Indiantown Cogeneration, L.P.

Indiantown Cogeneration, L.P.
P.O. Box 1799
13303 SW Silver Fox Lane
Indiantown, FL 34956

772.597.6500
Fax: 772.597.6210

April 3, 2007

RECEIVED
APR 04 2007
BUREAU OF AIR REGULATION

Darrel Graziani
Florida Department of Environmental Protection
400 N. Congress Ave
West Palm Beach, FL. 33416

VIA FEDERAL EXPRESS

Re: ***Initial Compliance Test Protocol for New Auxiliary Boilers***

Dear Darrel:

As a follow up to Indiantown Cogeneration L.Ps' letter dated March 19th, 2007, enclosed please find a copy of the Test Protocol for your review. The Initial Compliance Testing for the newly installed Auxiliary boilers is scheduled for April 25 & 26, 2007.

Thank you for your continuing assistance.

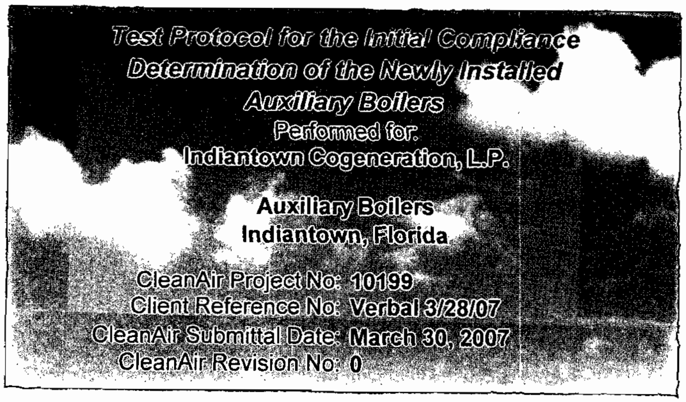
Sincerely,

Nicholas Laryea
Environmental Manager

jl

Enclosure: 1

cc: US EPA Region IV
Tom Casio- DEP Tallahassee
Lauren Billheimer- Cogentrix
A.J. Jablonowski- Earth Tech
Nicholas Laryea-Indiantown Cogen
Robert Preksta (CAE)
File



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March 19, 2007

United States Environmental Protection Agency
Region 4
Sam Nunn Atlanta Federal Center
Director, Air, Pesticides and Toxics Management Division
61 Forsyth Street, SW
Atlanta, GA 30303- 3104

Subject: **NSPS Subparts A/Db Notice of Intent to conduct a performance test, NESHAP Subparts A/DDDDD Notice of Intent to conduct a performance test, Permit No. 0850102-008-AC, Facility ID No. 0850102**

This submittal serves as the NSPS Subpart Db notification and the NESHAP Subpart DDDDD notification for the planned stack test of two new auxiliary boiler located at the Indiantown Cogeneration, 13303 SW Silver Fox Lane (P.O. Box 1799) in Indiantown Florida. The planned stack test of the auxiliary boilers is April 25 & 26, 2007.

The facility mailing address is:

13303 SW Silver Fox Lane
Indiantown Florida 34956

The facility is off Route 710 (SW Warfield Blvd), northwest of downtown Indiantown.

If you have any questions concerning this notice, please feel free to contact Nicholas Laryea at 772-597-6500 ext. 19.

Very truly yours,

Gary E. Willer
General Manager

Cc:
Darrel Graziani, DEP S.E. District
Tom Cascio – DEP Tallahassee
Lauren Billheimer -- Cogentrix
A.J. Jablonowski - Earth Tech
Nicholas Laryea – ICLP
File

CleanAir.

CleanAir Engineering
1601 Parkway View Drive
Pittsburgh, PA 15205-1409
800-632-1619
www.cleanair.com

Indiantown Cogeneration, L.P.
13303 SW Silver Fox Lane
Indiantown, Florida 34956

RECEIVED
APR 04 2007
BUREAU OF AIR REGULATION

TEST PROTOCOL FOR THE INITIAL COMPLIANCE DETERMINATION OF THE NEWLY INSTALLED AUXILIARY BOILERS

To Be Performed for:
INDIANTOWN COGENERATION, L.P.
INDIANTOWN, FLORIDA

Client Reference No: Verbal 3/28/07
CleanAir Project No: 10199
Revision 0: March 30, 2007

To the best of our knowledge, the State and Federal regulations applicable to each source to be tested have been reviewed and all testing requirements therein have been incorporated into the test protocol.

Submitted by,

Robert H. Preksta
Robert Preksta
Sr. Project Manager
(615) 773-7177
bpreksta@cleanair.com

REVISION HISTORY

TEST PROTOCOL FOR THE INITIAL COMPLIANCE DETERMINATION OF THE NEWLY INSTALLED AUXILIARY BOILERS

Revision History

Revision No:	Date	Pages	Comments
0	03/30/2007	All	Original version of document.

CONTENTS

PROJECT OVERVIEW

Indiantown Cogeneration, L.P. has contracted Clean Air Engineering (CleanAir) to perform a series of air emission measurements at their Indiantown, Florida facility. The program is designed to meet the requirements of Indiantown, Florida, for the initial compliance demonstration of the two (2) newly installed Victory Energy Model 23M Keystone boilers.

OBJECTIVE

The objectives of the test program are:

- Demonstrate initial compliance of the two (2) Victory Energy Model 23M Keystone boilers with the Florida Department of Environmental Protection ARMS Permit No. 0850102-008-AC and 40 CFR 63 Subpart DDDD requirements.

- Perform a Relative Accuracy Test Audit on the Auxiliary Boiler Stack Continuous Emissions Measurement System (CEMS).

The field portion of the test program will include the determination of the following parameters:

- nitrogen oxides (NO_X)
- carbon monoxide (CO)
- opacity
- total hydrocarbons (THC)
- flue gas composition (e.g., O_2, CO_2, H_2O)
- flue gas temperature
- flue gas flow rate

PROJECT CONTACTS

Indiantown Cogeneration (ICLP)	Clean Air Engineering – Project Manager
Nicholas Laryea Indiantown Cogeneration, L.P. 13303 SW Silver Fox Lane Indiantown, Florida 34956 (772) 597-6500 ext. 19: Office (772) 597-6524: Facsimile NicholasLaryea@Cogentrix.com: email	Bob Preksta Clean Air Engineering 404 Stockbridge Way Mt. Juliet, Tennessee 37122 (615) 773-7177: Office (412) 787-9130: Mobile (615) 773-7177: Facsimile bpreksta@cleanair.com: email

SCOPE OF WORK

CleanAir will perform a series of air emission measurements at the Auxiliary Boilers Main Steel Stack (EPA Test Ports located at 8th Floor). Testing will be performed on each unit individually. Each unit will be tested while operating at full load. Operating the unit at full load allows for the test runs to be used to demonstrate both compliance and relative accuracy of the CEMS.

A series of three (3) 60 minute test runs will be performed separately on each unit. In addition, seven (7) 21-minute test runs will be performed to complete the CEMS certification.

The dry instrumental methods (NO_x and CO) will be converted into the applicable permit limits (lb/MBtu) using the natural gas Dry Fuel Factor (F_d) of 8,710 dscf/MBtu and Carbon Based Fuel Factor (F_c) of 1,040 scf/MBtu as referenced in EPA Method 19 Table 19-2 "F Factors for Various Fuels".

The wet instrumental method (THC) will be converted into the applicable permit limit of lb/hour using the exhaust gas moisture content and volumetric flow rate determined in conjunction with each test run.

The parameters and applicable permit limits are summarized in Tables 1-1 and 1-2.

Table 1-1:
Compliance Testing Permit Summary

Target Emission	Test Method	Unit Test Load(s)	Applicable Permit Limit[1]
NO_x	EPA Method 7E,19	Full Load	0.040 lb/MMBtu
Visible Emissions	EPA Method 9	Full Load	20%
CO	EPA Method 10,19	Full Load	0.040 lb/MBtu
VOC	EPA Method 1-4, 25A	Full Load	0.70 lb/hr

[1]Florida Department of Environmental Protection ARMS Permit No. 0850102-008-AC

PROJECT OVERVIEW

Table 1-2:
RATA Specification Summary

Parameter	Reference Method	Specification Limit[1]
Carbon Dioxide (%wv)	EPA M3A	20.00%
Zero Drift (24-hour)	PS3	0.50%
Calibration Drift (24-hour)	PS3	0.50%
CO_2 Cycle Time (min:sec)	PS3	15:00
Nitrogen Oxides (lb/MBtu)	EPA M7E/19	20.00%
Zero Drift (24-hour)	PS2	2.50%
Calibration Drift (24-hour)	PS2	2.50%
NO_x Cycle Time (min:sec)	PS2	15:00
Carbon Monoxide (lb/MBtu)	EPA M10/19	10.00%
Zero Drift (24-hour)[2]	PS4	5.00%
Calibration Drift (24-hour)[2]	PS4	5.00%
CO Cycle Time (min:sec)	PS4	15:00

[1] Specification limits obtained 40 CFR Part 60, Appendix B.
[2] Carbon monoxide calibration drift test is based on 6 out of 7 days.

An example of the format of the test results is present in Tables 2-1 through 2-3 on pages 2-1 through 2-3.

PROJECT OVERVIEW

Table 1-3:
Schedule of Activities

Day	Activity	Location	EPA Test Method	Number of Test Runs	Duration of Each Test Run
1	Mobilization/Set-up				
2	Volumetric Flow	Aux. Boiler Stack	1-4	3	60 min.
	O_2, CO_2,	Aux. Boiler A	3A	3	60 min.
	NO_x, CO, THC		7E, 10, 25A	3	60 min.
	Opacity		9	3	60 min.
	O_2, CO_2,		3A	7	21 min.
	NO_x, CO, THC		7E, 10, 25A	7	21 min.
3	Volumetric Flow	Aux. Boiler Stack	M1-4	3	60 min.
	O_2, CO_2,	Aux. Boiler B	3A	3	60 min.
	Opacity		9	3	60 min.
	NO_x, CO, THC		7E, 10, 25A	3	60 min.
4	Demobilization				

Compliance Test Program

O_2, CO_2, NO_x, CO and THC

CleanAir will incorporate guidelines as stated in 40 CFR 60, Appendix A. Figure 1-1 outlines the testing guidelines.

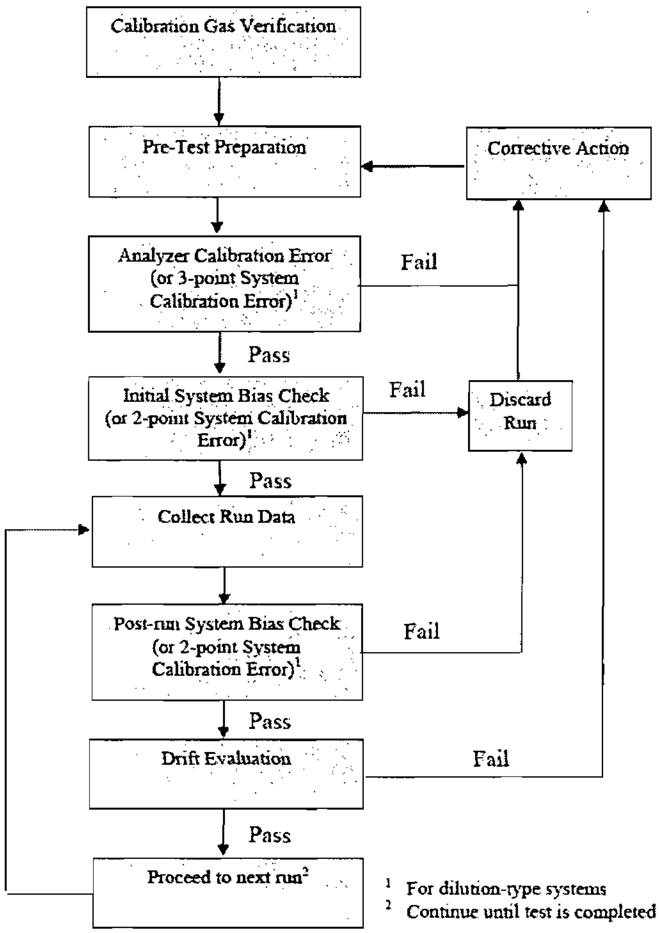


Figure 1-1: Testing Flow Chart (EPA Method 7E)

PROJECT OVERVIEW

Calibration Gas Verification: CleanAir will use EPA protocol 1 calibration gases for the calibration of all instruments. An example of the Certificate of Analysis is contained in Appendix B of this test protocol. The calibration span (high level gas) will be selected to insure measurements are with 20 to 100% of the calibration span value.

Pre-Test Preparation: The following activities will be performed in the field prior to the start of the sampling program.

- Measurement system preparation including verification of sample line and moisture removal system operating temperatures, sampling system leak-check and sample delivery rate.
- Calibration error test in which three (3) calibration gases, low-level (0-20% of calibration span), mid-level (40-60% of calibration span) and high-level (calibration span) will be introduced directly into the analyzer. Each response must be within ± 2% of the calibration span value.
- Calibration error test, (THC), in which four (4) calibration gases, zero, low-level (25-35% of span value), mid-level (45-55% of span value) and high-level (80-90% of span value) will be introduced at the calibration valve assembly. Each response must be within ± 5% of the span value.
- NO_2 to NO conversion efficiency test in which a calibration gas containing 40 to 60 ppm of NO_2 will be introduced directly to the analyzer. A response of 90% or greater is required for an acceptable result.
- System bias checks will be performed by introducing the low-level and calibration gas (mid or high) which is closest to the expected concentration in the exhaust gas stream. No adjustments will be to the analyzer. Each response must be within ± 5% of the calibration span value.
- System response time will be determined by in conjunction with the bias test. This is a measure of the time required to record a value of 95% of the calibration gas value. This will be performed for both the low and calibration gas used. The longer of the two measurements will be the system response time.
- Interference checks – In accordance with the method current instruments analysis principles) that already passed the interference test requirement under the previous method (before August 14, 2006) are grandfathered from the new interference test requirements.

PROJECT OVERVIEW

Determination of Stratification: The NO_x and CO concentrations will be measured at twelve (12) traverse points located according to EPA Reference Method 1 criteria. (Alternatively, three points on a line passing through the center of the stack located at 16.7, 50.0, and 83.3 percent of the stack diameter may be used).

Each point will be sampled for a minimum of twice the system response time. The concentration will be recorded at each point and the mean (average) concentration will be calculated.

If the concentration at each traverse point differs from the mean concentration for all traverse points by no more than:

(a) ± 5.0 percent of the mean concentration; or
(b) ± 0.5 ppm (whichever is less restrictive), the gas stream is considered unstratified and samples may be collected from a single point that most closely matches the mean.

If the 5.0 percent or 0.5 ppm criterion is not met, but the concentration at each traverse point differs from the mean concentration for all traverse points by no more than:

(a) ± 10.0 percent of the mean; or
(b) (b) ± 1.0 ppm (whichever is less restrictive), the gas stream is considered to be minimally stratified, and samples may be collected from three points located at 16.7, 50.0, and 83.3 percent of the stack diameter.

If the gas stream is found to be stratified because the 10.0 percent or 1.0 ppm criterion is not met samples must be collected at all twelve traverse points for each test run.

Sample Collection: The sampling probe will be positioned at the first traverse point and a minimum system purge of twice the system response time is required prior to the collection of test data. The actual sampling time per point will be dependent of the actual number of sampling points required by the stratification test. A minimum purge time of twice the system response time is required anytime the test probe is removed from the duct or following system calibrations.

If at any time a measured one-minute average gas concentration exceeds the calibration span value it will be reported as a deviation from the method and may be cause to invalidate the test run.

Post Run Bias Check – Immediately following each test run the low and calibration gas will be introduced into the sampling system as close as possible to the probe tip. No adjustments will be to the analyzer. Each response must be within ± 5% of the calibration span value.

Volatile Organic Compounds

The definition utilized in this project for the term volatile organic compound (VOC) is an organic compound that participates in atmospheric chemical reactions; i.e., an organic compound other than those which the EPA has designated as having negligible photoreactivity. The exempted compounds, two of which are methane and ethane, are listed in 40 CFR 51.100(s)(1).

EPA Method 25A (Total Hydrocarbons - THC) does not distinguish between the photoreactive and non-photoreactive compounds, as referenced in 40 CFR 51. The flame ionization analyzer will detect methane and ethane concentrations in the sample gas as well as other hydrocarbon compounds.

In order to determine the non-methane/non-ethane concentration in the exhaust gas stream a sample of the actual exhaust gas will be collected concurrently with each EPA Method 25A test run.

In the event the VOC concentration, as measured by Method 25A, exceeds the permitted limit the individual gas sample corresponding to that test run will be analyzed in the laboratory for methane and ethane using EPA Method 18 (gas chromatography coupled with a flame ionization detector GC/FID). The methane and ethane concentrations will be subtracted from the total hydrocarbon concentration.

Visible Observations

Visible observations of emissions will be made according to EPA Method 9. This method is based upon visible evaluations of the opacity of emissions by a trained and FDEP certified observer.

<u>Observer Certification Procedure</u>

The field observer for the project will attend and successfully completed an EPA certified Visual Emission Certification Program (Eastern Technician Associates with State of Florida criteria). This program will consist of a classroom lecture and discussion session (as required) in conjunction with actual field opacity determinations.

The classroom curriculum (if required) will consist of the following items:

- Background, principles, and the theory of opacity
- Source conditions, related particle characteristics, and opacity reading procedures and problems

- Proper procedures for conducting field observations under a variety of conditions
- Influence and impact of meteorology on plume behavior
- Legal aspects of VE and opacity measurements
- Actual observation/testing procedures

The field proficiency portion of the program will consist of fifty plumes (25 white and 25 black) produced by a smoke generator. The plumes within each color set will be presented in a random order. The observer will be required to assign an opacity to each plume and record it to the nearest 5 percent. The observer will demonstrate the following requirements:

- The average error will not exceed 7.5 percent opacity in each category
- The error on any individual reading will not exceed 15 percent

Field Records

The observer will record his name, company and certification date along with the name of the facility, source identification, process and control devices associated with the emission point. The time, estimated distance, height and orientation of the observer from emission point, meteorological data (wind speed and direction, sky conditions etc.), plume and background description will also recorded.

Field Observations - EPA Method 9

The observer will position himself at a sufficient distance from each source to provide a clear view of the emissions. The sun will be oriented in the 140-degree sector to his back. Consistent with the above requirements, the observer will make his observations from a position such that his line of vision will be perpendicular to the plume direction. The observations will be made at the point of greatest opacity in the portion of the plume where condensed water vapor is not present. The observer will not look continuously at the plume, but will observe the plume momentarily at 15-second intervals.

Relative Accuracy Test Audit

The RATA for the facility Part 60 Continuous Emissions Monitoring System (CEMS) will consist of concurrent pollutant emissions measurements using the facility CEMS and a Reference Method (RM) monitoring system. A complete RATA will be comprised of a minimum of 9 runs of paired measurements. Each test run will be a minimum of 21-minutes in duration. Testing will be performed while the units are operated at full load, therefore, the three 60-minute compliance test runs will also be used to determine the relative accuracy. The 21or 60-minute average of the RM results and the CEMS results will be determined. The differences between the RM results and the CEMS results will be determined. The relative accuracy will be based on the average of these differences and the 95% statistical confidence coefficient.

Individual run values will be calculated using the arithmetic average of 21or 60 one-minute-average RM readings with the 21or 60-minute average reading supplied by the CEMS data acquisition system print-out. The relative accuracy will be based on units of percent dry volume (%dv) for CO_2 and pounds per million Btu (lb/MBtu) for the NO_x and CO. Pollutant (NO_X and CO) and diluent (O_2 and CO_2) measurements will be made concurrently by both the facility CEMS and RM system to facilitate the lb/10^6Btu calculations. The determined relative accuracy will be considered acceptable if the CEMS are within 20 percent (CO_2 and NOx) or 10 percent (CO) of the reference method average.

7-Day Calibration Drift Test

The calibration drift of CO_2, NO_X and CO analyzers will be measured once for each of seven consecutive days at approximately 24-hour intervals. Zero (0-20% of span) and high-level (80-100% of span) calibration gases are introduced as close as possible to the probe tip. The calibration drift tests are acceptable if the monitors do not deviate from the reference value of the calibration gas more than 2.5% based on the instrument span for NO_x and 0.5% for CO_2. For CO the calibration drift shall not deviate from the reference value of the calibration gas by more than 5.0 percent based upon the instrument's span value six of seven days

The auxiliary boilers are operated on a limited basis through out the year. Therefore, the calibration error test will be performed over a consecutive seven calendar day period regardless of boiler operations. In previous correspondence with Peter Westlin (US EPA) the question concerning importance of plant load during the seven-day drift period was addressed. The following is the answer presented by Mr. Westlin, "In answer to the drift test question first, you are on the right track that load really has no bearing on completing the 7-day drift test. We have conveyed to others in the past that the drift test can proceed regardless of the process operation during the seven days. The more important factor is determining whether the CEMS can pass the checks for at least seven days straight."

Linearity Check (Calibration Error)

Part 60 does not require linearity checks.

Cycle Time (Response Time)

The cycle time of each monitor will be determined using a low and high level calibration gas. The gas will be introduced into the system and the system will be allowed to stabilize. Once the system is stabilized, the introduction of calibration gas will be stopped, and the amount of time required to reach 95% of the stack emissions value will be recorded. Each gas will be injected three times. The test is acceptable if none of the response times exceed 15 minutes.

PROCESS DATA

The following process data will be collected by ICLP personnel during each test run and included in the final test report. Additional parameters as applicable may also be included.

Auxiliary Boiler Operational Parameters:

- Natural Gas Flow
- Propane Flow
- Heat Input

RESULTS

Table 2-1:
Auxiliary Boiler – NOx, CO, Visible Emissions and THC

Run No.		1	2	3	Average
Date (2007)		mmm dd	mmm dd	mmm dd	
Start Time (approx.)		hh:mm	hh:mm	hh:mm	
Stop Time (approx.)		hh:mm	hh:mm	hh:mm	
Operational Parameters					
C_1	Heat Input	XX,XXX	XX,XXX	XX,XXX	
C_2	Natural Gas Flow (CFH)	XX,XXX	XX,XXX	XX,XXX	
C_3	Propane Flow (CFH)	X,XXX	X,XXX	X,XXX	
C_4	Dry Fuel Factor (F_d)	8,710	8,710	8,710	
C_5	Carbon Based Fuel Factor (F_c)	1,040	1,040	1,040	
Gas Conditions					
O_2	Oxygen (dry volume %)	X.X	X.X	X.X	**X.X**
CO_2	Carbon dioxide (dry volume %)	XX.X	XX.X	XX.X	**XX.X**
T_s	Sample temperature (°F)	XXX	XXX	XXX	**XXX**
B_w	Water vapor in gas (% by volume)	XX.X	XX.X	XX.X	**XX.X**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	XX,XXX	XX,XXX	XX,XXX	**XX,XXX**
Q_s	Volumetric flow rate, standard (scfm)	XX,XXX	XX,XXX	XX,XXX	**XX,XXX**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	XX,XXX	XX,XXX	XX,XXX	**XX,XXX**
Nitrogen Oxides (NO_X) Results					
C_{sd}	NO_x Concentration (ppmdv)	XX.X	XX.X	XX.X	**XX.X**
E_{Fd}	NOx Rate - Fd-based (lb/MMBtu)	X.XXX	X.XXX	X.XXX	**X.XXX**
F_{Fc}	NOx Rate - Fc-based (lb/MMBtu)	X.XXX	X.XXX	X.XXX	**X.XXX**
$E_{lb/hr}$	NO_x Rate (lb/hr), based on Fd	XX.X	XX.X	XX.X	**XX.X**
Visible Emissions Results					
	Opacity (%)	X.X	X.X	X.X	**X.X**
Carbon Monoxide (CO) Results					
C_{sd}	CO Concentration (ppmdv)	XX.X	XX.X	XX.X	**XX.X**
E_{Fd}	CO Rate - Fd-based (lb/MMBtu)	X.XXX	X.XXX	X.XXX	**X.XXX**
F_{Fc}	CO Rate - Fc-based (lb/MMBtu)	X.XXX	X.XXX	X.XXX	**X.XXX**
$E_{lb/hr}$	CO Rate (lb/hr), based on Fd	XX.X	XX.X	XX.X	**XX.X**
Total Hydrocarbon (THC) Results, Methane Basis					
C_{sw}	THC Concentration (ppmdw)	XX.X	XX.X	XX.X	**XX.X**
C_{sd}	THC Concentration (ppmdv)	XX.X	XX.X	XX.X	**XX.X**
E_{Fd}	THC Rate - Fd-based (lb/MMBtu)	X.XXX	X.XXX	X.XXX	**X.XXX**
F_{Fc}	THC Rate - Fc-based (lb/MMBtu)	X.XXX	X.XXX	X.XXX	**X.XXX**
$E_{lb/hr}$	THC Rate (lb/hr)	X.X	X.X	X.X	**X.X**

RESULTS

Table 2-2:
Auxiliary Boiler – Nitrogen Oxides – Calibration Error

Zero and Calibration Drift (24-hour) data sheet						CEM NOx	serial # xxxxxxxxxx			
Data Set #	Date	Run Time Begin	Run Time End	Zero Reading Initial A	Zero Reading Final B	Zero Drift C=B-A	High Level Reading Initial D	High Level Reading Final E	Span Drift F=E-D	Calibration Drift G=F-C
	m/dd/yy	h:mm	h:mm		x.xx			xxx.xx		
1	m/dd/yy	h:mm	h:mm	x.xx	x.xx	x.xx	xxx.xx	xxx.xx	x.xx	x.xx
2	m/dd/yy	h:mm	h:mm	x.xx	x.xx	x.xx	xxx.xx	xxx.xx	x.xx	x.xx
3	m/dd/yy	h:mm	h:mm	x.xx	x.xx	x.xx	xxx.xx	xxx.xx	x.xx	x.xx
4	m/dd/yy	h:mm	h:mm	x.xx	x.xx	x.xx	xxx.xx	xxx.xx	x.xx	x.xx
5	m/dd/yy	h:mm	h:mm	x.xx	x.xx	x.xx	xxx.xx	xxx.xx	x.xx	x.xx
6	m/dd/yy	h:mm	h:mm	x.xx	x.xx	x.xx	xxx.xx	xxx.xx	x.xx	x.xx
7	m/dd/yy	h:mm	h:mm	x.xx	x.xx	x.xx	xxx.xx	xxx.xx	x.xx	x.xx
Arithmetic Mean (Eq. 2-1)						x.xxx	Arithmetic Mean (Eq. 2-1)			x.xx
Confidence Interval (Eq. 2-2)						x.xxx	Confidence Interval (Eq. 2-2)			x.xx
Instrument Span			xxx.xx	Zero Drift		x.xx	Calibration Drift *			x.xx

* Use Equation 2-3, with the span value for R. V.

RESULTS

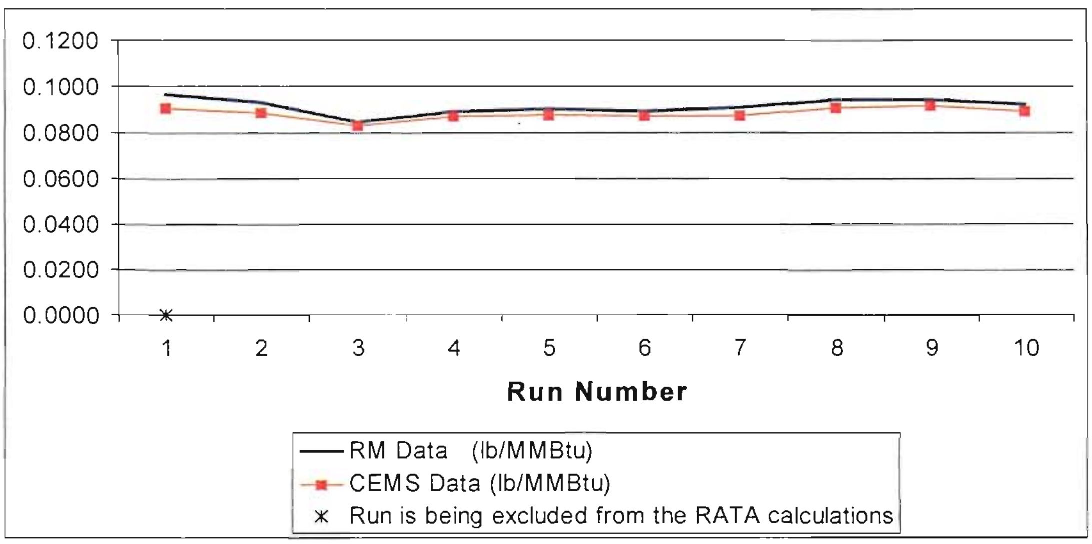
Table 2-3:
Auxiliary Boiler – Nitrogen Oxides (lb/MBtu) – Example Data

Run No.	Start Time	Date (2007)	RM Data (lb/MMBtu)	CEMS Data (lb/MMBtu)	Difference (lb/MMBtu)	Percent Difference	
1	14:56	Dec 9	0.0968	0.0911	0.0057	5.89%	*
2	15:41	Dec 9	0.0934	0.0889	0.0045	4.82%	
3	8:14	Dec 10	0.0850	0.0832	0.0018	2.07%	
4	8:45	Dec 10	0.0892	0.0873	0.0019	2.12%	
5	9:15	Dec 10	0.0902	0.0879	0.0023	2.54%	
6	9:44	Dec 10	0.0894	0.0872	0.0022	2.43%	
7	10:17	Dec 10	0.0909	0.0873	0.0036	3.94%	
8	10:47	Dec 10	0.0942	0.0908	0.0034	3.61%	
9	11:18	Dec 10	0.0941	0.0917	0.0024	2.60%	
10	11:49	Dec 10	0.0922	0.0895	0.0027	2.98%	
Average			**0.0910**	**0.0882**	**0.0028**	3.03%	

	RATA	Limits
Standard Deviation	0.000904	
Confidence Coefficient	0.000695	
Relative Accuracy (as % of RM)	3.79%	**20.00%**

* Indicates that the run was not included in the RATA calculations.
9 Runs are being considered in the RATA calculations
1 Run is being excluded from the RATA calculations
footnote # explanation here if runs were invalidated.

RM = Reference Method (CleanAir Data)
CEMS = Continuous Emissions Monitoring System (Indiantown Cogeneration data)



INDIANTOWN COGENERATION, L.P.
INDIANTOWN, FLORIDA

Client Reference No: Verbal 3/28/07
CleanAir Project No: 10199

RESULTS

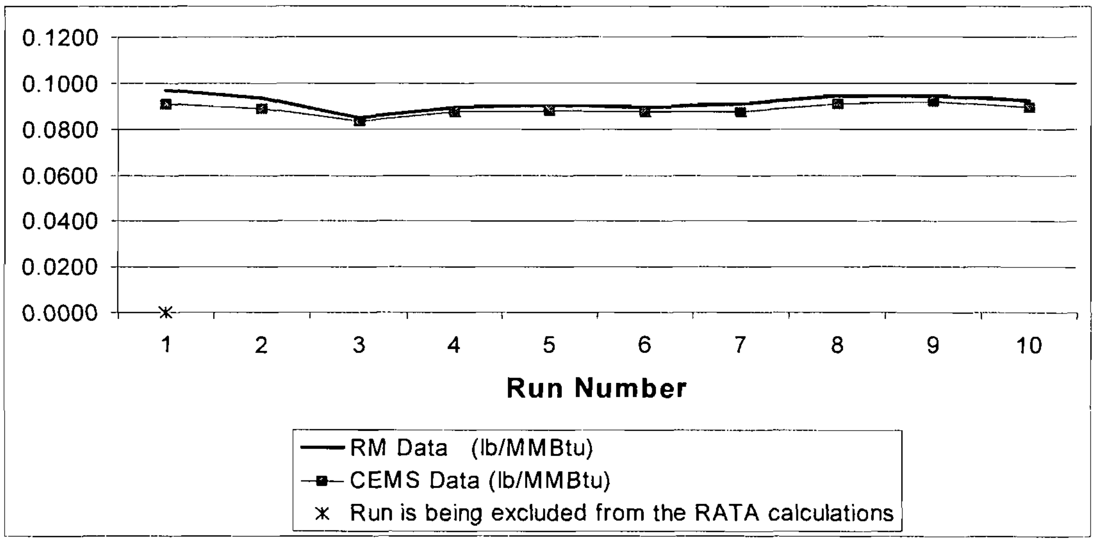
Table 2-3:
Auxiliary Boiler – Nitrogen Oxides (lb/MBtu) – Example Data

Run No.	Start Time	Date (2007)	RM Data (lb/MMBtu)	CEMS Data (lb/MMBtu)	Difference (lb/MMBtu)	Percent Difference	
1	14:56	Dec 9	0.0968	0.0911	0.0057	5.89%	*
2	15:41	Dec 9	0.0934	0.0889	0.0045	4.82%	
3	8:14	Dec 10	0.0850	0.0832	0.0018	2.07%	
4	8:45	Dec 10	0.0892	0.0873	0.0019	2.12%	
5	9:15	Dec 10	0.0902	0.0879	0.0023	2.54%	
6	9:44	Dec 10	0.0894	0.0872	0.0022	2.43%	
7	10:17	Dec 10	0.0909	0.0873	0.0036	3.94%	
8	10:47	Dec 10	0.0942	0.0908	0.0034	3.61%	
9	11:18	Dec 10	0.0941	0.0917	0.0024	2.60%	
10	11:49	Dec 10	0.0922	0.0895	0.0027	2.98%	
Average			**0.0910**	**0.0882**	**0.0028**	3.03%	

	RATA	Limits
Standard Deviation	0.000904	
Confidence Coefficient	0.000695	
Relative Accuracy (as % of RM)	3.79%	**20.00%**

* Indicates that the run was not included in the RATA calculations.
9 Runs are being considered in the RATA calculations
1 Run is being excluded from the RATA calculations
footnote # explanation here if runs were invalidated.

RM = Reference Method (CleanAir Data)
CEMS = Continuous Emissions Monitoring System (Indiantown Cogeneration data)



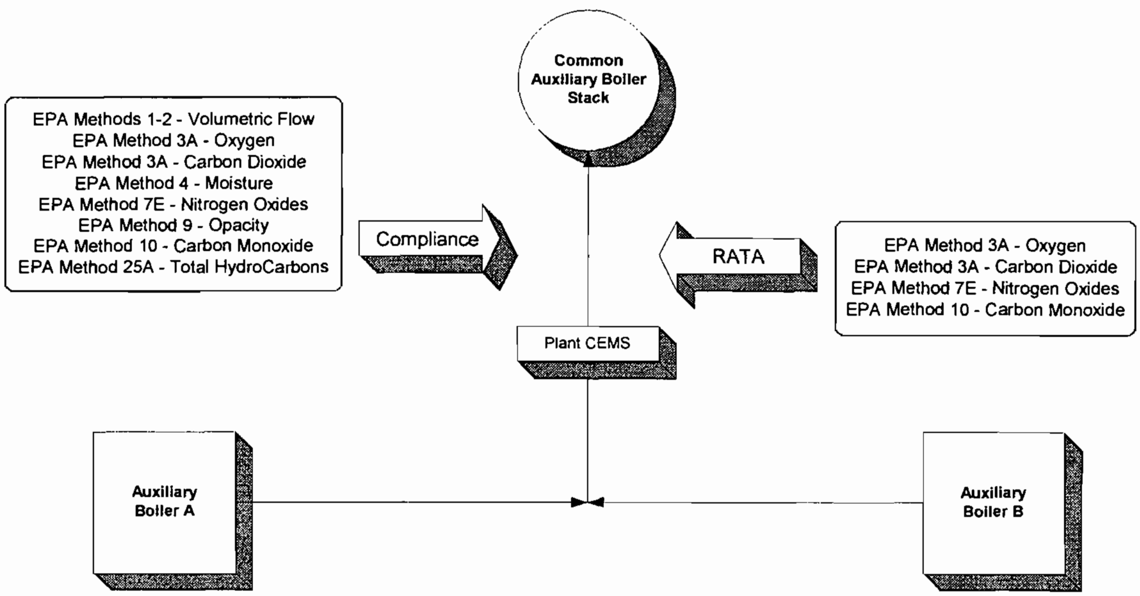
DESCRIPTION OF INSTALLATION

PROCESS DESCRIPTION

The Indiantown Cogeneration Plant operates two (2) auxiliary boilers when necessary to assist in startup of the pulverized coal boiler or to provide process steam to an adjacent company. Natural gas is the primary fuel with propane available as the backup fuel.

Nitrogen oxides emissions from each boiler are controlled through burner technology. The exhaust from each boiler travels through a common header and is exhausted to the atmosphere through a steel stack 215 feet above grade. Two (2) EPA Test ports are located in the steel stack. The test ports are located on the 8th floor and access is available by way of the permanent plant elevator.

A schematic of the process indicating sampling locations is shown in Figure 3-1.



Note: All measurements will be performed at the Common Stack. Measurements will be taken with only one (1) Auxiliary Boiler in operation at a time.

Figure 3-1: Process Schematic

DESCRIPTION OF INSTALLATION

DESCRIPTION OF SAMPLING LOCATION

Compliance Test Program
The velocity traverse (volumetric flow) sampling point locations will be determined according to EPA Method 1.

Instrumental methods (O_2, CO_2, NO_x, CO and THC) initial stratification check traverse point locations will be determined according to EPA Method 1.

Table 3-1outlines the various sampling point configurations that may be possible based on the results of the field performed stratification check (EPA Method 7E). Figures 3-2 and 3-3 illustrate two of the potential sampling point configurations and orientation of sampling ports.

In the event the stratification check indicates all points are within 5% of the mean value, three (3) points located at 16.7, 50.0 and 83.3% of the stack diameter will be sampled instead of the permitted single point. This is based on the runs being used for compliance and RATA determinations.

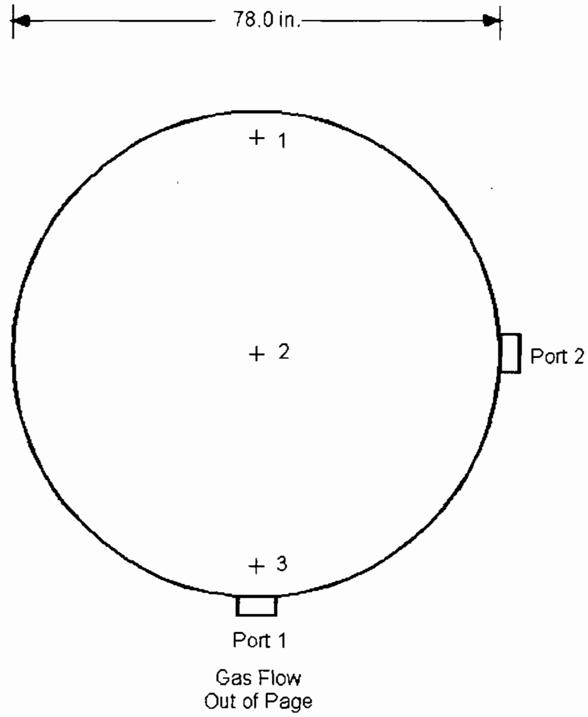
Table 3-1:
Potential Sampling Point Configurations

Location	Parameters	Method	Results of Initial Stratification Check	No. of Sample Points Required	Time per Point	Figure
Stack	O_2, CO_2, NOx, CO, THC	3A, 7E, 10, 25A	All points <5% of mean value	1	60 min.	N/A
	O_2, CO_2, NOx, CO, THC	3A, 7E, 10, 25A	All points <10% of mean value	3	20 min.	3-2
	O_2, CO_2, NOx, CO, THC	3A, 7E, 10, 25A	Point > 10% of mean value	12	5 min.	3-3

Relative Accuracy Test Audit
Instrumental methods (O_2, CO_2, NO_x and CO) sampling points will be located on a measurement line passing through the centroidal area of the stack. The points will be positioned at 16.7, 50.0 and 83.3% of the stack diameter. Figure 3-2 illustrates the sampling point locations.

DESCRIPTION OF INSTALLATION

DESCRIPTION OF SAMPLING LOCATION (CONTINUED)



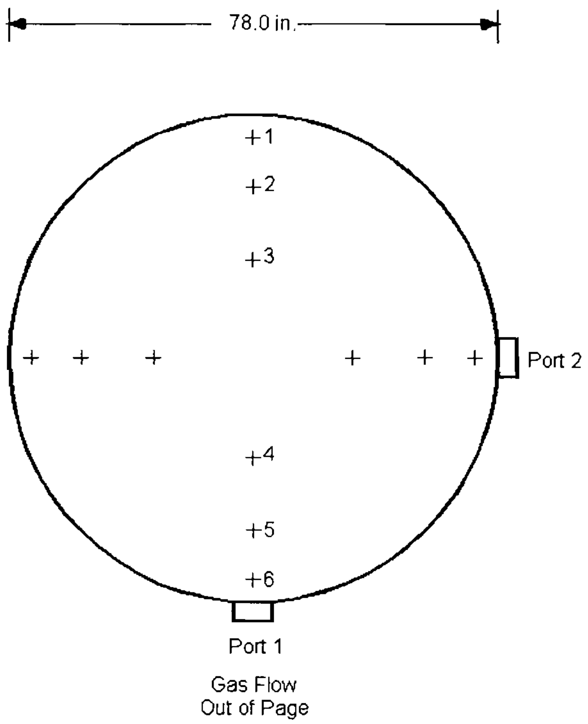
Sampling Point	Port to Point Distance (in.)
1	65.0 in. (83.3% of Diameter)
2	39.0 in. (50.0 % of Diameter)
3	13.0 in. (16.7% of Diameter)

Duct diameters upstream from flow disturbance (A):	>2.0	Limit: 0.5
Duct diameters downstream from flow disturbance (B):	>8.0	Limit: 2.0

Figure 3-2: Auxiliary Boiler Stack Sampling Point Determination (Performance Specification 2)

DESCRIPTION OF INSTALLATION

DESCRIPTION OF SAMPLING LOCATION (CONTINUED)



Sampling Point	Port to Point Distance (in.)
1	74.6
2	66.6
3	54.9
4	23.1
5	11.4
6	3.4

Duct diameters upstream from flow disturbance (A):	>2.0	Limit: 0.5
Duct diameters downstream from flow disturbance (B):	>8.0	Limit: 2.0

Figure 3-3: Auxiliary Boiler Stack Sampling Point Determination (EPA Method 1)

METHODOLOGY

Clean Air Engineering will follow procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1, 2, 3A, 4, 7E, 9, 10, 19 and 25A and Performance Specifications 2, 3 and 4. The following table summarizes the methods and their respective sources.

Table 4-1:
Summary of Sampling Procedures

Title 40 CFR Part 60 Appendix A	
Method 1	"Sample and Velocity Traverses for Stationary Sources"
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"
Method 3A	"Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)"
Method 4	"Determination of Moisture Content in Stack Gases"
Method 7E	"Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)"
Method 9	"Visual Determination of the Opacity of Emissions from Stationary Sources"
Method 10	"Determination of Carbon Monoxide Emissions from Stationary Sources"
Method 19	"Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide, and Nitrogen Oxide Emission Rates"
Method 25A	"Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer"
Title 40 CFR Part 60 Appendix B (Performance Specifications (PS))	
PS2	"Specifications and Test Procedures for SO_2 and NO_x Continuous Emission Monitoring Systems in Stationary Sources"
PS3	"Specifications and Test Procedures for O_2 and CO_2 Continuous Emission Monitoring Systems in Stationary Sources"
PS4	"Specifications and Test Procedures for Carbon Monoxide Continuous Emission Monitoring Systems in Stationary Sources"

These methods appear in detail in Title 40 of the Code of Federal Regulations (CFR) and on the World Wide Web at http://www.cleanair.com.

Diagrams of the sampling apparatus and major specifications of the sampling equipment are summarized for each method in Appendix A.

Clean Air Engineering will follow specific quality assurance and quality control (QA/QC) procedures as outlined in the individual methods and in USEPA "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III Stationary Source-Specific Methods", EPA/600/R-94/038C. Additional QA/QC methods as prescribed in Clean Air's internal Quality Manual will also be followed.

APPENDIX

TEST METHOD SPECIFICATIONS

A

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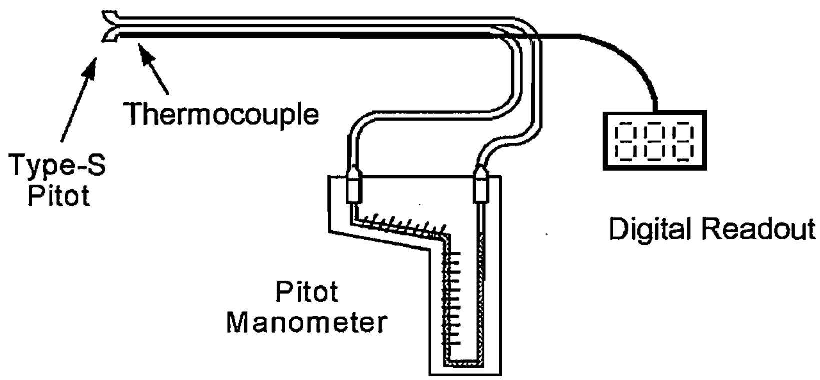
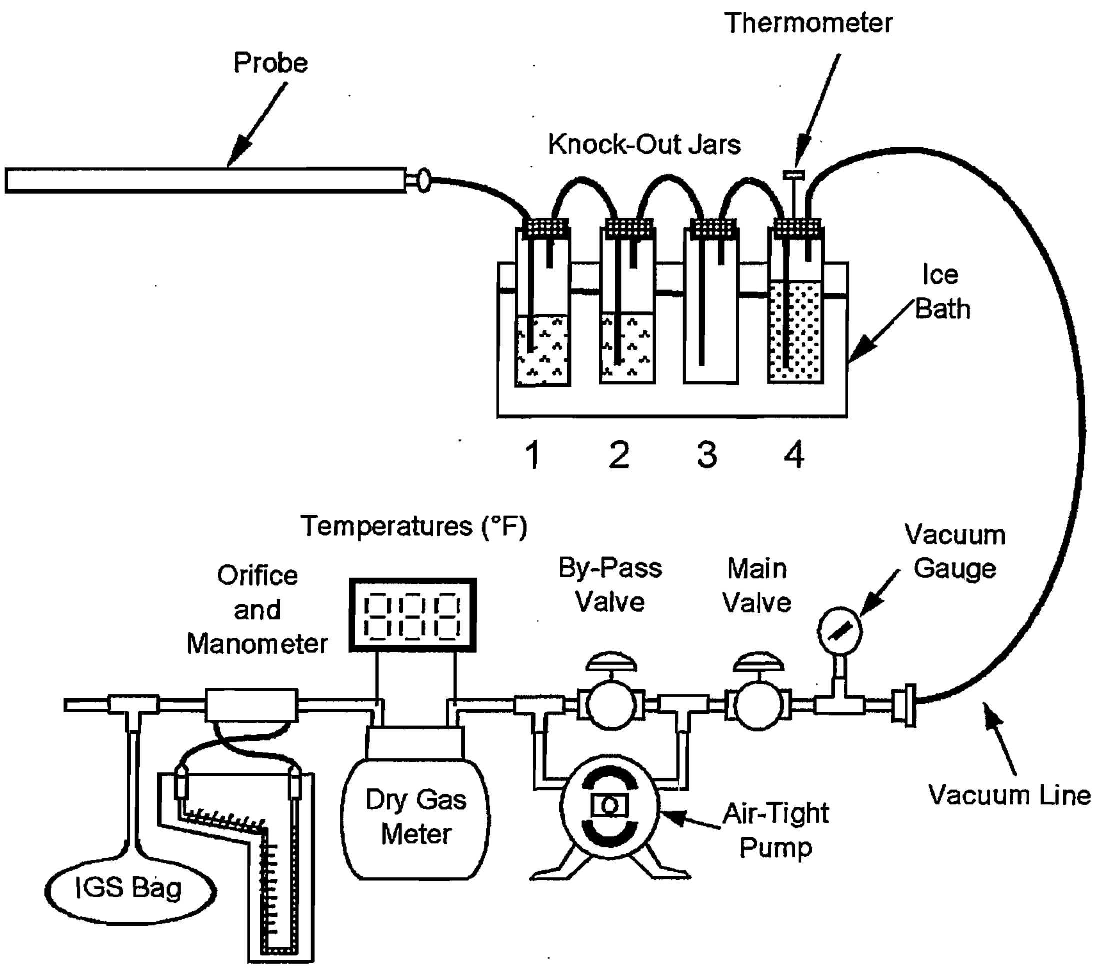
EPA Method 2
Sampling Train Configuration



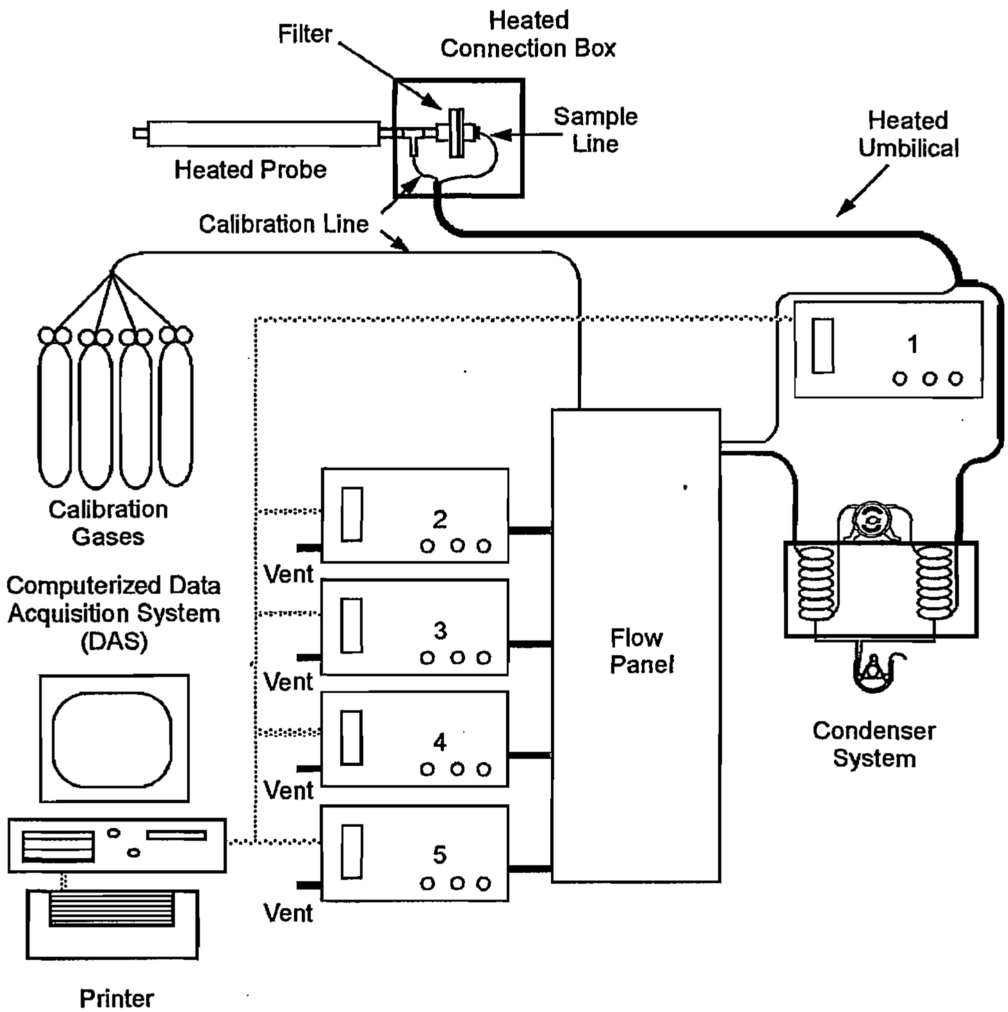
EPA Method 4
Sampling Train Configuration



Knock Out Jar Contents

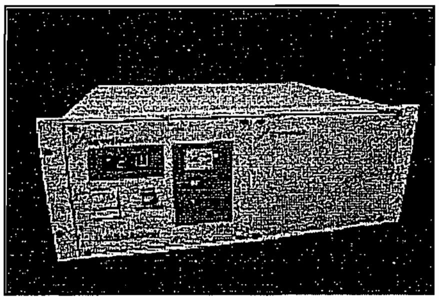
Knock Out Jar 1
Knock Out Jar 2
Knock Out Jar 3
Knock Out Jar 4

EPA Methods 3A, 7E, 10, 25A Sampling Train Configuration



Number	Gas	Monitor	Range Used	Calibration Gas Concentrations (approx.)
1	THC	JUM 3-300	0-100 PPM	30, 60, 90 PPM
2	O2	Servomex 1420C	0-20%	10, 20%
3	CO2	Servomex 1415C	0-20%	10, 20%
4	NOx	42CLS	0-200 PPM	80, 190 PPM
5	CO	48C	0-500 PPM	250, 450 PPM

Servomex 1415C CO2 Analyzer



The 1415C CO2 Analyzer Includes:

- Analyzer
- Power cord
- Signal cable
- Manual
- Calibration sheet
- Instrument Rental Shipping Carton

Specifications:

- Weight: 12 lbs.
- Dimensions: 9" x 5" x 7" (single unit)
- Range: 0-20 & 25% CO_2.
- Accuracy: 1% of selected range
- Linearity: 1% of selected range
- Repeatability: 1% of selected range
- Response time (T_{90}): <10 seconds
- Zero Drift: 2% of full scale/week
- Span Drift: 1% of reading/day
- Warm up time: typically 1 hour
- Electrical output: 0-1V non-isolated (min load 1K) or 4-20mA isolated (max load 600?).
- Display: 3.5 digit green LED display reading.
- Display resolution: 0.1%
- AC Supply: 88-264VAC, 47-63 Hz
- Power required: 45 VA
- Operating ambient temperature: 32°F to 113°F (0°C to 45°C) as standard. 32°F to 104°F (0°C to 40°C) when fitted in bench top case.
- Storage temperature: -4°F to 158°F (-20°C to 70°C)
- Relative humidity: 0-90% non-condensing.

Rental/Application Notes:

1. Effect of ambient temperature: 1% of full scale per 10°C change.
2. Effect of barometric pressure: 0.15% of reading per mbar within specified range.
3. Inlet pressure: 1-10 psig (7-70 kPag)
4. Vent pressure: 11.6 to 15.9 psia (80-110 kPag)
5. Flow rate: 1-6 lpm
6. The Servomex 1420C/1415C can be plumbed together in a 19" rack mount (Model 1440C). The combined weight is 44 lbs. These units are compatible with the older 1400B series.
7. When renting, equipment must be returned in its original packaging.

Clean Air Engineering
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Fax: (847) 934-8260
www.cleanair.com

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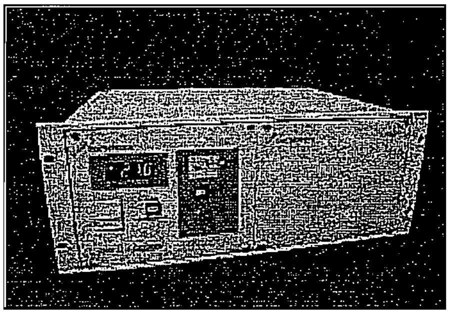
Servomex 1420C Oxygen Analyzer



The 1420C Oxygen Analyzer Includes:

- Analyzer
- Power cord
- Signal cable
- Manual
- Calibration sheet
- Instrument Rental Shipping Container

Specifications:

- Weight: 12 lbs.
- Dimensions: 9" x 5" x 7" (single unit)
- Range: 0-25 & 100% O_2.
- Accuracy: +/- 0.1%
- Linearity: +/- 0.1% O_2
- Repeatability: +/- 0.1% O_2
- Response time (T_{90}): 2.5 seconds at 200 ml/min; 2.0 seconds at 250 ml/min
- Zero Drift: <+/- .002% O_2/hour
- Span Drift: <+/- .002% O_2/hour
- Warm up time: typically 1 hour
- Electrical output: 0-1V non-isolated (min load 1K) or 4-20mA isolated (max load 600?).
- Display: 3.5 digit green LED display reading 0-100% oxygen.
- Display resolution: 0.1%
- AC Supply: 88-264VAC, 47-63 Hz
- Power required: 45 VA
- Operating ambient temperature: 32°F to 113°F (0°C to 45°C) as standard. 32°F to 104°F (0°C to 40°C) when fitted in bench top case.
- Storage temperature: -4°F to 158°F (-20°C to 70°C).
- Relative humidity: 0-90% non-condensing.

Rental/Application Notes:

1. Effect of ambient temperature: <+/- 0.03% O_2/°C zero; <+/- 0.10% O_2/°C span
2. Effect of barometric pressure: The analyzer measures the partial pressure of oxygen in the sample gas. Therefore, any change in sample pressure at the measuring cell will have an effect, which is proportional to the change in absolute pressure from time of calibration. An analyzer for oxygen purity (with pressure compensation) reduces error by a factor of approximately 5.
3. Inlet pressure: 1-10 psig (7-70 kPag)
4. Vent pressure: 11.6 to 15.9 psia (80-110 kPag)
5. Flow rate: 1-6 lpm
6. The Servomex 1420C/1415C can be plumbed together in a 19" rack mount (Model 1440C). The combined weight is 44 lbs. These units are compatible with the older 1400B series.
7. When renting, equipment must be returned in its original packaging.

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INSTRUMENT RENTAL

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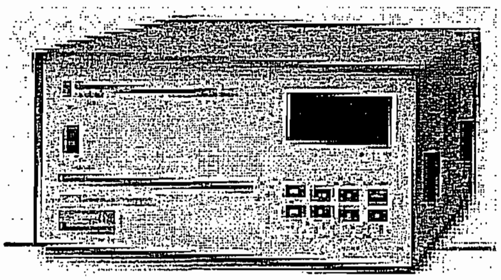
Thermo Model 42CLS NO-NO_2-NO_x Analyzer



Model 42CLS NO-NO_2-NO_x Analyzer Includes:

- Analyzer
- Power Cord
- Signal Cable
- Drierite
- Ozone Scrubber
- Manual
- Shipping Carton

Specifications:

- Approximate Shipping Weight: 75lbs / 2 boxes
- Detection Method: Chemiluminescence
- Preset Ranges: 0-0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50ppm (plus custom ranges between 0-50ppm)
- Extended Ranges: 0.5, 1, 2, 5, 10, 20, 50, 100, 200ppm (plus custom ranges between 0-200ppm)
- Noise: 0.005ppm RMS (1 minute average time)
- Lower Detectable Limit: 0.01ppm (1 minute average time)
- Zero Drift (24 hour): ~0.005ppm
- Span Drift (24 hour): ± 1% full-scale
- Response Time: 40 sec (10 second averaging time)
  (in automatic mode) 80 sec (60 second averaging time)
  300 sec (300 second averaging time)
  Response time: NO_x only mode <5 seconds
- Linearity: ± 1% full scale
- Sample Flow Rate: ~100 cc/min
- Operating Temperature: 15° - 35° C
- Power Requirements: 105-125 VAC, 60HZ; 300 WATTS
- Physical Dimensions: 16.75" (W) x 8.62" (H) x 23" (D)
- Outputs: Selectable voltages and RS-232 standard; 4-20mA
- Stainless Steel NO_2 Converter set between 600°C-675°C

Rental/Application Notes:

1. User programmable software capabilities allow individual measurement range settings to be stored in memory for subsequent recall and NO, NO_2, NO_x hourly average storage for up to one month.
2. Instrument diagnostics can be performed locally and remotely
3. Troubleshooting diagnostics provide instant indication of instrument operating parameters including pressure, flow, DC supply voltages, internal temperature, reaction chamber temperature, PMT operating voltage, and converter temperature.
4. Includes an internal pump and proprietary ammonia scrubber for SCR and SNCR applications.
5. Low NO_x gases are available for rental at ranges below 20ppm.
6. When renting, equipment must be returned in its original packaging.

Clean Air Engineering
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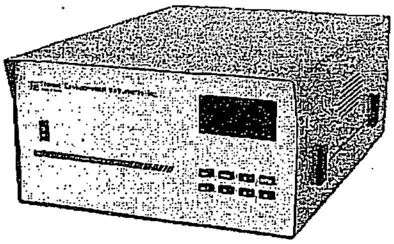
Thermo Model 48C CO Analyzer



Model 48C Analyzer Includes:

- Analyzer
- Power Cord
- Signal Cable
- Manual with Quick Start Guide
- Instrument Rental Shipping Carton

Specifications:

- Approximate Shipping Weight: 50lbs Packaged
- Detection Method: Gas Filter Correlation
- Ranges: 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10,000ppm
- Zero Noise: 0.02 ppm RMS (30 second averaging time)
- Lower Detectable Limit: 0.04 ppm (30 second averaging time)
- Zero Drift (24 hour): <0.1 ppm
- Span Drift (24 hour): ± 1% full-scale
- Response Time: 60 Seconds (30 Second averaging time)
- Precision: 1% of reading or 0.05 ppm
- Linearity: ± 1% full scale up to 1000 ppm, ±3% full scale for higher ranges
- Sample Flow Rate: 1 liters/minute
- Operating Temperature: 20° - 30° C (may be safely operated over the range of 5° - 45°C)
- Power Requirements: 105-125 VAC, 60HZ; 100 WATTS
- Physical Dimensions: 16.75" (W) x 8.62" (H) x 23" (D)
- Outputs: Selectable voltages and RS-232 standard

Rental/Application Notes:

1. Designed for EPA Designated Method RFCA-0981-054
2. Can be remotely controlled with bi-directional RS-232 Communication Port
3. Analog data outputs with selectable voltages
4. Analog status outputs (optional)
5. Instrument diagnostics can be performed locally and remotely
6. High and Low CO and Zero Air are available from Clean Air Instrument Rental.
7. When renting, equipment must be returned in its original packaging.

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500 W. Wood Street
Palatine, IL 60067
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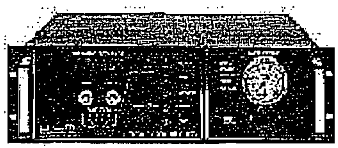
J.U.M. Model 3-300A THC Analyzer



J.U.M. Model 3-300A Includes:

- Analyzer
- Power Cord
- Signal Cable
- Manual with QuickStart Guide
- Instrument Rental Shipping Carton

Specifications:

- Approximate Shipping Weight, 50 lbs.
- Detection Method: Flame Ionization Detector (FID)
- Voltage Requirement: 115 VAC/60Hz, 850 watts
- Fuel Requirement: 100% Hydrogen, Zero Grade (Normal), 60/40 FID Fuel (on request)
- Fuel Consumption: Hydrogen: ~20 cc/min. at 22 PSIG (1.5 bar), 40%H_2/60%He: ~90 cc/min at 22 PSIG
- Air Consumption: None; Integral Air Generator
- Outputs Available: 0-10V, 4-20mA
- Sensitivity: Max: 1ppm CH_4
- Response Time: 0.2 seconds
- T_{90} time: 1.2 seconds
- Zero Drift: <1% of full scale per 24 hours
- Span Drift: <1% of full scale per 24 hours
- Linearity: Within 1%
- Oxygen Synergism: Less than 1.2% of selected range
- Ranges: 0-10 up to 0-100,000 ppm
- Display: 3.5" digital
- Zero/Span Adjust: Manual on front panel
- Zero/Span Gas: 3 PSIG (200 m Bar)
- Sample Pump: All stainless steel, heated, 2.5 liters per minute at operating temperature.
- Sample Pressure: By integral pump 3 PSIG (200 m Bar)
- Sample Filter: Permanent all stainless steel, 2 micron back-purged for cleaning
- Oven Temperature: 374° F (190° C)
- Ambient Temperature: 41° F to 110° F
- Dimensions: Width=19", Depth=18-1/8", Height=5-1/5"

Rental/Application Notes:

1. Designed for EPA Method 25A Testing
2. Direct reading in parts per million (ppm) - sensitive down to one ppm (as Methane)
3. Our in-house calibration is done using propane (C3) balanced in nitrogen unless requested otherwise. Methane is available. Specify air or nitrogen background also & fuel type.
4. Response factors can be generated for other compounds upon request. (Additional set-up fees will apply.)
5. When renting, equipment must be returned in its original packaging.

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RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET,TROY,MI 48083 Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No.: 52829-71-65000
Project No.: 05-12027-012

Customer

CLEAN AIR ENGINEERING
DON ALLEN
500 W. WOOD STREET
PALATINE IL 60067

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; *Procedure G-1; September, 1997.*

Cylinder Number: ALM049176 **Certification Date:** 04Nov2003 **Exp. Date:** 03Nov2006

Cylinder Pressure*:** 1900 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
CARBON DIOXIDE	10.10 %	+/- 1%	Direct NIST and NMi
OXYGEN	10.94 %	+/- 1%	Direct NIST and NMi
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997. Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2300	01Jan2004	ALM047640	23.34 %	CARBON DIOXIDE
NTRM 2350	01Feb2004	A1377	23.51 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
VARIAN/3400/10693	21Oct2003	THERMAL CONDUCTIVITY
ROSEMOUNT/755R/1000430	17Oct2003	PARAMAGNETIC

ANALYZER READINGS

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

First Triad Analysis — Second Triad Analysis — Calibration Curve

CARBON DIOXIDE

First Triad Analysis		
Date: 04Nov2003	Response Unit:AREA	
Z1=0.00000	R1=1207650.	T1=524268.0
R2=1207634.	Z2=0.00000	T2=524411.0
Z3=0.00000	T3=524168.0	R3=1207661.
Avg. Concentration:	10.10	%

Calibration Curve	
Concentration=A+Bx+Cx2+Dx3+Ex4	
r=.999998	
Constants:	A=-0.0248831
B=1.94E-5	C=0
D=0	E=0

OXYGEN

First Triad Analysis		
Date: 04Nov2003	Response Unit:%	
Z1=0.00000	R1=23.63000	T1=10.99000
R2=23.63000	Z2=0.00000	T2=10.99000
Z3=0.00000	T3=10.99000	R3=23.63000
Avg. Concentration:	10.94	%

Calibration Curve	
Concentration=A+Bx+Cx2+Dx3+Ex4	
r=.999999	
Constants:	A=0.0075780
B=1.0	C=0.0
D=0.0	E=0.0

APPROVED BY:

COMPLIANCE CLASS

Dual-Analyzed Calibration Standard

Scott Specialty Gases

1290 COMBERMERE STREET,TROY,MI 48083 Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

P.O. No.: 54534-71-65800

05-37386-002

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

Customer

CLEAN AIR INSTRUMENT RENTAL
GARY ZAPEL
500 WEST WOOD STREET
PALATINE IL 60067

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: AAL12560 Certification Date: 22Nov2005 Exp. Date: 22Nov2007

Cylinder Pressure***: 1750 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
NITROGEN DIOXIDE	78.6	PPM	+/- 2%	NIST and NMi
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol procedures , September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2654	04Jul2008	ALM058105	528.0 PPM	NITROGEN DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
BECKMAN/951/010177	22Nov2005	CHEMILUMINESCENCE

APPROVED BY: [signature]

Page 1 of 1

Airgas

Certificate of Analysis: EPA Protocol Gas Mixture

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
773.785.3000 Fax 773.785.1928
www.airgas.com

Cylinder Number:	CC105028	Reference Number:	54-124021430-7
Cylinder Pressure:	1998.6 PSIG	Expiration Date:	9/7/2007
Certification Date:	9/7/2004	Laboratory:	ASG - Chicago - IL

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
CARBON MONOXIDE	183.200 PPM	+/- 1%	NDIR	G1
NITROGEN	Balance			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed.
Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig.

Approval Signature

Reference Standard Information

Type	Component	Cyl.Number	Concentration
NTRM 980506	CARBON MONOXIDE	SG9159474BAL	244.7 PPM

Analytical Results

1st Component CARBON MONOXIDE

1st Analysis Date: 08/31/2004

R 244.7	S 183.3	Z 0	Conc 183.3 PPM
S 182.9	Z 0	R 244.7	Conc 182.9 PPM
Z 0	R 244.7	S 183.4	Conc 183.4 PPM
			AVG: 183.2 PPM

2nd Analysis Date: 09/07/2004

R 244.7	S 183.3	Z 0	Conc 183.3 PPM
S 182.9	Z 0	R 244.7	Conc 182.9 PPM
Z 0	R 244.7	S 183.4	Conc 183.4 PPM
			AVG: 183.2 PPM

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SAMPLE CALCULATIONS

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CEM Field Sample Calculations

Sample data taken from Run 1
and Channel 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

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1. Average of a calibration series

$$C_{mce} = \frac{(C_1 + C_2 + C_3)}{3}$$

Where:

C_1, C_2, C_3	= concentrations of 3 consecutive gas samples that are representative of the calibration gas			
C_{mce}	= average concentration of a calibration series In this case the low cal series for channel 1	=		ppmdv

2. Calibration Error Check for non-Hydrocarbons (2% of Instrument Span)

$$E = abs\left|\frac{C_{mce} - C_{ma}}{Span}\right| \leq l_{cal}$$

Where:

C_{mce}	= average concentration of a calibration series In this case the low cal series for channel 1	=		ppmdv
C_{ma}	= concentration of actual calibration gas value	=		ppmdv
Span	= instrument span value	=		
l_{cal}	= limit for calibration error for non-hydrocarbons	=	2.0%	
E	= calibration error check value	=		**Pass**

3. System Bias as Percent of Span Value (5% is allowed)

$$E_{Bias} = abs\left|\frac{C_{mf} - C_{mce}}{Span}\right| \leq l_{bias}$$

Where:

C_{mce}	= average concentration of a calibration series in this case the Low cal series for channel 1	=		ppmdv
C_{mf}	= calibration error response concentration for Cal02	=		ppmdv
Span	= instrument span value	=		ppmdv
l_{bias}	= limit for system bias error	=	5.0%	
E_{bias}	= calibration bias error check value	=		**Pass**

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4. System Drift as Percent of Span Value (3%)

$$E_{Drift} = abs\left|\frac{C_{mf} - C_{mi}}{Span}\right| \leq l_{drift}$$

Where:

C_{mf}	= calibration error response concentration for Cal02 (final)	=		ppmdv
C_{mi}	= calibration error response concentration for Cal01 (initial)	=		ppmdv
Span	= instrument span value	=		ppmdv
l_{drift}	= limit for system drift error	=	3.0%	
E_{drift}	= calibration drift error check value	=		**Pass**

5. Average Concentration for an entire Run

$$C = \frac{\sum_{i=1}^{N} C_i}{N}$$

Where: i=1

C_i	= All concentration readings for the entirety of Run 1 for the monitor looking for NOX on channel 1	=		ppmdv
N	= total number of readings in Run 1	=	60	
C	= average NOX concentration for Run 1	=		ppmdv

6. Drift-Corrected Average Concentration for an entire Run

$$C_{DC} = \left(C - \frac{C_{oi} + C_{of}}{2}\right)\left(\frac{C_{ma}}{\frac{C_{mi} + C_{mf}}{2} - \frac{C_{oi} + C_{of}}{2}}\right)$$

C_{ma}	= concentration of actual calibration gas value	=		ppmdv
C	= average NOX concentration for Run 1	=		ppmdv
C_{mf}	= calibration error response concentration for Cal01 (final)	=		ppmdv
C_{mi}	= calibration error response concentration for Cal00 (initial)	=		ppmdv
C_{of}	= calibration error response concentration for Cal01 (final) for zero gas	=		ppmdv
C_{oi}	= calibration error response concentration for Cal00 (initial) for zero gas	=		ppmdv
C_{DC}	= drift corrected average concentration for Run 1	=		ppmdv

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CEM Emissions Sample Calculations

Sample data taken from Run 1
and Channel 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

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1. NOx concentration (ppmdv)

$$C(ppmdv) = k_1 \times C_{DC} \quad if \quad dry \quad gas$$

$$C(ppmdv) = \frac{k_1 \times C_{DC}}{\left(1 - \frac{B_W}{100}\right)} \quad if \quad wet \quad gas$$

Where:

C_{DC}	= drift corrected average concentration	=		ppmdv
B_w	= actual water vapor in gas (% v/v)	=		% v/v
100	= conversion factor to change percentage to decimal	=	100	
k_1	= ppm/% to ppm conversion factor for diluent gases	=	1	
C (ppmdv)	= NOx concentration (ppmdv)	=		ppmdv

2. NOx concentration (ppmwv)

$$C(ppmwv) = k_1 \times C_{DC} \quad if \quad wet \quad gas$$

$$C(ppmwv) = k_1 \times C_{DC} \times \left(1 - \frac{B_W}{100}\right) \quad if \quad dry \quad gas$$

Where:

C_{DC}	= drift corrected average concentration	=		ppmdv
B_w	= actual water vapor in gas (% v/v)	=		% v/v
100	= conversion factor to change percentage to decimal	=	100	
k_1	= ppm/% to ppm conversion factor for diluent gases	=	1	
C (ppmwv)	= NOx concentration (ppmwv)	=		ppmwv

3. NOx concentration (lb/dscf)

$$C(lb/dscf) = \frac{C(ppmdv) \times MW(gas)}{10^6\, ppm \times 385.3}$$

Where:

C (ppmdv)	= NOx concentration (ppmdv)	=		ppmdv
MW	= Molecular Weight of NOx gas	=	46.0055	lb/lb-mole
10^6	= conversion factor from decimal to ppm	=	1.00E+06	
385.3	= molar volume	=	385.3	dscf/lb-mole
C (lb/dscf)	= NOx concentration (lb/dscf)	=		lb/dscf

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4. NOx concentration (lb/scf)

$$C\left(lb/scf\right) = C\left(lb/dscf\right) \times \frac{Q_{std}}{Q_s}$$

Where:

C (lb/dscf)	= NOx concentration (lb/dscf)	=		lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=		dscf/min
Q_s	= volumetric flow rate (standard cubic feet/min)	=		scf/min
C (lb/scf)	= NOx concentration (lb/scf)	=		lb/scf

5. NOx concentration (lb/acf)

$$C\left(lb/acf\right) = C\left(lb/dscf\right) \times \frac{Q_{std}}{Q_a}$$

Where:

C (lb/dscf)	= NOx concentration (lb/dscf)	=		lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=		dscf/min
Q_a	= volumetric flow rate (actual cubic feet/min)	=		acf/min
C (lb/acf)	= NOx concentration (lb/acf)	=		lb/acf

6. NOx concentration (%dv)

$$C\left(\%dv\right) = C\left(ppmdv\right) \times \frac{100}{10^6}$$

Where:

C (ppmdv)	= NOx concentration (ppmdv)	=		ppmdv
100	= conversion factor from decimal to percentage	=	1.00E+02	
10^6	= conversion factor from decimal to ppm	=	1.00E+06	
C (%dv)	= NOx concentration (%dv)	=		%dv

7. NOx concentration (mg/dscm)

$$C\left(mg/dscm\right) = C\left(lb/dscf\right) \times k_2 \times 35.31$$

Where:

C (lb/dscf)	= NOx concentration (lb/dscf)	=		lb/dscf
k_2	= conversion factor from lb to mg	=	453515	mg/lb
35.31	= conversion factor from dscf to dscm	=	35.31	ft^3/m^3
C (mg/dscm)	= NOx concentration (mg/dscm)	=		mg/dscm

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8. NOx concentration (mg/Nm3 dry)

$$C \quad (mg/Nm^3\ dry) = C(lb/dscf) \times k_2 \times 35.31 \times \left(\frac{68+460}{32+460}\right)$$

Where:

C (lb/dscf)	= NOx concentration (lb/dscf)	=		lb/dscf
k_2	= conversion factor from lb to mg	=	453515	mg/lb
35.31	= conversion factor from dscf to dscm	=	35.31	ft^3/m^3
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	
C (mg/Nm3 dry)	= NOx concentration (mg/Nm3 dry)	=		mg/Nm^3 dry

9. NOx concentration corrected to 7% O2 (ppmdv example)

$$C(ppmdv@x\%02) = C(ppmdv) \times \left(\frac{20.9 - x}{20.9 - O_2}\right)$$

Where:

C (ppmdv)	= NOx concentration (ppmdv)	=		ppmdv
x	= oxygen content of corrected gas (%)	=	7.00	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=		%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C (ppmdv - O2)	= NOx concentration corrected to 7% O2 (ppmdv example)	=		ppmdv @ 7%O2

10. NOx concentration corrected to 12% CO2 (ppmdv example)

$$C(ppmdv @ y\%C0_2) = C(ppmdv) \times \left(\frac{y}{CO_2}\right)$$

Where:

C (ppmdv)	= NOx concentration (ppmdv)	=		ppmdv
y	= carbon dioxide content of corrected gas (%)	=	12.00	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=		%
C (ppmdv -CO2)	= NOx concentration corrected to 12% CO2 (ppmdv example)	=		ppmdv @ 12%CO2

11. NOx emission rate (lb/hr)

$$E_{lb/hr} = C(lb / dscf) \times Q_{std} \times 60$$

Where:

C (lb/dscf)	= NOx concentration (lb/dscf)	=		lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=		dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= NOx emission rate (lb/hr)	=		lb/hr

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12. NOx emission rate (kg/hr)

$$E_{kg/hr} = C(lb/dscf) \times Q_{std} \times 60 \times 0.454$$

Where:

C (lb/dscf)	= NOx concentration (lb/dscf)	=		lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=		dscfm
60	= conversion factor (min/hr)	=	60	min/hr
0.454	= conversion factor (kg/lb)	=	0.454	kg/lb
$E_{kg/hr}$	= NOx emission rate (kg/hr)	=		kg/hr

13. NOx emission rate (gm/sec)

$$E_{gm/sec} = C(lb/dscf) \times Q_{std} \times \frac{454}{60}$$

Where:

C (lb/dscf)	= NOx concentration (lb/dscf)	=		lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=		dscfm
60	= conversion factor (sec/min)	=	60	sec/min
454	= conversion factor (g/lb)	=	453.515	kg/lb
$E_{gm/sec}$	= NOx emission rate (gm/sec)	=		gm/sec

14. NOx emission rate (Ton/yr)

$$E_{T/yr} = C(lb/dscf) \times Q_{std} \times 60 \times \left(\frac{Cap}{2000}\right)$$

Where:

C (lb/dscf)	= NOx concentration (lb/dscf)	=		lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=		dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Cap	= capacity factor for process (hours operated/year)	=		hours/yr
2000	= conversion factor (lb/Ton)	=	2,000	lb/Ton
$E_{T/yr}$	= NOx emission rate (Ton/yr)	=	N/A	Ton/yr

15. NOx Fd-based emission rate (lb/MMBtu)

$$E_{Fd} = C(lb/dscf) \times F_d \times \left(\frac{20.9}{20.9 - O_2}\right)$$

Where:

C (lb/dscf)	= NOx concentration (lb/dscf)	=		lb/dscf
F_d	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=		dscf/MMBtu
O_2	= proportion of oxygen in the gas stream by volume (%)	=		%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= NOx Fd-based emission rate (lb/MMBtu)	=		lb/MMBtu

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16. NOx Fc-based emission rate (lb/MMBtu)

$$E_{Fc} = C\left(lb / dscf\right) \times F_c \times \left(\frac{100}{CO_2}\right)$$

Where:

C (lb/dscf)	= NOx concentration (lb/dscf)	=		lb/dscf
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=		dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=		%
100	= conversion factor	=	100	
E_{Fc}	= NOx Fc-based emission rate (lb/MMBtu)	=		lb/MMBtu

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CEM RATA Sample Calculations
for NOx Stack

Sample data taken from	Run 1
and	Channel 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

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1. NOx value difference between Plant CEM Data and CleanAir RM Data (lb/MBtu)

$$D = C_R - C_P$$

Where:

C_P	= NOx value from Plant CEM Data	=	lb/MBtu
C_R	= NOx value from CleanAir RM Data	=	lb/MBtu
D	= NOx value difference between 2 methods	=	lb/MBtu

2. Percent Value Difference (%)

$$D_{\%} = \frac{D}{C_R}$$

Where:

C_R	= NOx value from CleanAir RM Data	=	lb/MBtu
D	= NOx value difference between 2 methods	=	lb/MBtu
$D_{\%}$	= NOx value difference as a percentage of RM Data	=	

3. Average NOx Value (Plant CEM Data example) (lb/MBtu)

$$C_{p,avg} = \frac{\sum_{i=1}^{N} C_{p,i}}{N}$$

Where: i=1

$C_{p,i}$	= NOx value from Plant CEM Data for ith run	=	lb/MBtu
N	= total number of runs included in the CEM data	=	
$C_{p,avg}$	= Average NOx value from Plant CEM Data	=	lb/MBtu

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4. Standard Deviation of Plant CEM data and CleanAir RM data

$$STDEV = \sqrt{\frac{\sum_{i=1}^{N}\left(C_{R,i} - C_{p,i}\right)^2 - \frac{\left(\sum_{i=1}^{N}\left(C_{R,i} - C_{p,i}\right)\right)^2}{N}}{N-1}}$$

Where:

$C_{R,i}$	= NOx value from CleanAir RM Data for ith run	=	lb/MBtu
$C_{p,i}$	= NOx value from Plant CEM Data for ith run	=	lb/MBtu
N	= total Number of RATA Runs	=	
STDEV	= standard deviation of plant CEM data and CleanAir RM data	=	lb/MBtu

5. Confidence Coefficient

$$CC = STDEV \times \frac{t}{\sqrt{N}}$$

Where:

STDEV	= standard deviation of plant CEM data and CleanAir RM data	=	lb/MBtu
t	= confidence factor	=	
N	= total Number of RATA Runs	=	
CC	= confidence coefficient	=	lb/MBtu

6. Relative Accuracy (as a percentage of the reference method)

$$RA = \frac{abs\left|\frac{\sum_{i=1}^{N}(C_{R,i} - C_{p,i})}{N}\right| + abs\left|CC\right|}{\frac{\sum_{i=1}^{N} C_{R,i}}{N}}$$

Where:

$C_{R,i}$	= NOx value from CleanAir RM Data for ith run	=	lb/MBtu
$C_{p,i}$	= NOx value from Plant CEM Data for ith run	=	lb/MBtu
N	= total Number of RATA Runs	=	
CC	= confidence coefficient	=	lb/MBtu
RA	= relative accuracy (as a percentage of the reference method)	=	
	Limit	=	

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