AP42 Section:	Chapters 1 and 3
Related:	4
Title:	Source Test Review, Hershey Chocolate USA, Derry Township, PA Entropy Inc for Pennsylvania Dept of Environmental Protection November 1996

PDEP0009

COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection
November 8, 1996
717-787-4310

SUBJECT: Source Test Review
Hershey Chocolate USA
Hershey East Plant
Derry Township, Dauphin County

TO: Richard D. Roller
Air Pollution Control Engineer
Southcentral Regional Office

FROM: Michael S. Hopko
Air Quality Program Specialist
Stationary Source Section
Division of Air Resource Management

NG/#6FO fired Boilers

THROUGH: L. Blaine DeHaven
Chief
Division of Source Testing and Monitoring

Timothy R. Brooks
Chief
Source Testing Section
Division of Source Testing and Monitoring

Hershey Chocolate USA operates two identical natural gas/No. 6 fuel oil fired boilers, designated as Boiler Nos. 2 and 3, at the aforementioned location. Each boiler is rated at 99.9 MMBtu/hr (approximately 80,000 lb/hr steam capacity). The emissions from these boilers are discharged to the atmosphere through a 69 inches inside diameter common stack.

Entropy, Inc. conducted testing for Oxides of Nitrogen (NO_x) and Carbon Monoxide (CO) on April 10-11, 1996 to demonstrate compliance with the Plan Approval emission limits. Emissions of NO_x are not to exceed 0.04 lb/MMBtu when fired with natural gas or 0.3 lb/MMBtu when fired with No. 6 fuel oil. Emissions of CO are not to exceed 0.1 lb/MMBtu when fired with either fuel. Testing was conducted in the common stack for the two boilers. One boiler was shut down while the other boiler was being tested. This process was repeated on the second day with a change in fuel. The test runs were conducted in accordance with the preapproved test protocol and EPA Methods 3A, 7E, and 10. The results are acceptable to the Department.

The following is a summary of data presented in the test report:

Boiler Number 2-Natural Gas

Test Run No.	1	2	3
Test Date	04/10/96	04/10/96	04/10/96
CO Concentration [ppm]	1.7	1.7	1.4
NOx Concentration [ppm]	31.1	30.7	30.5
CO Emission Rate [lb/mmBtu]	0.00121	0.00121	0.00100
NOx Emission Rate [lb/mmBtu]	0.0363	0.0359	0.0357

Boiler Number 2-No.6 Fuel Oil

Test Run No.	1	2	3
Test Date	04/11/96	04/11/96	04/11/96
CO Concentration [ppm]	15.2	9.0	8.6
NOx Concentration [ppm]	293.9	295.0	296.6
CO Emission Rate [lb/mmBtu]	0.00720	0.00709	0.00676
NOx Emission Rate [lb/mmBtu]	0.383	0.382	0.383

Boiler Number 3-Natural Gas

Test Run No.	1	2	3
Test Date	04/10/96	04/10/96	04/10/96
CO Concentration [ppm]	4.0	4.8	4.3
NOx Concentration [ppm]	29.5	29.6	29.5
CO Emission Rate [lb/mmBtu]	0.00322	0.00356	0.00319
NOx Emission Rate [lb/mmBtu]	0.0391	0.0361	0.0360

Boiler Number 3-No.6 Fuel Oil

Test Run No.	1	2	3
Test Date	04/11/96	04/11/96	04/11/96
CO Concentration [ppm]	84.9	22.2	25.3
NOx Concentration [ppm]	293.0	302.9	308.0
CO Emission Rate [lb/mmBtu]	0.0666	0.0175	0.020
NOx Emission Rate [lb/mmBtu]	0.378	0.393	0.392

cc: Data File, Source Testing ✓
RACT OP 22-2004
Permit File 22-302-109
Krish Ramamurthy, Permits
Scott Kepner, Compliance and Enforcement
EPA/TRB
Reading File, Source Testing Section

LBD:TRB:MSH:msh

Environmental Protection
May 23, 1996

SUBJECT: Source Test Review
Hershey Chocolate USA
Hershey East Plant
Derry Township, Dauphin County
File: 22-2004 and 22-302-109

TO: L. Blaine DeHaven, Chief
Division of Source Testing and Monitoring

FROM: Richard D. Roller RDR
Air Pollution Control Engineer
Southcentral Regional Office

Please review the attached source tests which were conducted on the two new natural gas/No. 6 fuel oil fired boilers at the above location. The identical Tampella Power boilers are each rated at 99.9 MBtu/hr (approximately 80,000 lb/hr steam capacity) and are subject to both NSPS, Subpart Dc and several special permit conditions. The pretest procedure was reviewed by Jay Pai.

The following should be considered when reviewing the test report:

1. Testing was conducted to demonstrate compliance only with the non-NSPS special permit conditions (Conditions 8, 9 and 12 thru 15 of RACT Plan Approval 22-2004 and Conditions 9, 10 and 15 thru 18 of Plan Approval 22-302-109).

2. The applicable NO_X and CO emission standards are:

   a. NO_X: 0.04 lb/MBtu when fired with natural gas and 0.30 lb/MBtu when fired with No. 6 fuel oil

      Note: Hershey is in the process of seeking a revision to the No. 6 fuel oil NO_X limit

   b. CO: 0.10 lb/MBtu when fired with either natural gas or No. 6 fuel oil

3. The boilers were originally referred to as Boilers A and B. Hershey now refers to them as Boilers 2 and 3.

Should you have any questions or comments, please contact me at 657-4587.

cc: Southcentral Region 22-2004
Southcentral Region 22-302-109

ENTROPY, INC.

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STATIONARY SOURCE SAMPLING REPORT

REFERENCE NO. 13929

HERSHEY CHOCOLATE

HERSHEY, PENNSYLVANIA

Derry Twp., Dauphin County

EMISSIONS:

CARBON MONOXIDE

NITROGEN OXIDES

Hershey East Plant

File 22-2004

22-302-109

APRIL 1996

BOILER NOS. 2 AND 3

PERFORMED FOR:

HERSHEY CHOCOLATE

HERSHEY, PENNSYLVANIA

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REPORT CERTIFICATION

EI Reference Number 13929

The sampling and analysis performed for this report were carried out under my direction and supervision, and I hereby certify that, to the best of my knowledge, the test report is authentic and accurate.

Signature: J. Gary Bulluck

Date: 5-7-96

J. Gary Bulluck
Project Director
Client Services Division

1.0 INTRODUCTION

1.1 Outline of Test Program

Hershey Chocolate has conducted a testing program to quantify specific emissions from Boiler Nos. 2 and 3 in Hershey, Pennsylvania.

EPA Method 3A, 7E, and 10 tests were conducted concurrently on April 10 and 11, 1996 at Boiler Nos. 2 and 3 using two different fuels. Natural Gas was used to fire each boiler on April 10, 1996 and No. 6 low sulfur fuel oil was used to fire each boiler on April 11, 1996.

1.2 Test Participants

Table 1-1 lists the personnel involved in the test program.

TABLE 1-1
TEST PARTICIPANTS
BOILER NOS. 2 AND 3
APRIL 1996

Hershey Chocolate	Chuck Stoner Test Coordinator
Commonwealth of Pennsylvania, Department of Environmental Resources, Bureau of Air Quality Control	Richard Roller Test Observer
	Jaydeb Pal Protocol Reviewer
Entropy, Inc.	J. Gary Bulluck Project Director
	Lauren A. Sherwood Project Manager
	Michael S. Riedel Engineering Technician

2.0 SUMMARY OF RESULTS

This testing program is to demonstrate compliance with the nitrogen oxides and carbon monoxide emission limits of the construction permit as described in Chapter 139 of the Department Source Testing Manual. Emissions of nitrogen oxides are not to exceed 0.04 lb/MMBtu when fired with natural gas or 0.3 lb/MMBtu when fired with No. 6 fuel oil. Emissions of carbon monoxide are not to exceed 0.1 lb/MMBtu when fired with either fuel.

During the testing, the process was operating at full capacity. The No. 2 boiler was operating within a steam production range of 79.7 - 80.4 klbs/hr and at 78.0 - 79.0 klbs/hr while burning natural gas and No. 6 fuel oil, respectively. The No. 3 boiler's operating range for natural gas and No. 6 fuel oil was 78.4 - 79.8 and 77.7 - 80.0, respectively. See **Appendix D** for the process data provided by plant personnel.

Table 2-1 presents a summary of the test results vs. permitted limits. Detailed test results are presented in **Appendix A**; field and calibration data are given in **Appendices B** and **C**, respectively.

TABLE 2-1
TEST RESULTS VS. PERMITTED LIMITS
BOILER NOS. 2 AND 3
APRIL 1996

	Rep 1	Rep 2	Rep 3	Average	Permit Limit
BOILER NO. 2-Natural Gas					
Concen., ppm					
Carbon Monoxide	1.7	1.7	1.4	1.6	NA
Nitrogen Oxides	31.1	30.7	30.5	30.8	NA
Emission Rate, lb/mmBtu					
Carbon Monoxide	0.00121	0.00121	0.00100	0.00114	0.1
Nitrogen Oxides	0.0363	0.0359	0.0357	0.0360	0.04
BOILER NO. 2-No. 6 Fuel Oil					
Concen., ppm					
Carbon Monoxide	15.2	9.0	8.6	10.9	NA
Nitrogen Oxides	293.9	295.0	296.6	295.2	NA
Emission Rate, lb/mmBtu					
Carbon Monoxide	0.0120	0.00709	0.00676	0.00862	0.1
Nitrogen Oxides	0.383	0.382	0.383	0.383	0.3
BOILER NO. 3-Natural Gas					
Concen., ppm					
Carbon Monoxide	4.0	4.8	4.3	4.4	NA
Nitrogen Oxides	29.5	29.6	29.5	29.5	NA
Emission Rate,lb/mmBtu					
Carbon Monoxide	0.00322	0.00356	0.00319	0.00332	0.1
Nitrogen Oxides	0.0391	0.0361	0.0360	0.0371	0.04
BOILER NO. 3-No. 6 Fuel Oil					
Concen., ppm					
Carbon Monoxide	84.9	22.2	25.3	44.1	NA
Nitrogen Oxides	293.0	302.9	308.0	301.3	NA
Emission Rate,lb/mmBtu					
Carbon Monoxide	0.0666	0.0175	0.020	0.0347	0.1
Nitrogen Oxides	0.378	0.393	0.392	0.388	0.3

3.0 PROCESS DESCRIPTION AND OPERATION

Hershey Chocolate manufactures chocolate at their facility located in Hershey, Pennsylvania. Power for this facility is generated by two 99 MMBtu mirror image package boilers. These two boilers can be fired with either natural gas or No. 6 low sulfur fuel oil. Testing will be conducted on the two mirror image boilers. Since the two boilers share a common stack, one boiler was shut down while the other boiler was being tested. This process was repeated on the second day with a change in fuel. On the first and second days of testing, the boilers were fueled with natural gas and No. 6 fuel oil, respectively.

The testing covered in this report was performed at the Boiler Nos. 2 and 3. The sampling location is a circular vertical stack with a 69 inch internal diameter and is outfitted with two 4 inch diameter sampling ports.

4.0 TEST EQUIPMENT AND PROCEDURES

4.1 Instrumental Reference Method Test Equipment and Procedures

Instrumental reference method testing was conducted for carbon monoxide (CO) and nitrogen oxide (NO_x) emissions and oxygen (O_2) concentrations. Entropy's extractive measurement system and all sampling and analytical procedures for the O_2, NO_x and CO testing conformed with the requirements of EPA Test Methods 3A, 7E, and 10 (40 CFR 60), respectively.

Table 4-1 presents a list of the analyzers that Entropy used during the test program to quantify the gas concentration levels at the sample point locations. **Figure 4-1** is a simplified schematic of Entropy's instrumental reference method measurement system.

The extractive monitors require that the effluent gas sample be conditioned to eliminate any possible interference (i.e., water vapor and/or particulate matter) before being transported and injected into each analyzer. All components of the sampling system which contacted the sample were constructed of Type 316 stainless steel or Teflon. The outputs from the monitors were connected to a computerized data acquisition system (DAS).

The O_2, NO_x, and CO sample collection system consisted of a heated probe with an in-stack glass wool particulate filter, heated sample lines, a moisture removal trap, an out-of-stack secondary particulate filter, and a pump. All samples were routed through a distribution manifold board for delivery to the analyzers. The configuration of the sampling system allows for the injection of calibration gases directly to the analyzers or through the sampling system. A Thomas Model 2107CA 18-TFE pump was used to move the effluent sample through the system. All pretest and posttest calibration procedures were performed as outlined in the specific EPA methods. The operation of each analyzer and the DAS are described below.

TABLE 4-1
REFERENCE METHOD GAS ANALYZERS
APRIL 1996

PARAMETER (RANGE)	ANALYZER/MODEL NUMBER	ANALYTICAL TECHNIQUE
CO (0-500 ppm-oil) (0-200 ppm-natural gas)	Thermo Environmental Instruments / 48	Gas Filter Correlation
O_2 (0-25%)	Teledyne Model / 320P-4	Fuel Cell
NO_x (0-200%)	Thermo Environmental Instruments / 10	Chemiluminescence

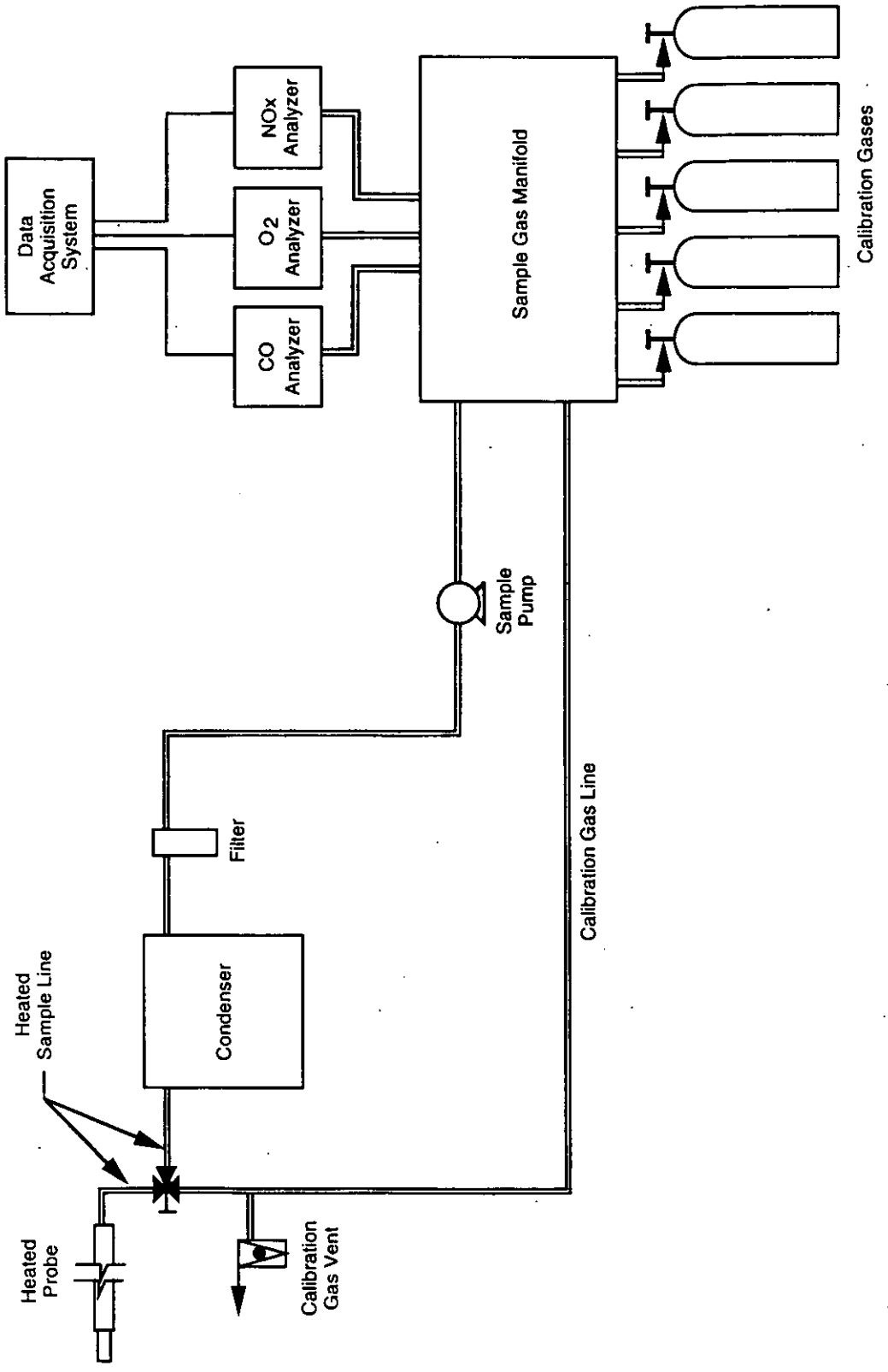

FIGURE 4-1. INSTRUMENTAL REFERENCE MEASUREMENT SYSTEM

Thermo Environmental Instruments Model 48/GFC CO Analyzer. The analyzer utilizes the gas filter correlation (GFC) technique to determine CO concentrations. The GFC technique involves the use of a high CO concentration filter which, when inserted into the infrared light beam, produces a reference beam, i.e., no further infrared radiation can be attenuated by the CO in the effluent sample. The CO filter is located on a modulated copper wheel which allows the use of a single infrared source and detector. A multiple pass optical bench/sample chamber of the white cell design provides improved sensitivity with a smaller chamber length.

TECO Model 10 NO/NOx Analyzer. This analyzer automatically and continuously determines the concentration of the nitric oxide (NO) or nitrogen oxides (NO_x) in the effluent. The analytical technique is chemiluminescence. The sample is routed through a converter where the NO_2 is dissociated to form NO. The sample is then passed through a reaction chamber where the NO is quantitatively converted to NO_2 by gas phase oxidation with molecular ozone produced within the analyzer. In this reaction, the NO_2 molecules are elevated to an electronically excited state and immediately reverted to a nonexcited ground state. This reversion is accompanied by the emission of photons, which impinge on a photomultiplier detector and generate a low level DC current. The current is then amplified and used to drive a front panel meter and a data recorder. The NO_x concentration seen by the instrument includes the contributions of both the NO in the sample and the NO resulting from the dissociation of the NO_2 in the sample.

Teledyne Model 320P-4 O_2 Analyzer. This analyzer was designed specifically to measure O_2 in flue gas streams. It utilizes a patented micro-fuel cell that consumes O_2 from the atmosphere surrounding the measuring probe. The consumption of O_2 generates a proportional electric current, which is amplified and used to drive a built-in front panel meter with a scale of 0 to 25%. The analyzer incorporates its own integral pump and power system.

Data Acquisition System. Entropy's (DAS) uses an IBM-compatible computer with hard disk storage and an internal 12-bit analog-to-digital converter with a 16-channel multiplexer. In addition to providing an instantaneous display of analyzer responses, the DAS compiles the analyzer data collected once each second and averages them, calculates emission rates, and documents analyzer calibrations. The test data and calibrations are stored on hard disk and then printed.

All test run concentration results were determined from the average gas concentrations measured during the run and adjusted based on the zero and upscale sampling system bias check results (Equation 6C-1 presented in Method 6C, Section 8). The emission rate values (in units of lb/mmBtu of heat input) were computed from the corrected reference CO and NO_x emission rate values using the O_2-based fuel specific F-factor, 8,710 for Natural Gas and 9,190 for No. 6 Fuel Oil, and the equation presented in EPA Method 19, Section 2.1.

4.2 Equipment Calibration

EPA Protocol 1 gases were used on this compliance test. The calibration gas certificates of analysis, the reference method system performance tests, and the NO_2 to NO conversion efficiency tests are provided in **Appendix C.**

APPENDIX A. TEST RESULTS

1. Boiler No. 2

a. Natural Gas

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - GAS
RUN: 2G-CEM-1<1505-1605> DATE: 04/10/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	0.8	1.0	0.9
46.9	ppm NOx	46.8	47.4	47.1
0.0	ppm CO	0.5	0.3	0.4
59.3	ppm CO	57.4	57.4	57.4
0.00	% Oxygen	0.21	0.13	0.17
12.02	% Oxygen	11.82	11.81	11.82

Uncorrected Data: 31.5 ppm NOx 2.36 % Oxygen
2.0 ppm CO

CORRECTED RESULTS

31.1	ppm NOx	0.0363	lb NOx/MBtu
1.7	ppm CO	0.00121	lb CO/MBtu
2.26	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - GAS
RUN: 2G-CEM-2<1615-1715> DATE: 04/10/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	1.0	1.1	1.1
46.9	ppm NOx	47.4	48.2	47.8
0.0	ppm CO	0.3	0.4	0.4
59.3	ppm CO	57.4	57.4	57.4
0.00	% Oxygen	0.13	0.07	0.10
12.02	% Oxygen	11.81	11.84	11.83

Uncorrected Data: 31.7 ppm NOx 2.33 % Oxygen
2.0 ppm CO

CORRECTED RESULTS

30.7	ppm NOx	0.0359	lb NOx/MBtu
1.7	ppm CO	0.00121	lb CO/MBtu
2.29	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - GAS
RUN: 2G-CEM-3<1725-1825> DATE: 04/10/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	1.1	1.3	1.2
46.9	ppm NOx	48.2	47.2	47.7
0.0	ppm CO	0.4	1.0	0.7
59.3	ppm CO	57.4	57.6	57.5
0.00	% Oxygen	0.07	0.10	0.09
12.02	% Oxygen	11.84	11.87	11.86

Uncorrected Data: 31.4 ppm NOx 2.39 % Oxygen
2.0 ppm CO

CORRECTED RESULTS

30.5	ppm NOx	0.0357	lb NOx/MBtu
1.4	ppm CO	0.00100	lb CO/MBtu
2.35	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - GAS TEST DATE: 04/10/96

RUN NUMBER: 2G-CEM-1<1505-1605>

SPAN VALUES: 100.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	0.8	0.30	1.0	0.50	0.20
NOx UP-SCALE	46.5	46.8	0.30	47.4	0.90	0.60
CO ZERO GAS	0.4	0.5	0.05	0.3	-0.05	-0.10
CO UP-SCALE	59.3	57.4	-0.95	57.4	-0.95	0.00
O2 ZERO GAS	0.22	0.21	-0.04	0.13	-0.36	-0.32
O2 UP-SCALE	12.06	11.82	-0.96	11.81	-1.00	-0.04

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - GAS

TEST DATE: 04/10/96

RUN NUMBER: 2G-CEM-2<1615-1715>

SPAN VALUES: 100.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	1.0	0.50	1.1	0.60	0.10
NOx UP-SCALE	46.5	47.4	0.90	48.2	1.70	0.80
CO ZERO GAS	0.4	0.3	-0.05	0.4	0.00	0.05
CO UP-SCALE	59.3	57.4	-0.95	57.4	-0.95	0.00
O2 ZERO GAS	0.22	0.13	-0.36	0.07	-0.60	-0.24
O2 UP-SCALE	12.06	11.81	-1.00	11.84	-0.88	0.12

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - GAS

TEST DATE: 04/10/96

RUN NUMBER: 2G-CEM-3<1725-1825>

SPAN VALUES: 100.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	1.1	0.62	1.3	0.80	0.18
NOx UP-SCALE	46.5	48.2	1.70	47.2	0.70	-1.00
CO ZERO GAS	0.4	0.4	0.00	1.0	0.30	0.30
CO UP-SCALE	59.3	57.4	-0.95	57.6	-0.85	0.10
O2 ZERO GAS	0.22	0.07	-0.60	0.10	-0.48	0.12
O2 UP-SCALE	12.06	11.84	-0.88	11.87	-0.76	0.12

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

APPENDIX A. TEST RESULTS

1. Boiler No. 2

b. No. 6 Fuel Oil

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - OIL
RUN: 2O-CEM-1<0815-0915> DATE: 04/11/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	0.8	2.9	1.9
257.0	ppm NOx	253.0	253.7	253.4
0.0	ppm CO	0.4	0.4	0.4
59.3	ppm CO	57.4	57.4	57.4
0.00	% Oxygen	0.20	0.14	0.17
12.02	% Oxygen	12.07	12.07	12.07

Uncorrected Data: 289.5 ppm NOx 3.42 % Oxygen
15.0 ppm CO

CORRECTED RESULTS

293.9	ppm NOx	0.383	lb NOx/MBtu
15.2	ppm CO	0.0120	lb CO/MBtu
3.28	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - OIL
RUN: 2O-CEM-2<0925-1025> DATE: 04/11/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	2.9	2.3	2.6
257.0	ppm NOx	253.7	251.4	252.6
0.0	ppm CO	0.4	0.4	0.4
59.3	ppm CO	57.4	57.2	57.3
0.00	% Oxygen	0.14	0.28	0.21
12.02	% Oxygen	12.07	12.17	12.12

Uncorrected Data: 289.6 ppm NOx 3.38 % Oxygen
9.0 ppm CO

CORRECTED RESULTS

295.0	ppm NOx	0.382	lb NOx/MBtu
9.0	ppm CO	0.00709	lb CO/MBtu
3.20	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - OIL
RUN: 2O-CEM-3<1045-1145> DATE: 04/11/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	2.3	2.5	2.4
257.0	ppm NOx	251.4	254.3	252.9
0.0	ppm CO	0.4	1.0	0.7
59.3	ppm CO	57.2	57.2	57.2
0.00	% Oxygen	0.28	0.11	0.20
12.02	% Oxygen	12.17	12.10	12.14

Uncorrected Data: 291.5 ppm NOx 3.34 % Oxygen
8.9 ppm CO

CORRECTED RESULTS

296.6	ppm NOx	0.383	lb NOx/MBtu
8.6	ppm CO	0.00676	lb CO/MBtu
3.16	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - OIL TEST DATE: 04/11/96

RUN NUMBER: 20-CEM-1<0815-0915>

SPAN VALUES: 500.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	0.8	0.06	2.9	0.48	0.42
NOx UP-SCALE	252.8	253.0	0.04	253.7	0.18	0.14
CO ZERO GAS	0.2	0.4	0.10	0.4	0.10	0.00
CO UP-SCALE	59.1	57.4	-0.85	57.4	-0.85	0.00
O2 ZERO GAS	0.24	0.20	-0.16	0.14	-0.40	-0.24
O2 UP-SCALE	12.17	12.07	-0.40	12.07	-0.40	0.00

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE - ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE - INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - OIL TEST DATE: 04/11/96

RUN NUMBER: 20-CEM-2<0925-1025>

SPAN VALUES: 500.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	2.9	0.48	2.3	0.36	-0.12
NOx UP-SCALE	252.8	253.7	0.18	251.4	-0.28	-0.46
CO ZERO GAS	0.2	0.4	0.10	0.4	0.10	0.00
CO UP-SCALE	59.1	57.4	-0.85	57.2	-0.95	-0.10
O2 ZERO GAS	0.24	0.14	-0.40	0.28	0.16	0.56
O2 UP-SCALE	12.17	12.07	-0.40	12.17	0.00	0.40

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE - ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE - INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 2 - OIL TEST DATE: 04/11/96

RUN NUMBER: 20-CEM-3<1045-1145>

SPAN VALUES: 500.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	2.3	0.36	2.5	0.40	0.04
NOx UP-SCALE	252.8	251.4	-0.28	254.3	0.30	0.58
CO ZERO GAS	0.2	0.4	0.10	1.0	0.40	0.30
CO UP-SCALE	59.1	57.2	-0.95	57.2	-0.95	0.00
O2 ZERO GAS	0.24	0.28	0.16	0.11	-0.52	-0.68
O2 UP-SCALE	12.17	12.17	0.00	12.10	-0.28	-0.28

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

APPENDIX A. TEST RESULTS

2. Boiler No. 3

a. Natural Gas

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - GAS
RUN: 3G-CEM-1<1000-1100> DATE: 04/10/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	0.6	0.8	0.7
46.9	ppm NOx	46.4	46.5	46.5
0.0	ppm CO	0.6	1.0	0.8
59.3	ppm CO	58.5	57.4	58.0
0.00	% Oxygen	0.27	0.30	0.29
12.02	% Oxygen	11.97	11.97	11.97

Uncorrected Data: 29.5 ppm NOx 4.65 % Oxygen
4.7 ppm CO

CORRECTED RESULTS

29.5	ppm NOx	0.0391	lb NOx/MBtu
4.0	ppm CO	0.00322	lb CO/MBtu
4.49	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - GAS
RUN: 3G-CEM-2<1110-1210> DATE: 04/10/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	0.8	0.8	0.8
46.9	ppm NOx	46.5	47.0	46.8
0.0	ppm CO	1.0	0.4	0.7
59.3	ppm CO	57.4	57.4	57.4
0.00	% Oxygen	0.30	0.08	0.19
12.02	% Oxygen	11.97	11.84	11.91

Uncorrected Data: 29.8 ppm NOx 3.20 % Oxygen
5.3 ppm CO

CORRECTED RESULTS

29.6	ppm NOx	0.0361	lb NOx/MBtu
4.8	ppm CO	0.00356	lb CO/MBtu
3.09	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - GAS
RUN: 3G-CEM-3<1220-1320> DATE: 04/10/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	0.8	0.8	0.8
46.9	ppm NOx	47.0	46.8	46.9
0.0	ppm CO	0.4	0.5	0.5
59.3	ppm CO	57.4	57.4	57.4
0.00	% Oxygen	0.08	0.21	0.15
12.02	% Oxygen	11.84	11.82	11.83

Uncorrected Data: 29.8 ppm NOx 3.16 % Oxygen
4.6 ppm CO

CORRECTED RESULTS

29.5	ppm NOx	0.0360	lb NOx/MBtu
4.3	ppm CO	0.00319	lb CO/MBtu
3.10	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - GAS TEST DATE: 04/10/96

RUN NUMBER: 3G-CEM-1<1000-1100>

SPAN VALUES: 100.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	0.6	0.10	0.8	0.30	0.20
NOx UP-SCALE	46.5	46.4	-0.10	46.5	0.00	0.10
CO ZERO GAS	0.4	0.6	0.10	1.0	0.30	0.20
CO UP-SCALE	59.3	58.5	-0.40	57.4	-0.95	-0.55
O2 ZERO GAS	0.22	0.27	0.20	0.30	0.32	0.12
O2 UP-SCALE	12.06	11.97	-0.36	11.97	-0.36	0.00

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE - ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE - INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - GAS

TEST DATE: 04/10/96

RUN NUMBER: 3G-CEM-2<1110-1210>

SPAN VALUES: 100.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	0.8	0.30	0.8	0.30	0.00
NOx UP-SCALE	46.5	46.5	0.00	47.0	0.50	0.50
CO ZERO GAS	0.4	1.0	0.30	0.4	0.00	-0.30
CO UP-SCALE	59.3	57.4	-0.95	57.4	-0.95	0.00
O2 ZERO GAS	0.22	0.30	0.32	0.08	-0.56	-0.88
O2 UP-SCALE	12.06	11.97	-0.36	11.84	-0.88	-0.52

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - GAS TEST DATE: 04/10/96

RUN NUMBER: 3G-CEM-3<1220-1320>

SPAN VALUES: 100.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	0.8	0.30	0.8	0.30	0.00
NOx UP-SCALE	46.5	47.0	0.50	46.8	0.30	-0.20
CO ZERO GAS	0.4	0.4	0.00	0.5	0.05	0.05
CO UP-SCALE	59.3	57.4	-0.95	57.4	-0.95	0.00
O2 ZERO GAS	0.22	0.08	-0.56	0.21	-0.04	0.52
O2 UP-SCALE	12.06	11.84	-0.88	11.82	-0.96	-0.08

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE - ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE - INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

APPENDIX A. TEST RESULTS

2. Boiler No. 3

b. No. 6 Fuel Oil

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - OIL
RUN: 3O-CEM-1<1430-1530> DATE: 04/11/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	2.5	3.1	2.8
257.0	ppm NOx	254.3	253.2	253.8
0.0	ppm CO	1.0	1.1	1.1
59.3	ppm CO	57.2	56.8	57.0
0.00	% Oxygen	0.11	0.25	0.18
12.02	% Oxygen	12.10	11.87	11.99

Uncorrected Data: 289.0 ppm NOx 3.26 % Oxygen
81.1 ppm CO

CORRECTED RESULTS

293.0	ppm NOx	0.378	lb NOx/MBtu
84.9	ppm CO	0.0666	lb CO/MBtu
3.13	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - OIL
RUN: 3O-CEM-2<1540-1640> DATE: 04/11/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	3.1	4.6	3.9
257.0	ppm NOx	253.2	256.0	254.6
0.0	ppm CO	1.1	1.9	1.5
59.3	ppm CO	56.8	56.6	56.7
0.00	% Oxygen	0.25	0.12	0.19
12.02	% Oxygen	11.87	12.17	12.02

Uncorrected Data: 299.4 ppm NOx 3.38 % Oxygen
22.2 ppm CO

CORRECTED RESULTS

302.9	ppm NOx	0.393	lb NOx/MBtu
22.2	ppm CO	0.0175	lb CO/MBtu
3.24	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE NOx AND CO EMISSIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - OIL
RUN: 3O-CEM-3<1650-1750> DATE: 04/11/96

GAS VALUE		INITIAL CAL	FINAL CAL	MEAN CAL
0.0	ppm NOx	4.6	3.6	4.1
257.0	ppm NOx	256.0	255.9	256.0
0.0	ppm CO	1.9	1.7	1.8
59.3	ppm CO	56.6	56.4	56.5
0.00	% Oxygen	0.12	0.20	0.16
12.02	% Oxygen	12.17	12.08	12.13

Uncorrected Data: 306.0 ppm NOx 3.04 % Oxygen
25.1 ppm CO

CORRECTED RESULTS

308.0	ppm NOx	0.392	lb NOx/MBtu
25.3	ppm CO	0.020	lb CO/MBtu
2.89	% Oxygen		

Corrected Conc. = $Cma(\bar{C} - Co)/(Cm - Co)$

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - OIL TEST DATE: 04/11/96

RUN NUMBER: 3o-CEM-1<1430-1530>

SPAN VALUES: 500.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	2.5	0.40	3.1	0.52	0.12
NOx UP-SCALE	252.8	254.3	0.30	253.2	0.08	-0.22
CO ZERO GAS	0.2	1.0	0.40	1.1	0.45	0.05
CO UP-SCALE	59.1	57.2	-0.95	56.8	-1.15	-0.20
O2 ZERO GAS	0.24	0.11	-0.52	0.25	0.04	0.56
O2 UP-SCALE	12.17	12.10	-0.28	11.87	-1.20	-0.92

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - OIL

TEST DATE: 04/11/96

RUN NUMBER: 3O-CEM-2<1540-1640>

SPAN VALUES: 500.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	3.1	0.52	4.6	0.82	0.30
NOx UP-SCALE	252.8	253.2	0.08	256.0	0.64	0.56
CO ZERO GAS	0.2	1.1	0.45	1.9	0.85	0.40
CO UP-SCALE	59.1	56.8	-1.15	56.6	-1.25	-0.10
O2 ZERO GAS	0.24	0.25	0.04	0.12	-0.48	-0.52
O2 UP-SCALE	12.17	11.87	-1.20	12.17	0.00	1.20

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE - ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE - INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

COMPANY: HERSHEY CHOCOLATE
SOURCE: UNIT 3 - OIL TEST DATE: 04/11/96

RUN NUMBER: 30-CEM-3<1650-1750>

SPAN VALUES: 500.0 ppm NOx
200.0 ppm CO
25.00 % Oxygen

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.5	4.6	0.82	3.6	0.62	-0.20
NOx UP-SCALE	252.8	256.0	0.64	255.9	0.62	-0.02
CO ZERO GAS	0.2	1.9	0.85	1.7	0.75	-0.10
CO UP-SCALE	59.1	56.6	-1.25	56.4	-1.35	-0.10
O2 ZERO GAS	0.24	0.12	-0.48	0.20	-0.16	0.32
O2 UP-SCALE	12.17	12.17	0.00	12.08	-0.36	-0.36

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

APPENDIX A. TEST RESULTS

3. Example Calculations

NOTE

The example values shown in these calculations have been rounded for presentation purposes. Any hand calculations conducted using these example values may produce slightly different results than those presented.

CONSTANTS, DEFINITIONS, NOMENCLATURE, AND UNITS

460	0 degrees Fahrenheit in degrees Rankin. The sum of 460 and the standard temperature (60, 68, 77, etc. in °F) gives Tstd in degrees Rankin.
273	0 degrees Celsius in degrees Kelvin. The sum of 273 and the standard temperature (18, 20, 25, etc. in °C) gives Tstd in degrees Kelvin.
29.92	Standard absolute pressure (Pstd), inches of mercury. English unit.
760	Standard absolute pressure (Pstd), millimeters of mercury. Metric unit.
*24.056**	Liters per gram-mole at standard conditions.
*385.3**	Molar volume cubic feet/pound-mole at standard conditions.
*0.04707**	Standard cubic feet per gram or mL of H20 at standard conditions.
7000	Grains per pound.
453.592	Grams per pound.
0.02832	Cubic meters per cubic foot.
28.32	Liters per cubic foot.
0.03531	Cubic feet per liter.
35.31	Cubic feet per cubic meter.
1000	Conversion from milligrams to grams, milliliters to liters, and liters to cubic meters.
10^6	Conversion factor for decimal fraction to parts per million.
144	Square inches per square foot.
60	Minutes per hour and seconds per minute.
13.6	Specific gravity of mercury (1 inch of mercury = 13.6 inches of H20).
20.9	Percent O2 by volume (dry basis) in ambient air.
85.49	Pitot tube constant (Kp): $\frac{feet}{second}\sqrt{\frac{(lb/lb-mole)*(inches\ Mercury)}{(degrees\ Rankin)*(inches\ H2O)}}$
A	Stack cross-sectional area, square inches.

* Where applicable, these constants must be corrected (if the standard temperature is not 68°F) by multiplying them by the ratio of the standard temperatures. For example to convert to 77° F: (460+77)/(460+68)

EXAMPLE TEST CALCULATIONS
Boiler No. 2
RUN NUMBER: 2G-CEM-1

EMISSION RATE, CARBON MONOXIDE, lb/MMBtu

lb/mmBtu = $(ppm_{wd} \bullet fwt) / (385.3 \bullet 10^6) \bullet F \bullet 20.9 / (20.9 - \%O2)$

lb/mmBtu = (1.7 • 28.01) / (385.3 • 10^6) * 8710 * 20.9 / (20.9 - 2.3)

lb/mmBtu = 0.00121 lb/mmBtu

APPENDIX B. FIELD DATA

1. Boiler No. 2

a. Natural Gas

UNIT #3 GAS
UNIT #2 GAS

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: POST RUN 3 PRE RUN 4 SYSTEM BIAS CHECK
UNIT #2 RUN 1

DATE : 04-10-1996 TIME: 13:20 - 13:27

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 3 UNIT 2	ppmNOX	0.0	0.8
1	UNIT 3	ppmNOX	(46.5) 46.9 AVG	46.8
2	UNIT 3	ppm CO	0.0	0.5
2	UNIT 3	ppm CO	(57.3) 59.3 AVG	57.4
3	UNIT 3	% O2	0.00	0.21
3	UNIT 3	% O2	12.02	11.82

Unit 2-045-1

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
15:06	30.8	2.4	2.39	0.036	0.002
15:07	30.8	1.5	2.39	0.036	0.001
15:08	30.9	1.6	2.36	0.036	0.001
15:09	30.8	2.2	2.26	0.036	0.002
15:10	30.8	2.9	2.23	0.036	0.002
15:11	30.9	2.1	2.36	0.036	0.002
15:12	30.9	1.9	2.38	0.036	0.001
15:13	31.1	1.6	2.39	0.037	0.001
15:14	31.1	1.3	2.56	0.037	0.001
15:15	31.0	1.7	2.29	0.036	0.001
15:16	31.0	2.3	2.41	0.036	0.002
15:17	31.1	1.7	2.33	0.036	0.001
15:18	30.8	3.1	2.29	0.036	0.002
15:19	30.9	2.2	2.34	0.036	0.002
15:20	31.2	1.7	2.41	0.037	0.001
AVERAGE VALUES FOR THE LAST 15 MINUTES					
15:20	30.9	2.0	2.36	0.036	0.001
15:21	31.0	2.1	2.32	0.036	0.002
15:22	31.1	1.9	2.41	0.037	0.001
15:23	31.0	1.4	2.44	0.037	0.001
15:24	31.0	1.4	2.51	0.037	0.001
15:25	31.2	1.4	2.42	0.037	0.001
15:26	31.8	2.0	2.29	0.037	0.001
15:27	31.9	3.1	2.28	0.037	0.002
15:28	32.0	2.0	2.28	0.037	0.001
15:29	32.0	1.9	2.33	0.037	0.001
15:30	31.9	2.1	2.33	0.037	0.002
15:31	31.9	1.8	2.40	0.037	0.001
15:32	32.0	1.2	2.46	0.038	0.001
15:33	31.9	1.8	2.29	0.037	0.001
15:34	31.7	3.0	2.27	0.037	0.002
15:35	31.8	2.7	2.28	0.037	0.002
AVERAGE VALUES FOR THE LAST 15 MINUTES					
15:35	31.6	2.0	2.35	0.037	0.001
15:36	31.9	2.0	2.33	0.037	0.001
15:37	31.8	1.8	2.43	0.037	0.001
15:38	31.9	1.3	2.44	0.038	0.001
15:39	31.8	1.8	2.42	0.037	0.001
15:40	31.9	1.3	2.40	0.038	0.001
15:41	31.7	2.4	2.24	0.037	0.002
15:42	31.8	2.3	2.37	0.037	0.002
15:43	31.8	1.8	2.42	0.037	0.001
15:44	31.8	1.8	2.41	0.037	0.001
15:45	31.8	1.5	2.39	0.037	0.001
15:46	31.7	2.3	2.31	0.037	0.002
15:47	31.7	2.3	2.32	0.037	0.002
15:48	31.7	1.6	2.38	0.037	0.001

UNIT 2 Wks - 1

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
15:49	31.7	1.9	2.40	0.037	0.001
15:50	31.6	2.1	2.40	0.037	0.002
AVERAGE VALUES FOR THE LAST 15 MINUTES					
15:50	31.8	1.9	2.38	0.037	0.001
15:51	31.7	1.8	2.41	0.037	0.001
15:52	31.7	1.7	2.40	0.037	0.001
15:53	31.7	1.6	2.40	0.037	0.001
15:54	31.6	2.0	2.33	0.037	0.001
15:55	31.6	1.6	2.42	0.037	0.001
15:56	31.7	2.0	2.33	0.037	0.001
15:57	31.4	3.5	2.17	0.036	0.002
15:58	31.8	2.0	2.39	0.037	0.001
15:59	31.6	1.5	2.39	0.037	0.001
16:00	31.7	1.6	2.48	0.037	0.001
16:01	31.6	1.3	2.37	0.037	0.001
16:02	31.5	2.1	2.41	0.037	0.002
16:03	31.5	1.8	2.32	0.037	0.001
16:04	31.6	2.4	2.28	0.037	0.002
16:05	31.5	2.4	2.28	0.037	0.002
AVERAGE VALUES FOR THE LAST 15 MINUTES					
16:05	31.6	2.0	2.36	0.037	0.001
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
16:05	31.5	2.0	2.36	0.037	0.001

COMMENTS: END RUN 1
UNIT 2 GAS

Unit 2-6

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE
(4)

REASON: POST RUN 1 PRE RUN 2 SYSTEM BIAS CHECK
UNIT 2

DATE : 04-10-1996 TIME: 16:05 - 16:11

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
-1	UNIT 2	ppmNOX	0.0	1.0
1	UNIT 2	ppmNOX	(46.5) 46.9 AR	47.4
2	UNIT 2	ppm CO	0.0	0.3
2	UNIT 2	ppm CO	59.3	57.4
3	UNIT 2	% O2	0.00	0.13
3	UNIT 2	% O2	12.02	11.81

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HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
16:16	31.0	2.0	2.39	0.036	0.001
16:17	30.8	1.4	2.38	0.036	0.001
16:18	31.0	2.3	2.27	0.036	0.002
16:19	31.2	1.4	2.33	0.037	0.001
16:20	31.2	2.3	2.21	0.036	0.002
16:21	31.3	2.1	2.34	0.037	0.001
16:22	31.2	2.2	2.27	0.036	0.002
16:23	31.3	1.7	2.35	0.037	0.001
16:24	31.3	1.5	2.32	0.037	0.001
16:25	31.3	1.9	2.30	0.037	0.001
16:26	31.4	3.5	2.17	0.036	0.002
16:27	31.7	2.6	2.32	0.037	0.002
16:28	31.4	2.6	2.19	0.037	0.002
16:29	31.6	1.8	2.33	0.037	0.001
16:30	31.7	1.5	2.33	0.037	0.001
AVERAGE VALUES FOR THE LAST 15 MINUTES					
16:30	31.3	2.1	2.30	0.037	0.001
16:31	31.5	1.8	2.35	0.037	0.001
16:32	31.6	1.9	2.29	0.037	0.001
16:33	31.5	2.2	2.37	0.037	0.002
16:34	31.6	1.6	2.30	0.037	0.001
16:35	31.6	2.3	2.28	0.037	0.002
16:36	31.5	3.5	2.18	0.037	0.002
16:37	31.4	2.4	2.58	0.037	0.002
16:38	32.4	2.4	2.26	0.038	0.002
16:39	32.3	2.1	2.34	0.038	0.001
16:40	32.4	2.4	2.38	0.038	0.002
16:41	32.2	1.6	2.45	0.038	0.001
16:42	32.2	1.3	2.47	0.038	0.001
16:43	32.1	2.0	2.31	0.038	0.001
16:44	32.2	1.8	2.41	0.038	0.001
16:45	32.1	1.8	2.32	0.038	0.001
AVERAGE VALUES FOR THE LAST 15 MINUTES					
16:45	31.9	2.1	2.35	0.037	0.001
16:46	32.1	2.9	2.32	0.038	0.002
16:47	32.2	1.9	2.36	0.038	0.001
16:48	32.2	1.6	2.46	0.038	0.001
16:49	32.2	1.5	2.40	0.038	0.001
16:50	32.0	2.5	2.35	0.037	0.002
16:51	32.1	1.7	2.43	0.038	0.001
16:52	32.0	2.0	2.28	0.037	0.001
16:53	32.2	2.0	2.43	0.038	0.001
16:54	32.0	2.1	2.31	0.037	0.002
16:55	31.9	2.2	2.43	0.038	0.002
16:56	31.4	1.3	2.41	0.037	0.001
16:57	31.4	2.0	2.32	0.037	0.001
16:58	31.4	1.9	2.34	0.037	0.001

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
16:59	31.4	1.9	2.25	0.037	0.001
17:00	31.4	2.1	2.30	0.037	0.001
AVERAGE VALUES FOR THE LAST 15 MINUTES					
17:00	31.9	2.0	2.36	0.037	0:001
17:01	31.4	2.0	2.32	0.037	0.001
17:02	31.6	2.3	2.26	0.037	0.002
17:03	31.5	2.8	2.24	0.037	0.002
17:04	31.6	2.0	2.30	0.037	0.001
17:05	31.5	1.9	2.28	0.037	0.001
17:06	31.7	1.5	2.44	0.037	0.001
17:07	31.6	1.5	2.36	0.037	0.001
17:08	31.4	2.5	2.25	0.037	0.002
17:09	31.5	2.0	2.29	0.037	0.001
17:10	31.6	2.7	2.24	0.037	0.002
17:11	31.7	2.4	2.31	0.037	0.002
17:12	31.8	2.2	2.30	0.037	0.002
17:13	31.8	2.3	2.29	0.037	0.002
17:14	31.8	1.7	2.39	0.037	0.001
17:15	31.7	1.7	2.35	0.037	0.001
AVERAGE VALUES FOR THE LAST 15 MINUTES					
17:15	31.6	2.1	2.31	0.037	0.001
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
17:15	31.7	2.0	2.33	0.037	0.001

COMMENTS: END RUN 2
UNIT 2 - GAS

UNIT 2 GAS

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: POST RUN 2 PRE RUN 3 SYSTEM BIAS CHECK

DATE : 04-10-1996 TIME: 17:15 - 17:20

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 2	ppmNOX	0.0	1.1
1	UNIT 2	ppmNOX	(46.5) 46.9 PK	48.2
2	UNIT 2	ppm CO	0.0	0.4
2	UNIT 2	ppm CO	59.3	57.4
3	UNIT 2	% O2	0.00	0.07
3	UNIT 2	% O2	12.02	11.84

Unit 2 Gas 3

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
17:26	31.5	2.9	2.27	0.037	0.002
17:27	31.7	2.1	2.32	0.037	0.001
17:28	31.5	2.3	2.25	0.037	0.002
17:29	31.6	2.1	2.26	0.037	0.001
17:30	31.7	1.8	2.27	0.037	0.001
17:31	31.5	1.7	2.37	0.037	0.001
17:32	31.7	1.2	2.42	0.037	0.001
17:33	31.5	1.2	2.37	0.037	0.001
17:34	31.5	2.0	2.31	0.037	0.001
17:35	31.5	2.3	2.26	0.037	0.002
17:36	31.5	2.2	2.26	0.037	0.002
17:37	31.5	2.8	2.27	0.037	0.002
17:38	31.6	2.0	2.31	0.037	0.001
17:39	31.6	2.0	2.24	0.037	0.001
17:40	31.5	1.9	2.43	0.037	0.001
AVERAGE VALUES FOR THE LAST 15 MINUTES					
17:40	31.6	2.0	2.31	0.037	0.001
17:41	31.6	1.4	2.37	0.037	0.001
17:42	31.5	2.0	2.28	0.037	0.001
17:43	31.4	1.6	2.38	0.037	0.001
17:44	31.4	2.3	2.24	0.037	0.002
17:45	31.5	2.3	2.25	0.037	0.002
17:46	31.3	1.9	2.76	0.038	0.001
17:47	32.2	1.5	2.38	0.038	0.001
17:48	32.1	2.5	2.33	0.038	0.002
17:49	32.0	2.2	2.37	0.038	0.002
17:50	31.9	2.0	2.44	0.038	0.001
17:51	32.0	1.4	2.50	0.038	0.001
17:52	32.0	2.0	2.38	0.037	0.001
17:53	32.0	1.9	2.34	0.037	0.001
17:54	32.1	2.2	2.40	0.038	0.002
17:55	31.9	2.2	2.31	0.037	0.002
AVERAGE VALUES FOR THE LAST 15 MINUTES					
17:55	31.8	2.0	2.38	0.037	0.001
17:56	31.8	1.9	2.39	0.037	0.001
17:57	31.9	1.6	2.51	0.038	0.001
17:58	31.8	1.4	2.43	0.037	0.001
17:59	32.0	2.1	2.35	0.037	0.002
18:00	31.6	2.7	2.35	0.037	0.002
18:01	31.6	2.0	2.35	0.037	0.001
18:02	31.6	3.1	2.28	0.037	0.002
18:03	31.7	2.0	2.44	0.037	0.001
18:04	31.5	2.1	2.34	0.037	0.001
18:05	31.5	1.7	2.44	0.037	0.001
18:06	31.2	1.5	2.58	0.037	0.001
18:07	31.2	2.6	2.56	0.037	0.002
18:08	30.8	1.6	2.54	0.036	0.001

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HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
18:09	30.6	1.7	2.46	0.036	0.001
18:10	30.6	1.8	2.48	0.036	0.001
AVERAGE VALUES FOR THE LAST 15 MINUTES					
18:10	31.4	2.0	2.43	0.037	0.001
18:11	30.5	1.6	2.48	0.036	0.001
18:12	30.6	1.8	2.45	0.036	0.001
18:13	30.5	2.9	2.32	0.036	0.002
18:14	30.7	2.2	2.39	0.036	0.002
18:15	30.6	2.6	2.37	0.036	0.002
18:16	30.9	1.6	2.61	0.037	0.001
18:17	30.8	1.4	2.44	0.036	0.001
18:18	30.7	2.7	2.36	0.036	0.002
18:19	30.9	1.5	2.48	0.036	0.001
18:20	30.8	1.9	2.40	0.036	0.001
18:21	30.8	2.3	2.37	0.036	0.002
18:22	30.7	2.4	2.36	0.036	0.002
18:23	30.9	2.2	2.37	0.036	0.002
18:24	30.8	2.2	2.48	0.036	0.002
18:25	30.9	1.6	2.55	0.037	0.001
AVERAGE VALUES FOR THE LAST 15 MINUTES					
18:25	30.7	2.1	2.43	0.036	0.001
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
18:25	31.4	2.0	2.39	0.037	0.001

COMMENTS: END RUN 3
UNIT 2 GAS

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: POST TEST 3 (6) SYSTEM BIAS CHECK

DATE : 04-10-1996 TIME: 18:25 - 18:29

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 2	ppmNOX	0.0	1.3
1	UNIT 2	ppmNOX	(46.5) 46.9 PPM	47.2
2	UNIT 2	ppm CO	0.0	1.0
2	UNIT 2	ppm CO	59.3	57.6
3	UNIT 2	% O2	0.00	0.10
3	UNIT 2	% O2	12.02	11.87

APPENDIX B. FIELD DATA

1. Boiler No. 2

b. No. 6 Fuel Oil

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: DIRECT CALIBRATION ERROR CHECK DIL PR

DATE : 04-11-1996 TIME: 06:31 - 06:43

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 2	ppmNOX	0.0	0.5
1	UNIT 2	ppmNOX	252.0 257 PR	252.8
1	UNIT 2	ppmNOX	452.0 457 PR	452.7
2	UNIT 2	ppm CO	0.0	0.2
2	UNIT 2	ppm CO	59.3	59.1
2	UNIT 2	ppm CO	91.0	90.5
2	UNIT 2	ppm CO	151.0 151.4 PR	151.0
3	UNIT 2	% O2	0.00	0.24
3	UNIT 2	% O2	12.02	12.17
3	UNIT 2	% O2	20.12	20.26

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: PRE RUN 1 SYSTEM BIAS CHECK

DATE : 04-11-1996 TIME: 06:44 - 07:24

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 2	ppmNOX	0.0	0.8
1	UNIT 2	ppmNOX	155.0	156.7
1	UNIT 2	ppmNOX	252.0 257.02	253.0
2	UNIT 2	ppm CO	0.0	0.4
2	UNIT 2	ppm CO	91.0	91.5
2	UNIT 2	ppm CO	151.0	151.4
3	UNIT 2	% O2	0.00	0.20
3	UNIT 2	% O2	12.02	12.07

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: PRE RUN 1 SYSTEM BIAS CHECK - CO ANALYZER

DATE : 04-11-1996 TIME: 07:33 - 07:38

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
2	UNIT 2	ppm CO	0.0	0.4
2	UNIT 2	ppm CO	59.3	57.4

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
08:16	283.6	28.3	3.28	0.350	0.021
08:17	284.3	26.8	3.28	0.351	0.020
08:18	283.9	26.2	3.31	0.351	0.020
08:19	284.0	26.2	3.27	0.350	0.020
08:20	284.1	20.7	3.29	0.351	0.016
08:21	283.9	22.7	3.27	0.350	0.017
08:22	284.5	26.8	3.33	0.352	0.020
08:23	285.2	18.8	3.40	0.354	0.014
08:24	285.4	23.5	3.33	0.353	0.018
08:25	284.5	20.9	3.40	0.353	0.016
08:26	284.3	26.5	3.32	0.352	0.020
08:27	284.7	22.9	3.35	0.353	0.017
08:28	285.0	20.5	3.35	0.353	0.015
08:29	284.8	24.1	3.37	0.353	0.018
08:30	284.9	23.0	3.26	0.351	0.017
AVERAGE VALUES FOR THE LAST 15 MINUTES					
08:30	284.5	23.9	3.32	0.352	0.018
08:31	283.9	20.6	3.37	0.352	0.016
08:32	283.8	23.0	3.31	0.351	0.017
08:33	283.7	21.4	3.37	0.352	0.016
08:34	283.1	23.3	3.35	0.350	0.018
08:35	282.8	25.1	3.37	0.351	0.019
08:36	283.7	21.3	3.41	0.353	0.016
08:37	271.8	25.5	3.69	0.343	0.020
08:38	283.0	17.8	3.36	0.351	0.013
08:39	283.1	21.8	3.31	0.350	0.016
08:40	282.9	19.4	3.44	0.352	0.015
08:41	283.0	22.6	3.34	0.350	0.017
08:42	283.4	25.4	3.39	0.352	0.019
08:43	283.4	19.0	3.51	0.354	0.014
08:44	283.5	19.0	3.42	0.352	0.014
08:45	283.8	18.1	3.58	0.356	0.014
AVERAGE VALUES FOR THE LAST 15 MINUTES					
08:45	282.6	21.5	3.41	0.351	0.016
08:46	287.0	15.7	3.45	0.358	0.012
08:47	283.2	16.6	3.46	0.353	0.013
08:48	288.0	15.3	3.61	0.362	0.012
08:49	299.3	5.0	3.54	0.375	0.004
08:50	300.7	4.1	3.56	0.377	0.003
08:51	301.4	3.7	3.62	0.379	0.003
08:52	301.4	3.6	3.55	0.378	0.003
08:53	301.2	3.6	3.61	0.379	0.003
08:54	301.7	3.5	3.61	0.379	0.003
08:55	301.1	3.5	3.63	0.379	0.003
08:56	300.4	3.5	3.61	0.378	0.003
08:57	301.0	4.0	3.54	0.377	0.003
08:58	297.9	4.6	3.50	0.372	0.004

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
08:59	297.5	4.8	3.50	0.372	0.004
09:00	296.2	5.6	3.42	0.368	0.004
AVERAGE VALUES FOR THE LAST 15 MINUTES					
09:00	297.2	6.5	3.55	0.372	0.005
09:01	297.0	5.4	3.40	0.369	0.004
09:02	295.0	5.9	3.44	0.367	0.004
09:03	294.6	6.1	3.42	0.366	0.005
09:04	294.2	6.3	3.41	0.366	0.005
09:05	293.6	7.8	3.35	0.364	0.006
09:06	295.5	6.6	3.46	0.368	0.005
09:07	294.1	7.7	3.32	0.364	0.006
09:08	293.0	8.2	3.42	0.364	0.006
09:09	292.6	9.9	3.38	0.363	0.007
09:10	292.6	7.9	3.41	0.364	0.006
09:11	293.0	8.7	3.36	0.363	0.007
09:12	293.2	10.3	3.31	0.362	0.008
09:13	293.3	11.3	3.36	0.363	0.009
09:14	293.5	8.5	3.39	0.364	0.006
09:15	292.0	10.9	3.36	0.362	0.008
AVERAGE VALUES FOR THE LAST 15 MINUTES					
09:15	293.8	8.1	3.39	0.365	0.006
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
09:15	289.5	15.0	3.42	0.360	0.011

COMMENTS: END RUN 1
UNIT 2 OIL

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: POST RUN 1 PRE RUN 2 SYSTEM BIAS CHECK

DATE : 04-11-1996 TIME: 09:15 - 09:22

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 2	ppmNOX	0.0	2.9
1	UNIT 2	ppmNOX	155.0	157.0
1	UNIT 2	ppmNOX	252.0 257 PPM	253.7
2	UNIT 2	ppm CO	0.0	0.4
2	UNIT 2	ppm CO	59.3	57.4
3	UNIT 2	% O2	0.00	0.14
3	UNIT 2	% O2	12.02	12.07

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
09:26	290.1	7.6	3.49	0.362	0.006
09:27	289.9	9.7	3.43	0.361	0.007
09:28	290.8	7.4	3.52	0.364	0.006
09:29	290.9	7.2	3.48	0.363	0.005
09:30	290.9	7.8	3.47	0.363	0.006
09:31	290.6	8.0	3.43	0.362	0.006
09:32	290.8	8.3	3.42	0.362	0.006
09:33	291.1	7.9	3.43	0.362	0.006
09:34	290.0	7.9	3.51	0.362	0.006
09:35	290.4	9.0	3.41	0.361	0.007
09:36	291.0	8.1	3.43	0.362	0.006
09:37	289.9	8.9	3.43	0.361	0.007
09:38	290.2	10.2	3.42	0.361	0.008
09:39	289.1	8.9	3.41	0.359	0.007
09:40	290.2	8.0	3.47	0.362	0.006
AVERAGE VALUES FOR THE LAST 15 MINUTES					
09:40	290.4	8.3	3.45	0.362	0.006
09:41	289.8	9.3	3.40	0.360	0.007
09:42	289.0	8.6	3.45	0.360	0.007
09:43	289.9	8.9	3.40	0.360	0.007
09:44	289.3	9.1	3.41	0.360	0.007
09:45	288.9	9.6	3.39	0.359	0.007
09:46	288.8	9.2	3.45	0.360	0.007
09:47	282.3	9.1	3.74	0.358	0.007
09:48	288.1	11.9	3.28	0.356	0.009
09:49	288.7	9.2	3.38	0.358	0.007
09:50	287.9	12.2	3.30	0.356	0.009
09:51	289.0	9.1	3.37	0.358	0.007
09:52	287.1	9.8	3.36	0.356	0.007
09:53	288.6	9.6	3.34	0.357	0.007
09:54	288.0	8.1	3.41	0.358	0.006
09:55	289.6	7.7	3.36	0.359	0.006
AVERAGE VALUES FOR THE LAST 15 MINUTES					
09:55	288.3	9.4	3.40	0.358	0.007
09:56	288.7	7.3	3.39	0.358	0.006
09:57	287.5	8.2	3.38	0.357	0.006
09:58	288.0	7.9	3.36	0.357	0.006
09:59	288.8	7.9	3.41	0.359	0.006
10:00	289.1	7.4	3.43	0.360	0.006
10:01	288.0	9.0	3.33	0.356	0.007
10:02	289.3	7.6	3.42	0.360	0.006
10:03	289.2	9.3	3.31	0.357	0.007
10:04	288.9	10.0	3.31	0.357	0.008
10:05	289.2	9.6	3.38	0.359	0.007
10:06	288.0	10.3	3.40	0.358	0.008
10:07	287.7	8.7	3.28	0.355	0.007
10:08	291.4	7.9	3.33	0.361	0.006

UNIT 2 OIL
RUN 2

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
10:09	289.2	9.9	3.38	0.359	0.007
10:10	289.3	9.3	3.29	0.357	0.007
AVERAGE VALUES FOR THE LAST 15 MINUTES					
10:10	288.8	8.7	3.36	0.358	0.007
10:11	289.2	10.6	3.32	0.358	0.008
10:12	290.0	8.5	3.38	0.360	0.006
10:13	289.8	8.4	3.38	0.360	0.006
10:14	289.1	9.1	3.28	0.357	0.007
10:15	290.3	9.8	3.34	0.359	0.007
10:16	290.9	10.3	3.28	0.359	0.008
10:17	290.6	8.4	3.35	0.360	0.006
10:18	290.3	9.4	3.29	0.358	0.007
10:19	290.9	11.3	3.32	0.360	0.009
10:20	291.9	9.8	3.34	0.361	0.007
10:21	291.3	9.4	3.30	0.360	0.007
10:22	291.1	10.2	3.25	0.359	0.008
10:23	291.9	9.3	3.36	0.362	0.007
10:24	292.0	9.5	3.32	0.361	0.007
10:25	292.0	7.6	3.27	0.360	0.006
AVERAGE VALUES FOR THE LAST 15 MINUTES					
10:25	290.8	9.4	3.32	0.360	0.007
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
10:25	289.6	9.0	3.38	0.359	0.007

COMMENTS: END RUN 2
UNIT 2 OIL

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: POST RUN 2 PRE RUN 3 SYSTEM BIAS CHECK

DATE : 04-11-1996 TIME: 10:25 - 10:31

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 2	ppmNOX	0.0	2.3
1	UNIT 2	ppmNOX	(252.0) 257M	251.4
2	UNIT 2	ppm CO	0.0	0.4
2	UNIT 2	ppm CO	59.3	57.2
3	UNIT 2	% O2	0.00	0.28
3	UNIT 2	% O2	12.02	12.17

UNIT 2 & 3

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
10:46	290.3	7.8	3.39	0.380	0.006
10:47	290.9	10.4	3.36	0.380	0.008
10:48	290.8	9.0	3.36	0.380	0.007
10:49	289.9	9.6	3.42	0.380	0.008
10:50	290.1	9.2	3.32	0.378	0.007
10:51	290.8	11.4	3.32	0.380	0.009
10:52	290.1	10.2	3.33	0.379	0.008
10:53	289.5	10.8	3.32	0.378	0.009
10:54	289.4	8.5	3.40	0.379	0.007
10:55	289.3	10.1	3.36	0.378	0.008
10:56	289.0	10.9	3.29	0.376	0.009
10:57	291.2	10.1	3.34	0.380	0.008
10:58	289.3	9.5	3.35	0.378	0.008
10:59	289.5	10.2	3.29	0.377	0.008
11:00	289.8	8.9	3.39	0.380	0.007
AVERAGE VALUES FOR THE LAST 15 MINUTES					
11:00	290.0	9.8	3.35	0.379	0.008
11:01	289.9	8.9	3.31	0.378	0.007
11:02	289.8	9.8	3.39	0.380	0.008
11:03	290.3	9.0	3.32	0.379	0.007
11:04	290.4	9.5	3.30	0.378	0.008
11:05	289.7	9.6	3.33	0.378	0.008
11:06	289.8	8.5	3.38	0.379	0.007
11:07	288.4	9.2	3.32	0.376	0.007
11:08	289.3	9.1	3.37	0.378	0.007
11:09	290.1	9.9	3.42	0.381	0.008
11:10	289.6	8.7	3.37	0.379	0.007
11:11	290.1	10.3	3.32	0.379	0.008
11:12	289.8	8.8	3.44	0.381	0.007
11:13	290.3	9.4	3.33	0.379	0.007
11:14	289.8	9.1	3.39	0.380	0.007
11:15	289.2	9.6	3.41	0.379	0.008
AVERAGE VALUES FOR THE LAST 15 MINUTES					
11:15	289.8	9.3	3.36	0.379	0.007
11:16	291.0	8.2	3.36	0.381	0.007
11:17	289.8	11.1	3.35	0.379	0.009
11:18	289.0	8.7	3.39	0.379	0.007
11:19	289.6	9.6	3.34	0.378	0.008
11:20	289.2	10.9	3.33	0.378	0.009
11:21	289.8	11.7	3.38	0.379	0.009
11:22	289.9	9.4	3.36	0.379	0.008
11:23	290.6	8.8	3.37	0.380	0.007
11:24	290.4	8.2	3.39	0.380	0.007
11:25	290.2	10.5	3.32	0.379	0.008
11:26	289.8	8.8	3.33	0.378	0.007
11:27	292.5	8.6	3.29	0.381	0.007
11:28	292.3	8.9	3.29	0.381	0.007

UNIT 2 OIL

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

TIME	CHAN 1 UNIT 2 ppmNOX	CHAN 2 UNIT 2 ppm CO	CHAN 3 UNIT 2 % O2	UNIT 2 lb NOX MM-BTU	UNIT 2 lb CO MM-BTU
11:29	292.2	8.4	3.27	0.380	0.007
11:30	292.7	9.2	3.27	0.381	0.007
AVERAGE VALUES FOR THE LAST 15 MINUTES					
11:30	290.6	9.4	3.34	0.379	0.007
11:31	293.2	9.5	3.27	0.381	0.007
11:32	294.1	8.3	3.29	0.383	0.007
11:33	294.1	8.2	3.24	0.382	0.007
11:34	293.7	7.7	3.30	0.383	0.006
11:35	294.1	7.5	3.35	0.384	0.006
11:36	294.2	8.0	3.26	0.382	0.006
11:37	294.2	7.7	3.33	0.384	0.006
11:38	295.9	6.6	3.32	0.386	0.005
11:39	296.5	6.2	3.30	0.386	0.005
11:40	296.1	6.2	3.32	0.386	0.005
11:41	296.6	7.6	3.26	0.386	0.006
11:42	296.2	6.6	3.32	0.386	0.005
11:43	297.1	7.7	3.28	0.387	0.006
11:44	298.4	6.3	3.29	0.389	0.005
11:45	299.2	5.9	3.31	0.390	0.005
AVERAGE VALUES FOR THE LAST 15 MINUTES					
11:45	295.6	7.3	3.30	0.385	0.006
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
11:45	291.5	8.9	3.34	0.381	0.007

COMMENTS: END RUN 3
UNIT 2 OIL

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: POST RUN 3 PRE RUN 4 (RUN 1 OIL UNIT 3) SYSTEM BIAS CHECK

DATE : 04-11-1996 TIME: 11:45 - 11:52

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 2	ppmNOX	0.0	2.5
1	UNIT 2	ppmNOX	252.0 257 AR	254.3
2	UNIT 2	ppm CO	0.0	1.0
2	UNIT 2	ppm CO	59.3	57.2
3	UNIT 2	% O2	0.00	0.11
3	UNIT 2	% O2	12.02	12.10

APPENDIX B. FIELD DATA

2. Boiler No. 3

a. Natural Gas

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: DIRECT CALIBRATION ERROR CHECK GAS M2

DATE : 04-10-1996 TIME: 06:30 - 06:43

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 3	ppmNOX	0.0	0.7
1	UNIT 3	ppmNOX	46.5 (46.9 M2)	45.2
1	UNIT 3	ppmNOX	88.9 (89.7 M2)	88.7
2	UNIT 3	ppm CO	0.0	0.4
2	UNIT 3	ppm CO	59.3	59.3
2	UNIT 3	ppm CO	91.0	92.1
2	UNIT 3	ppm CO	151.4	153.0
3	UNIT 3	% O2	0.00	0.31
3	UNIT 3	% O2	12.11 (12.02 M2)	12.13
3	UNIT 3	% O2	20.12	20.10

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: PRE RUN 1 SYSTEM BIAS CHECK GAS PR

DATE : 04-10-1996 TIME: 06:43 - 06:52

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 3	ppmNOX	0.0	0.7
1	UNIT 3	ppmNOX	46.5 46.9 PR	46.1
2	UNIT 3	ppm CO	0.0	0.6
2	UNIT 3	ppm CO	59.3	58.5
3	UNIT 3	% O2	12.11 12.02 PR	11.96
3	UNIT 3	% O2	20.12	19.95

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: PRE RUN 1 RE-DIRECT NOX

DATE : 04-10-1996 TIME: 06:52 - 06:55

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE		MONITOR RESPONSE
1	UNIT 3	ppmNOX	0.0		0.5
1	UNIT 3	ppmNOX	46.5	46.9 PI2	46.5
1	UNIT 3	ppmNOX	88.9	89.7 PI2	89.6

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: PRE RUN 1 NOX SYSTEM BIAS CHECK

DATE : 04-10-1996 TIME: 06:55 - 06:59

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 3	ppmNOX	0.0	0.6
1	UNIT 3	ppmNOX	(46.5) 46.9 AR	46.4

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: O2 ANALYZER REDIRECT - NEW CYLINDER

DATE : 04-10-1996 TIME: 07:31 - 07:35

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
3	UNIT 3	% O2	0.00	0.22
3	UNIT 3	% O2	12.02	12.06
3	UNIT 3	% O2	20.12	20.29

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: PRE RUN 1 SYSTEM BIAS CHECK - O2 ANALYZER

DATE : 04-10-1996 TIME: 07:35 - 07:38

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
3	UNIT 3	% O2	0.00	0.27
3	UNIT 3	% O2	12.02	11.97

UNIT 3 - RUN 1 - CAL

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 3 ppmNOX	CHAN 2 UNIT 3 ppm CO	CHAN 3 UNIT 3 % O2	UNIT 3 lb NOX MM-BTU	UNIT 3 lb CO MM-BTU
10:01	29.3	3.3	4.79	0.040	0.003
10:02	29.3	4.8	4.61	0.039	0.004
10:03	29.4	5.5	4.64	0.039	0.004
10:04	29.4	6.2	4.55	0.039	0.005
10:05	29.4	5.1	4.73	0.040	0.004
10:06	29.5	4.8	4.77	0.040	0.004
10:07	29.4	6.0	4.69	0.039	0.005
10:08	29.5	3.8	4.85	0.040	0.003
10:09	29.6	3.5	4.81	0.040	0.003
10:10	29.6	3.8	4.77	0.040	0.003
10:11	29.6	4.3	4.68	0.040	0.004
10:12	29.5	4.7	4.61	0.039	0.004
10:13	29.5	5.9	4.62	0.039	0.005
10:14	29.6	5.4	4.66	0.040	0.004
10:15	29.5	3.4	4.85	0.040	0.003
AVERAGE VALUES FOR THE LAST 15 MINUTES					
10:15	29.5	4.7	4.71	0.040	0.004
10:16	29.5	3.3	4.70	0.040	0.003
10:17	29.4	4.7	4.64	0.039	0.004
10:18	29.5	6.1	4.62	0.039	0.005
10:19	29.5	4.9	4.64	0.039	0.004
10:20	29.5	4.6	4.74	0.040	0.004
10:21	29.1	3.9	5.30	0.041	0.003
10:22	29.9	4.3	4.47	0.040	0.003
10:23	30.0	6.1	4.45	0.040	0.005
10:24	30.0	4.0	4.43	0.040	0.003
10:25	30.0	3.7	4.46	0.040	0.003
10:26	29.9	3.1	4.51	0.040	0.003
10:27	29.9	6.9	4.44	0.040	0.006
10:28	29.8	5.6	4.36	0.039	0.004
10:29	29.8	5.3	4.36	0.039	0.004
10:30	29.8	3.7	4.53	0.040	0.003
AVERAGE VALUES FOR THE LAST 15 MINUTES					
10:30	29.7	4.7	4.58	0.040	0.004
10:31	29.7	6.1	4.41	0.039	0.005
10:32	29.9	8.2	4.36	0.039	0.007
10:33	29.9	7.1	4.43	0.039	0.006
10:34	29.9	4.0	4.43	0.039	0.003
10:35	30.0	3.7	4.54	0.040	0.003
10:36	29.9	3.5	4.68	0.040	0.003
10:37	29.8	3.7	4.53	0.040	0.003
10:38	29.6	4.1	4.44	0.039	0.003
10:39	29.9	5.3	4.43	0.039	0.004
10:40	29.4	6.5	4.34	0.039	0.005
10:41	29.6	5.1	4.44	0.039	0.004
10:42	29.6	5.1	4.30	0.039	0.004
10:43	29.7	5.8	4.43	0.039	0.005

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 3 ppmNOX	CHAN 2 UNIT 3 ppm CO	CHAN 3 UNIT 3 % O2	UNIT 3 lb NOX MM-BTU	UNIT 3 lb CO MM-BTU
10:44	29.4	4.1	4.79	0.040	0.003
10:45	29.2	4.0	4.94	0.040	0.003
AVERAGE VALUES FOR THE LAST 15 MINUTES					
10:45	29.7	5.1	4.50	0.039	0.004
10:46	29.2	2.5	4.92	0.040	0.002
10:47	29.2	5.2	4.93	0.040	0.004
10:48	29.0	4.8	4.75	0.039	0.004
10:49	29.0	5.9	4.70	0.039	0.005
10:50	29.2	4.6	4.77	0.039	0.004
10:51	29.2	6.3	4.94	0.040	0.005
10:52	29.1	4.6	4.76	0.039	0.004
10:53	29.2	3.7	4.83	0.040	0.003
10:54	29.1	4.3	4.79	0.039	0.004
10:55	29.3	3.7	4.89	0.040	0.003
10:56	29.2	2.5	4.92	0.040	0.002
10:57	29.2	3.6	4.88	0.040	0.003
10:58	29.0	2.7	4.82	0.039	0.002
10:59	29.1	5.8	4.77	0.039	0.005
11:00	29.1	7.9	4.68	0.039	0.006
AVERAGE VALUES FOR THE LAST 15 MINUTES					
11:00	29.2	4.5	4.82	0.039	0.004
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
11:00	29.5	4.7	4.65	0.039	0.004

COMMENTS: END RUN 1
UNIT 3 GAS

Unit #3-GAS

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

Unit #3
REASON: POST RUN1 PRE RUN 2 SYSTEM BIAS CHECK

DATE : 04-10-1996 TIME: 11:00 - 11:07

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 3	ppmNOX	0.0	0.8
1	UNIT 3	ppmNOX	(46.5) 46.9 AL	46.5
2	UNIT 3	ppm CO	0.0	1.0
2	UNIT 3	ppm CO	59.3	57.4
3	UNIT 3	% O2	0.00	0.30
3	UNIT 3	% O2	12.02	11.97

Unit 3-EU2-CAS

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 3 ppmNOX	CHAN 2 UNIT 3 ppm CO	CHAN 3 UNIT 3 % O2	UNIT 3 lb NOX MM-BTU	UNIT 3 lb CO MM-BTU
11:11	29.9	3.0	3.30	0.037	0.002
11:12	29.9	4.1	3.21	0.037	0.003
11:13	29.9	5.6	3.24	0.037	0.004
11:14	29.9	13.1	3.27	0.037	0.010
11:15	29.9	6.5	3.18	0.037	0.005
11:16	30.0	4.0	3.21	0.037	0.003
11:17	29.9	6.5	3.25	0.037	0.005
11:18	30.1	4.5	3.31	0.037	0.003
11:19	30.0	3.4	3.27	0.037	0.003
11:20	29.9	7.6	3.17	0.037	0.006
11:21	29.9	4.0	3.30	0.037	0.003
11:22	29.9	5.8	3.20	0.037	0.004
11:23	30.0	4.3	3.31	0.037	0.003
11:24	30.1	2.7	3.33	0.037	0.002
11:25	30.0	2.6	3.27	0.037	0.002
AVERAGE VALUES FOR THE LAST 15 MINUTES					
11:25	29.9	5.2	3.25	0.037	0.004
11:26	29.8	6.2	3.25	0.037	0.005
11:27	30.0	3.2	3.22	0.037	0.002
11:28	29.9	3.8	3.23	0.037	0.003
11:29	30.0	3.7	3.24	0.037	0.003
11:30	29.9	5.1	3.09	0.036	0.004
11:31	30.0	4.9	3.19	0.037	0.004
11:32	29.8	9.2	3.17	0.037	0.007
11:33	29.9	4.7	3.25	0.037	0.004
11:34	29.4	2.8	3.63	0.037	0.002
11:35	30.4	4.7	3.04	0.037	0.003
11:36	30.2	4.8	3.00	0.037	0.004
11:37	30.2	6.5	2.97	0.037	0.005
11:38	30.3	5.3	3.05	0.037	0.004
11:39	30.2	4.4	2.97	0.037	0.003
11:40	30.2	6.1	3.04	0.037	0.004
AVERAGE VALUES FOR THE LAST 15 MINUTES					
11:40	30.0	5.0	3.16	0.037	0.004
11:41	30.1	5.5	3.01	0.037	0.004
11:42	30.1	4.7	3.07	0.037	0.004
11:43	30.1	6.6	2.98	0.036	0.005
11:44	30.1	4.2	3.08	0.037	0.003
11:45	30.0	3.6	3.08	0.037	0.003
11:46	30.0	3.9	3.10	0.037	0.003
11:47	30.1	2.9	3.07	0.037	0.002
11:48	30.0	3.1	3.06	0.037	0.002
11:49	29.9	10.0	2.97	0.036	0.007
11:50	30.1	5.8	2.97	0.036	0.004
11:51	29.9	3.9	3.03	0.036	0.003
11:52	29.7	4.9	3.15	0.036	0.004
11:53	29.7	3.1	3.39	0.037	0.002

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 3 ppmNOX	CHAN 2 UNIT 3 ppm CO	CHAN 3 UNIT 3 % O2	UNIT 3 lb NOX MM-BTU	UNIT 3 lb CO MM-BTU
11:54	29.7	5.9	3.29	0.037	0.004
11:55	29.5	3.7	3.28	0.036	0.003
AVERAGE VALUES FOR THE LAST 15 MINUTES					
11:55	29.9	4.8	3.10	0.037	0.004
11:56	29.4	4.9	3.22	0.036	0.004
11:57	29.4	7.4	3.27	0.036	0.006
11:58	29.4	6.2	3.19	0.036	0.005
11:59	29.5	6.5	3.31	0.036	0.005
12:00	29.5	10.4	3.25	0.036	0.008
12:01	29.6	4.0	3.31	0.037	0.003
12:02	29.5	3.6	3.28	0.036	0.003
12:03	29.5	3.8	3.22	0.036	0.003
12:04	29.4	6.3	3.32	0.036	0.005
12:05	29.5	9.9	3.34	0.037	0.007
12:06	29.3	2.7	3.38	0.036	0.002
12:07	29.4	5.3	3.36	0.036	0.004
12:08	29.5	5.5	3.38	0.037	0.004
12:09	29.4	6.7	3.29	0.036	0.005
12:10	29.5	9.0	3.23	0.036	0.007
AVERAGE VALUES FOR THE LAST 15 MINUTES					
12:10	29.5	6.1	3.29	0.036	0.005
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
12:10	29.8	5.3	3.20	0.037	0.004

COMMENTS: END RUN 2
UNIT 3 GAS

UNITS

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE
UNIT 3
REASON: POST RUN2 PRE RUN 3 SYSTEM BIAS CHECK

DATE : 04-10-1996 TIME: 12:11 - 12:16

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 3	ppmNOX	0.0	0.8
1	UNIT 3	ppmNOX	46.5 46.9 PPM	47.0
2	UNIT 3	ppm CO	0.0	0.4
2	UNIT 3	ppm CO	59.3 -	57.4
3	UNIT 3	% O2	0.00	0.08
3	UNIT 3	% O2	12.02 -	11.84

UNIT 3 RUN 3 GAS

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 3 ppmNOX	CHAN 2 UNIT 3 ppm CO	CHAN 3 UNIT 3 % O2	UNIT 3 lb NOX MM-BTU	UNIT 3 lb CO MM-BTU
12:21	29.9	6.2	3.12	0.037	0.005
12:22	30.0	4.6	3.17	0.037	0.003
12:23	30.0	3.9	3.19	0.037	0.003
12:24	30.0	4.0	3.20	0.037	0.003
12:25	29.9	4.0	3.26	0.037	0.003
12:26	29.9	2.6	3.25	0.037	0.002
12:27	30.0	3.5	3.21	0.037	0.003
12:28	29.9	5.6	3.06	0.036	0.004
12:29	30.0	7.7	3.14	0.037	0.006
12:30	30.0	5.0	3.19	0.037	0.004
12:31	29.9	4.7	3.17	0.037	0.004
12:32	30.0	4.2	3.24	0.037	0.003
12:33	30.1	4.1	3.15	0.037	0.003
12:34	30.0	4.8	3.29	0.037	0.004
12:35	30.0	3.2	3.31	0.037	0.002
AVERAGE VALUES FOR THE LAST 15 MINUTES					
12:35	30.0	4.5	3.20	0.037	0.003
12:36	30.0	5.4	3.09	0.037	0.004
12:37	30.0	4.3	3.23	0.037	0.003
12:38	30.0	4.9	3.29	0.037	0.004
12:39	30.1	4.1	3.20	0.037	0.003
12:40	30.0	3.8	3.16	0.037	0.003
12:41	29.7	7.3	3.37	0.037	0.006
12:42	30.3	5.3	3.03	0.037	0.004
12:43	30.3	4.8	3.07	0.037	0.004
12:44	30.4	3.6	3.05	0.037	0.003
12:45	30.1	3.9	3.05	0.037	0.003
12:46	30.3	4.0	2.95	0.037	0.003
12:47	30.1	5.2	3.01	0.037	0.004
12:48	30.2	3.4	3.00	0.037	0.002
12:49	30.2	3.7	3.01	0.037	0.003
12:50	30.0	3.1	3.04	0.036	0.002
AVERAGE VALUES FOR THE LAST 15 MINUTES					
12:50	30.1	4.5	3.10	0.037	0.003
12:51	30.0	3.9	3.02	0.037	0.003
12:52	30.0	2.9	3.06	0.037	0.002
12:53	29.9	3.4	3.03	0.036	0.003
12:54	30.0	4.1	3.05	0.037	0.003
12:55	29.9	5.2	3.05	0.036	0.004
12:56	30.0	4.0	3.01	0.036	0.003
12:57	29.8	7.0	2.94	0.036	0.005
12:58	29.9	4.3	3.05	0.036	0.003
12:59	29.8	4.2	3.06	0.036	0.003
13:00	29.9	4.1	3.00	0.036	0.003
13:01	29.8	4.2	3.08	0.036	0.003
13:02	29.8	6.6	3.01	0.036	0.005
13:03	29.4	5.0	3.02	0.036	0.004

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-10-1996

TIME	CHAN 1 UNIT 3 ppmNOX	CHAN 2 UNIT 3 ppm CO	CHAN 3 UNIT 3 % O2	UNIT 3 lb NOX MM-BTU	UNIT 3 lb CO MM-BTU
13:04	29.5	5.5	3.24	0.036	0.004
13:05	29.2	6.4	3.24	0.036	0.005
AVERAGE VALUES FOR THE LAST 15 MINUTES					
13:05	29.8	4.7	3.06	0.036	0.004
13:06	29.2	4.5	3.27	0.036	0.003
13:07	29.3	4.9	3.29	0.036	0.004
13:08	29.2	3.0	3.28	0.036	0.002
13:09	29.2	3.3	3.34	0.036	0.003
13:10	29.2	3.7	3.30	0.036	0.003
13:11	29.2	7.7	3.23	0.036	0.006
13:12	29.3	7.9	3.24	0.036	0.006
13:13	29.3	5.9	3.22	0.036	0.004
13:14	29.3	4.3	3.28	0.036	0.003
13:15	29.3	4.5	3.27	0.036	0.003
13:16	29.2	5.1	3.35	0.036	0.004
13:17	29.3	4.4	3.27	0.036	0.003
13:18	29.2	4.5	3.19	0.036	0.003
13:19	29.5	4.1	3.21	0.036	0.003
13:20	29.1	3.4	3.25	0.036	0.003
AVERAGE VALUES FOR THE LAST 15 MINUTES					
13:20	29.3	4.8	3.27	0.036	0.004
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
13:20	29.8	4.6	3.16	0.036	0.003

COMMENTS: END RUN 3
UNIT 3 GAS

UNIT 2 GAS
UNIT 2 GAS

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: POST RUN 3 PRE RUN 4 SYSTEM BIAS CHECK
UNIT 2 RUN 1

DATE : 04-10-1996 TIME: 13:20 - 13:27

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 3	ppmNOX	0.0	0.8
1	UNIT 3	ppmNOX	(46.5) 46.9 PM	46.8
2	UNIT 3	ppm CO	0.0	0.5
2	UNIT 3	ppm CO	(57.3) 59.3 PM	57.4
3	UNIT 3	% O2	0.00	0.21
3	UNIT 3	% O2	12.02	11.82

APPENDIX B. FIELD DATA

2. Boiler No. 3

b. No. 6 Fuel Oil

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: DIRECT CALIBRATION ERROR CHECK OIL M2

DATE : 04-11-1996 TIME: 06:31 - 06:43

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 2 @ UNITS	ppmNOX	0.0	0.5
1	UNIT 2 M2	ppmNOX	252.0 257 M2	252.8
1	UNIT 2	ppmNOX	452.0 457 PIL	452.7
2	UNIT 2	ppm CO	0.0	0.2
2	UNIT 2	ppm CO	59.3	59.1
2	UNIT 2	ppm CO	91.0	90.5
2	UNIT 2	ppm CO	151.0 151.4 M2	151.0
3	UNIT 2	% O2	0.00	0.24
3	UNIT 2	% O2	12.02	12.17
3	UNIT 2	% O2	20.12	20.26

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: PRE RUN 1 SYSTEM BIAS CHECK

DATE : 04-11-1996 TIME: 06:44 - 07:24

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 2	ppmNOX	0.0	0.8
1	UNIT 2	ppmNOX	155.0	156.7
1	UNIT 2	ppmNOX	252.0 257 AR	253.0
2	UNIT 2	ppm CO	0.0	0.4
2	UNIT 2	ppm CO	91.0	91.5
2	UNIT 2	ppm CO	151.0	151.4
3	UNIT 2	% O2	0.00	0.20
3	UNIT 2	% O2	12.02	12.07

UNIT 3-OIL - 1

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

	CHAN 1 UNIT #3	CHAN 2 UNIT #3	CHAN 3 UNIT #3	UNIT #3 lb NOX	UNIT #3 lb CO
TIME	ppmNOX	ppm CO	% O2	MM-BTU	MM-BTU
14:31	297.7	26.9	3.06	0.383	0.021
14:32	299.2	26.0	3.13	0.386	0.020
14:33	298.8	25.4	3.10	0.385	0.020
14:34	298.8	26.7	3.07	0.384	0.021
14:35	299.4	29.4	3.12	0.386	0.023
14:36	297.9	31.9	3.04	0.383	0.025
14:37	291.6	57.1	3.16	0.377	0.045
14:38	291.8	64.6	3.16	0.377	0.051
14:39	291.7	67.3	3.02	0.374	0.053
14:40	291.2	82.3	3.15	0.376	0.065
14:41	291.8	69.0	3.11	0.376	0.054
14:42	290.5	71.2	3.10	0.374	0.056
14:43	291.1	76.4	3.06	0.374	0.060
14:44	290.1	75.8	3.15	0.375	0.060
14:45	291.0	89.5	3.10	0.375	0.070
AVERAGE VALUES FOR THE LAST 15 MINUTES					
14:45	294.2	54.6	3.10	0.379	0.043
14:46	291.4	120.3	3.07	0.375	0.094
14:47	289.2	85.1	3.02	0.371	0.066
14:48	289.2	104.0	3.18	0.374	0.082
14:49	288.0	139.4	3.02	0.369	0.109
14:50	288.8	112.9	3.15	0.373	0.089
14:51	286.8	92.2	3.09	0.369	0.072
14:52	287.9	70.4	3.31	0.375	0.056
14:53	286.9	65.0	3.31	0.374	0.052
14:54	285.5	86.6	3.28	0.372	0.069
14:55	283.2	119.9	3.28	0.369	0.095
14:56	283.1	113.8	3.28	0.368	0.090
14:57	283.5	123.9	3.35	0.371	0.099
14:58	285.4	105.3	3.25	0.371	0.083
14:59	286.8	93.3	3.34	0.374	0.074
15:00	286.8	106.5	3.29	0.374	0.084
AVERAGE VALUES FOR THE LAST 15 MINUTES					
15:00	286.8	102.6	3.21	0.372	0.081
15:01	286.9	73.7	3.33	0.375	0.059
15:02	288.9	62.3	3.34	0.377	0.050
15:03	288.4	66.8	3.37	0.377	0.053
15:04	289.6	60.6	3.36	0.379	0.048
15:05	288.2	60.6	3.26	0.375	0.048
15:06	287.3	88.3	3.32	0.375	0.070
15:07	286.1	103.8	3.33	0.373	0.082
15:08	287.8	89.1	3.25	0.374	0.070
15:09	289.6	90.6	3.36	0.379	0.072
15:10	291.3	70.7	3.25	0.378	0.056
15:11	288.2	53.4	3.41	0.378	0.043
15:12	287.1	76.5	3.41	0.377	0.061
15:13	286.6	87.4	3.35	0.375	0.070

UNIT 3-DEC-1

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

	CHAN 1 UNIT #3	CHAN 2 UNIT #3	CHAN 3 UNIT #3	UNIT #3 lb NOX	UNIT #3 lb CO
TIME	ppmNOX	ppm CO	% O2	MM-BTU	MM-BTU
15:14	287.2	80.6	3.49	0.378	0.065
15:15	286.8	70.4	3.36	0.375	0.056
AVERAGE VALUES FOR THE LAST 15 MINUTES					
15:15	288.0	75.6	3.35	0.376	0.060
15:16	288.7	86.4	3.34	0.377	0.069
15:17	289.5	68.3	3.44	0.380	0.055
15:18	290.2	54.4	3.45	0.382	0.043
15:19	290.0	76.5	3.33	0.379	0.061
15:20	290.6	53.9	3.40	0.381	0.043
15:21	289.2	48.2	3.46	0.380	0.039
15:22	289.5	87.6	3.36	0.378	0.070
15:23	289.8	77.8	3.40	0.380	0.062
15:24	283.9	83.4	3.43	0.373	0.067
15:25	284.3	124.3	3.35	0.371	0.099
15:26	283.9	136.6	3.36	0.371	0.109
15:27	284.4	109.4	3.39	0.373	0.087
15:28	283.5	135.1	3.34	0.370	0.107
15:29	283.9	97.2	3.39	0.372	0.077
15:30	281.6	132.1	3.42	0.370	0.106
AVERAGE VALUES FOR THE LAST 15 MINUTES					
15:30	286.9	91.4	3.39	0.376	0.073
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
15:30	289.0	81.1	3.26	0.376	0.064

COMMENTS: END RUN 1
UNIT 3 OIL

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: POST RUN 1 (4) PRE RUN 2 (5) SYSTEM BIAS CHECK

DATE : 04-11-1996 TIME: 15:30 - 15:37

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT #3	ppmNOX	0.0	3.1
1	UNIT #3	ppmNOX	252.0	257 AVG 253.2
2	UNIT #3	ppm CO	0.0	1.1
2	UNIT #3	ppm CO	59.3	56.8
3	UNIT #3	% O2	0.00	0.25
3	UNIT #3	% O2	12.02	11.87

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

TIME	CHAN 1 UNIT 3 ppmNOX	CHAN 2 UNIT 3 ppm CO	CHAN 3 UNIT 3 % O2	UNIT 2 lb NOX MBTU	UNIT 2 lb CO MBTU
15:41	295.5	25.9	3.47	0.389	0.021
15:42	296.3	21.2	3.58	0.393	0.017
15:43	296.6	16.6	3.53	0.391	0.013
15:44	295.6	24.9	3.51	0.390	0.020
15:45	296.6	26.6	3.44	0.390	0.021
15:46	297.1	19.8	3.53	0.392	0.016
15:47	297.9	18.8	3.49	0.392	0.015
15:48	298.4	20.9	3.51	0.394	0.017
15:49	297.6	18.4	3.49	0.392	0.015
15:50	297.3	25.4	3.44	0.391	0.020
15:51	299.8	13.2	3.51	0.395	0.011
15:52	299.6	15.0	3.48	0.394	0.012
15:53	300.2	17.2	3.50	0.396	0.014
15:54	302.6	10.0	3.59	0.401	0.008
15:55	301.1	10.4	3.49	0.397	0.008
AVERAGE VALUES FOR THE LAST 15 MINUTES					
15:55	298.2	19.0	3.50	0.393	0.015
15:56	300.8	15.0	3.46	0.396	0.012
15:57	301.5	9.9	3.58	0.399	0.008
15:58	303.6	7.2	3.59	0.402	0.006
15:59	304.1	7.5	3.52	0.401	0.006
16:00	302.9	6.8	3.62	0.402	0.006
16:01	302.1	8.1	3.51	0.398	0.007
16:02	303.2	8.7	3.57	0.401	0.007
16:03	302.5	9.4	3.61	0.401	0.008
16:04	304.1	9.8	3.54	0.402	0.008
16:05	305.0	8.2	3.45	0.401	0.007
16:06	305.0	6.9	3.59	0.404	0.006
16:07	305.3	6.6	3.55	0.404	0.005
16:08	305.0	5.6	3.53	0.403	0.005
16:09	303.9	7.2	3.47	0.400	0.006
16:10	298.6	13.6	3.39	0.391	0.011
AVERAGE VALUES FOR THE LAST 15 MINUTES					
16:10	303.2	8.7	3.53	0.400	0.007
16:11	297.5	35.5	3.24	0.386	0.028
16:12	298.9	25.7	3.24	0.388	0.020
16:13	298.8	31.7	3.25	0.388	0.025
16:14	299.0	27.8	3.20	0.388	0.022
16:15	300.1	24.4	3.33	0.392	0.019
16:16	297.9	28.5	3.23	0.387	0.022
16:17	296.8	43.3	3.24	0.385	0.034
16:18	296.5	28.8	3.22	0.385	0.023
16:19	296.6	47.4	3.17	0.384	0.037
16:20	296.8	40.6	3.36	0.388	0.032
16:21	295.8	41.2	3.19	0.383	0.032
16:22	296.2	40.1	3.25	0.385	0.032
16:23	297.5	31.6	3.20	0.385	0.025

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

TIME	CHAN 1 UNIT 3 ppmNOX	CHAN 2 UNIT 3 ppm CO	CHAN 3 UNIT 3 % O2	UNIT 2 lb NOX MBTU	UNIT 2 lb CO MBTU
16:24	297.7	30.5	3.24	0.387	0.024
16:25	298.6	25.0	3.28	0.389	0.020
AVERAGE VALUES FOR THE LAST 15 MINUTES					
16:25	297.6	33.5	3.24	0.387	0.026
16:26	297.4	25.6	3.28	0.387	0.020
16:27	296.2	37.9	3.24	0.385	0.030
16:28	296.7	30.3	3.25	0.386	0.024
16:29	296.9	35.7	3.24	0.386	0.028
16:30	297.7	31.3	3.32	0.388	0.025
16:31	299.2	29.5	3.22	0.388	0.023
16:32	298.2	30.1	3.21	0.387	0.024
16:33	299.3	38.9	3.20	0.388	0.031
16:34	299.4	23.4	3.25	0.389	0.018
16:35	299.6	26.6	3.32	0.391	0.021
16:36	299.9	14.6	3.34	0.392	0.012
16:37	299.8	16.0	3.37	0.392	0.013
16:38	299.0	20.8	3.17	0.387	0.016
16:39	299.4	28.4	3.17	0.387	0.022
16:40	300.2	24.0	3.22	0.389	0.019
AVERAGE VALUES FOR THE LAST 15 MINUTES					
16:40	298.6	27.5	3.25	0.388	0.022
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
16:40	299.4	22.2	3.38	0.392	0.018

COMMENTS: END RUN 2
UNIT 3 OIL

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: POST RUN 2 (5) PRE RUN 3 (6) SYSTEM BIAS CHECK

DATE : 04-11-1996 TIME: 16:40 - 16:45

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT #3	ppmNOX	0.0	4.6
1	UNIT #3	ppmNOX	(252.0) 257/M	256.0
2	UNIT #3	ppm CO	0.0	1.9
2	UNIT #3	ppm CO	59.3	56.6
3	UNIT #3	% O2	0.00	0.12
3	UNIT #3	% O2	12.02	12.17

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

TIME	CHAN 1 UNIT 3 ppmNOX	CHAN 2 UNIT 3 ppm CO	CHAN 3 UNIT 3 % O2	UNIT 2 lb NOX MBTU	UNIT 2 lb CO MBTU
16:51	302.2	10.9	3.27	0.393	0.009
16:52	304.1	10.1	3.39	0.398	0.008
16:53	304.3	8.5	3.36	0.398	0.007
16:54	303.1	9.6	3.25	0.394	0.008
16:55	303.5	9.9	3.27	0.395	0.008
16:56	303.9	7.6	3.24	0.395	0.006
16:57	304.0	9.2	3.21	0.394	0.007
16:58	304.1	7.5	3.21	0.394	0.006
16:59	304.0	7.9	3.30	0.396	0.006
17:00	305.2	7.5	3.22	0.396	0.006
17:01	305.8	6.6	3.23	0.397	0.005
17:02	306.8	6.9	3.17	0.397	0.005
17:03	309.4	4.7	3.30	0.403	0.004
17:04	309.1	4.7	3.22	0.401	0.004
17:05	309.4	4.1	3.32	0.404	0.003
AVERAGE VALUES FOR THE LAST 15 MINUTES					
17:05	305.3	7.7	3.26	0.397	0.006
17:06	309.0	4.3	3.23	0.401	0.003
17:07	308.9	4.2	3.36	0.404	0.003
17:08	309.6	3.8	3.36	0.405	0.003
17:09	309.5	4.2	3.20	0.401	0.003
17:10	310.3	4.8	3.25	0.403	0.004
17:11	310.9	4.0	3.18	0.402	0.003
17:12	310.4	4.6	3.11	0.400	0.004
17:13	309.6	4.4	3.12	0.399	0.003
17:14	302.4	4.8	3.39	0.396	0.004
17:15	312.0	4.1	3.00	0.400	0.003
17:16	310.7	4.4	2.98	0.398	0.003
17:17	313.1	4.1	3.12	0.404	0.003
17:18	313.1	3.8	3.05	0.402	0.003
17:19	313.7	3.9	3.07	0.403	0.003
17:20	311.6	3.9	3.03	0.400	0.003
AVERAGE VALUES FOR THE LAST 15 MINUTES					
17:20	310.3	4.2	3.16	0.401	0.003
17:21	312.4	4.1	3.09	0.402	0.003
17:22	312.6	3.7	3.08	0.402	0.003
17:23	313.1	3.6	3.05	0.402	0.003
17:24	313.5	3.7	3.09	0.404	0.003
17:25	312.1	3.6	3.04	0.401	0.003
17:26	313.2	3.7	3.09	0.403	0.003
17:27	313.5	3.6	3.15	0.405	0.003
17:28	314.0	3.4	3.18	0.406	0.003
17:29	312.4	3.7	3.01	0.401	0.003
17:30	309.2	4.4	3.00	0.396	0.003
17:31	296.0	53.6	2.87	0.377	0.041
17:32	293.3	61.7	3.07	0.378	0.048
17:33	300.6	84.1	2.59	0.377	0.064

HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE 04-11-1996

TIME	CHAN 1 UNIT 3 ppmNOX	CHAN 2 UNIT 3 ppm CO	CHAN 3 UNIT 3 % O2	UNIT 2 lb NOX MBTU	UNIT 2 lb CO MBTU
17:34	301.0	78.9	2.61	0.377	0.060
17:35	299.9	72.7	2.66	0.377	0.056
AVERAGE VALUES FOR THE LAST 15 MINUTES					
17:35	307.8	25.9	2.97	0.394	0.020
17:36	298.4	84.0	2.64	0.375	0.064
17:37	299.4	101.8	2.59	0.375	0.078
17:38	300.0	72.4	2.63	0.377	0.055
17:39	299.6	70.3	2.65	0.377	0.054
17:40	299.4	84.0	2.62	0.376	0.064
17:41	298.6	100.8	2.59	0.374	0.077
17:42	299.0	80.4	2.69	0.377	0.062
17:43	298.7	90.5	2.60	0.374	0.069
17:44	301.9	63.1	2.86	0.384	0.049
17:45	301.5	36.0	2.86	0.383	0.028
17:46	301.5	47.2	2.89	0.384	0.037
17:47	302.2	23.7	2.99	0.387	0.018
17:48	303.9	21.4	2.95	0.388	0.017
17:49	301.9	29.1	2.91	0.385	0.023
17:50	302.4	31.5	2.97	0.387	0.025
AVERAGE VALUES FOR THE LAST 15 MINUTES					
17:50	300.6	62.4	2.76	0.380	0.048
AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA					
17:50	306.0	25.1	3.04	0.393	0.019
17:51	302.7	21.6	3.03	0.388	0.017

COMMENTS: END RUN 3
UNIT 3 OIL

CALIBRATION SUMMARY

SOURCE: HERSHEY CHOCOLATE - BOILER 2 & 3 COMPLIANCE

REASON: POST RUN 3 (6) SYSTEM BIAS CHECK

DATE : 04-11-1996 TIME: 17:51 - 17:56

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
1	UNIT 3	ppmNOX	0.0	3.6
1	UNIT 3	ppmNOX	(252.0) 257 MR	255.9
2	UNIT 3	ppm CO	0.0	1.7
2	UNIT 3	ppm CO	59.3	56.4
3	UNIT 3	% O2	0.00	0.20
3	UNIT 3	% O2	12.02	12.08

APPENDIX C. CALIBRATION DATA

Scott Specialty Gases

6141 EASTON ROAD, P.O. BOX 310, PLUMSTEADVILLE, PA 18949-0310 (215) 766-8861 FAX: (215) 766-0320

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy
8724 Glenwood Ave
Raleigh, NC 27612

Assay Laboratory
Scott Specialty Gases, Inc.
6141 Easton Road
P.O. Box 310
Plumsteadville, PA 18949-0310

Purchase Order 5071-MAXWEJ
Scott Project # 01-73802-005

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; 1 Procedure #G1, Section Number 3.0.4; September, 1993.

Cylinder Number	ALM058282	**Certification Date**	11-28-95	**Expiration Date**	11-28-97
Cylinder Pressure	2000 psig+	**Previous Certification Dates**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	**46.5 ppm**	**±1% NIST Traceable**
Total Oxides of Nitrogen	**46.9 ppm**	**Reference Value Only**
Balance Gas: Nitrogen		

+Do not use when cylinder is less than 150 psig.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM1684	06-07-97	ALM049155	94.4 ppm NO in N_2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NO: Horiba/CLA220/5708850810	11-10-95	Chemiluminescent

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Nitric Oxide	Date: 11-21-95 Response Units: Volts Z1=-0.0001 R1=0.9477 T1=0.4632 R2=0.9452 Z2=0.0001 T2=0.4618 Z3=0.0000 T3=0.4616 R3=0.9433 Avg. Conc. of Cust. Cyl. 46.7 ppm	Date: 11-28-95 Response Units: Volts Z1=-0.0003 R1=0.9454 T1=0.4638 R2=0.9474 Z2=0.0005 T2=0.4670 Z3=-0.0003 T3=0.4684 R3=0.9486 Avg. Conc. of Cust. Cyl. 46.4 ppm	Concentration= $A+Bx+Cx^2+Dx^3+Ex^4$ r=0.99992 NTRM1684 Constants: A=-2.4890E-01 B=9.8680E+01 C=0.0000E+00 D=0.0000E+00 E=0.0000E+00

Special Notes:

Analyst Wesley Bleiler

Scott Specialty Gases

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: Intereference-Free™ Multi-Component EPA Protocol Gas

Customer
Entropy Environmentalists
Attn: John Maxwell
Accounts Payable
P.O. Box 12291
Research Triangle Park, NC 27709

Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order MAXWELL
Scott Project # 12- 16095

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	ALM-000970	**Certification Date**	03-06-95	**Expiration Date**	03-06-98
Cylinder Pressure	1923 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	88.89 PPM	+/- 1% NIST Directly Traceable
Nox	89.74 PPM	Reference Value Only
Nitrogen		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM# 1684	06-97	ALM-049051	94.4 PPM NO Balance in N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NICOLET / 8220 / AAB9400252	02-06-96	Scott Enhanced FTIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components

Nitric Oxide

First Triad Analysis

Date: 02-28-96 Response Units: PPM
Z1= -0.155 R2= 94.48 Z3= -0.045
R1= 94.28 Z2= 0.048 T3= 88.88
T1= 88.84 T2= 89.24 R3= 94.42
Average Concentration : 88.99 PPM

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Second Triad Analysis

Date: 03-06-96 Response Units: PPM
Z1=-0.184 R2=94.37 Z3=-0.018
R1=94.50 Z2=-0.155 T3= 88.95
T1=88.82 T2= 88.60 R3=94.33
Average Concentration : 88.79 PPM

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Calibration Curve

Date: 02-06-96
Concentration = A+Bx+Cx2+Dx3+Ex4+Fx5
R=0.99999 A= -2.04523E-1
B=7.55972E-1 C=2.59896E-4
D=5.37748E-7 E=-1.13202E-1
F=1.91805E-13

Date:

Date:

Analyst B. Becton

Air Produ and Chemicals, Inc.
P.O. BOX 3!
R.D. #1
TAMAQUA, PA 18252

Certificate of Analysis - EPA Protocol Gas Standard

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

Customer:
AIR PRODUCTS & CHEMICALS
1680 OAK TREE RD. Notes:
EDISON NJ 08820

PO: Rel:

Order No: 147-034169-25
Batch No: 255-69382

Cylinder No: SG9121024BAL
Cylinder Pressure*: 2000 psig
Certification Date: 06/09/95
Expiration Date: 06/09/97

*** Certified Concentration ***		********* Reference Standards *********			************ Analytical Instrumentation ************			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
NITRIC OXIDE	155 ±0.40 PPM	SG9138639BAL	GMIS	97.8700 PPM	Thermal Enviro	10S-4502	05/17/95	CHEMILUMINESCENCE

Balance Gas: Nitrogen

* Standard should not be used below 150 psig

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Analyst: Jeff LaGrassa /mk
Jeff LaGrassa

Approved By: K. Roubik /mk
Ken Roubik

Scott Specialty Gases

6141 EASTON ROAD, P.O. BOX 310, PLUMSTEADVILLE, PA 18949-0310 (215) 766-8861 FAX: (215) 766-0320

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy
Cem Division
8724 Glenwood Avenue
Raleigh, NC 27612

Assay Laboratory
Scott Specialty Gases, Inc.
6141 Easton Road
P.O. Box 310
Plumsteadville, PA 18949-0310

Purchase Order 4783-MAXWELJ
Scott Project # 01-63890-007

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol 1 Procedure #G1, Section Number 3.0.4

Cylinder Number	ALM055644	**Certification Date**	01-11-95	**Expiration Date**	01-11-97
Cylinder Pressure	2000 psig+	**Previous Certification Dates**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	252 ppm	±1% NIST Traceable
Total Oxides of Nitrogen	257 ppm	Reference Value Only
Balance Gas: Air		

+Do not use when cylinder is less than 150 psig.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM 1686	08-04-96	ALM025120	495 ppm NO in N_2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NO: Teco/10/9741111S	01-10-95	Chemiluminescent

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Nitric Oxide	Date: 01-04-95 Response Units: Volts Z1=0.0000 R1=7.3100 T1=7.5000 R2=7.2563 Z2=0.0000 T2=7.4930 Z3=0.0000 T3=7.2911 R3=7.4991 Avg. Conc. of Cust. Cyl. 252 ppm	Date: 01-11-95 Response Units: Volts Z1=0.0000 R1=4.6955 T1=2.3873 R2=4.7143 Z2=0.0000 T2=2.3911 Z3=0.0000 T3=2.3900 R3=4.7099 Avg. Conc. of Cust. Cyl. 251 ppm	Concentration=$A+Bx+Cx^2+Dx^3+Ex^4$ r=0.99999 NTRM1687 Constants: A=7.5202E-01 B=1.0413E+02 C=0.0000E+00 D=0.0000E+00 E=0.0000E+00

Special Notes:

☐ Check this box if certified concentration has been corrected for analytical interferences.

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Analyst Wesley Pfeiler

Scott Specialty Gases

6141 EASTON ROAD, P.O. BOX 310, PLUMSTEADVILLE, PA 18949-0310 (215) 766-8861 FAX (215) 766-0320

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy
Cem Division
8724 Glenwood Avenue
Raleigh, NC 27612

Assay Laboratory
Scott Specialty Gases, Inc.
6141 Easton Road
P.O. Box 310
Plumsteadville, PA 18949-0310

Purchase Order 5011-MAXWELJ
Scott Project # 01-71229-019

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; 1 Procedure #G1, Section Number 3.0.4; September, 1993.

Cylinder Number ALM041868
Cylinder Pressure 2000 psig+
Certification Date 08-25-95
Previous Certification Dates None
Expiration Date 08-25-97

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Nitric Oxide	452 ppm	±1% NIST Traceable
Total Oxides of Nitrogen	457 ppm	Reference Value Only
Balance Gas: Nitrogen		

+Do not use when cylinder is less than 150 psig.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM1686	08-04-96	ALM021309	495 ppm NO in N_2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NO: Teco/10/9741111S	08-03-95	Chemiluminescent

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Nitric Oxide

First Triad Analysis
Date: 08-17-95 Response Units: Volts
Z1=-0.0067 R1=9.4633 T1=4.3801
R2=9.5028 Z2=0.0198 T2=4.3975
Z3=0.0221 T3=4.4170 R3=9.5499
Avg. Conc. of Cust. Cyl. 451 ppm

Second Triad Analysis
Date: 08-25-95 Response Units: Volts
Z1=0.0020 R1=4.8025 T1=4.3923
R2=4.8016 Z2=0.0162 T2=4.3982
Z3=0.0169 T3=4.4268 R3=4.8245
Avg. Conc. of Cust. Cyl. 453 ppm

Calibration Curve
Concentration=$A+Bx+Cx^2+Dx^3+Ex^4$
r=1.00000 NTRM1687
Constants: A=-4.3165E-01
B=1.0274E+02 C=0.0000E+00
D=0.0000E+00 E=0.0000E+00

Special Notes:

Analyst Wesley Bleiler

Scott Specialty Gases, Inc.

Shipped From: 1750 EAST CLUB BLVD.
DURHAM NC 27704
Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ANALYSIS

ENTROPY
MR. JOHN MAXWELL
CEM DIVISION
8724 GLENWOOD AVENUE
RALEIGH NC 27612

PROJECT #: 12-09145-004
PO#: 4704-MAXWELLJ
ITEM #: 12024311 4AL
DATE:11/17/94

CYLINDER #: AAL9093 ANALYTICAL ACCURACY: +/-2%

BLEND TYPE : CERTIFIED MASTER GAS

COMPONENT	REQUESTED GAS CONC	MOLES	ANALYSIS (MOLES)	
CARBON MONOXIDE	50.	PPM	49.8	PPM
METHANE	50.	PPM	50.1	PPM
AIR		BALANCE		BALANCE

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ANALYST: K. COOKE

Scott Specialty Gases

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: Intereference-Free™ Multi-Component EPA Protocol Gas

Customer
Entropy Environmentalists
Attn: John Maxwell
Accounts Payable
P.O. Box 12291
Research Triangle Park, NC 27709

Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order MAXWELL
Scott Project # 12- 16095

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	ALM-038607	**Certification Date**	03-05-96	**Expiration Date**	03-05-99
Cylinder Pressure	1957 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Carbon Monoxide	59.26 PPM	+/- 1% NIST Directly Traceable
Nitrogen		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM# 1679	08-96	ALM-041546	97.1 PPM CO Balance in N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NICOLET / 8220 / AAB9400252	02-06-96	Scott Enhanced FTIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Carbon Monoxide

First Triad Analysis

Date:02-27-96 Response Units: PPM
Z1=-0.037 R2=97.16 Z3=0.033
R1=97.01 Z2=-0.007 T3=59.35
T1=59.29 T2=59.18 R3=97.13
Average Concentration:59.27 PPM

Second Triad Analysis

Date: 03-05-96 Response Units: PPM
Z1=-0.045 R2=97.13 Z3=0.014
R1=97.09 Z2=-0.008 T3=59.22
T1=59.20 T2=59.31 R3=97.07
Average Concentration: 59.24 PPM

Calibration Curve

Date: 02-06-96
Concentration = A+Bx+Cx2+Dx3+Ex4+Fx5
R=0.99999 A=-3.23459E-1
B=2.69481E-1 C=3.28372E-4
D=4.54495E-6 E=3.89233E-9
F=1.80390E-12

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Date:

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Date: Response Units:
Z1= R2= Z3=
R1= Z2= T3=
T1= T2= R3=

Date:

B. Becton
Analyst B. Becton

Air Products and Chemicals, Inc.
P.O. BOX 351
R.D. #1
TAMAQUA, PA 18252

Certificate of Analysis - EPA Protocol Gas Standard

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

Customer:
AIR PRODUCTS AND CHEMICALS, INC.
HOMETOWN FACILITY Notes:
R.R. #1, P.O. BOX 351
TAMAQUA PA 18252-

PO: Rel:

Order No: 255-055424-02
Batch No: 255-73395

Cylinder No: SG9147500BAL
Cylinder Pressure*: 2000 psig
Certification Date: 08/24/95
Expiration Date: 08/24/98

*** Certified Concentration ***		********* Reference Standards *********			************ Analytical Instrumentation ************			
Component	Certified Concentration	Cylinder #	Standard Number	Concentration	Instrument Make/Model	Serial Number	Last Calibration	Measurement Principal
CARBON MONOXIDE	91.0 ±0.23 PPM	SG887934	GMIS	91.7000 PPM	Hewlett Packar	2518A052	08/12/95	GC-FID

Balance Gas: Nitrogen

* Standard should not be used below 150 psig

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Analyst: Mike Pascolini /mk
Mike Pascolini

Approved By: K. Roubik /mk
Ken Roubik

Scott Specialty Gases

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy Environmentalist
Attn: John Maxwell
Attn: Accts Payable
P.O. Box 12291
Research Triangle Park, NC 27709

Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, N.C. 27704

Purchase Order 5011-MAXWELLJ
Scott Project # 12-13047

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	AAL-774	**Certification Date**	08-21-95	**Expiration Date**	08-21-98
Cylinder Pressure	1929 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Carbon Monoxide	151.4 PPM	+/- 1% NIST Directly Traceable
Nitrogen		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM# 2636	08-96	ALM-034275	244.2 PPM CO Balance in N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
NICOLET / 8220 / AAB9400252	08-01-95	FTIR

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Carbon Monoxide

First Triad Analysis

Date: 08-11-95 Response Units: PPM

Z1=-0.058	R2=243.8	Z3=0.133
R1=244.2	Z2=-0.068	T3=151.1
T1=151.1	T2=151.0	R3=243.8

Second Triad Analysis

Date: 08-21-95 Response Units: PPM

Z1=-0.028	R2=243.8	Z3=0.200
R1=244.2	Z2=0.017	T3=151.5
T1=151.6	T2=151.7	R3=243.5

Calibration Curve

Date: 08-01-95

Date: Response Units:

Z1=	R2=	Z3=
R1=	Z2=	T3=
T1=	T2=	R3=

Date:

Date: Response Units:

Z1=	R2=	Z3=
R1=	Z2=	T3=
T1=	T2=	R3=

Date:

B. Becton

Analyst B. Becton

Scott Specialty Gases

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy
ATTN: Mr. John Maxwell
CEM Division
8724 Glenwood Avenue
Raleigh, NC 27612

Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order 4965-MAXWELLJ
Scott Project # 12-12390

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	AAL-18882	**Certification Date**	06-28-95	**Expiration Date**	06-28-98
Cylinder Pressure	2000 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Oxygen	**12.02 %**	**+/- 1% NIST Directly Traceable**
Nitrogen		**Balance**

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM # 2658	11-96	ALM-031884	9.68% O2 Balance in N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Varian /3400/16804	05-22-95	Gas Chromatography

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components: Oxygen

First Triad Analysis

Date: 06-28-95	Response Units: Area
STD=261883	SPL=325175
SPL=325305	STD=261454
STD=261818	SPL=324821

Second Triad Analysis

Date:	Response Units:
STD=	SPL=
SPL=	STD=
STD=	SPL=

Calibration Curve

Date: 05-22-95

Date:	Response Units:
STD=	SPL=
SPL=	STD=
STD=	SPL=

Date:	Response Units:
STD=	SPL=
SPL=	STD=
STD=	SPL=

Date:

Date:	Response Units:
STD=	SPL=
SPL=	STD=
STD=	SPL=

Date:	Response Units:
STD=	SPL=
SPL=	STD=
STD=	SPL=

B. Becton

Analyst B. Becton

Scott Specialty Gases

1750 EAST CLUB BOULEVARD, DURHAM, NC 27704 (919) 220-0803 FAX: (919) 220-0808

CERTIFICATE OF ANALYSIS: EPA PROTOCOL GAS

Customer
Entropy
Attn: John Maxwell
Research Division
8724 Glenwood Avenue
Raleigh, NC 27612

Assay Laboratory
Scott Specialty Gases, Inc.
1750 East Club Boulevard
Durham, NC 27704

Purchase Order 5051-MXWELJ
Scott Project # 12-14198

ANALYTICAL INFORMATION

Certified to exceed the minimum specifications of EPA Protocol Procedure #G1, issued September, 1993.

Cylinder Number	AAL-18203	**Certification Date**	10-16-95	**Expiration Date**	10-16-98
Cylinder Pressure	2000 PSIG	**Previous Certification**	None		

ANALYZED CYLINDER

Components	Certified Concentration	Analytical Uncertainty*
Carbon Dioxide	17.33 %	+/- 1% NIST Directly Traceable
Oxygen	20.12 %	+/- 1% NIST Directly Traceable
Nitrogen		Balance

Do not use when cylinder pressure is less than 150 PSIG.

*Analytical uncertainty is inclusive of usual known error sources which at least includes reference standard error & precision of the measurement processes.

REFERENCE STANDARD

Type	Expiration Date	Cylinder Number	Concentration
NTRM # 18000	12-96	ALM-047691	17.95% CO2 Balance in N2
NTRM # 2659	11-96	ALM-031720	20.72% O2 Balance in N2

INSTRUMENTATION

Instrument/Model/Serial #	Last Date Calibrated	Analytical Principle
Varian /3400/0160	09-19-95	Gas Chromatography
Varian /3400/16804	10-06-95	Gas Chromatography

ANALYZER READINGS (Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

Components	First Triad Analysis	Second Triad Analysis	Calibration Curve
Carbon Dioxide	Date: 10-16-95 Response Units: Area STD=3125609 SPL=3037381 SPL=3046850 STD=3171492 STD=3154008 SPL=3045314	Date: Response Units: STD= SPL= SPL= STD= STD= SPL=	Date: 09-19-95
Oxygen	Date: 10-16-95 Response Units: Area STD= 551721 SPL=536386 SPL=535741 STD=551695 STD=552421 SPL=535367	Date: Response Units: STD= SPL= SPL= STD= STD= SPL=	Date: 10-06-95
	Date: Response Units: STD= SPL= SPL= STD= STD= SPL=	Date: Response Units: STD= SPL= SPL= STD= STD= SPL=	

B. Becton

Analyst B. Becton

INTERFERENCE RESPONSE

Analyzer Type.....TECO 10 NOX EEI#14 Span..... 100
Serial number.....10S-52956-294 Date.....6/16/95

Gas Type	Concentration	Analyzer response	(a) % of span
CO/N2	30.0 ppm	0.000	0.0000
SO2/N2	89.8 ppm	0.000	0.0000
CO2/N2	0.11 %	0.000	0.0000
O2/N2	20.9 %	0.000	0.0000

INTERFERENCE TEST PROCEDURES

ENTROPY followed the manufacturer's recommended set-up procedures contained in the analyzer manual. After the initial set-up procedures were completed, the electronics of the monitor were adjusted according to the manufacturer's guidelines. The monitor was calibrated by flowing NO calibration gases into the instrument. The SO2, CO, CO2 and O2 calibration gases listed above were injected into the monitor and the responses were recorded with a data aquisition system, which was analyzed to determine if the gases caused interference (ie. deviations from a zero reading) in the NOx monitor.

Note: This is a summary of the data collected, all corresponding data will be provided upon request.

INTERFERENCE RESPONSE

Analyzer Type.....TECO MODEL 48 CO Span..... 1000
Serial number.....48-40957-264 Date.....1/29/93
EEI#..... 8

Gas Type	Concentration	Analyzer response	(a) % of span
NOx/N2	247.0 ppm	0.000	0.0000
SO2/N2	246.0 ppm	0.000	0.0000
CO2/N2	10.85 %	0.000	0.0000
O2/N2	20.5 %	0.000	0.0000
		(b) Totals	0.0000

(a) % of span = ANALYZER RESPONSE/INSTRUMENT SPAN X 100

(b) SPECIFICATION (EPA METHODS MANUAL FOR COMPLIANCE WITH BIF REGULATION 2.1.6.4.2.2). CO ANALYZER RESPONSE MUST BE LESS THAN 1% OF THE APPLICABLE MEASUREMENT RANGE.

INTERFERENCE TEST PROCEDURES

ENTROPY followed the manufacturer's recommended set-up procedures contained in the analyzer manual. After the initial set-up procedures were completed, the electronics of the monitor were adjusted according to the manufacturer's guidelines. The monitor was calibrated by flowing CO calibration gases into the instrument. The SO2, NOx, CO2 and O2 calibration gases listed above were injected into the monitor and the responses were recorded with a data aquisition system, which was analyzed to determine if the gases caused interference (ie. deviations from a zero reading) in the NOx monitor.

NOTE: This is a summary of the data collected. All supporting data is available upon request.

INTERFERENCE RESPONSE

Analyzer Type.....TELEDYNE 320P-4 Span..... 25 %
Serial number.....101233 Date.....3\15\90
EEI #.....8

Gas Type	Concentration	Analyzer response	(a) % of span
CO/N2	246.0 ppm	0.000	0.0000
SO2/N2	449.0 ppm	0.000	0.0000
NO/N2	747.0 ppm	0.000	0.0000
CO2/N2	9.9 %	0.000	0.0000
		(b) Totals	0.0000

(a) % of span = ANALYZER RESPONSE/INSTRUMENT SPAN X 100

(b) SPECIFICATION (EPA METHOD 20): SUM OF INTERFERENCE RESPONSES MUS' NOT EXCEED 2% OF SPAN.

INTERFERENCE TEST PROCEDURES

ENTROPY followed the manufacturer's recommended set-up procedures contained in the analyzer manual. After the initial set-up procedures were completed, the electronics of the monitor were adjusted according to the manufacturer's guidelines. The monitor was calibrated by flowing O2 calibration gases into the instrument. The SO2, CO, NOx and CO2 calibration gases listed above were injected into the monitor and the responses were recorded with a data aquisition system, which was analyzed to determine if the gases caused interference (ie. deviations from a zero reading) in the O2 monitor.

NO2-NO CONVERSION EFFICIENCY

Analyzer Type.....TECO 10 NOX EEI#14 Span..... 500
Serial number.....10S-52956-294 Date.....11-06-95

PEAK RESPONSE RECORDED DURING CONVERTER EFFICIENCY TEST..... 264.4 ppm

RESPONSE RECORDED AT THE END OF THE 30-MINUTE TEST..... 260.5 ppm

PERCENT DECREASE FROM PEAK RESPONSE..... 1.48 %

CONVERTER EFFICIENCY..... 98.5 %

SPECIFICATIONS (EPA METHOD 20): RESPONSE AT 30 MINUTES MUST NOT DECREASE BY MORE THAN 2% OF THE PEAK RESPONSE VALUE.

NO2-NO CONVERTER EFFICIENCY TEST PROCEDURES

ENTROPY followed the manufacturer's recommended set-up procedures contained in the analyzer manual. After the initial set-up procedures were completed, the electronics of the monitor were adjusted according to the manufacturer's guidelines. The monitor was then calibrated by flowing NO calibration gases into the instrument. A calibration gas was then diluted (1:1) with purified compressed air. The gas mixture was routed through a manifold into a Tedlar bag, which was previously leak tested and evacuated. This arrangement afforded sufficient volume to allow the sampling system to operate for the required 30 minutes. Immediately after the bag was filled, the manifold was connected to the sampling system. The system was turned on and the analyzer response was recorded on a data aquisition system. The one minute averages from the data aquisition system was analyzed for the peak response and the response at the end of the 30-minute sampling period.

APPENDIX D. PROCESS DATA

DATA SHEET

Date: 4-10-96 #3 Boiler

Stack Test No. 2

Fuel/Process: Gas

Trial No.:

SOx (NOx) Part.

Firing Rate: Full

Time	Steam Production (Lbs) x1000 SO_2	Exit Gas Tmp	Boiler Out Tmp	Lbs/Hr	Fuel Usage (GPM or MCF)	Stack Temp-Press Gas Meter	Drum Press Orifice Plate
10 00 A.M.	1.4	334.3	739	79.8	97	174.6	191.7
10 10	1.4	334.9	740	79.7	96.7	175.3	192.4
10 20	1.4	336.4	739	79.7	96.9	175.1	192.2
10 30	1.4	337.1	740	79.7	96.8	175.6	192.6
10 40	1.4	337.3	739	80	96.1	175.3	192.5
10 50	1.3	336.9	740	80.2	96.3	175.6	192.8
11 00	1.4	336.8	740	80	96.1	176.2	193.3
11 10	1.5	338.6	740	80	96.9	174.4	191.7
11 20	1.5	339	740	80.1	96	175.8	193.2
11 30	1.5	338.3	739	80.1	96.6	175.3	192.4
11 40	1.3	337.3	740	80.2	95.8	175.8	192.9
11 50	1.3	337.5	739	80.4	96	175.6	192.8
12 00	1.4	337.2	740	80.2	96.2	175.6	192.6
12 10	1.3	335.3	739	79.7	96.2	175.1	192.3
12 20	1.4	336.4	739	80.3	95.9	176.5	193.5
12 30	1.5	335.8	739	80.1	95.8	175.9	192.9
12 40	1.4	337	738	79.9	95.9	176	193.1
12 50	1.4	336.6	739	80.4	96.4	174.7	191.8
1 00	1.4	335.5	738	80.3	96.5	174.8	191.9
1 10	1.4	336	739	80.1	96.1	175.5	192.1
1 20	1.4	336.3	739	80.0	96.1	175.2	192.2

DATA SHEET

Date: 4-10-96 #2 Boiler

Stack Test No. 3

Fuel/Process: GAS

Serial No.:

Firing Rate: Full

SOx NOx Part.

Time	Steam Production (lbs) x1000 O_2	Stack Exh Tmp	Boiler Outlet Exh Tmp	Lbs/Hr	Fuel Usage (GPM or MCF)	Steam Press Gas Meter	Draft Pres. Orifice Plate
3 05 PM	1.4	311.1	618	79.8	91.5	175.2	191.3
3 15	1.4	311.4	618	79	91.5	175.9	192
3 25	1.5	310.3	619	78.7	92.2	174	190.5
3 35	1.3	310.3	620	79.3	91.5	175.9	192.1
3 45	1.4	311.1	619	78.9	91.6	175.9	192.1
3 55	1.4	310.6	619	78.4	92.0	175.5	191.6
4 05	1.3	310.2	620	79.2	91.5	176.8	192.9
4 15 PM	1.4	310.9	621	79.8	91.7	175.1	191.3
4 25	1.4	310.0	619	78.8	92.0	175.1	191.2
4 35	1.5	310.7	619	78.9	91.9	174.9	191.2
4 45	1.3	311.1	620	79.5	91.5	175.7	192.1
4 55	1.4	311.2	620	79.2	92.1	174.7	190.9
5 05	1.4	310.9	621	79.4	91.6	175.0	191.2
5 15	1.4	310.8	620	78.9	92.0	175.3	191.3
5 25 PM	1.5	311.5	620	78.7	91.7	175.3	191.4
5 35	1.4	311.5	619	78.7	91.7	175.1	191.2
5 45	1.4	311.8	620	79.7	91.7	174.7	190.8
5 55	1.4	311.1	620	79.6	91.8	175.2	191.2
6 05	1.4	310.3	620	78.7	91.8	175.8	191.8
6 15	1.4	309.9	621	79.6	91.5	175.6	191.9
6 25	1.4	310.4	620	78.7	92.1	175.1	191.2

DATA SHEET

#2 Boiler

Date: 4-1-96

Stack Test No. 1

Fuel/Process: Oil

Serial No.:

Firing Rate: Full

SOx NOx Part.

Time	Steam Production (Lbs)				Fuel Usage	5 Point Press Gas Meter	Boiler Drum Orifice Plate
	SO_2	Steam Stk Tmp	Boiler Out Temp	Lbs/Hr	(GPH or MCF) / 88.8 lb/min x 100 lb/min	175.4	191.4
15	2.8	305.8	603	78.1			
25	2.8	305.6	603	78	88.7	175.9	191.8
35	2.8	304.8	601	78	88.3	174.6	190.5
45	2.8	305.3	602	78.2	88.6	174.2	190.2
55	2.8	306.5	604	78.1	88.9	175.6	191.7
05	2.8	305.9	602	78.3	88.5	176	192.1
15	2.8	305.1	602	78.5	89	174.8	190.9
25	2.9	305.7	603	78.4	88.3	175	191.1
35	2.8	305.4	602	78.1	88.8	175.4	191.3
45	2.8	303.6	602	77.1	88.4	175.5	191.6
55	2.9	303.6	603	77.9	88.4	175.1	190.9
05	2.8	303.9	602.1	78.2	88.9	175.2	191.1
15	2.8	304	602	77.4	89	175.5	191.4
25	2.8	305.3	602	78	88.5	175.4	191.3
45	2.8	305.5	603	78.1	88.7	175.2	191.2
55	2.8	306.6	602	79	88.9	174.2	190.4
05	2.8	307.2	603	78.7	88.8	175	191.3
15	2.8	307.8	602	78.4	88.7	174.2	190.3
25	2.8	308.1	603	78.3	88.9	175.6	191.6
35	2.8	307.2	603	78.6	89.0	175.2	191.2
45	2.8	306.1	604	77.8	88.7	175.9	191.9

$GPM = (lb/min)(7.26\ lb/gal)$

DATA SHEET

#3 Boiler

Date: 4-11-96

Stack Test No. 2

Fuel/Process: Oil

Serial No.:

SOx NOx Part.

Firing Rate: Full

Time	Steam Production (lbs)				Fuel Usage	Steam Press Gas Meter	Boiler Drum Orifice Plate
	$\%O_2$	Steam Temp	Boiler Out Temp	Lbs/Hr	(GPM or MCF) 1 lb/min		
2 30	3.1	318.8	698	78.7	88.4	174.6	191.7
2 40	3.0	318.5	696	78.8	87.6	175.3	192.3
2 50	3.1	318.6	697	77.7	87.9	174.5	191.2
3 00	2.8	318.3	696	77.8	88.1	174.5	191.3
3 10	3.1	318.9	697	79.4	88.1	173.4	190.5
3 20	3.0	318.7	697	78.4	87.8	175.8	192.6
3 30	3.0	318.7	696	78.7	87.6	175.6	193.3
3 40	3.0	319.5	699	78.7	87.7	174.9	191.8
3 50	3.2	319.5	699	79.0	87.5	174.7	191.8
4 00	2.9	320.1	702	79.0	87.8	176.6	193.7
4 10	2.7	318.9	698	79.4	87.7	175.7	192.8
4 20	2.7	317.8	695	78.2	87.9	176.8	193.6
4 30	2.6	317.4	695	78.5	87.6	175.0	191.9
4 40	2.7	317.6	695	79.0	88.1	175.6	192.5
4 50	2.6	317.5	695	78.7	87.9	175.8	192.8
5 00	2.3	316.6	694	78.9	88.4	175.3	192.3
5 10	2.2	316.7	695	80.0	87.9	173.6	190.7
5 20	2.3	316.1	695	78.7	87.3	175.7	192.4
5 30	2.2	315.7	691	78.9	87.9	174.9	191.9
5 40	2.4	314.7	689	79.4	87.5	175.0	192.0
5 50	2.6	315.9	691	78.0	87.9	174.5	193.2

GPM = (lb/min)(7.26 lb/gal)