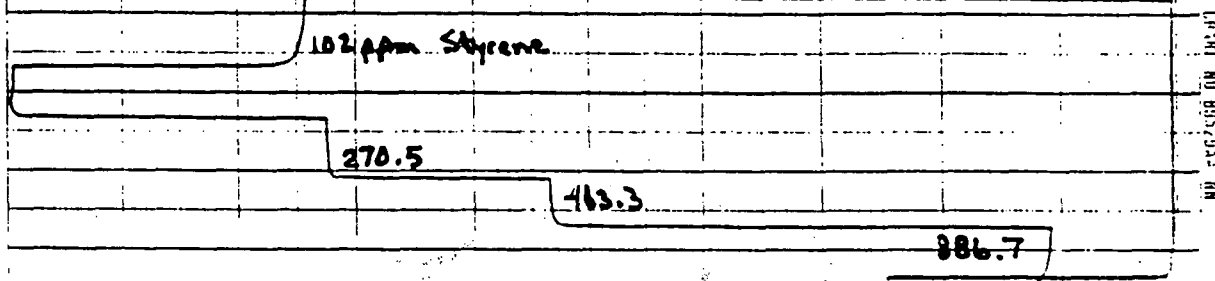
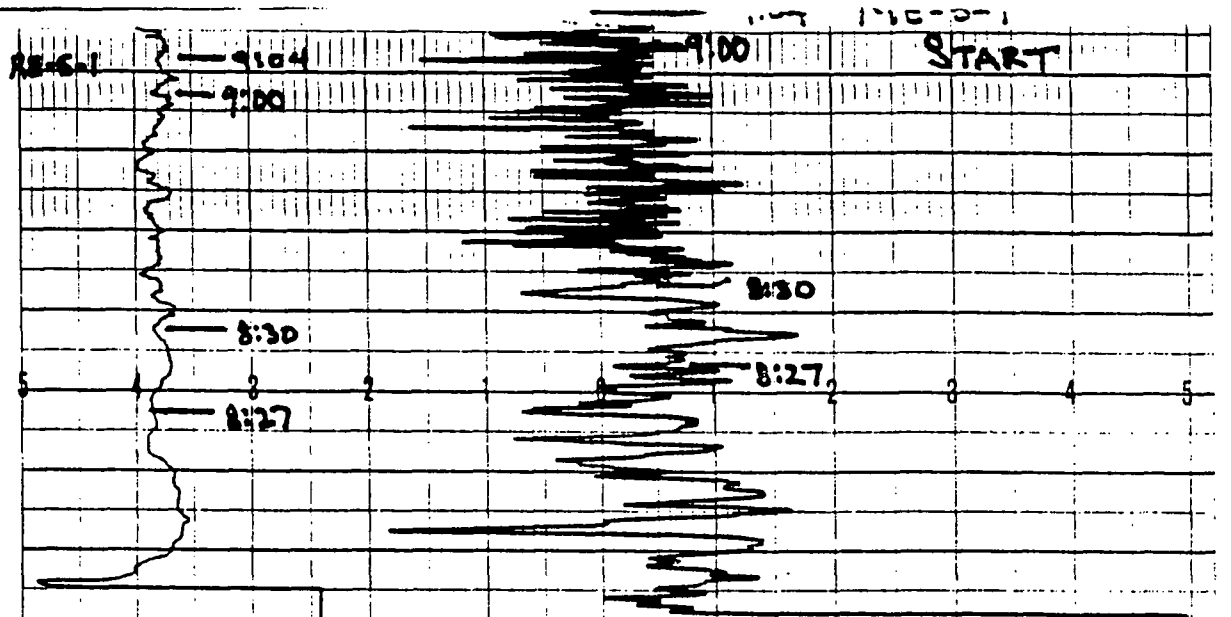
11:97











5-19-97

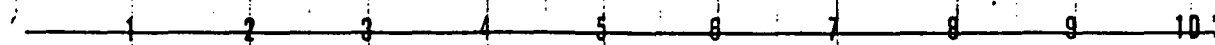
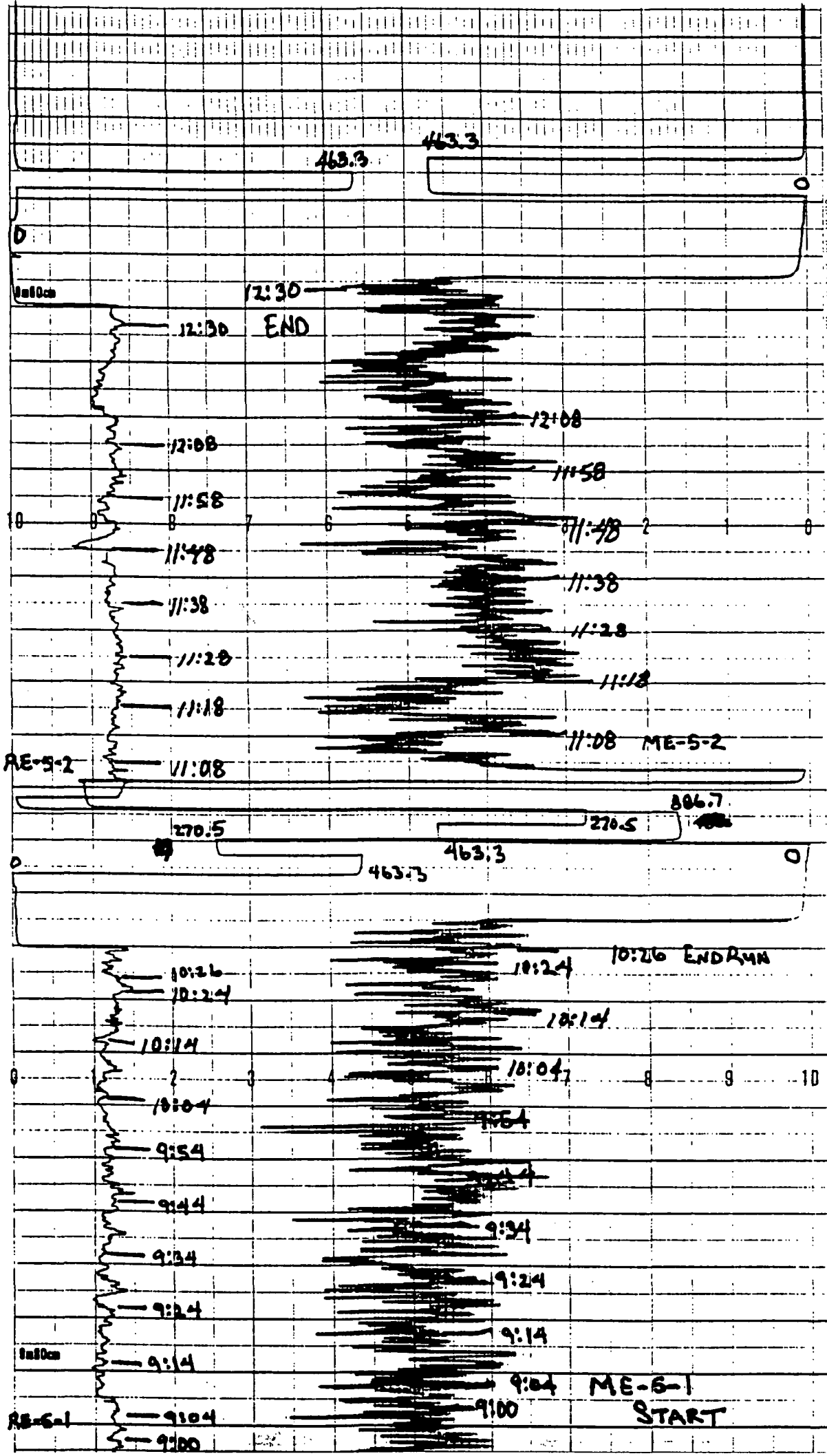


CHART NO. 0152934 RM

11:50



(11497)

16:57 LINE STOPPED 16:58 LINE ON

16:55

16:45

16:35

16:25

16:15

16:05

START

16:00

END

15:15

15:15

15:03

15:03

14:53

14:53

14:43

14:43

14:33

14:33

14:23

14:23

14:13

14:13

14:03

14:03

13:53 ME-5-3

ME-5-3

13:53

220.5

886.7

463.3

463.3

463.3

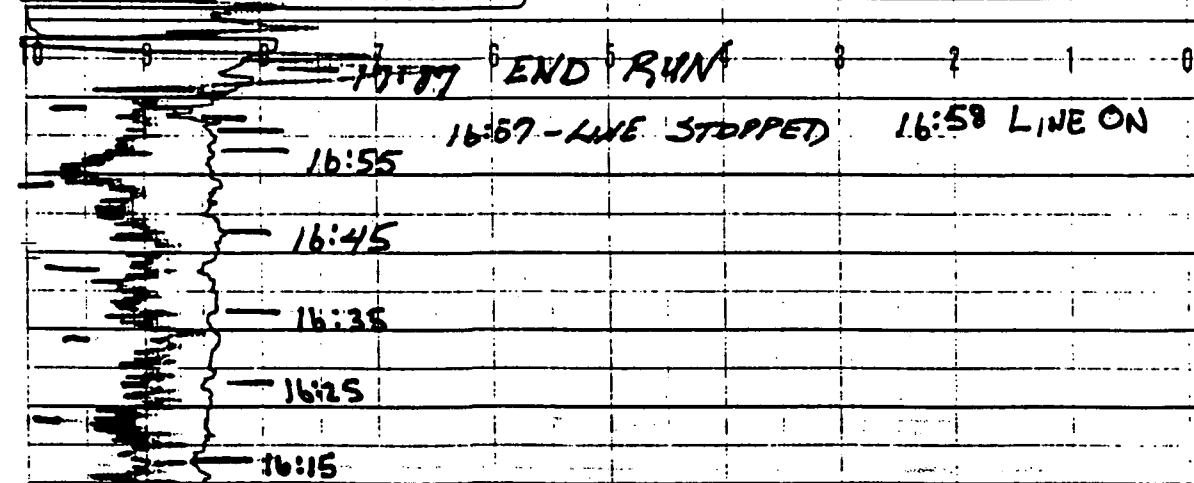
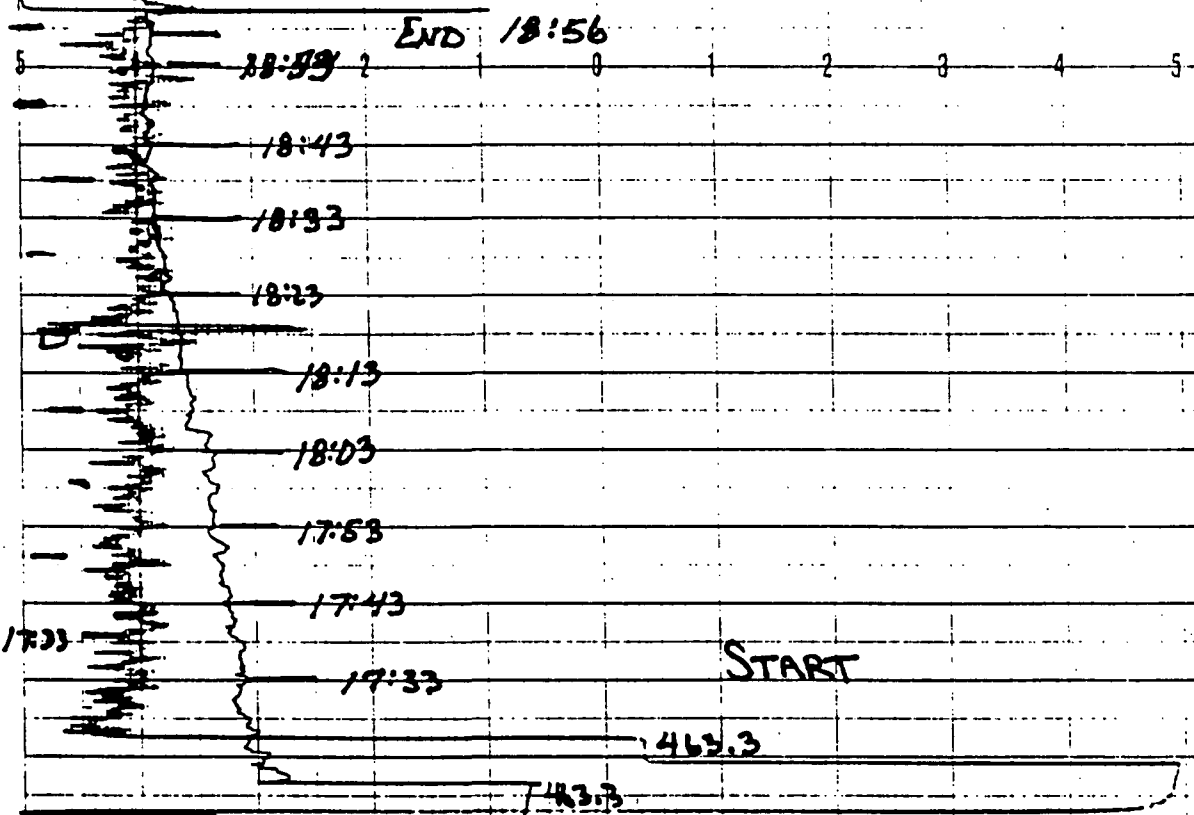
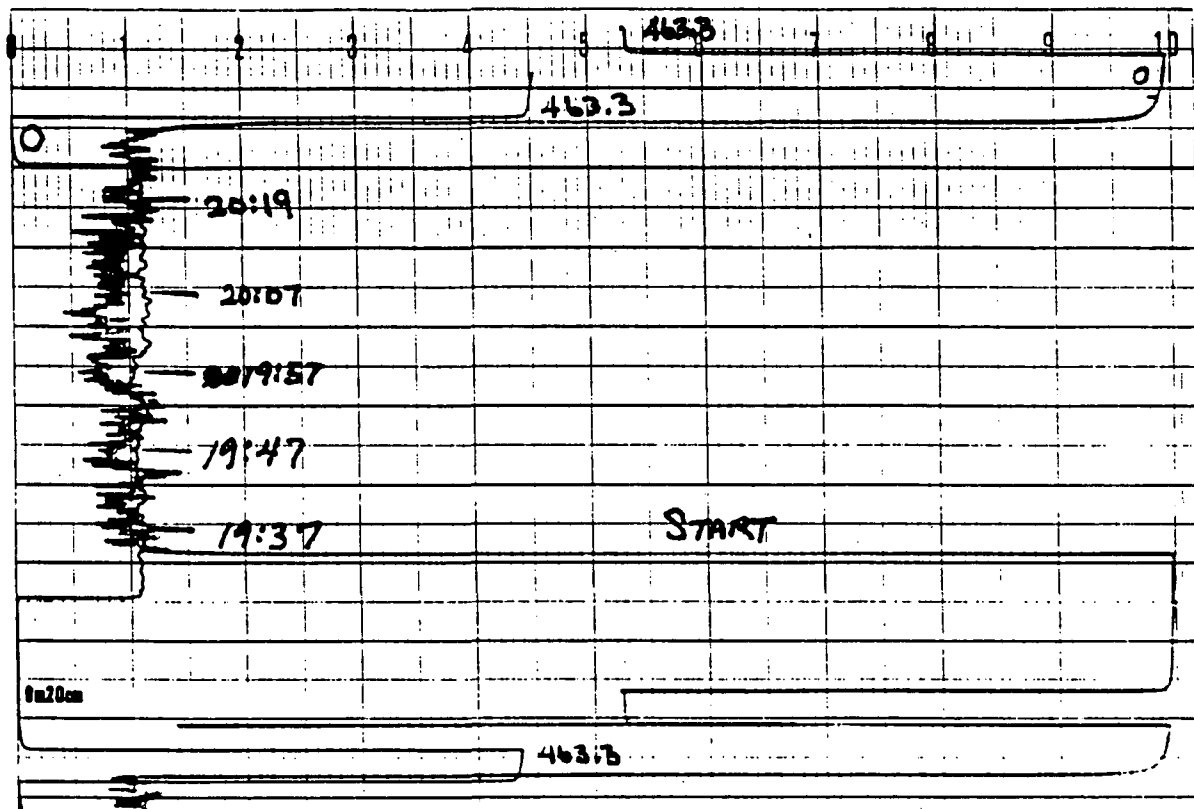
ME-5-1

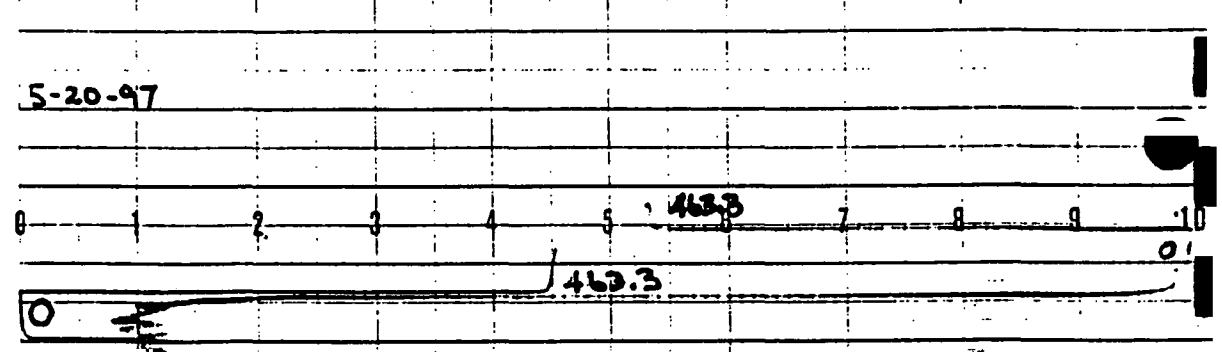
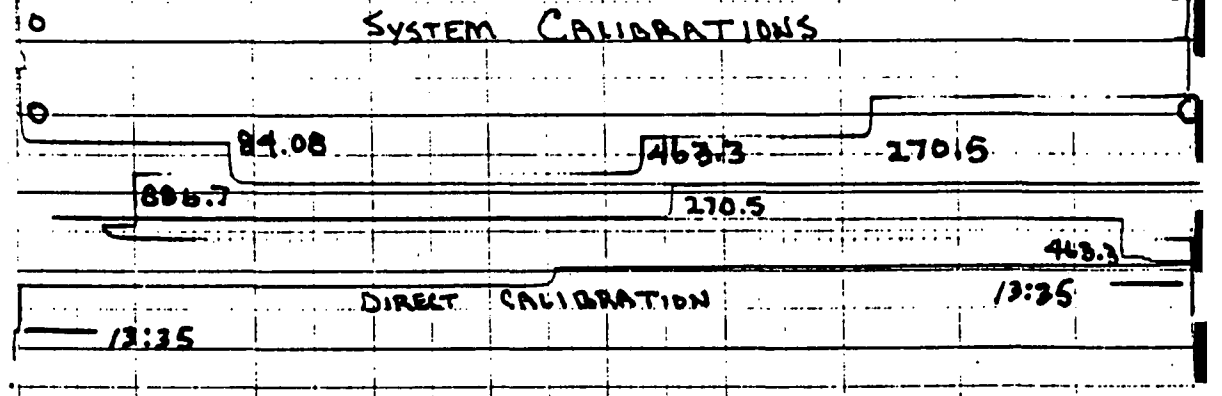
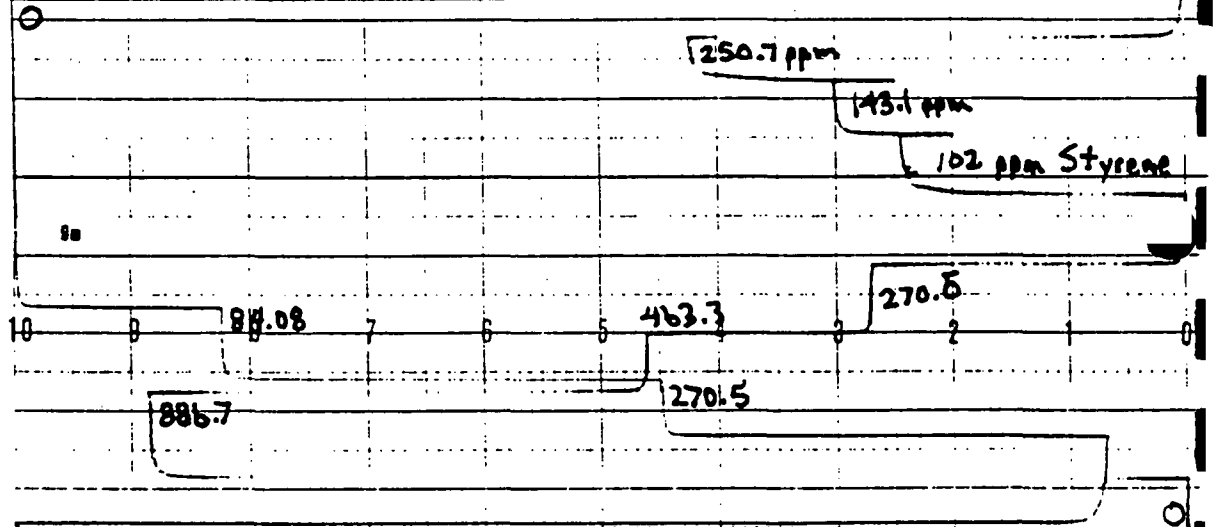
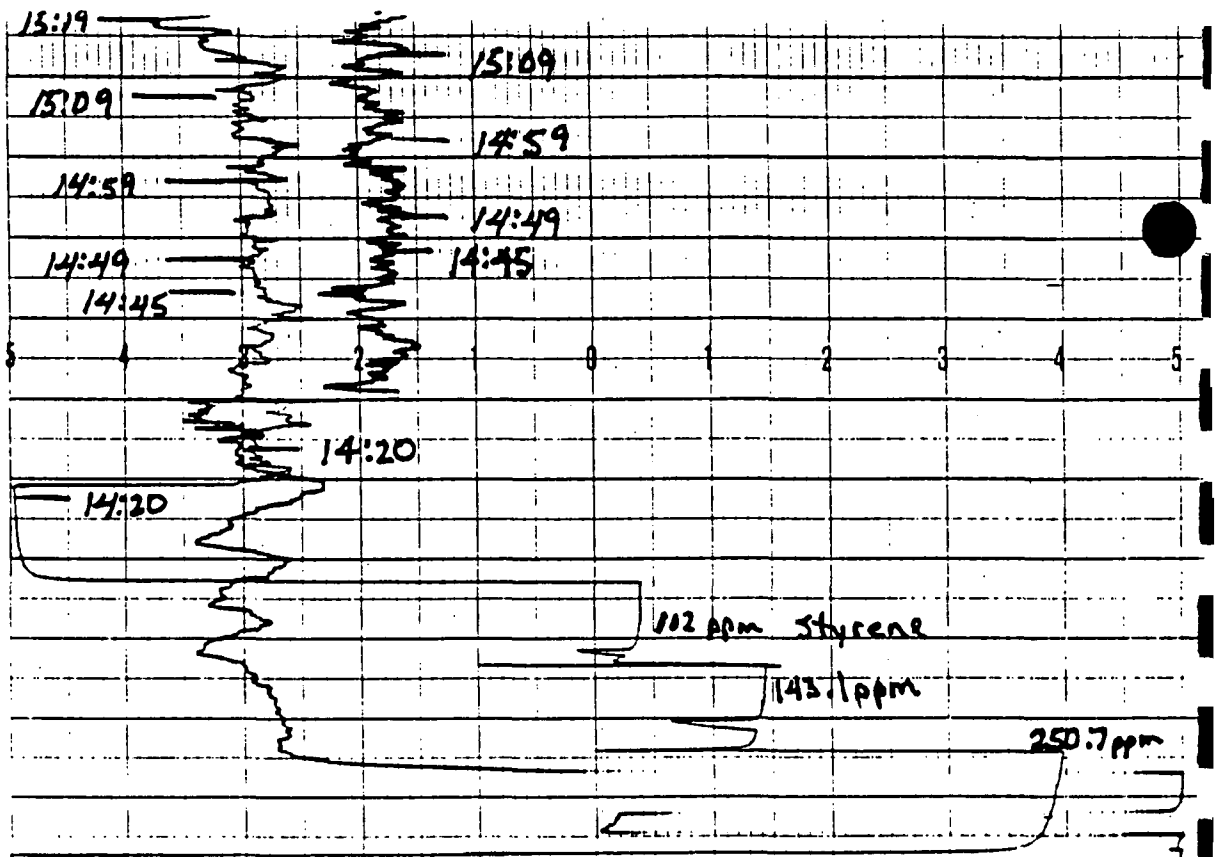
9104

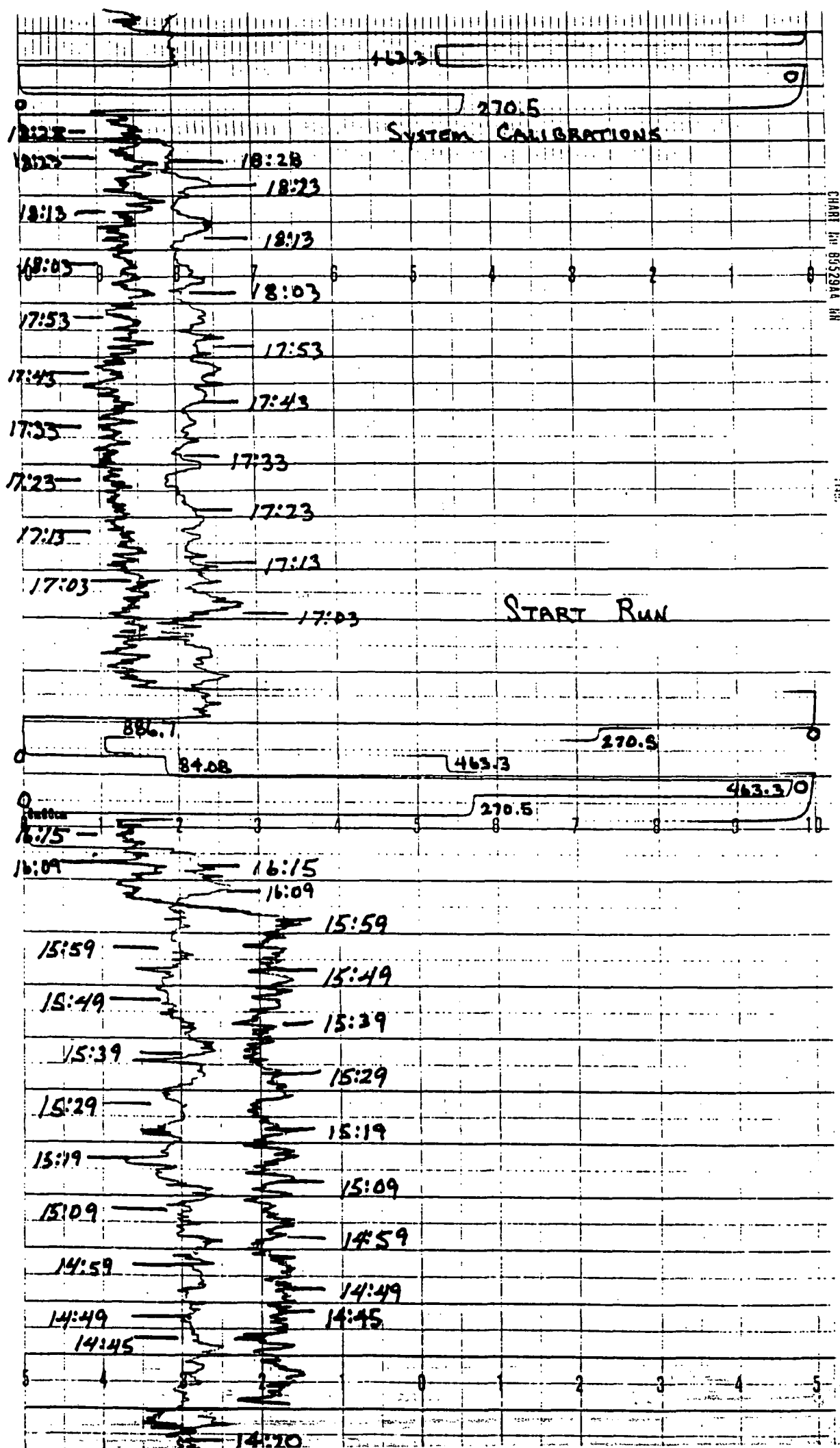
9100

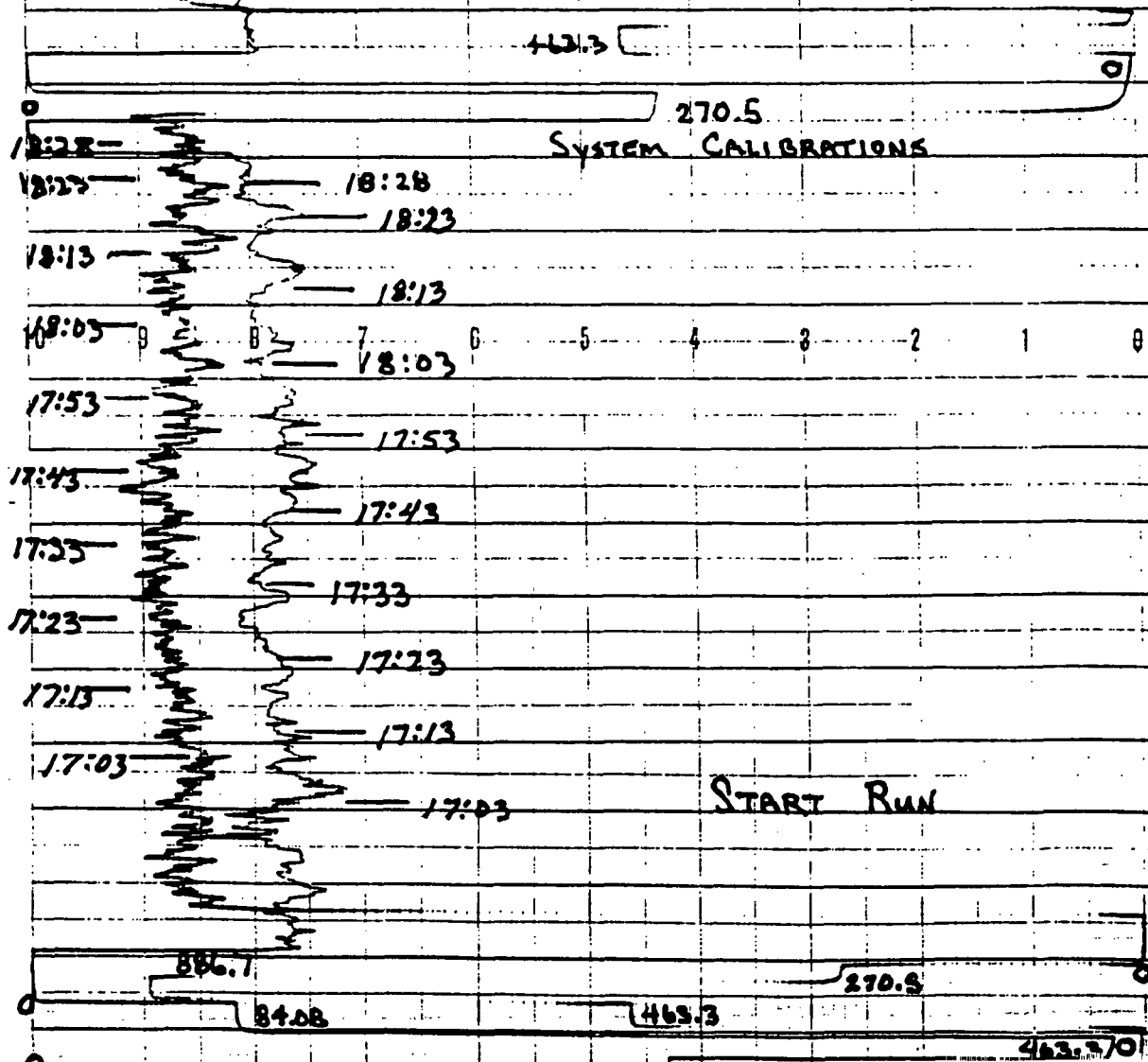
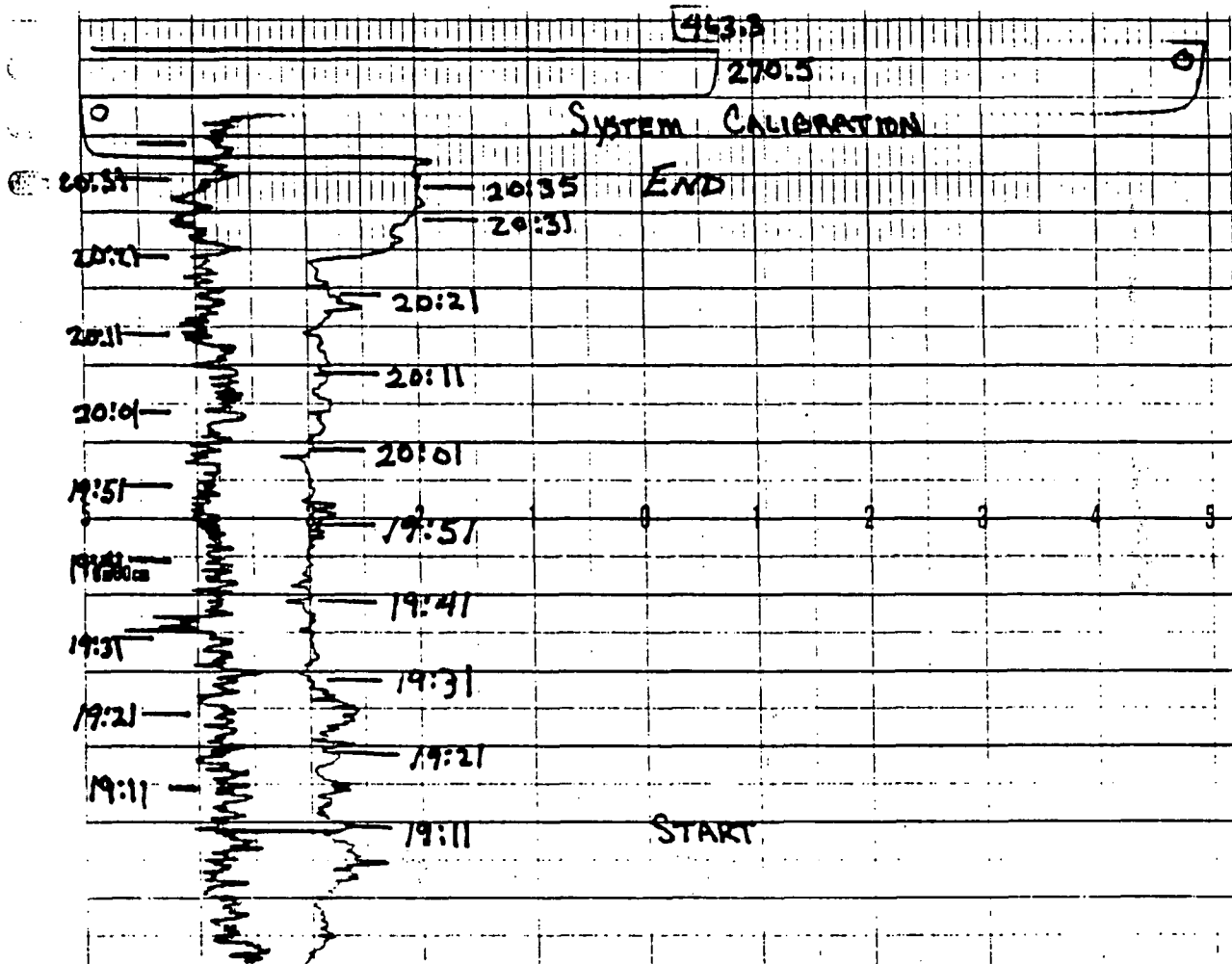
START

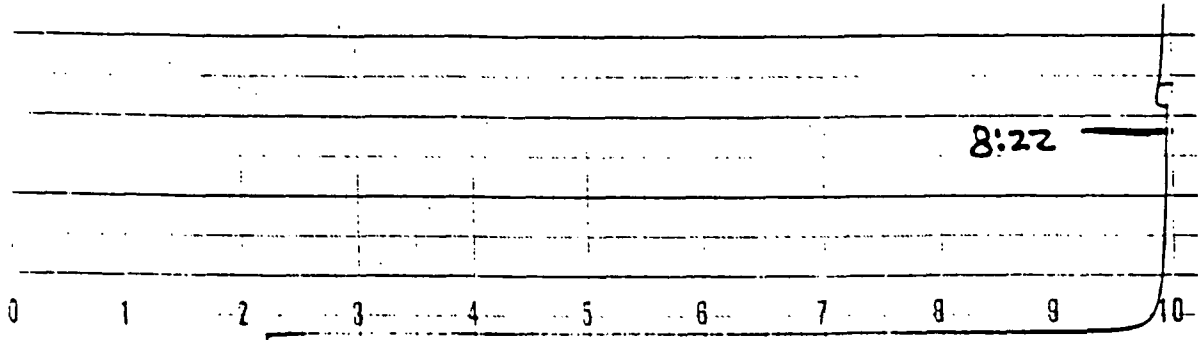
CREAT 10-1











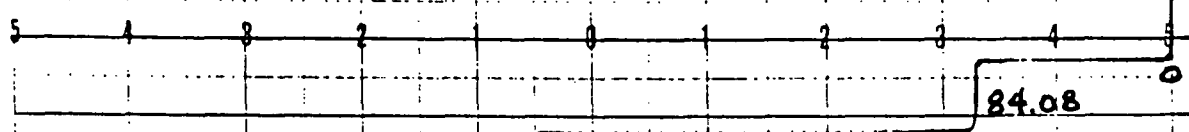
Styrene

250.7 ppm

143.1 ppm

102 ppm Styrene

12000 cm



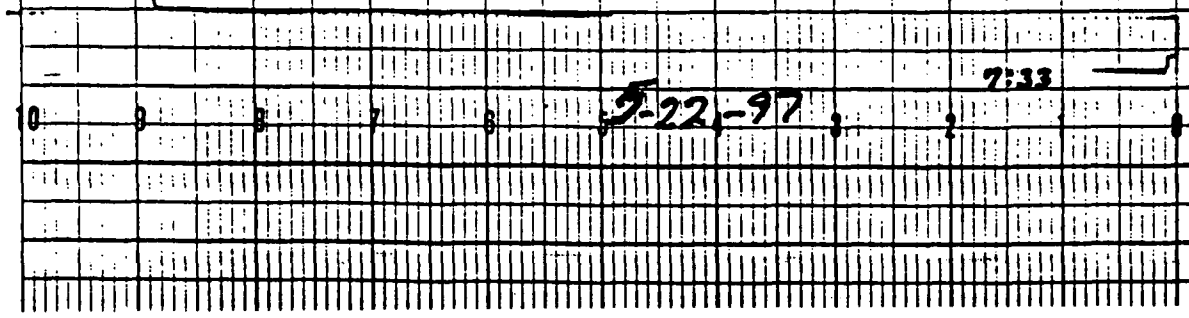
270.5 ppm

463.3 ppm Propane

DIRECT CALIBRATION
AUXILIARY EXHAUST FAN

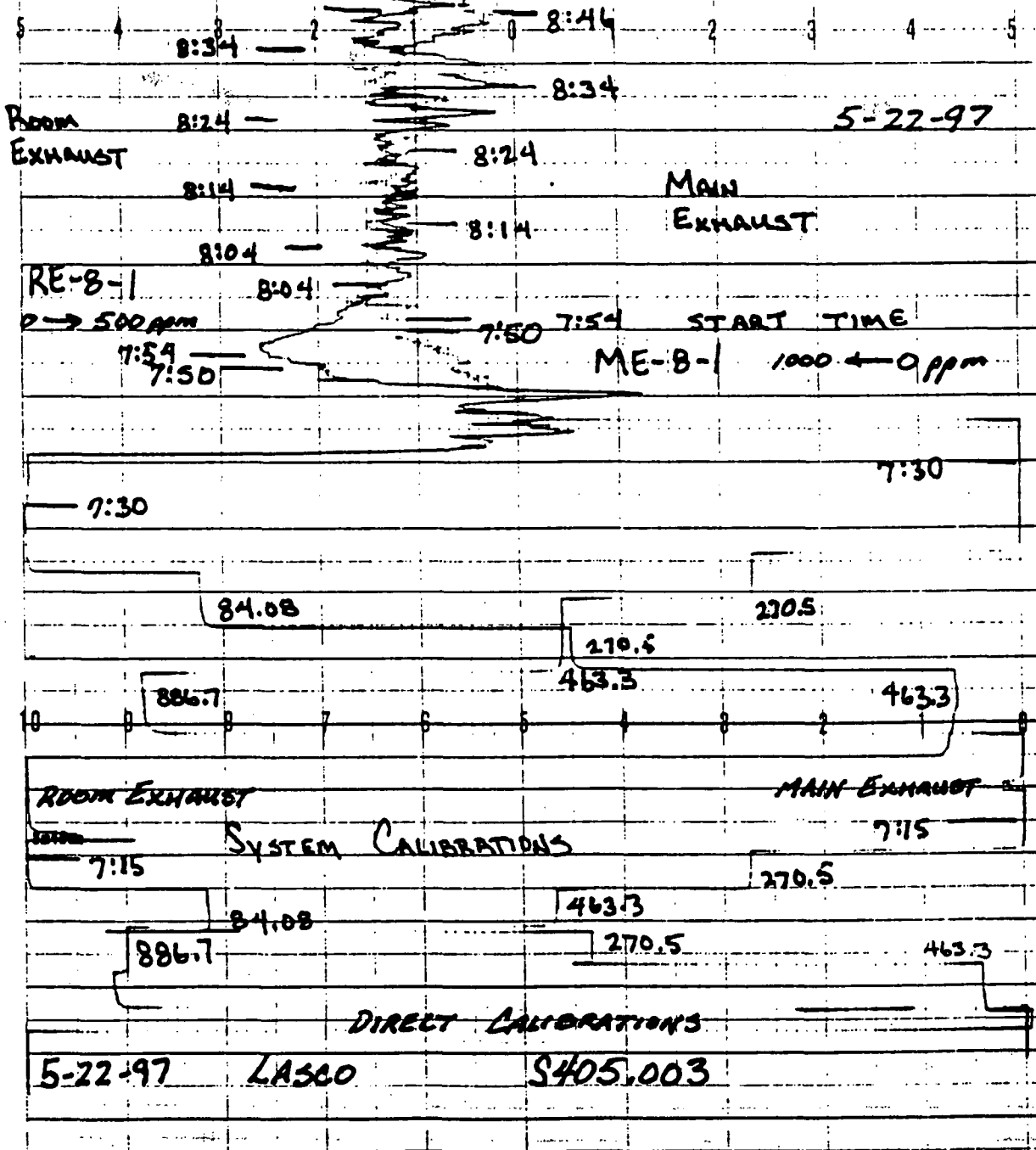
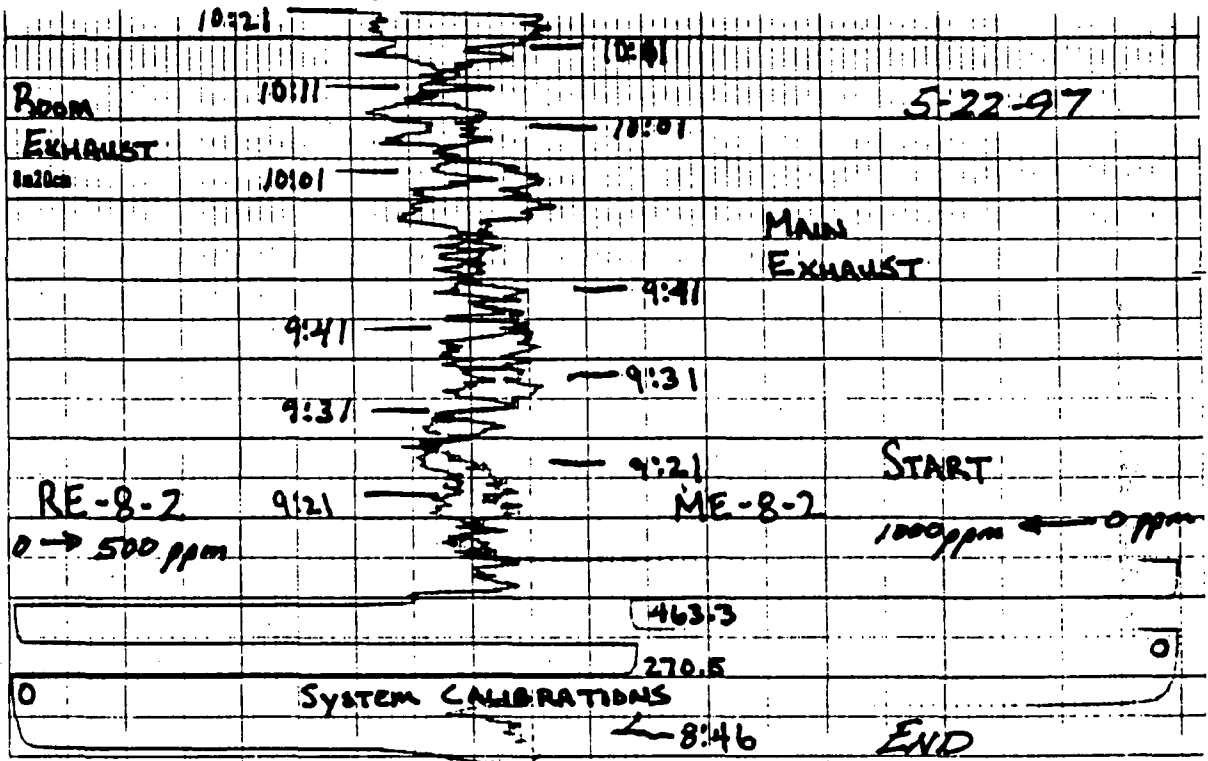
7:53
5.23.99

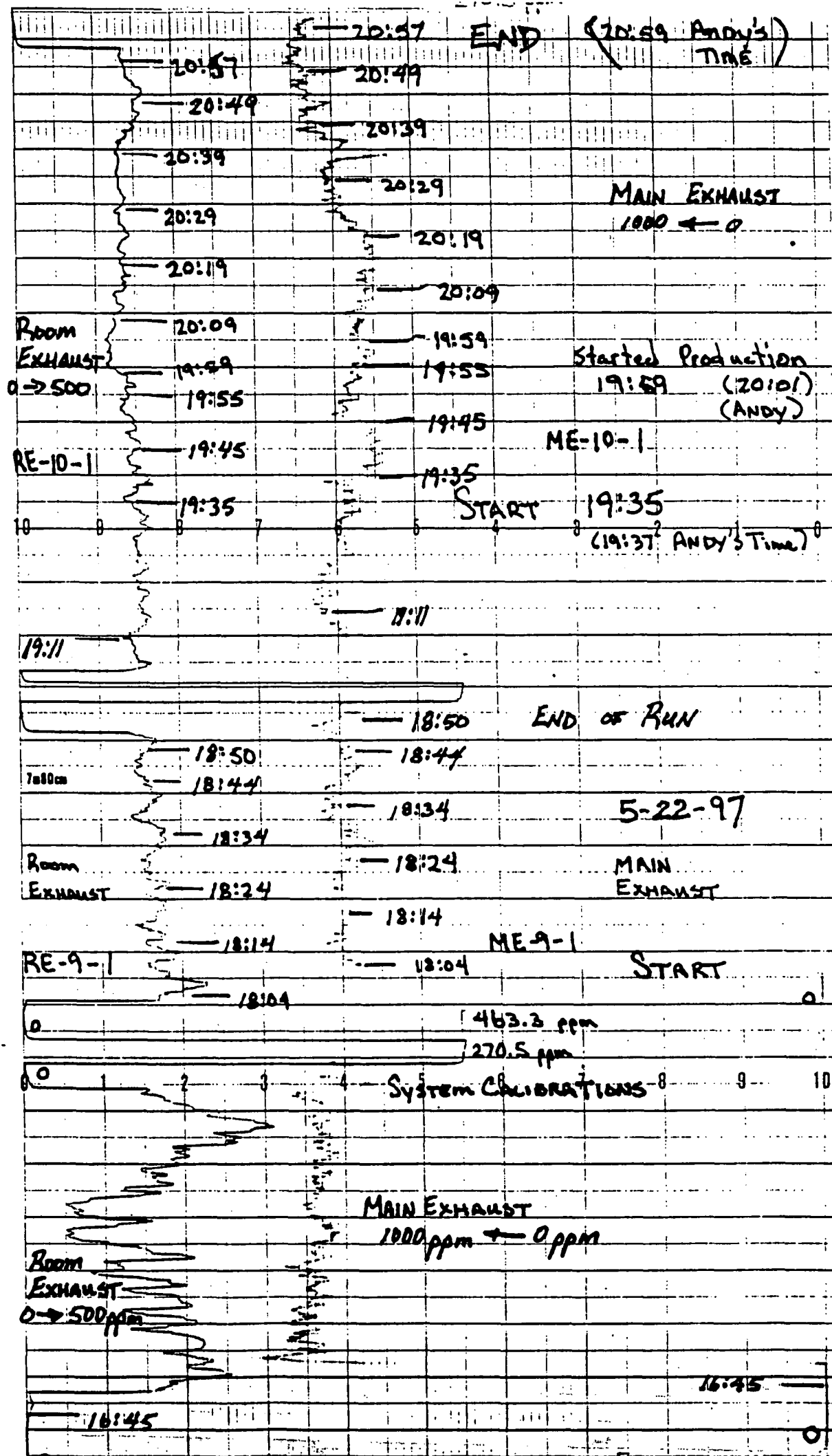
7:45

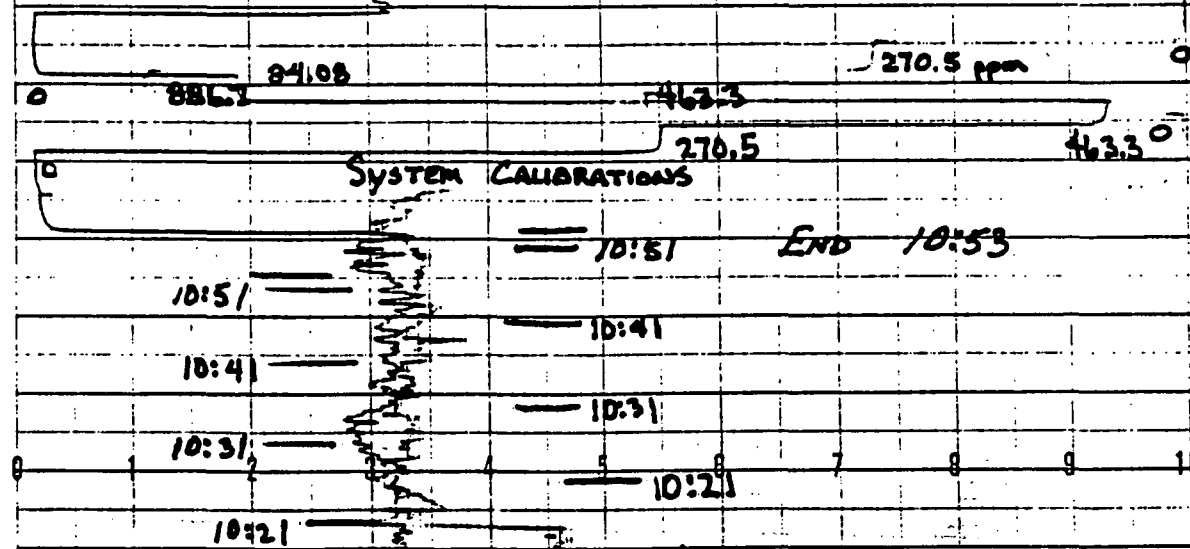
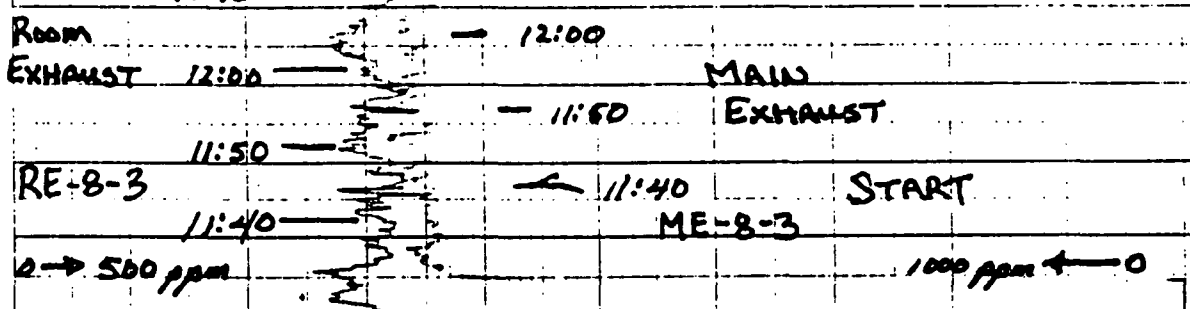
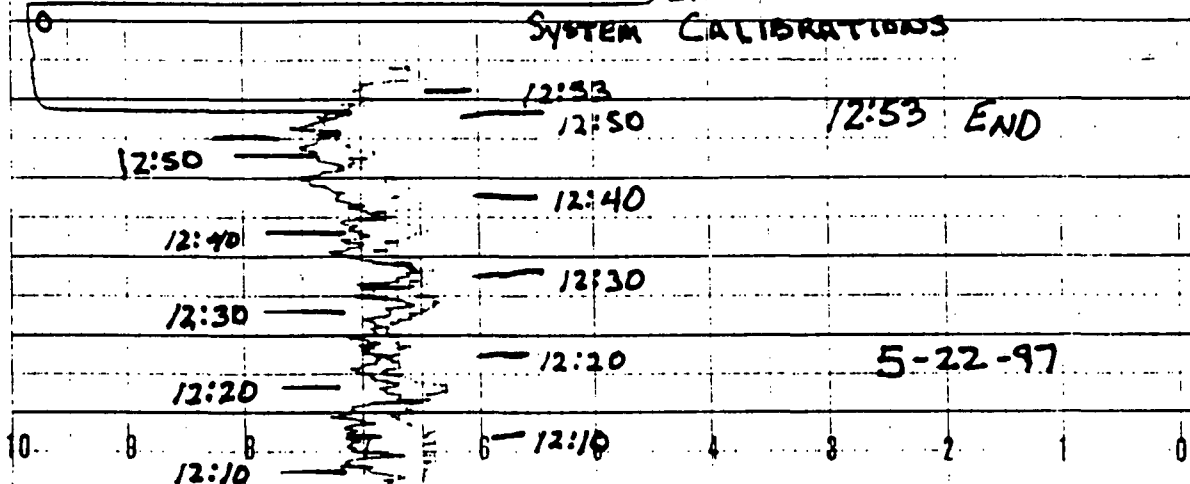
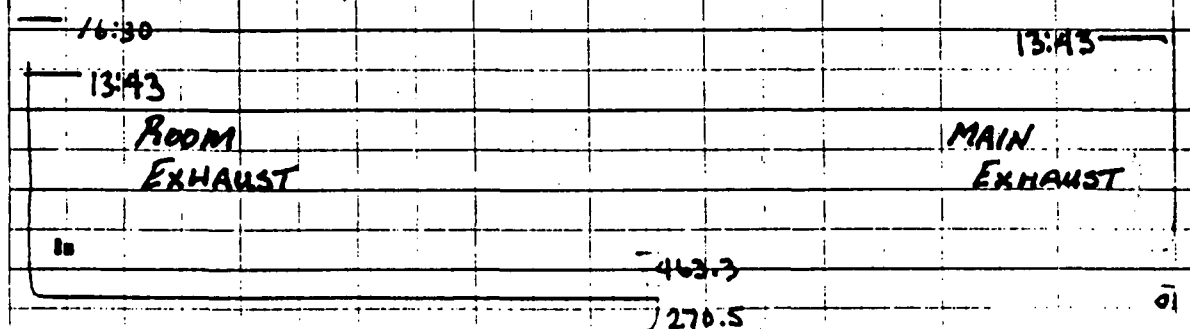
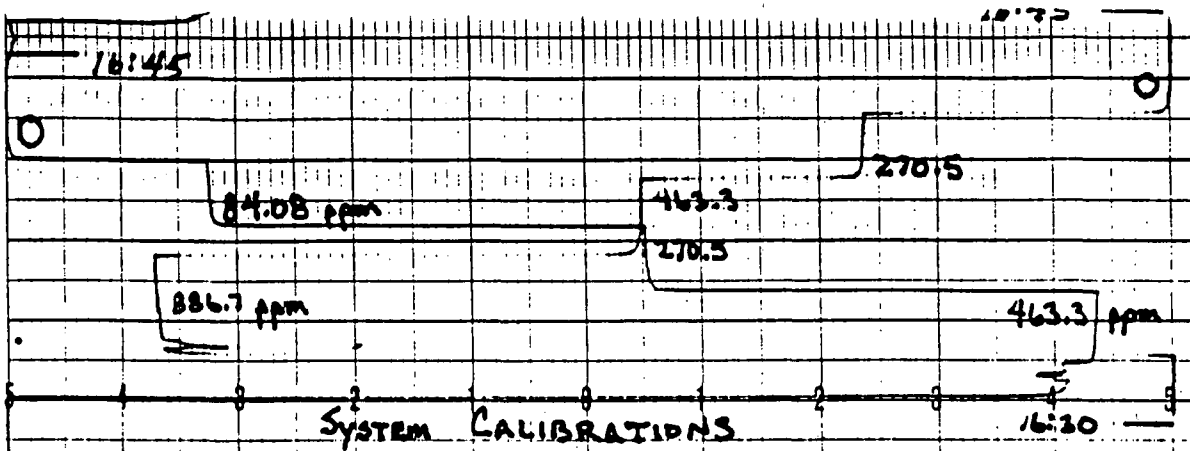


5-22-97

7:33







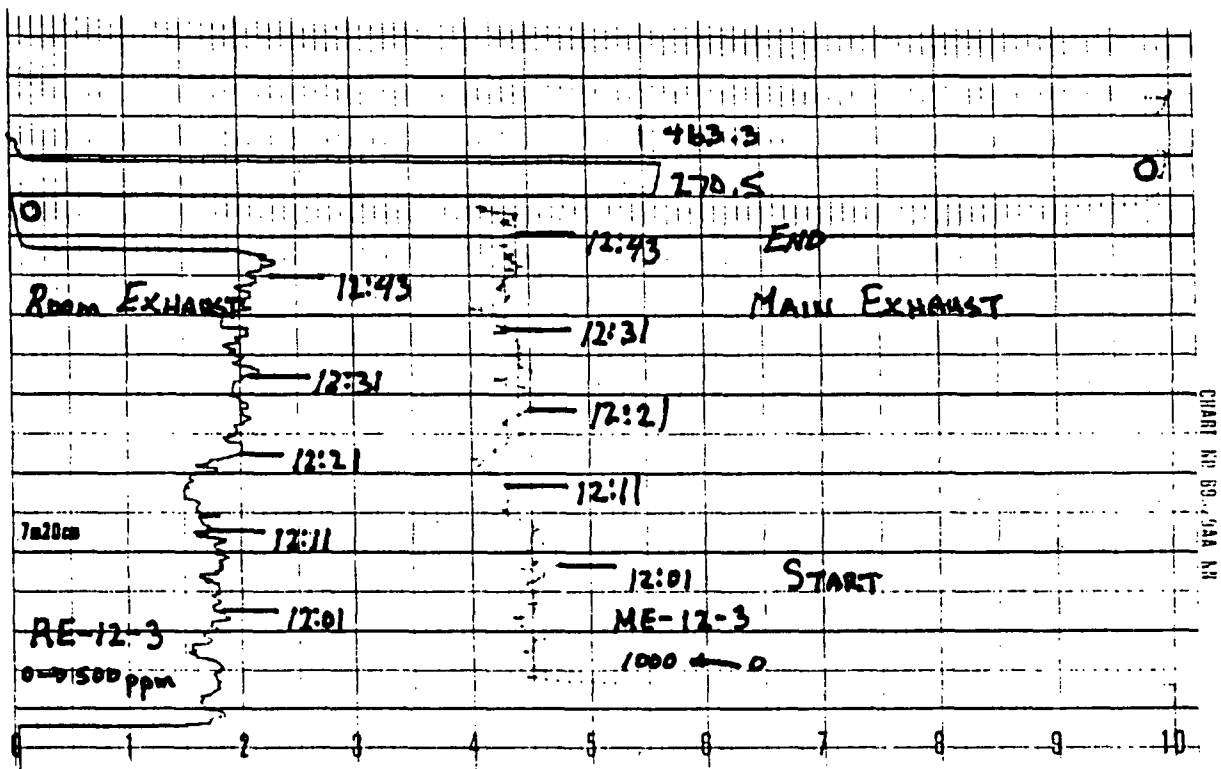
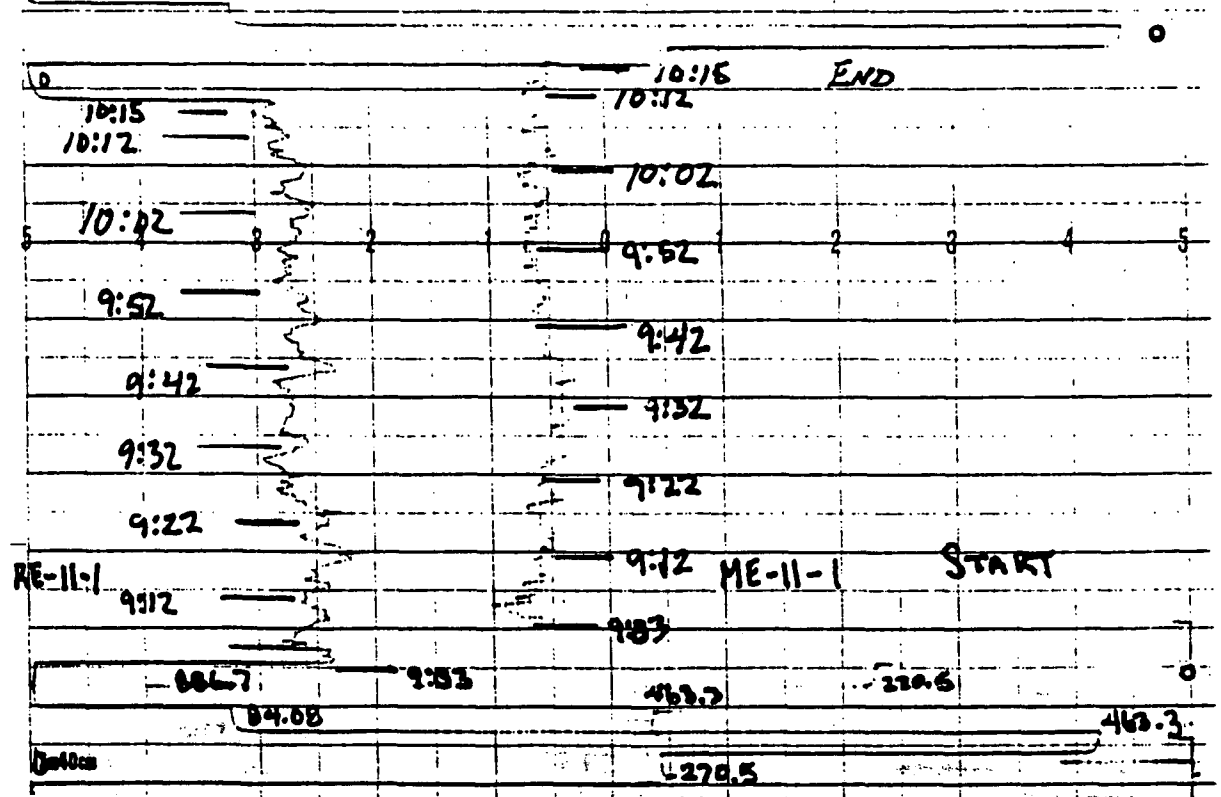
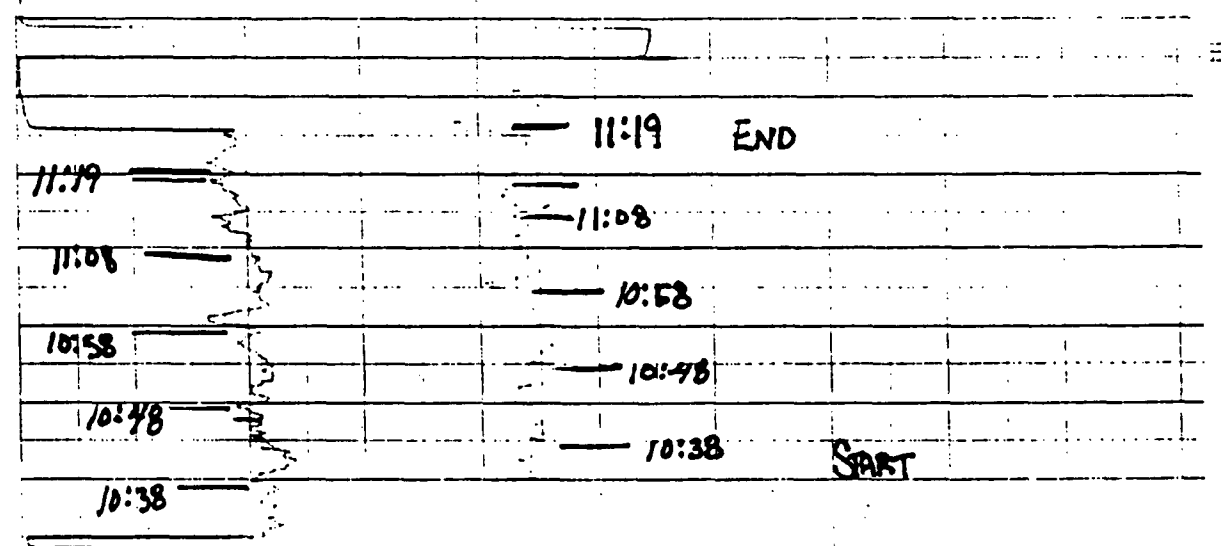
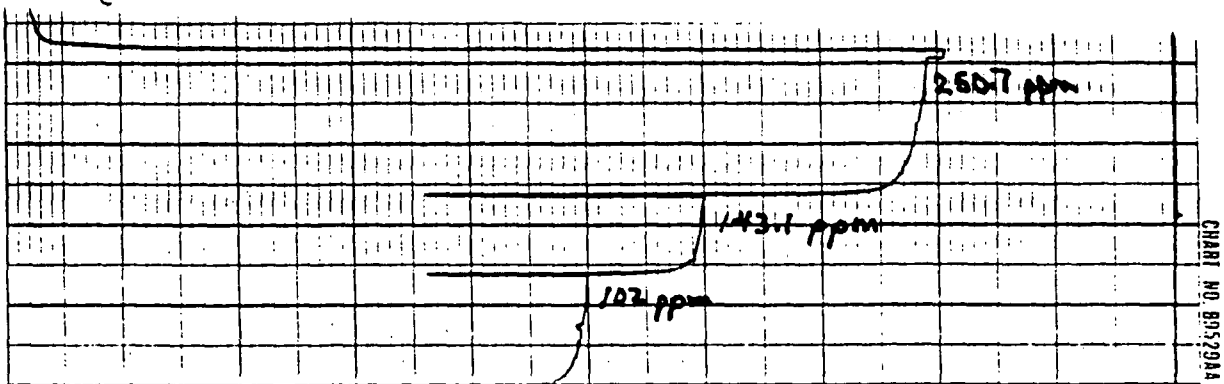


CHART NO. 89-2-54A NH





STYRENE CALIBRATIONS

Room EXHAUST

250.7 ppm Styrene

143.1 ppm Styrene

102 ppm Styrene

MAIN EXHAUST

84.08

270.5

463.3 ppm

886.7

270.5 ppm

463.3
217

7117
7110cm

SYSTEM CALIBRATIONS

84.08

463.3

270.5

886.7

270.5

463.3

DIRECT CALIBRATIONS

5-23-97

LASCO

S405.003

463.3 ppm

270.5 ppm

20:57

END

(20:59 Andy's
Time)

20:49

20:57

20:39

20:39

20:29

20:29

20:19

20:19

20:09

20:09

Room

EXHAUST

19:59

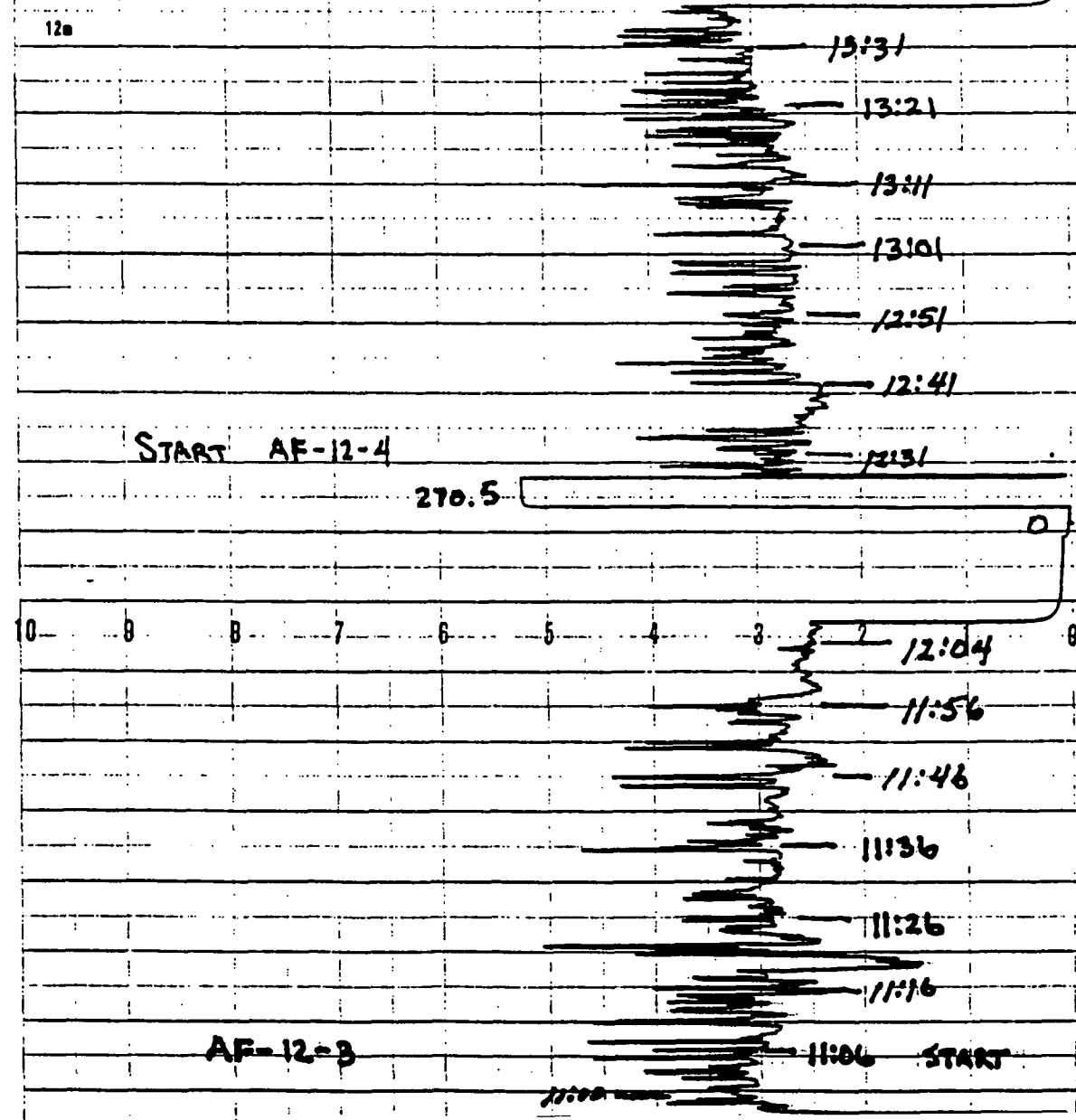
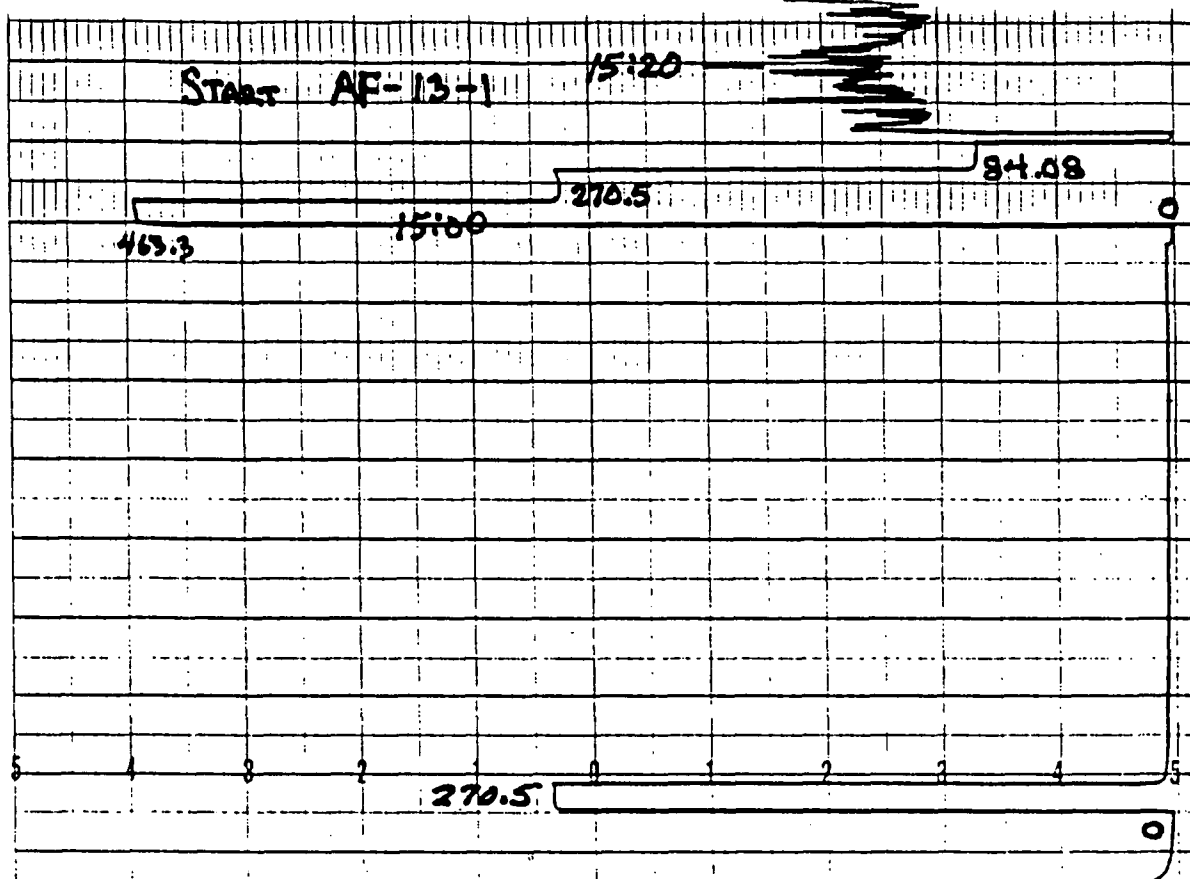
19:55

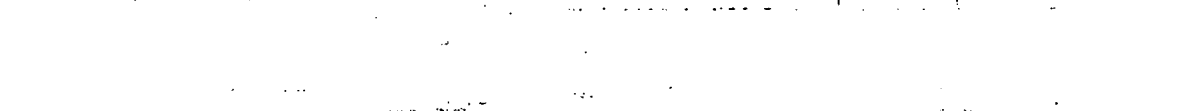
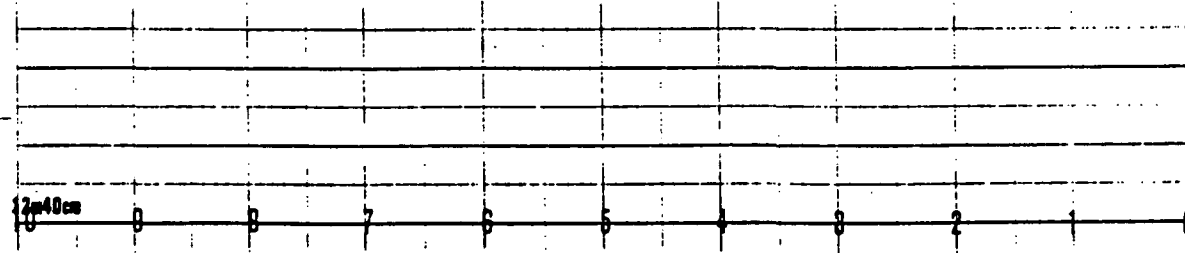
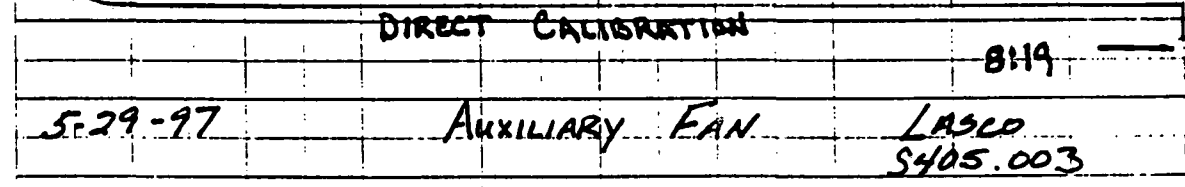
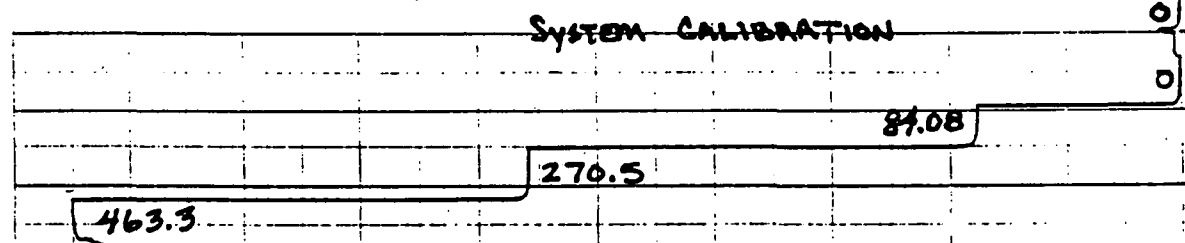
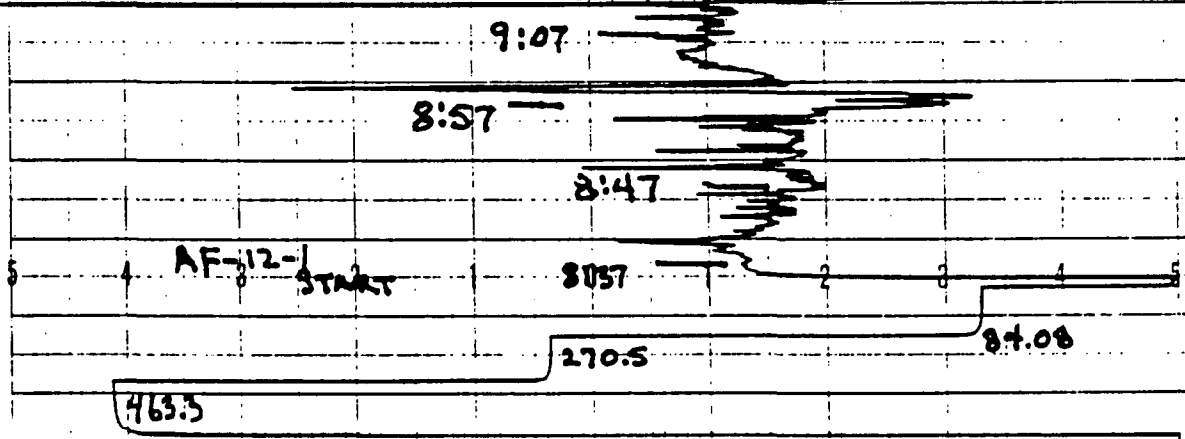
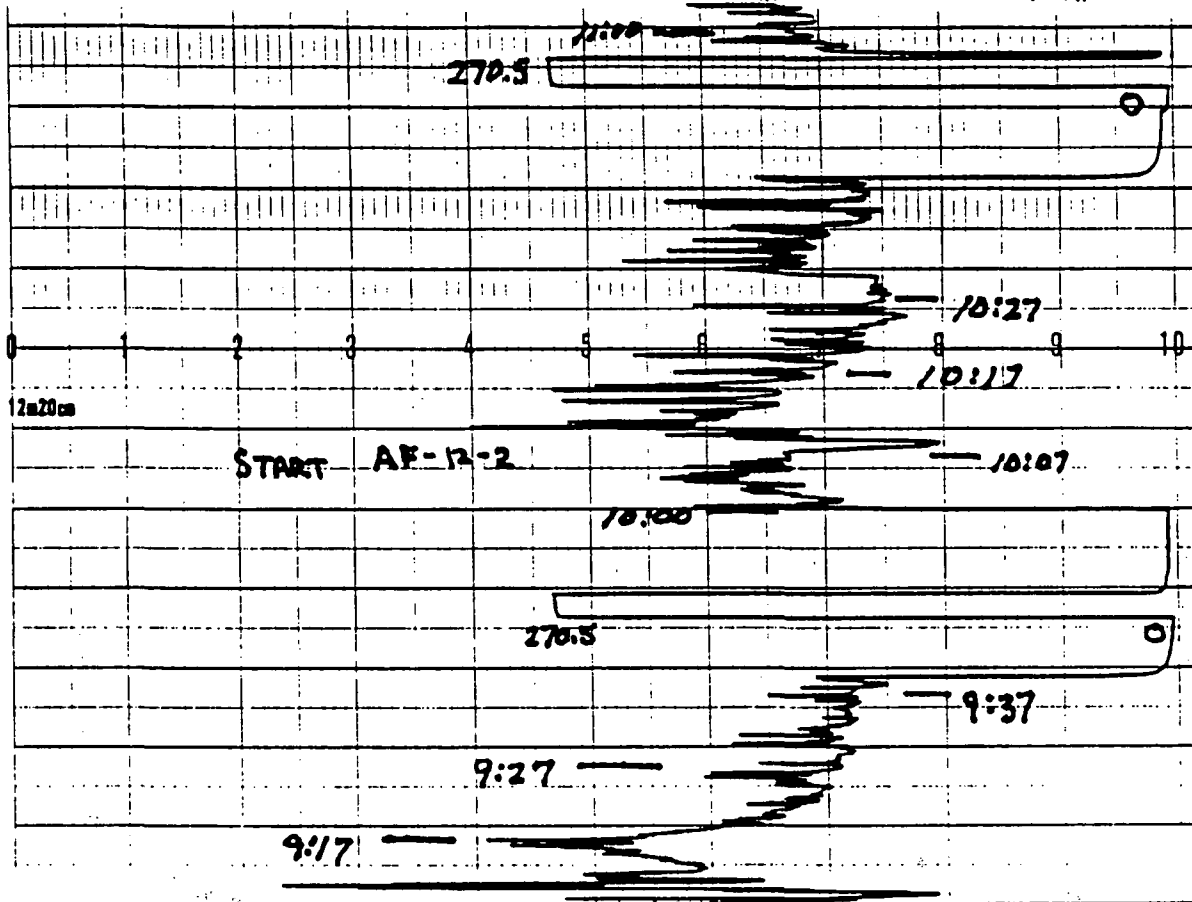
Started Production

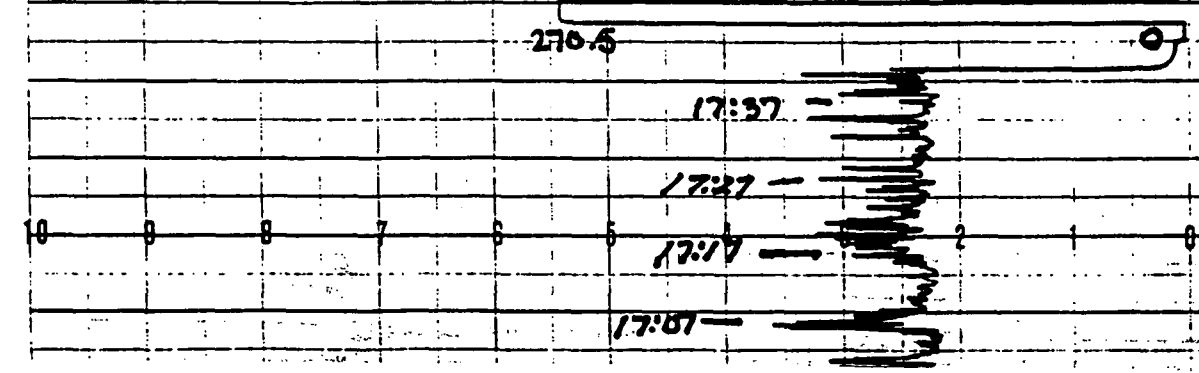
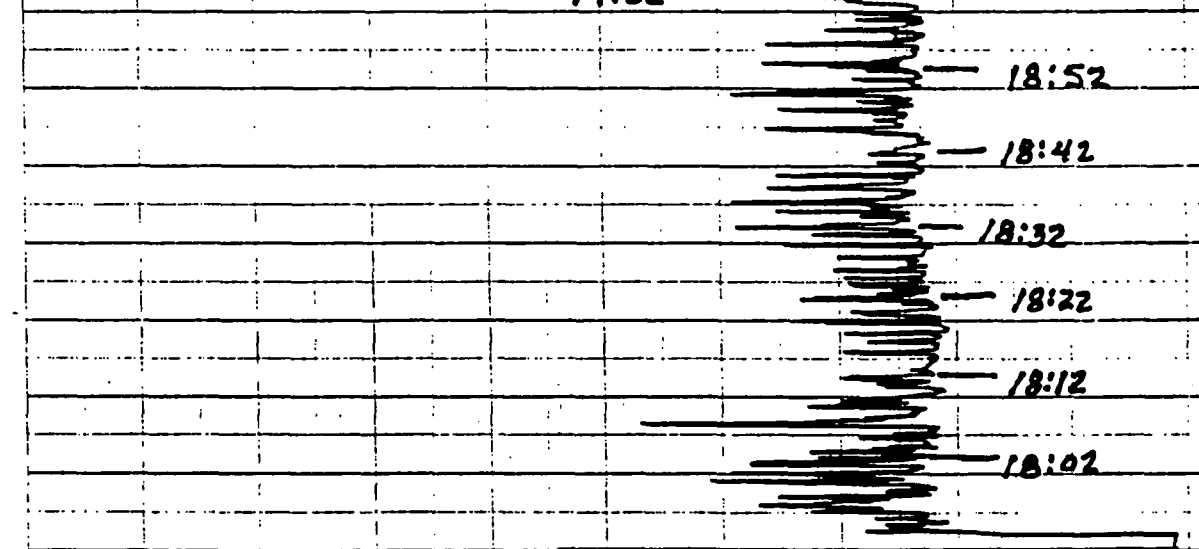
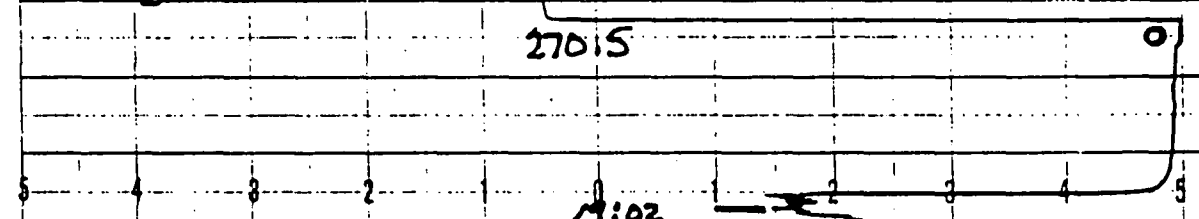
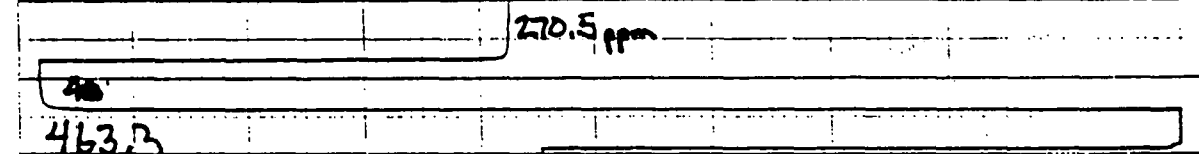
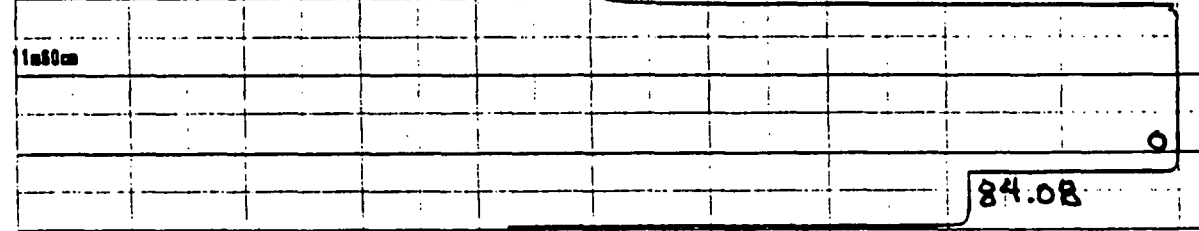
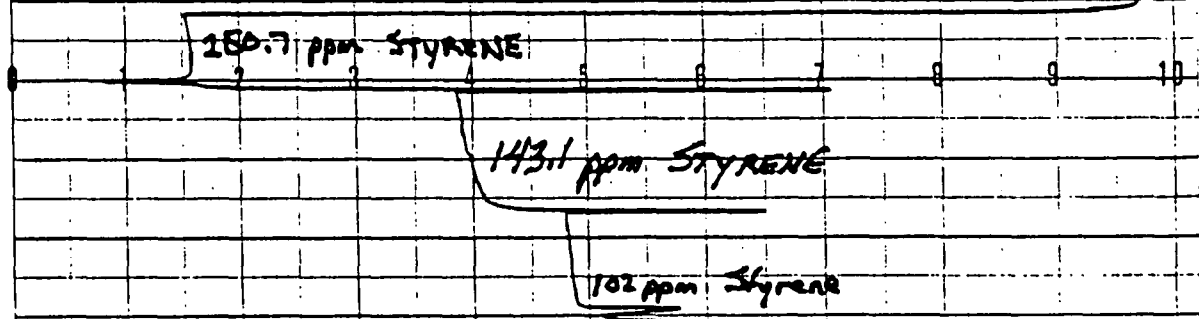
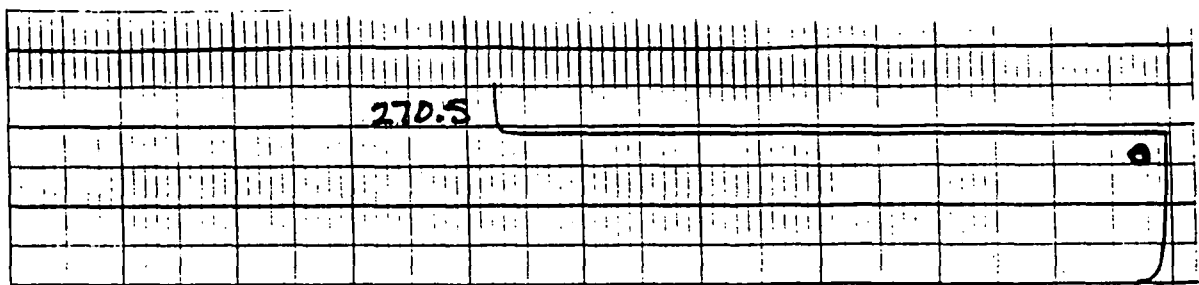
19:59 (20:01)

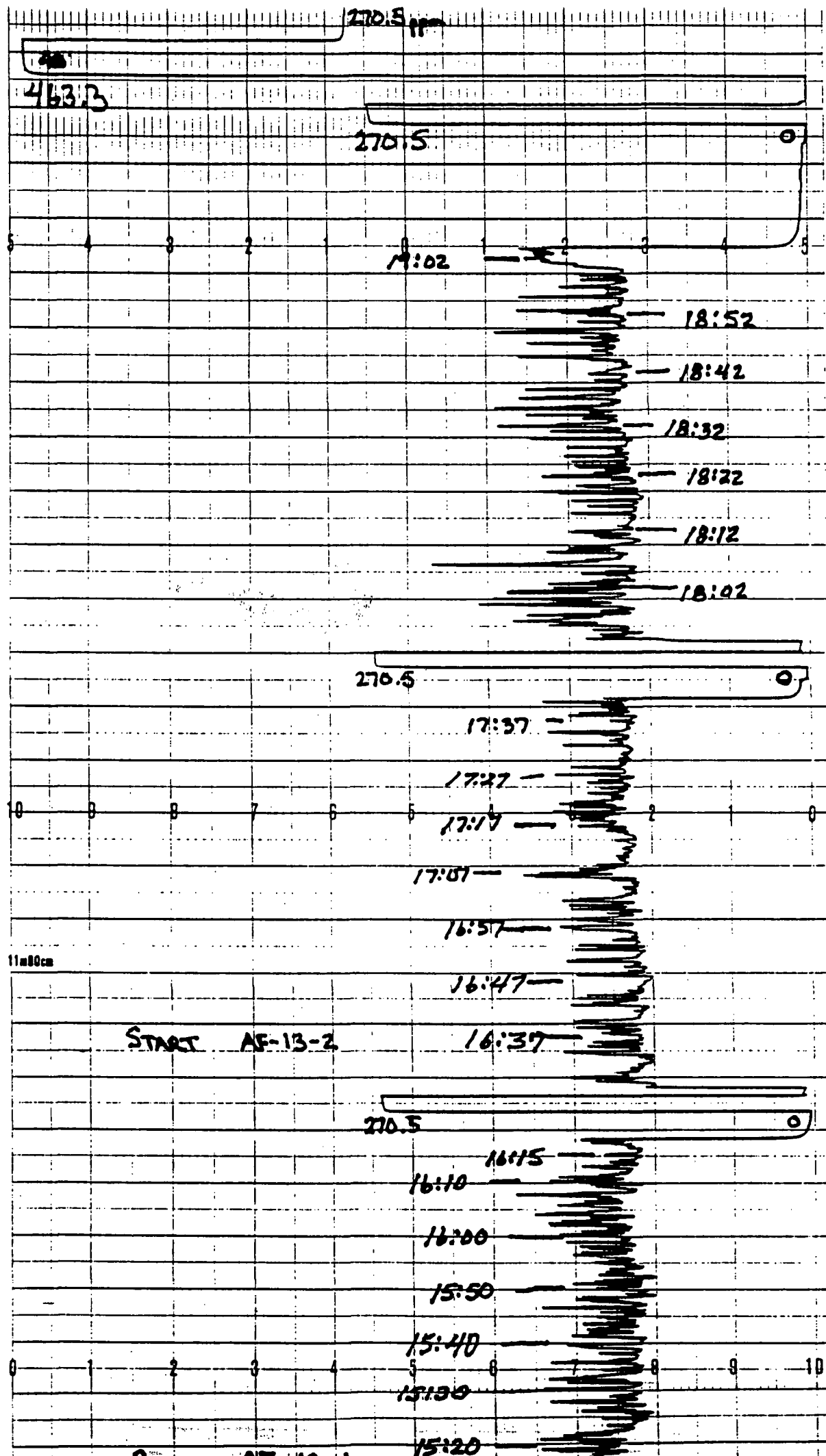
MAIN EXHAUST

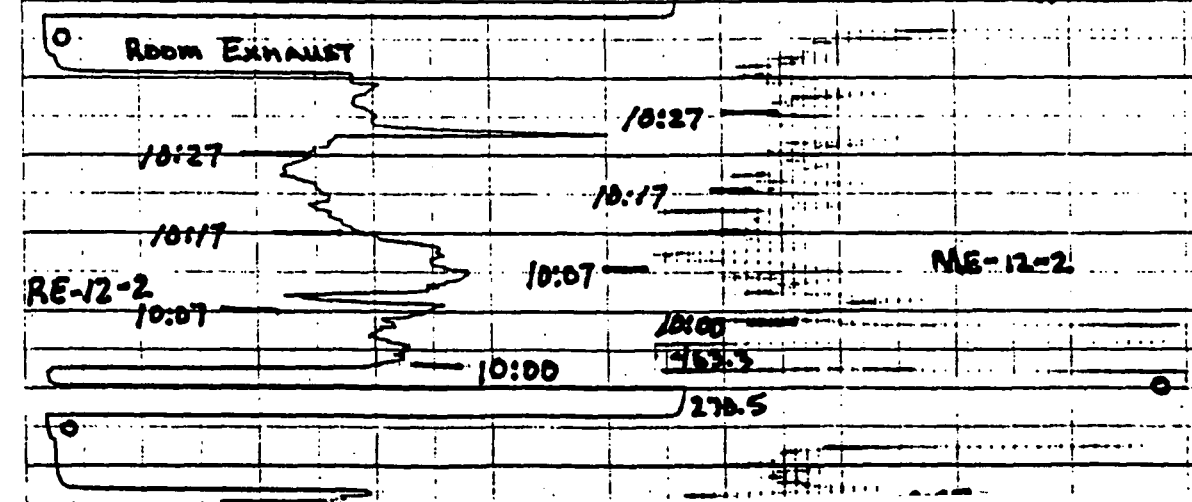
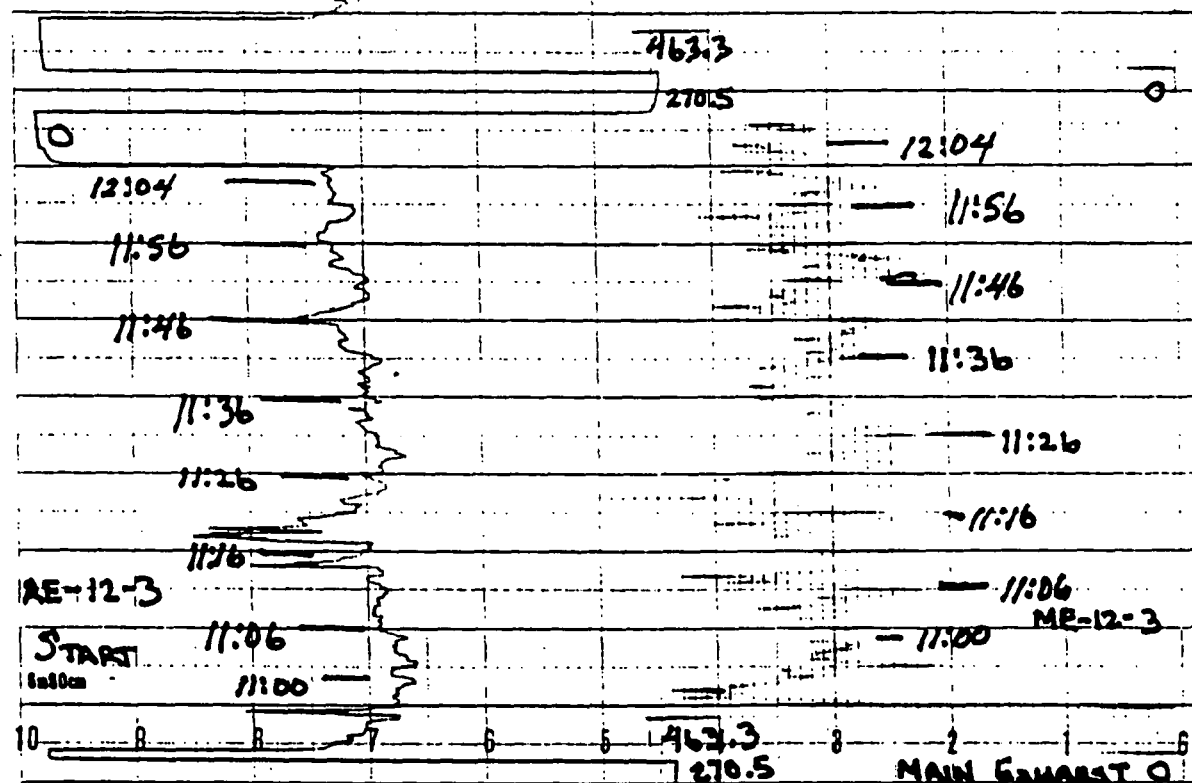
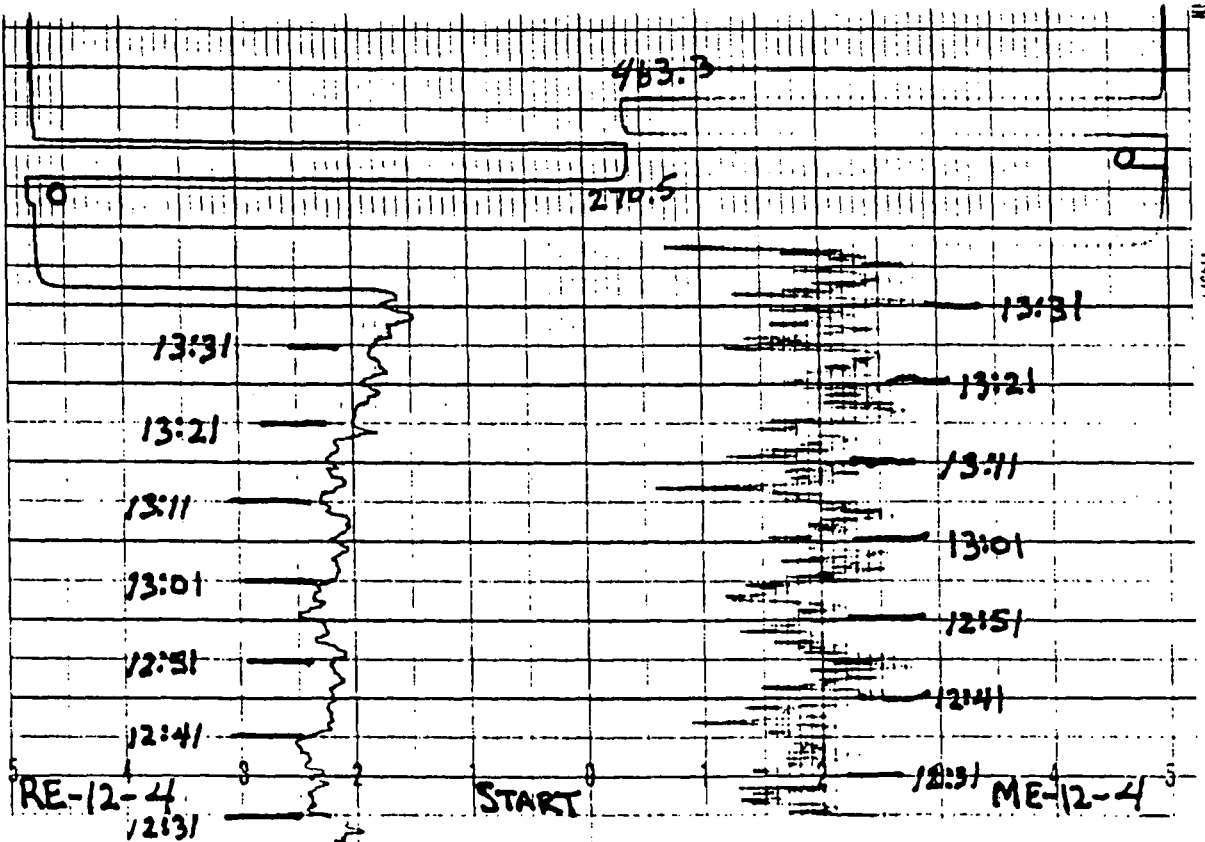
1000 ← 0

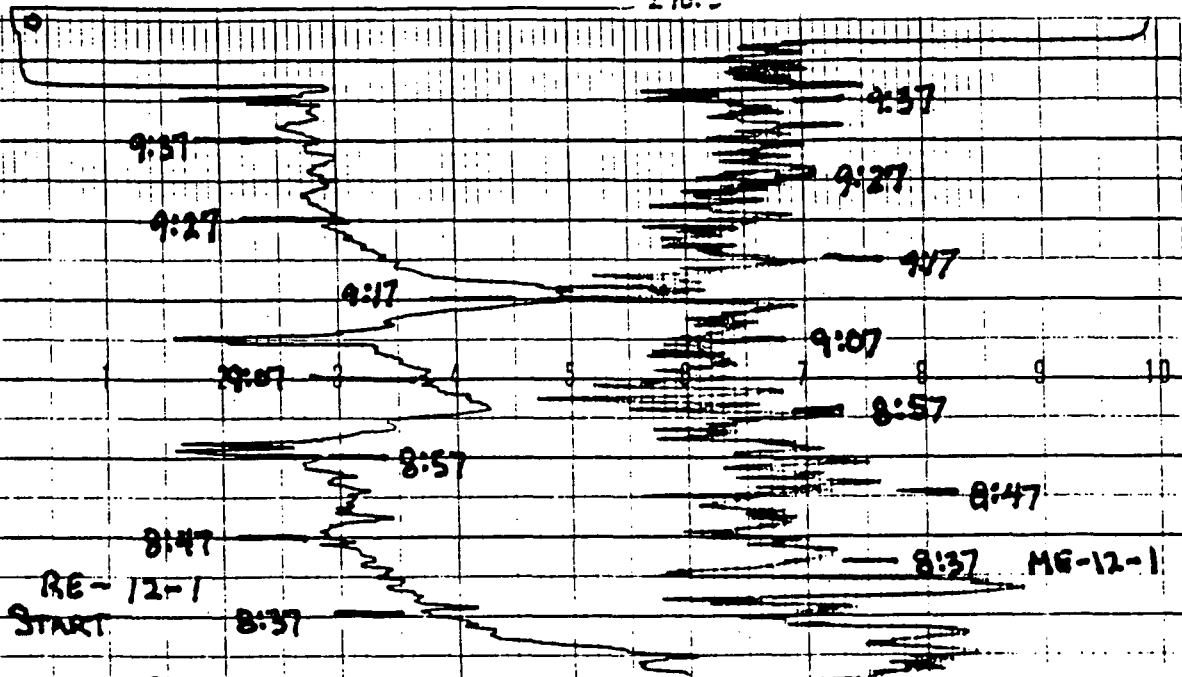












RE-12-1
START

Room Exhaust

8:20

84.08

8:20
MAIN EXHAUST

270.5

463.3

270.5

84.08

463.3

270.5

886.7

463.3

SYSTEM CALIBRATIONS

84.08

463.3

270.5

886.7

270.5

463.3

DIRECT CALIBRATIONS

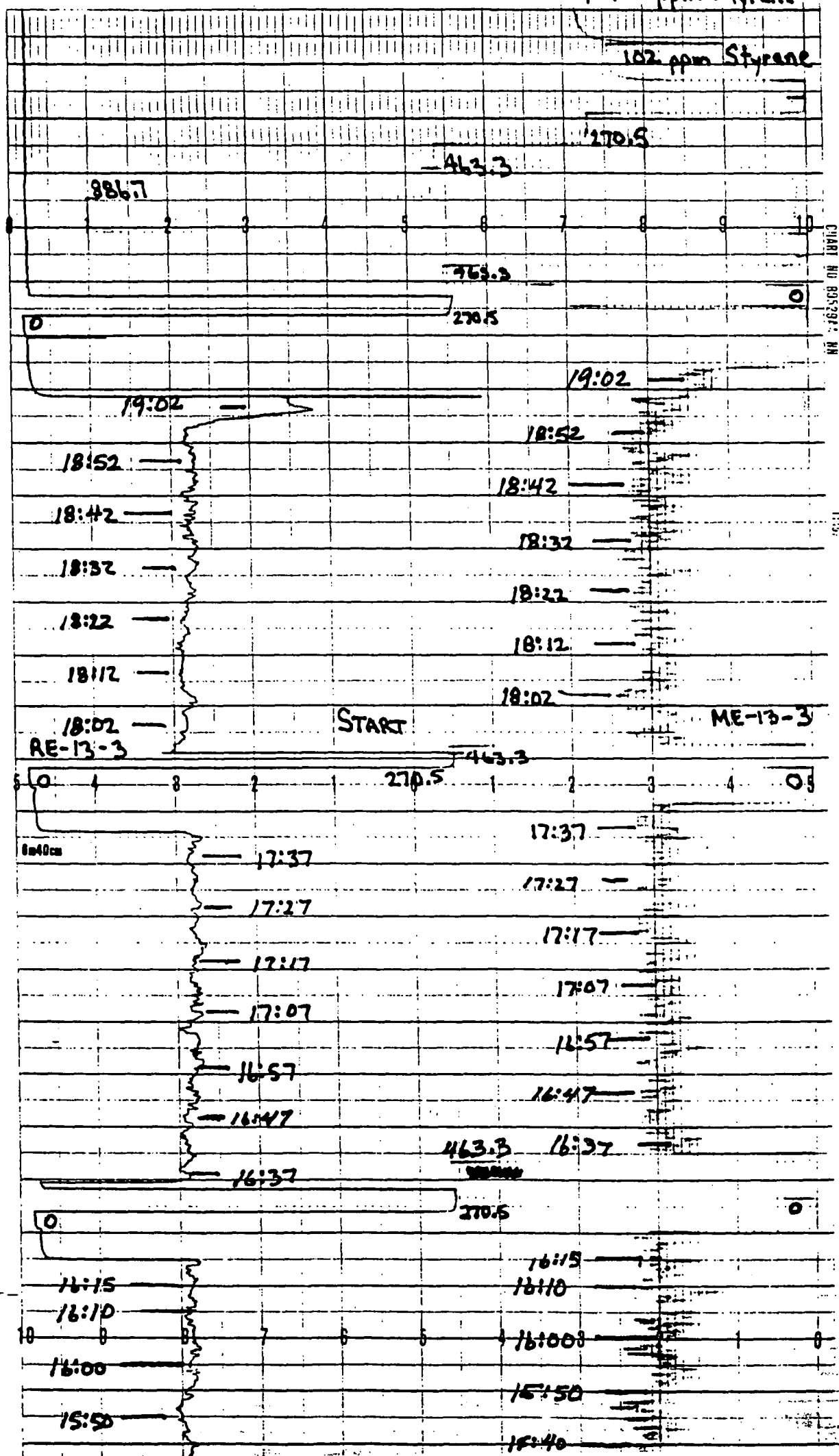
Room Exhaust

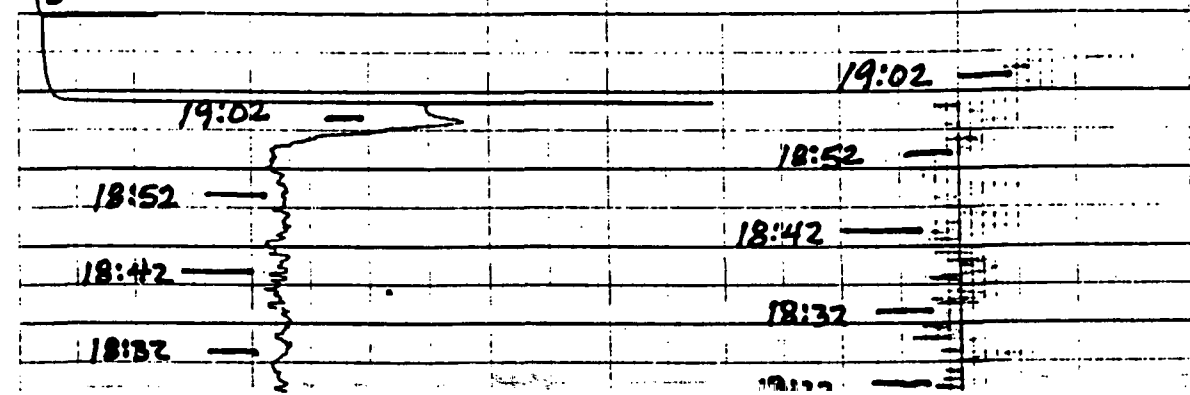
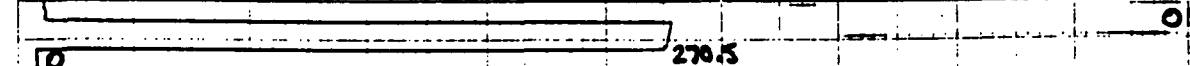
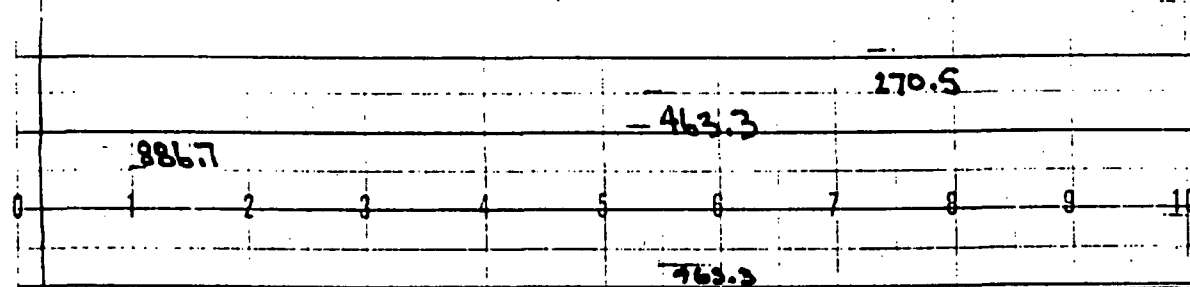
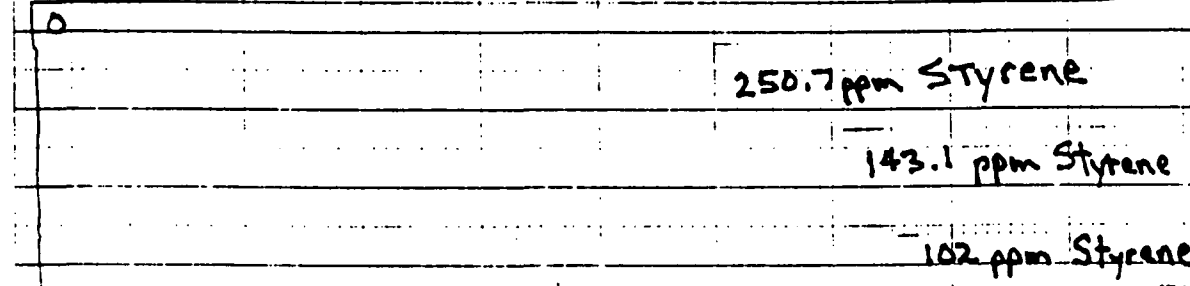
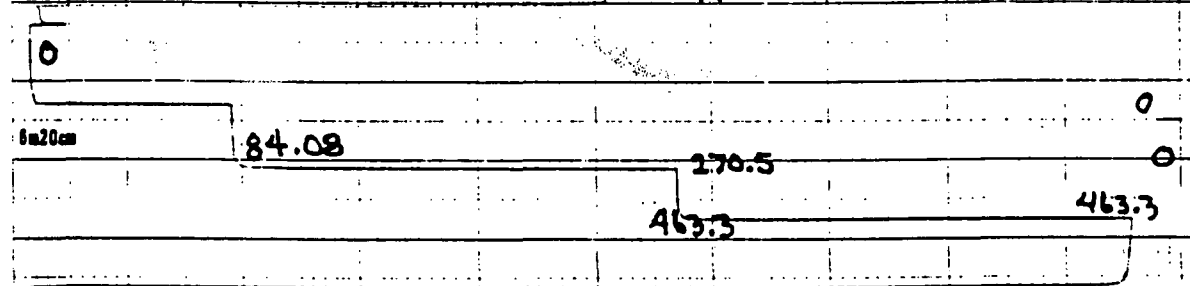
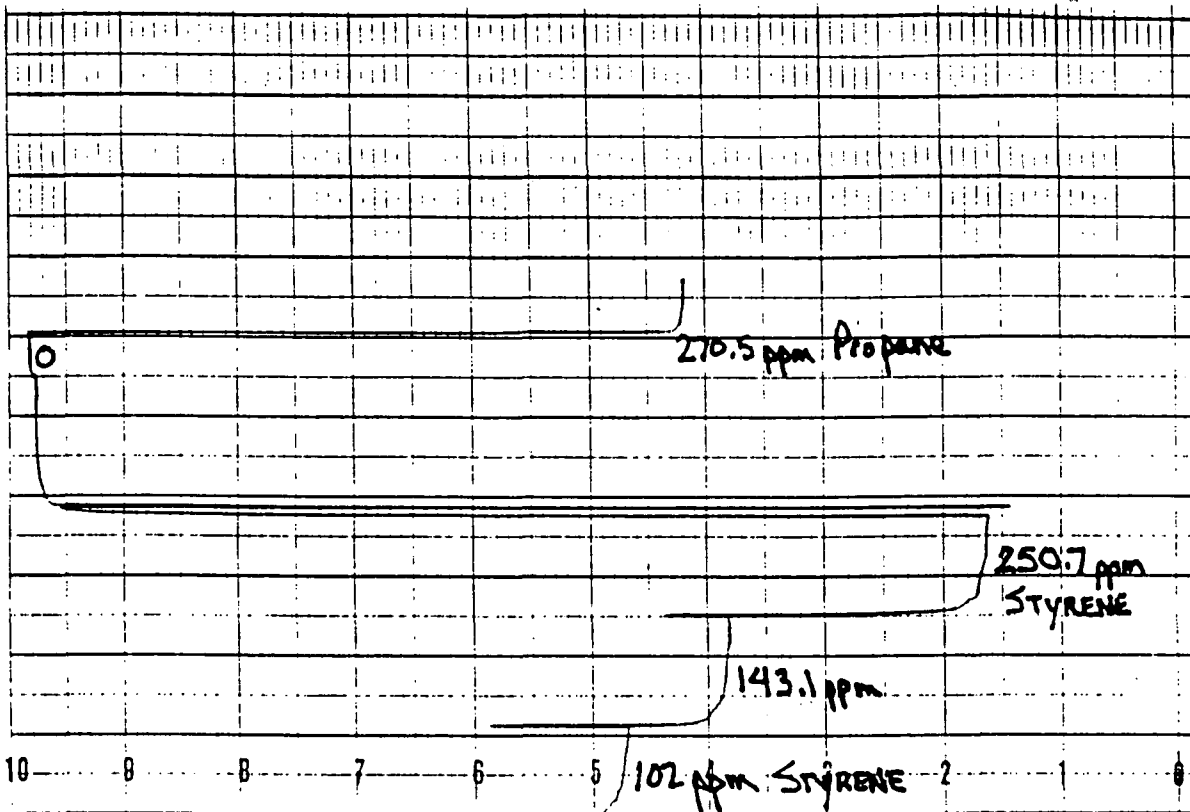
LASCO

8405.003

MAIN EXHAUST

5-29-97





APPENDIX A.2.16

Oven Nos. 9 and 10 Method 25A Data

Project ID: 97-14?? Date: 05-14-1997 Start Time: 10:34:33

Client: LASCO Test Location: TTE

1 Min. Averages Condition 1 Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
10:35:39	43	35.5		6.5	
10:36:39	44.4	30.7		7	
10:37:39	43.8	28.5		6.7	
10:38:39	43.3	27.1		6.7	
10:39:39	44	26.2		7.2	
10:40:39	42.7	25.9		6.8	
10:41:39	41.6	27.7		7	
10:42:39	41.3	35.3		6.6	
10:43:39	42.1	51.8		6.1	
10:44:39	42.1	63.9		5.8	
10:45:39	42	75.7		6	
10:46:39	43	92.1		6.1	
10:47:39	43.8	110	In Transition (not any one specific ND)		
10:48:39	44.2	122.5	17.1		
10:49:39	42.5	129.6	17.3		
10:50:39	40.9	135.2	16.4		
10:51:39	40	136.6	15		
10:52:39	40.1	138.4	20		
10:53:39	40.7	141	15.8		
10:54:39	40	145.6	16.5		
10:55:39	40.1	142.6	In Transition (not any one specific ND)		
10:56:39	41	136.5		5.9	
10:57:39	42	133.4		5.4	
10:58:39	42.8	132.6		5.2	
10:59:39	43.2	137.6		5.9	
11:00:39	42.7	138.4		5.9	
11:01:39	42.4	142.8		6.1	
11:02:39	42.9	136.8		6.3	
11:03:39	43	129.6		6.1	
11:04:39	43	129.3		6	
11:05:39	42.2	131.7	In Transition (not any one specific ND)		
11:06:39	40.6	137.9	13.9		
11:07:39	41.2	131.8	14.2		
11:08:39	40.4	133.1	14.2		
11:09:39	39.8	133.6	16.6		
11:10:39	40.1	138.5	14.3		
11:11:39	41.1	142.1	16.2		
11:12:39	42.2	144.4	14.2		
11:13:39	40.8	142.6	16		
11:14:39	40.6	136.5	17.2		
11:15:39	42	138.4	In Transition (not any one specific ND)		
11:16:39	43	139.2		4.3	
11:17:39	43.3	139.5		4.5	

11:18:39	44.2	136.3		4.6
11:19:39	45.2	138.3		5.5
11:20:39	46.4	142.8		6.3
11:21:39	46.8	142.1		6.6
11:22:39	47.6	140.3		6.5
11:23:39	47.7	143.4		6.8
11:24:39	47.6	143.5		6.5
11:25:39	47.8	140.7	In Transition (not any one specific ND)	
11:26:39	48	136.7	16.3	
11:27:39	47.2	140.9	17.8	
11:28:39	47.2	139.4	15.7	
11:29:39	47.8	139.3	15.9	
11:30:39	48.8	140.3	15.2	
11:31:39	49.2	140.8	16.9	
11:32:39	48.7	144	14.6	
11:33:39	47.2	146.9	17.4	
11:34:39	46	136.4	13	

Run avgs.	43.5	118.7	15.9	6.1 Not Run

Project ID: 97-3020 Date: 05-14-1997 Start Time: 12:25:43

Client: LASCO Test Location: TTE

1 Min. Averages Condition 1 Run number 2

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
12:26:49	43.2	140.3			61.8
12:27:49	44.1	135			61.4
12:28:49	44.8	134.7			61.6
12:29:49	44.9	138.5			57
12:30:49	44.2	132.5			53.3
12:31:49	44.6	135.3			62.5
12:32:49	44.9	140.1			56.4
12:33:49	44.2	140.6			55.9
12:34:49	43.3	142.4			55
12:35:49	43.1	136.9			67.5
12:36:49	43.4	125.1	In Transition (not any one specific ND		
12:37:49	43.1	124.5		4.7	
12:38:49	43.3	127.2		4.9	
12:39:49	42.9	133.9		5.3	
12:40:49	43.1	131.3		5.5	
12:41:49	43.5	133.4		5.6	
12:42:49	43.6	133.2		5.8	
12:43:49	43.5	131.7		5.7	
12:44:49	42.7	135.8		6	
12:45:49	42	134.6		6.9	
12:46:49	41.7	133.3	In Transition (not any one specific ND		
12:47:49	41.4	125.7			55.9
12:48:49	41	126.1			57.5
12:49:49	41.7	132.6			60.4
12:50:49	42.1	131.1			55.7
12:51:49	42.4	124.2			57
12:52:49	41.9	118.5			52.8
12:53:49	39.8	125.7			51.9
12:54:49	38.2	132.8			53.4
12:55:49	37.8	136.8			50.1
12:56:49	38.4	128			56.1
12:57:49	39.5	119.1			54.8
12:58:49	41	122.1		6.1	
12:59:49	41.7	131.7		3.9	
13:00:49	40.4	131.8		4.1	
13:01:49	39.7	126.7		3.6	
13:02:49	40.8	130.2		4.1	
13:03:49	42.3	139.9		4.9	
13:04:49	43	139.8		5.5	
13:05:49	42.7	136.8		5.4	
13:06:49	41.2	135	In Transition (not any one specific ND		
13:07:49	39.7	134.4			53.7
13:08:49	40.3	125.9			53.3

13:09:49	40.4	131.5		62.7
13:10:49	39.8	127.1		63.5
13:11:49	39	120.5		60.5
13:12:49	39	125.8		65.1
13:13:49	39.7	131.2		62.1
13:14:49	38.8	139.6		57.4
13:15:49	38.2	141.9		61.6
13:16:49	39.2	137	6.6	
13:17:49	39.7	136.5	5.8	
13:18:49	40.1	137.2	5.2	
13:19:49	39.9	135.4	4.3	
13:20:49	40.8	133.6	4.1	
13:21:49	42.1	131.8	4.3	
13:22:49	44.1	135.1	4.5	
13:23:49	44.6	136.8	4.5	
13:24:49	44.1	129.4	3.7	
13:25:49	44	133.1	3.6	

Run avgs.	41.7	132.3	Not Run	5.0	57.9
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Project ID: 97-14?? Date: 05-14-1997 Start Time: 15:46:23

Client: LASCO Test Location: TTE

1 Min. Averages Condition 1 Run number 3

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
15:47:29	47.7	148.3			78.8
15:48:29	48.8	141			63.6
15:49:29	47.7	132.3			73.8
15:50:29	47.9	135.9			63.4
15:51:29	48.1	138.3			66.2
15:52:29	48.6	132.9			67.5
15:53:29	48.6	137.8			68.2
15:54:29	48.7	140.5			66.8
15:55:29	47.7	139.4			73
15:56:29	47.4	137.1			68.6
15:57:29	48.3	135.6			69.1
15:58:29	49.4	137.4			67.5
15:59:29	49	139	In Transition (not any one specific ND		
16:00:29	47.5	141.6		10.2	
16:01:29	46.8	140.4		10	
16:02:29	45.4	136.7		10	
16:03:29	45.2	138.6		8.7	
16:04:29	45	141.1		7.6	
16:05:29	45.2	133.8		8.7	
16:06:29	44.3	128		8.7	
16:07:29	44.1	125.2	In Transition (not any one specific ND		
16:08:29	43.9	126.9		6	
16:09:29	43.2	127.7	4.3		
16:10:29	41.3	124.5	3.8		
16:11:29	40.3	122.9	3.8		
16:12:29	39.9	124.3	3.4		
16:13:29	38.4	125.9	3.1		
16:14:29	37.8	133.5	2.9		
16:15:29	38.9	133.4	2.7		
16:16:29	40.1	130.6	2.3		
16:17:29	40.6	128.8	4.4		
16:18:29	40.5	128.2	In Transition (not any one specific ND		
16:19:29	39.8	128.4		7.1	
16:20:29	37.4	127.3		6.3	
16:21:29	35.9	133.4		6.2	
16:22:29	36.2	135.2		6.4	
16:23:29	35.6	131.9		6.6	
16:24:29	35	129.7		7.3	
16:25:29	35.5	128.4		6	
16:26:29	36.4	123.6		5.6	
16:27:29	35.3	127.5		5.7	
16:28:29	33.6	124.6	2.6		
16:29:29	32.8	121.3	2.3		

16:30:29	33.2	114.7	2.3
16:31:29	33.4	115.8	2.2
16:32:29	33.2	113.8	2.1
16:33:29	32.9	110.9	2.1
16:34:29	32.3	109.2	2.1
16:35:29	31.6	114.1	2.1
16:36:29	30.9	113.8	1.7
16:37:29	30.9	118.2	In Transition (not any one specific ND
16:38:29	31.4	123.4	In Transition (not any one specific ND
16:39:29	31.9	132.6	5.9
16:40:29	32	132.7	5.2
16:41:29	31.5	126.8	4.9
16:42:29	30.7	118.8	4.7
16:43:29	29.6	112.6	5
16:44:29	30.8	113.4	5
16:45:29	31.8	110.8	8.5
16:46:29	32.4	113.2	4.8

Run avgs.	39.5	128.2	3.0	6.9	68.9
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Project ID: 97-14?? Date: 05-14-1997 Start Time: 20:20:19

Client: LASCO Test Location: TTE

1 Min. Averages Condition 2 Run 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
20:21:25	44	95.7			6
20:22:25	43.9	101			6.2
20:23:25	43.3	106.4			6.1
20:24:25	42.8	105.8			6.2
20:25:25	43.3	107.4			5.8
20:26:25	44.8	112.9			5.9
20:27:25	45.1	113.2			5.6
20:28:25	45.3	118.2			6.3
20:29:25	45.6	116.6			6
20:30:25	46.3	107.9			5.9
20:31:25	46.8	104			6
20:32:25	47.8	109	2.4		
20:33:25	48.1	109.5	1.9		
20:34:25	No Data	No Data	No Data	No Data	No Data
20:35:25	No Data	No Data	No Data	No Data	No Data
20:36:25	No Data	No Data	No Data	No Data	No Data
20:37:25	No Data	No Data	No Data	No Data	No Data
20:38:25	No Data	No Data	No Data	No Data	No Data
20:39:25	No Data	No Data	No Data	No Data	No Data
20:40:25	No Data	No Data	No Data	No Data	No Data
20:41:25	No Data	No Data	No Data	No Data	No Data
20:42:25	No Data	No Data	No Data	No Data	No Data
20:43:25	No Data	No Data	No Data	No Data	No Data
20:44:25	No Data	No Data	No Data	No Data	No Data
20:45:25	No Data	No Data	No Data	No Data	No Data
20:46:25	No Data	No Data	No Data	No Data	No Data
20:47:25	No Data	No Data	No Data	No Data	No Data
20:48:25	No Data	No Data	No Data	No Data	No Data
20:49:25	No Data	No Data	No Data	No Data	No Data
20:50:25	No Data	No Data	No Data	No Data	No Data
20:51:25	No Data	No Data	No Data	No Data	No Data
20:52:25	No Data	No Data	No Data	No Data	No Data
20:53:25	No Data	No Data	No Data	No Data	No Data
20:54:36	38.3	67.3	1.9		
20:55:36	37.8	36.1	1.7		
20:56:36	38.8	25.6	1.7		
20:57:36	40.6	25.1	1.7		
20:58:36	40.3	25.2	1.2		
20:59:36	41	23.7	1.2		
21:00:36	42.2	22.4	1.2		
21:01:36	43	21.7	1		
21:03:12	44.6	21.2	1.6		
21:04:12	45	21	2.1		

21:05:12	46.3	21.1 In Transition (not any one specific ND	
21:06:12	45.9	21.5 In Transition (not any one specific ND	
21:07:12	44.9	26.1	8.6
21:08:12	44.6	23.3	6.7
21:09:12	43.8	21.8	5.2
21:10:12	42.6	20.9	5.4
21:11:12	41.1	8.6	5
21:12:12	41.4	26.6	4.9
21:13:12	42.8	24.1	4.6
21:14:12	44.3	23.5	4.5
21:15:12	44.2	30.3	3.6
21:16:12	43.9	29.4	1.9
21:17:12	43.8	33.6	1.7
21:18:12	44	31.1	1.7
21:19:12	43.7	29.4	1.4
21:20:12	42.5	27.6	1.6
21:21:12	42.2	26	1.6
21:22:12	42.4	24.8	1.8
21:23:12	42.6	23.3	1.4
21:24:12	44	23.9	1.7
21:25:12	44.3	24	1.6

Run avgs.	43.5	50.4	1.6	5.7 Not Run
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Project ID: 97-14?? Date: 05-14-1997 Start Time: 21:55:18

Client: Lasco Test Location:

1 Min. Averages Condition 2 Run number 2

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
21:56:24	36.2	65.4		2.7	
21:57:24	36.5	68.9		2.6	
21:58:24	36.4	70.5		17.9	
21:59:24	35.8	70.2		17.6	
22:00:24	35.2	71.6		6.8	
22:01:24	35.5	67.2		3.8	
22:02:24	35.8	70.9		3.4	
22:03:24	35.7	65.9		2.9	
22:04:24	36.1	66		3	
22:05:24	36.1	67.9		2.7	
22:06:24	36	66.7	In Transition (not any one specific ND		
22:07:24	35.8	65.5	3.2		
22:08:24	35.9	62.7	2.4		
22:09:24	36.3	65.9	2.7		
22:10:24	37	64.9	3.2		
22:11:24	36.7	66.8	3.2		
22:12:24	35.5	66.4	3.6		
22:13:24	35.2	66.3	3.2		
22:14:24	35.1	68.8	2.7		
22:15:24	35.8	70.2	2.8		
22:16:24	36.4	70.7	3.8		
22:17:24	37.2	70.3	3.6		
22:18:24	38	72.4	In Transition (not any one specific ND		
22:19:24	37.4	69.3	In Transition (not any one specific ND		
22:20:24	36.9	83		4.6	
22:21:24	37	80.8		3.4	
22:22:24	37.3	78.4		3.5	
22:23:24	37.6	71.8		3.3	
22:24:24	37	71.3		3.1	
22:25:24	37.7	71.3		3.1	
22:26:24	38.8	67.6		3.1	
22:27:24	40.1	71.9		2.6	
22:28:24	40.1	71.8		2.8	
22:29:24	39.8	72.8	In Transition (not any one specific ND		
22:30:24	39.3	66.7	2.6		
22:31:24	38.1	66.1	2.6		
22:32:24	38	65.2	2.9		
22:33:24	38.8	69.8	2.9		
22:34:24	39	69.5	3.3		
22:35:24	38.8	68.2	2.6		
22:36:24	39.3	64.6	3.3		
22:37:24	39.9	68.6		3.8	
22:38:24	39.9	66.6		3.7	

22:39:24	38.8	67.6		3.5
22:40:24	39.4	67.4		3.9
22:41:24	40.4	67.6		3.5
22:42:24	40.4	67.7		3.8
22:43:24	39.5	65		3.7
22:44:24	40.5	66.4		3.8
22:45:24	40.8	64.9		3.9
22:46:24	41.3	67.1	2.9	
22:47:24	41	65.7	2.9	
22:48:24	41.4	70.7	2.8	
22:49:24	41.1	74.5	2.6	
22:50:24	40	83.3	2.7	
22:51:24	39.9	96	2.7	
22:52:24	40.2	97.7	2.8	
22:53:24	41	99.8	2.8	
22:54:24	40.7	104.6	2.7	
22:55:24	41.3	109	2.7	

Run avgs.	38.1	71.9	2.9	4.5 Not Run

Project ID: 97-14?? Date: 05-14-1997 Start Time: 23:37:56

Client: Lasco Test Location:

1 Min. Averages Condition 2 Run number 3

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
23:39:02	35.8	90.4	9.7		
23:40:02	35.6	92.8	9.1		
23:41:02	36.6	94.8	8.5		
23:42:02	36.1	104.1	7.3		
23:43:02	35.6	110.4	7.7		
23:44:02	35.2	113.5	7.6		
23:45:02	35.1	113.4	7.6		
23:46:02	35	112.8	7		
23:47:02	34.4	111.4	7.2		
23:48:02	34.6	104.3	7.2		
23:49:02	34.4	106.1	In Transition	(not any one specific ND	
23:50:02	35.2	107.2			2.8
23:51:02	36.2	106.9			3.1
23:52:02	35.9	108.1			3
23:53:02	35.4	112.9			2.8
23:54:02	35.2	112.1			2.9
23:55:02	36	117.7			3.1
23:56:02	36.2	117.1			2.8
23:57:02	35.5	112.2			2.6
23:58:02	34.8	110.4			2.7
23:59:02	33.8	108.9	In Transition	(not any one specific ND	
00:00:02	33.4	104		43.5	
00:01:02	33.3	108.1		46.4	
00:02:02	33.1	113.5		45.7	
00:03:02	32.4	105.2		41.7	
00:04:02	32.8	110.2		34.2	
00:05:02	32.1	112.9		38.4	
00:06:02	31.1	111.4		40.7	
00:07:02	30.9	113.1		38.9	
00:08:02	31.5	108.5		43.3	
00:09:02	32	107.4	In Transition	(not any one specific ND	
00:10:02	32.3	107			6.6
00:11:02	32	103.3			6.7
00:12:02	32.1	110.3			6.3
00:13:02	31.6	111			6.3
00:14:02	31.6	111.5			6.5
00:15:02	31.7	115.9			6.4
00:16:02	31.3	111.4			5.9
00:17:02	32.3	103.2	In Transition	(not any one specific ND	
00:18:02	33.3	97.3	In Transition	(not any one specific ND	
00:19:02	33.2	96.3	In Transition	(not any one specific ND	
00:20:02	33.9	93.3	4.9		
00:21:02	33.9	97.3	3.1		

00:22:02	34	103.8	2.6	
00:23:02	33	106.3	2.3	
00:24:02	32.3	102	2.2	
00:25:02	32.3	98.3	2.1	
00:26:02	32.3	100.6	2	
00:27:02	32.8	102.8	1.9	
00:28:02	33.4	104.2	1.9	
00:29:02	33.6	104.8	In Transition	(not any one specific ND
00:30:02	34	112.5	In Transition	(not any one specific ND
00:31:02	35.8	120.2		14.1
00:32:02	37.3	123.2		9.4
00:33:02	38.3	120.9		14.9
00:34:02	39.3	115.8		15.5
00:35:02	40.6	108.5		13.2
00:36:02	41.9	110		20.7
00:37:02	43.1	108.1		24.7
00:38:02	45	118.9		26

Run avgs.	34.6	108.0	5.4	30.1
				4.4

Project ID: 97-14?? Date: 05-15-1997 Start Time: 14:25:20

Client: LASCO Test Location: TTE

1 Min. Averages Condition 3 Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
14:26:26	178.4	63.4		12.6	
14:27:26	180.8	65.1		12	
14:28:26	177.8	62.7		11.1	
14:29:26	179.1	63.1		11.6	
14:30:26	182.3	62.2		11.8	
14:31:26	183.1	64.2		11.7	
14:32:26	185	59.8		11.9	
14:33:26	186.2	59.5		11.7	
14:34:26	187.2	58.8		11.7	
14:35:26	187.1	60.3		11.3	
14:36:26	188.2	59.4	In Transition (not any one specific ND		
14:37:26	187.6	58.6	1.1		
14:38:26	186.6	57.3	0.8		
14:39:26	185.3	56.7	0.7		
14:40:26	185.2	55.8	0.6		
14:41:26	185.1	57.8	0.4		
14:42:26	185	56.2	0.4		
14:43:26	185.7	57.8	0.5		
14:44:26	184.7	56.3	0.6		
14:45:26	184.9	56	0.6		
14:46:26	185	56.4			10.8
14:47:26	184	54.7			11.3
14:48:26	183.6	53.8			11.2
14:49:26	183.8	53.5			11.5
14:50:26	182.6	54.6			11.5
14:51:26	182.9	54.3			11.2
14:52:26	183.6	54.9			10.3
14:53:26	182.5	66.8			10.1
14:54:26	181.5	76			10.5
14:55:26	181.1	86.5			10.6
14:56:26	183.6	93.7	In Transition (not any one specific ND		
14:57:26	185.6	110.3		9.3	
14:58:26	185.3	114.6		9.6	
14:59:26	184.3	109.9		10.1	
15:00:26	185	110.6		10.5	
15:01:26	186.6	114.4		10.2	
15:02:26	187.3	113		10.5	
15:03:26	188.6	116.2		10.8	
15:04:26	188.6	119.8		10.3	
15:05:26	189.4	122.4		10.6	
15:06:26	190.6	119.1	In Transition (not any one specific ND		
15:07:26	191.7	118	In Transition (not any one specific ND		
15:08:26	193.9	118.6			13

15:09:26	196.5	116		13
15:10:26	191.7	116.5		14
15:11:26	190.3	119.7		13.5
15:12:26	188.9	121		13.7
15:13:26	189	119.8		17.3
15:14:26	189.6	114.1		13.6
15:15:26	189.6	111.9		13.9
15:16:26	188.5	113.9		12.9
15:17:26	187	115.3		11.7
15:18:26	186.3	113.1	In Transition (not any one specific ND	
15:19:26	186.6	119.3		13
15:20:26	186.4	122.6		12
15:21:26	184.1	122.7		15.7
15:22:26	183.4	119.9		12.7
15:23:26	182.2	115.5		14.3
15:24:26	182.2	113.7		17.1
15:25:26	183.5	116.3		17.7

Run avgs.	185.7	87.9	0.6	12.0
				12.3

Project ID: 97-14?? Date: 05-15-1997 Start Time: 15:59:36

Client: LASCO Test Location: TTE

1 Min. Averages Condition 3 Run number 2

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
16:00:42	183.8	125.2		15.1	
16:01:42	183.5	125.5		14.4	
16:02:42	182.3	127.9		16	
16:03:42	178.6	127.1		15.6	
16:04:42	177.2	124.8		15.1	
16:05:42	177.1	120.2		15.9	
16:06:42	178.9	120.9		14.9	
16:07:42	178	123.8		15.7	
16:08:42	176.3	123.1		17.7	
16:09:42	175.5	123.6		17.1	
16:10:42	175.3	127.3	In Transition	(not any one specific ND	
16:11:42	175.8	132.1			2.2
16:12:42	175.4	129			1.8
16:13:42	175	126.9			1.8
16:14:42	175.3	122.7			1.8
16:15:42	181.8	125.5			1.8
16:16:42	187.7	125.9			1.7
16:17:42	189.2	124.3			1.7
16:18:42	191.9	119.5			1.7
16:19:42	194.6	121.5			1.7
16:20:42	193.7	119	In Transition	(not any one specific ND	
16:21:42	193.5	117.1		14.4	
16:22:42	194.4	118.6		16	
16:23:42	194.1	117.3		15.3	
16:24:42	194.4	120.9		15.3	
16:25:42	193.9	117.9		15.4	
16:26:42	194.8	113.1		15.4	
16:27:42	194.5	115.2		14.5	
16:28:42	194.2	117		15.2	
16:29:42	194.7	118.7		15	
16:30:42	194.8	120	In Transition	(not any one specific ND	
16:31:42	194.1	119.9	1.7		
16:32:42	194.6	119.3	1.6		
16:33:42	193.3	114.3	1.6		
16:34:42	193.2	113.8	1.7		
16:35:42	193.8	118.9	1.7		
16:36:42	193.7	119.2	1.7		
16:37:42	194.8	122.7	1.8		
16:38:42	193.5	124.6	1.7		
16:39:42	192.6	124.4	1.8		
16:40:42	193	122.8	1.8		
16:41:42	192.9	116.9	In Transition	(not any one specific ND	
16:42:42	191.7	117.7		14.2	

16:43:42	192.3	117		14.5
16:44:42	191.1	116.6		14.3
16:45:42	191.5	118.1		14.2
16:46:42	192.1	115.6		14
16:47:42	192.1	114.4		13.7
16:48:42	193.5	116.3		14.1
16:49:42	193.1	115.5		13.4
16:50:42	193.1	116.2	In Transition (not any one specific ND	
16:51:42	194.4	113.4	2.1	
16:52:42	194.3	113.9	2	
16:53:42	193.6	111.8	1.9	
16:54:42	192.5	108.1	1.9	
16:55:42	192.6	108.7	1.9	
16:56:42	192.8	107.1	1.9	
16:57:42	191.3	106.5	1.9	
16:58:42	190.9	104.5	2	
16:59:42	190.8	105.1	2.1	

Run avgs.	189.1	118.9	1.8	15.1
				1.8

Project ID: 97-14?? Date: 05-15-1997 Start Time: 17:35:54

Client: LASCO Test Location: TTE

1 Min. Averages Condition 3 Run number 3

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
17:37:00	190.8	119.6		12.7	
17:38:00	189.2	121.1		11.1	
17:39:00	189.1	115.8		11.1	
17:40:00	189.8	115.4		11.1	
17:41:00	189.4	121.6		12	
17:42:00	190.4	122.2		12.6	
17:43:00	189.4	120.4		12.8	
17:44:00	190.1	117.3		11.9	
17:45:00	190.2	114		11.4	
17:46:00	191	111.2		11.4	
17:47:00	190.1	109.2		11.8	
17:48:00	189.3	118.2		12	
17:49:00	187.9	119.4	In Transition (not any one specific ND)		
17:50:00	188.3	119.7	1.6		
17:51:00	189.9	112.7	1.4		
17:52:00	190.3	110.5	1.5		
17:53:00	189	115.3	1.5		
17:54:00	188.1	116.5	1.5		
17:55:00	188.3	116.5	4		
17:56:00	188.4	112.1	6.4		
17:57:00	188.2	111.9	12.6		
17:58:00	189.3	109.4	9.3		
17:59:00	188.9	111.8	10.1		
18:00:00	187.5	108.5	12.1		
18:01:00	186.6	107	In Transition (not any one specific ND)		
18:02:00	186.9	102.9		11.6	
18:03:00	186.8	83.5		11.9	
18:04:00	188.4	74.2		11.9	
18:05:00	189.6	65.3		11.9	
18:06:00	187.3	63.6		11.7	
18:07:00	185.2	61		11.9	
18:08:00	187.7	60.9		11.8	
18:09:00	188.1	64.8	In Transition (not any one specific ND)		
18:10:00	188.2	75.1	13.7		
18:11:00	189.4	92.5	11.3		
18:12:00	187.7	103.6	13		
18:13:00	186.8	107.9	11.6		
18:14:00	186.9	110.4	13.2		
18:15:00	186.9	107	11.4		
18:16:00	200.4	105.1	13.4		
18:17:00	215.2	108	In Transition (not any one specific ND)		
18:18:00	228.2	110.2		10.3	
18:19:00	234.7	112.7		10.1	

18:20:00	238	116.6	10.2	
18:21:00	239.6	112.4	10	
18:22:00	240.3	116	12.4	
18:23:00	239.7	117.5	10.5	
18:24:00	240.2	113	10	
18:25:00	239.5	107.8	9.8	
18:26:00	238.7	109.9	9.7	
18:27:00	237.4	110.7	In Transition (not any one specific ND)	
18:28:00	237.2	115	2.1	
18:29:00	237.2	118	3.6	
18:30:00	236.1	118.9	2.1	
18:31:00	235.4	114.8	2.2	
18:32:00	237.3	108.2	1.4	
18:33:00	236.6	105.4	6.6	
18:34:00	237.4	107.9	4.2	
18:35:00	237.4	107.3	1.4	
18:36:00	237.6	101.5	1.5	

Run avgs.	204.7	106.4	8.3	11.3 2.8

Project ID: 97-14?? Date: 05-15-1997 Start Time: 20:05:04

Client: LASCO Test Location: TTE

1 Min. Averages Condition 4 Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
20:06:10	233.6	114.9		12.9	
20:07:10	232.7	112.5		13.1	
20:08:10	232.4	111.4		12.8	
20:09:10	223.1	110.7		12.3	
20:10:10	230.7	110.4		11.8	
20:11:10	231.9	110.9		12.6	
20:12:10	233.4	112.6		12.1	
20:13:10	233.8	107.6		12.1	
20:14:10	233.6	107.6		12.5	
20:15:10	233.1	108.3		12.2	
20:16:10	233.3	109.3	In Transition (not any one specific ND		
20:17:10	232.6	111.3			1.7
20:18:10	233.3	112.6			1.6
20:19:10	235.2	110.1			1.7
20:20:10	232.8	109.6			1.6
20:21:10	231.1	112.1			1.8
20:22:10	229.5	108.9			1.6
20:23:10	231.8	109.4			1.5
20:24:10	232.6	106.9			1.6
20:25:10	232.2	112	In Transition (not any one specific ND		
20:26:10	230.7	109.4		10.5	
20:27:10	231.8	109.9		12.5	
20:28:10	232.5	110.3		13.4	
20:29:10	233.3	109.6		12.5	
20:30:10	233.4	110.3		12.8	
20:31:10	232.2	106.2		12.7	
20:32:10	232.6	109.6		12.7	
20:33:10	232.3	110.5		12.9	
20:34:10	231.6	113.8		13.1	
20:35:10	232.3	115.6		12.7	
20:36:10	231.8	106.7	In Transition (not any one specific ND		
20:37:10	231.2	108.9	1.8		
20:38:10	231.3	109.1	1.8		
20:39:10	231.4	108.9	1.7		
20:40:10	231.8	109.8	1.7		
20:41:10	231.2	111.6	1.7		
20:42:10	231.7	112.8	1.7		
20:43:10	229.3	112.8	1.6		
20:44:10	230.7	110.6	1.6		
20:45:10	230.1	108.4	1.6		
20:46:10	229.4	110.2	In Transition (not any one specific ND		
20:47:10	230.5	107.4		13.8	
20:48:10	232	106.4		14.7	

20:49:10	229.6	111		13.9
20:50:10	227.8	111.2		13.6
20:51:10	228.9	110.7		13.2
20:52:10	229.7	108.8		12.5
20:53:10	229.5	109.5		12.8
20:54:10	229.7	108.1		13.1
20:55:10	230.7	108.4		12.7
20:56:10	228.4	108.4	In Transition (not any one specific ND	
20:57:10	227.2	109	1.7	
20:58:10	228.2	109.9	1.7	
20:59:10	229.6	110.2	1.6	
21:00:10	229.1	110.1	1.7	
21:01:10	228.6	108.8	1.7	
21:02:10	229.4	108.9	1.7	
21:03:10	230.2	110	1.7	
21:04:10	229.6	109.9	1.7	
21:05:10	227.8	115.6	1.7	

Run avgs.	231.0	110.1	1.7	12.8
				1.6

Project ID: 97-14?? Date: 05-15-1997 Start Time: 21:30:10

Client: LASCO Test Location: TTE

1 Min. Averages Condition 4 Run number 2

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
21:31:16	227.8	112.9		15.9	
21:32:16	228.3	108.4		16.9	
21:33:16	228.8	110.2		16.6	
21:34:16	229.3	114.2		16.8	
21:35:16	229.2	110.8		15.4	
21:36:16	229	109.4		15.9	
21:37:16	230.1	109.4		15.9	
21:38:16	229.6	109.7		16.1	
21:39:16	227.8	108.7		15.5	
21:40:16	227	113.9		15.6	
21:41:16	226.7	115.3	In Transition	(not any one specific ND	
21:42:16	226.7	115.4	1.7		
21:43:16	226.3	115.3	1.7		
21:44:16	225.6	112.8	1.5		
21:45:16	226.4	109.5	1.5		
21:46:16	225.9	106.4	1.5		
21:47:16	225.3	109.1	1.7		
21:48:16	226.7	111.2	1.7		
21:49:16	227.4	110.2	1.7		
21:50:16	226.8	109	1.7		
21:51:16	227.3	109.4	In Transition	(not any one specific ND	
21:52:16	225.7	109.5		17.3	
21:53:16	224.8	111.8		17.4	
21:54:16	225.6	108.7		18.1	
21:55:16	225.5	112.1		17.8	
21:56:16	225.6	110.2		17.2	
21:57:16	225.4	114.5		18	
21:58:16	224.6	114.5		18.5	
21:59:16	223.5	115.6		19.2	
22:00:16	223.5	115		18.6	
22:01:16	223.7	113.8	In Transition	(not any one specific ND	
22:02:16	222.6	113.3	1.8		
22:03:16	222.2	113.6	1.7		
22:04:16	222.5	113.1	1.7		
22:05:16	222.6	113.7	1.7		
22:06:16	222.1	117.9	1.7		
22:07:16	223	116.1	1.6		
22:08:16	220.8	115.9	1.5		
22:09:16	220.8	117.3	1.6		
22:10:16	221.1	116.9	1.6		
22:11:16	220.9	117.8	In Transition	(not any one specific ND	
22:12:16	220.2	117.4		19.3	
22:13:16	217.5	114.9		19.4	

22:14:16	215.8	115.7	19.3
22:15:16	212.3	113	19.6
22:16:16	213	112.7	18.7
22:17:16	221.7	113.4	19.1
22:18:16	229.7	115.1	19.3
22:19:16	233	117.4	19.3
22:20:16	235	117.5	19.2
22:21:16	234.4	115.3	18.4
22:22:16	234.8	116.5	19.7
22:23:16	236.3	115.7	19.3
22:24:16	235.9	111.6	20
22:25:16	236	116.1	20.1
22:26:16	234.8	117	20.2
22:27:16	235.3	115.4	20.2
22:28:16	236.6	113.5	20
22:29:16	236.1	115.3	20
22:30:16	234.8	115.8	19.9

Run avgs.	226.6	113.4	1.6	18.3	Not Run
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Project ID: 97-3020 Date: 05-19-1997 Start Time: 09:03:36

Client: PES Test Location: OVEN/NDO Condition 5

1 Min. Averages Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
09:04:42	126.5	146.5		1.4	
09:05:42	125.3	146.1		1.1	
09:06:42	124.6	144.4		1.2	
09:07:42	124	142.3		1.9	
09:08:42	125	142.5		1.5	
09:09:42	126.5	140.3		1	
09:10:42	125.9	142.4		1	
09:11:42	126.4	144.1		0.9	
09:12:42	126.1	145.7		1.2	
09:13:42	127	147		1.8	
09:14:42	128.7	149.4		1.4	
09:15:42	128	150.9		1.3	
09:16:42	127.5	149.7		1.1	
09:17:42	127.4	147.8		1.2	
09:18:42	124.6	145.9		1.3	
09:19:42	122.6	145.6		1	
09:20:42	122.1	144		0.7	
09:21:42	122.2	147.1		1.1	
09:22:42	122.5	147.9		1	
09:23:42	124.7	147.3		0.7	
09:24:42	125.7	149.8		0.5	
09:25:42	124.8	146		0.5	
09:26:42	124.4	147		0.5	
09:27:42	125.2	148.6		0.4	
09:28:42	126.4	151.8		0.6	
09:29:42	127.2	152.4		1.2	
09:30:42	126.6	153.6		1.2	
09:31:42	126.9	153.8		1.4	
09:32:42	127.4	149.1		1.6	
09:33:42	128.7	150.7		0.8	
09:34:42	128.7	152.6		0.7	
09:35:42	127.3	148.2		1	
09:36:42	125.4	150.6		0.6	
09:37:42	126.6	150.5		1	
09:38:42	126	149.8		1	
09:39:42	127.2	154.3		1.4	
09:40:42	128.2	155.5		1.4	
09:41:42	129	152.7		2	
09:42:42	128.8	151.1		1.3	
09:43:42	127.9	153.1		0.9	
09:44:42	125.5	152.4		0.8	
09:45:42	122	151.6		1.1	

09:46:42	121	151.6	In Transition (not any one specific ND
09:47:42	119.8	151.4	-1.7
09:48:42	119.3	150.2	-1.9
09:49:42	118.7	145.9	-2
09:50:42	120	146.6	-2.1
09:51:42	122.9	149.8	-2.1
09:52:42	123.2	150.2	-2.1
09:53:42	123.5	147.6	-2
09:54:42	124.1	150.8	-2
09:55:42	123.9	156	-2.1
09:56:42	123.3	154.2	-2
09:57:42	123.4	153.1	-2
09:58:42	123.6	152.5	-2.1
09:59:42	125.2	153.7	-2.1
10:00:42	125.6	153	-2.1
10:01:42	125.7	154.6	-2.1
10:02:42	126.7	154.3	-2.1
10:03:42	128.5	155.2	-2.1
10:04:42	131.7	155.2	-2.2
10:05:42	133	154.2	-2.1
10:06:42	131.7	153.8	In Transition (not any one specific ND
10:07:42	132	152.2	-1.9
10:08:42	130.1	150.6	-2.2
10:09:42	127.8	151.3	-2.2
10:10:42	125.8	151.4	-2.3
10:11:42	123.2	150.2	-2.3
10:12:42	125.3	147.3	-2.4
10:13:42	126.3	149.6	-2.4
10:14:42	127	150.1	-0.4
10:15:42	124.7	149.2	-2.1
10:16:42	122.6	150	-2.2
10:17:42	121.5	148.2	-2
10:18:42	121	149.5	-2.2
10:19:42	121.1	152	-2.2
10:20:42	124.7	153.2	-2.2
10:21:42	125.9	152.8	-2.3
10:22:42	125.5	147.7	-2.4
10:23:42	127.3	146.1	-2.4
10:24:42	127.9	146.5	-2.3
10:25:42	125.9	149.3	-2.1
10:26:42	126.5	148.6	-2
10:27:42	128.9	150.6	-2.1

Run avgs.	125.6	149.8	-2.0	1.1	-2.1
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Project ID: 97-3020 Date: 05-19-1997 Start Time: 11:06:56

Client: PES Test Location: OVEN/NDO Condition 5

1 Min. Averages Run number 2

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
11:08:02	117	27.4		4.2	
11:09:02	116.5	141.2		4	
11:10:02	115.9	163.7		3.8	
11:11:02	115.4	157.2		3.3	
11:12:02	115	158.4		3.4	
11:13:02	116	165.3		3.6	
11:14:02	116.5	168		3.5	
11:15:02	116.3	168.4		3.5	
11:16:02	117.7	169.4		3.6	
11:17:02	119.9	168.8		3.5	
11:18:02	122.9	168.1		4.7	
11:19:02	122.5	166.4		5.2	
11:20:02	121.9	166.6		5.8	
11:21:02	120.7	167.5		5.9	
11:22:02	119.9	167.5		5.7	
11:23:02	120.2	169.7		5.6	
11:24:02	123.6	166.7		5.5	
11:25:02	124.8	169.7		5.6	
11:26:02	124.5	168		5.7	
11:27:02	123.4	162.7		5.6	
11:28:02	124.4	166.5		5.4	
11:29:02	123.1	167.1		5.2	
11:30:02	122	163.7		5.9	
11:31:02	121.6	166.6		5.8	
11:32:02	121.1	166		5	
11:33:02	122.1	165.9		5.2	
11:34:02	122.6	169.2		5.3	
11:35:02	123.5	168.4		5.1	
11:36:02	122	167.8		5.6	
11:37:02	121.6	166.8		5.7	
11:38:02	122.8	168		5.7	
11:39:02	122.8	166.9		5.9	
11:40:02	122.7	168.4		5.2	
11:41:02	122.9	169.9		4.4	
11:42:02	122	170.7		3.6	
11:43:02	121.9	168.5		3.2	
11:44:02	121.5	169.2		2.9	
11:45:02	120.4	169.2		3.1	
11:46:02	120.3	168.2		3.2	
11:47:02	120	171.1		3	
11:48:02	120	171	In Transition (not any one specific ND)		
11:49:02	120.1	168.7	4.9		
11:50:02	119.4	171.4	3.4		

11:51:02	118.2	172.4	1
11:52:02	118.7	167	0.7
11:53:02	119.6	165.8	0.8
11:54:02	120.8	167.2	0.7
11:55:02	121	168.2	0.5
11:56:02	122.7	169.7	0.4
11:57:02	122.7	167.4	0.4
11:58:02	122.6	167.2	0.6
11:59:02	121.5	169	0.7
12:00:02	121.4	165.6	0.8
12:01:02	120	158.8	0.7
12:02:02	120.7	162.8	0.6
12:03:02	121	164.3	0.6
12:04:02	120.7	162.7	0.4
12:05:02	122.5	164.4	0.4
12:06:02	125.1	165.5	0.3
12:07:02	125.7	164.7	0.4
12:08:02	126.4	164.8	0.5
12:09:02	127	163	0.6
12:10:02	126.5	161.4 In Transition (not any one specific ND)	
12:11:02	125.8	159.1	0.7
12:12:02	124.8	157.2	0.5
12:13:02	122.9	158.8	0.6
12:14:02	122.4	159.1	0.5
12:15:02	122.8	160.9	0.5
12:16:02	121.6	159.6	0.4
12:17:02	120.7	158.5	0.6
12:18:02	121	160.8	0.2
12:19:02	121.4	159.5	0.2
12:20:02	123.9	162.5	0.1
12:21:02	125.9	167.4	0.3
12:22:02	126	169	0.4
12:23:02	125.6	167.6	0.4
12:24:02	124.2	168.9	0.5
12:25:02	123.4	170.1	0.6
12:26:02	122.3	167.3	0.8
12:27:02	122.2	166.9	0.3
12:28:02	121.2	165.7	0.8
12:29:02	120.1	168.5	0.3
12:30:02	119.1	168.5	0.2
12:31:02	118.9	169.3	0.6

Run avgs.	121.6	164.1	0.9	4.7	0.5
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Project ID: 97-3020 Date: 05-19-1997 Start Time: 13:57:23

Client: pes Test Location: OVEN/NDO Condition 5

1 Min. Averages Run number 3

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
13:58:29	116.6	146		3.3	
13:59:29	119.8	147.3		3.4	
14:00:29	120.9	142.9		3.2	
14:01:29	115	144.6		3.2	
14:02:29	124.1	145.9		2.9	
14:03:29	123.8	145.2		3	
14:04:29	124.6	146.1		3.2	
14:05:29	124.2	144.7		3.4	
14:06:29	125	149.5		3.2	
14:07:29	124.9	148.7		3.8	
14:08:29	124.1	146.8		3.6	
14:09:29	124.7	147.3		2.9	
14:10:29	123	149.7		3.2	
14:11:29	121.6	149.3		3.5	
14:12:29	121.7	150		3.4	
14:13:29	120.8	149.3		3.1	
14:14:29	121.2	147.3		3.3	
14:15:29	120.7	146.1		3.7	
14:16:29	122	145.9		3.3	
14:17:29	121.8	143.8		3.6	
14:18:29	121.6	141.6		3.2	
14:19:29	120.2	138.5		3.1	
14:20:29	118.8	136.2		3	
14:21:29	118	135.6		3	
14:22:29	117.8	136.2		3	
14:23:29	118.2	134.1		2.9	
14:24:29	119.6	133.9		2.8	
14:25:29	120.1	132.8		3.3	
14:26:29	120.6	135.2		3.2	
14:27:29	118.8	132.4		2.8	
14:28:29	117.4	131		2.8	
14:29:29	116.9	130.2		3.4	
14:30:29	119.7	128.4		3.2	
14:31:29	123.2	134.4		3.2	
14:32:29	123.4	134.1		3.2	
14:33:29	121.7	136.5		3.3	
14:34:29	120.4	137.3		3.4	
14:35:29	119.7	138.8		3.2	
14:36:29	119	135.6		3.4	
14:37:29	119.7	136.7		4.2	
14:38:29	118.9	137.3		4.8	
14:39:29	118.5	137		4.5	
14:40:29	121.1	138.4	In Transition	(not any one specific ND	

14:41:29	124.2	140.9	1.1	
14:42:29	126.2	144.5	1	
14:43:29	125.7	145.8	1	
14:44:29	124.7	143	1	
14:45:29	124.5	139.2	0.8	
14:46:29	123.6	140.2	0.7	
14:47:29	123.9	140.2	0.7	
14:48:29	123.7	142.4	0.7	
14:49:29	124.2	142.9	0.6	
14:50:29	123.2	136.3	0.5	
14:51:29	123.7	136.8	0.6	
14:52:29	124	136.9	0.5	
14:53:29	124.1	136.9	0.7	
14:54:29	120.8	139.8	0.8	
14:55:29	118.3	141.2	0.9	
14:56:29	116.6	137.8	1	
14:57:29	114.9	139.8	1	
14:58:29	114.8	139.1	1.1	
14:59:29	113.7	137.8	1.1	
15:00:29	113.6	138 In Transition	(not any one specific ND	
15:01:29	113.6	136.8 In Transition	(not any one specific ND	
15:02:29	112.8	135.3 In Transition	(not any one specific ND	
15:03:29	112.2	135.7	2.5	
15:04:29	111.4	133.6	1.7	
15:05:29	111.7	135.3	1.2	
15:06:29	110.8	140.7	1	
15:07:29	110.6	141.7	0.9	
15:08:29	110.4	138.4	0.9	
15:09:29	109.7	133.7	0.9	
15:10:29	110	130.9	0.9	
15:11:29	109.1	133.2	0.8	
15:12:29	108.6	135.2	1	
15:13:29	108.5	136.6	1	
15:14:29	108.6	139.8	1	
15:15:29	108	138.9	1.2	
15:16:29	108.6	142.2	0.8	
15:17:29	107.7	141.1	0.9	
15:18:29	106.8	145.3	1.1	
15:19:29	107.4	143.6	0.8	
15:20:29	107	141.3	0.9	
15:21:29	108.1	136.4	1.1	

Run avgs.	118.1	139.8	0.8	3.3 1.1

Project ID: 97-3020 Date: 05-19-1997 Start Time: 16:05:49

Client: pes Test Location: OVEN/NDO Condition 6

1 Min. Averages Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
16:06:55	105.5	157		3.4	
16:07:55	105.7	163.7		3.3	
16:08:55	111.5	163.3		3.3	
16:09:55	112.2	162.8		3.3	
16:10:55	112.6	158.1		3.5	
16:11:55	113.4	155.5		2.9	
16:12:55	114.3	156.7		4.6	
16:13:55	115.2	161.3		3.4	
16:14:55	116.5	165.6		3.1	
16:15:55	116.1	165.7		3	
16:16:55	116.8	162.3		3	
16:17:55	117.5	161.1		3	
16:18:55	116.8	162.1		3.4	
16:19:55	115.9	166.2		3.7	
16:20:55	115.7	164.9		3.7	
16:21:55	115.7	169.1		3.6	
16:22:55	116.2	170		4.1	
16:23:55	117.1	169.1		3.9	
16:24:55	120.9	168.2		4.4	
16:25:55	120.4	170.5		4.4	
16:26:55	118.9	171.2		4.8	
16:27:55	117.8	173.5		4.4	
16:28:55	117.8	173		3.9	
16:29:55	116.7	170.7		4.3	
16:30:55	115.7	169.6		3.9	
16:31:55	114.2	166.1		3.8	
16:32:55	114.4	167		3.9	
16:33:55	117.9	163.7		4.7	
16:34:55	120.4	162.1		5.2	
16:35:55	120.7	163.2		4.5	
16:36:55	121.4	164		4.1	
16:37:55	121.4	167.8		4.3	
16:38:55	120.5	168.5		4.3	
16:39:55	122.6	168.7		4.2	
16:40:55	126	166.1		5.2	
16:41:55	128.2	161.6		5.4	
16:42:55	130.2	163.9		4.8	
16:43:55	131.6	166.5		4.1	
16:44:55	130.3	164.8		4	
16:45:55	127.3	166.8		3.4	
16:46:55	124.8	167.1		3.5	
16:47:55	122.1	166.8	In Transition	(not any one specific ND	
16:48:55	121.1	167.1	3.3		

16:49:55	119.7	167.6	2.5			
16:50:55	120.2	170.2	2.5			
16:51:55	121.8	169.4	2.5			
16:52:55	122.8	165.1	2.4			
16:53:55	124.9	164.6	2.6			
16:54:55	128.5	163.9	2.7			
16:55:55	132.6	164.2	2.7			
16:56:55	135	141.1	2.6			
16:57:57	115.9	101.1	2.8			
16:58:59	No Data	No Data	No Data	No Data	No Data	No Data
16:59:45	74.9	71.9	2.6			
17:00:45	60.9	61	2.5			
17:01:45	56.5	68.1	2.7			
17:02:45	57.3	98.7	2.8			
17:03:45	56.8	117.6	In Transition	(not any one specific ND		
17:04:45	54.9	127.4	In Transition	(not any one specific ND		
17:05:45	55.9	137.7			3.4	
17:06:45	67.9	175.6			2.5	

Run avgs.	111.7	156.3	2.7	3.9	3.0	

Project ID: 97-3020 Date: 05-19-1997 Start Time: 17:34:13

Client: pes Test Location: OVEN/NDO Condition 6

1 Min. Averages Run number 2

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
17:35:19	125.2	85.3		5.1	
17:36:19	125.1	88.3		4.7	
17:37:19	126.2	89.6		3.7	
17:38:19	126.4	93.1		3.7	
17:39:19	127.9	107.3		4	
17:40:19	131.4	125.3		4.3	
17:41:19	132.3	134.2		3.8	
17:42:19	133.9	141.6		3.8	
17:43:19	138.4	151.3		3.6	
17:44:19	138.4	160.5		4.1	
17:45:19	136.4	161.8		3.1	
17:46:19	135.1	162.5		3.7	
17:47:19	134.9	162.8		3.9	
17:48:19	134	164.2		3.4	
17:49:19	133.4	163.4		4.1	
17:50:19	133.4	167		3.4	
17:51:19	133.9	169.4		3.9	
17:52:19	137.2	171.1		3.6	
17:53:19	137.2	172.2		4	
17:54:19	136.1	170.1		4	
17:55:19	137	171.8		4	
17:56:19	137.6	173.3		4.1	
17:57:19	137.1	169.8		3.7	
17:58:19	137.6	170.9		3.7	
17:59:19	136.2	170		3.6	
18:00:19	134.9	166.7		3.7	
18:01:19	135.4	166.4		3.8	
18:02:19	137.3	169.3		3.2	
18:03:19	138.4	169.7		3.2	
18:04:19	138.4	171.1		3.8	
18:05:19	139	168.9		3.8	
18:06:19	140.1	166.1		4	
18:07:19	139.8	167.4		3.7	
18:08:19	138.7	166.1		4.5	
18:09:19	138.7	163.6		4	
18:10:19	141.3	164.2		3.6	
18:11:19	142.4	165.8		3.8	
18:12:19	140.9	168.1		4	
18:13:19	139.8	171.2		3.4	
18:14:19	141.5	170.6		3.5	
18:15:19	142.5	168.8		3.5	
18:16:19	142	171.5		3.6	
18:17:19	142.8	170.4	In Transition	(not any one specific ND	

18:18:19	142	171.3	2.8
18:19:19	144	172.1	2.8
18:20:19	145.5	171.1	2.5
18:21:19	145.4	171.8	2.9
18:22:19	144.9	168.8	2.9
18:23:19	145	169.1	2.6
18:24:19	144.8	167	8.9
18:25:19	146	162.5	6.9
18:26:19	145.8	164.2	6.8
18:27:19	145.1	166.8	5.6
18:28:19	144.1	168.4	7.3
18:29:19	142.5	168.9	6.7
18:30:19	143.8	171.7	6.4
18:31:19	146.5	169.3	6.4
18:32:19	146	164.9	8.3
18:33:19	145.3	165	7.1
18:34:19	146	167	7
18:35:19	145.7	167.1	7.2
18:36:19	146.8	162.2	6.1
18:37:19	148.3	163.5	In Transition (not any one specific ND
18:38:19	150.6	166.7	In Transition (not any one specific ND
18:39:19	150.5	167.7	6.3
18:40:19	148.5	164.4	5.8
18:41:19	146.4	165.2	7.1
18:42:19	148.2	166.7	5.1
18:43:19	148.1	167.8	7.4
18:44:19	146.7	165.9	6.4
18:45:19	145.4	168.6	10.3
18:46:19	141.6	167.8	17
18:47:19	139.6	167.5	9.2
18:48:19	136.7	169.1	20.1
18:49:19	134.3	164.1	17.9
18:50:19	136	165.5	7
18:51:19	137.9	167.5	8
18:52:19	138.7	166.4	10.7
18:53:19	139	167.1	5.8
18:54:19	141.1	163.4	5.8
18:55:19	139.4	164.3	15.5

Run avgs.	139.9	161.4	5.6	3.8	9.7
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Project ID: 97-3020 Date: 05-19-1997 Start Time: 19:36:55

Client: pes Test Location: OVEN/NDO Condition 6

1 Min. Averages Run number 3

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
19:38:01	129.6	163.1		2.6	
19:39:01	128.6	166.6		2.3	
19:40:01	121.6	167.9		2.2	
19:41:01	125.8	164.3		2.2	
19:42:01	127	168.5		2.4	
19:43:01	125.4	169.4		2.4	
19:44:01	126.4	169.6		2.4	
19:45:01	127.1	166.9		2.4	
19:46:01	128	168.5		2.5	
19:47:01	131.4	171.7		2.6	
19:48:01	132.3	171.6		2.5	
19:49:01	132.4	172.3		2.4	
19:50:01	133.7	167.7		2.3	
19:51:01	134.7	168.2		2.2	
19:52:01	137.3	171		2.5	
19:53:01	134.6	170.7		2.4	
19:54:01	134.2	170.9		2.5	
19:55:01	134.1	170		2.4	
19:56:01	132.4	169.9		2.4	
19:57:01	132.8	166.9		2.1	
19:58:01	131.7	166.7		2	
19:59:01	129.9	170.1	In Transition (not any one specific ND)		
20:00:01	128	168.9	2.1		
20:01:01	131	172	1.6		
20:02:01	134.7	172.9	2.9		
20:03:01	134.3	173.2	2.3		
20:04:01	132.9	170.8	2.5		
20:05:01	131.9	166.6	1.7		
20:06:01	131.6	167.6	1.5		
20:07:01	131	168.7	1.4		
20:08:01	131.3	165.8	1.3		
20:09:01	132.4	163.6	1.3		
20:10:01	133.9	164.5	In Transition (not any one specific ND)		
20:11:01	134.2	164.9			35.6
20:12:01	132.1	164.5			38.4
20:13:01	131.1	166.7			35.6
20:14:01	129.7	160.1			32.4
20:15:01	129.9	158.3			34.2
20:16:01	128.8	153.6			20.1
20:17:01	129.3	155.9			14.1
20:18:01	132.2	162.6			26.1
Run avgs.	131.0	167.2	1.9	2.4	29.6

Project ID: 97-14?? Date: 05-20-1997 Start Time: 14:49:53
 Client: PES/Lasco Test Location: Open 9&10/NDOs Condition 7
 1 Min. Averages Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
14:50:59	167.5	142.7			2.8
14:51:59	166.5	142.5			2.7
14:52:59	165	144			2.6
14:53:59	166.4	139.9			2.7
14:54:59	167.4	137.5			2.7
14:55:59	167.3	142.2			3.4
14:56:59	169.3	145			3.1
14:57:59	171.3	142.8			2.8
14:58:59	171.8	146.8			3
14:59:59	170.5	143.7			2.8
15:00:59	170.7	147.1			3.7
15:01:59	168.6	144.1			5.1
15:02:59	169.8	143.3			3.7
15:03:59	169.8	145.6			3.2
15:04:59	171.3	147.8			4.4
15:05:59	172.7	147.5			3.3
15:06:59	171.4	152.1			3.3
15:07:59	169.9	148.1			2.9
15:08:59	168.9	143.7			2.6
15:09:59	167.5	145.1			4
15:10:59	168.5	146.2			4.2
15:11:59	169.5	145.3			3
15:12:59	168.4	140.4			2.7
15:13:59	167.7	142.3			3.2
15:14:59	166.9	145.3			3.2
15:15:59	166.5	142.8			2.7
15:16:59	164.2	141.7			2.6
15:17:59	161.9	142.2			2.4
15:18:59	162.4	143			16.1
15:19:59	162.5	144.5			4
15:20:59	162.4	146.3			2.6
15:21:59	163	146.9			2.8
15:22:59	162.6	143.9			2.7
15:23:59	162.4	141.8			2.4
15:24:59	162.2	147.6			2.6
15:25:59	161.1	148.1			3.4
15:26:59	162.3	149.6			3.3
15:27:59	161.3	146.4			3.6
15:28:59	161.6	146.9			3
15:29:59	160.3	146			2.7
15:30:59	159.5	148.8			2.8
15:31:59	160.2	146.9	In Transition (not any one specific ND		
15:32:59	160.7	148.5	2.6		

15:33:59	160.9	146.9	2.1		
15:34:59	160.5	147.3	2.4		
15:35:59	160.5	145.5	2.3		
15:36:59	161.6	147.5	1.5		
15:37:59	162.8	146.3	2.4		
15:38:59	162.2	151.8	1.7		
15:39:59	162.7	151.7	1.6		
15:40:59	162.7	151.3	1.9		
15:41:59	162.4	150.5	2.3		
15:42:59	162.7	150.1	2.3		
15:43:59	163.2	149.2	2		
15:44:59	163.3	150.1	1.9		
15:45:59	162.5	149	1.6		
15:46:59	162.8	147.9	2.1		
15:47:59	164.5	151	2.7		
15:48:59	165.1	151.1	2.1		
15:49:59	165.7	151	1.8		
15:50:59	165	151.9	2.2		
15:51:59	165.6	150.6	4.2		
15:52:59	164.6	145.2	2.4		
15:53:59	165.9	146.1	2		
15:54:59	164.8	148.2	In Transition (not any one specific ND)		
15:55:59	164.8	144.9		3.2	
15:56:59	164.7	139.8		4.4	
15:57:59	164.7	142.8		4.8	
15:58:59	163.9	143.6		2.3	
15:59:59	164.2	147.9		2.5	
16:00:59	164.8	144.3		1.2	
16:01:59	165.1	150		5.3	
16:02:59	164.2	151		8.7	
16:03:59	164.5	149.5		2.1	
16:04:59	162.9	150.9		2.7	
16:05:59	162.2	151.9		2.3	
16:06:59	162.2	143.7		1.6	
16:07:59	161.9	145.5		2.9	
16:08:59	162.4	143.2		3	
16:09:59	163.2	155.2		2.2	
16:10:59	162.6	148		2.8	
16:11:59	173	143.7		2.9	
16:12:59	189.6	141.8		5.1	
16:13:59	198.9	140.9		6.9	

Run avgs.	165.6	146.3	2.2	3.4	3.5

Client: PES/Lasco Test Location: Open 9&10/NDOs Condition 7
 1 Min. Averages Run number 2

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
17:05:45	160.8	112.6		1.9	
17:06:45	170.7	116		2	
17:07:45	168.8	121.5		2	
17:08:45	169.4	119.4		2	
17:09:45	169.1	115.5		1.9	
17:10:45	169	120		1.9	
17:11:45	170.5	121.3		2.1	
17:12:45	170.2	118.6		2.2	
17:13:45	170.1	122.6		2.1	
17:14:45	171	124.3		2.2	
17:15:45	168.9	118.4		2	
17:16:45	168	119.5		2.3	
17:17:45	167.5	118		2.3	
17:18:45	168.6	117		2.1	
17:19:45	168.1	121.9		2.2	
17:20:45	166.3	119.7		2.2	
17:21:45	167.2	119.7		2.1	
17:22:45	167.5	116.1		2.1	
17:23:45	167.8	118.8		1.7	
17:24:45	168.9	118.6		1.7	
17:25:45	168.4	119.3		1.5	
17:26:45	167.9	117.5		1.7	
17:27:45	167.7	117.1		1.5	
17:28:45	168.1	119.9		1.6	
17:29:45	168.1	118.8		2	
17:30:45	166.7	122.1		2.3	
17:31:45	168.4	120.4		2.2	
17:32:45	169.1	120.2		2.2	
17:33:45	170	122.5		2	
17:34:45	170.7	122.4		2.2	
17:35:45	169.8	119.9		1.9	
17:36:45	168.9	121.8		2.1	
17:37:45	167.7	118.1		2.4	
17:38:45	168.8	119.2		2.6	
17:39:45	168.8	119.4		2	
17:40:45	167.3	124		1.9	
17:41:45	167.8	117.9		1.7	
17:42:45	167.4	120.5		2.2	
17:43:45	167.9	121.3		2.3	
17:44:45	167.7	117.5		2	
17:45:45	166.2	120.6		2.1	
17:46:45	167.6	123.4		2.1	
17:47:45	167.1	122.7	In Transition (not any one specific ND		
17:48:45	166.7	124	2.9		

17:49:45	167.7	120.3	1.4		
17:50:45	168.4	125	2.1		
17:51:45	168.8	126.1	2.6		
17:52:45	168.8	125	2.6		
17:53:45	167.5	123.7	2.2		
17:54:45	168.4	126.9	1.8		
17:55:45	168.4	125	2.1		
17:56:45	168.1	124.4	1.5		
17:57:45	168.3	125.6	3.4		
17:58:45	168.5	123.1	1.7		
17:59:45	168.3	122.2	1.7		
18:00:45	167.4	122.3	0.7		
18:01:45	166.9	125.2	0.6		
18:02:45	167.9	124.9	0.5		
18:03:45	168.4	124.2	0.4		
18:04:45	167.9	123.9	0.3		
18:05:45	166.8	120.5	0.3		
18:06:45	166.6	123.8	0.4		
18:07:45	168	123.7	0.4		
18:08:45	169.4	125.2	0.4		
18:09:45	170.1	124.4	0.5		
18:10:45	168.1	125.5	0.9		
18:11:45	168.9	121.7	1		
18:12:45	168.5	123.7	0.7		
18:13:45	167.6	125.4	3.9		
18:14:45	167.3	123.4	3.9		
18:15:45	167.6	122.8	In Transition (not any one specific ND)		
18:16:45	167	125.3		1.3	
18:17:45	165.5	123.6		0.9	
18:18:45	163.7	122.3		0.7	
18:19:45	165.6	122.9		0.8	
18:20:45	166.6	126.8		1.6	
18:21:45	167.7	122.4		2.3	
18:22:45	168.2	123.5		2.6	
18:23:45	168	123.2		2.8	
18:24:45	168.1	128.9		2.2	
18:25:45	167.7	128.1		4.1	
18:26:45	167.8	121.9		10	
18:27:45	167.5	124.6		10.6	
18:28:45	168.5	122.5		10.1	

Run avgs.	168.0	121.8	1.5	2.0	3.8

Project ID: 97-14?? Date: 05-20-1997 Start Time: 19:12:53
 Client: PES/Lasco Test Location: Open 9&10/NDOs Condition 7
 1 Min. Averages Run number 3 (NOTE: Data Lost = JUM Unlit)

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
19:13:59	152.5	111.5			1.7
19:14:59	160.7	120.2			1.5
19:15:59	161.5	123.3			1.5
19:16:59	161.6	120.7			1.6
19:17:59	162	119.1			2
19:18:59	161	119.9			2
19:19:59	161.9	118.6			1.9
19:20:59	161.8	119.1			2.1
19:21:59	162.1	120.7			2
19:22:59	163.1	118.5			2.1
19:23:59	162.4	122.8			2.2
19:24:59	163.6	119.7			2
19:25:59	Data Lost	117.1			2.2
19:26:59	Data Lost	121.6			1.8
19:27:59	Data Lost	121			1.5
19:28:59	Data Lost	118.1			1.6
19:29:59	Data Lost	120.3			1.6
19:30:59	Data Lost	120.4			1.8
19:31:59	Data Lost	121.5			2
19:32:59	Data Lost	120.3			1.6
19:33:59	Data Lost	121			1.6
19:34:59	Data Lost	118.5			1.7
19:35:59	Data Lost	118.7			1.3
19:36:59	Data Lost	120.5			1.6
19:37:59	Data Lost	119.9			1.9
19:38:59	Data Lost	117.4			1.9
19:39:59	Data Lost	122.1			1.8
19:40:59	Data Lost	119.5			1.9
19:41:59	Data Lost	122.8			1.8
19:42:59	Data Lost	122.6			1.8
19:43:59	Data Lost	119.1			1.9
19:44:59	Data Lost	119			1.8
19:45:59	Data Lost	120.8			1.9
19:46:59	Data Lost	123.3			1.9
19:47:59	Data Lost	118.4			1.9
19:48:59	Data Lost	118.9			2.2
19:49:59	Data Lost	119.7			2.3
19:50:59	Data Lost	121.9			2.2
19:51:59	Data Lost	118.6			2.2
19:52:59	Data Lost	121.2			2.3
19:53:59	165.4	117.6			1.8
19:54:59	151.4	114.7			2.6
19:55:59	152.2	116 In Transition (not any one specific ND			

19:56:59	153.9	121.6	0.9		
19:57:59	155.9	120.9	0.8		
19:58:59	156	117.5	0.9		
19:59:59	156.6	117.1	0.9		
20:00:59	157.2	118.5	0.7		
20:01:59	157.3	120.6	0.6		
20:02:59	158.4	119.2	0.7		
20:03:59	158.8	117.7	0.8		
20:04:59	158.4	121.3	0.9		
20:05:59	157.1	117.3	0.9		
20:06:59	155.6	114.5	1		
20:07:59	155.4	118	1.2		
20:08:59	155.9	120.6	1.1		
20:09:59	156.4	117.4	1.2		
20:10:59	157.5	92.9	0.9		
20:11:59	156.9	81.6	0.9		
20:12:59	155.7	73.5	0.8		
20:13:59	156	71.8	1		
20:14:59	157.2	67.8	2		
20:15:59	158.3	64.1	1.2		
20:16:59	159.3	62.7	1.1		
20:17:59	162.1	59.7	1.5		
20:18:59	162.8	59	1.2		
20:19:59	163.2	57.8	In Transition (not any one specific ND)		
20:20:59	163.7	62.2	1		
20:21:59	164.7	59.8		0.8	
20:22:59	164.7	60.6		0.6	
20:23:59	165.3	59.2		0.6	
20:24:59	166.7	68.8		0.6	
20:25:59	168.1	83.4		0.6	
20:26:59	168.5	97.6		0.4	
20:27:59	168.6	109.6		0.4	
20:28:59	168.4	116.7		0.4	
20:29:59	168.2	122		0.5	
20:30:59	169.1	124.4		0.7	
20:31:59	170	124.9		4.7	
20:32:59	169.4	126		4.1	
20:33:59	168.3	125.9		3.3	
20:34:59	168.4	129.4		1.6	
20:35:59	169.5	129.8		1.4	
20:36:59	168.1	130.9		1.8	

Run avgs.	161.3	109.9	1.0	1.9	1.4

Project ID: 97-14?? Date: 05-22-1997 Start Time: 07:52:35

Client: PES/EPA Test Location: Open/ndo Condition 8

1 Min. Averages Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
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07:53:41	62.8	126.2		10.1	
07:54:41	63.7	130		9.9	
07:55:41	64.4	131.9		10	
07:56:41	63.8	131.1		11	
07:57:41	63.7	127.5		11.3	
07:58:41	64	124.9		10.9	
07:59:41	62.8	127		12	
08:00:41	61.2	124.2		12	
08:01:41	62.1	128.4		12.5	
08:02:41	63.1	128.8		12.2	
08:03:41	64.2	127.4		12	
08:04:41	64.2	128.3		12	
08:05:41	64.9	107.2		11.8	
08:06:41	64.9	84.7		11.1	
08:07:41	63.6	69.7		9.6	
08:08:41	63.7	61.3		11.5	
08:09:41	64.9	58.5		11.6	
08:10:41	62.5	72.9		11.8	
08:11:41	61.7	86.4		10.1	
08:12:41	61.5	86		10.6	
08:13:41	62.1	89		10.5	
08:14:41	62.8	87.4		10.3	
08:15:41	64.8	87.2		11.8	
08:16:41	63.3	90.7		11	
08:17:41	63.2	88		12.5	
08:18:41	62.5	83		11.3	
08:19:41	61.7	85.5		9.9	
08:20:41	61.4	93.8		10.9	
08:21:41	61.9	107.6		11	
08:22:41	62.9	114.7		10.9	
08:23:41	62.1	117.1		10.9	
08:24:41	60.9	117		10.6	
08:25:41	60.6	121.9		10.6	
08:26:41	61.5	124.9		10.6	
08:27:41	61.7	125.9		10.4	
08:28:41	60.9	127.7		10.2	
08:29:41	61.2	124.7		10.4	
08:30:41	61.4	129.7		10.4	
08:31:41	62.3	125.5		10.4	
08:32:41	62.5	127.4		10.6	
08:33:41	62.8	128.6		10.8	
08:34:41	62.2	127.2		10.5	
08:35:41	59.2	124.1		10.6	

08:36:41	58.5	125.2	In Transition (not any one specific ND
08:37:41	60.8	128.4	13.6
08:38:41	60	130.8	8.8
08:39:41	60.5	132.4	5.6
08:40:41	62.5	131.5	4.4
08:41:41	63.7	128.4	2.8
08:42:41	62.9	129.1	3.4
08:43:41	60.4	125.8	4.9
08:44:41	60.4	129	5.7

Run avgs.	62.4	112.9	6.2	11.0	No Data
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Project ID: 97-14?? Date: 05-22-1997 Start Time: 09:19:33

Client: PES/EPA Test Location: Open/ndo Condition 8

1 Min. Averages Run number 2

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
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09:20:39	54.6	49.2			5.1
09:21:39	56.4	60.5			5.1
09:22:39	54.1	74.2			4.8
09:23:39	53.5	98			5.5
09:24:39	54.4	113.2			6.5
09:25:39	54.5	121.8			6.2
09:26:39	55.6	130			6.9
09:27:39	57	134.6			6.5
09:28:39	58	137.1			7.1
09:29:39	59	138.1			6.7
09:30:39	60	137.7			7.5
09:31:39	60.2	136.5			8
09:32:39	60.1	135.9			7.1
09:33:39	62.5	137.5			7.5
09:34:39	61.9	135.2			6.9
09:35:39	62.9	134.1			6.7
09:36:39	64.6	132.8			5.4
09:37:39	66.1	133.5			6.1
09:38:39	66.2	131.5			5.8
09:39:39	66.1	131.5			4.5
09:40:39	67	133.5			5.4
09:41:39	66.1	133.7			4.9
09:42:39	64.5	134.8			4.7
09:43:39	66.3	132.4			4.7
09:44:39	68.1	130.5			4.6
09:45:39	68.2	131.8			4.9
09:46:39	64.9	132.6			4.8
09:47:39	66.4	137.9			5.7
09:48:39	66.8	139			6.7
09:49:39	65.1	138.5			6.7
09:50:39	65.2	136.3			5.3
09:51:39	64.5	133.2			5
09:52:39	63.8	132.1			4.6
09:53:39	63.2	133.5			4.4
09:54:39	62.7	136.2			5
09:55:39	65.4	137.1			4.1
09:56:39	65.3	136.7			5.2
09:57:39	64.4	140			5
09:58:39	63.7	142.9			4.8
09:59:39	64.7	141.9			5.3
10:00:39	65	138.8			4.6
10:01:39	64.3	136.5			3.8
10:02:39	64.1	135			4.3

10:03:39	62.7	136.5	5
10:04:39	61.8	136.5	5.1
10:05:39	62.3	133.1	5.1
10:06:39	64.4	136.5	In Transition (not any one specific ND
10:07:39	63.7	137	3.9
10:08:39	62.1	140.9	3.1
10:09:39	62.4	140.6	3
10:10:39	63.9	139.8	2.3
10:11:39	62.7	140.8	2
10:12:39	63.3	141.3	2.6
10:13:39	63.1	140.1	3.2
10:14:39	63.1	137	3.2
10:15:39	62.1	138.5	3.7
10:16:39	60.7	137.1	3.1
10:17:39	60.2	136.1	3.6
10:18:39	61	137.9	2.3
10:19:39	60.7	136.1	2.6
10:20:39	61.2	137.4	4
10:21:39	59.8	136.4	4.5
10:22:39	59.1	125.8	2.6
10:23:39	59.9	130.1	2.2
10:24:39	56.7	127.1	1.8
10:25:39	56.6	126.2	1.8
10:26:39	57.2	125.9	3.5
10:27:39	58.7	128	In Transition (not any one specific ND
10:28:39	62	129.9	3
10:29:39	65.9	129.7	2.3
10:30:39	68	129.7	2
10:31:39	70.6	129.4	1.7
10:32:39	72.7	131.3	3
10:33:39	72.9	131.7	3.6
10:34:39	72.6	130.6	2.6
10:35:39	71.9	134	2.2
10:36:39	71.2	135.1	2.4
10:37:39	71.4	134.2	2.2
10:38:39	72.4	133.7	2.3
10:39:39	72.6	131.7	2.6
10:40:39	74.7	132.8	2.1
10:41:39	75.2	132.7	2.2
10:42:39	74.5	134.1	1.8
10:43:39	73.8	132.9	1.7
10:44:39	74.2	137.1	2.2
10:45:39	73.1	136	1.8
10:46:39	73.4	135.5	2.1
10:47:39	74.3	135.8	2.2
10:48:39	73.3	134.7	4.1
10:49:39	72.8	134.3	5.6

Run avgs.	64.4	131.5	3.0 5.6 2.5

Project ID: 97-14?? Date: 05-22-1997 Start Time: 11:39:03

Client: PES/EPA Test Location: Open/ndo Condition 8

1 Min. Averages Run number 3

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
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11:40:09	99.4	130.2	No Data From NDOs this Run, JUM Proble		
11:41:09	102.8	131.7			
11:42:09	102	131.8			
11:43:09	100.1	130			
11:44:09	99.3	129			
11:45:09	99.2	130.3			
11:46:09	99.6	128.7			
11:47:09	100.4	130.9			
11:48:09	100.9	129.3			
11:49:09	100.6	129.6			
11:50:09	100.5	130.8			
11:51:09	100.3	132.8			
11:52:09	101.2	130			
11:53:09	100.5	133			
11:54:09	99.1	130.7			
11:55:09	98.5	134.8			
11:56:09	98.7	135.8			
11:57:09	97.4	134.5			
11:58:09	96.9	135.3			
11:59:09	98.1	136			
12:00:09	98.5	132.8			
12:01:09	99	131.3			
12:02:09	98.9	129.3			
12:03:09	98.8	133.4			
12:04:09	97.2	131.7			
12:05:09	96.1	133.3			
12:06:09	97.9	136.1			
12:07:09	97.6	131.6			
12:08:09	97.4	131.9			
12:09:09	97.1	129.6			
12:10:09	96	125.7			
12:11:09	97.1	125.5			
12:12:09	96.9	126.7			
12:13:09	95.6	122			
12:14:09	96	121.3			
12:15:09	96	126.4			
12:16:09	96.4	131			
12:17:09	95.8	125.8			
12:18:09	96.1	128.1			
12:19:09	97	127.9			
12:20:09	97.1	127			
12:21:09	96.1	125.8			
12:22:09	96.8	133.1			

12:23:09	98.1	129.1
12:24:09	97.7	126.1
12:25:09	97.7	127.8
12:26:09	97.8	130.3
12:27:09	98.2	127
12:28:09	101.7	128.5
12:29:09	104.8	129.1
12:30:09	103.9	126.9
12:31:09	103.5	126.9
12:32:09	101.9	123.9
12:33:09	104.4	128.1
12:34:09	101.7	129.5
12:35:09	100	126.1
12:36:09	100.6	122.6
12:37:09	101.4	122.2
12:38:09	99.1	122.7
12:39:09	96.9	126.6
12:40:09	95.8	126.5
12:41:09	94.8	126.1
12:42:09	94.9	123.4
12:43:09	96.5	123.2
12:44:09	96.8	116.5
12:45:09	96.7	83
12:46:09	97.4	60.8
12:47:09	98.3	46.4
12:48:09	99.5	37.9
12:49:09	101.3	32.9
12:50:09	101.7	30.8
12:51:09	102.3	38.9
12:52:09	104.5	51.3
12:53:09	107.4	58.8
12:54:09	107.4	63.8
12:55:09	107.5	66.7
12:56:09	109.4	69.2
12:57:09	108.7	69.8
12:58:09	112	71.9
12:59:09	113.5	75.4
13:00:09	113.8	73.7
13:01:09	113.8	69.5
13:02:09	113.5	66.1
13:03:09	112.9	68.9
13:04:09	111.8	74.7
13:05:09	110.8	80.4
13:06:09	110.7	78.1
13:07:09	110.2	75.8
13:08:09	110.6	78.1
13:09:09	110.3	81

Run avgs.	101.1	110.8	No Data From NDOs this Run, JUM Proble
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Project ID: 97-14?? Date: 05-22-1997 Start Time: 18:02:05

Client: PES/EPA Test Location: Open/NDO Condition 9

1 Min. Averages Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
18:03:11	192.9	65.6		3.6	
18:04:11	205.9	63.9		4.2	
18:05:11	211.7	65.7		2.8	
18:06:11	210.4	64.4		3	
18:07:11	216.5	62.3		3.4	
18:08:11	220.7	65.8		4	
18:09:11	221.1	65.9		3.7	
18:10:11	219.5	65.6		3.2	
18:11:11	221.5	64.4		3.8	
18:12:11	223	64.7		2.8	
18:13:11	224.3	61.8		2.5	
18:14:11	223.8	62.2		3	
18:15:11	225.4	62.2		2.7	
18:16:11	232.1	61.2		2.8	
18:17:11	228	65		2.8	
18:18:11	224	64.3		3.1	
18:19:11	224.1	63.9		2.5	
18:20:11	226	63.5		3.8	
18:21:11	230.5	64.9		4.1	
18:22:11	227.8	63.5		3	
18:23:11	223.5	65.7		3.1	
18:24:11	221.7	68.1	In Transition (not any one specific ND		
18:25:11	220.2	68.4	2.6		
18:26:11	222.6	72	2.3		
18:27:11	220	78.3	5.6		
18:28:11	218.3	78.1	2.1		
18:29:11	223.3	76.9	1.8		
18:30:11	222.6	77.7	2.1		
18:31:11	225.5	78.2	2.7		
18:32:11	227	77.8	2.9		
18:33:11	224.3	77.7	2.2		
18:34:11	220.1	71.6	2.9		
18:35:11	218.8	66.6	In Transition (not any one specific ND		
18:36:11	221.7	64.2		1.9	
18:37:11	228.6	62.3		2	
18:38:11	227.6	64		2.1	
18:39:11	223.8	64.4		2.8	
18:40:11	224.7	66.8		2.6	
18:41:11	230.7	67.8		3.7	
18:42:11	234.5	66.3		2.7	
18:43:11	235.4	60.7		3.2	
18:44:11	231.3	60.4		3.2	

) Run avgs. 222.7 67.0 2.7 3.2 2.7

Project ID: 97-14?? Date: 05-22-1997 Start Time: 19:59:59

Client: PES/EPA Test Location: oven/ndo condition 10

1 Min. Averages Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
20:01:05	175.9	66.3		2.9	
20:02:05	184.2	69.5		3.1	
20:03:05	183.2	82.1		3	
20:04:05	180.1	91.6		2.9	
20:05:05	179.3	104		2.9	
20:06:05	181.6	105.9		3.2	
20:07:05	182.9	105.2		3.3	
20:08:05	185.1	110		3.1	
20:09:05	187.4	107.4		4.3	
20:10:05	186.3	108.3		3.5	
20:11:05	185.3	109.1		3.9	
20:12:05	185.3	109.4		4.7	
20:13:05	186.3	112		4.1	
20:14:05	188.5	112.6		4	
20:15:05	188.8	108.9		4.1	
20:16:05	184.9	113		4.2	
20:17:05	187.5	115.8		4.1	
20:18:05	190.7	111.2		4.5	
20:19:05	187.1	108.6		4.3	
20:20:05	187.7	111.3		3.6	
20:21:05	184.8	112.4		3.5	
20:22:05	185.8	109.4		4.7	
20:23:05	187.6	110.3		4.3	
20:24:05	186.5	115.4		4.3	
20:25:05	189.1	117.6	In Transition (not any one specific ND)		
20:26:05	192.5	118.6	3		
20:27:05	192	112.7	2.4		
20:28:05	191.6	110.6	2.6		
20:29:05	190.8	117	2.8		
20:30:05	193.8	117.4	2.7		
20:31:05	205.5	113.4	2.6		
20:32:05	206.7	117.1	2.6		
20:33:05	209.9	113.9	2.6		
20:34:05	204.9	112.4	2.6		
20:35:05	194.7	112	2.4		
20:36:05	191.2	114.8	2.5		
20:37:05	191.5	116.5	In Transition (not any one specific ND)		
20:38:05	193.1	116.3		2.5	
20:39:05	191.9	118.7		2.4	
20:40:05	190.3	117.2		2.6	
20:41:05	188.2	114.9		2.5	
20:42:05	188.2	117.1		2.6	
20:43:05	187.7	120.5		2.6	

20:44:05	186.2	122.5			2.5
20:45:05	184.7	122.9			2.5
20:46:05	184.7	124.3			2.6
20:47:05	188.8	119.6			2.7
20:48:05	191.9	117.2			2.8
20:49:05	195.8	115			2.7
20:50:05	207.4	114.8			2.7

Run avgs.	189.5	110.9	2.6	3.8	2.6

Project ID: 97-3020 Date: 05-23-1997 Start Time: 09:12:51

Client: pes/epa Test Location: oven/ndo condition 11

1 Min. Averages Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
09:13:57	254.7	65.8		10.3	
09:14:57	244.7	62		11.7	
09:15:57	250.8	61.7		10.8	
09:16:57	249.1	59.7		11.3	
09:17:57	250.6	58.7		9.3	
09:18:57	250.6	60.3		10.8	
09:19:57	250.6	61.8		10	
09:20:57	251.9	60.2		9.9	
09:21:57	255.8	59.9		8.3	
09:22:57	260.5	56.5		8.5	
09:23:57	262.1	57.9		7.5	
09:24:57	267.9	57.6		8.9	
09:25:57	278.3	58.8		9.1	
09:26:57	280	58.6		7.7	
09:27:57	277.1	58.7		6.4	
09:28:57	273.3	58.5		6.8	
09:29:57	272.8	57.8		7.5	
09:30:57	275.2	55.2		8.4	
09:31:57	276.4	54.3		7.1	
09:32:57	275.6	59.3		6.6	
09:33:57	274.3	57.6		7.7	
09:34:57	272.6	59.5		8.5	
09:35:57	273.5	62		7.3	
09:36:57	275	60.7		7.3	
09:37:57	275.5	59.8		7	
09:38:57	276.4	57		7.9	
09:39:57	274.6	58.7		8.2	
09:40:57	271.4	56.6		7.3	
09:41:57	269.1	58.3		7	
09:42:57	268.2	57.2		5.7	
09:43:57	268.1	59.2		5.3	
09:44:57	267.9	58.3		6.3	
09:45:57	266.5	61		6.9	
09:46:57	266.9	59		6.2	
09:47:57	269.1	58.4		6.2	
09:48:57	267.1	58.1	In Transition (not any one specific ND		
09:49:57	265.2	58	3.2		
09:50:57	264	58.6	3		
09:51:57	264.9	60	2.7		
09:52:57	263.9	57.6	2.4		
09:53:57	263.1	57.9	3.2		
09:54:57	260.3	58.3	3.9		
09:55:57	265.4	58	4.5		

09:56:57	266.6	57.9	4		
09:57:57	255.2	55.1	3.3		
09:58:57	264.9	59.2	3		
09:59:57	271.8	58.8	3.4		
10:00:57	270.5	60.6	3.1		
10:01:57	267.7	60.4	3.6		
10:02:57	269.1	59.4	3.3		
10:03:57	271.6	58.3	3.8		
10:04:57	275.2	62.2	3		
10:05:57	277.6	58.2	In Transition (not any one specific ND)		
10:06:57	279.7	60.8			1.7
10:07:57	279.7	59.7			2.1
10:08:57	280	58.1			1.4
10:09:57	281.8	58.6			0.9
10:10:57	284.8	61.4			0.7
10:11:57	285.5	60.4			1.7
10:12:57	285.3	62.4			1.2
10:13:57	281.6	60.6			1.4
10:14:57	281.9	61.8			1.8
10:15:57	287.1	63.5			1.8

Run avgs.	269.2	59.2	3.3	8.0	1.5

Project ID: 97-3020 Date: 05-23-1997 Start Time: 10:40:23

Client: pes/epa Test Location: oven/ndo condition 11

1 Min. Averages Run number 2

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
10:41:29	263	63.5		5.4	
10:42:29	284.5	63.6		4.6	
10:43:29	282.9	65		5.3	
10:44:29	276.6	64.3		4.8	
10:45:29	274	65.3		4.8	
10:46:29	275.6	64.5		4.5	
10:47:29	277.1	67.6		4.1	
10:48:29	277.4	69.1		4.2	
10:49:29	282.7	68.3		6.3	
10:50:29	282.9	65.4		5.7	
10:51:29	284.8	58.8		6.6	
10:52:29	288.1	60.1		6.1	
10:53:29	289.2	66.6		5.4	
10:54:29	287.6	69.3		4.6	
10:55:29	286.6	69.4		3.9	
10:56:29	287.4	69.4		3.5	
10:57:29	284.9	67		2.9	
10:58:29	282.4	61.2		4.5	
10:59:29	279.2	66.7		5.6	
11:00:29	278.1	67.1		5	
11:01:29	279.7	67.8		5.1	
11:02:29	285.3	69.1		5.2	
11:03:29	298	68.2		5.6	
11:04:29	289	70.1		5.7	
11:05:29	286.4	71.4	In Transition (not any one specific ND)		
11:06:29	284.6	68.6	1.5		
11:07:29	284.7	69.1	1.1		
11:08:29	284.6	67.3	0.6		
11:09:29	283.4	70.9	0.6		
11:10:29	283.2	70.2	0.6		
11:11:29	281.2	69.6	1.5		
11:12:29	282.1	72.4	1.1		
11:13:29	283.5	71.6	0.9		
11:14:29	286.7	71.2	0.7		
11:15:29	286.2	70.2	1		
11:16:29	285.8	70.1	1.5		
11:17:29	285.3	71	In Transition (not any one specific ND)		
11:18:29	286.7	69.7		1.1	
11:19:29	287.8	68.2		1	
11:20:29	289.7	69.9		0.9	
11:21:29	287.1	69.3		0.5	
Run avgs.	283.6	67.8	1.0	5.0	0.9

Project ID: 97-14?? Date: 05-23-1997 Start Time: 12:00:47

Client: pes/epa Test Location: oven/ndo condition 11

1 Min. Averages Run number 3

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
12:01:53	267.1	72.5			3.8
12:02:53	267.9	73.7			3.8
12:03:53	264.7	70.7			4.9
12:04:53	267.1	69.5			3.9
12:05:53	267.7	67.6			4.1
12:06:53	266.6	69.1			3.9
12:07:53	265	72			4.3
12:08:53	264.7	73.9			4.1
12:09:53	264.3	76.4			4.3
12:10:53	262.8	76.6			4.3
12:11:53	261.2	77.4			4.1
12:12:53	258.7	75.7			3.4
12:13:53	258.9	71.3			3.4
12:14:53	258.6	67.1			3.7
12:15:53	265.2	70.3			3.2
12:16:53	264.8	72.3			4
12:17:53	262.8	73.5			3.8
12:18:53	265.1	71.9			4.1
12:19:53	271.1	69.2			3.9
12:20:53	273	69.9			3.7
12:21:53	272	69.6			3.5
12:22:53	268.1	71.3			3.7
12:23:53	264.4	71.7			3.6
12:24:53	265.7	72.7			3.8
12:25:53	265.6	74.1	In Transition (not any one specific ND		
12:26:53	269.6	71.2	1		
12:27:53	274.6	68.8	1.2		
12:28:53	279.6	68.6	0.7		
12:29:53	286	70.6	0.5		
12:30:53	286.2	71.7	0.6		
12:31:53	288.8	73	0.7		
12:32:53	288.2	69.2	0.2		
12:33:53	288.1	69.1	0.2		
12:34:53	288.6	71	0.5		
12:35:53	287.3	70.6	1.4		
12:36:53	286.4	73.7	1.2		
12:37:53	284.5	73.6	1.3		
12:38:53	286.1	74.2	In Transition (not any one specific ND		
12:39:53	284.2	72.5			1.8
12:40:53	286.3	69.8			2
12:41:53	288.6	66			3.5
12:42:53	291.9	69.3			5.2

Run avgs.	273.3	71.5	0.8	3.9	3.1
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Project ID: 97-3020 Date: 05-29-1997 Start Time: 08:35:41

Client: PES/EPA Test Location: Oven/NDO Condition 12

1 Min. Averages Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
08:36:47	163.4	73.7		11.5	
08:37:47	166.8	76.2		11.7	
08:38:47	165.6	79		11.4	
08:39:47	171.5	97.2		11.8	
08:40:47	175.3	113.3		11.5	
08:41:47	178.9	115.8		10.8	
08:42:47	177.6	94.6		11.1	
08:43:47	211.2	95.5		11	
08:44:47	245.2	93.9		11.6	
08:45:47	250.5	94.8		10.6	
08:46:47	242.9	96.9		11.6	
08:47:47	237	95.1		9.8	
08:48:47	227.6	96.3		11.1	
08:49:47	223	96		11.2	
08:50:47	222	97.3		11.5	
08:51:47	223.4	99.7		10	
08:52:47	221.4	101.7		10.9	
08:53:47	216.9	100		10.5	
08:54:47	215.3	101.8		10.9	
08:55:47	219.3	99.5		12.5	
08:56:47	224	98		11.8	
08:57:47	227.2	98.6		10.6	
08:58:47	229.5	95.9		10.3	
08:59:47	231.8	87		10.9	
09:00:47	233.3	79.2		10.4	
09:01:47	234	85		10.5	
09:02:47	233.5	96.1		9.3	
09:03:47	235.2	104.1		9.7	
09:04:47	237.9	109.5		9.2	
09:05:47	241.3	110.7		8.5	
09:06:47	242.8	109.2	In Transition (not any one specific ND)		
09:07:47	243.4	109.4	1.8		
09:08:47	244.6	112.6	1.6		
09:09:47	244.1	105.4	1.6		
09:10:47	247.5	87	1.4		
09:11:47	268.5	85.3	1.3		
09:12:47	268.8	79.8	1.3		
09:13:47	258.9	78.3	1.5		
09:14:47	256	76.2	1.5		
09:15:47	258.9	81.7	1.4		
09:16:47	263.4	92.6	1.5		
09:17:47	265.9	101.9	1.5		
09:18:47	267.7	107.4	1.7		

09:19:47	269.5	115.2	1.6		
09:20:47	271.7	120.1	1.6		
09:21:47	272.7	120.4	In Transition (not any one specific ND)		
09:22:47	272.7	122.8			1.5
09:23:47	273.2	123.9			1.4
09:24:47	273.2	124.6			1.3
09:25:47	273	126.7			1.2
09:26:47	272.3	125.3			1.1
09:27:47	272.3	121.6			1.2
09:28:47	272.4	122			1.2
09:29:47	272.5	126.6			1.3
09:30:47	274.4	122.6			1.4
09:31:47	273.8	124.7			1.5
09:32:47	274.9	126			1.5
09:33:47	276.2	126.1			1.5
09:34:47	275.1	125.9			1.6
09:35:47	272.5	127.2			1.6

Run avgs.	240.9	103.5	1.5	10.8	1.4

There was no run 2 for Condition 12.
It was started, but aborted/voided 16 minutes into the run.

Project ID: 97-3020 Date: 05-29-1997 Start Time: 11:04:43

Client: PES/EPA Test Location: Oven/NDO Condition 12

1 Min. Averages Run number 3

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
11:05:49	283.7	132.4			13
11:06:49	278.3	127.8			12.6
11:07:49	287.6	130.7			9.5
11:08:49	286.6	134			12.5
11:09:49	284.4	131.6			12.2
11:10:49	284.1	130.6			14
11:11:49	283.3	129.4			12
11:12:49	282.1	130.7			10.6
11:13:49	279.9	132.4			12.9
11:14:49	279.9	132.2			13.3
11:15:49	278.7	127.6			11.4
11:16:49	279.9	129.2			15.1
11:17:49	279.9	128.4			11.1
11:18:49	279.4	130.9			10.4
11:19:49	280.2	128.6			12
11:20:49	280.4	127.4			12.7
11:21:49	285.3	127.6			13.8
11:22:49	285	130.2			12.3
11:23:49	286.3	132.7			13.3
11:24:49	285.5	131.4			12
11:25:49	283.9	133.5			11.8
11:26:49	283.3	131.4			12.9
11:27:49	284.1	130.9			10.1
11:28:49	283.2	131.4			11.3
11:29:49	282.8	132.1			12
11:30:49	281.3	132.8			10.7
11:31:49	280.8	132.6			11
11:32:49	280	131.6			12.6
11:33:49	284.3	131.7			11
11:34:49	294.8	132.2			10.5
11:35:49	293.6	132.7	In Transition (not any one specific ND)		
11:36:49	288	134.4	0.5		
11:37:49	283.7	135	0.5		
11:38:49	281.1	134.6	0.4		
11:39:49	278.6	132.6	0.5		
11:40:49	276.6	131.9	0.4		
11:41:49	277.2	129.8	0.3		
11:42:49	277.8	131.2	0.3		
11:43:49	277.8	129.9	0.3		
11:44:49	276.2	128.5	0.2		
11:45:49	275.5	128	0.3		
11:46:49	275.5	129.8	0.2		
11:47:49	276.4	127.3	0.3		

11:48:49	277.5	127.9	0.2		
11:49:49	277.2	127.1	0.2		
11:50:49	277	128.4	0.3		
11:51:49	276.6	128.3	In Transition	(not any one specific ND	
11:52:49	276.2	129.6	In Transition	(not any one specific ND	
11:53:49	275.7	126.7		0.3	
11:54:49	277	127.8		0.2	
11:55:49	275.4	129.7		0.2	
11:56:49	276.1	130.9		0.1	
11:57:49	276	130.4		0.1	
11:58:49	275.1	130		0.1	
11:59:49	274.9	128.3		0.2	
12:00:49	276.1	125.5		0.3	
12:01:49	276	126.2		0.2	
12:02:49	275.4	127.5		0.2	

Run avgs.	280.5	130.3	0.3	12.0	0.2

Project ID: 97-3020 Date: 05-29-1997 Start Time: 12:30:07

Client: PES/EPA Test Location: Oven/NDO Condition 12

1 Min. Averages Run number 4

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
12:31:13	252.5	106.9		9.1	
12:32:13	263.1	111.2		11.1	
12:33:13	261	109.9		11	
12:34:13	260.2	111.8		12.8	
12:35:13	258.9	113.5		12.5	
12:36:13	258.5	113.4		12.2	
12:37:13	265.8	112.3		9.8	
12:38:13	267.6	112.4		12.6	
12:39:13	260.5	113.7		10.5	
12:40:13	258	114.9		10	
12:41:13	260.3	114.2		8.7	
12:42:13	263	110.3		12.2	
12:43:13	255.7	110.3		11.5	
12:44:13	246.6	110.2		10.2	
12:45:13	250.5	108.5		10.9	
12:46:13	253.7	108.5		11.5	
12:47:13	253.4	113.8		11.6	
12:48:13	252.4	111.4		11.3	
12:49:13	251.7	116.6		9.6	
12:50:13	250.2	128.2		12.2	
12:51:13	255.2	126.3		11.1	
12:52:13	260.3	123.6		9.9	
12:53:13	256.4	125.6		10.8	
12:54:13	251.5	92.8		14.1	
12:55:13	247.4	68		12.7	
12:56:13	244.3	58.7		11.1	
12:57:13	245.6	50.6		12.2	
12:58:13	247.7	44.6		11.3	
12:59:13	257.9	40.2		11.1	
13:00:13	271.3	47.4		11	
13:01:13	283.4	61.8	In Transition (not any one specific ND		
13:02:13	290	70.4	0.5		
13:03:13	295.2	83.1	0.5		
13:04:13	297.9	104.4	0.5		
13:05:13	302.7	120.4	0.3		
13:06:13	305.9	129.3	0.3		
13:07:13	307.5	131.4	0.3		
13:08:13	311	132.7	0.2		
13:09:13	312.3	132.1	0.1		
13:10:13	313.4	132.3	0.4		
13:11:13	313.9	136.1	0.2		
13:12:13	315.4	134.7	0.3		
13:13:13	315.5	133.9	0.5		

13:14:13	315.4	133.2	0.5		
13:15:13	315.7	132.8	0.4		
13:16:13	317	132.3	In Transition	(not any one specific ND	
13:17:13	317.3	133.9	In Transition	(not any one specific ND	
13:18:13	317.9	132.2			0.4
13:19:13	318.9	129.7			0.3
13:20:13	318.3	129.7			0.2
13:21:13	319.1	132.3			0.1
13:22:13	319.8	133.5			0.2
13:23:13	319.4	128.1			0.2
13:24:13	318.2	130.6			0.1
13:25:13	318.6	134.9			0.1
13:26:13	319.8	134.9			0.1
13:27:13	319.5	128.6			0
13:28:13	318.6	130.1			0.1
13:29:13	320.4	132.3			0.3
13:30:13	316.1	133.5			0.2

Run avgs.	284.3	112.9	0.4	11.2	0.2

Project ID: 97-3020 Date: 05-29-1997 Start Time: 15:18:45

Client: PES/EPA Test Location: Oven/NDO Condition 13

1 Min. Averages Run number 1

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
15:19:51	307.9	121.2		10.5	
15:20:53	312.6	127.7		10.1	
15:21:53	311.9	125.5		12	
15:22:53	312	123.8		14.2	
15:23:53	310.9	124.3		13.3	
15:24:53	310.5	125		10.5	
15:25:53	310	125.7		13.6	
15:26:53	308.7	126.2		10.7	
15:27:53	306.8	125.7		13.4	
15:28:53	306.7	125.3		10	
15:29:53	304.3	127.4		9.9	
15:30:53	304.1	130		11.9	
15:31:53	305.5	129.9		10.1	
15:32:53	310.8	128.7		12.7	
15:33:53	322.2	127.5		13.5	
15:34:53	328.7	118.1		12	
15:35:53	332.3	122.4		10.6	
15:36:53	333.3	126.2		12.2	
15:37:53	342.3	125.2		10	
15:38:53	342.2	122.6		13.9	
15:39:53	338.9	120		12.4	
15:40:53	334.6	120.5		12.2	
15:41:53	336.8	124.4		13.4	
15:42:53	339.1	125.1		11.8	
15:43:53	339	126.4		12.5	
15:44:53	342.4	122.3		10.4	
15:45:53	346.1	121.7		9.3	
15:46:53	343.4	124.3		10.6	
15:47:53	341.5	125.3		10.9	
15:48:53	343.8	123.7		11.4	
15:49:53	344.8	122.7	In Transition	(not any one specific ND	
15:50:53	340.5	126.2	136.9 <---	Data Ignored, Plant Pers	
15:51:53	339.2	126.6	137.2	moved the sampling probe	
15:52:53	340.3	123.9	137.2		
15:53:53	342.2	121	137.2 <---	Data Ignored, Plant Pers	
15:54:53	342.6	123.2	137.2	moved the sampling probe	
15:55:53	341	123.8	137.2		
15:56:53	340.1	122.6	137.2 <---	Data Ignored, Plant Pers	
15:57:53	340.2	124	137.2	moved the sampling probe	
15:58:53	340.3	124.2	137.2		
15:59:53	340.2	122.6	137.2 <---	Data Ignored, Plant Pers	
16:00:53	342	125.1	137.2	moved the sampling probe	
16:01:53	341.9	125.1	In Transition	(not any one specific ND	

16:02:53	340.2	125.3	In Transition	(not any one specific ND
16:03:53	340.2	125.9		7
16:04:53	339.1	127.8		5.3
16:05:53	339	125.8		4.3
16:06:53	340.2	123.9		4
16:07:53	339.7	123.5		3.4
16:08:53	338.5	125.5		2.9
16:09:53	339.8	126.6		2.6
16:10:53	339.5	126.8	In Transition	(not any one specific ND
16:11:53	337.7	123.1	In Transition	(not any one specific ND
16:12:53	339.2	124	2 <--	Moved back to NDO C to
16:13:53	340.8	124.5	1.8	make up for previou
16:14:53	340.5	124.2	1.7	lost time

Run avgs.	331.8	124.6	1.8	11.7 4.2

Project ID: 97-3020 Date: 05-29-1997 Start Time: 16:37:01

Client: PES/EPA Test Location: Oven/NDO Condition 13

1 Min. Averages Run number 2

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
16:38:07	324.3	130.9		10.3	
16:39:07	326.9	131.5		10.3	
16:40:07	329	132		9.7	
16:41:07	329.5	132.1		9.5	
16:42:07	304.9	128.4		11.6	
16:43:07	334.3	132.8		8.9	
16:44:07	334.3	132.8		9.5	
16:45:07	334.5	132		10	
16:46:07	334.7	134		11.4	
16:47:07	335.9	132.7		9.3	
16:48:07	336.3	130.7		10.6	
16:49:07	337.5	132.4		8.7	
16:50:07	342.3	133.6		9.9	
16:51:07	344.2	129.9		10.3	
16:52:07	343.4	129.3		11.4	
16:53:07	340.1	128.2		10.8	
16:54:07	335.4	125		9.8	
16:55:07	334.9	128.4		9.8	
16:56:07	334.5	131.3		10.1	
16:57:07	333.5	128.9		10.9	
16:58:07	334.7	126.8		10.3	
16:59:07	354.8	126.8		9.2	
17:00:07	382.8	129.7		10.3	
17:01:07	388.2	133.3		12.4	
17:02:07	379.1	133.1		9.8	
17:03:07	356.8	133.7		9.9	
17:04:07	342.4	134.1		10.1	
17:05:07	337.8	134.4		9	
17:06:07	339.7	137.6		10.2	
17:07:07	340.9	137.6		9.2	
17:08:07	340.9	133.2	In Transition (not any one specific ND)		
17:09:07	337.1	132.1	2.6		
17:10:07	339.2	131.6	2.2		
17:11:07	339.8	132.5	2		
17:12:07	339.2	132.2	2		
17:13:07	340.6	133.3	1.8		
17:14:07	340.3	129.4	1.6		
17:15:07	340.1	126.7	1.6		
17:16:07	341.5	130	1.7		
17:17:07	342.4	131.3	1.7		
17:18:07	343.1	131	1.8		
17:19:07	343.3	127.4	1.7		
17:20:07	343.1	123.6	1.8		

17:21:07	344.6	121.8	1.7		
17:22:07	343	127.4	1.9		
17:23:07	342.3	130.4	In Transition	(not any one specific ND	
17:24:07	340.2	129.5	In Transition	(not any one specific ND	
17:25:07	340.4	129.9			1.7
17:26:07	341.1	132.9			1.7
17:27:07	338.5	131.7			1.7
17:28:07	336.6	127.8			1.7
17:29:07	336.9	128.5			1.4
17:30:07	336.8	128.6			1.3
17:31:07	336.9	129.3			1.4
17:32:07	335.4	130.1			1.4
17:33:07	338.2	129.9			1.3
17:34:07	337.3	131.7			1.4
17:35:07	337	131.9			1.5
17:36:07	337.1	133.8			1.6
17:37:07	337.9	132.1			1.4

Run avgs.	340.3	130.8	1.9	10.1	1.5
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Project ID: 97-3020 Date: 05-29-1997 Start Time: 18:01:07

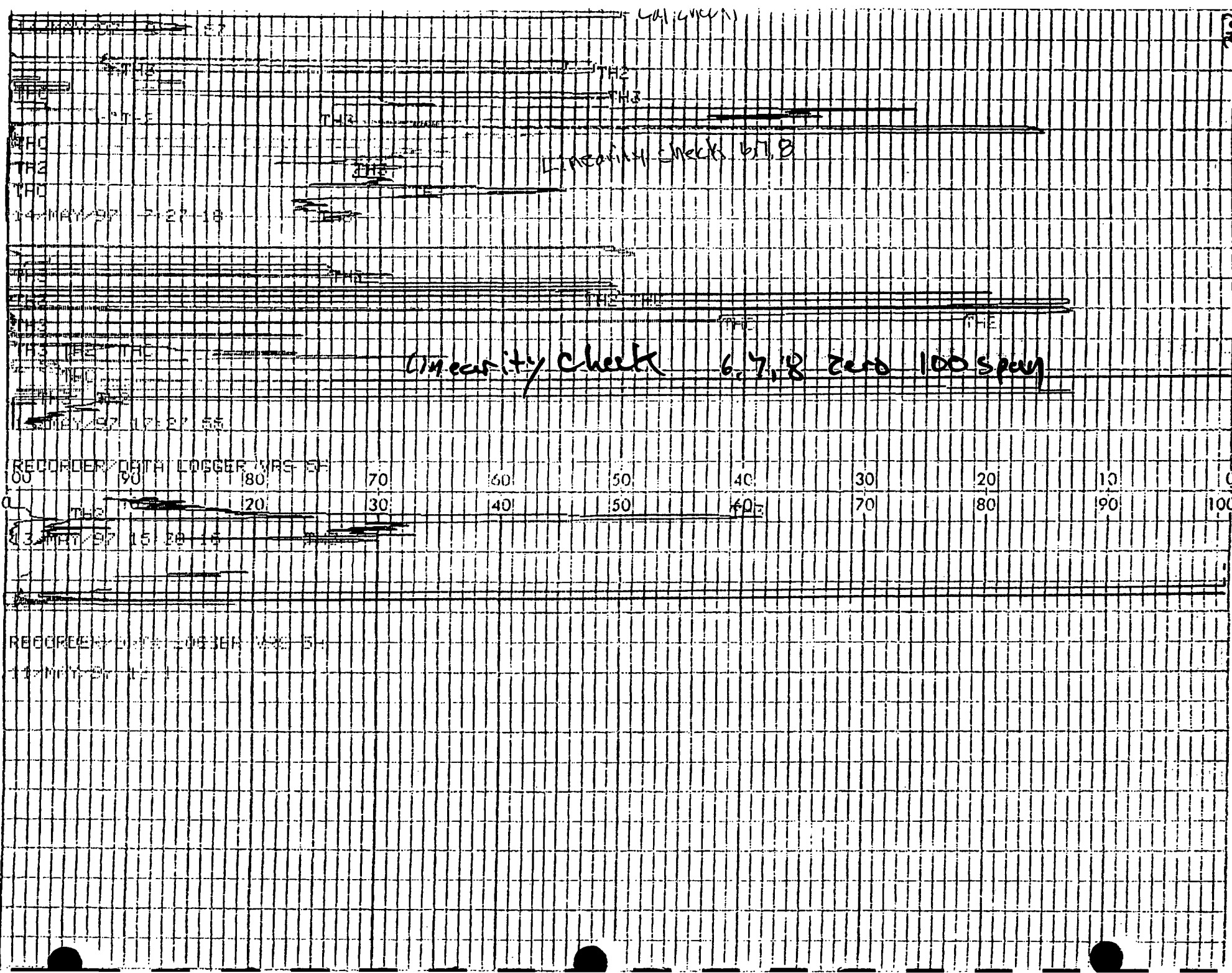
Client: PES/EPA Test Location: Oven/NDO Condition 13

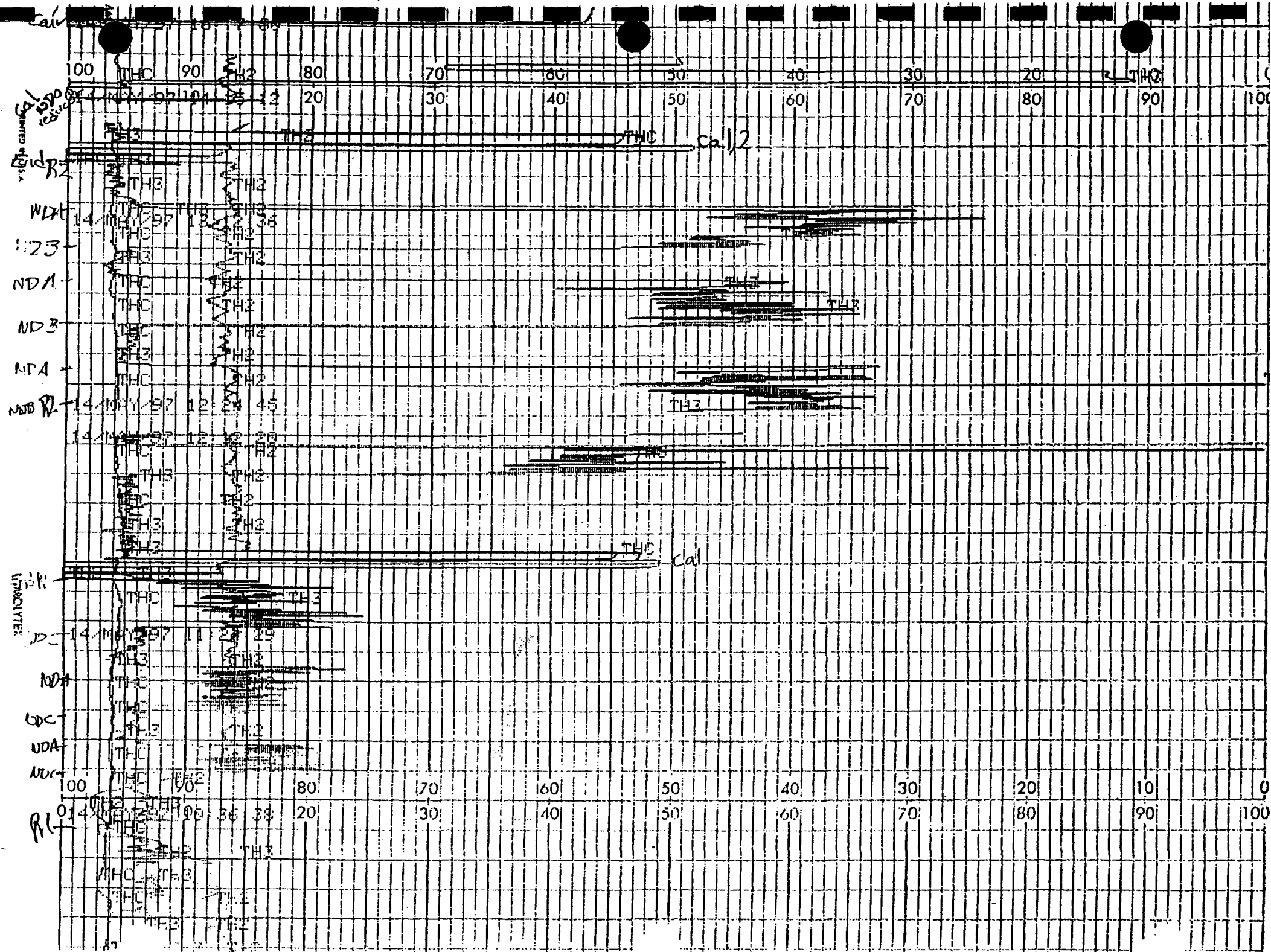
1 Min. Averages Run number 3

Time	Open 10 ppm	Open 9 %/ppm	NDO C %/ppm	NDO A %/ppm	NDO B %/ppm
18:02:13	323.6	112		8.2	
18:03:13	322.2	126.1		10.4	
18:04:13	321.8	127.4		8.3	
18:05:13	323.1	127.3		9.7	
18:06:13	323.2	126		8.8	
18:07:13	321.9	126.8		11.3	
18:08:13	321.7	127		8.9	
18:09:13	322	125.5		9.2	
18:10:13	322	128.7		11.1	
18:11:13	320.8	123.5		8.4	
18:12:13	318.9	116.7		6.5	
18:13:13	316.5	123.1		7.6	
18:14:13	314.4	119.8		6.9	
18:15:13	313.1	118.8		6.4	
18:16:13	311.1	116.8		8.6	
18:17:13	310.1	118.9		8.4	
18:18:13	308.1	118.5		7	
18:19:13	303.9	118.3		6.8	
18:20:13	300.9	117.3		8.5	
18:21:13	297.8	117.1		8.1	
18:22:13	308.2	118.7		7.7	
18:23:13	320.6	121.3		6	
18:24:13	329.2	122.6		7.1	
18:25:13	337.8	123.7		7.4	
18:26:13	354.2	124.2		7.4	
18:27:13	366.2	124.3		11	
18:28:13	360.1	123.6		13.5	
18:29:13	354.3	122.5		8.2	
18:30:13	348.9	121.1		6.1	
18:31:13	349.4	117.4	In Transition	(not any one specific ND	
18:32:13	348.2	113.3	In Transition	(not any one specific ND	
18:33:13	348.2	115.2	2.2		
18:34:13	348.2	119	1.9		
18:35:13	347.1	119.5	1.8		
18:36:13	346.8	121.8	1.9		
18:37:13	346.5	121.5	1.9		
18:38:13	345.5	120.8	1.8		
18:39:13	345.2	120.4	1.5		
18:40:13	345.1	122.6	1.5		
18:41:13	344.5	122	1.7		
18:42:13	345.5	122.4	1.6		
18:43:13	344.8	122.1	1.7		
18:44:13	343.2	122.5	1.7		

18:45:13	342.3	119.7	1.7		
18:46:13	342.5	123.4	In Transition	(not any one specific ND	
18:47:13	340.7	124.2			3.8
18:48:13	341	118.7			3.3
18:49:13	342.5	119.7			3.3
18:50:13	342.1	120.1			3.2
18:51:13	343.2	121.4			4.1
18:52:13	343.5	121.3			4
18:53:13	341.8	121.4			4.2
18:54:13	339.1	123.2			4.1
18:55:13	339.8	123.9			4
18:56:13	340.9	124.8			4
18:57:13	339.8	125.6			1.9
18:58:13	339.7	124.9			1.9
18:59:13	338.4	125.9			1.7
19:00:13	338.3	126.7			1.6
19:01:13	338.3	124.5			1.8

Run avgs.	334.0	121.8	1.8	8.4	3.1





R6

Cal 45

RA-3
NDC

WDA
condition
R5

CHART NO. 41440

NDH
condition
R4

Cal check
cyl
rest

ENR3

N24

NDC

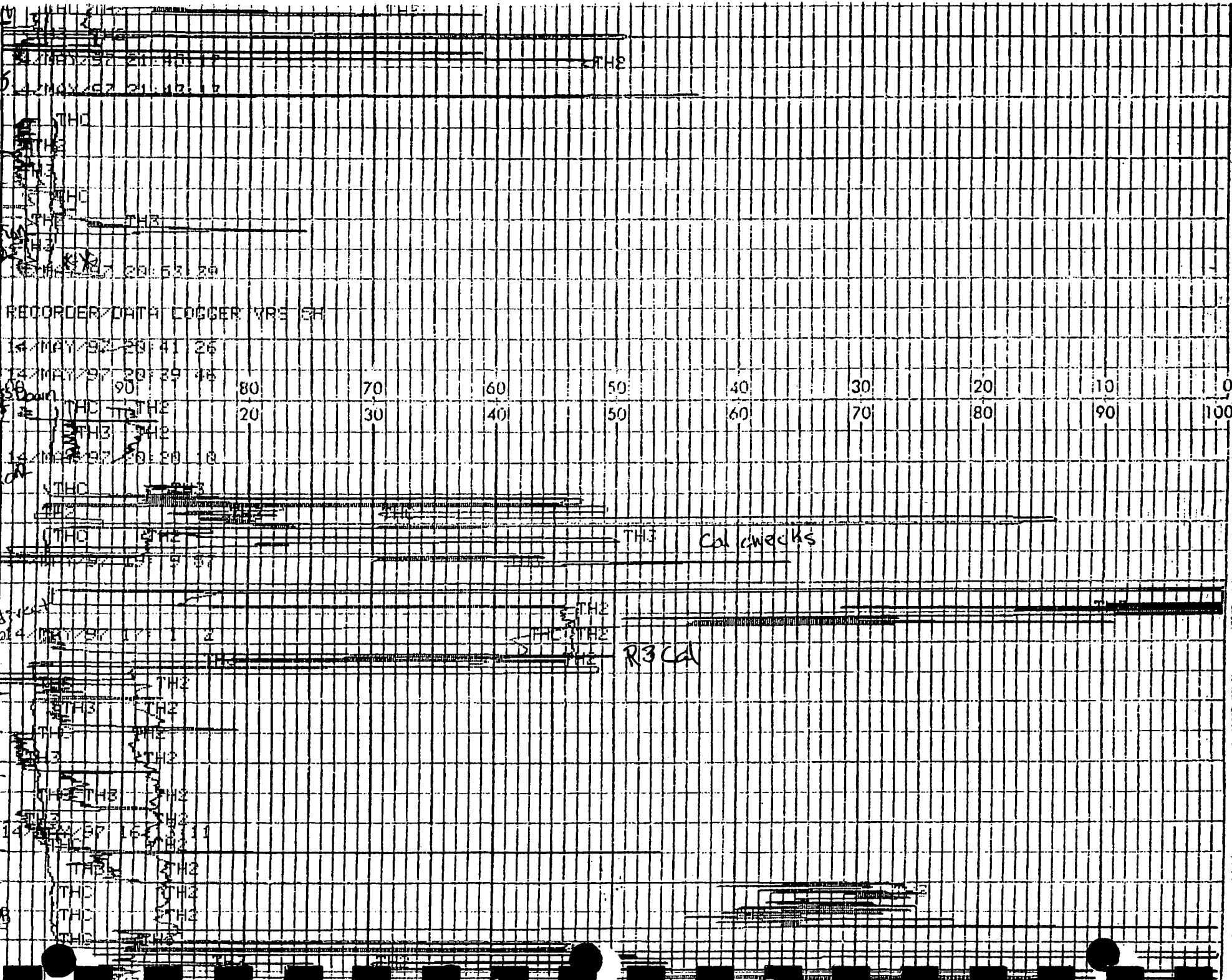
NDA

NDC

NDA

NDB

R3



[illegible]

End Run

Post Card Run

Pre Card Run

Switch to WDD B @ 1007

Switch to WDD C @ 0944

Start Run C 9:04

Start @ WDD A

Calk Finished @ 8:30 Set to Standby Mode

Perform Calk 5/19/77

PRE Run

Calk

MACYTEX

Change
In 607
Col
Ch 607
@ 1007

End Run
Cond 4

NDA

WDC

NDA

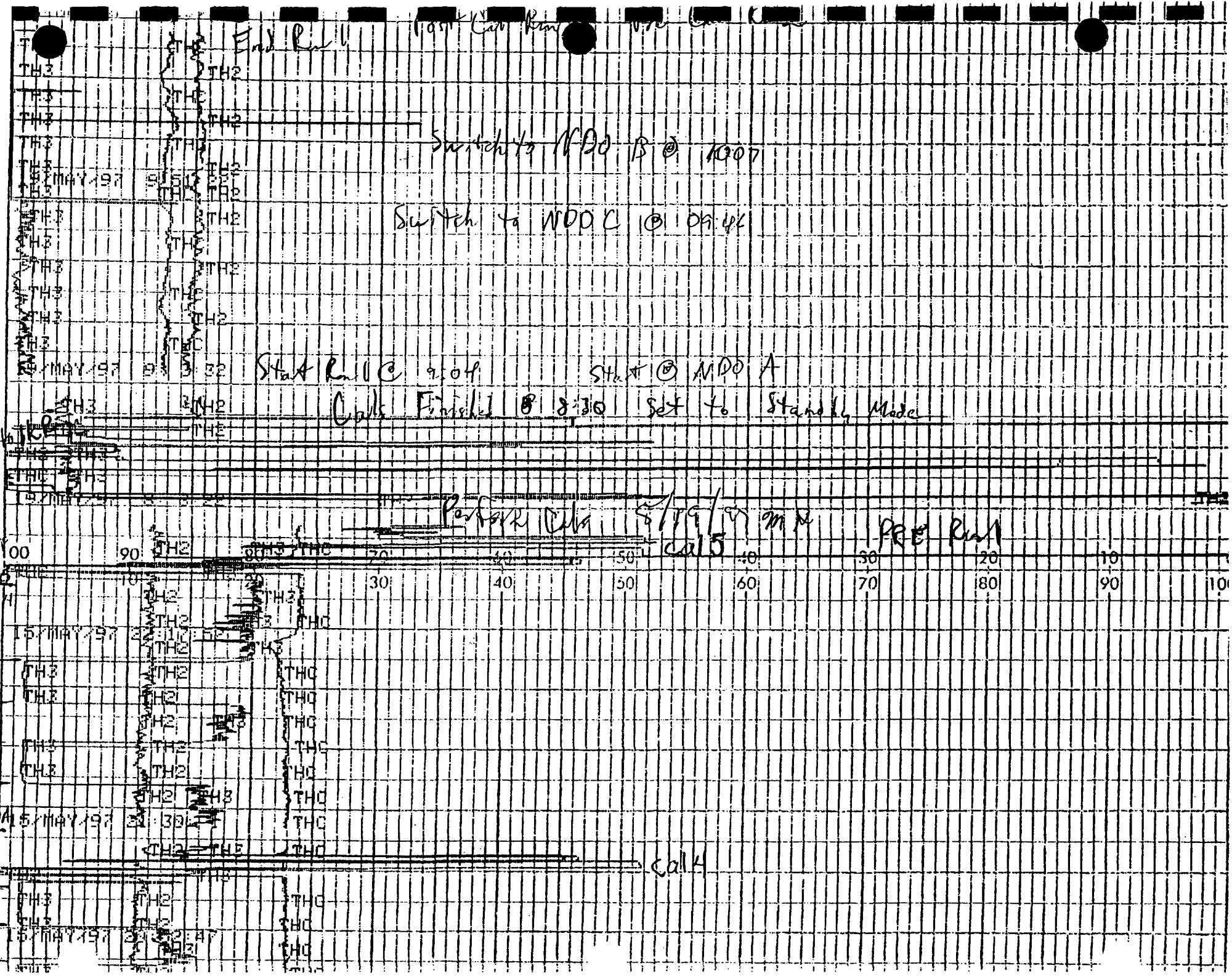
WDC

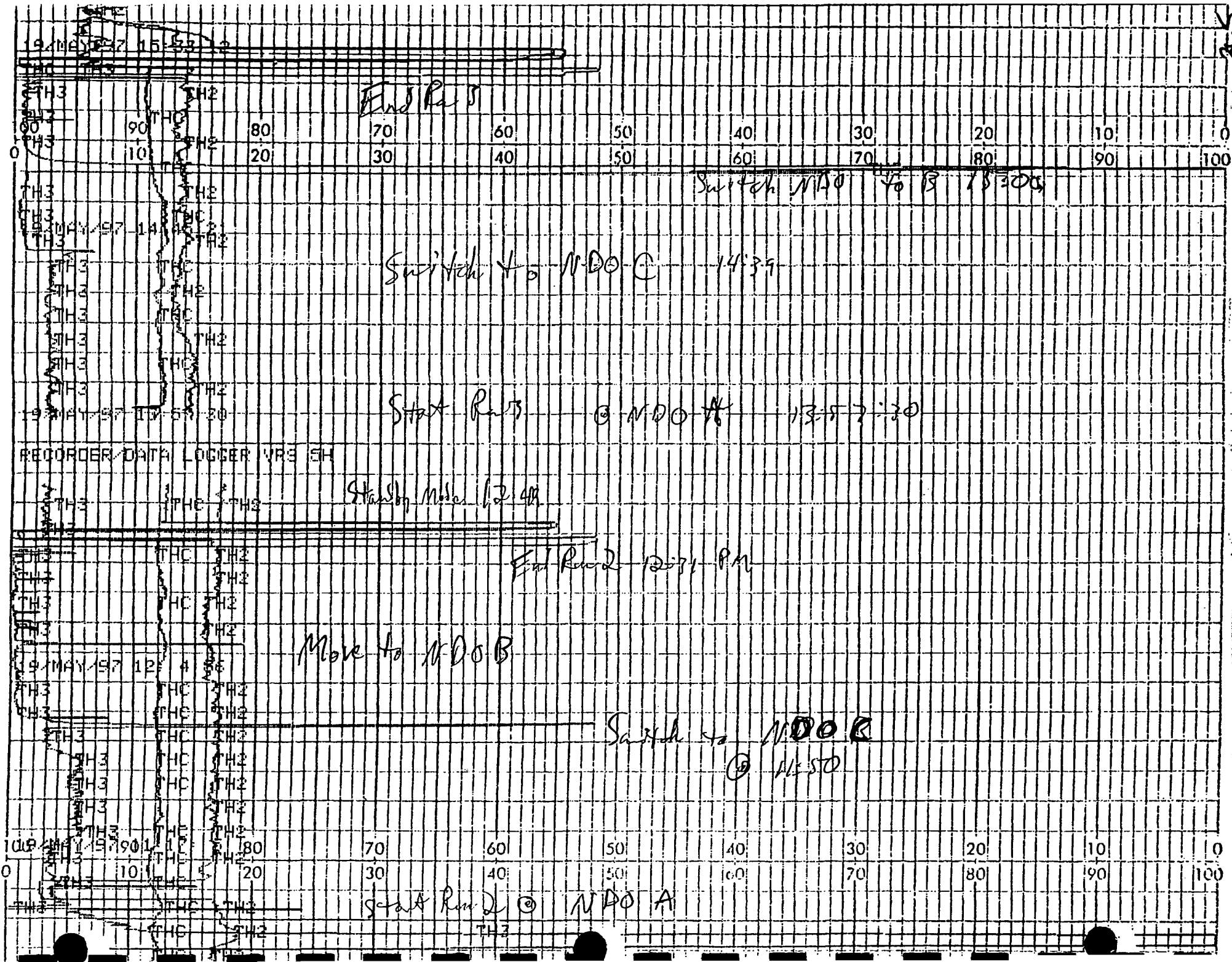
R5 WDA

End 4

WDC

NDA





Start Run 6 AKA Run 7 19:57

19 MAY 67 19:58

End Run 18:56

Move to NDO B @ 18:58

Move to NDO C @ 18:17

100	90	80	70	60	50	40	30	20	10
0	10	20	30	40	50	60	70	80	90

19 MAY 67 17:54 10

Start Run 5 AKA Run 4 @ NDO A

19 MAY 67 17:25 45

End Run @ 17:07

Run 4 as Run 1 Repeat

Move to NDO B @ 17:02

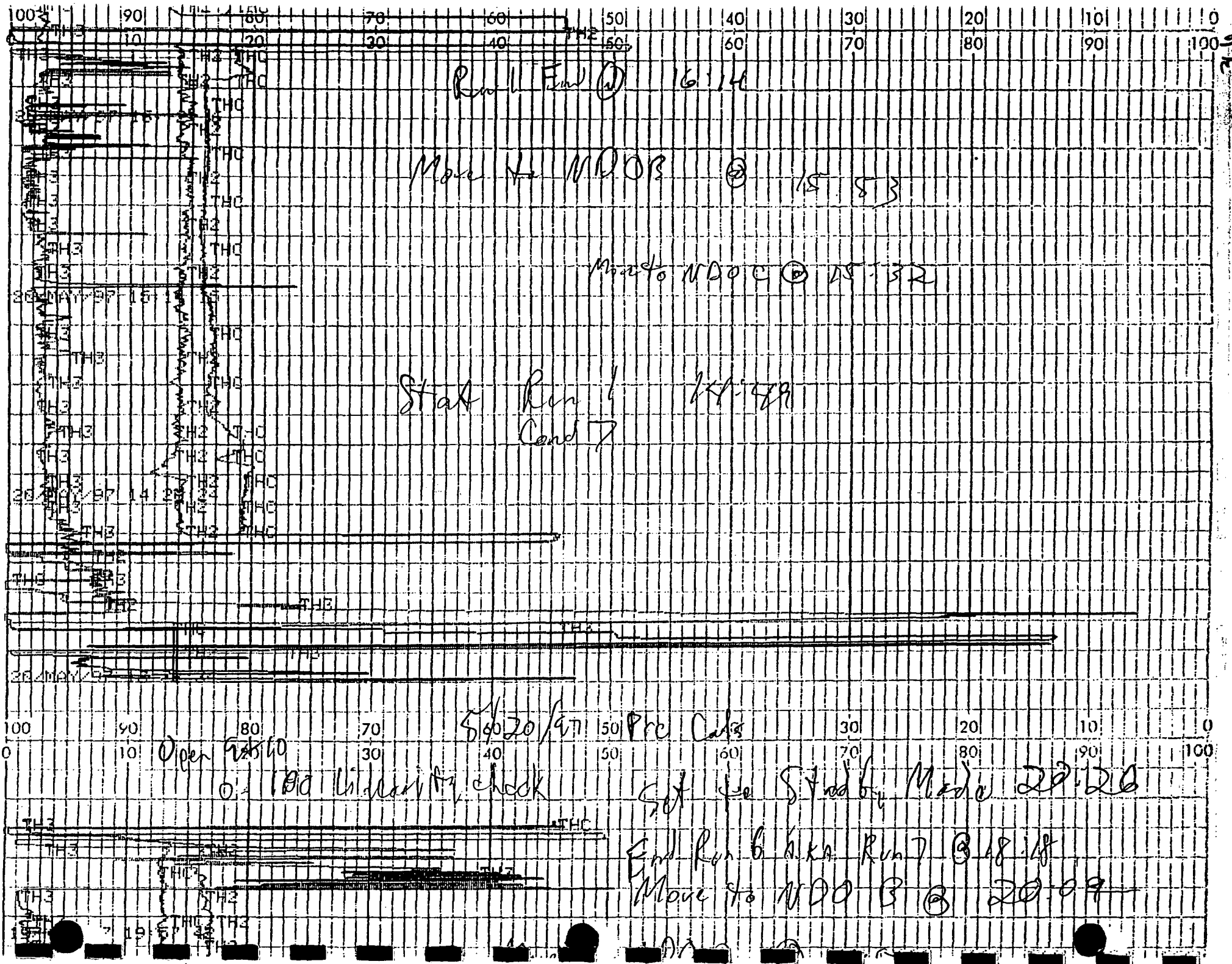
Line Stopped @ 16:56

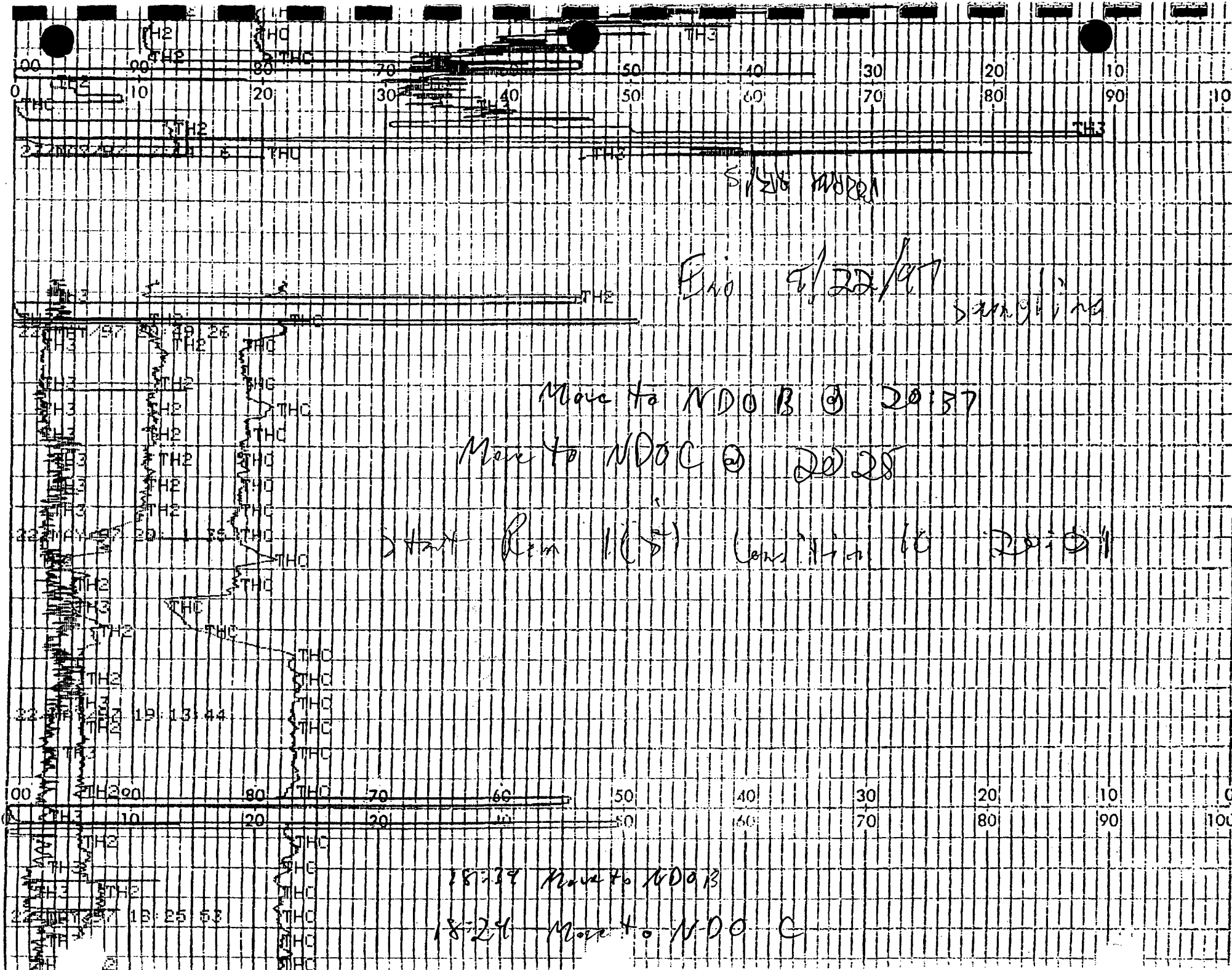
Run Suspended

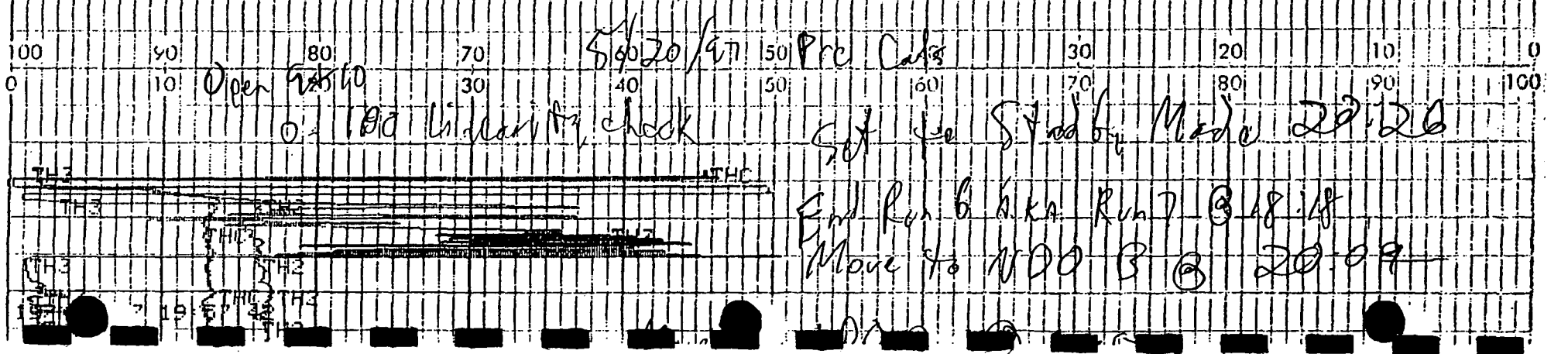
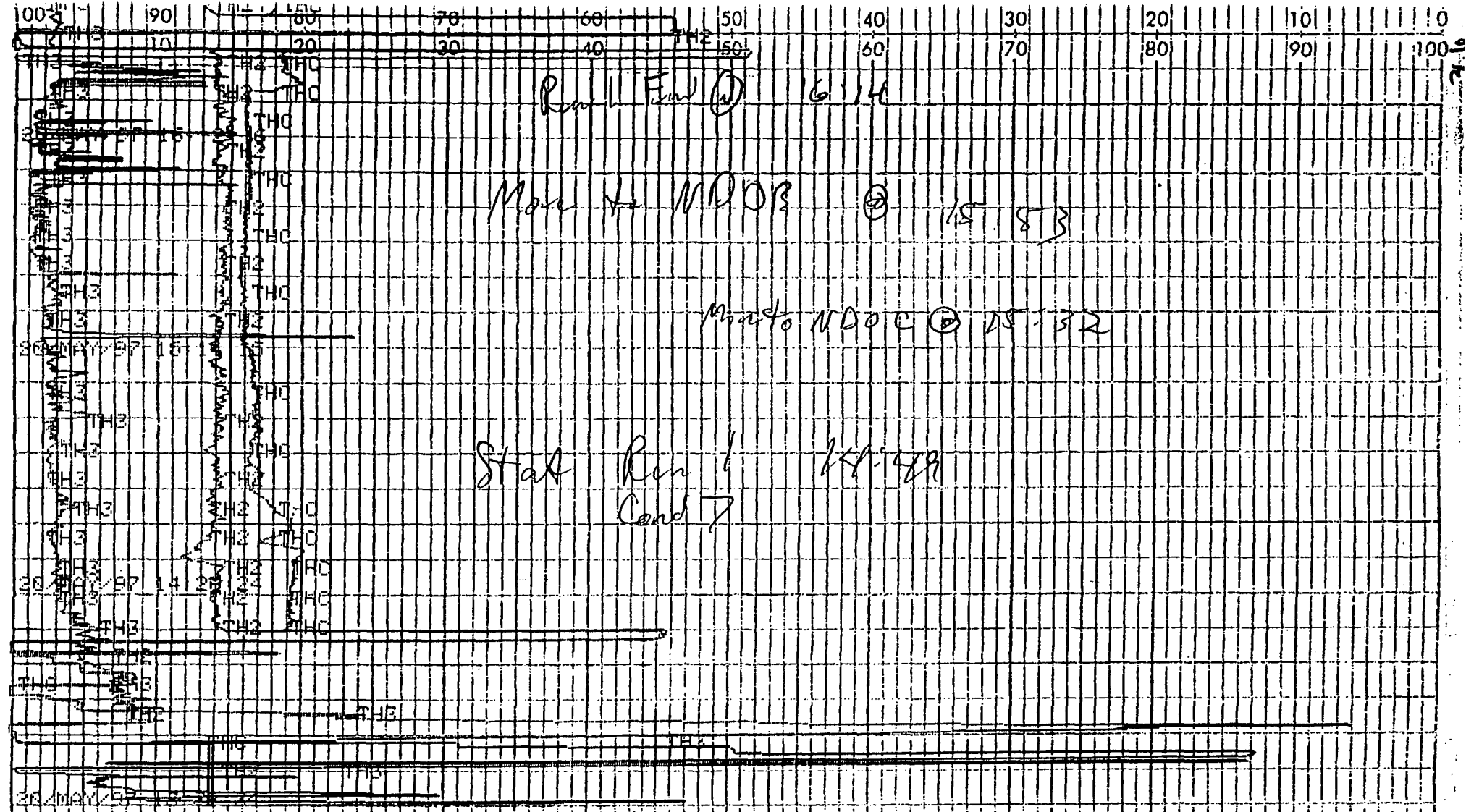
Switch NDO to C 16:48

19 MAY 67 16:55 45

Start Run 4 Condition 6 NDO A 16:08







End Run 3 @ 20:37

Moved to NDO B @ 20:20

Moved to NDO C @ 19:55

Top of

Start Run 3 @ 17:13

40 30 20 10 0
60 70 80 90 100

Start Run 3 @ 17:13

End Run 3 @ 18:29

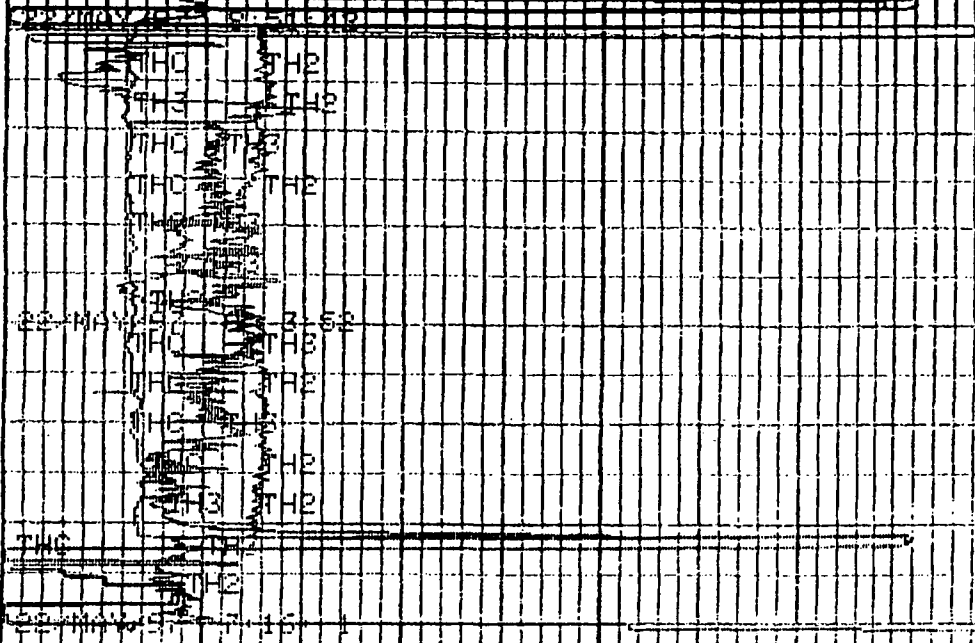
Moved to NDO B @ 18:14

Moved to NDO C @ 17:47

Start Run 2 17:05 @ NDO A

STAT Pa 2 @ 0919

More to NDO C
@ 08:34



RECORDER DATA LOGGER VRS SH 8 Pre data 5/22/97

100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100

Cal 407
End Response Factor Test

TH3 ← 250.7 PPM Styrene
TH2 ← 143.1 PPM Styrene

TH3 ← 100 PPM Styrene

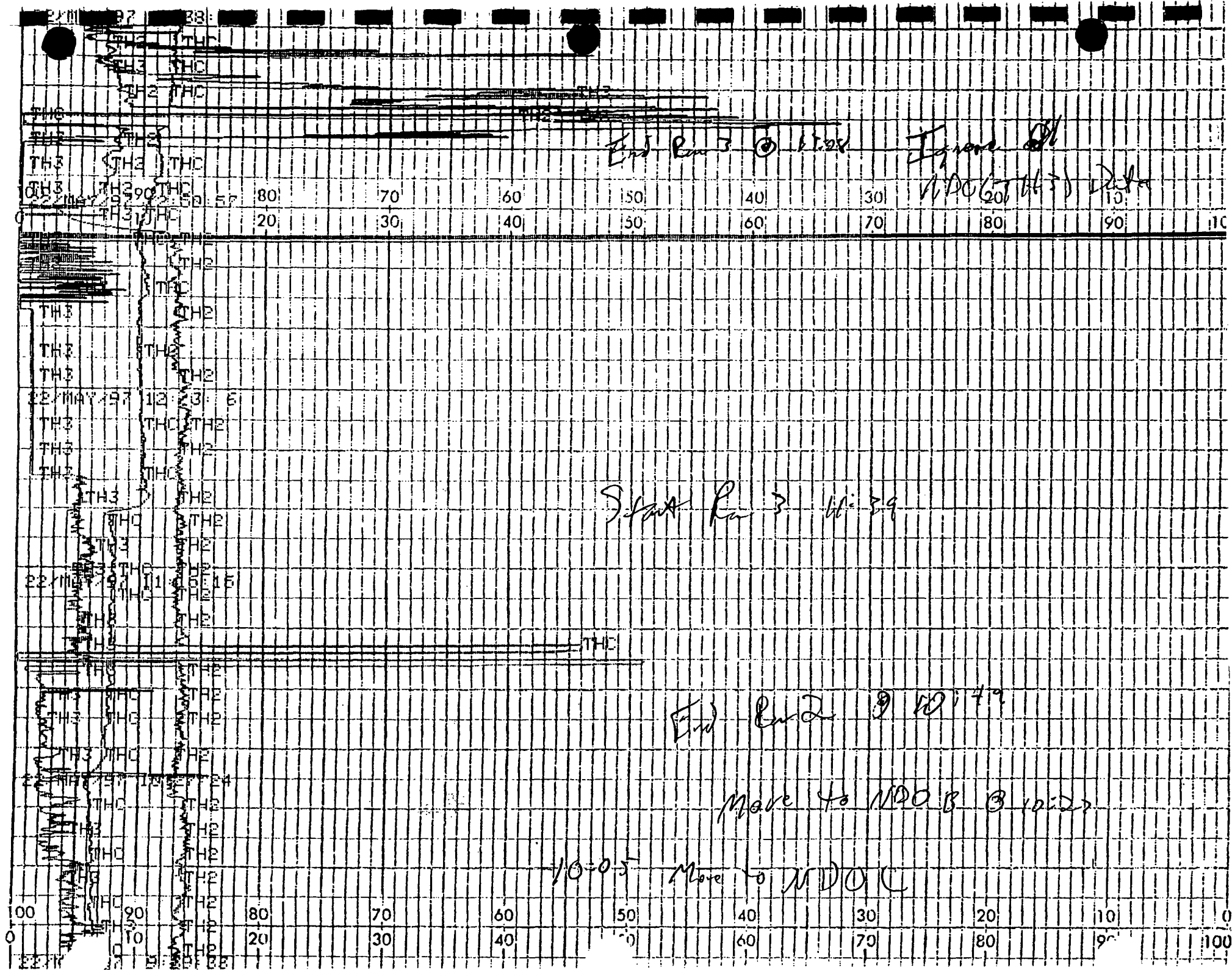
21 MAY 97 12:44:47

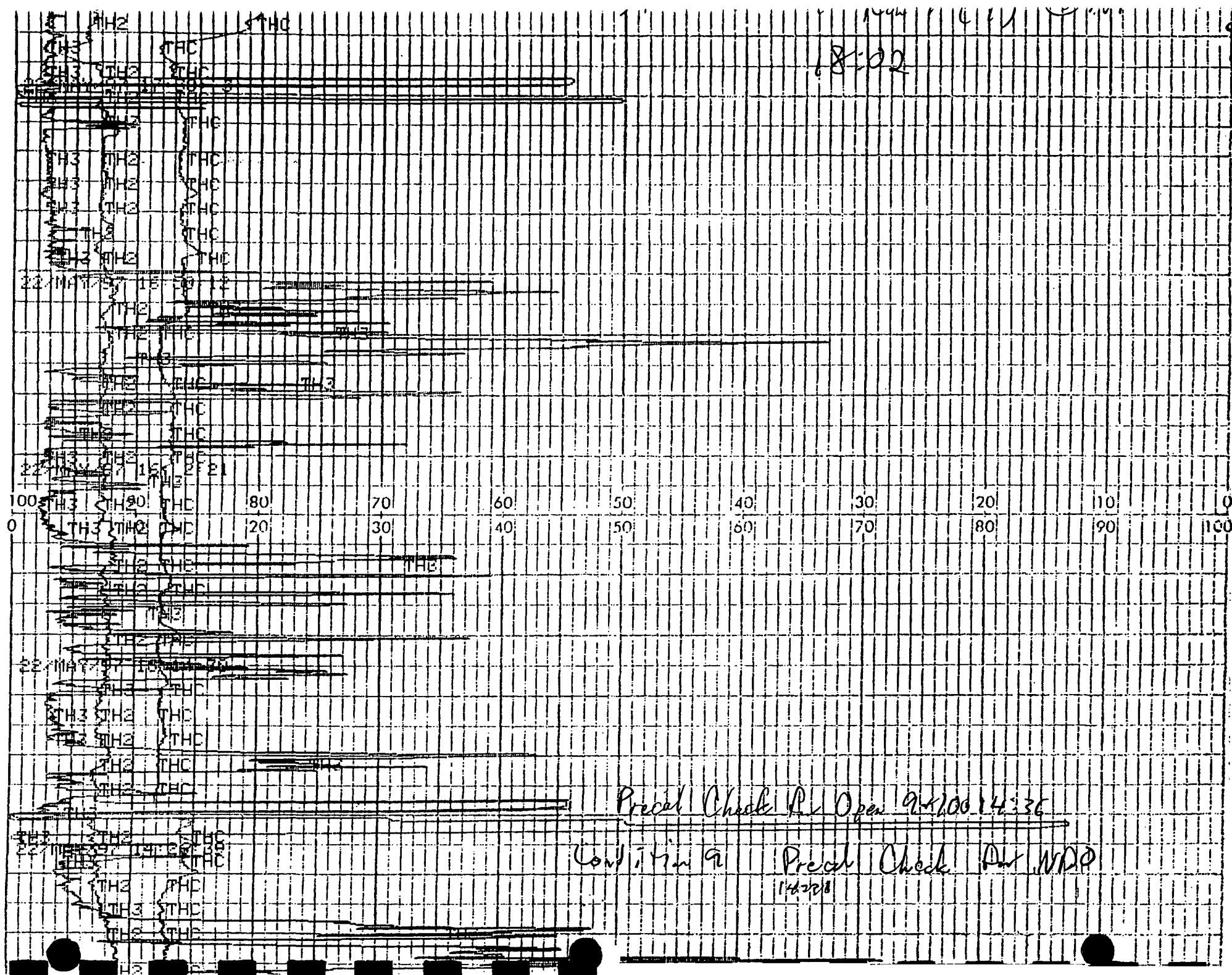
5/21/97 Response Factor Calc

PRINTED IN U.S.A.

Calo

07.7
R₁₃
May
1997

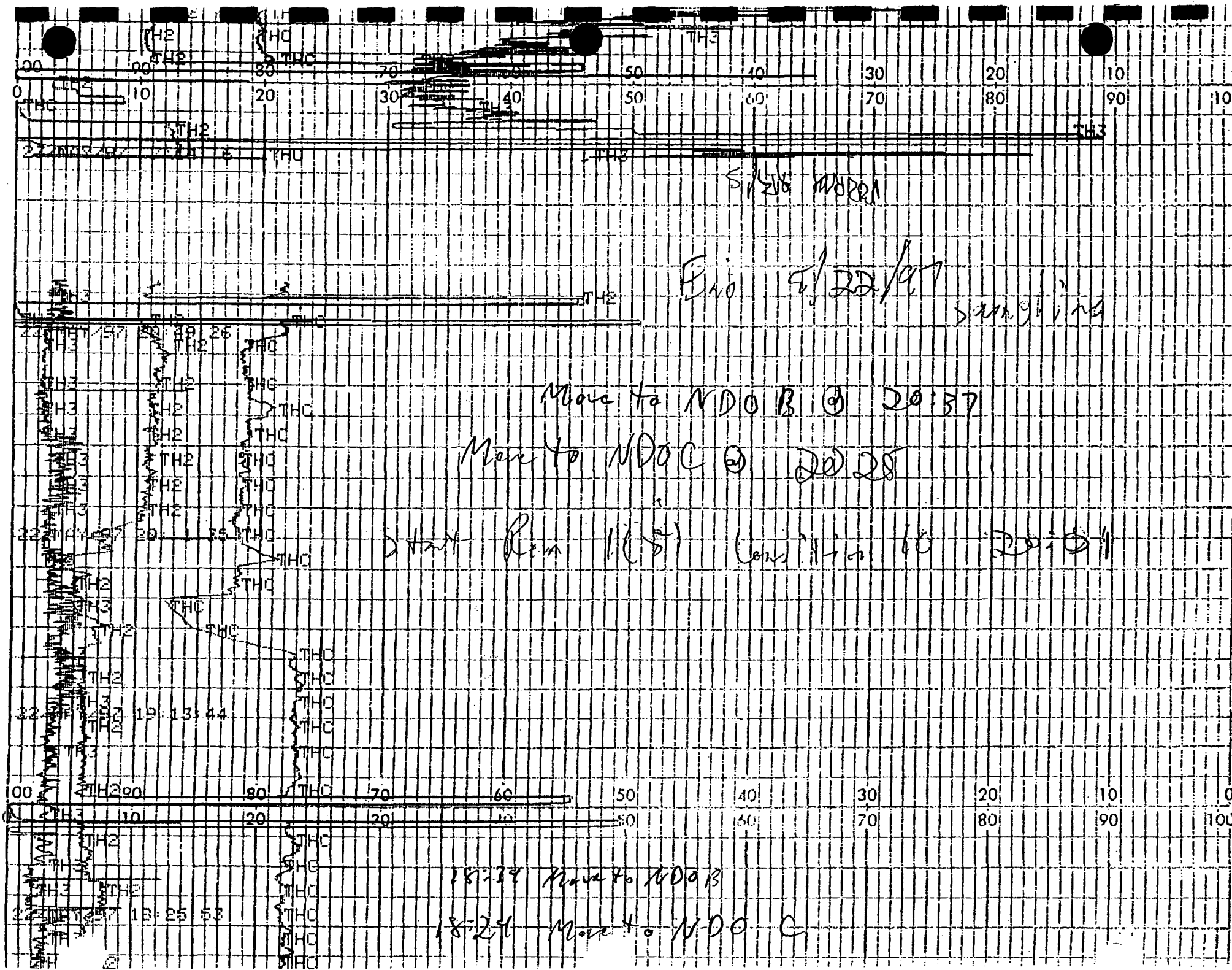


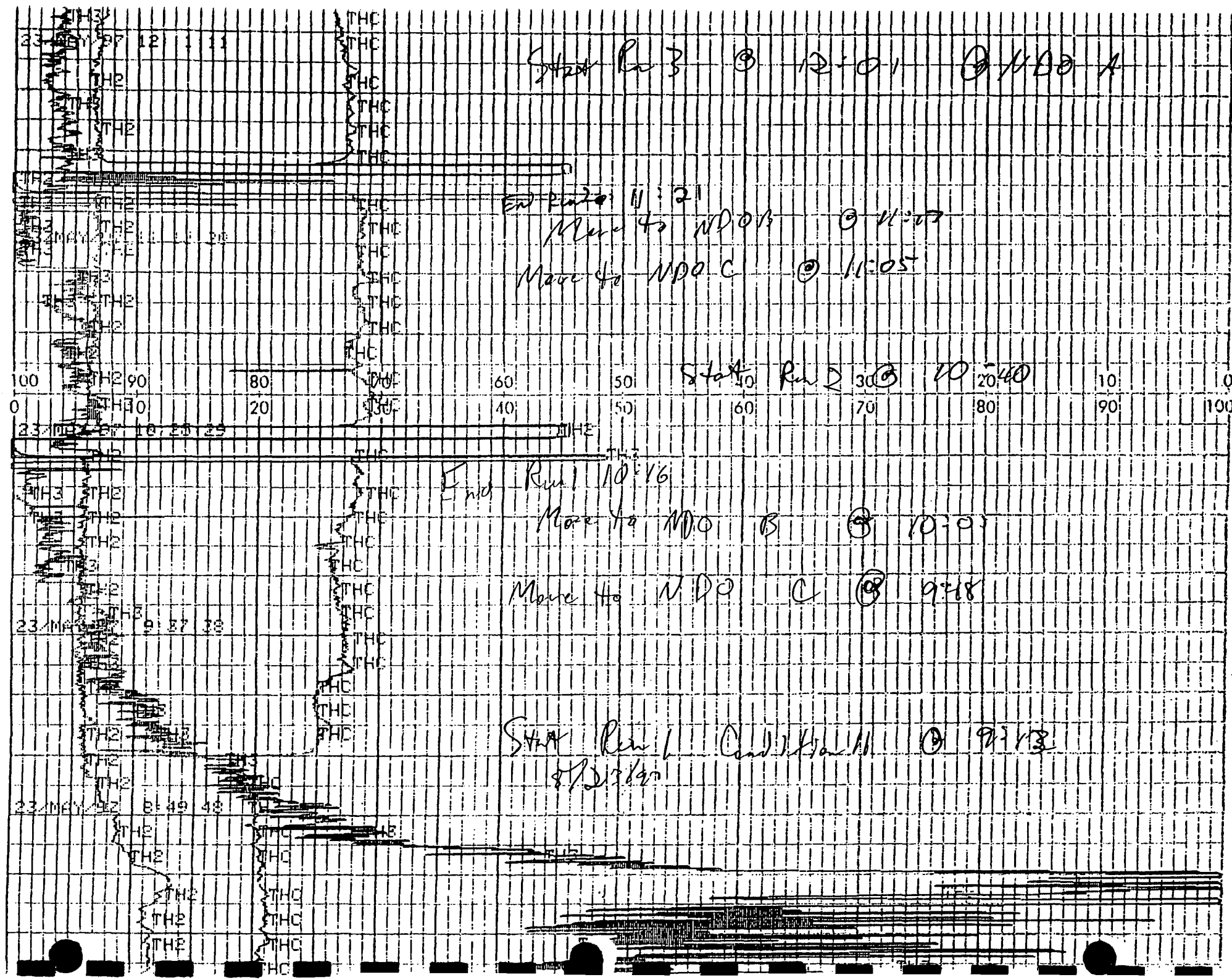


Preced Check R. Open 9-200-24336

Conf. Item 9 Preced Check Am. WDP

1/22/8





29 MAY 97 10:00

Run 2 SAT 10:00

End Run 1 @ 09:30

Moved to MDO B @ 09:20

Moved to MDO C @ 09:00

Start Run 11 @ 08:30 @ MDO A

End Condition 12 Prevalent

Change Don't to Thick Range

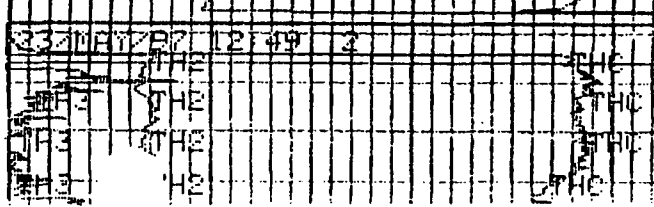
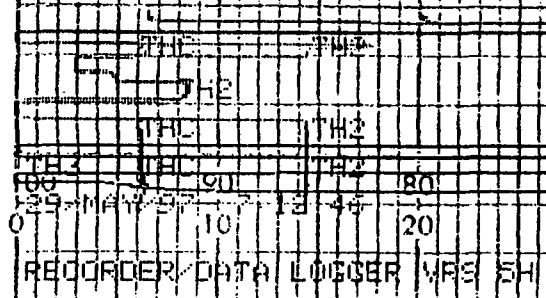
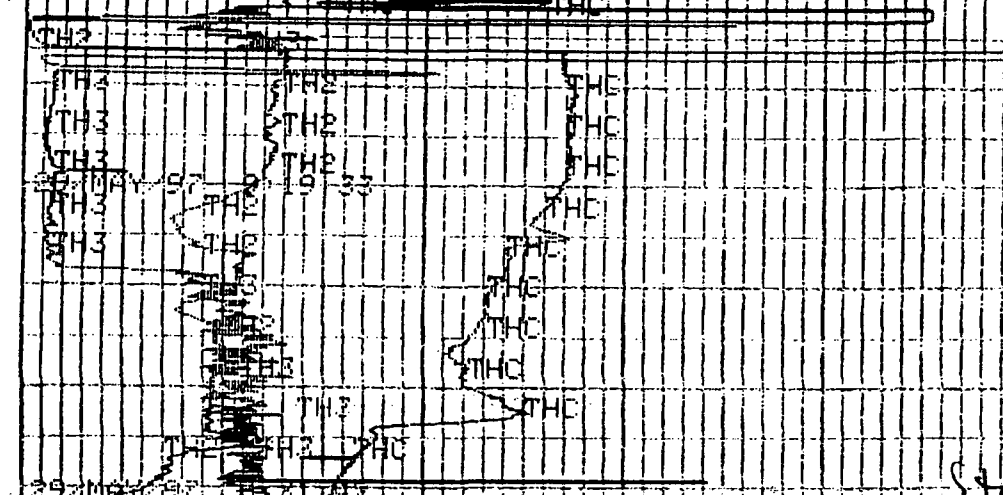
5/29 Precal 50

On 9/9 10 0-100 / 100 Check

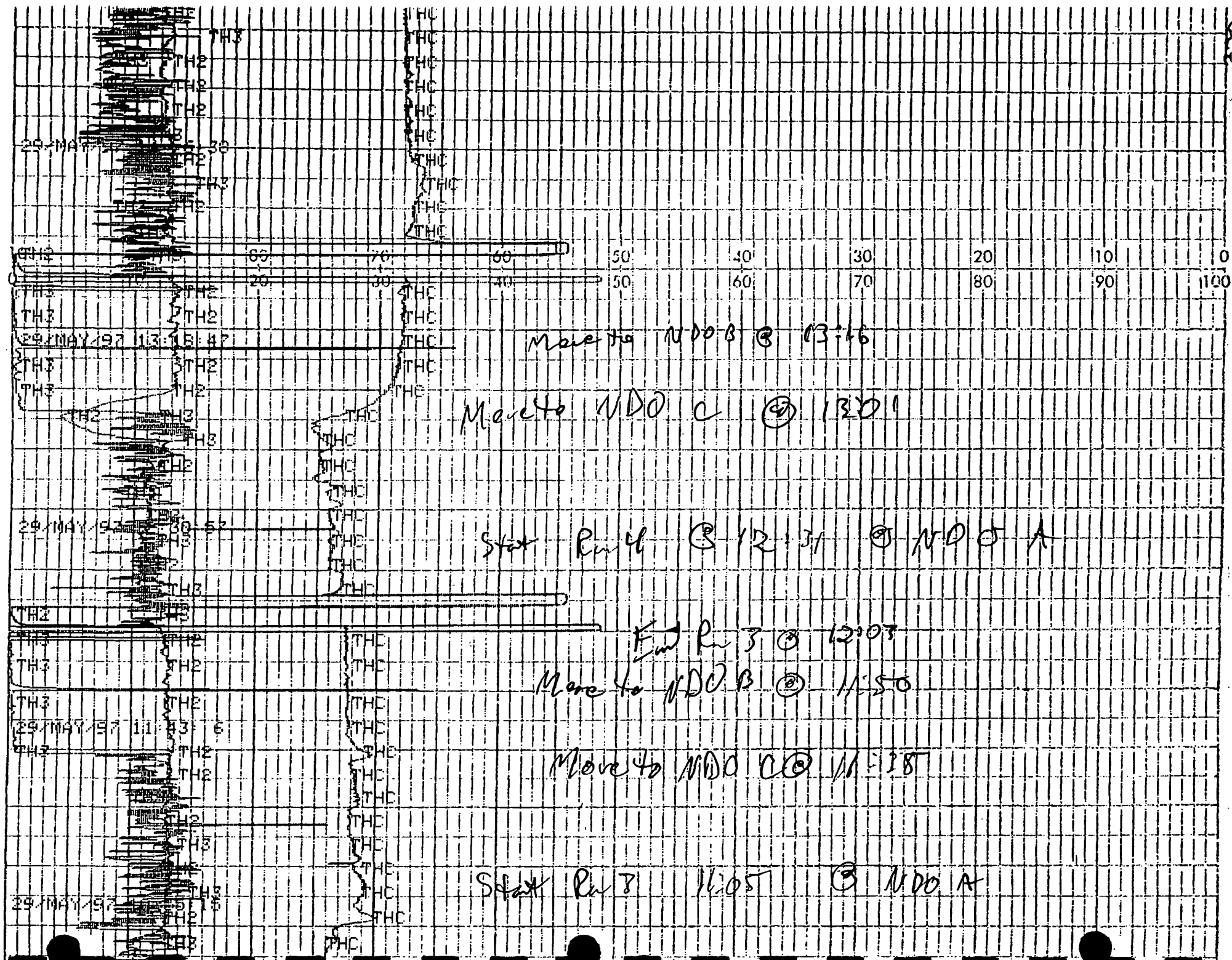
ASH M50 5/20/97 End of Week 2

End Run 3 @ 12:30

Moved to MDO B @ 12:37



ADDITIONAL INFORMATION



[illegible]

Moved to NDC @ 18:3

5. X R-3 @ 180! @ NDD A

THE En 2 @ 17-37

Memo to MOOB @ 17-22

1. 4. WDO C C 17:07

Start Run 262 Cond. Tion 15 @ 1100 A
@ 16237

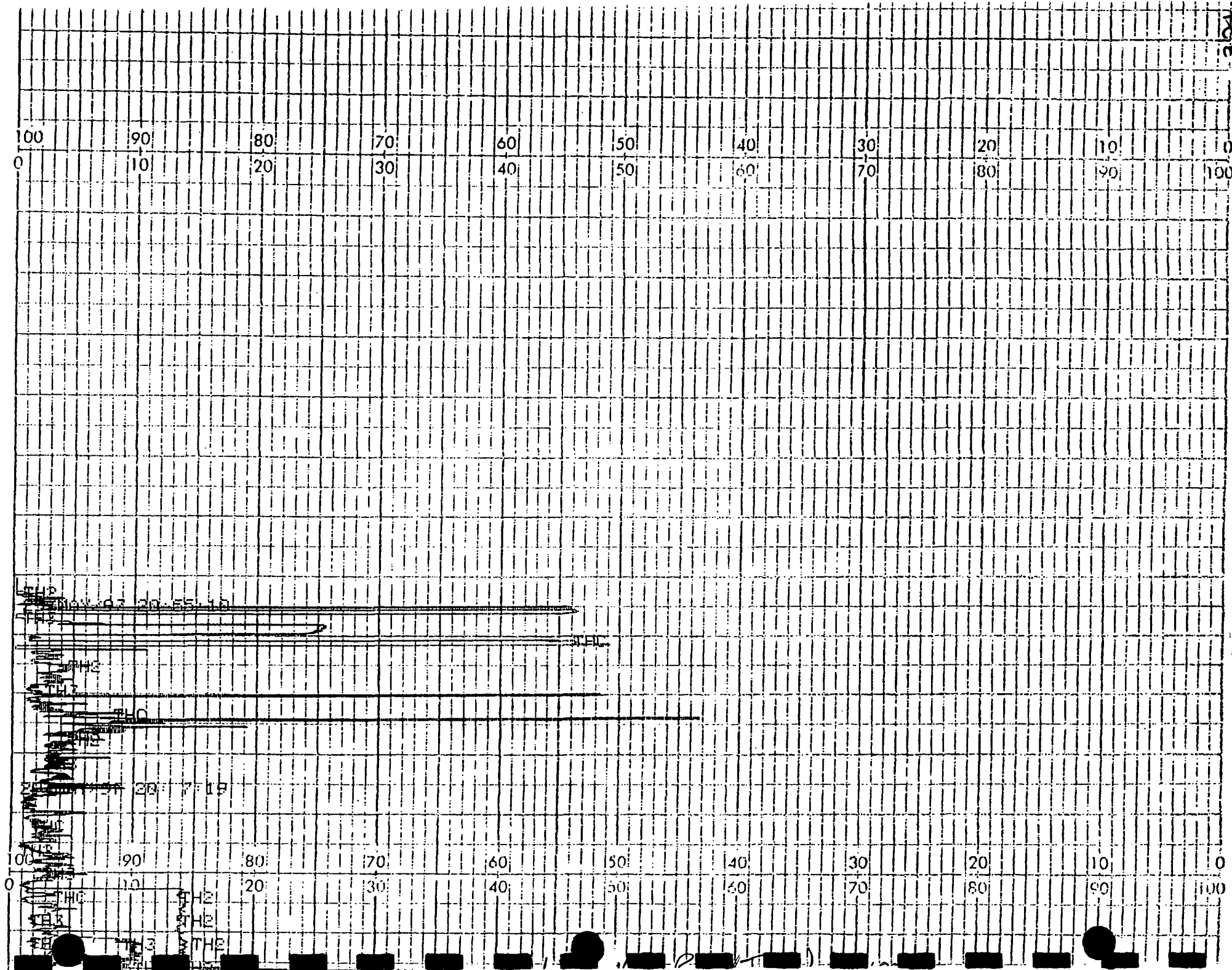
END P. 11 Ch 13 @ 16:11

More to add @ 16 = 1

Move the NDD BO 16:0

More to NDOC @ 48:40

Stack Reg 1(5) Condition 13 ©157-29
©1100 K





CEM Calibration Sheet

Client Lasco Location Florence, Ky
Test Site TTE Date 8-14-97
CEM Operator BPalm

0735			Run 1 Condition 1							Run 2							Run 3							
Calibration Error			Pretest Time: 0935		Post Test Time: 1134		Calibration		Pretest Time: 1134		Post Test Time: 1326		Calibration		Pretest Time: 1326		Post Test Time: 1649		Calibration					
Yielder	Analyzer	Difference	System Calibration	System Cal Bias	System Calibration	System Cal Bias	Diff	Correction	System Calibration	System Cal Bias	System Calibration	System Cal Bias	Diff	Correction	System Calibration	System Cal Bias	System Calibration	System Cal Bias	Diff	Correction	System Calibration	System Cal Bias	Diff	Correction
Value	Response	(% of Span)	Response	(% of Span)	Response	(% of Span)	(% of Span)	Co & Cm	Response	(% of Span)	Response	(% of Span)	(% of Span)	Co & Cm	Response	(% of Span)	Response	(% of Span)	(% of Span)	Co & Cm	Response	(% of Span)	(% of Span)	Co & Cm
0	0.2	0.02	-0.4	-0.04	-0.2	-0.02	0.02		-0.2	-0.02	-0.3	-0.03	0.01	(4)	-0.3	-0.03	-1.9	-0.2	-0.2					
4	20.3	-3.5													30.8									
8	48.9	-1.8													50.4									
26	85.3	-1.5													86.8									
4	455.3	-1.9	458.5	-1.2	454.9	452.9	-0.04		454.9	-2.0	452.9	451.9	-0.3		455.9	0.4	455.9	-1.8	-1.0					
2	0.2	0.02	-2.8		-2.1	-2.1			-2.1	-0.2	-2.2	-2.2	-0.01		-2.8	-0.3	-2.7	-0.2	-0.01					
4	30.8	-1.9																						
8	50.2	0.8																						
6	86.7	0.1																						
4	477.0	2.8	480.5	3.6	485.3	475.3	-0.5		475.3	2.4	474.1	474.1	-0.1		472.6	2.1	473.6	464.9	0.2	0.9				
1	0.0	0	0.1	0.1	0.2	-0.2	-0.3		-0.2	-0.2	0.0	0.0	-0.2	(14)	0.1	-0.1	-0.5	-0.5	-0.4					
4	30.4	-3.2													31.2	-0.6								
8	49.1	-1.4	49.9	0.2	49.2	49.2	-0.7		49.2	-1.2	51.3	51.0	0.2.1		50.7	1.8	49.0	-1.6	-1.7					
6	84.7	-2.2													86.7	0.1								

*Run Start NDA 20 Time 0 A=40 C=50 N=20
Run Start NDB Time 0 A=10 C=20
Run Start Time 0 B=12 A=30 C=40

Client: LASCO City: Florence, Ky
Source: TTE Date: 5-14-97
CEM Operator: DP/Im

Open 10 #415 2053 84 85
NDA=0 UDC=0
A=10

NDA 0 -A 40
C 10 C 50

NDA 6 C 40
C 10 A 50

CEM Calibration Sheet

Client: LaSCO City: Florence, Ky
Source: TTE Date: 5-15-97
CEM Operator: BPalm

CEM Operator: B. Palm

[illegible]

Low calibration gas is used only for turbine testing.

NOA 0.

AD-10

NDL-30

NDA-40
[REDACTED]

NOA-2

ND C

12. A

Condition 5

CEM Operator: ML

[illegible]

Set 4. 1K Range

CEM Calibration Sheet

Client: PE's City: Florence ky

Source: Owen H. (JHC) Date: 5/12/67

CEM Operator: 34

[illegible]

low calibration gas is used only for turbine testing.

et al. 1988

1k 0.1 0.1

CEM Calibration Sheet

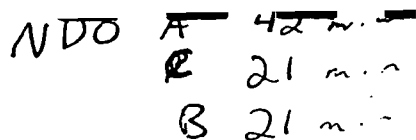
Client: PEJ City: Florence Ky
Source: NDO (TH3) Date: 5/19/92
CEM Operator: MH

Order
- 42 min
21 min
21 min

[illegible]

low calibration gas is used only for turbine testing.

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Client PES Location Flarencia KY
Test Site Open 9, 10 / NDO Date 5/20/97
CEM Operator MH

Change
to 1k
Range

NOO Sample Times
A - 42 min
C - 27 min

NDO Sample Times
A - 42
C - 25

CEM Calibration Sheet

CEM Calibration Sheet

Client: PES/EP4 City: Florence Ky

Source: Open 9,10 / NRPD ABC Date: 5/22/97

CEM Operator: MH

0-100 linearity checks
0-1000 calibration
range

[illegible]

low calibration gas is used only for turbine testing.

NVOA 42 min
N [redacted] C [redacted] at min

NDO A 45 min
NDO 22 1/2 min

Ignore Data from

CEM Calibration Sheet

Client: PES/EPA City: Florence, KY
 Source: Am 9+10/NDO ABC Date: 5/22/97
 CEM Operator: 99HSE

0-100% linearity
 check
 0-100% Calibration
 long

(05-22-4.PRN)

Calibration Error			Rev: 1(4) Condition 9					Rev: 2(5) Condition 80					Rev: 2(6) Condition 9				
			Pre-test Time: 13:09	Post-test Time: 18:45					Pre-test Time: 18:45	Post-test Time: 20:51					Pre-test Time:	Post-test Time:	
Cylinder Value	Analyzer Calibration Response	Difference (% of Span) (<2%)	System Calibration Response	System Cal Bias (% of Span) (<1%)	System Cal Drift (% of Span) (<1%)	System Calibration Response	System Cal Bias (% of Span) (<1%)	System Cal Drift (% of Span) (<1%)	System Calibration Response	System Cal Bias (% of Span) (<1%)	System Cal Drift (% of Span) (<1%)	System Calibration Response	System Cal Bias (% of Span) (<1%)	System Cal Drift (% of Span) (<1%)	System Calibration Response	System Cal Bias (% of Span) (<1%)	System Cal Drift (% of Span) (<1%)
0	0.6 (0.6)	0	0.6 (0.6)	0.1 (0.1)	2.7	0.3	0.1	2.7	0.3	2.4	0.2	-0.03					
31.4	31.2 (0.6)		31.2 (0.6)														
49.4	50.8 (2.8)	451	459.0	1.8 (1.4)	455.8	1.1	-0.02	455.8	1.1	457.2	1.4	0.1					
86.6	87.4 (0.9)		87.4 (0.9)														
0	0.6 (0.6)	0	-1.8 (-1.8)	0.2 (0.2)	-1.6	-0.2	0.0	-1.6	-0.2	-1.4	-0.1	0.02					
31.4	31.4 (0.0)		31.4 (0.0)														
49.4	50.8 (2.8)	451	436.6	-3.2	450.0	-0.2	0.0	450.0	-0.2	462.2	2.5	1.2					
86.6	87.4 (0.9)		87.4 (0.9)														
0			0.2 (0.2)	0.2 (0.2)	0.3	0.3	0.0	0.3	0.3	0.2	0.2	-0.1					
31.4			31.2	-0.6													
49.4			50.6	2.4 (0.4)	49.6	0.4	-0.2	49.6	0.4	50.8	2.8	1.2					
86.6			87.2	0.7													

ch 8 (Cal check) 14:31

low calibration gas is used only for turbine testing.

Test NDO A 22 min
 10 min

NDO A 25 min
 C 22 min

Client: PES/EPA City: Florence ky
Source: On 9/10/MDO Date: 8/23/97
CEM Operator: MH

Client: PES/EPA City: Florence ky
Source: Qum 9410/ND0 Date: 8/23/97
CEM Operator: MH

CEM Operator: MT

O-100 Liquidity
O-1000 Col
Rng.

low calibration gas is used only for turbine testing.

NDO A. 35 min

ND0A - 25 min
12 1/2 min

ADO A - 24

Area 9+10
0-100 Linearity
Check
0-1000 Calibration
Range

City: Florence KY

Date: 5/29/97

CEM Operator: MH

6 (Over 10)

ND 9.52

These

Low calibration gas is used only for turbine testing.	
---	--

NOO A 30 min
C 15 min

NDO A 30 min
C 15 min
B 13 min

NDJ

A	30 min
C	15 min
B	15 min

Client: PEI/EPA City: Florence KY
Source: On 9/16 NDO APC Date: 5/29/97
CEM Operator: MW

Client: PEI/EPA City: Florence KY
Source: On 9/16 NDO APC Date: 5/29/97
CEM Operator: MW

CEM Operator: MW

Over 90.00
0-100 Linearity
0-1000 Calibration
Range

Calibration Error			Run: 1 (5) Condition 13					Run: 2 (6) Condition 13					Run: 3 (7) Condition 13				
Cylinder Value	Analyser Calibration Response	Difference (% of Span) (<3%)	Pretest Time: 13:31	Post test Time: 16:16	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Cal Drift (% of Span) (<3%)	Pretest Time: 16:20	Post test Time: 17:38	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Cal Drift (% of Span) (<3%)	Pretest Time: 17:38	Post test Time: 19:02	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Cal Drift (% of Span) (<3%)
0	0.1 (0.1)	0	2.2	0.2	2.5	0.3	0.03	2.5	0.3	2.4	0.2	-0.01	2.4	0.2	2.6	0.3	0.02
31.4	30.8 (-1.9)																
49.4	50.1 (2.0)	451	456.9	1.3	454.2	0.7	-0.3	454.2	0.7	452.5	0.3	-0.2	452.5	0.3	451.8	0.2	-0.1
86.6	87.4 (0.9)																
0	0.2 (0.2)	0	-0.5	-0.1	-0.6	-0.1	-0.01	-0.6	-0.1	-0.4	-0.04	0.02	-0.4	-0.04	-0.7	-0.1	-0.03
31.4	31.0 (-1.3)																
49.4	50.5 (2.2)	451	442.5	-0.8	442.1	-2.0	-0.5	442.1	-2.0	441.0	-2.2	-0.1	441.0	-2.2	442.8	-1.8	0.2
86.6	87.5 (1.0)																
NDO ABC			System Calibration Response	System Cal Bias (% of Span) (<3%)	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Cal Drift (% of Span) (<3%)	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Cal Drift (% of Span) (<3%)	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Cal Drift (% of Span) (<3%)
0	0.2	0.2	-0.4	-0.4	-0.6	-0.6	-0.2	0.4	0.4	0.3	0.3	-0.1	0.3	0.3	0.6	0.6	0.3
31.4	30.8	-1.9						31.4	0.0								
49.4	50.5	2.2	45.3	-2.2	47.2	-4.5	-1.1	50.8	2.8	50.5	2.2	-0.3	50.5	2.2	50.2	1.2	-0.3
86.6	87.2	0.7						87.4	0.9								

Now calibration gas is used only for turbine testing.

Não a 30 min

Recall $\nearrow$ NDO A 30 min
NDO C 15 min

NDO A 30 min
NDO C 15 min

Over 9-10
0-100 Linearity Check
0-1000 Calibration Range

CEM Calibration Sheet

Client: PEI/EPA City: Florence KY
Source: On 9, 10 NDO ABC Date: 5/29/97
CEM Operator: MH

Check with Styrene Calibration Gas for

Lin
Che

Calibration Error			Pretest Time:			Post test Time:			Pretest Time:			Post test Time:			Pretest Time:			Post test Time:		
Cylinder Value	Analyzer Calibration Response	Difference (% of Span) (<3%)	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Cal Drift (% of Span) (<3%)	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Cal Drift (% of Span) (<3%)	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Calibration Response	System Cal Bias (% of Span) (<3%)	System Cal Drift (% of Span) (<3%)			
0	0.1 (0.1)	0	2.6	0.3				-3.7	-0.4	-2.7	-0.3	0.1								
31.4	30.8 (1.9)																			
49.4	50.4 (2.0)	451	457.8	0.2				461.7	2.4	462.7	2.6	0.1								
86.6	87.4 (0.9)																			
0	0.2 (0.2)	0	-0.7	-0.1				-2.0	-0.2	-1.2	-0.1	0.1								
31.4	31.0 (1.3)																			
49.4	50.5 (2.2)	451	442.8	-1.8				461.0	2.2	462.7	2.6	0.2								
86.6	87.5 (1.0)																			
0	0.4 (0.4)	0	-0.1	-0.01				-2.1	-0.2	-0.7	-0.1	0.1								
31.4	31.4 (0.0)																			
49.4	50.8 (2.0)	451	459.4	1.9				462.0	2.4	459.3	1.8	-0.3								
86.6	87.4 (0.9)																			

On 9 NDO ABC
(Change to K Range)

low calibration gas is used only for turbine testing.

339

TECHNICAL REPORT DATA Please read instructions on the reverse before completing		
1. REPORT NO. EPA-454/R-99-024b	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Air Emissions From Reinforced Plastics Manufacturing Process, LASCO Panel Products: Volume II Volume II of III	5. REPORT DATE August 1999	6. PERFORMING ORGANIZATION CODE
	8. PERFORMING ORGANIZATION REPORT NO.	
7. AUTHOR(S) Franklin Meadows Daniel F. Scheffel	10. PROGRAM ELEMENT NO.	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Pacific Environmental Services, Inc. Post Office Box 12077 Research Triangle Park, North Carolina 27709-2077	11. CONTRACT/GRANT NO. 68-D-70069	
	13. TYPE OF REPORT AND PERIOD COVERED Final	
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Emissions, Monitoring and Analysis Division Research Triangle Park, North Carolina 27711	14. SPONSORING AGENCY CODE	
	15. SUPPLEMENTARY NOTES	
16. ABSTRACT The United States Environmental Protection Agency (EPA) Emission Standards Division (ESD) requested that the EPA's Emissions Monitoring and Analysis Division (EMAD), Emission Measurement Center (EMC) provide testing support in the investigation of the reinforced plastics composite manufacturing source category to properly set the Maximum Achievable Control Technology (MACT) standards as required by the Clean Air Act Amendments of 1990. The reinforced plastics composite manufacturing process located at LASCO Panel Products in Florence, Kentucky was selected by the ESD as the host facility for this emissions testing program. The sampling program was designed to support the following ESD objectives: 1) Identify and quantify the hazardous air pollutants (HAPs) emitted by reinforced plastic manufacturing, 2) Identify the sources of HAPs and the total HAPs mass emission rates from the wet application area and the oven area, 3) Evaluate three ventilation scenarios, 4) Depending on the effectiveness of the industry proposed "closed" system, develop a performance-based emission limitation achieved by the use of a wet area enclosed table system, 5) Assess the existing emission factors for volatile organic compound emissions from a continuous lamination process for the purposes of updating the information in AP-42 and determining cost effectiveness for MACT options involving emissions abatement, and 6) Determine the effect of various process parameters such as line speed, laminate thickness, HAP content of raw material and the addition of a gel coat layer on the emission factor. Sampling was performed during 13 process operating conditions. Measurements were made of the total hydrocarbons (THC), styrene, cumene, and methyl methacrylate (MMA), and the air flow rate at all enclosure exhausts. A secondary objective of the sampling program was to obtain the emissions of HAPs from the oven stacks. This volume (Volume II) is comprised of 407 pages and consists of Appendix A.2 (Instrumental Methods Raw Field Data).		
17. KEY WORDS AND DOCUMENT ANALYSIS		
a. DESCRIPTIONS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COASTI Field/Group
Cumene Emission Measurements Hazardous Air Pollutants Lamination Process Methyl Methacrylate Reinforced Plastics Manufacturing Styrene Total Hydrocarbons Volatile Organic Compounds		
18. DISTRIBUTION STATEMENT Unlimited	19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES 1,670 407
	20. SECURITY CLASS (This page) Unclassified	22. PRICE