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

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

AP42 Section:	11.3
Background Chapter	4
Reference:	37
Title:	*Stationary Source Sampling Report for Statesville Brick Company, Statesville, NC, Kiln Exhaust, Sawdust Dryer Exhaust*, Trigon Engineering Consultants, Inc., Charlotte, NC, November 1994.

EXHIBIT H (37)

STATIONARY SOURCE SAMPLING REPORT

FOR

STATESVILLE BRICK COMPANY

STATESVILLE, NORTH CAROLINA

Kiln Exhaust
Sawdust Dryer Exhaust

Performed by:

Trigon Engineering Consultants, Inc.
Air Monitoring Division
1920 Starita Road, Suite J
Charlotte, North Carolina 28206
704/598-1049

Trigon Project # 046-94-166
November 1994

TRIGON

REPORT CERTIFICATION

The sampling and analyses performed for this report were carried out under my supervision and/or direction.

Date December 7, 1994 Signature Tom E. Wynn

Tom E. Wynn
Project Manager
Air Monitoring Division
Trigon Engineering Consultants, Inc.

I have reviewed all testing details and results in this report and hereby certify that the test report is authentic and accurate.

Date December 7, 1994 Signature Paul R. Jenkins

Paul R. Jenkins, Jr.
Quality Assurance Manager
Air Monitoring Division
Trigon Engineering Consultants, Inc.

I have reviewed all testing details and results in this report and hereby certify that the test report is authentic and accurate.

Date December 7, 1994 Signature Richard B. McCain III

Richard B. McCain, III
Manager
Air Monitoring Division
Trigon Engineering Consultants, Inc.

TRIGON

TABLE OF CONTENTS

INTRODUCTION
- Purpose 1
- Outline of Test Program 1
- Test Participants 2

PROCESS DESCRIPTION
- Discussion 3
  - Figure 1 - Process Air Flow Schematic 4

SUMMARY OF RESULTS
- Presentation 5
- Tabular Summary of Results:
  - Table 1 - Carbon Monoxide Sampling, Kiln Exhaust 6
  - Table 2 - Carbon Monoxide Sampling, Sawdust Dryer Exhaust 7

SAMPLING AND ANALYTICAL PROCEDURES
- General 8
- Carbon Monoxide Sampling and Analysis 8
- Sampling Ports and Points 9
- Location of Sampling Ports and Points:
  - Figure 2 - Kiln Exhaust 10
  - Figure 3 - Sawdust Dryer Exhaust 11

QUALITY ASSURANCE AND QUALITY CONTROL
- Discussion 12

APPENDICES 13
- A. Summary of Results and Example Calculations
- B. Field Data Sheets
- C. Method 10 Data Reduction
- D. Calibration Data

TRIGON

INTRODUCTION

Purpose:

The purpose of this sampling project was to determine concentrations and emission rates of carbon monoxide on two sources designated as the Kiln Exhaust and the Sawdust Dryer Exhaust located at the Statesville Brick Company facility in Statesville, North Carolina. The results of the sampling and the documentation provided in this report will be used internally by Statesville Brick Company for engineering purposes. Data provided in this report will be compared to published emission factors for similar processes and used in the preparation of a Title V permit application.

Outline of Test Program:

Stationary source sampling was performed November 29, 1994 by the Air Monitoring Division of Trigon Engineering Consultants, Inc. at the Statesville Brick Company facility in Statesville, North Carolina. Three 1-hour sampling runs were conducted simultaneously at the Kiln Exhaust and Sawdust Dryer Exhaust serving the Tunnel Kiln. United States Environmental Protection Agency (US EPA) Reference Test Methods 1 through 4 and 10 were used for the determination of carbon monoxide. Carbon monoxide sampling was performed utilizing a Thermo Environmental Instruments, Inc. (TECO) Model 48 analyzer. The TECO Model 48 is a gas filter correlation (GFC) non-dispersive infrared (NDIR) analyzer. The carbon monoxide analyzer system was calibrated with US EPA Protocol 1 gas standards. All sampling and analytical procedures used were those established by the US EPA in standard reference test methods and appropriate state-of-the-art analytical procedures. The test runs were conducted during normal operating conditions.

Test Participants:

The project was managed by Mr. Tom E. Wynn, Project Manager, Trigon Engineering Consultants, Inc. The test team also included Messrs. Brian L. Wrenn and Bryan L. Starnes of Trigon Engineering Consultants, Inc. Sampling was coordinated by Mr. Brad Brown, Statesville Brick Company.

The following sections of the report detail the summary of results, process description, sampling and analytical procedures, and quality assurance/quality control measures implemented in this project.

PROCESS DESCRIPTION

The tunnel kiln is a continuous push, 12-brick wide Harrop; the length of the kiln is 290 feet and it holds 28 cars. There are 6,336 standard brick on each car.

The exhaust from the kiln is divided into two ducts: one goes out through the roof and is called the kiln exhaust; the second goes to the sawdust dryer and through a cyclone and exhausts as the sawdust dryer exhaust. A gate at the entrance to the two ducts allows slight adjustments in the hot air flow to the dryer. Approximately 95 percent of the total exhaust flow goes to the sawdust dryer. Figure 1 details the process air flow schematic for the Tunnel Kiln.

Production documentation was compiled by Statesville Brick. During the testing, production was at maximum capacity. The kiln was fired with a hardwood/softwood mixture of dry sawdust at a rate of 3,200 pounds per hour. As a result, "ware" or brick was finished at a rate of 19,475 pounds per hour.

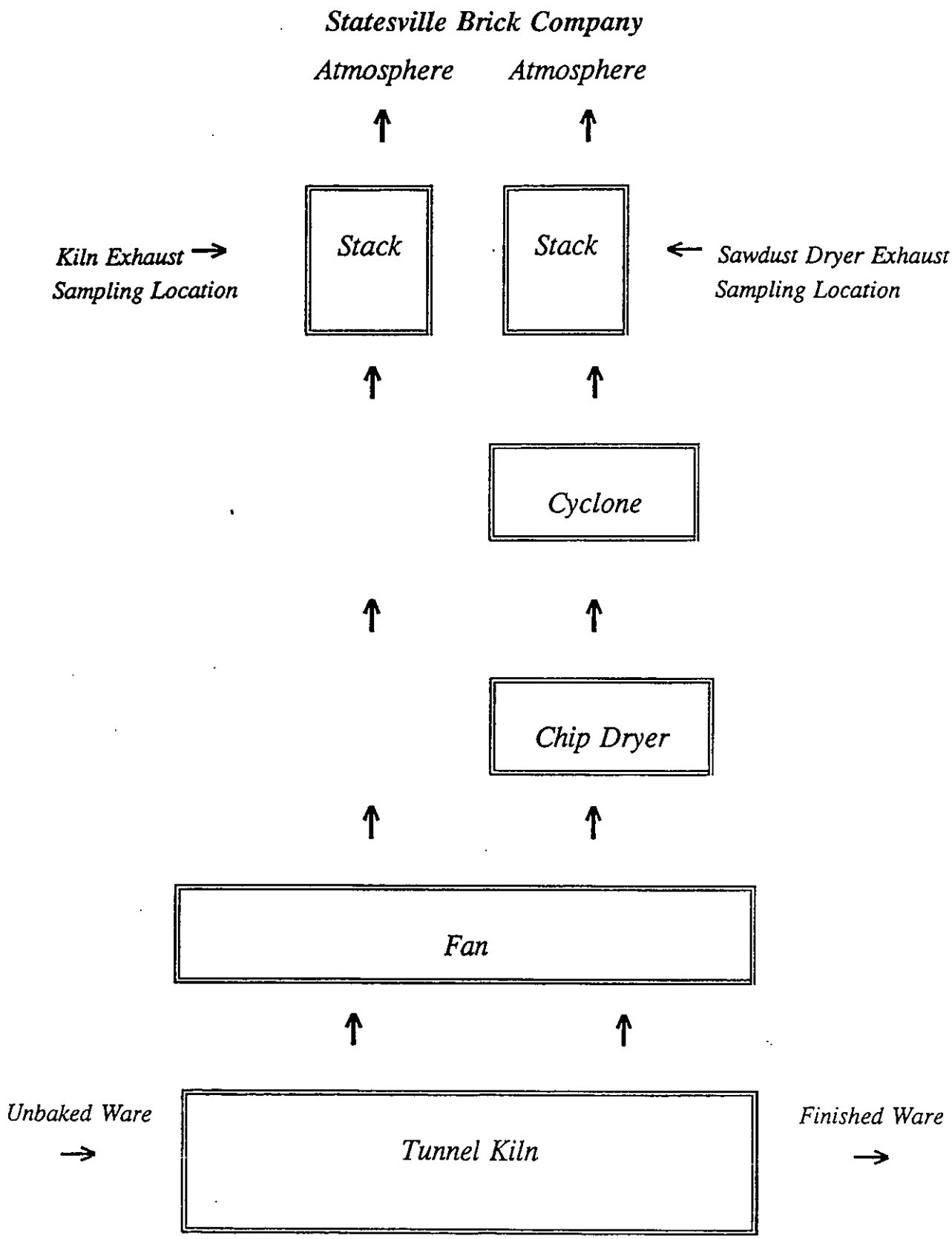


Figure 1
Process Air Flow Schematic

SUMMARY OF RESULTS

Presentation:

Tables 1 and 2 present the summary of results for the carbon monoxide sampling at the Kiln Exhaust and Sawdust Dryer Exhaust, respectively. A synopsis of the pollutant emissions is provided in the following table:

	Carbon Monoxide	
Concentration Units/Sampling Location	***Kiln Exhaust***	***Sawdust Dryer Exhaust***
parts per million, (ppm)	88.0	65.2
pounds per dry standard cubic foot, (lbs/dscf)	6.39E-06	4.73E-06
pounds per hour, (lbs/hr)	1.96	3.77

Detailed sampling results and example calculations are presented in Appendix A. Field data sheets are presented in Appendix B. Method 10 data reduction tables can be found in Appendix C.

TABLE 1

Summary of Results, Carbon Monoxide Sampling

Kiln Exhaust

Run Number	1	2	3
Date	11/29/94	11/29/94	11/29/94
Run Duration, Minutes	60	60	60
Sample Time, 24-hour clock	1139-1239	1239-1339	1413-1513
Average Stack Gas Temperature, °F	512.0	524.0	531.0
Average Stack Gas Velocity, ft/sec	16.84	15.76	19.22
Stack Gas Volumetric Flow Rate*, dry standard cubic feet/minute (DSCFM)	4908.7	4870.0	5475.8
Stack Gas Volumetric Flow Rate, actual cubic feet/minute (ACFM)	11863.3	11102.4	13538.2
Carbon Monoxide:			
Sample Identification	4166-01	4166-02	4166-03
C_{ndir} Concentration, ppm	83.6	90.8	100.5
C_{stack} Concentration, ppm	80.3	87.2	96.5
Concentration, lbs/dscf*	5.83E-06	6.33E-06	7.01E-06
Emission Rate, lbs/hr	1.72	1.85	2.30

* 68°F, 29.92 inches Hg

TRIGON

TABLE 2

Summary of Results, Carbon Monoxide Sampling

Sawdust Dryer Exhaust

Run Number	1	2	3
Date	11/29/94	11/29/94	11/29/94
Run Duration, Minutes	60	60	60
Sample Time, 24-hour clock	1139-1239	1239-1339	1413-1513
Average Stack Gas Temperature, °F	198.0	183.0	190.0
Average Stack Gas Velocity, ft/sec	64.80	63.68	64.28
Stack Gas Volumetric Flow Rate*, dry standard cubic feet/minute (DSCFM)	13365.7	13236.3	13230.0
Stack Gas Volumetric Flow Rate, actual cubic feet/minute (ACFM)	18466.9	18149.4	18319.6
Carbon Monoxide:			
Sample Identification	4166-04	4166-05	4166-06
C_{ndir} Concentration, ppm	61.4	67.1	74.0
C_{stack} Concentration, ppm	59.3	64.8	71.4
Concentration, lbs/dscf*	4.30E-06	4.70E-06	5.19E-06
Emission Rate, lbs/hr	3.45	3.73	4.12

* 68°F, 29.92 inches Hg

TRIGON

SAMPLING AND ANALYTICAL PROCEDURES

General:

The sampling and analytical procedures used during the Statesville Brick Company test program are discussed in this section. The procedures used were those established by the US EPA and North Carolina Department of Environment, Health and Natural Resources. Sampling runs were conducted in triplicate to validate the sampling.

The US EPA methods used in this test program were Method 1 for the location of sampling ports and points, Method 2 for the determination of cyclonic and volumetric flow rates, Method 3 for the determination of dry molecular weight of the stack gas, and Method 4 for the determination of moisture in the stack gas. Sampling and analysis for carbon monoxide was determined according to Method 10. These methods are available in the Code of Federal Regulations or by request from Trigon. An overview of the sampling system, analytical and data reduction procedures used in this test program are provided in the following section.

Carbon Monoxide Sampling and Analysis:

Sampling for carbon monoxide was performed according to EPA Method 10. A continuous gas sample was extracted from a sampling point and collected in a leakfree, evacuated tedlar bag. Each sample was then analyzed for carbon monoxide (CO) using a gas filter correlation (GFC) non-dispersive infrared (NDIR) analyzer. The principal components of the sampling system were sequentially:

* A sample probe with cooling coil and particulate filter;
* Sample transfer line, sample pump and Tedlar bag;
* A GFC NDIR analyzer and EPA Protocol 1 calibration gases;
* A single pen strip chart recorder to permanently record data.

The instrumentation used was a TECO Model 48 analyzer. The TECO Model 48 exceeds those specifications described in Section 4 of Method 10. The CO measurement system was calibrated utilizing multipoint EPA Protocol 1 calibration gases at approximately 30% and 60% of span.

Prior to and after the test series, instrument calibration and drift checks were performed. During the initial calibration and subsequent drift determinations calibration gases were sent directly to the analyzer for comparison to their certified concentrations. The acceptable initial analyzer calibration tolerance was ± 2 percent of the span. At the conclusion of the analysis procedures a drift check was performed on the instrument. A drift response of less than 3 percent of span for the zero and the upscale calibration gases were required in order to consider the test runs valid.

Sampling Ports and Points:

The dimensions of each sampling site and the location of the sampling ports and points are detailed in Figures 2 and 3. Method 1 sampling criteria was maintained. Each stack was divided into maximum equal areas as specified in EPA Method 1 for volumetric flow measurement. Sample runs were 60 minutes in duration. During each run, a continuous bag sample was extracted from a single sampling point which was representative of the average stack velocity. The gaseous sample in the tedlar bag was then analyzed for CO.

Kiln Exhaust

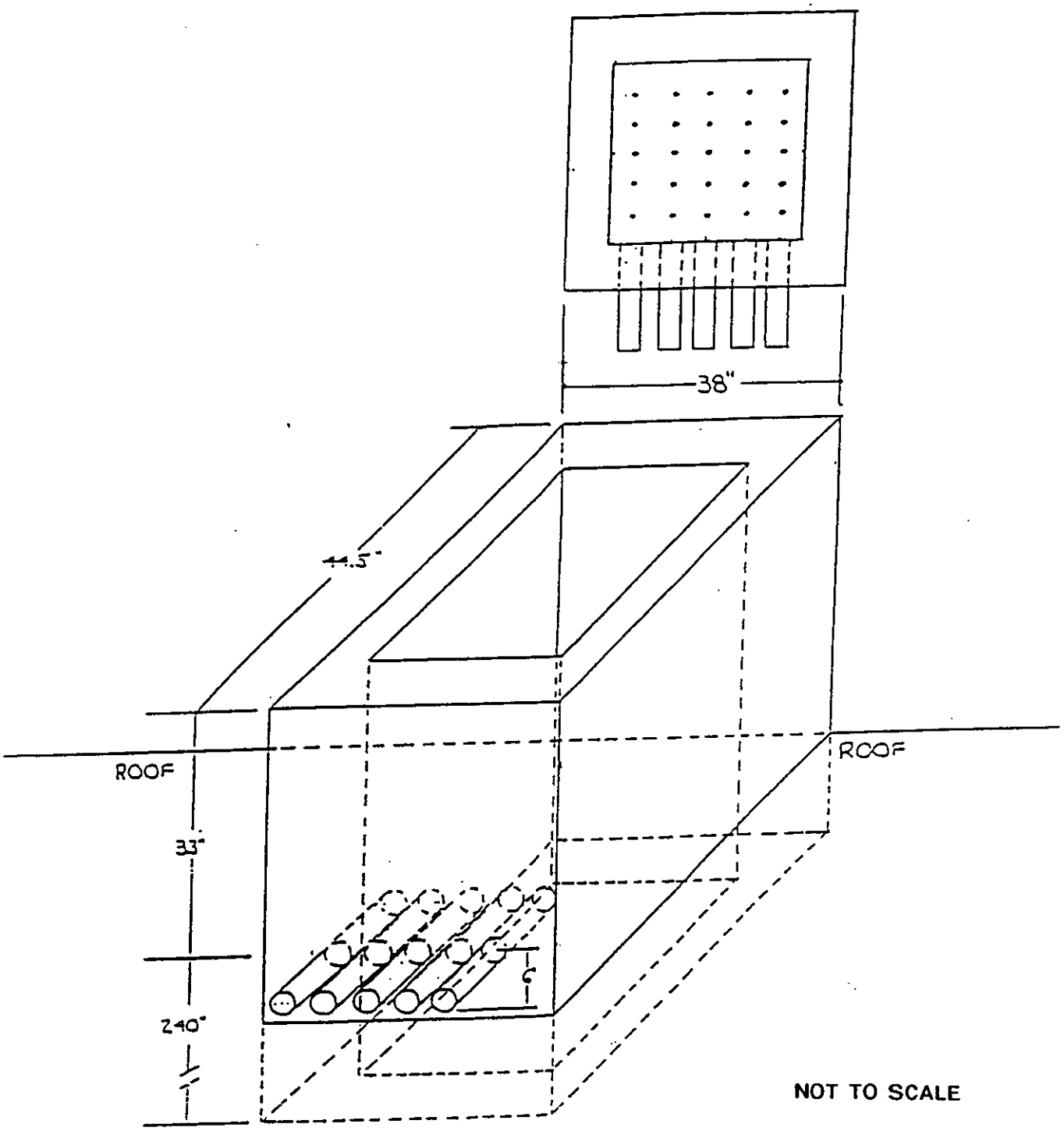
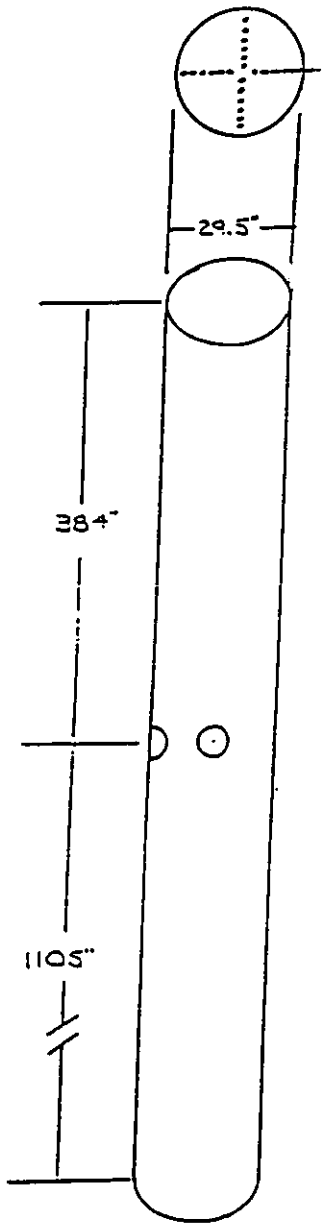


Figure 2
Location of Sampling Ports and Points

Sawdust Dryer Exhaust



NOT TO SCALE

Figure 3
Location of Sampling Ports and Points

QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

Discussion:

Trigon Engineering Consultants, Inc., Air Monitoring Division has established quality assurance and quality control (QA/QC) guidelines for providing the highest quality sampling and analytical data from source tests. These QA/QC procedures were implemented to ensure the acceptability and reliability of the data generated.

In summary, a high degree of data quality was maintained throughout this project. All field equipment and instrumentation leak check and calibration QA criteria were met. Quality control procedures for Method 10 were followed including equipment pre- and post-test calibrations utilizing EPA Protocol 1 gas standards. Data reduction documentation is reported in Appendix C. Copies of all the calibration data including the EPA Protocol 1 calibration gas certificates can be found in Appendix D.

Field data and audited data reduction results were entered into Trigon's Air Quality Data System by an environmental scientist, independently audited by the project manager, and reviewed by the Quality Assurance Manager for verification of data. After QC review by the QA Manager, the Division Manager verified the final report for completeness and reasonableness of data. The report was returned to the Project Manager for final review and preparation of the final draft. The report requires the signature of the Project Manager, QA Manager, and the Division Manager before release to the client. Data and final reports are archived in a secured area for a minimum period of three years.

Trigon's field and laboratory test equipment has been maintained and calibrated in accordance with quality assurance procedures established by the US EPA in the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. Equipment calibrations including pre-test and post-test calibration data are presented in Appendix D.

APPENDICES

SUMMARY OF RESULTS AND EXAMPLE CALCULATIONS

SUMMARY OF RESULTS
EPA REFERENCE METHOD 10
Determination of Carbon Monoxide Emissions
Statesville Brick Company
Statesville, North Carolina
Kiln Exhaust

Run Number		1	2	3
Date:		11/29/94	11/29/94	11/29/94
TT	Net Time of Test, min.	60	60	60
PB	Barometric Pressure, in. Hg	29.60	29.47	29.50
SP	Static Pressure, in. Hg	-0.002	-0.002	-0.002
PS	Stack Pressure Absolute, in. Hg	29.598	29.468	29.498
Bws	Moisture Content of Gas Stream	0.230	0.170	0.230
PMV	Percent Moisture	23.0	17.0	23.0
MFD	Mole Fraction Dry Gas, Percent	0.770	0.830	0.770
P02	Percent Oxygen, Dry	17.5	17.5	17.0
PC02	Percent Carbon Dioxide, Dry	4.0	4.0	4.0
MD	Mole. WT. Stack Gas, Dry Basis, lb/lb mole	29.340	29.340	29.320
MW	Mole. WT. Stack Gas, Wet Basis, lb/lb mole	26.732	27.412	26.716
CP	Pitot Tube Coefficient	0.84	0.84	0.84
DPS	Avg. Sqrt Delta P, in. H20	0.21	0.20	0.24
TS	Avg. Stack Temp., Deg. F	512.0	524.0	531.0
VS	Avg. Stack Velocity, ft/sec	16.84	15.76	19.22
AS	Area Stack, Ft2	11.74	11.74	11.74
QS	Gas Volume Flow, Dry Std. Cond., CFM	4908.7	4870.0	5475.8
QA	Gas Volume Flow, Actual, CFM	11863.3	11102.4	13538.2

TRIGON

SUMMARY OF RESULTS
EPA REFERENCE METHOD 10
Determination of Carbon Monoxide Emissions
Statesville Brick Company
Statesville, North Carolina
Kiln Exhaust

Carbon Monoxide Concentrations and Emission Rates

Cndir	CO Concentration as Measured, ppm	83.6	90.8	100.5
Cstck	CO Concentration in stack, ppm	80.3	87.2	96.5
CAN	CO Concentration, lbs/dscf	5.83E-06	6.33E-06	7.01E-06
CAW	CO Emission Rate, lbs/hr	1.72	1.85	2.30

TRIGON

SUMMARY OF RESULTS
EPA REFERENCE METHOD 10
Determination of Carbon Monoxide Emissions
Statesville Brick Company
Statesville, North Carolina
Kiln Exhaust

Example Calculations Run 1

Stack Pressure Absolute, in. Hg
PS = PB - SP = 29.598

Mole Fraction Dry Gas, Percent

$$MFD = \frac{100 - PMV}{100} = 0.770$$

Mole. WT. Stack Gas, Dry Basis, lb/lb mole
MD = 0.44 * %CO2 + 0.32 * %O2 + 0.28 * (100 - %CO2 - %O2) = 29.34

Mole. WT. Stack Gas, Wet Basis, lb/lb mole
MW = MD * MFD + [18 *(1 -MFD)] = 26.732

Avg. Stack Velocity, ft/sec
VS = 85.49 * CP * DPS * SQRT (TS + 460)/(PS * MW) = 16.84

Gas Volume Flow, Dry Std. Cond., CFM

$$QS = \frac{1059 * VS * PS * AS * (1-Bws)}{TS + 460} = 4908.7$$

Gas Volume Flow, Actual, CFM
QA = AS * VS * 60 = 11863.3

Carbon Monoxide in Stack, ppm
Cstck = Cndir * (1 - (%CO2/100)) = 80.3

Carbon Monoxide Concentration, lbs/dscf
(At Standard Conditions)
CAN = Cstck * 7.263E-8 = 5.83E-06

Carbon Monoxide Emission Rate, lbs/hr
(At Standard Conditions)
CAW = 60 * CAN * QS = 1.72

Standard Conditions 68 Deg. F, 29.92 in. Hg

TRIGON

SUMMARY OF RESULTS
EPA REFERENCE METHOD 10
Determination of Carbon Monoxide Emissions
Statesville Brick Company
Statesville, North Carolina
Sawdust Dryer Exhaust

Run Number		1	2	3
Date:		11/29/94	11/29/94	11/29/94
TT	Net Time of Test, min.	60	60	60
PB	Barometric Pressure, in. Hg	29.60	29.47	29.50
SP	Static Pressure, in. Hg	0.056	0.056	0.056
PS	Stack Pressure Absolute, in. Hg	29.656	29.526	29.556
Bws	Moisture Content of Gas Stream	0.090	0.100	0.100
PMV	Percent Moisture	9.0	10.0	10.0
MFD	Mole Fraction Dry Gas, Percent	0.910	0.900	0.900
P02	Percent Oxygen, Dry	17.5	17.0	18.0
PC02	Percent Carbon Dioxide, Dry	3.5	3.5	3.5
MD	Mole. WT. Stack Gas, Dry Basis, lb/lb mole	29.260	29.240	29.280
MW	Mole. WT. Stack Gas, Wet Basis, lb/lb mole	28.247	28.116	28.152
CP	Pitot Tube Coefficient	0.84	0.84	0.84
DPS	Avg. Sqrt Delta P, in. H20	1.02	1.01	1.01
TS	Avg. Stack Temp., Deg. F	198.0	183.0	190.0
VS	Avg. Stack Velocity, ft/sec	64.80	63.68	64.28
AS	Area Stack, Ft2	4.75	4.75	4.75
QS	Gas Volume Flow, Dry Std. Cond., CFM	13365.7	13236.3	13230.0
QA	Gas Volume Flow, Actual, CFM	18466.9	18149.4	18319.6

TRIGON

SUMMARY OF RESULTS
EPA REFERENCE METHOD 10
Determination of Carbon Monoxide Emissions
Statesville Brick Company
Statesville, North Carolina
Sawdust Dryer Exhaust

Carbon Monoxide Concentrations and Emission Rates

Cndir	CO Concentration as Measured, ppm	61.4	67.1	74
Cstck	CO Concentration in stack, ppm	59.3	64.8	71.4
CAN	CO Concentration, lbs/dscf	4.30E-06	4.70E-06	5.19E-06
CAW	CO Emission Rate, lbs/hr	3.45	3.73	4.12

TRIGON

SUMMARY OF RESULTS
EPA REFERENCE METHOD 10
Determination of Carbon Monoxide Emissions
Statesville Brick Company
Statesville, North Carolina
Sawdust Dryer Exhaust

Example Calculations Run 1

Stack Pressure Absolute, in. Hg
PS = PB - SP = 29.656

Mole Fraction Dry Gas, Percent

$$MFD = \frac{100 - PMV}{100} = 0.910$$

Mole. WT. Stack Gas, Dry Basis, lb/lb mole
MD = 0.44 * %CO2 + 0.32 * %O2 + 0.28 * (100 - %CO2 - %O2) = 29.26

Mole. WT. Stack Gas, Wet Basis, lb/lb mole
MW = MD * MFD + [18 *(1 -MFD)] = 28.247

Avg. Stack Velocity, ft/sec
VS = 85.49 * CP * DPS * SQRT (TS + 460)/(PS * MW) = 64.80

Gas Volume Flow, Dry Std. Cond., CFM

$$QS = \frac{1059 * VS * PS * AS * (1-Bws)}{TS + 460} = 13365.7$$

Gas Volume Flow, Actual, CFM
QA = AS * VS * 60 = 18466.9

Carbon Monoxide in Stack, ppm
Cstck = Cndir * (1 - (%CO2/100)) = 59.3

Carbon Monoxide Concentration, lbs/dscf
(At Standard Conditions)
CAN = Cstck * 7.263E-8 = 4.30E-06

Carbon Monoxide Emission Rate, lbs/hr
(At Standard Conditions)
CAW = 60 * CAN * QS = 3.45

Standard Conditions 68 Deg. F, 29.92 in. Hg

TRIGON

FIELD DATA SHEETS

EPA Method 1
Determination of Sampling Ports and Points

Client Statesville Brick
Sampling Location Kiln Exhaust Stack

City/State Statesville, NC
Date 11/25/94

Sampling Location Dimensions:

From Far Wall to Outside of Port 50.5
Nipple Length 6.0
Depth of Duct 44.5
Width (Rectangular Duct) 38

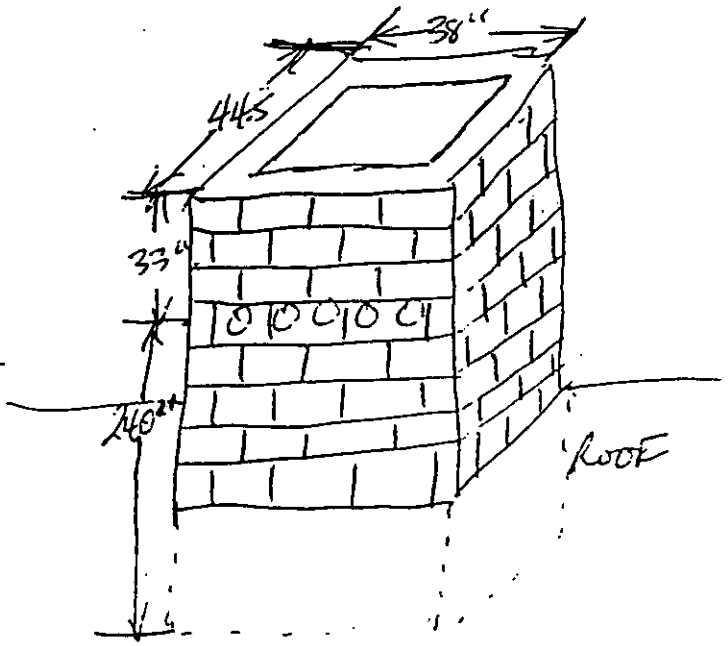
Equivalent Diameter Calculation (DE):

$$DE = \frac{2 \times \text{Length} \times \text{Width}}{\text{Length} + \text{Width}} = \frac{2(44.5)(38)}{(44.5 + 38)} = 40.99$$

Distance From Ports to Nearest Flow Disturbance:

	Upstream	Downstream
Dimensions in Inches	33"	240"
Duct Diameters	0.81	5.86

Stack Area, in Square Feet 11.74
Calculations By RW



Schematic of Sampling Location

Location of Traverse Points in Circular Stacks					
	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	25.0	14.6	10.5	8.2	6.7
3	75.0	29.6	19.4	14.6	11.8
4	93.3	70.4	32.3	22.6	17.7
5		85.4	67.7	34.2	25.0
6		95.6	80.6	65.8	35.6
7			89.5	77.4	64.4
8			96.8	85.4	75.0
9				91.8	82.3
10				97.4	88.2
11					93.3
12					97.9

Location of Traverse Points in Rectangular Stacks											
	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

Point No.	% of Stack ID	Stack ID	Distance From Inside Wall	Nipple Length	Distance From Outside of Port
1	10.0	44.5	4.45	6.0	10.45
2	30.0	↓	13.35	↓	19.35
3	50.0	↓	22.25	↓	28.25
4	70.0	↓	31.15	↓	37.15
5	90.0	↓	40.05	↓	46.05

TRIGON

FIELD DATA SHEETS

EPA Method 1
Determination of Sampling Ports and Points

Client Statesville Brick
Sampling Location Kiln Exhaust Stack

City/State Statesville, NC
Date 11/25/94

Sampling Location Dimensions:

From Far Wall to Outside of Port 50.5
Nipple Length 6.0
Depth of Duct 44.5
Width (Rectangular Duct) 38

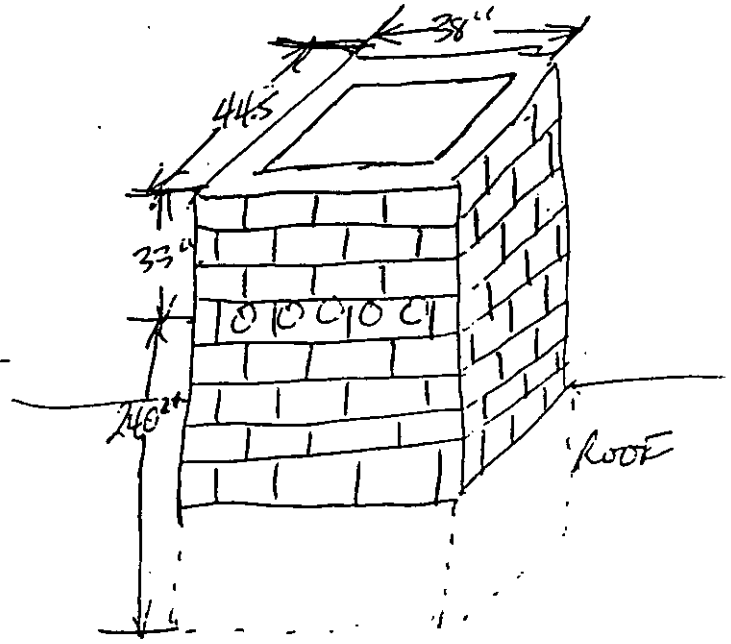
Equivalent Diameter Calculation (DE):

$$DE = \frac{2 \times \text{Length} \times \text{Width}}{\text{Length} + \text{Width}} = \frac{2(44.5)(38)}{(44.5 + 38)} = 40.99$$

Distance From Ports to Nearest Flow Disturbance:

	Upstream	Downstream
Dimensions in Inches	33"	240"
Duct Diameters	0.81	5.86

Stack Area, in Square Feet 11.74
Calculations By [illegible]



Schematic of Sampling Location

Location of Traverse Points in Circular Stacks

	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	25.0	14.6	10.5	8.2	6.7
3	75.0	29.6	19.4	14.6	11.8
4	93.3	70.4	32.3	22.6	17.7
5		85.4	67.7	34.2	25.0
6		95.6	80.6	65.8	35.6
7			89.5	77.4	64.4
8			96.8	85.4	75.0
9				91.8	82.3
10				97.4	88.2
11					93.3
12					97.9

Location of Traverse Points in Rectangular Stacks

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

Point No.	% of Stack ID	Stack ID	Distance From Inside Wall	Nipple Length	Distance From Outside of Port
1	10.0	44.5	4.45	6.0	10.45
2	30.0	↓	13.35	↓	19.35
3	50.0	↓	22.25	↓	28.25
4	70.0	↓	31.15	↓	37.15
5	90.0	↓	40.05	↓	46.05

TRIGON

EPA Method 2
Determination of Stack Gas Velocity, Volumetric Flow Rate and Cyclonic Flow

Client Statesville Brick
Sampling Location Kiln Exhaust
Run Date 11/29/94
Barometric Pressure, in. Hg 29.60
Static Pressure, in. H_2O −0.025
Pitot Tube I.D. No. 200.044
Date Calibrated 11/25/94
Stack Dimensions, in., diameter/side 1 44.5"

City/State Statesville, NC
Operators Bill, BLS
Time 1045
Stack Pressure, in. Hg 29.598
Static Pressure, in. Hg -0.008
Pitot Tube Coefficient, C_p 0.84
Leak Check, in H_2O <0.1 @ 4.7
Side 2, in. 33"

Field Data

Traverse Point Number	Velocity Head Δp Inches H_2O		Stack Temperature °F		Cyclonic Flow Determination: Δp, at 0° Reference		Angle Which Yields a Null Δp	
A 1	0.035	~~512~~ BW	512					
2	0.050	~~512~~ BW	512					
3	0.055	~~512~~ BW	512					
4	0.050		512					
5	0.025		512					
B 1	0.040		512					
2	0.050		512					
3	0.050		512					
4	0.055		512					
5	0.045		512					
C 1	0.070		512					
2	0.035		512					
3	0.045		512					
4	0.060		512					
5	0.040		512					
D 1	0.060		512					
2	0.055		512					
3	0.055		512					
4	0.045		512					
5	0.035		512					
E 1	0.045		512					
2	0.040		512					
3	0.050		512					
4	0.040		512					
5	0.020		512					
Averages	0.046			512				

Stack Temperature, Dry, °F (A) 512
Difference (A - B) 347

Stack Temperature, Wet °F (B) 165
Percent Moisture 24

Comments

TRIGON

EPA Method 2
Determination of Stack Gas Velocity and Volumetric Flow Rate

Client: Statesville Brick Co.
Sampling Location: Kiln Exhaust
Run Date: 11/29/94
Pitot Tube I.D. No.: 200.044
Date Calibrated: 11/28/94
Stack Dimensions, in., diameter/side 1: 44.5"

City/State: Statesville NC
Operators: GLW, BLS
Time: 1139
Pitot Tube Coefficient, C_p: 0.84
Leak Check, in H_2O <0.1 @ 4.7
Side 2, in.: 35"

Field Data

Run No./Sample No.	1 Bag 1	2 Bag 2	3 Bag 1
Time (24-Hour Clock)	1139 – 1239	1239 – 1339	1413 – 1513
Bar. Press., in. Hg	29.60	29.47	29.50
Stack Press., in. Hg	TOW ~~29.60~~ 29.598	TOW ~~29.47~~ 29.468	TOW ~~29.50~~ 29.498
Static Press., in. H_2O	– 0.025	–0.025	–0.025
Static Press., in. Hg	–0.002	–0.002	–0.002
Stack Temp., Dry, °F	572	524	531
Stack Temp., Wet, °F	165	157	165
Difference, °F	347	367	366
Moisture, %	23	17	23

Traverse Point Number	Run # 1 Velocity Head Δp Inches H_2O A	B	Run # 2 Velocity Head Δp Inches H_2O A	B	Run # 3 Velocity Head Δp Inches H_2O A	B
1	0.025	0.060	0.015	0.050	0.040	0.065
2	0.050	0.050	0.045	0.040	0.065	0.055
3	0.055	0.050	0.040	0.040	0.065	0.060
4	0.050	0.055	0.045	0.050	0.070	0.065
5	0.035	0.045	0.035	0.035	0.055	0.060
1	C 0.070	D 0.060	C 0.060	D 0.055	C 0.070	D 0.075
2	0.035	0.035	0.030	0.035	0.045	0.050
3	0.045	0.035	0.040	0.040	0.050	0.055
4	0.040	0.045	0.050	0.055	0.065	0.075
5	0.040	0.035	0.035	0.040	0.060	0.050
1	E 0.035		E 0.030		E 0.045	
2	0.040	4 0.060	0.035	4 0.050	0.050	0.065
3	0.050	5 0.020	0.045	5 0.015	0.060	0.025
Average	0.046		0.040		0.058	

Comments _____

TRIGON

EPA Method 2
Determination of Stack Gas Velocity, Volumetric Flow Rate and Cyclonic Flow

Client Statesville Brick
Sampling Location Kiln Exhaust
Run Date 11/29/04
Barometric Pressure, in. Hg 29.60
Static Pressure, in. H_2O −0.025
Pitot Tube I.D. No. 200.044
Date Calibrated 11/25/04
Stack Dimensions, in., diameter/side 1 44.5"

City/State Statesville, NC
Operators BLW, BLS
Time 1045
Stack Pressure, in. Hg 29.598
Static Pressure, in. Hg −0.008
Pitot Tube Coefficient, C_p 0.84
Leak Check, in H_2O <0.1 @ 4.7
Side 2, in. 33"

Field Data

Traverse Point Number	Velocity Head Δp Inches H_2O		Stack Temperature °F		Cyclonic Flow Determination: Δp, at 0° Reference		Angle Which Yields a Null Δp	
A 1	0.025	~~512 BW~~	512					
2	0.050	~~512 BW~~	512					
3	0.055	~~512 BW~~	512					
4	0.050		512					
5	0.025		512					
B 1	0.040		512					
2	0.050		512					
3	0.050		512					
4	0.055		512					
5	0.045		512					
C 1	0.070		512					
2	0.035		512					
3	0.045		512					
4	0.040		512					
5	0.040		512					
D 1	0.060		512					
2	0.035		512					
3	0.035		512					
4	0.045		512					
5	0.035		512					
E 1	0.045		512					
2	0.040		512					
3	0.050		512					
4	0.040		512					
5	0.020		512					
Averages	0.046			512				

Stack Temperature, Dry, °F (A) 512
Difference (A - B) 347

Stack Temperature, Wet °F (B) 165
Percent Moisture 24

Comments

TRIGON

EPA Method 2
Determination of Stack Gas Velocity and Volumetric Flow Rate

Client Statesville Brick Co.
Sampling Location Kiln Exhaust
Run Date 11/29/94
Pitot Tube I.D. No. 200.044
Date Calibrated 11/28/94
Stack Dimensions, in., diameter/side 1 44.5"

City/State Statesville NC
Operators GLW, BLS
Time 1139
Pitot Tube Coefficient, C_p 0.84
Leak Check, in H_2O <0.1 @ 4.7
Side 2, in. 38"

Field Data

Run No./Sample No.	1 Bag 1	2 Bag 2	3 Bag 1
Time (24-Hour Clock)	1139 – 1239	1239 – 1339	1413 – 1513
Bar. Press., in. Hg	29.60	29.47	29.50
Stack Press., in. Hg	TOW ~~29.60~~ 29.598	TOW ~~29.47~~ 29.468	TOW ~~29.50~~ 29.498
Static Press., in. H_2O	– 0.025	–0.025	–0.025
Static Press., in. Hg	–0.002	–0.002	–0.002
Stack Temp., Dry, °F	572	524	531
Stack Temp., Wet, °F	165	157	165
Difference, °F	347	367	366
Moisture, %	23	17	23

Traverse Point Number	Run # 1 Velocity Head Δp Inches H_2O A	B	Run # 2 Velocity Head Δp Inches H_2O A	B	Run # 3 Velocity Head Δp Inches H_2O A	B
1	0.025	0.060	0.015	0.050	0.040	0.065
2	0.050	0.050	0.045	0.040	0.065	0.055
3	0.055	0.050	0.040	0.040	0.065	0.040
4	0.050	0.055	0.045	0.050	0.070	0.065
5	0.035	0.045	0.035	0.035	0.055	0.060
1	C 0.070	D 0.060	C 0.060	D 0.055	C 0.070	D 0.075
2	0.035	0.035	0.030	0.035	0.045	0.050
3	0.045	0.035	0.040	0.040	0.050	0.055
4	0.040	0.045	0.050	0.055	0.065	0.075
5	0.040	0.035	0.035	0.040	0.060	0.050
1	E 0.035		E 0.030		E. 0.045	
2	0.040	4 0.040	0.035	4 0.050	0.050	0.065
3	0.050	5 0.020	0.045	5 0.015	0.060	0.075
Average	0.046		0.040		0.058	

Comments

TRIGON

EPA Method 3 - Molecular Weight Determination - Data Analysis

Client Name Statesville Brick Co. Project Number 046-94-164
City/State Statesville, NC Sample Date 11/29/94
Sampling Location Kiln Exhaust Operator Bell / BLS
Sample Type ☒ Bag ☐ In-Situ ☐ Continuous ☒ Integrated Fuel Type Sawdust
Analyzer Type Fyrite Serial # 300.063 ☒ Oxygen Calibration Check Must Be 20.9 ± 0.1%

Run # and/or Sample ID 1 Sampling Time (24 - Hour Clock) 1139-1239

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.44	1.76
O_2	21.5	17.5	21.5	17.5	21.5	17.5	17.5	0.32	5.6
N_2	100	78.5	100	78.5	100	78.5	78.5	0.28	21.98
								Total	29.34

Run # and/or Sample ID 2 Sampling Time (24 - Hour Clock) 1239-1339

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.44	1.76
O_2	21.5	17.5	21.5	17.5	21.5	17.5	17.5	0.32	5.6
N_2	100	78.5	100	78.5	100	78.5	78.5	0.28	21.98
								Total	29.34

Run # and/or Sample ID 3 Sampling Time (24 - Hour Clock) 1413-1513

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.44	1.76
O_2	21.0	17.0	21.0	17.0	21.0	17.0	17.0	0.32	5.44
N_2	100	79.0	100	79.0	100	79.0	79.0	0.28	22.12
								Total	29.32

TRIGON

EPA Method 1
Determination of Sampling Ports and Points

Client Statesville Brick
Sampling Location Sawdust Dryer Exhaust

City/State Statesville, NC
Date 11/28/94

Sampling Location Dimensions:

From Far Wall to Outside of Port 29.5"
Nipple Length 0"
Depth of Duct 29.5"
Width (Rectangular Duct) —

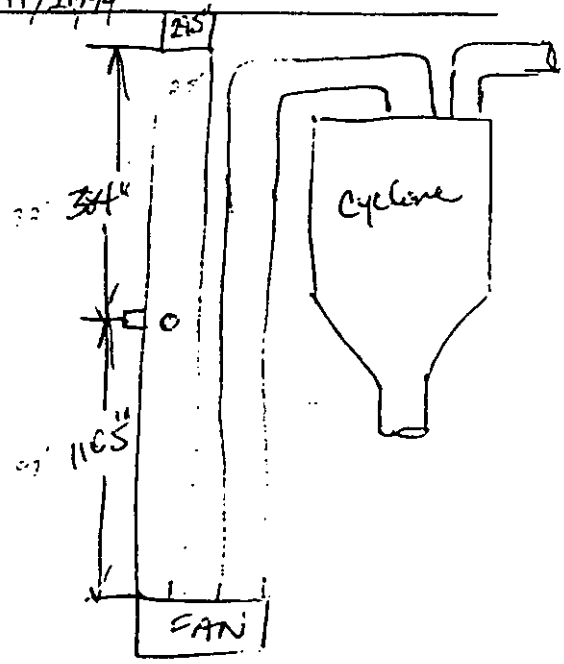
Equivalent Diameter Calculation (DE):

$$DE = \frac{2 \times \text{Length} \times \text{Width}}{\text{Length} + \text{Width}} = \frac{2(\ -\ )(\ -\ )}{(\ -\ +\ -\ )} = \text{N/A}$$

Distance From Ports to Nearest Flow Disturbance:

	Upstream	Downstream
Dimensions in Inches	334"	110.5"
Duct Diameters	13.00	3.75

Stack Area, in Square Feet 4.75
Calculations By [illegible]



Schematic of Sampling Location

Location of Traverse Points in Circular Stacks

	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	25.0	14.6	10.5	8.2	6.7
3	75.0	29.6	19.4	14.6	11.8
4	93.3	70.4	32.3	22.6	17.7
5		85.4	67.7	34.2	25.0
6		95.6	80.6	65.8	35.6
7			89.5	77.4	64.4
8			96.8	85.4	75.0
9				91.8	82.3
10				97.4	88.2
11					93.3
12					97.9

Location of Traverse Points in Rectangular Stacks

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

Point No.	% of Stack ID	Stack ID	Distance From Inside Wall	Nipple Length	Distance From Outside of Port
1	2.1	29.5"	0.62	0"	0.62+10
2	6.7		1.98		1.98
3	11.8		3.48		3.48
4	17.7		5.22		5.22
5	25.0		7.38		7.38
6	35.6		10.50		10.50
7	64.4		19.00		19.00
8	75.0		22.13		22.13
9	82.3		24.28		24.28
10	88.2		26.02		26.02
11	93.3		27.52		27.52
12	97.9		28.88		28.88+28.5

TRIGON

EPA Method 3 - Molecular Weight Determination - Data Analysis

Client Name Statesville Brick Co. Project Number 046-94-164
City/State Statesville, NC Sample Date 11/29/94
Sampling Location Kiln Exhaust Operator Bill / Bill S
Sample Type ☒ Bag ☐ In-Situ ☐ Continuous ☒ Integrated Fuel Type Sawdust
Analyzer Type Fyrite Serial # 300.063 ☒ Oxygen Calibration Check Must Be 20.9 ± 0.1%

Run # and/or Sample ID 1 Sampling Time (24 - Hour Clock) 1139-1239

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.44	1.76
O_2	21.5	17.5	21.5	17.5	21.5	17.5	17.5	0.32	5.6
N_2	100	78.5	100	78.5	100	78.5	78.5	0.28	21.98
								Total	29.34

Run # and/or Sample ID 2 Sampling Time (24 - Hour Clock) 1239-1339

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.44	1.76
O_2	21.5	17.5	21.5	17.5	21.5	17.5	17.5	0.32	5.6
N_2	100	78.5	100	78.5	100	78.5	78.5	0.28	21.98
								Total	29.34

Run # and/or Sample ID 3 Sampling Time (24 - Hour Clock) 1413-1513

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	0.44	1.76
O_2	21.0	17.0	21.0	17.0	21.0	17.0	17.0	0.32	5.44
N_2	100	79.0	100	79.0	100	79.0	79.0	0.28	22.12
								Total	29.32

TRIGON

EPA Method 1
Determination of Sampling Ports and Points

Client Statesville Brick
Sampling Location Sawdust Dryer Exhaust

City/State Statesville, NC
Date 11/28/94

Sampling Location Dimensions:

From Far Wall to Outside of Port 29.5"
Nipple Length 0"
Depth of Duct 29.5"
Width (Rectangular Duct) —

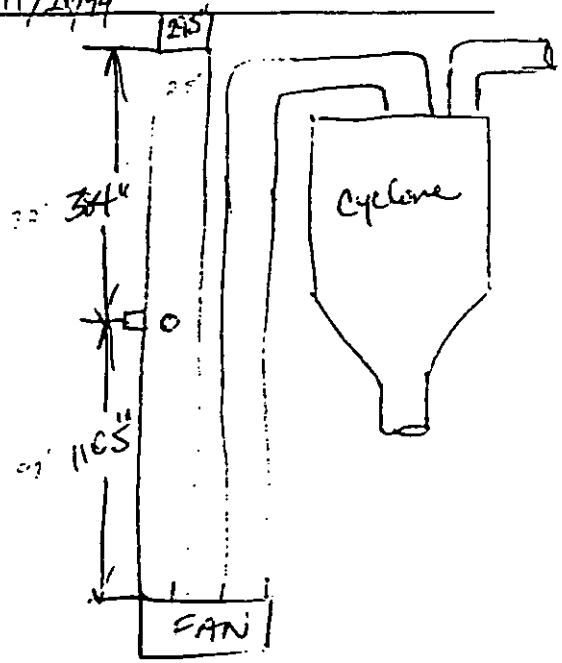
Equivalent Diameter Calculation (DE):

$$DE = \frac{2 \times \text{Length} \times \text{Width}}{\text{Length} + \text{Width}} = \frac{2(\ -\ )(\ -\ )}{(\ -\ +\ -\ )} = \text{N/A}$$

Distance From Ports to Nearest Flow Disturbance:

	Upstream	Downstream
Dimensions in Inches	354"	110.5"
Duct Diameters	12.0	3.75

Stack Area, in Square Feet 4.75
Calculations By N/A



Schematic of Sampling Location

Location of Traverse Points in Circular Stacks

	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	25.0	14.6	10.5	8.2	6.7
3	75.0	29.6	19.4	14.6	11.8
4	93.3	70.4	32.3	22.6	17.7
5		85.4	67.7	34.2	25.0
6		95.6	80.6	65.8	35.6
7			89.5	77.4	64.4
8			96.8	85.4	75.0
9				91.8	82.3
10				97.4	88.2
11					93.3
12					97.9

Location of Traverse Points in Rectangular Stacks

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

Point No.	% of Stack ID	Stack ID	Distance From Inside Wall	Nipple Length	Distance From Outside of Port
1	2.1	29.5"	0.62	0"	0.62+0=0
2	6.7		1.98		1.98
3	11.8		3.48		3.48
4	17.7		5.22		5.22
5	25.0		7.38		7.38
6	35.6		10.50		10.50
7	64.4		19.00		19.00
8	75.0		22.13		22.13
9	82.3		24.28		24.28
10	88.2		26.02		26.02
11	93.3		27.52		27.52
12	97.9		28.88		28.88+28.5

EPA Method 2

Determination of Stack Gas Velocity, Volumetric Flow Rate and Cyclonic Flow

Client: Statesville Brick
Sampling Location: Sawdust Dryer Exhaust
Run Date: 11/29/94
Barometric Pressure, in. Hg: ~~+0.76~~ BU 29.100
Static Pressure, in. H_2O: +0.76
Pitot Tube I.D. No.: 200.028
Date Calibrated: 01/03/94
Stack Dimensions, in., diameter/side 1: 29.5"

City/State: Statesville, NC
Operators: RLW BLS
Time: 1000
Stack Pressure, in. Hg: 29.156
Static Pressure, in. Hg: 0.056
Pitot Tube Coefficient, C_p: 0.84
Leak Check, in H_2O: <0.1 @ 5.1
Side 2, in.: —

Field Data

Traverse Point Number	Velocity Head Δp Inches H_2O		Stack Temperature °F		Cyclonic Flow Determination: Δp, at 0° Reference		Cyclonic Flow Determination: Angle Which Yields a Null Δp	
1	0.91	0.93	198	198	0.50	0.41	13	9
2	0.98	0.97	198	198	0.49	0.37	12	8
3	1.09	1.00	198	198	0.48	0.40	11	8
4	1.10	1.10	198	198	0.47	0.39	11	8
5	1.10	1.10	198	198	0.47	0.40	10	9
6	1.20	1.10	198	198	0.46	0.41	10	7
7	1.20	1.20	198	198	0.40	0.35	9	6
8	1.20	1.30	198	198	0.30	0.23	8	6
9	1.20	1.20	198	198	0.15	0.16	7	6
10	1.00	1.10	198	198	0.08	0.14	6	5
11	0.86	0.94	198	198	0.08	0.14	9	6
12	0.60	0.54	198	198	0.07	0.01	4	6
Average		1.03		198			8.08	

Stack Temperature, Dry, °F (A): 198
Stack Temperature, Wet °F (B): 118
Difference (A - B): 80
Percent Moisture: 9

Comments:

TRIGON

EPA Method 2
Determination of Stack Gas Velocity and Volumetric Flow Rate

Client: Statesville Brick Co.
Sampling Location: Sawdust Dryer Exhaust
Run Date: 11/29/94
Pitot Tube I.D. No.: 200.028
Date Calibrated: 01/03/94
Stack Dimensions, in., diameter/side 1: 29.5"

City/State: Statesville, NC
Operators: BW, SLS
Time: 1139
Pitot Tube Coefficient, C_p: 0.84
Leak Check, in H_2O <0.1 @ 5.1
Side 2, in.:

Field Data

Run No./Sample No.	1 Bag 7	2 Bag 8	3 Bag 9
Time (24-Hour Clock)	1139 - 1239	1239 - 1339	1413 - 1513
Bar. Press., in. Hg	29.60	29.47	29.50
Stack Press., in. Hg	29.66	29.53	29.54
Static Press., in. H_2O	0.76	0.76	0.76
Static Press., in. Hg	0.056	0.056	0.056
Stack Temp., Dry, °F	198	183	190
Stack Temp., Wet, °F	118	121	119
Difference, °F	80	62	71
Moisture, %	9	10	10

Traverse Point Number	Run # 1 Velocity Head Δp Inches H_2O A	B	Run # 2 Velocity Head Δp Inches H_2O A	B	Run # 3 Velocity Head Δp Inches H_2O A	B
1	0.91	0.93	0.87	0.87	0.92	0.86
2	0.98	0.97	0.94	0.94	0.98	0.93
3	1.00	1.00	0.99	0.97	1.10	0.97
4	1.10	1.10	1.00	1.00	1.10	1.00
5	1.20	1.10	1.00	1.10	1.20	1.10
6	1.20	1.10	1.20	1.10	1.20	1.10
7	1.20	1.20	1.20	1.30	1.20	1.20
8	1.20	1.30	1.30	1.30	1.10	1.20
9	1.00	1.20	1.20	1.20	1.20	1.10
10	~~0.86~~ 1.10	1.10	1.10	1.10	1.10	1.10
11	0.86	0.84	0.85	0.83	0.88	0.91
12	0.60	0.84	0.65	0.58	0.47	0.65
Average	1.04		1.02		1.03	

Comments

TRIGON

EPA METHOD 2

Determination of Stack Gas Velocity, Volumetric Flow Rate and Cyclonic Flow

Client: Statesville Brick
Sampling Location: Sawdust Dryer Exhaust
Run Date: 11/29/94
Barometric Pressure, in. Hg: ~~+0.76 BW~~ 29.100
Static Pressure, in. H_2O: +0.76
Pitot Tube I.D. No.: 200.028
Date Calibrated: 01/03/94
Stack Dimensions, in., diameter/side 1: 29.5"

City/State: Statesville NC
Operators: RLW BLS
Time: 1000
Stack Pressure, in. Hg: 29.656
Static Pressure, in. Hg: 0.056
Pitot Tube Coefficient, C_p: 0.84
Leak Check, in H_2O: <0.1 @ 5.1
Side 2, in.: —

Field Data

Traverse Point Number	Velocity Head Δp Inches H_2O		Stack Temperature °F		Cyclonic Flow Determination: Δp, at 0° Reference		Cyclonic Flow Determination: Angle Which Yields a Null Δp	
1	0.91	0.93	198	198	0.50	0.41	13	9
2	0.98	0.97	198	198	0.49	0.39	12	8
3	1.00	1.00	198	198	0.48	0.40	11	8
4	1.10	1.10	198	198	0.47	0.39	11	8
5	1.10	1.10	198	198	0.47	0.40	10	9
6	1.20	1.10	198	198	0.46	0.41	10	7
7	1.20	1.20	198	198	0.40	0.35	9	6
8	1.20	1.30	198	198	0.30	0.23	8	6
9	1.20	1.20	198	198	0.15	0.16	7	6
10	1.00	1.10	198	198	0.08	0.14	6	5
11	0.86	0.84	198	198	0.08	0.14	9	6
12	0.60	0.54	198	198	0.07	0.08	4	6
Averages		1.03		198			8.08	

Stack Temperature, Dry, °F (A): 198
Difference (A - B): 80

Stack Temperature, Wet °F (B): 118
Percent Moisture: 9

Comments:

TRIGON

EPA Method 2
Determination of Stack Gas Velocity and Volumetric Flow Rate

Client: Statesville Brick Co.
City/State: Statesville, NC
Sampling Location: Sawdust Dryer Exhaust
Operators: BW, SCS
Run Date: 11/29/94
Time: 1139
Pitot Tube I.D. No.: 200.028
Pitot Tube Coefficient, C_p: 0.84
Date Calibrated: 01/03/94
Leak Check, in H_2O <0.1 @ 5.1
Stack Dimensions, in., diameter/side 1: 29.5"
Side 2, in.:

Field Data

Run No./Sample No.	1 Bag 7	2 Bag 8	3 Bag 7
Time (24-Hour Clock)	1139 - 1239	1239 - 1339	1413 - 1513
Bar. Press., in. Hg	29.60	29.47	29.50
Stack Press., in. Hg	29.66	29.53	29.54
Static Press., in. H_2O	0.76	0.76	0.76
Static Press., in. Hg	0.056	0.056	0.056
Stack Temp., Dry, °F	198	183	190
Stack Temp., Wet, °F	118	121	119
Difference, °F	80	62	71
Moisture, %	9	10	10

Traverse Point Number	Run # 1 Velocity Head Δp Inches H_2O A	B	Run # 2 Velocity Head Δp Inches H_2O A	B	Run # 3 Velocity Head Δp Inches H_2O A	B
1	0.91	0.93	0.87	0.87	0.92	0.8[illegible]
2	0.98	0.97	0.94	0.94	0.98	0.93
3	1.00	1.00	0.99	0.97	1.10	0.97
4	1.10	1.10	1.00	1.00	1.10	1.00
5	1.20	1.10	1.00	1.10	1.20	1.10
6	1.20	1.10	1.20	1.10	1.20	1.10
7	1.20	1.20	1.20	1.30	1.20	1.20
8	1.20	1.30	1.30	1.30	1.10	1.20
9	1.00	1.20	1.20	1.20	1.20	1.10
10	~~0.84~~ 1.10	1.10	1.10	1.10	1.10	1.10
11	0.86	0.84	0.85	0.83	0.88	0.91
12	0.60	0.84	0.65	0.58	0.47	0.65
Average	1.04		1.02		1.03	

Comments

TRIGON

EPA Method 3 - Molecular Weight Determination - Data Analysis

Client Name Statesville Brick Co. Project Number 046-94-164
City/State Statesville, NC Sample Date 11-29-94
Sampling Location Sawdust Dryer Exhaust Operator ALW / BLS
Sample Type ☒ Bag ☐ In-Situ ☐ Continuous ☒ Integrated Fuel Type Sawdust
Analyzer Type Fyrite Serial # 300.663 ☒ Oxygen Calibration Check Must Be 20.9 ± 0.1%

Run # and/or Sample ID 1 Sampling Time (24 - Hour Clock) 1139 - 1239

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	0.44	1.54
O_2	21.0	17.5	21.0	17.5	21.0	17.5	17.5	0.32	5.6
N_2	100	79.0	100	79.0	100	79.0	79.0	0.28	22.12
								Total	29.24

Run # and/or Sample ID 2 Sampling Time (24 - Hour Clock) 1239 - 1339

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	0.44	1.54
O_2	20.5	17.0	20.5	17.0	20.5	17.0	17.0	0.32	5.44
N_2	100	79.5	100	79.5	100	79.5	79.5	0.28	22.26
								Total	29.24

Run # and/or Sample ID 3 Sampling Time (24 - Hour Clock) 1413 - 1513

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	0.44	1.54
O_2	21.5	18.0	21.5	18.0	21.5	18.0	18.0	0.32	5.76
N_2	100	78.5	100	78.5	100	78.5	78.5	0.28	21.98
								Total	29.28

TRIGON

EPA REFERENCE METHOD 10
DETERMINATION OF CARBON MONOXIDE EMISSIONS
USING INSTRUMENT ANALYZER

Plant Statesville Brick

City Statesville, NC

Sampling Location Kiln Exhaust & Chip dryer

Instrument #42864-268

Run Date: 11/29/94 Operators TEW/BWC/BLS

Observer NONE

Instrument Readiness:

Range 0-500

Range Setting: 8

Time Setting: 0

Intensity 1: 24751

Intensity 2: 24551

Zero Setting: 553

Span Setting: 1044

Temperature: 70 °F 21.3 °C

Pressure: 720 mm Hg

Calibration Gases:

Mid 154

High 301

Sample Time: 3-1 hr

Start: 1149 1139 1239 1413

Stop: 1239 1339 1513

ANALYZER CALIBRATION DATA

SPAN: 500	CYLINDER VALUE	ANALYZER ppm	ABSOLUTE DIFFERENCE	PERCENT DIFFERENCE	SPEC.
Zero	0.0	0.0	0	0	± 2%
Mid Range	154	155	1	TEW ~~0.2~~ -0.6	± 2%
High Range	301	302	1	TEW ~~0.2~~ -0.3	± 2%

~~SYSTEM~~ Analyzer CALIBRATION BIAS AND DRIFT DATA

RUN 1	ANALYZER RESPONSE	INITIAL SYSTEM RESPONSE	SYSTEM CAL. BIAS	FINAL SYSTEM RESPONSE	DRIFT	SPEC.
Zero	0.0	0.0	0	-0.3	-0.06	± 3%
Upscale	302	302	0	301	-0.2	± 5%

SYSTEM RESPONSE TIME

Zero 10 10 10 Avg. 10 sec

Upscale 10 10 10 Avg. 10 sec

Note: Must be 95% of a step change in gas.

TRIGON

File:046\datashet\method10.frm

EPA Method 3 - Molecular Weight Determination - Data Analysis

Client Name Statesville Brick Co. Project Number 046-94-164
City/State Statesville, NC Sample Date 11-29-94
Sampling Location Sawdust Dryer Exhaust Operator ACW / BLS
Sample Type ☒ Bag ☐ In-Situ ☐ Continuous ☒ Integrated Fuel Type Sawdust
Analyzer Type Fyrite Serial # 300.663 ☒ Oxygen Calibration Check Must Be 20.9 ± 0.1%

Run # and/or Sample ID 1 Sampling Time (24 - Hour Clock) 1139 - 1239

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	0.44	1.54
O_2	21.0	17.5	21.0	17.5	21.0	17.5	17.5	0.32	5.6
N_2	100	79.0	100	79.0	100	79.0	79.0	0.28	22.12
								Total	29.24

Run # and/or Sample ID 2 Sampling Time (24 - Hour Clock) 1239 - 1339

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	0.44	1.54
O_2	20.5	17.0	20.5	17.0	20.5	17.0	17.0	0.32	5.44
N_2	100	79.5	100	79.5	100	79.5	79.5	0.28	22.26
								Total	29.24

Run # and/or Sample ID 3 Sampling Time (24 - Hour Clock) 1413 - 1513

Gas	Replicate 1		Replicate 2		Replicate 3		Average Percent	Multiplier	Molecular Weight Dry lb/lb mole
	Actual	Net	Actual	Net	Actual	Net			
CO_2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	0.44	1.54
O_2	21.5	18.0	21.5	18.0	21.5	18.0	18.0	0.32	5.76
N_2	100	78.5	100	78.5	100	78.5	78.5	0.28	21.98
								Total	29.28

TRIGON

EPA REFERENCE METHOD 10
DETERMINATION OF CARBON MONOXIDE EMISSIONS
USING INSTRUMENT ANALYZER

Plant Statesville Rock

City Statesville, NC

Sampling Location Kiln Exhaust + Chip dryer

Instrument #42864-268

Run Date: 11/29/94 Operators TEW/BLW/BS

Observer NONE

Instrument Readiness:

Range ~~8~~ 0-500
Range Setting: 8
Time Setting: 0
Intensity 1: 24751
Intensity 2: 26551
Zero Setting: 553
Span Setting: 1046
Temperature: 70 °F 21.3°C
Pressure: 720 mm Hg

Calibration Gases:

Mid 154
High 301

Sample Time: 3-1 hr
Start: ~~1149~~ 1139 1239 1413
Stop: 1239 1339 1513

ANALYZER CALIBRATION DATA

SPAN: 500	CYLINDER VALUE	ANALYZER ppm	ABSOLUTE DIFFERENCE	PERCENT DIFFERENCE	SPEC.
Zero	0.0	0.0	0	0	± 2%
Mid Range	154	155	1	TEW ~~0.2~~ -0.6	± 2%
High Range	301	302	1	TEW ~~0.2~~ -0.3	± 2%

~~SYSTEM~~ Analyzer CALIBRATION BIAS AND DRIFT DATA

RUN 1	ANALYZER RESPONSE	INITIAL SYSTEM RESPONSE	SYSTEM CAL. BIAS	FINAL SYSTEM RESPONSE	DRIFT	SPEC.
Zero	0.0	0.0	0	-0.3	-0.06	± 3%
Upscale	302	302	0	301	-0.2	± 5%

SYSTEM RESPONSE TIME

Zero 10 10 10 Avg. 10 sec

Upscale 10 10 10 Avg. 10 sec

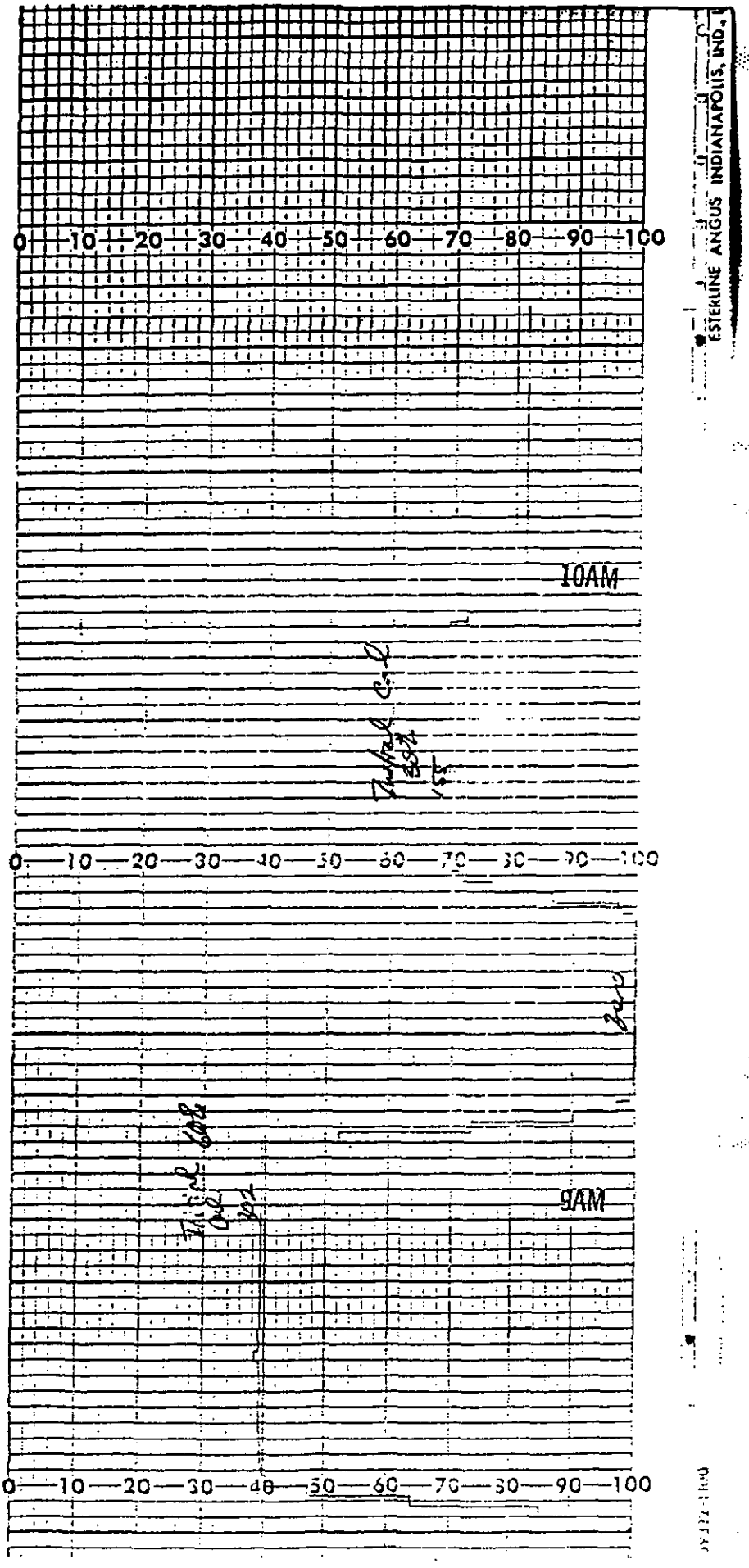
Note: Must be 95% of a step change in gas.

TRIGON

File:046\datashet\method10.frm

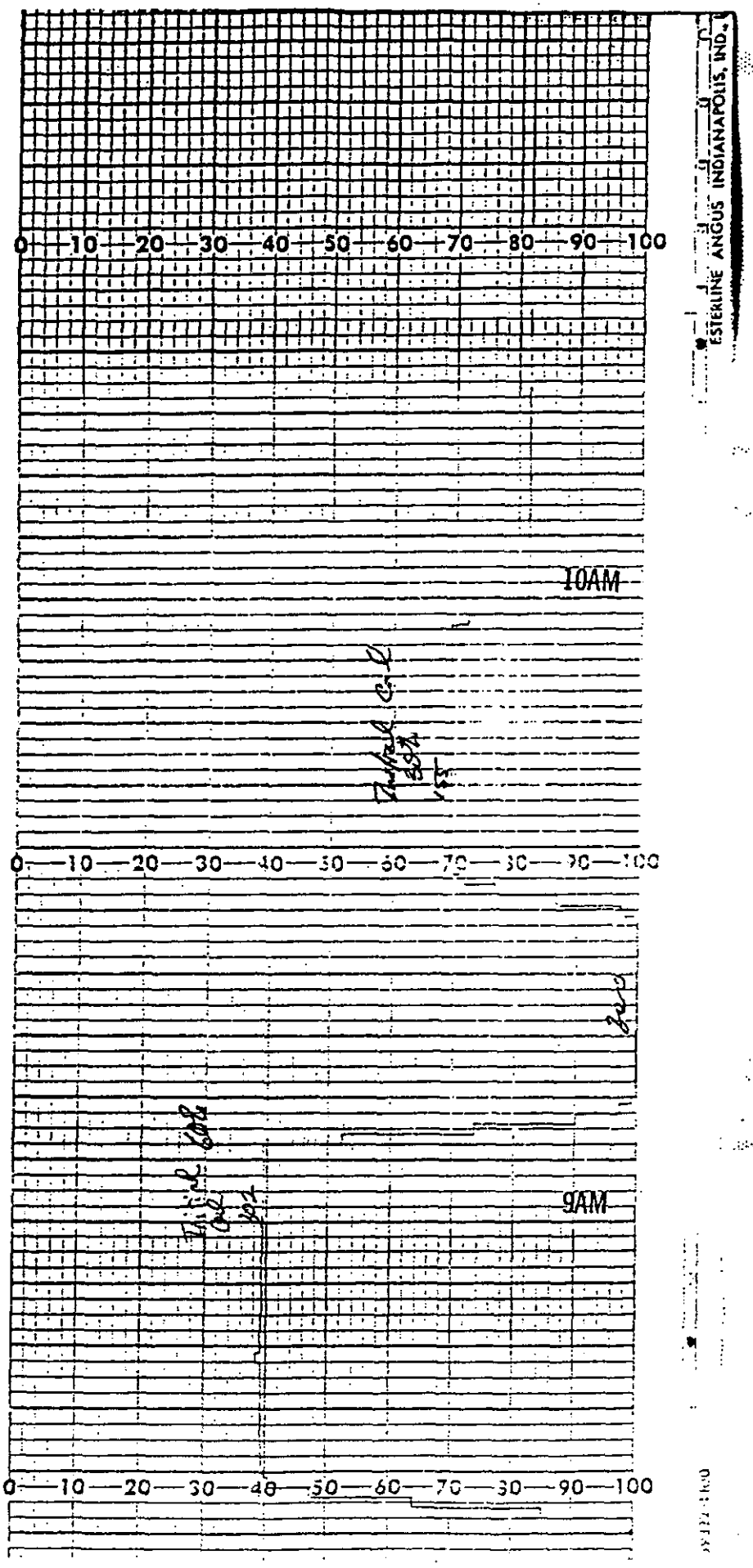
APPENDIX C

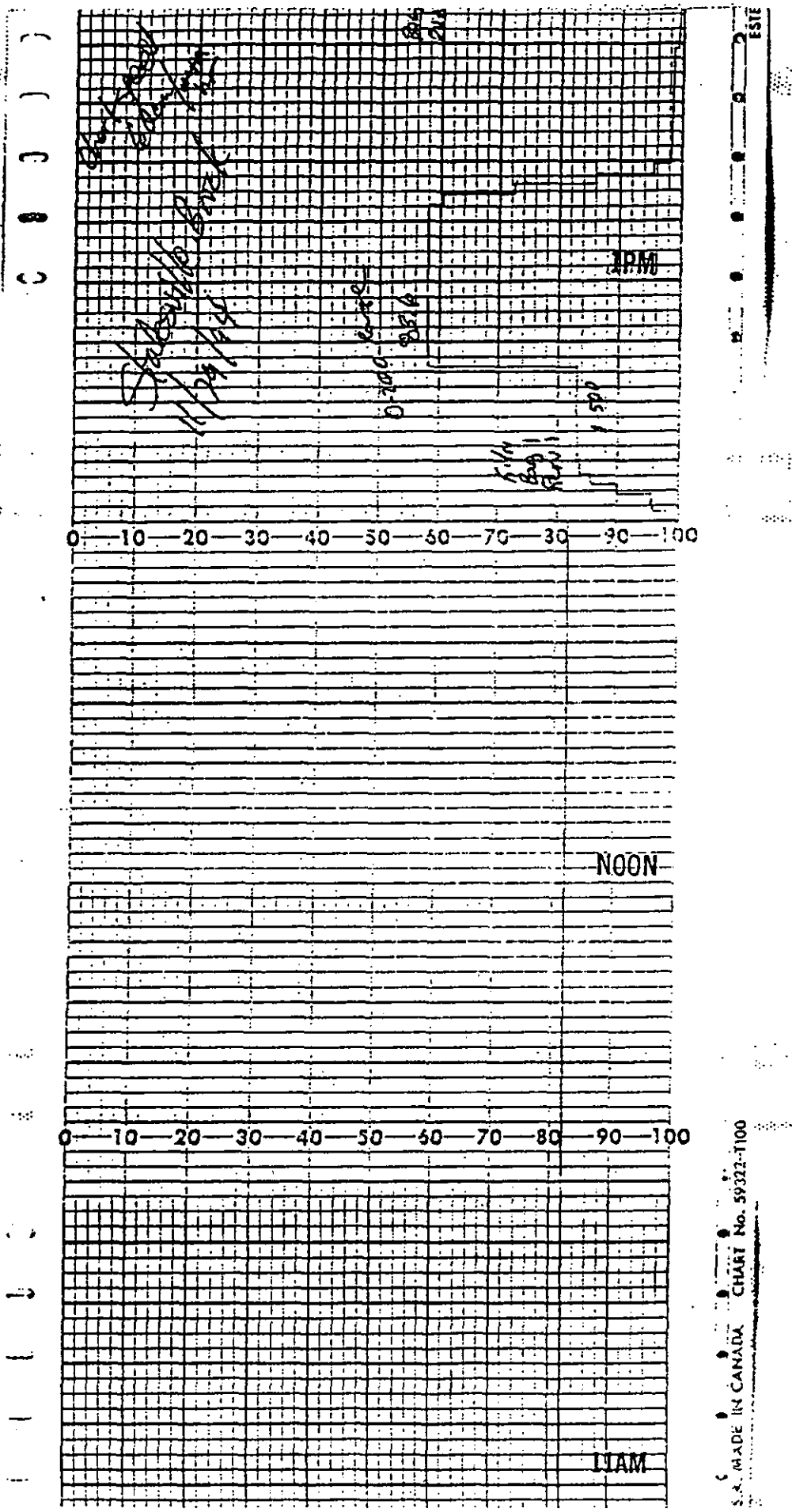
METHOD 10 DATA REDUCTION

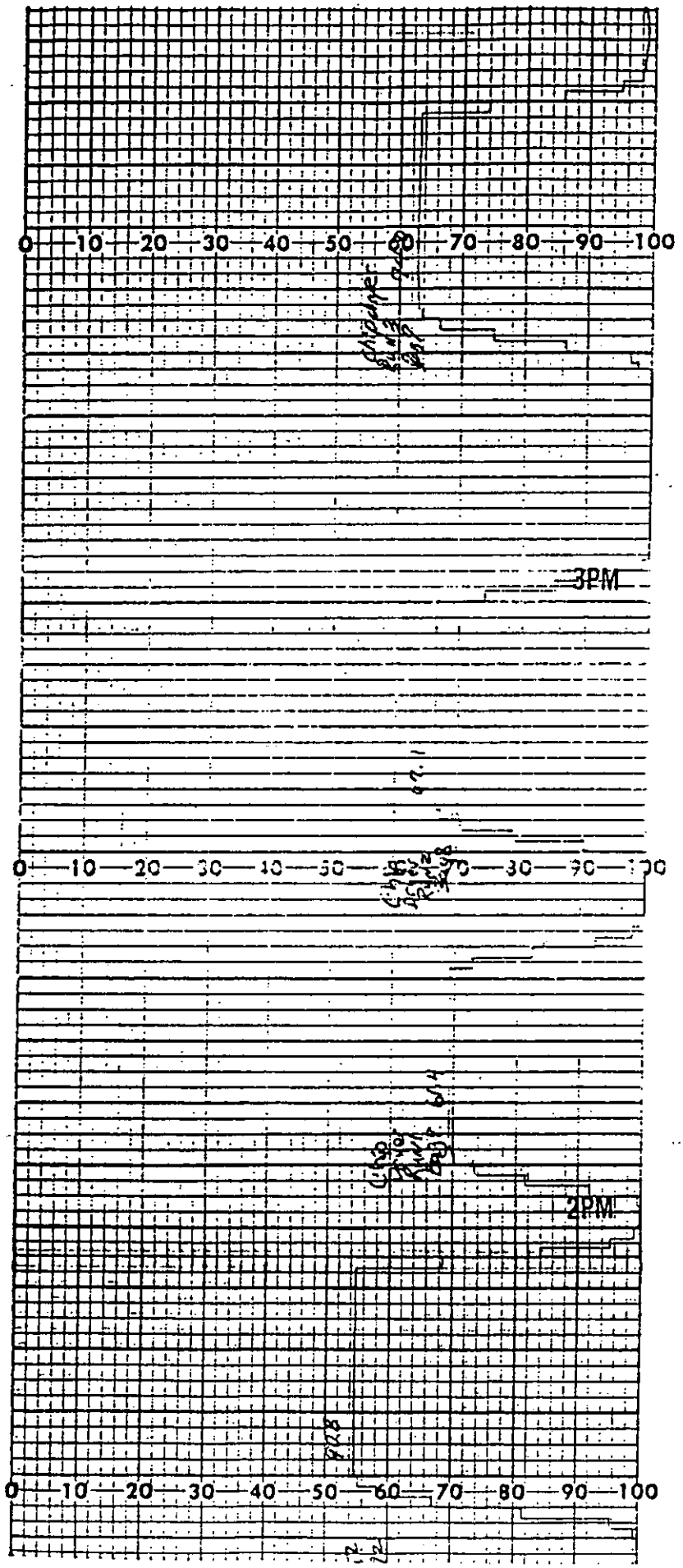

0 10 20 30 40 50 60 70 80 90 100
10AM
0 10 20 30 40 50 60 70 80 90 100
9AM
0 10 20 30 40 50 60 70 80 90 100
ESTERLINE ANGUS INDIANAPOLIS, IND.

APPENDIX C

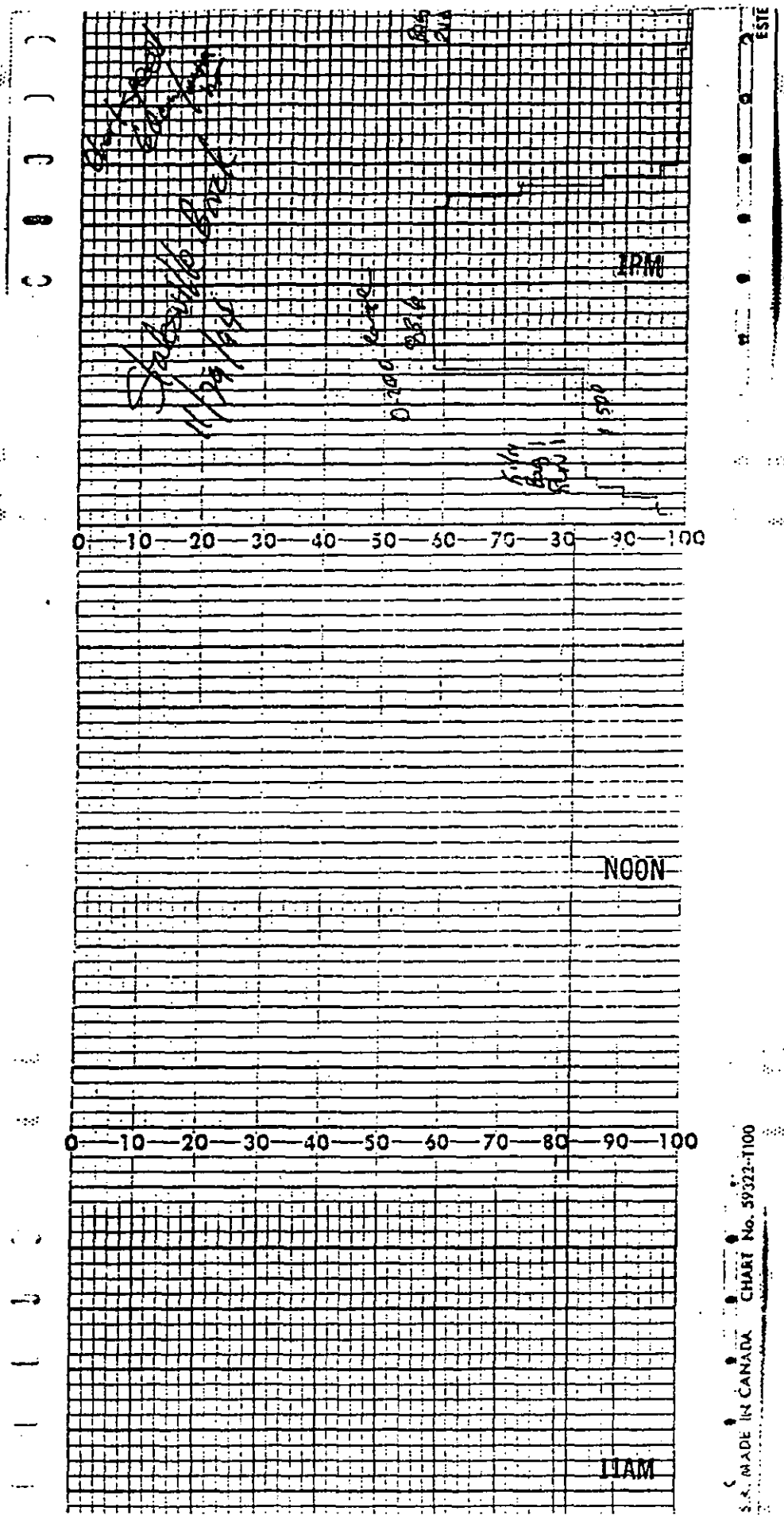
METHOD 10 DATA REDUCTION

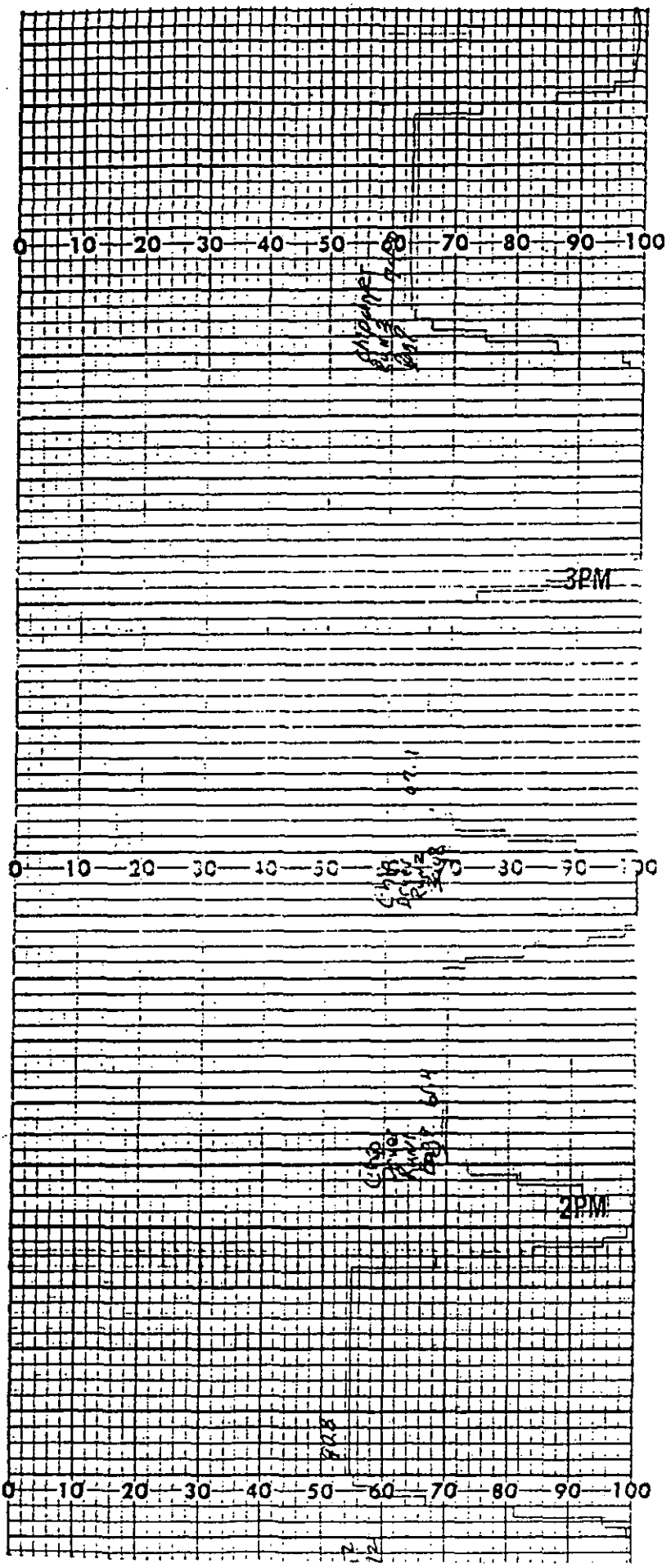

ESTERLINE ANGUS INDIANAPOLIS, IND.
0 10 20 30 40 50 60 70 80 90 100
10AM
0 10 20 30 40 50 60 70 80 90 100
9AM
0 10 20 30 40 50 60 70 80 90 100


0 10 20 30 40 50 60 70 80 90 100
1PM
NOON
0 10 20 30 40 50 60 70 80 90 100
11AM
MADE IN CANADA
CHART No. 59322-T100



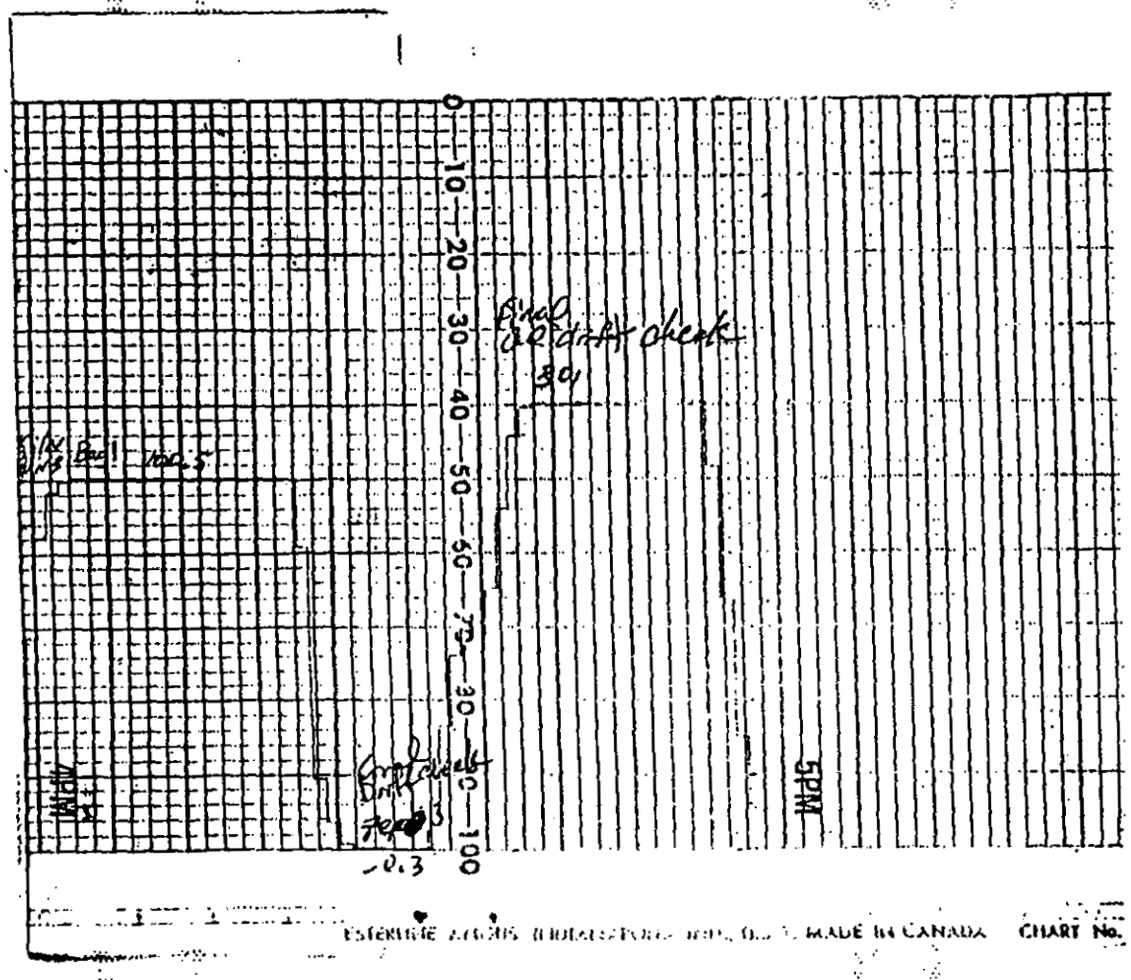
KLINE ANGUS INDIANAPOLIS, IND. U.S.A. MADE IN CANADA

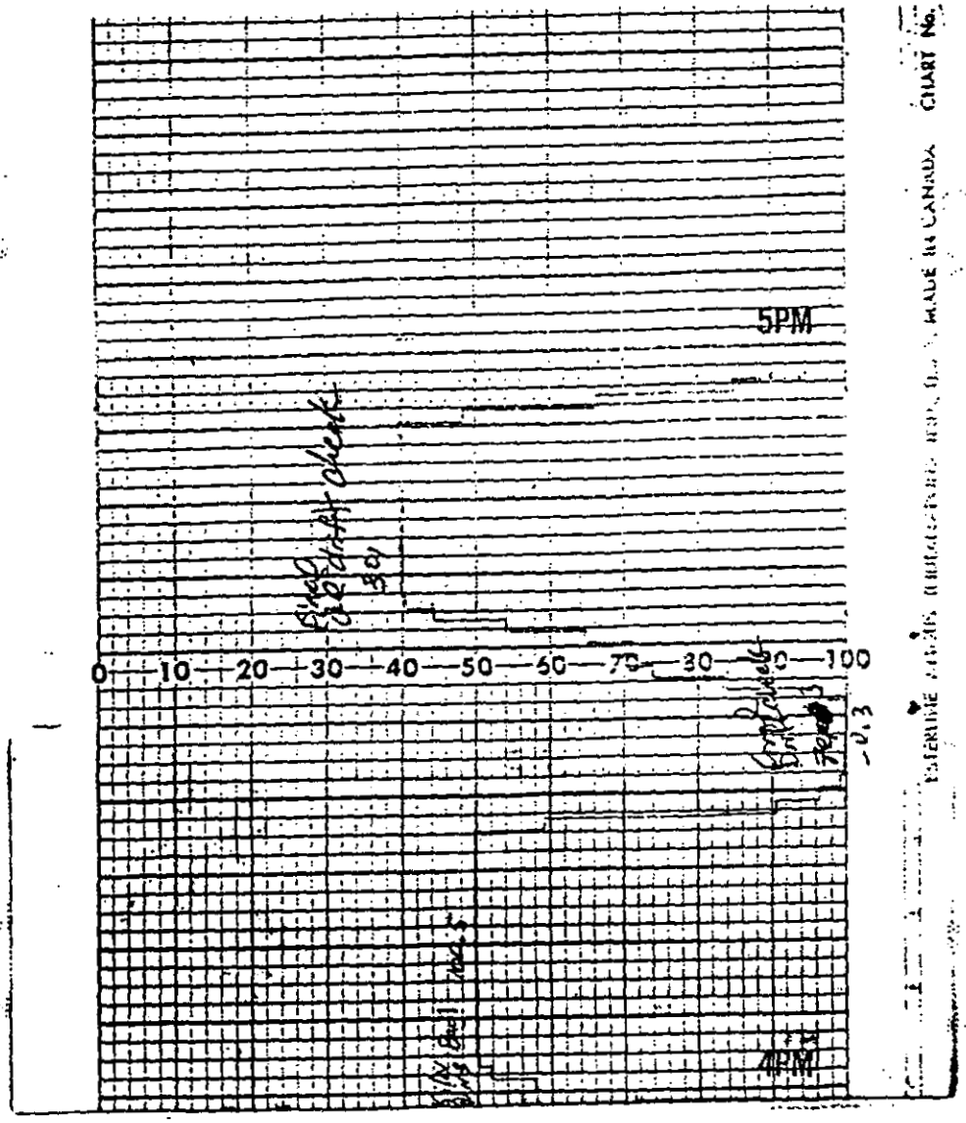

1PM
NOON
11AM
0—10—20—30—40—50—60—70—80—90—100
0—10—20—30—40—50—60—70—80—90—100
ESTE
S.R. MADE IN CANADA CHART No. 59322-T100



KLINE ANGUS INDIANAPOLIS, IND., U.S.A. MADE IN CANADA

TRIGON


5PM
0
10
20
30
40
50
60
70
80
90
100
-0.3
MADE IN CANADA
CHART No.


5PM
4PM
0
10
20
30
40
50
60
70
80
90
100
-0.3
MADE IN CANADA
CHART No.

CALIBRATION DATA

QUALITY ASSURANCE AND EQUIPMENT CALIBRATION PROCEDURES

General. Each item of field or laboratory test equipment purchased or fabricated by Trigon Engineering Consultants is assigned a unique, permanent identification number. New items for which calibration is required are calibrated before initial field use. Equipment whose calibration status may change with use or with time is inspected in the field before testing begins, and again upon return from each field use. When an item of equipment is found to be out of calibration, it is adjusted and recalibrated or retired from service. All equipment is periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in accordance with United States Environmental Protection Agency (US EPA) specifications. Trigon follows the calibration procedures outlined in EPA Reference Methods, and those recommended in the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. When the Reference Methods are inapplicable, Trigon uses methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations are recorded on standardized forms, which are verified for completeness and accuracy by the Quality Assurance Director. Data reduction and subsequent calculations are performed using Trigon's Air Quality Data System. Calibration calculations are performed by an environmental scientist, independently audited by the Laboratory Director, and reviewed by the Quality Assurance/Quality Control Manager for verification of data. Copies of calibration data are included in each test or project report.

Inspection and Maintenance. An effective preventative maintenance program is necessary to ensure equipment performance quality prior to, during, and following every test. Each item of equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated when necessary.

Each item of equipment transported to the field for a test project is inspected again prior to being packed. Trigon performs these quality assurance checks prior to departure for the project site to detect equipment problems which may occur during periods of storage. Trigon transports adequate back-up equipment to each project so as to avoid any unforeseen circumstances.

Calibration. Source sampling equipment that require calibration include nozzles, pitot tubes, thermometers, flow meters, dry gas meters, and barometers. The following sections detail the calibration procedures followed by Trigon for each item.

CALIBRATION DATA

QUALITY ASSURANCE AND EQUIPMENT CALIBRATION PROCEDURES

General. Each item of field or laboratory test equipment purchased or fabricated by Trigon Engineering Consultants is assigned a unique, permanent identification number. New items for which calibration is required are calibrated before initial field use. Equipment whose calibration status may change with use or with time is inspected in the field before testing begins, and again upon return from each field use. When an item of equipment is found to be out of calibration, it is adjusted and recalibrated or retired from service. All equipment is periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in accordance with United States Environmental Protection Agency (US EPA) specifications. Trigon follows the calibration procedures outlined in EPA Reference Methods, and those recommended in the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. When the Reference Methods are inapplicable, Trigon uses methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations are recorded on standardized forms, which are verified for completeness and accuracy by the Quality Assurance Director. Data reduction and subsequent calculations are performed using Trigon's Air Quality Data System. Calibration calculations are performed by an environmental scientist, independently audited by the Laboratory Director, and reviewed by the Quality Assurance/Quality Control Manager for verification of data. Copies of calibration data are included in each test or project report.

Inspection and Maintenance. An effective preventative maintenance program is necessary to ensure equipment performance quality prior to, during, and following every test. Each item of equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated when necessary.

Each item of equipment transported to the field for a test project is inspected again prior to being packed. Trigon performs these quality assurance checks prior to departure for the project site to detect equipment problems which may occur during periods of storage. Trigon transports adequate back-up equipment to each project so as to avoid any unforeseen circumstances.

Calibration. Source sampling equipment that require calibration include nozzles, pitot tubes, thermometers, flow meters, dry gas meters, and barometers. The following sections detail the calibration procedures followed by Trigon for each item.

Nozzles. Each probe nozzle is uniquely and permanently identified at the time of purchase or fabrication, and it is calibrated before initial field use and prior to each test. The inside diameter of the nozzle is measured to the nearest 0.001 inch using a digital micrometer. Five measurements are made using different diameters each time. If the difference between the high and the low measurements do not exceed 0.004 inch, the average of the five measurements is used. If the difference exceeds this amount, or when the nozzle becomes nicked, dented, or corroded, the nozzle is reshaped, sharpened, and recalibrated. Regardless of usage, all nozzles are inspected and recalibrated on a yearly basis.

Pitot Tubes. All Type S pitot tubes are constructed and calibrated in strict accordance with the procedures contained in EPA Reference Method 2. A Type S pitot tube will have a coefficient of 0.84 $\pm$ 0.02. A standard pitot tube will have a coefficient of 0.99. Each pitot tube is visually inspected prior to any field use. If the inspection indicates damage, it is recalibrated. Regardless of usage, all pitot tubes are inspected and recalibrated on a yearly basis.

Dry Gas Meter and Orifice. Each metering system receives a full calibration at the time of purchase and annually, thereafter. Post-test calibrations are performed after each source test. If the calibration factor, γ (gamma), deviates by less than five percent from the initial value, the test data are acceptable. If γ deviates by more than five percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used. Standard practice at Trigon is to recalibrate the dry gas meter anytime γ is found to be outside the range of $0.98 \leq \gamma \leq 1.02$.

Barometer. Each field barometer is calibrated to agree within $\pm$ 0.1 inches Hg of a reference mercury barometer. The barometric pressure is corrected for pressure and temperature. Prior to and following each field test the field barometer is verified.

Thermometers. Each new thermometer, pyrometer and thermocouple purchased or fabricated by Trigon is calibrated in strict accordance with US EPA Protocol. Calibration tolerance limits are as follow:

Impinger Thermometers	$\pm$ 1°C
Dry Gas Meter Thermometers	$\pm$ 3°C
Stack Thermocouples	$\pm$ 1.5% of absolute temperature

All thermometers and thermocouples are inspected and calibrated prior to and following each field test. Regardless of usage, all thermometers and thermocouples are inspected and recalibrated on a yearly basis.

Laboratory Equipment. Trigon Engineering Consultants has a written quality assurance document that covers calibration and maintenance of laboratory equipment. This includes calibration of each analytical balance against Class S weights. Calibration of thermometers, barometers, and wet test meters are traceable to NIST. A copy of our quality assurance document may be obtained by written request.

TRIGON

PRETEST - POSTEST CALIBRATION CHECKS
Thermometers, Thermocouples, and Barometer

Client/City: Statesville Brick, Statesville, N.C.

Calibrator: BLS Pretest Date: 11/28/94 Postest Date: 11/30/94

Reference Thermometer # 600.022 Reference Barometer # 600.003

	Pretest		Postest	
	Temp., °F	Ref. Temp., °F	Temp., °F	Ref. Temp., °F
Omega 880 DB	58	59	68	68
Omega 880 WB	58	59	68	68
Omega 880 HT				
Dial DB #				
Dial WB #				
DGM In/Out #				
DGM In/Out #				
Impinger #1				
Impinger #2				
Impinger #3				
Impinger #4				
Impinger #5				
Impinger #6				
Filter Box #1				
Filter Box #2				
Filter Box #3				
Filter Box #4				
Filter Box #5				
Filter Box #6				
Probe #				
Probe #				
Probe #				
Probe #				
Probe #				
Probe #				
Pitot # 200.028	57	59	67	68
Pitot # 200.002	57	59	67	68
Pitot # 200.044	58	59	68	68

	Pretest		Postest	
Reference Barometer	29.09	in. Hg	29.45	in. Hg
Field Barometer	29.12	in. Hg	29.47	in. Hg
Difference	.03	in. Hg	.02	in. Hg

TRIGON

Was the pretest field barometer correct? (within ± 0.1 in. Hg) Yes ✓ No ____
Was the postest field barometer correct? (within ± 0.1 in. Hg) Yes ✓ No ____
Was recalibration required? Yes ____ No ✓ If yes, no correction necessary for calculations when the field barometer has a lower reading; if the reference barometer is lower, subtract the difference from the field data readings for the calculations.

Nozzles. Each probe nozzle is uniquely and permanently identified at the time of purchase or fabrication, and it is calibrated before initial field use and prior to each test. The inside diameter of the nozzle is measured to the nearest 0.001 inch using a digital micrometer. Five measurements are made using different diameters each time. If the difference between the high and the low measurements do not exceed 0.004 inch, the average of the five measurements is used. If the difference exceeds this amount, or when the nozzle becomes nicked, dented, or corroded, the nozzle is reshaped, sharpened, and recalibrated. Regardless of usage, all nozzles are inspected and recalibrated on a yearly basis.

Pitot Tubes. All Type S pitot tubes are constructed and calibrated in strict accordance with the procedures contained in EPA Reference Method 2. A Type S pitot tube will have a coefficient of 0.84 $\pm$ 0.02. A standard pitot tube will have a coefficient of 0.99. Each pitot tube is visually inspected prior to any field use. If the inspection indicates damage, it is recalibrated. Regardless of usage, all pitot tubes are inspected and recalibrated on a yearly basis.

Dry Gas Meter and Orifice. Each metering system receives a full calibration at the time of purchase and annually, thereafter. Post-test calibrations are performed after each source test. If the calibration factor, γ (gamma), deviates by less than five percent from the initial value, the test data are acceptable. If γ deviates by more than five percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used. Standard practice at Trigon is to recalibrate the dry gas meter anytime γ is found to be outside the range of $0.98 \leq \gamma \leq 1.02$.

Barometer. Each field barometer is calibrated to agree within $\pm$ 0.1 inches Hg of a reference mercury barometer. The barometric pressure is corrected for pressure and temperature. Prior to and following each field test the field barometer is verified.

Thermometers. Each new thermometer, pyrometer and thermocouple purchased or fabricated by Trigon is calibrated in strict accordance with US EPA Protocol. Calibration tolerance limits are as follow:

Impinger Thermometers	$\pm$ 1°C
Dry Gas Meter Thermometers	$\pm$ 3°C
Stack Thermocouples	$\pm$ 1.5% of absolute temperature

All thermometers and thermocouples are inspected and calibrated prior to and following each field test. Regardless of usage, all thermometers and thermocouples are inspected and recalibrated on a yearly basis.

Laboratory Equipment. Trigon Engineering Consultants has a written quality assurance document that covers calibration and maintenance of laboratory equipment. This includes calibration of each analytical balance against Class S weights. Calibration of thermometers, barometers, and wet test meters are traceable to NIST. A copy of our quality assurance document may be obtained by written request.

TRIGON

PRETEST - POSTEST CALIBRATION CHECKS
Thermometers, Thermocouples, and Barometer

Client/City: Statesville Brick, Statesville, N.C.

Calibrator: BLS Pretest Date: 11/28/94 Postest Date: 11/30/94

Reference Thermometer # 600.022 Reference Barometer # 600.003

	Pretest		Postest	
	Temp., °F	Ref. Temp., °F	Temp., °F	Ref. Temp., °F
Omega 880 DB	58	59	68	68
Omega 880 WB	58	59	68	68
Omega 880 HT				
Dial DB #				
Dial WB #				
DGM In/Out #				
DGM In/Out #				
Impinger #1				
Impinger #2				
Impinger #3				
Impinger #4				
Impinger #5				
Impinger #6				
Filter Box #1				
Filter Box #2				
Filter Box #3				
Filter Box #4				
Filter Box #5				
Filter Box #6				
Probe #				
Probe #				
Probe #				
Probe #				
Probe #				
Probe #				
Pitot # 200.028	57	59	67	68
Pitot # 200.002	57	59	67	68
Pitot # 200.044	58	59	68	68

	Pretest		Postest	
Reference Barometer	29.09	in. Hg	29.45	in. Hg
Field Barometer	29.12	in. Hg	29.47	in. Hg
Difference	.03	in. Hg	.02	in. Hg

TRIGON

Was the pretest field barometer correct? (within ± 0.1 in. Hg) Yes ✓ No ____
Was the postest field barometer correct? (within ± 0.1 in. Hg) Yes ✓ No ____
Was recalibration required? Yes ____ No ✓ If yes, no correction necessary for calculations when the field barometer has a lower reading; if the reference barometer is lower, subtract the difference from the field data readings for the calculations.

TYPE "S" PITOT TUBE CALIBRATION FORM

Date: 01/03/94 Calibrator: BLW

Specifications:
A.) Pitot tube assembly must be level.
B.) If pitot tube is damaged explain under comments section.
C.) Z = A Sin γ ($\leq$0.125) and W = A Sin θ ($\leq$0.03125)
D.) $\alpha \leq 10°$ and $\beta \leq 5°$

I.D.	Length	$\alpha 1°$	$\alpha 2°$	$\beta 1°$	$\beta 2°$	$\gamma°$	$\theta°$	A, in.	Z, in.	W, in.	PA, in.	PB, in.	Dt, in.
Individual Pitot Tubes													
200.019	2'	1.00	0.50	0.00	0.00	1.50	0.00	0.938	0.0246	0.0000	0.469	0.469	0.373
200.002	4'	0.00	0.00	0.50	0.00	1.00	0.00	0.930	0.0162	0.0000	0.465	0.465	0.374
200.028	4'	1.50	4.00	0.00	0.00	1.00	1.50	0.969	0.0169	0.0254	0.484	0.485	0.374
200.025**	5'	0.50	0.50	0.00	0.00	0.00	0.50	0.948	0.0000	0.0083	0.474	0.474	0.378
200.003	6'	1.00	1.00	0.00	1.00	0.50	0.00	0.946	0.0083	0.0000	0.473	0.473	0.374
200.044	6'	1.00	1.00	0.00	0.50	0.00	1.00	0.956	0.0000	0.0167	0.478	0.478	0.378
200.038	7'	1.00	1.00	0.00	0.00	1.00	1.50	0.952	0.0166	0.0249	0.476	0.476	0.374
200.030	8'	0.00	4.00	1.00	1.00	0.00	0.50	0.952	0.0000	0.0083	0.476	0.476	0.374
200.031	10'	1.00	0.00	1.50	1.00	1.50	1.00	0.925	0.0242	0.0161	0.463	0.462	0.375
Pitot Tubes Attached to Probes													
200.020	2'	1.00	2.00	0.50	0.50	0.50	1.50	1.045	0.0091	0.0274	0.522	0.523	0.375
200.021	2'	4.00	1.50	1.00	0.50	2.00	1.00	1.066	0.0372	0.0186	0.533	0.533	0.375
200.036	2'	1.00	0.50	1.00	1.00	0.00	0.50	0.971	0.0000	0.0085	0.485	0.486	0.381
200.037	2'	1.00	1.00	1.00	1.00	0.00	0.00	0.989	0.0000	0.0000	0.494	0.495	0.376
200.004	3'	0.50	0.00	2.00	2.00	1.00	0.00	0.936	0.0163	0.0000	0.468	0.468	0.375
200.005	3'	0.00	0.50	0.50	0.00	0.50	0.00	0.944	0.0082	0.0000	0.472	0.472	0.377
200.006	3'	1.00	1.00	1.00	0.50	0.00	0.50	0.933	0.0000	0.0081	0.466	0.467	0.376
200.015	3'	1.00	1.00	2.50	2.50	1.50	0.50	0.937	0.0245	0.0082	0.468	0.469	0.375
200.016	3'	1.00	1.00	0.00	1.00	1.50	0.50	0.941	0.0246	0.0082	0.470	0.471	0.375
200.017	3'	0.50	0.50	0.50	0.50	1.00	0.50	0.939	0.0164	0.0082	0.469	0.470	0.376
200.007	5'	0.50	1.00	1.00	1.50	1.50	0.50	0.945	0.0247	0.0082	0.472	0.473	0.375
200.008	5'	0.50	0.50	0.00	0.50	1.00	0.00	0.946	0.0165	0.0000	0.473	0.473	0.375
200.009	5'	0.00	0.50	0.50	0.50	0.50	1.00	0.938	0.0082	0.0164	0.469	0.469	0.375
200.022	5'	0.50	0.00	1.00	0.00	0.50	0.00	0.937	0.0082	0.0000	0.468	0.469	0.377
200.027	5'	1.00	1.00	0.00	0.50	0.00	1.00	0.940	0.0000	0.0164	0.470	0.470	0.376
200.034	5'	0.50	0.50	0.50	0.50	2.00	0.50	0.935	0.0326	0.0082	0.468	0.467	0.373
200.024 *	6'	0.50	0.50	0.00	1.50	2.00	1.00	0.629	0.0220	0.0110	0.314	0.315	0.253
200.010	7'	0.50	0.50	0.00	0.00	1.00	0.50	0.937	0.0164	0.0082	0.468	0.469	0.376
200.011	7'	2.00	1.00	0.50	0.00	1.50	1.50	0.938	0.0246	0.0246	0.469	0.469	0.378
200.012	7'	0.50	0.50	0.00	0.50	1.00	0.50	0.940	0.0164	0.0082	0.470	0.470	0.378
200.039	7'	0.50	0.00	0.50	0.50	0.00	0.00	0.932	0.0000	0.0000	0.466	0.466	0.375
200.040	7'	1.00	0.00	1.00	1.00	0.00	0.00	0.939	0.0000	0.0000	0.469	0.470	0.376
200.041	8'	0.00	0.00	0.50	0.00	0.00	0.00	0.932	0.0000	0.0000	0.466	0.466	0.375
200.013	10'	1.00	1.50	1.50	2.00	0.50	0.50	0.927	0.0081	0.0081	0.463	0.464	0.376
200.014	10'	0.00	0.00	0.00	0.50	0.00	0.50	0.948	0.0000	0.0083	0.474	0.474	0.377

Comments: Pitot Tubes Required Only Minor Maintenance

* Water Cooled
** Inconel

Pitot tubes requiring calibration: None

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM

THERMOCOUPLES

Tolerance: ± 1.5% of Absolute Temperature

Date: 01/03/94
Ambient Temperature °C: 21.6
Calibrator: SEA

Barometric Pressure, In. Hg.: 29.504
Reference Thermometer Number: U38717

Thermocouple/ Thermometer I.D.#	Reference Point	Source[a]	Reference Thermometer Temperature °C	Thermocouple Potentiometer Temperature °C	Temperature Difference[b] %
Omega HH-82 Dry Bulb - Red Team					
100.014	1	Ice Water	0	0.4	-0.15
	2	Water Bath	90	90.0	0.00
	3	Oil Bath	210	208.0	0.41
Omega HH-82 Wet Bulb - Red Team					
100.014	1	Ice Water	0	0.0	0.00
	2	Water Bath	90	90.1	-0.03
	3	Oil Bath	210	212.0	-0.41
Omega HH-82 Dry Bulb - Blue Team					
100.010	1	Ice Water	0	0.2	-0.07
	2	Water Bath	90	90.2	-0.06
	3	Oil Bath	210	211.0	-0.21
Omega HH-82 Wet Bulb - Blue Team					
100.010	1	Ice Water	0	0.8	-0.29
	2	Water Bath	90	90.0	0.00
	3	Oil Bath	210	210.5	-0.10
Omega HH-82 Dry Bulb - Green Team					
100.001	1	Ice Water	0	0.0	0.00
	2	Water Bath	98	98.0	0.00
	3	Oil Bath	210	210.0	0.00
Omega HH-82 Wet Bulb - Green Team					
100.001	1	Ice Water	0	0.0	0.00
	2	Water Bath	99	99.0	0.00
	3	Oil Bath	210	210.2	-0.04
Omega HH-25 KF Dry Bulb					
100.017	1	Ice Water	0	0.0	0.00
	2	Water Bath	90	90.5	-0.14
	3	Oil Bath	210	210.0	0.00
Omega HH-25 KF Wet Bulb					
100.017	1	Ice Water	0	0.0	0.00
	2	Water Bath	90	90.0	0.00
	3	Oil Bath	210	209.8	0.04

[a] Type of calibration system used.
[b] Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. °C} + 273) - (\text{Test Temp. °C} + 273)}{\text{Ref. Temp. °C} + 273} \times 100 \leq 1.5\%$$

TRIGON

TYPE "S" PITOT TUBE CALIBRATION FORM

Date: 01/03/94 Calibrator: BLW

Specifications:
A.) Pitot tube assembly must be level.
B.) If pitot tube is damaged explain under comments section.
C.) Z = A Sin γ ($\leq$0.125) and W = A Sin θ ($\leq$0.03125)
D.) $\alpha \leq 10°$ and $\beta \leq 5°$

I.D.	Length	$\alpha 1°$	$\alpha 2°$	$\beta 1°$	$\beta 2°$	$\gamma°$	$\theta°$	A, in.	Z, in.	W, in.	PA, in.	PB, in.	Dt, in.
Individual Pitot Tubes													
200.019	2'	1.00	0.50	0.00	0.00	1.50	0.00	0.938	0.0246	0.0000	0.469	0.469	0.373
200.002	4'	0.00	0.00	0.50	0.00	1.00	0.00	0.930	0.0162	0.0000	0.465	0.465	0.374
200.028	4'	1.50	4.00	0.00	0.00	1.00	1.50	0.969	0.0169	0.0254	0.484	0.485	0.374
200.025**	5'	0.50	0.50	0.00	0.00	0.00	0.50	0.948	0.0000	0.0083	0.474	0.474	0.378
200.003	6'	1.00	1.00	0.00	1.00	0.50	0.00	0.946	0.0083	0.0000	0.473	0.473	0.374
200.044	6'	1.00	1.00	0.00	0.50	0.00	1.00	0.956	0.0000	0.0167	0.478	0.478	0.378
200.038	7'	1.00	1.00	0.00	0.00	1.00	1.50	0.952	0.0166	0.0249	0.476	0.476	0.374
200.030	8'	0.00	4.00	1.00	1.00	0.00	0.50	0.952	0.0000	0.0083	0.476	0.476	0.374
200.031	10'	1.00	0.00	1.50	1.00	1.50	1.00	0.925	0.0242	0.0161	0.463	0.462	0.375
Pitot Tubes Attached to Probes													
200.020	2'	1.00	2.00	0.50	0.50	0.50	1.50	1.045	0.0091	0.0274	0.522	0.523	0.375
200.021	2'	4.00	1.50	1.00	0.50	2.00	1.00	1.066	0.0372	0.0186	0.533	0.533	0.375
200.036	2'	1.00	0.50	1.00	1.00	0.00	0.50	0.971	0.0000	0.0085	0.485	0.486	0.381
200.037	2'	1.00	1.00	1.00	1.00	0.00	0.00	0.989	0.0000	0.0000	0.494	0.495	0.376
200.004	3'	0.50	0.00	2.00	2.00	1.00	0.00	0.936	0.0163	0.0000	0.468	0.468	0.375
200.005	3'	0.00	0.50	0.50	0.00	0.50	0.00	0.944	0.0082	0.0000	0.472	0.472	0.377
200.006	3'	1.00	1.00	1.00	0.50	0.00	0.50	0.933	0.0000	0.0081	0.466	0.467	0.376
200.015	3'	1.00	1.00	2.50	2.50	1.50	0.50	0.937	0.0245	0.0082	0.468	0.469	0.375
200.016	3'	1.00	1.00	0.00	1.00	1.50	0.50	0.941	0.0246	0.0082	0.470	0.471	0.375
200.017	3'	0.50	0.50	0.50	0.50	1.00	0.50	0.939	0.0164	0.0082	0.469	0.470	0.376
200.007	5'	0.50	1.00	1.00	1.50	1.50	0.50	0.945	0.0247	0.0082	0.472	0.473	0.375
200.008	5'	0.50	0.50	0.00	0.50	1.00	0.00	0.946	0.0165	0.0000	0.473	0.473	0.375
200.009	5'	0.00	0.50	0.50	0.50	0.50	1.00	0.938	0.0082	0.0164	0.469	0.469	0.375
200.022	5'	0.50	0.00	1.00	0.00	0.50	0.00	0.937	0.0082	0.0000	0.468	0.469	0.377
200.027	5'	1.00	1.00	0.00	0.50	0.00	1.00	0.940	0.0000	0.0164	0.470	0.470	0.376
200.034	5'	0.50	0.50	0.50	0.50	2.00	0.50	0.935	0.0326	0.0082	0.468	0.467	0.373
200.024 *	6'	0.50	0.50	0.00	1.50	2.00	1.00	0.629	0.0220	0.0110	0.314	0.315	0.253
200.010	7'	0.50	0.50	0.00	0.00	1.00	0.50	0.937	0.0164	0.0082	0.468	0.469	0.376
200.011	7'	2.00	1.00	0.50	0.00	1.50	1.50	0.938	0.0246	0.0246	0.469	0.469	0.378
200.012	7'	0.50	0.50	0.00	0.50	1.00	0.50	0.940	0.0164	0.0082	0.470	0.470	0.378
200.039	7'	0.50	0.00	0.50	0.50	0.00	0.00	0.932	0.0000	0.0000	0.466	0.466	0.375
200.040	7'	1.00	0.00	1.00	1.00	0.00	0.00	0.939	0.0000	0.0000	0.469	0.470	0.376
200.041	8'	0.00	0.00	0.50	0.00	0.00	0.00	0.932	0.0000	0.0000	0.466	0.466	0.375
200.013	10'	1.00	1.50	1.50	2.00	0.50	0.50	0.927	0.0081	0.0081	0.463	0.464	0.376
200.014	10'	0.00	0.00	0.00	0.50	0.00	0.50	0.948	0.0000	0.0083	0.474	0.474	0.377

Comments: Pitot Tubes Required Only Minor Maintenance

* Water Cooled
** Inconel

Pitot tubes requiring calibration: None

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM

THERMOCOUPLES

Tolerance: ± 1.5% of Absolute Temperature

Date: 01/03/94
Ambient Temperature °C: 21.6
Calibrator: SEA

Barometric Pressure, In. Hg.: 29.504
Reference Thermometer Number: U38717

Thermocouple/ Thermometer I.D.#	Reference Point	Source[a]	Reference Thermometer Temperature °C	Thermocouple Potentiometer Temperature °C	Temperature Difference[b] %
Omega HH-82 Dry Bulb - Red Team					
100.014	1	Ice Water	0	0.4	-0.15
	2	Water Bath	90	90.0	0.00
	3	Oil Bath	210	208.0	0.41
Omega HH-82 Wet Bulb - Red Team					
100.014	1	Ice Water	0	0.0	0.00
	2	Water Bath	90	90.1	-0.03
	3	Oil Bath	210	212.0	-0.41
Omega HH-82 Dry Bulb - Blue Team					
100.010	1	Ice Water	0	0.2	-0.07
	2	Water Bath	90	90.2	-0.06
	3	Oil Bath	210	211.0	-0.21
Omega HH-82 Wet Bulb - Blue Team					
100.010	1	Ice Water	0	0.8	-0.29
	2	Water Bath	90	90.0	0.00
	3	Oil Bath	210	210.5	-0.10
Omega HH-82 Dry Bulb - Green Team					
100.001	1	Ice Water	0	0.0	0.00
	2	Water Bath	98	98.0	0.00
	3	Oil Bath	210	210.0	0.00
Omega HH-82 Wet Bulb - Green Team					
100.001	1	Ice Water	0	0.0	0.00
	2	Water Bath	99	99.0	0.00
	3	Oil Bath	210	210.2	-0.04
Omega HH-25 KF Dry Bulb					
100.017	1	Ice Water	0	0.0	0.00
	2	Water Bath	90	90.5	-0.14
	3	Oil Bath	210	210.0	0.00
Omega HH-25 KF Wet Bulb					
100.017	1	Ice Water	0	0.0	0.00
	2	Water Bath	90	90.0	0.00
	3	Oil Bath	210	209.8	0.04

[a] Type of calibration system used.
[b] Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. °C} + 273) - (\text{Test Temp. °C} + 273)}{\text{Ref. Temp. °C} + 273} \times 100 \leq 1.5\%$$

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM

THERMOMETERS

Tolerance: ± 1.5% of Absolute Temperature

Date: 01/03/94
Ambient Temperature °C: 21.7
Calibrator: SEA

Barometric Pressure, In. Hg.: 29.364
Reference Thermometer Number: U38717

Thermocouple/ Thermometer I.D.#	Reference Point	Source[a]	Reference Thermometer Temperature °C	Thermometer Potentiometer Temperature °C	Temperature Difference[b] %
Bimetallic Dial Dry Bulb					
100.004	1	Water Bath	22	23*	-0.34
	2	Water Bath	90	93*	-0.83
	3	Oil Bath	205	206*	-0.21
Bimetallic Dial Wet Bulb					
100.005	1	Ice Water	0	0*	0.00
	2	Water Bath	22	22*	0.00
	3	Water Bath	90	91*	-0.28
Bimetallic Dial Wet Bulb					
100.006	1	Ice Water	0	0*	0.00
	2	Water Bath	22	23*	-0.34
	3	Water Bath	90	92*	-0.55
Bimetallic Dial Dry Bulb					
100.007	1	Water Bath	22	22*	0.00
	2	Water Bath	90	91*	-0.28
	3	Oil Bath	205	206*	-0.21
Bimetallic Dial Wet Bulb					
100.019	1	Ice Water	0	1*	-0.37
	2	Water Bath	22	22*	0.00
	3	Water Bath	90	92*	-0.55
Bimetallic Dial Wet Bulb					
100.020	1	Ice Water	0	0*	0.00
	2	Water Bath	22	22*	0.00
	3	Water Bath	90	91*	-0.28
Bimetallic Dial Wet Bulb					
100.021	1	Ice Water	0	0*	0.00
	2	Water Bath	22	22*	0.00
	3	Water Bath	90	91*	-0.28

* Temperature was read in °F and converted to °C.
[a] Type of calibration system used.
[b] Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. °C} + 273) - (\text{Test Temp. °C} + 273)}{\text{Ref. Temp. °C} + 273} \times 100 \leq 1.5\%$$

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM
THERMOCOUPLES

Tolerance: +/- 1.5% of Absolute Temperature

Date: 09/27/94
Ambient Temperature, Deg. C: 21.9
Calibrated By: JAM

Barometric Pressure, In. Hg: 29.215
Reference Thermometer No.: U38717

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
2' Pitot Tube					
200.019	1	Ice Water	0	1.1	-0.40
	2	Water Bath	93	92.9	0.03
	3	Oil Bath	220	219.0	0.20
4' Pitot Tube					
200.002	1	Ice Water	0	0.0	0.00
	2	Water Bath	93	92.6	0.11
	3	Oil Bath	215	215.1	-0.02
4' Pitot Tube					
200.028	1	Ice Water	0	0.3	-0.11
	2	Water Bath	93	91.6	0.38
	3	Oil Bath	215	214.1	0.18
5' Pitot Tube					
200.025	1	Ice Water	0	0.5	-0.18
	2	Water Bath	93	93.0	0.00
	3	Oil Bath	215	213.1	0.39
6' Pitot Tube					
200.003	1	Ice Water	0	0.9	-0.33
	2	Water Bath	99	99.0	0.00
	3	Oil Bath	290	290.0	0.00
6' Pitot Tube					
200.044	1	Ice Water	0	0.4	-0.15
	2	Water Bath	91	91.5	-0.14
	3	Oil Bath	217	216.8	0.04
7' Pitot Tube					
200.038	1	Ice Water	0	0.9	-0.33
	2	Water Bath	25	24.8	0.07
	3	Oil Bath	195	194.5	0.11
8' Pitot Tube					
200.030	1	Ice Water	0	0.2	-0.07
	2	Water Bath	99	98.8	0.05
	3	Oil Bath	220	219.0	0.20
10' Pitot Tube					
200.031	1	Ice Water	0	0.2	-0.07
	2	Water Bath	93	93.0	0.00
	3	Oil Bath	230	230.1	-0.02

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. Deg. C} + 273) - (\text{Test Temp. Deg. C} + 273)}{\text{Ref. Temp. Deg. C} + 273} \times 100 = <1.5\%$$

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM

THERMOMETERS

Tolerance: ± 1.5% of Absolute Temperature

Date: 01/03/94
Ambient Temperature °C: 21.7
Calibrator: SEA

Barometric Pressure, In. Hg.: 29.364
Reference Thermometer Number: U38717

Thermocouple/ Thermometer I.D.#	Reference Point	Source[a]	Reference Thermometer Temperature °C	Thermometer Potentiometer Temperature °C	Temperature Difference[b] %
Bimetallic Dial Dry Bulb					
100.004	1	Water Bath	22	23*	-0.34
	2	Water Bath	90	93*	-0.83
	3	Oil Bath	205	206*	-0.21
Bimetallic Dial Wet Bulb					
100.005	1	Ice Water	0	0*	0.00
	2	Water Bath	22	22*	0.00
	3	Water Bath	90	91*	-0.28
Bimetallic Dial Wet Bulb					
100.006	1	Ice Water	0	0*	0.00
	2	Water Bath	22	23*	-0.34
	3	Water Bath	90	92*	-0.55
Bimetallic Dial Dry Bulb					
100.007	1	Water Bath	22	22*	0.00
	2	Water Bath	90	91*	-0.28
	3	Oil Bath	205	206*	-0.21
Bimetallic Dial Wet Bulb					
100.019	1	Ice Water	0	1*	-0.37
	2	Water Bath	22	22*	0.00
	3	Water Bath	90	92*	-0.55
Bimetallic Dial Wet Bulb					
100.020	1	Ice Water	0	0*	0.00
	2	Water Bath	22	22*	0.00
	3	Water Bath	90	91*	-0.28
Bimetallic Dial Wet Bulb					
100.021	1	Ice Water	0	0*	0.00
	2	Water Bath	22	22*	0.00
	3	Water Bath	90	91*	-0.28

* Temperature was read in °F and converted to °C.

[a] Type of calibration system used.

[b] Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. °C} + 273) - (\text{Test Temp. °C} + 273)}{\text{Ref. Temp. °C} + 273} \times 100 \leq 1.5\%$$

TRIGON

TEMPERATURE SENSOR CALIBRATION FORM
THERMOCOUPLES

Tolerance: +/- 1.5% of Absolute Temperature

Date: 09/27/94
Ambient Temperature, Deg. C: 21.9
Calibrated By: JAM

Barometric Pressure, In. Hg: 29.215
Reference Thermometer No.: U38717

Thermocouple ID No.	Reference Point	Source	Reference Thermometer Temperature Degrees F	Thermocouple Potentiometer Temperature Degrees F	Temperature Difference Calculation Percent, %
2' Pitot Tube					
200.019	1	Ice Water	0	1.1	-0.40
	2	Water Bath	93	92.9	0.03
	3	Oil Bath	220	219.0	0.20
4' Pitot Tube					
200.002	1	Ice Water	0	0.0	0.00
	2	Water Bath	93	92.6	0.11
	3	Oil Bath	215	215.1	-0.02
4' Pitot Tube					
200.028	1	Ice Water	0	0.3	-0.11
	2	Water Bath	93	91.6	0.38
	3	Oil Bath	215	214.1	0.18
5' Pitot Tube					
200.025	1	Ice Water	0	0.5	-0.18
	2	Water Bath	93	93.0	0.00
	3	Oil Bath	215	213.1	0.39
6' Pitot Tube					
200.003	1	Ice Water	0	0.9	-0.33
	2	Water Bath	99	99.0	0.00
	3	Oil Bath	290	290.0	0.00
6' Pitot Tube					
200.044	1	Ice Water	0	0.4	-0.15
	2	Water Bath	91	91.5	-0.14
	3	Oil Bath	217	216.8	0.04
7' Pitot Tube					
200.038	1	Ice Water	0	0.9	-0.33
	2	Water Bath	25	24.8	0.07
	3	Oil Bath	195	194.5	0.11
8' Pitot Tube					
200.030	1	Ice Water	0	0.2	-0.07
	2	Water Bath	99	98.8	0.05
	3	Oil Bath	220	219.0	0.20
10' Pitot Tube					
200.031	1	Ice Water	0	0.2	-0.07
	2	Water Bath	93	93.0	0.00
	3	Oil Bath	230	230.1	-0.02

Source = Type of calibration system used.

Temperature Difference Calculation:

$$\frac{(\text{Ref. Temp. Deg. C} + 273) - (\text{Test Temp. Deg. C} + 273)}{\text{Ref. Temp. Deg. C} + 273} \times 100 = <1.5\%$$

TRIGON

EVER READY THERMOMETER CO., INC.
228 LACKAWANNA AVENUE
WEST PATERSON, NJ 07424
(201) 812-7474

REPORT OF CALIBRATION

LIQUID-IN-GLASS-THERMOMETER

CALIBRATED BY EVER READY THERMOMETER CO.

MARKED: ERTCO CAT 1002-3FC S/N-2890
RANGE: +30 TO +124 DEGREES F IN 0.2 DEGREE GRADUATIONS.

THERMOMETER READING	CORRECTION (ITS-90)**
31.94 F	0.06 F
40.00	0.00
60.00	0.00
100.00	0.06
120.00	0.00

** ALL TEMPERATURES IN THIS REPORT ARE BASED ON THE INTERNATIONAL TEMPERATURE SCALE OF 1990 (ITS-90) PUBLISHED IN THE METROLGIA 27, NO. 1, 3/10/90.

THIS THERMOMETER WAS CALIBRATED AGAINST A STANDARD CALIBRATED AT THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) FORMERLY THE NATIONAL BUREAU OF STANDARDS (NBS) IN ACCORDANCE WITH ASTM METHOD E 77, AND NBS MONOGRAPH 174.

FOR A DISCUSION OF ACCURACIES ATTAINABLE WITH SUCH THERMOMETERS SEE NBS MONOGRAPH 250-23.

IF NO SIGN IS GIVEN ON THE CORRECTION, THE TRUE TEMPERATURE IS HIGHER THAN THE INDICATED TEMPERATURE; IF THE SIGN GIVEN IS NEGATIVE, THE TRUE TEMPERATURE IS LOWER THAN THE INDICATED TEMPERATURE. TO USE THE CORRECTIONS PROPERLY, REFERENCE SHOULD BE MADE TO THE NOTES GIVEN BELOW.

THE THERMOMETER WAS TESTED IN A LARGE, CLOSED-TOP, ELECTRICALLY HEATED, LIQUID BATH, BEING "IMMERSED" 76MM. THE TEMPERATURE OF THE ROOM WAS ABOUT 25 DEGREES C (77 DEGREES F). IF THE THERMOMETER IS USED UNDER CONDITIONS WHICH WOULD CAUSE THE AVERAGE TEMPERATURE OF THE EMERGENT LIQUID COLUMN TO DIFFER MARKEDLY FROM THAT PREVAILING IN THE TEST, APPRECIABLE DIFFERENCES IN THE INDICATIONS OF THE THERMOMETER WOULD RESULT.

CONTINUED

TEST NUMBER: 145875
DATE: 03/29/94
STANDARD SERIAL NO. 128239
NIST IDENTIFICATION NO. 88024

REPORT OF CALIBRATION

LIQUID-IN-GLASS-THERMOMETER

THE TABULATED CORRECTIONS APPLY PROVIDED THE ICE-POINT READING, TAKEN AFTER EXPOSURE FOR NOT LESS THAN 3 DAYS TO A TEMPERATURE OF ABOUT 20 DEGREES C (70 DEGREES F) IS 31.94 DEGREES F. IF THE ICE-POINT READING IS FOUND TO BE HIGHER (OR LOWER) THAN STATED, ALL OTHER READINGS WILL BE HIGHER (OR LOWER) TO THE SAME EXTENT. IF THE THERMOMETER IS USED AT A GIVEN TEMPERATURE SHORTLY AFTER BEING HEATED TO A HIGHER TEMPERATURE. AN ERROR OF 0.01 DEGREES OR LESS, FOR EACH 10 DEGREE DIFFERENCE BETWEEN THE TWO TEMPERATURES, MAY BE INTRODUCED. THE TABULATED CORRECTIONS APPLY IF THE THERMOMETER IS USED IN THE UPRIGHT POSITION; IF USED IN A HORIZONTAL POSITION, THE INDICATIONS MAY BE A FEW HUNDREDTHS OF A DEGREE HIGHER.

TEST NUMBER: 145875
DATE: 03/29/94
STANDARD SERIAL NO. 128239
NIST IDENTIFICATION NO. 88024

Charles Tang-Nian
QUALITY CONTROL MANAGER

EVER READY THERMOMETER CO., INC.
228 LACKAWANNA AVENUE
WEST PATERSON, NJ 07424
(201) 812-7474

REPORT OF CALIBRATION

LIQUID-IN-GLASS-THERMOMETER

CALIBRATED BY EVER READY THERMOMETER CO.

MARKED: ERTCO CAT 1002-3FC S/N-2890
RANGE: +30 TO +124 DEGREES F IN 0.2 DEGREE GRADUATIONS.

THERMOMETER READING	CORRECTION (ITS-90)**
31.94 F	0.06 F
40.00	0.00
60.00	0.00
100.00	0.06
120.00	0.00

** ALL TEMPERATURES IN THIS REPORT ARE BASED ON THE INTERNATIONAL TEMPERATURE SCALE OF 1990 (ITS-90) PUBLISHED IN THE METROLGIA 27, NO. 1, 3/10/90.

THIS THERMOMETER WAS CALIBRATED AGAINST A STANDARD CALIBRATED AT THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) FORMERLY THE NATIONAL BUREAU OF STANDARDS (NBS) IN ACCORDANCE WITH ASTM METHOD E 77, AND NBS MONOGRAPH 174.

FOR A DISCUSION OF ACCURACIES ATTAINABLE WITH SUCH THERMOMETERS SEE NBS MONOGRAPH 250-23.

IF NO SIGN IS GIVEN ON THE CORRECTION, THE TRUE TEMPERATURE IS HIGHER THAN THE INDICATED TEMPERATURE; IF THE SIGN GIVEN IS NEGATIVE, THE TRUE TEMPERATURE IS LOWER THAN THE INDICATED TEMPERATURE. TO USE THE CORRECTIONS PROPERLY, REFERENCE SHOULD BE MADE TO THE NOTES GIVEN BELOW.

THE THERMOMETER WAS TESTED IN A LARGE, CLOSED-TOP, ELECTRICALLY HEATED, LIQUID BATH, BEING "IMMERSED" 76MM. THE TEMPERATURE OF THE ROOM WAS ABOUT 25 DEGREES C (77 DEGREES F). IF THE THERMOMETER IS USED UNDER CONDITIONS WHICH WOULD CAUSE THE AVERAGE TEMPERATURE OF THE EMERGENT LIQUID COLUMN TO DIFFER MARKEDLY FROM THAT PREVAILING IN THE TEST, APPRECIABLE DIFFERENCES IN THE INDICATIONS OF THE THERMOMETER WOULD RESULT.

CONTINUED

TEST NUMBER: 145875
DATE: 03/29/94
STANDARD SERIAL NO. 128239
NIST IDENTIFICATION NO. 88024

REPORT OF CALIBRATION

LIQUID-IN-GLASS-THERMOMETER

THE TABULATED CORRECTIONS APPLY PROVIDED THE ICE-POINT READING, TAKEN AFTER EXPOSURE FOR NOT LESS THAN 3 DAYS TO A TEMPERATURE OF ABOUT 20 DEGREES C (70 DEGREES F) IS 31.94 DEGREES F. IF THE ICE-POINT READING IS FOUND TO BE HIGHER (OR LOWER) THAN STATED, ALL OTHER READINGS WILL BE HIGHER (OR LOWER) TO THE SAME EXTENT. IF THE THERMOMETER IS USED AT A GIVEN TEMPERATURE SHORTLY AFTER BEING HEATED TO A HIGHER TEMPERATURE. AN ERROR OF 0.01 DEGREES OR LESS, FOR EACH 10 DEGREE DIFFERENCE BETWEEN THE TWO TEMPERATURES, MAY BE INTRODUCED. THE TABULATED CORRECTIONS APPLY IF THE THERMOMETER IS USED IN THE UPRIGHT POSITION; IF USED IN A HORIZONTAL POSITION, THE INDICATIONS MAY BE A FEW HUNDREDTHS OF A DEGREE HIGHER.

TEST NUMBER: 145875
DATE: 03/29/94
STANDARD SERIAL NO. 128239
NIST IDENTIFICATION NO. 88024

Charles Tang-Nian
QUALITY CONTROL MANAGER

453

NATIONAL WEATHER SERVICE TYPE MERCURIAL BAROMETERS

Usable up to 900 metres (3,000 feet)

The National Weather Service type barometer is PRINCO's highest grade mercurial barometer. It is used by weather services and airports the world over. The glass tube has a uniform inside diameter of 7 mm for constant capillary depression throughout the length of the scale. Scales are set at the factory by comparison with a barometer certified by the National Bureau of Standards, and read the local pressure without the necessity of correcting for capillary depression. The vernier can be smoothly and precisely set by means of a rack and pinion drive, controlled by a knurled adjusting knob. White plastic backgrounds on the mounting panel facilitate observation of the Fortin type cistern and mercury column. The vernier has a sighting edge, front and rear, to avoid parallax. A suspension bracket and an adjustable ring clamp for the cistern hold the barometer firmly in the vertical position on the mounting panel. A dual scale Celsius/Fahrenheit thermometer with a −25 to 50°C/−10 to 120°F range indicates the proper temperature to be used for temperature corrections. An instruction booklet with information for understanding and proper use of the barometer is supplied with each instrument. Complete correction tables for temperature and gravity are included.

This barometer is accurate to ±0.3 mb, 0.2 mm, or 0.01 inch of mercury when carefully set and read, and after temperature and gravity corrections have been applied. For greatest accuracy a Certificate of Calibration may be obtained and the correction contained therein also applied. Each National Weather Service barometer has a serial number.

The rugged construction of the National Weather Service type barometer is such that it can be shipped safely by United Parcel Service or express. The kidskin bag, in the Fortin type reservoir, dampens mercury column oscillations during shipment. The lower part of the glass tube is narrowed down to minimize mercury weight, and is protected by foam cushions, thus offering added resistance to damage during shipment. The cistern may be opened in the field for cleaning of the cistern glass and cistern mercury. The barometer contains approximately 680 grams (1.5 pounds) of mercury total. It is shipped completely assembled, filled with mercury and ready to use. Mounting panel dimensions are 19 x 76 x 1072 mm (3/4 x 3 x 42 inches). The shipping weight is 5 kg (11 pounds) and box dimensions are 235 x 250 x 1197 mm (9 x 10 x 47 inches).

Catalog Number	Scales
→ 453	inch and millimetre
453BI	inch and millibar
453MB	millibar and millimetre

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-32778 CYLINDER #:LL572 CYL. PRESSURE:2000PSIG
EXPIRATION DATE: 7/27/97 LAST ANALYSIS DATE:7/27/94
CUSTOMER: NATIONAL WELDERS P.O.#
CHARLOTTE, NC
METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #: 1680B
CYL #: FF33954
CONC.: 477.0PPM

INSTRUMENT:BECKMAN NDIR
MODEL #:880A
SERIAL #:2000172
LAST CAL.:7/1/94

COMPONENT: CO		COMPONENT:		COMPONENT:	
MEAN CONC: 154PPM		MEAN CONC:		MEAN CONC:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC.	
DATE:7/20/94	DATE:7/27/94	DATE:	DATE:	DATE:	DATE:
154PPM	154PPM				
153PPM	153PPM				
154PPM	154PPM				

BALANCE GAS:N2

REPLICATE DATA COMPONENT:CO

DATE: 7/20/94						DATE:7/27/94					
Z	0	R	425.2	C	137.3	Z	0	R	425.2	C	137.3
R	425.3	Z	0	C	136.4	R	425.3	Z	0	C	136.4
Z	0	C	137.3	R	425.4	Z	0	C	137.3	R	425.4

REPLICATE DATA COMPONENT:

DATE:			DATE:		
Z	R	C	Z	R	C
R	Z	C	R	Z	C
Z	C	R	Z	C	R

REPLICATE DATA COMPONENT:

DATE:			DATE:		
Z	R	C	Z	R	C
R	Z	C	R	Z	C
Z	C	R	Z	C	R

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Robert McRae APPROVED BY: Jim Rowe

"THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY, THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH ITS RENDERING OF THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE."

453

NATIONAL WEATHER SERVICE TYPE MERCURIAL BAROMETERS

Usable up to 900 metres (3,000 feet)

The National Weather Service type barometer is PRINCO's highest grade mercurial barometer. It is used by weather services and airports the world over. The glass tube has a uniform inside diameter of 7 mm for constant capillary depression throughout the length of the scale. Scales are set at the factory by comparison with a barometer certified by the National Bureau of Standards, and read the local pressure without the necessity of correcting for capillary depression. The vernier can be smoothly and precisely set by means of a rack and pinion drive, controlled by a knurled adjusting knob. White plastic backgrounds on the mounting panel facilitate observation of the Fortin type cistern and mercury column. The vernier has a sighting edge, front and rear, to avoid parallax. A suspension bracket and an adjustable ring clamp for the cistern hold the barometer firmly in the vertical position on the mounting panel. A dual scale Celsius/Fahrenheit thermometer with a −25 to 50°C/−10 to 120°F range indicates the proper temperature to be used for temperature corrections. An instruction booklet with information for understanding and proper use of the barometer is supplied with each instrument. Complete correction tables for temperature and gravity are included.

This barometer is accurate to ±0.3 mb, 0.2 mm, or 0.01 inch of mercury when carefully set and read, and after temperature and gravity corrections have been applied. For greatest accuracy a Certificate of Calibration may be obtained and the correction contained therein also applied. Each National Weather Service barometer has a serial number.

The rugged construction of the National Weather Service type barometer is such that it can be shipped safely by United Parcel Service or express. The kidskin bag, in the Fortin type reservoir, dampens mercury column oscillations during shipment. The lower part of the glass tube is narrowed down to minimize mercury weight, and is protected by foam cushions, thus offering added resistance to damage during shipment. The cistern may be opened in the field for cleaning of the cistern glass and cistern mercury. The barometer contains approximately 680 grams (1.5 pounds) of mercury total. It is shipped completely assembled, filled with mercury and ready to use. Mounting panel dimensions are 19 x 76 x 1072 mm (3/4 x 3 x 42 inches). The shipping weight is 5 kg (11 pounds) and box dimensions are 235 x 250 x 1197 mm (9 x 10 x 47 inches).

Catalog Number	Scales
→ 453	inch and millimetre
453BI	inch and millibar
453MB	millibar and millimetre

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-32778 CYLINDER #:LL572 CYL. PRESSURE:2000PSIG
EXPIRATION DATE: 7/27/97 LAST ANALYSIS DATE:7/27/94
CUSTOMER: NATIONAL WELDERS P.O.#
CHARLOTTE, NC
METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #: 1680B
CYL #: FF33954
CONC.: 477.0PPM

INSTRUMENT:BECKMAN NDIR
MODEL #:880A
SERIAL #:2000172
LAST CAL.:7/1/94

COMPONENT:	CO	COMPONENT:		COMPONENT:	
MEAN CONC:	154PPM	MEAN CONC:		MEAN CONC:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC.	
DATE:7/20/94	DATE:7/27/94	DATE:	DATE:	DATE:	DATE:
154PPM	154PPM				
153PPM	153PPM				
154PPM	154PPM				

BALANCE GAS:N2

REPLICATE DATA COMPONENT:CO

DATE: 7/20/94						DATE:7/27/94					
Z	0	R	425.2	C	137.3	Z	0	R	425.2	C	137.3
R	425.3	Z	0	C	136.4	R	425.3	Z	0	C	136.4
Z	0	C	137.3	R	425.4	Z	0	C	137.3	R	425.4

REPLICATE DATA COMPONENT:

DATE:			DATE:		
Z	R	C	Z	R	C
R	Z	C	R	Z	C
Z	C	R	Z	C	R

REPLICATE DATA COMPONENT:

DATE:			DATE:		
Z	R	C	Z	R	C
R	Z	C	R	Z	C
Z	C	R	Z	C	R

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Robert McKoy APPROVED BY: Jim Rowe

"THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY, THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH ITS RENDERING OF THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE."

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-32779 CYLINDER #:LL38023 CYL. PRESSURE:2000PSIG
EXPIRATION DATE: 7/27/97 LAST ANALYSIS DATE:7/27/94
CUSTOMER: NATIONAL WELDERS P.O.#
CHARLOTTE, NC
METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #: 1680B
CYL #: FF33954
CONC.: 477.0PPM

INSTRUMENT:BECKMAN NDIR
MODEL #:880A
SERIAL #:2000172
LAST CAL.:7/1/94

COMPONENT: CO		COMPONENT:		COMPONENT:	
MEAN CONC: 301PPM		MEAN CONC:		MEAN CONC:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC.	
DATE:7/20/94	DATE:7/27/94	DATE:	DATE:	DATE:	DATE:
302PPM	301PPM				
301PPM	300PPM				
302PPM	301PPM				

BALANCE GAS:N2

REPLICATE DATA — COMPONENT:CO

DATE: 7/20/94						DATE:7/27/94					
Z	0	R	425.2	C	269.2	Z	0	R	425.2	C	268.3
R	425.3	Z	0	C	268.4	R	425.3	Z	0	C	267.5
Z	0	C	269.3	R	425.3	Z	0	C	268.4	R	425.4

REPLICATE DATA — COMPONENT:

DATE:			DATE:		
Z	R	C	Z	R	C
R	Z	C	R	Z	C
Z	C	R	Z	C	R

REPLICATE DATA — COMPONENT:

DATE:			DATE:		
Z	R	C	Z	R	C
R	Z	C	R	Z	C
Z	C	R	Z	C	R

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Robert McCoy APPROVED BY: Jim Roe

"THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY, THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH ITS RENDERING OF THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE."

Scott Specialty Gases

TRIGON ENGINEERING

LABEL OF CONTENT
PO No. AM5722

Component	Grade	Certified Purity
NITROGEN	U Z A M	99.999%

CAS Reg.No. 7727-37-9

Cylinder No ALM033614 Project No 12-08581

QC Batch: QC# 304812 Item No.1201811 AL

Reorder/Service Contact (919)220-0803 DURHAM NC 27704

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-32779 CYLINDER #:LL38023 CYL. PRESSURE:2000PSIG
EXPIRATION DATE: 7/27/97 LAST ANALYSIS DATE:7/27/94
CUSTOMER: NATIONAL WELDERS P.O.#
CHARLOTTE, NC
METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #: 1680B
CYL #: FF33954
CONC.: 477.0PPM

INSTRUMENT:BECKMAN NDIR
MODEL #:880A
SERIAL #:2000172
LAST CAL.:7/1/94

COMPONENT: CO		COMPONENT:		COMPONENT:	
MEAN CONC: 301PPM		MEAN CONC:		MEAN CONC:	
REPLICATE CONC.		REPLICATE CONC.		REPLICATE CONC.	
DATE:7/20/94	DATE:7/27/94	DATE:	DATE:	DATE:	DATE:
302PPM	301PPM				
301PPM	300PPM				
302PPM	301PPM				

BALANCE GAS:N2

REPLICATE DATA COMPONENT:CO

DATE: 7/20/94

Z	0	R	425.2	C	269.2
R	425.3	Z	0	C	268.4
Z	0	C	269.3	R	425.3

DATE:7/27/94

Z	0	R	425.2	C	268.3
R	425.3	Z	0	C	267.5
Z	0	C	268.4	R	425.4

REPLICATE DATA COMPONENT:

DATE:

Z	R	C
R	Z	C
Z	C	R

DATE:

Z	R	C
R	Z	C
Z	C	R

REPLICATE DATA COMPONENT:

DATE:

Z	R	C
R	Z	C
Z	C	R

DATE:

Z	R	C
R	Z	C
Z	C	R

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: APPROVED BY:

"THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY, THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH ITS RENDERING OF THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE."

Scott Specialty Gases

TRIGON ENGINEERING

LABEL OF CONTENT
PO No. AM5722

Component	Grade	Certified Purity
NITROGEN	U Z A M	99.999%

CAS Reg.No. 7727-37-9

Cylinder No. ALM033614 Project No 12-08581

QC Batch: QC# 304812 Item No.1201811 AL

Reorder/Service Contact (919)220-0803 DURHAM NC 27704