AIR HYGIENE, INC.

*Testing Solutions for a Better World*


# EMISSION COMPLIANCE TEST
# FOR THE
# MITSUBISHI, MODEL 501G, UNIT 1C
# PREPARED FOR
# FLORIDA POWER AND LIGHT
# AT THE
# WEST COUNTY ENERGY CENTER
# LOXAHATCHEE, FLORIDA
# OCTOBER 5-6, 2009

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**Emissions Compliance Test**
**Mitsubishi, Model 501G, Unit 1C**
**Florida Power and Light**
**West County Energy Center**
**Loxahatchee, Florida**
**October 5-6, 2009**

## 1.0 INTRODUCTION

Air Hygiene International, Inc. (Air Hygiene) has completed the emissions testing study for nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOC), ammonia ($NH_3$), opacity, carbon dioxide ($CO_2$), and oxygen ($O_2$) from the exhaust of the Mitsubishi, Model 501G, Unit 1C for Florida Power and Light at the West County Energy Center near Loxahatchee, Florida. This report details the background, results, process description, and the sampling/analysis methodology of the stack sampling survey conducted on October 5-6, 2009.

## 1.1 TEST PURPOSE AND OBJECTIVES

The purpose of the test was to conduct an initial compliance emission test to document levels of selected pollutants at two test loads (Base Load and Base Load with Duct Burners). The information will be used to confirm compliance with the operating permit issued by the Florida Department of Environmental Protection (FDEP). The specific objective was to determine the emission concentration of NOx, CO, VOC, $NH_3$, opacity, $CO_2$, and $O_2$ from the exhaust of Florida Power and Light's Mitsubishi, Model 501G, Unit 1C at Base Load and Base Load with Duct Burners of total capacity.

## 1.2 SUMMARY OF TEST PROGRAM

The following list details pertinent information related to this specific project:

1.2.1 Participating Organizations
- Florida Department of Environmental Protection (FDEP)
- Florida Power and Light
- Black and Veatch
- Air Hygiene

1.2.2 Industry
- Electric Utility / Electric Services

1.2.3 Air Permit and Federal Requirements
- Permit Number: PSD-FL-354
- Emission Unit Identification (ID): 003

1.2.4 Plant Location
- West County Energy Center near Loxahatchee, Florida

1.2.5 Equipment Tested
- Mitsubishi, Model 501G, Unit 1C

1.2.6 Emission Points

- Exhaust from the Mitsubishi, Model 501G, Unit 1C
- For all gases, one sample point in the exhaust duct from the Mitsubishi, Model 501G, Unit 1C, determined after conducting a stratification test (refer to Appendix F)
- For all $NH_3$ testing, 24 sampling points in the exhaust duct from the Mitsubishi, Model 501G, Unit 1C (refer to Appendix A)
- For opacity, one sample visual observation point from the exit of the exhaust duct to the atmosphere from the Mitsubishi, Model 501G, Unit 1C

1.2.7 Pollutants Measured

- NOx
- CO
- VOC
- $NH_3$
- Opacity
- $CO_2$
- $O_2$

1.2.8 Dates of Emission Test

- October 5-6, 2009

## 1.3 KEY PERSONNEL

| | | |
|---|---|---|
| Florida Power and Light: | John Mirino | 305-242-3895 |
| Florida Power and Light: | David Fawcett | 561-904-4907 |
| Florida Power and Light: | Emmett Callow | 561-904-4922 |
| Black and Veatch: | Bill Stevenson | 913-458-8549 |
| FDEP: | Michael Helmke | 561-837-5936 |
| Air Hygiene: | Jake Fahlenkamp | 918-307-8865 |
| Air Hygiene: | Tim Page | 918-307-8865 |

## 2.0 SUMMARY OF TEST RESULTS

Results from the sampling conducted on Florida Power and Light's Mitsubishi, Model 501G, Unit 1C located at the West County Energy Center on October 5-6, 2009 are summarized in the following table.

**TABLE 2.1**
**SUMMARY OF MITSUBISHI, 501G, UNIT #1C RESULTS**

| Parameter | Base W/O DB Load | Permit Limits | Base W/DB Load | Permit Limits |
|---|---|---|---|---|
| Run Duration (min / run) | 60 | – | 60 | – |
| Bar. Pressure (in. Hg) | 29.89 | – | 29.84 | – |
| Amb. Temp. (°F) | 95 | – | 89 | – |
| Rel. Humidity (%) | 53 | – | 71 | – |
| Spec. Humidity (lb water / lb air) | 0.019015 | – | 0.020639 | – |
| Avg. Stack Temp. (°F) | 185 | – | 176 | – |
| Turbine Fuel Flow (lb/min) | 1,783 | – | 1,625 | – |
| Duct Burner Fuel Flow (lb/min) | 0 | – | 196 | – |
| Total Fuel Flow (SCFH) | 2,475,658 | – | 2,529,121 | – |
| Stack Flow (RM19) (SCFH) | 56,321,485 | – | 50,919,043 | – |
| Stack Moisture (% Method 4) | 10.0 | – | 11.3 | – |
| Power Output (megawatts) | 241.3 | – | 248.1 | – |
| NOx (ppmvd) | 2.42 | – | 2.67 | – |
| NOx (ppm@15%$O_2$) | 1.81 | 2.00 | 1.77 | 2.00 |
| NOx (ppm@15%$O_2$&ISO) | 2.07 | – | 2.14 | – |
| NOx (lb/hr) | 16.30 | 20.00 | 16.22 | 24.20 |
| NOx (ton/year) at 8760 hr/year | 71.39 | – | 71.03 | – |
| NOx (lb/MMBtu) | 0.007 | – | 0.006 | – |
| CO (ppmvd) | 0.33 | – | 4.11 | – |
| CO (ppm@15%$O_2$) | 0.25 | 4.10 | 2.73 | 7.60 |
| CO (ppm@15%$O_2$&ISO) | 0.28 | – | 3.26 | – |
| CO (lb/hr) | 1.35 | 23.20 | 15.18 | 52.50 |
| CO (ton/year) at 8760 hr/year | 5.92 | – | 66.48 | – |
| CO (lb/MMBtu) | 0.001 | – | 0.006 | – |
| VOC (ppmvd) | 0.60 | – | 1.60 | – |
| VOC (ppm@15%$O_2$) | 0.45 | 1.20 | 1.06 | 1.50 |
| VOC (ppm@15%$O_2$&ISO) | 0.51 | – | 1.28 | – |
| VOC (lb/hr) | 1.40 | 4.10 | 3.39 | 5.40 |
| VOC (ton/year) at 8760 hr/year | 6.14 | – | 14.83 | – |
| VOC (lb/MMBtu) | 0.001 | – | 0.001 | – |
| Sulfur (gr S/100 scf) | <0.032 | 2.0000 | <0.032 | 2.0000 |
| $NH_3$ (ppmvd) | 1.93 | – | 1.87 | – |
| $NH_3$ (ppm@15%$O_2$) | 1.44 | 5.00 | 1.25 | 5.00 |
| $NH_3$ (lb/hr) | 4.80 | – | 4.22 | – |
| Opacity (%) | 0 | 10 | 0 | 10 |
| $CO_2$ (%) | 4.68 | – | 5.17 | – |
| $O_2$ (%) | 12.99 | – | 12.03 | – |

The results of all measured pollutant emissions were below the required limits. All testing was performed without any real or apparent errors. All testing was conducted according to the approved testing protocol. Total hydrocarbons (THC) were report as VOC. Fuel Analysis, for C1-C6 and fuel sulfur content, was taken on October 5 and 6, 2009. The sample taken on October 6, 2009 contained insufficient sample for a fuel sulfur content analysis. The fuel sulfur content analyses for both October 5 and 6, 2009 were obtained from the October 5, 2009 sample (Appendix E).

## 3.0 SOURCE OPERATION

## 3.1 PROCESS DESCRIPTION

Florida Power and Light (FPL) owns and operates the West County Energy Center (West County) located at 20505 State Road 80 in Loxahatchee, Florida. West County is a nominal 2,500 megawatt (MW) greenfield power plant and consists of two combined cycle units (Unit 1 and 2). Each combined cycle unit consists of: three nominal 250 MW Mitsubishi Model 501G combustion turbine-electrical generator (CTGs) sets with evaporative inlet cooling systems; three supplementary-fired heat recovery steam generators (HRSGs) with selective catalytic reduction (SCR) reactors; one nominal 428 million British thermal units per hour (MMBtu/hour) based on low heat value (LHV) natural gas-fired duct burner (DB) located within each of the three HRSG's; and a common nominal 500 MW steam turbine-electrical generator (STG). The total nominal generating capacity of each of the "3 on 1" combined cycle units is approximately 1,250 MW.

Each CTG has a nominal heat input rate of 2,333 MMBtu/hr when firing natural gas and 2,117 MMBtu/hr when firing distillate fuel oil (based on a compressor inlet air temperature of 59 degrees Fahrenheit (°F), the lower heating value (LHV) of each fuel, and 100 percent load), includes an automated gas turbine control system, and has dual-fuel capability of firing natural gas as the primary fuel or ultra low sulfur distillate (ULSD) fuel oil as a restricted alternate fuel. Each HRSG recovers exhaust, heat energy from each of the CTGs. Each Unit delivers steam to each STG. The efficient combustion of natural gas and restricted firing of ULSD fuel oil minimizes the emissions of carbon monoxide (CO), particulate matter (PM), sulfuric acid mist ($H_2SO_4$), sulfur dioxide ($SO_2$) and volatile organic compounds (VOCs). Dry Low-NOx (DLN) combustors for gas firing and water injection for oil firing reduce nitrogen oxides (NOx) emissions. A selective catalyst reduction (SCR) system further reduces NOx emissions.

## 3.2 SAMPLING LOCATION

The 501G stack is circular and measures 21.95 feet (ft) (263.38 inches) in diameter at the test ports which are approximately 138 ft above grade level with an exit elevation of approximately 150 ft above grade level. The test ports are located approximately 44.31 ft (531.75 inches) downstream and approximately 12 ft (144 inches) upstream from the nearest disturbances. All exhaust samples for gaseous emissions were continuously drawn from the exhaust system at the sample ports from a single point determined after conducting a stratification test (Appendix F). During the stratification test three points were traversed from each of the four ports. The probe was allowed to remain at a point for two times the system response time. For $NH_3$ testing, an initial velocity traverse was performed across the stack at base load from 24 total points. All $NH_3$ sampling occurred from the same 24 points by leaving the probe at each for an equal amount of time. All opacity observations were made by viewing the point where the exhaust system exited to the atmosphere at the top of the exhaust stack.

# 4.0 SAMPLING AND ANALYTICAL PROCEDURES

## 4.1 TEST METHODS

The emission test on the Mitsubishi, Model 501G, Unit 1C at the West County Energy Center was performed following United States Environmental Protection Agency (EPA) methods described by the Code of Federal Regulations (CFR). Table 4.1 outlines the specific methods performed on October 5-6, 2009.

**TABLE 4.1**
**SUMMARY OF SAMPLING METHODS**

| Pollutant or Parameter | Sampling Method | Analysis Method |
|---|---|---|
| Sample Point Location | EPA Method 1 | Equal Area Method |
| Stack Flow Rate | EPA Method 2 | Pitot |
| Oxygen | EPA Method 3a | Paramagnetic Cell |
| Carbon Dioxide | EPA Method 3a | Nondispersive Infrared Analyzer |
| Nitrogen Oxides | EPA Method 7e | Chemiluminescent Analyzer |
| Opacity | EPA Method 9 | Visual Observation |
| Carbon Monoxide | EPA Method 10 | Nondispersive Infrared Analyzer |
| Stack Flow Rate | EPA Method 19 | Dry Oxygen F Factor |
| Total Hydrocarbons | EPA Method 25a | Flame Ionization Detector |
| Ammonia Slip | EPA CTM-027 | Ion Chromatography M350.3 |
| Sulfur Content Analysis | ASTM D 6667 | Fuel Gas Sample and Laboratory Analysis |

## 4.2 INSTRUMENT CONFIGURATION AND OPERATIONS FOR GAS ANALYSIS

The sampling and analysis procedures used during these tests conform with the methods outlined in the Code of Federal Regulations (CFR), Title 40, Part 60, Appendix A, Methods 1, 2, 3a, 7e, 9, 10, 19, 25a, and Conditional Test Method (CTM)-027.

Figure 4.1 depicts the sample system used for the NOx, CO, THC, $CO_2$, and $O_2$ tests. A stainless steel probe was inserted into the sample ports of the stack to extract gas measurements from the emission stream at a single point in the stack determined after passing an initial stratification test. The gas sample was continuously pulled through the probe and transported, via heat-traced Teflon® tubing, to a stainless steel minimum-contact condenser designed to dry the sample. Transportation of the sample, through Teflon® tubing, continued into the sample manifold within the mobile laboratory via a stainless steel/Teflon® diaphragm pump. From the manifold, the sample was partitioned to the NOx, CO, $CO_2$, and $O_2$ analyzers through rotameters that controlled the flow rate of the sample. Exhaust samples were routed to the THC analyzer prior to gas conditioning.

Figure 4.1 shows that the sample system was also equipped with a separate path through which a calibration gas could be delivered to the probe and back through the entire sampling system. This allowed for convenient performance of system bias checks as required by the testing methods.

All instruments were housed in an air-conditioned, trailer-mounted mobile laboratory. Gaseous calibration standards were provided in aluminum cylinders with the concentrations certified by the vendor. EPA Protocol No. 1 was used to determine the cylinder concentrations where applicable (i.e. NOx calibration gases).

Table 4.2 provides a description of the analyzers used for the instrument portion of the tests. All data from the continuous monitoring instruments were recorded on a Logic Beach Portable Data Logging System Hyperlogger which retrieves calibrated electronic data from each instrument every one second and reports an average of the collected data every 30 seconds. Data records can be found in Appendix A and B of this report.

Figure 4.2 represents the sample system used for the wet chemistry tests ($NH_3$). A heated stainless steel probe with an inconel liner and stainless steel nozzle was inserted into the sample ports of the stack to extract gas measurements from the emission stream through a filter and glass impinger train. Flow rates are monitored with oil filled manometers and total sample volumes are measured with a dry gas meter.

Three test runs of approximately 60 minutes each were conducted on the Mitsubishi, Model 501G, Unit 1C at each of the multiple test loads for NOx, CO, THC, $CO_2$, $NH_3$, opacity, and $O_2$.

The stack gas analysis for $O_2$ and $CO_2$ concentrations was performed in accordance with procedures set forth in EPA Method 3a. The $O_2$ analyzer uses a paramagnetic cell detector and the $CO_2$ analyzer uses a continuous nondispersive infrared analyzer.

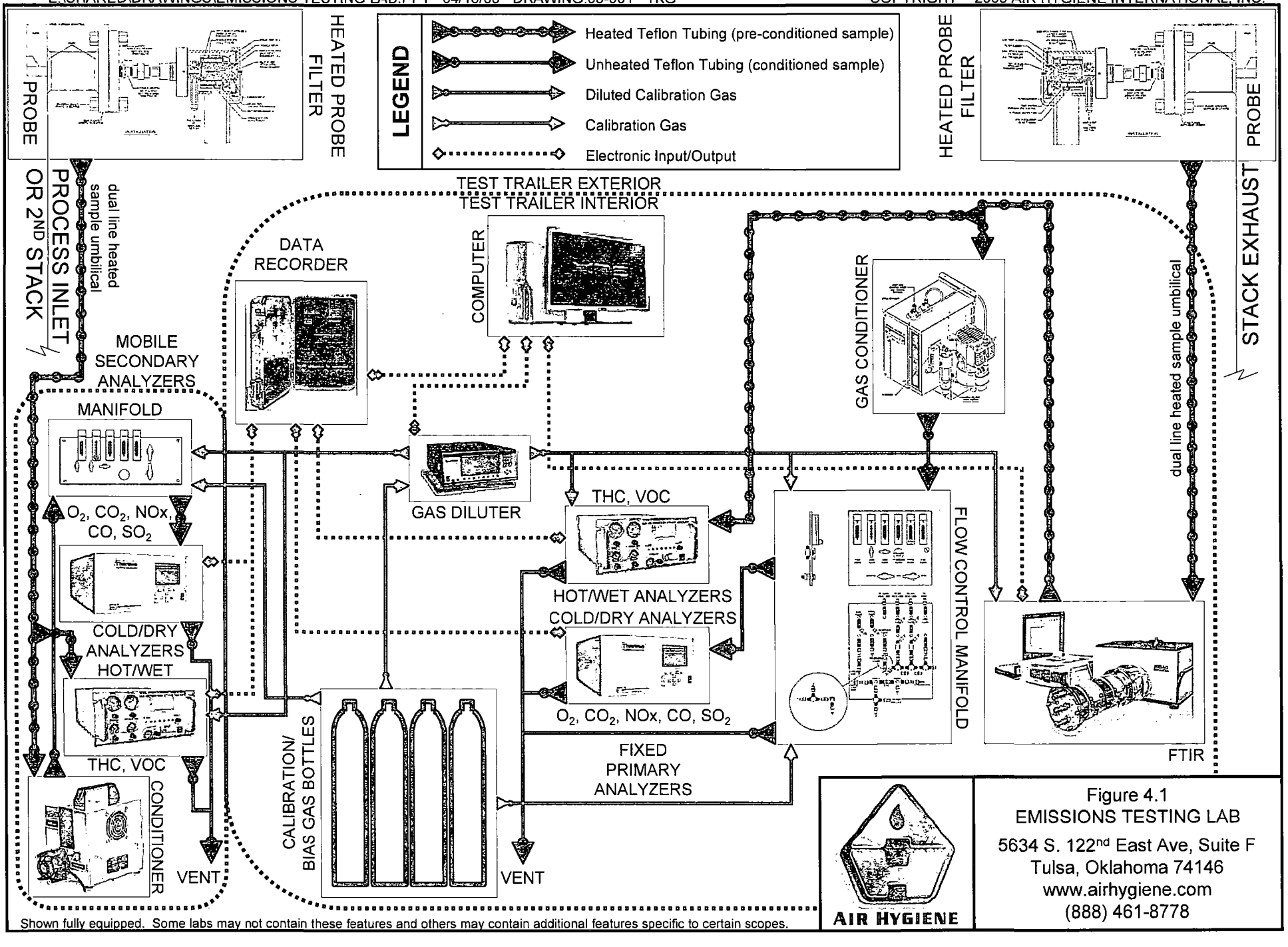
EPA Method 7e was used to determine concentrations of NOx. A chemiluminescent analyzer was used to determine the nitrogen oxides concentration in the gas stream. A $NO_2$ in nitrogen certified gas cylinder was used to verify at least a 90 percent $NO_2$ conversion on the day of the test.

CO emission concentrations were quantified in accordance with procedures set forth in EPA Method 10. A continuous nondispersive infrared (NDIR) analyzer was used for this purpose.

THC emission concentrations were quantified in accordance with procedures set forth in EPA Method 25a. A continuous flame ionization (FID) analyzer was used for this purpose. THC emission concentrations were reported as VOC.

## TABLE 4.2
## ANALYTICAL INSTRUMENTATION

| Parameter | Model and Manufacturer | Range | Sensitivity | Detection Principle |
|---|---|---|---|---|
| NOx | THERMO 42C | User may select up to 5,000 ppm | 0.1 ppm | Thermal reduction of $NO_2$ to NO. Chemiluminescence of reaction of NO with $O_3$. Detection by PMT. Inherently linear for listed ranges. |
| CO | THERMO 48C | User may select up to 5,000 ppm | 0.1 ppm | Infrared absorption, gas filter correlation detector, microprocessor based linearization. |
| $CO_2$ | CAI 200 | 0-20% | 0.1% | Non-dispersive infrared. |
| THC | THERMO 51 | User may select up to 10,000 ppm | 0.1 ppm | Flame Ionization Detector. |
| $O_2$ | CAI 200 | 0-25% | 0.1% | Paramagnetic cell, inherently linear. |




Shown fully equipped. Some labs may not contain these features and others may contain additional features specific to certain scopes.

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Figure 4.1
EMISSIONS TESTING LAB

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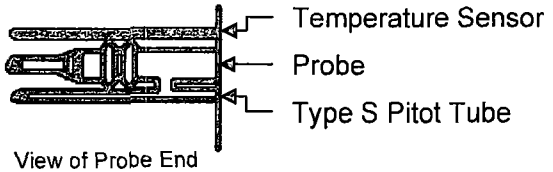


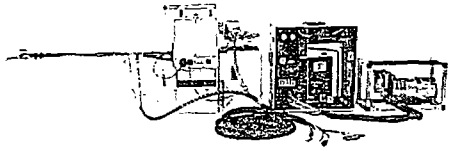
Wet Chemistry Assembly
(photo)

Temperature Sensor
Stack Wall
Liner (glass, stainless steel, or inconel)
Temperature Sensor
could add more impingers or other components to system
Temperature Sensor
Probe Housing (heated opt.)
Impingers
Nozzle
Glass Filter Holder
Ice Water Bath
Vacuum Line
Type S Pitot Tube
Heated Area
Oil-Filler Manometer
Hot Box
Cold Box
Filled with water or other various chemicals to cause capture of condensed liquid or reaction with target compounds
Vacuum Gauge
Temperature Sensor
Temperature Sensor
Orifice
By-pass Valve
Main Valve
Dry Gas Meter
Air-Tight Pump
Oil-Filler Manometer

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Figure 4.2
WET CHEMISTRY ASSEMBLY

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# APPENDIX A

# TEST RESULTS AND CALCULATIONS

**TABLE A.1:**
**EMISSIONS TESTING SCHEDULE**

| Unit | Load | Test Type | Run | Date | Start | Stop |
|---|---|---|---|---|---|---|
| 1C | Base Load | Stratification Test | 1 | 10/05/09 | 7:20:07 | 8:12:07 |
| 1C | Base W/O Db | Compliance | 1-1 | 10/05/09 | 10:00:15 | 10:59:45 |
| 1C | Base W/O Db | Compliance | 1-2 | 10/05/09 | 11:55:15 | 12:54:45 |
| 1C | Base W/O Db | Compliance | 1-3 | 10/05/09 | 13:30:15 | 14:29:45 |
| 1C | Base W/Db | Compliance | 2-1 | 10/05/09 | 17:51:15 | 18:50:45 |
| 1C | Base W/Db | Compliance | 2-2 | 10/05/09 | 19:05:15 | 20:04:45 |
| 1C | Base W/Db | Compliance | 2-3 | 10/06/09 | 9:57:28 | 10:56:58 |
| 1C | Base W/O Db | Preliminaries | Base-V1 | 10/05/09 | 7:00:00 | 7:40:00 |
| 1C | Base W/O Db | Ammonia | 1-1 | 10/05/09 | 10:00:00 | 11:34:00 |
| 1C | Base W/O Db | Ammonia | 1-2 | 10/05/09 | 11:55:00 | 13:15:00 |
| 1C | Base W/O Db | Ammonia | 1-3 | 10/05/09 | 13:30:00 | 14:50:00 |
| 1C | Base W/DB | Ammonia | 2-1 | 10/05/09 | 15:42:00 | 17:25:00 |
| 1C | Base W/DB | Ammonia | 2-2 | 10/05/09 | 17:51:00 | 19:03:00 |
| 1C | Base W/DB | Ammonia | 2-3 | 10/06/09 | 19:18:00 | 20:30:00 |

TABLE A.2
MITSUBISHI, 501G, UNIT #1C BASE W/O DB LOAD DATA SUMMARY

| Parameter | Base W/O Db Load, Run - 1-1 | Base W/O Db Load, Run - 1-2 | Base W/O Db Load, Run - 1-3 | Average |
|---|---|---|---|---|
| Run Duration (min / run) | 60 | 60 | 60 | 60 |
| Bar. Pressure (in. Hg) | 29.88 | 29.91 | 29.88 | 29.89 |
| Amb. Temp. (°F) | 91 | 97 | 98 | 95 |
| Rel. Humidity (%) | 64 | 52 | 44 | 53 |
| Spec. Humidity (lb water / lb air) | 0.020195 | 0.019710 | 0.017141 | 0.019015 |
| Avg. Stack Temp. (°F) | 183 | 185 | 186 | 185 |
| Turbine Fuel Flow (lb/min) | 1,799 | 1,779 | 1,771 | 1,783 |
| Duct Burner Fuel Flow (lb/min) | 0 | 0 | 0 | 0 |
| Total Fuel Flow (SCFH) | 2,497,491 | 2,470,180 | 2,459,303 | 2,475,658 |
| Stack Flow (RM19) (SCFH) | 56,670,297 | 56,255,179 | 56,038,978 | 56,321,485 |
| Stack Moisture (% Method 4) | 11.0 | 10.2 | 8.7 | 10.0 |
| Power Output (megawatts) | 244.1 | 240.8 | 238.9 | 241.3 |
| NOx (ppmvd) | 2.36 | 2.46 | 2.46 | 2.42 |
| NOx (ppm@15%$O_2$) | 1.75 | 1.84 | 1.83 | 1.81 |
| NOx (ppm@15%$O_2$&ISO) | 2.08 | 2.12 | 2.02 | 2.07 |
| NOx (lb/hr) | 15.96 | 16.51 | 16.43 | 16.30 |
| NOx (ton/year) at 8760 hr/year | 69.89 | 72.30 | 71.97 | 71.39 |
| NOx (lb/MMBtu) | 0.006 | 0.007 | 0.007 | 0.007 |
| CO (ppmvd) | 0.37 | 0.41 | 0.21 | 0.33 |
| CO (ppm@15%$O_2$) | 0.28 | 0.31 | 0.16 | 0.25 |
| CO (ppm@15%$O_2$&ISO) | 0.33 | 0.35 | 0.17 | 0.28 |
| CO (lb/hr) | 1.53 | 1.67 | 0.85 | 1.35 |
| CO (ton/year) at 8760 hr/year | 6.70 | 7.33 | 3.74 | 5.92 |
| CO (lb/MMBtu) | 0.001 | 0.001 | 0.000 | 0.001 |
| VOC (ppmvd) | 0.47 | 0.41 | 0.92 | 0.60 |
| VOC (ppm@15%$O_2$) | 0.35 | 0.30 | 0.69 | 0.45 |
| VOC (ppm@15%$O_2$&ISO) | 0.41 | 0.35 | 0.76 | 0.51 |
| VOC (lb/hr) | 1.10 | 0.95 | 2.15 | 1.40 |
| VOC (ton/year) at 8760 hr/year | 4.83 | 4.16 | 9.42 | 6.14 |
| VOC (lb/MMBtu) | 0.000 | 0.000 | 0.001 | 0.001 |
| Sulfur (gr S/100 scf) | <0.032 | <0.032 | <0.032 | <0.032 |
| $NH_3$ (ppmvd) | 1.90 | 1.92 | 1.98 | 1.93 |
| $NH_3$ (ppm@15%$O_2$) | 1.41 | 1.43 | 1.48 | 1.44 |
| $NH_3$ (lb/hr) | 4.76 | 4.77 | 4.90 | 4.81 |
| Opacity (%) | 0 | 0 | 0 | 0 |
| $CO_2$ (%) | 4.74 | 4.65 | 4.66 | 4.68 |
| $O_2$ (%) | 12.97 | 13.00 | 13.01 | 12.99 |

TABLE A.3
MITSUBISHI, 501G, UNIT #1C BASE W/DB LOAD DATA SUMMARY

| Parameter | Base W/Db Load, Run - 2-1 | Base W/Db Load, Run - 2-2 | Base W/Db Load, Run - 2-3 | Average |
|---|---|---|---|---|
| Run Duration (min / run) | 60 | 60 | 60 | 60 |
| Bar. Pressure (in. Hg) | 29.80 | 29.83 | 29.88 | 29.84 |
| Amb. Temp. (°F) | 93 | 87 | 86 | 89 |
| Rel. Humidity (%) | 52 | 74 | 88 | 71 |
| Spec. Humidity (lb water / lb air) | 0.017433 | 0.020635 | 0.023849 | 0.020639 |
| Avg. Stack Temp. (°F) | 173 | 173 | 181 | 176 |
| Turbine Fuel Flow (lb/min) | 1,614 | 1,624 | 1,638 | 1,625 |
| Duct Burner Fuel Flow (lb/min) | 198 | 198 | 192 | 196 |
| Total Fuel Flow (SCFH) | 2,516,237 | 2,530,124 | 2,541,002 | 2,529,121 |
| Stack Flow (RM19) (SCFH) | 50,530,276 | 50,885,020 | 51,341,833 | 50,919,043 |
| Stack Moisture (% Method 4) | 11.6 | 11.3 | 11.0 | 11.3 |
| Power Output (megawatts) | 247.3 | 248.2 | 248.9 | 248.1 |
| NOx (ppmvd) | 2.66 | 2.68 | 2.67 | 2.67 |
| NOx (ppm@15%$O_2$) | 1.76 | 1.78 | 1.78 | 1.77 |
| NOx (ppm@15%$O_2$&ISO) | 1.97 | 2.15 | 2.30 | 2.14 |
| NOx (lb/hr) | 16.03 | 16.26 | 16.36 | 16.22 |
| NOx (ton/year) at 8760 hr/year | 70.23 | 71.21 | 71.65 | 71.03 |
| NOx (lb/MMBtu) | 0.006 | 0.007 | 0.007 | 0.006 |
| CO (ppmvd) | 4.65 | 4.52 | 3.15 | 4.11 |
| CO (ppm@15%$O_2$) | 3.08 | 3.00 | 2.10 | 2.73 |
| CO (ppm@15%$O_2$&ISO) | 3.45 | 3.63 | 2.71 | 3.26 |
| CO (lb/hr) | 17.07 | 16.73 | 11.74 | 15.18 |
| CO (ton/year) at 8760 hr/year | 74.77 | 73.27 | 51.41 | 66.48 |
| CO (lb/MMBtu) | 0.007 | 0.007 | 0.005 | 0.006 |
| VOC (ppmvd) | 1.97 | 1.01 | 1.82 | 1.60 |
| VOC (ppm@15%$O_2$) | 1.31 | 0.67 | 1.22 | 1.06 |
| VOC (ppm@15%$O_2$&ISO) | 1.46 | 0.81 | 1.57 | 1.28 |
| VOC (lb/hr) | 4.13 | 2.14 | 3.89 | 3.39 |
| VOC (ton/year) at 8760 hr/year | 18.10 | 9.35 | 17.03 | 14.83 |
| VOC (lb/MMBtu) | 0.002 | 0.001 | 0.002 | 0.001 |
| Sulfur (gr S/100 scf) | <0.032 | <0.032 | <0.032 | <0.032 |
| $NH_3$ (ppmvd) | 1.78 | 1.83 | 2.01 | 1.87 |
| $NH_3$ (ppm@15%$O_2$) | 1.18 | 1.22 | 1.34 | 1.25 |
| $NH_3$ (lb/hr) | 3.98 | 4.12 | 4.56 | 4.22 |
| Opacity (%) | 0 | 0 | 0 | 0 |
| $CO_2$ (%) | 5.09 | 5.17 | 5.24 | 5.17 |
| $O_2$ (%) | 12.00 | 12.02 | 12.06 | 12.03 |

# TEST RESULTS

## NOx, CO, VOC, $CO_2$, and $O_2$ Emissions
## Base Load

**Florida Power and Light**
**October 5, 2009**
**Mitsubishi, 501G, Unit #1C**
**West County Energy Center**

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8,644 | SCF adv/MMBtu |
| Fuel Heating Value (HHV) | 996 | Btu/SCF fuel |
| Turbine Fuel Flow | 1,799 | lb/min |
| Duct Burner Fuel Flow | 0 | lb/min |
| Total Fuel Flow | 2,497,491 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.88 | in. Hg |
| Relative Humidity | 64 | % |
| Ambient Temperature | 91 | °F |
| Specific Humidity | 0.020195 | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 244.1 | megawatts |
| Combustor Inlet Pressure | 263 | psig |
| Meas. Stack Moisture | 11.0 | % |
| Stack Exhaust Flow (M19) | 56,670,297 | SCFH |

Data from: NH3 Run 1

Base W/O Db Load, Run - 1-1

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/05/09 10:00:15 | 690 | 12.97 | 2.27 | 0.26 | 0.51 | 4.94 |
| 10/05/09 10:00:45 | 720 | 12.97 | 2.29 | 0.25 | 0.50 | 4.89 |
| 10/05/09 10:01:15 | 750 | 12.97 | 2.29 | 0.27 | 0.48 | 4.87 |
| 10/05/09 10:01:45 | 780 | 12.96 | 2.26 | 0.26 | 0.53 | 4.88 |
| 10/05/09 10:02:15 | 810 | 12.98 | 2.33 | 0.22 | 0.61 | 4.92 |
| 10/05/09 10:02:45 | 840 | 12.98 | 2.31 | 0.26 | 0.59 | 4.90 |
| 10/05/09 10:03:15 | 870 | 12.98 | 2.30 | 0.27 | 0.54 | 4.91 |
| 10/05/09 10:03:45 | 900 | 12.99 | 2.25 | 0.23 | 0.50 | 4.93 |
| 10/05/09 10:04:15 | 930 | 12.98 | 2.23 | 0.32 | 0.56 | 4.88 |
| 10/05/09 10:04:45 | 960 | 12.98 | 2.26 | 0.31 | 0.53 | 4.88 |
| 10/05/09 10:05:15 | 990 | 12.99 | 2.26 | 0.19 | 0.65 | 4.88 |
| 10/05/09 10:05:45 | 1020 | 12.98 | 2.30 | 0.12 | 0.59 | 4.92 |
| 10/05/09 10:06:15 | 1050 | 12.99 | 2.35 | 0.23 | 0.51 | 4.88 |
| 10/05/09 10:06:45 | 1080 | 12.99 | 2.35 | 0.21 | 0.56 | 4.86 |
| 10/05/09 10:07:15 | 1110 | 12.99 | 2.28 | 0.26 | 0.54 | 4.86 |
| 10/05/09 10:07:45 | 1140 | 12.99 | 2.35 | 0.27 | 0.49 | 4.80 |
| 10/05/09 10:08:15 | 1170 | 12.98 | 2.32 | 0.23 | 0.52 | 4.84 |
| 10/05/09 10:08:45 | 1200 | 12.99 | 2.37 | 0.17 | 0.57 | 4.87 |
| 10/05/09 10:09:15 | 1230 | 13.00 | 2.30 | 0.22 | 0.64 | 4.88 |
| 10/05/09 10:09:45 | 1260 | 13.00 | 2.28 | 0.21 | 0.55 | 4.87 |
| 10/05/09 10:10:15 | 1290 | 12.99 | 2.28 | 0.25 | 0.53 | 4.89 |
| 10/05/09 10:10:45 | 1320 | 12.99 | 2.33 | 0.26 | 0.54 | 4.84 |
| 10/05/09 10:11:15 | 1350 | 12.99 | 2.31 | 0.25 | 0.53 | 4.81 |
| 10/05/09 10:11:45 | 1380 | 12.99 | 2.31 | 0.23 | 0.60 | 4.85 |
| 10/05/09 10:12:15 | 1410 | 12.98 | 2.27 | 0.15 | 0.67 | 4.84 |
| 10/05/09 10:12:45 | 1440 | 12.97 | 2.27 | 0.23 | 0.62 | 4.84 |
| 10/05/09 10:13:15 | 1470 | 12.97 | 2.31 | 0.23 | 0.65 | 4.87 |
| 10/05/09 10:13:45 | 1500 | 12.98 | 2.31 | 0.24 | 0.61 | 4.86 |
| 10/05/09 10:14:15 | 1530 | 12.98 | 2.31 | 0.22 | 0.67 | 4.87 |
| 10/05/09 10:14:45 | 1560 | 12.97 | 2.31 | 0.24 | 0.67 | 4.90 |
| 10/05/09 10:15:15 | 1590 | 12.97 | 2.28 | 0.14 | 0.67 | 4.93 |
| 10/05/09 10:15:45 | 1620 | 12.97 | 2.27 | 0.19 | 0.68 | 4.98 |
| 10/05/09 10:16:15 | 1650 | 12.98 | 2.29 | 0.14 | 0.62 | 4.94 |
| 10/05/09 10:16:45 | 1680 | 12.98 | 2.32 | 0.14 | 0.61 | 4.98 |
| 10/05/09 10:17:15 | 1710 | 12.98 | 2.30 | 0.07 | 0.67 | 4.96 |
| 10/05/09 10:17:45 | 1740 | 12.98 | 2.26 | 0.17 | 0.68 | 4.96 |
| 10/05/09 10:18:15 | 1770 | 12.99 | 2.26 | 0.22 | 0.68 | 4.95 |
| 10/05/09 10:18:45 | 1800 | 12.99 | 2.26 | 0.18 | 0.64 | 4.93 |
| 10/05/09 10:19:15 | 1830 | 12.97 | 2.34 | 0.18 | 0.67 | 4.91 |
| 10/05/09 10:19:45 | 1860 | 12.97 | 2.34 | 0.22 | 0.64 | 4.92 |
| 10/05/09 10:20:15 | 1890 | 12.99 | 2.34 | 0.22 | 0.73 | 4.91 |
| 10/05/09 10:20:45 | 1920 | 13.00 | 2.29 | 0.24 | 0.71 | 4.90 |
| 10/05/09 10:21:15 | 1950 | 13.01 | 2.28 | 0.18 | 0.67 | 4.91 |
| 10/05/09 10:21:45 | 1980 | 12.98 | 2.24 | 0.22 | 0.69 | 4.96 |
| 10/05/09 10:22:15 | 2010 | 13.00 | 2.26 | 0.14 | 0.69 | 4.95 |
| 10/05/09 10:22:45 | 2040 | 13.01 | 2.25 | 0.26 | 0.72 | 4.95 |
| 10/05/09 10:23:15 | 2070 | 12.98 | 2.27 | 0.20 | 0.78 | 4.95 |
| 10/05/09 10:23:45 | 2100 | 12.98 | 2.27 | 0.21 | 0.74 | 4.95 |
| 10/05/09 10:24:15 | 2130 | 12.99 | 2.30 | 0.15 | 0.71 | 4.91 |
| 10/05/09 10:24:45 | 2160 | 12.99 | 2.33 | 0.20 | 0.76 | 4.89 |
| 10/05/09 10:25:15 | 2190 | 12.99 | 2.38 | 0.15 | 0.70 | 4.91 |
| 10/05/09 10:25:45 | 2220 | 12.99 | 2.36 | 0.16 | 0.70 | 4.92 |
| 10/05/09 10:26:15 | 2250 | 12.98 | 2.25 | 0.22 | 0.72 | 4.95 |
| 10/05/09 10:26:45 | 2280 | 12.98 | 2.27 | 0.14 | 0.73 | 4.92 |
| 10/05/09 10:27:15 | 2310 | 12.99 | 2.27 | 0.18 | 0.79 | 4.92 |
| 10/05/09 10:27:45 | 2340 | 12.99 | 2.29 | 0.20 | 0.75 | 4.97 |
| 10/05/09 10:28:15 | 2370 | 13.00 | 2.27 | 0.19 | 0.73 | 4.96 |
| 10/05/09 10:28:45 | 2400 | 13.00 | 2.27 | 0.12 | 0.75 | 4.95 |
| 10/05/09 10:29:15 | 2430 | 13.00 | 2.28 | 0.24 | 0.74 | 4.97 |
| 10/05/09 10:29:45 | 2460 | 12.99 | 2.29 | 0.24 | 0.72 | 4.98 |
| 10/05/09 10:30:15 | 2490 | 12.98 | 2.30 | 0.23 | 0.79 | 4.96 |
| 10/05/09 10:30:45 | 2520 | 12.98 | 2.30 | 0.22 | 0.76 | 4.96 |
| 10/05/09 10:31:15 | 2550 | 12.98 | 2.30 | 0.17 | 0.84 | 4.94 |
| 10/05/09 10:31:45 | 2580 | 12.97 | 2.29 | 0.24 | 0.86 | 4.86 |
| 10/05/09 10:32:15 | 2610 | 12.98 | 2.33 | 0.14 | 0.76 | 4.84 |
| 10/05/09 10:32:45 | 2640 | 12.98 | 2.27 | 0.17 | 0.73 | 4.92 |
| 10/05/09 10:33:15 | 2670 | 12.99 | 2.34 | 0.15 | 0.74 | 4.87 |
| 10/05/09 10:33:45 | 2700 | 13.00 | 2.35 | 0.10 | 0.78 | 4.80 |
| 10/05/09 10:34:15 | 2730 | 12.99 | 2.29 | 0.19 | 0.81 | 4.88 |
| 10/05/09 10:34:45 | 2760 | 12.99 | 2.21 | 0.16 | 0.77 | 4.90 |
| 10/05/09 10:35:15 | 2790 | 12.99 | 2.23 | 0.16 | 0.86 | 4.89 |
| 10/05/09 10:35:45 | 2820 | 12.99 | 2.29 | 0.20 | 0.82 | 4.89 |
| 10/05/09 10:36:15 | 2850 | 12.99 | 2.26 | 0.13 | 0.75 | 4.89 |
| 10/05/09 10:36:45 | 2880 | 13.00 | 2.25 | 0.21 | 0.87 | 4.89 |
| 10/05/09 10:37:15 | 2910 | 12.99 | 2.26 | 0.16 | 0.89 | 4.89 |
| 10/05/09 10:37:45 | 2940 | 12.99 | 2.27 | 0.17 | 0.88 | 4.89 |
| 10/05/09 10:38:15 | 2970 | 13.00 | 2.29 | 0.14 | 0.87 | 4.91 |
| 10/05/09 10:38:45 | 3000 | 13.00 | 2.29 | 0.13 | 0.89 | 4.94 |
| 10/05/09 10:39:15 | 3030 | 13.00 | 2.28 | 0.12 | 0.88 | 4.94 |
| 10/05/09 10:39:45 | 3060 | 13.00 | 2.32 | 0.16 | 0.88 | 5.01 |
| 10/05/09 10:40:15 | 3090 | 13.00 | 2.30 | 0.13 | 0.87 | 5.03 |
| 10/05/09 10:40:45 | 3120 | 13.00 | 2.30 | 0.21 | 0.87 | 5.01 |
| 10/05/09 10:41:15 | 3150 | 12.99 | 2.25 | 0.16 | 0.83 | 5.01 |
| 10/05/09 10:41:45 | 3180 | 12.99 | 2.28 | 0.20 | 0.82 | 5.01 |

Florida Power and Light
October 5, 2009
Mitsubishi, 501G, Unit #1C
West County Energy Center

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8,644 | SCF exh/MMBtu |
| Fuel Heating Value (HHV) | 996 | Btu/SCF fuel |
| Turbine Fuel Flow | 1,799 | lb/min |
| Duct Burner Fuel Flow | 0 | lb/min |
| Total Fuel Flow | 2,497,491 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.88 | In. Hg |
| Relative Humidity | 64 | % |
| Ambient Temperature | 91 | °F |
| Specific Humidity | 0.020195 | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 244.1 | megawatts |
| Combustor Inlet Pressure | 263 | psig |
| Meas. Stack Moisture | 11.0 | % |
| Stack Exhaust Flow (M19) | 56,670,297 | SCFH |

Data from: NH3 Run 1

Base W/O Db Load, Run - 1-1

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/05/09 10:42:15 | 3210 | 13.00 | 2.33 | 0.12 | 0.89 | 5.05 |
| 10/05/09 10:42:45 | 3240 | 13.01 | 2.34 | 0.13 | 0.89 | 5.03 |
| 10/05/09 10:43:15 | 3270 | 12.99 | 2.33 | 0.12 | 0.87 | 4.96 |
| 10/05/09 10:43:45 | 3300 | 12.99 | 2.27 | 0.17 | 0.89 | 4.96 |
| 10/05/09 10:44:15 | 3330 | 13.00 | 2.33 | 0.05 | 0.92 | 5.00 |
| 10/05/09 10:44:45 | 3360 | 13.00 | 2.33 | 0.11 | 0.92 | 5.01 |
| 10/05/09 10:45:15 | 3390 | 13.00 | 2.33 | 0.14 | 0.89 | 5.01 |
| 10/05/09 10:45:45 | 3420 | 13.01 | 2.28 | -0.05 | 0.89 | 5.00 |
| 10/05/09 10:46:15 | 3450 | 13.02 | 2.26 | 0.14 | 0.92 | 5.01 |
| 10/05/09 10:46:45 | 3480 | 13.02 | 2.28 | 0.08 | 0.97 | 5.04 |
| 10/05/09 10:47:15 | 3510 | 13.01 | 2.32 | 0.11 | 0.97 | 5.05 |
| 10/05/09 10:47:45 | 3540 | 13.01 | 2.28 | 0.14 | 0.90 | 5.04 |
| 10/05/09 10:48:15 | 3570 | 13.01 | 2.29 | 0.08 | 0.93 | 5.03 |
| 10/05/09 10:48:45 | 3600 | 13.02 | 2.28 | 0.21 | 0.93 | 4.98 |
| 10/05/09 10:49:15 | 3630 | 13.01 | 2.28 | 0.06 | 0.93 | 4.99 |
| 10/05/09 10:49:45 | 3660 | 13.01 | 2.32 | 0.10 | 0.94 | 5.06 |
| 10/05/09 10:50:15 | 3690 | 13.01 | 2.32 | 0.11 | 0.91 | 5.08 |
| 10/05/09 10:50:45 | 3720 | 13.03 | 2.35 | 0.00 | 0.89 | 5.04 |
| 10/05/09 10:51:15 | 3750 | 13.01 | 2.31 | 0.03 | 0.91 | 5.08 |
| 10/05/09 10:51:45 | 3780 | 13.00 | 2.31 | 0.19 | 0.98 | 5.03 |
| 10/05/09 10:52:15 | 3810 | 13.02 | 2.36 | 0.14 | 0.98 | 5.08 |
| 10/05/09 10:52:45 | 3840 | 13.02 | 2.39 | 0.07 | 0.98 | 5.09 |
| 10/05/09 10:53:15 | 3870 | 13.02 | 2.38 | 0.11 | 0.92 | 5.08 |
| 10/05/09 10:53:45 | 3900 | 13.01 | 2.32 | 0.16 | 1.02 | 5.04 |
| 10/05/09 10:54:15 | 3930 | 13.00 | 2.37 | 0.14 | 0.98 | 5.03 |
| 10/05/09 10:54:45 | 3960 | 13.01 | 2.39 | 0.13 | 1.00 | 4.99 |
| 10/05/09 10:55:15 | 3990 | 13.02 | 2.39 | 0.15 | 0.98 | 4.99 |
| 10/05/09 10:55:45 | 4020 | 13.02 | 2.34 | 0.14 | 0.95 | 4.96 |
| 10/05/09 10:56:15 | 4050 | 13.03 | 2.27 | 0.14 | 0.99 | 4.94 |
| 10/05/09 10:56:45 | 4080 | 13.02 | 2.32 | 0.11 | 0.98 | 4.99 |
| 10/05/09 10:57:15 | 4110 | 13.00 | 2.40 | 0.06 | 0.90 | 4.94 |
| 10/05/09 10:57:45 | 4140 | 13.00 | 2.43 | 0.17 | 1.00 | 4.92 |
| 10/05/09 10:58:15 | 4170 | 13.00 | 2.37 | 0.09 | 0.96 | 4.93 |
| 10/05/09 10:58:45 | 4200 | 13.01 | 2.39 | 0.11 | 1.03 | 4.95 |
| 10/05/09 10:59:15 | 4230 | 13.02 | 2.39 | 0.12 | 1.08 | 4.94 |
| 10/05/09 10:59:45 | 4260 | 13.02 | 2.28 | 0.12 | 1.08 | 4.99 |
| ***RAW AVERAGE*** | | **12.99** | **2.30** | **0.17** | **0.77** | **4.94** |

| | Serial Number: | $O_2$ INST-22-0001 (%) | NOx INST-NX-0010 (ppmvd) | CO INST-CO-0008 (ppmvd) | VOC INST-TH-0010 (ppmvw) | $CO_2$ INST-22-0001 (%) |
|---|---|---|---|---|---|---|
| Bias | Initial Zero | 0.02 | 0.03 | 0.03 | 0.29 | 0.06 |
| | Final Zero | -0.01 | -0.03 | -0.44 | 0.50 | 0.41 |
| | Avg. Zero | 0.01 | 0.00 | -0.21 | 0.40 | 0.24 |
| | Initial UpScale | 12.01 | 4.92 | 4.91 | 3.26 | 9.19 |
| | Final UpScale | 12.03 | 4.83 | 4.70 | 3.52 | 9.55 |
| | Avg. UpScale | 12.02 | 4.88 | 4.81 | 3.39 | 9.37 |
| **Upscale Cal Gas** | | 12.00 | 4.99 | 4.94 | 3.00 | 9.20 |

| EMISSIONS DATA | $O_2$ | NOx | CO | VOC | $CO_2$ |
|---|---|---|---|---|---|
| Corrected Raw Average (ppm/% dry basis) | 12.97 | 2.36 | 0.37 | 0.47 | 4.74 |
| Concentration (ppm@ 15%$O_2$) | N/A | 1.75 | 0.28 | 0.35 | N/A |
| Concentration (ppm@ 15%$O_2$ &ISO) | N/A | 2.08 | 0.33 | 0.41 | N/A |
| Emission Rate (lb/hr) | N/A | 15.96 | 1.53 | 1.10 | N/A |
| Emission Rate (tons/year) at 8760 hr/yr | N/A | 69.89 | 6.70 | 4.83 | N/A |
| Emission Rate (lb/MMBtu) | N/A | 0.006 | 0.001 | 0.000 | N/A |

**Florida Power and Light**
**October 5, 2009**
**Mitsubishi, 501G, Unit #1C**
**West County Energy Center**

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8,644 | SCF exh/MMBtu |
| Fuel Heating Value (HHV) | 996 | Btu/SCF fuel |
| Turbine Fuel Flow | 1,779 | lb/min |
| Duct Burner Fuel Flow | 0 | lb/min |
| Total Fuel Flow | 2,470,180 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.91 | In. Hg |
| Relative Humidity | 52 | % |
| Ambient Temperature | 97 | °F |
| Specific Humidity | 0.019710 | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 240.8 | megawatts |
| Combustor Inlet Pressure | 260 | psig |
| Meas. Stack Moisture | 10.2 | % |
| Stack Exhaust Flow (M19) | 56,255,179 | SCFH |

Data from: NH3 Run 2

Base W/O Db Load, Run - 1-2

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/05/09 11:45:15 | 6990 | 13.03 | 2.36 | 0.05 | 0.54 | 5.05 |
| 10/05/09 11:45:45 | 7020 | 13.04 | 2.40 | 0.01 | 0.56 | 5.09 |
| 10/05/09 11:46:15 | 7050 | 13.04 | 2.38 | 0.08 | 0.55 | 5.01 |
| 10/05/09 11:46:45 | 7080 | 13.03 | 2.31 | 0.05 | 0.57 | 5.00 |
| 10/05/09 11:47:15 | 7110 | 13.04 | 2.35 | -0.03 | 0.52 | 4.97 |
| 10/05/09 11:47:45 | 7140 | 13.04 | 2.38 | 0.03 | 0.55 | 4.99 |
| 10/05/09 11:48:15 | 7170 | 13.03 | 2.42 | -0.02 | 0.54 | 4.99 |
| 10/05/09 11:48:45 | 7200 | 13.03 | 2.45 | 0.00 | 0.57 | 5.02 |
| 10/05/09 11:49:15 | 7230 | 13.03 | 2.37 | 0.01 | 0.56 | 4.96 |
| 10/05/09 11:49:45 | 7260 | 13.03 | 2.29 | 0.04 | 0.56 | 5.01 |
| 10/05/09 11:50:15 | 7290 | 13.04 | 2.27 | 0.04 | 0.54 | 5.02 |
| 10/05/09 11:50:45 | 7320 | 13.04 | 2.29 | 0.00 | 0.53 | 5.03 |
| 10/05/09 11:51:15 | 7350 | 13.05 | 2.26 | 0.01 | 0.54 | 5.07 |
| 10/05/09 11:51:45 | 7380 | 13.04 | 2.22 | -0.01 | 0.54 | 5.09 |
| 10/05/09 11:52:15 | 7410 | 13.03 | 2.21 | 0.06 | 0.57 | 5.11 |
| 10/05/09 11:52:45 | 7440 | 13.03 | 2.34 | -0.08 | 0.63 | 5.08 |
| 10/05/09 11:53:15 | 7470 | 13.03 | 2.46 | 0.00 | 0.57 | 5.07 |
| 10/05/09 11:53:45 | 7500 | 13.05 | 2.41 | -0.01 | 0.58 | 5.04 |
| 10/05/09 11:54:15 | 7530 | 13.04 | 2.30 | -0.01 | 0.60 | 5.03 |
| 10/05/09 11:54:45 | 7560 | 13.04 | 2.33 | 0.04 | 0.54 | 5.05 |
| 10/05/09 11:55:15 | 7590 | 13.04 | 2.33 | 0.02 | 0.57 | 5.10 |
| 10/05/09 11:55:45 | 7620 | 13.05 | 2.35 | 0.02 | 0.65 | 5.06 |
| 10/05/09 11:56:15 | 7650 | 13.05 | 2.31 | -0.03 | 0.55 | 5.05 |
| 10/05/09 11:56:45 | 7680 | 13.05 | 2.23 | 0.04 | 0.67 | 5.08 |
| 10/05/09 11:57:15 | 7710 | 13.02 | 2.31 | -0.05 | 0.66 | 5.13 |
| 10/05/09 11:57:45 | 7740 | 13.02 | 2.37 | -0.02 | 0.58 | 5.15 |
| 10/05/09 11:58:15 | 7770 | 13.02 | 2.41 | -0.02 | 0.63 | 5.09 |
| 10/05/09 11:58:45 | 7800 | 13.03 | 2.39 | 0.00 | 0.59 | 5.10 |
| 10/05/09 11:59:15 | 7830 | 13.04 | 2.36 | -0.15 | 0.59 | 5.12 |
| 10/05/09 11:59:45 | 7860 | 13.05 | 2.25 | 0.03 | 0.74 | 5.13 |
| 10/05/09 12:00:15 | 7890 | 13.03 | 2.28 | 0.00 | 0.57 | 5.16 |
| 10/05/09 12:00:45 | 7920 | 13.03 | 2.23 | 0.01 | 0.57 | 5.17 |
| 10/05/09 12:01:15 | 7950 | 13.03 | 2.24 | 0.07 | 0.64 | 5.21 |
| 10/05/09 12:01:45 | 7980 | 13.04 | 2.35 | -0.03 | 0.64 | 5.19 |
| 10/05/09 12:02:15 | 8010 | 13.04 | 2.37 | 0.03 | 0.71 | 5.12 |
| 10/05/09 12:02:45 | 8040 | 13.04 | 2.40 | -0.01 | 0.71 | 5.01 |
| 10/05/09 12:03:15 | 8070 | 13.05 | 2.38 | 0.07 | 0.72 | 4.98 |
| 10/05/09 12:03:45 | 8100 | 13.04 | 2.27 | 0.01 | 0.72 | 5.04 |
| 10/05/09 12:04:15 | 8130 | 13.04 | 2.33 | -0.01 | 0.69 | 5.00 |
| 10/05/09 12:04:45 | 8160 | 13.04 | 2.30 | 0.00 | 0.70 | 4.94 |
| 10/05/09 12:05:15 | 8190 | 13.04 | 2.27 | 0.04 | 0.60 | 5.04 |
| 10/05/09 12:05:45 | 8220 | 13.03 | 2.30 | 0.02 | 0.67 | 5.07 |
| 10/05/09 12:06:15 | 8250 | 13.01 | 2.32 | 0.00 | 0.78 | 5.07 |
| 10/05/09 12:06:45 | 8280 | 13.02 | 2.35 | 0.01 | 0.64 | 5.04 |
| 10/05/09 12:07:15 | 8310 | 13.05 | 2.38 | 0.00 | 0.75 | 5.00 |
| 10/05/09 12:07:45 | 8340 | 13.04 | 2.31 | 0.02 | 0.72 | 5.01 |
| 10/05/09 12:08:15 | 8370 | 13.03 | 2.27 | 0.04 | 0.72 | 5.08 |
| 10/05/09 12:08:45 | 8400 | 13.03 | 2.30 | -0.02 | 0.76 | 5.08 |
| 10/05/09 12:09:15 | 8430 | 13.04 | 2.40 | 0.00 | 0.81 | 5.11 |
| 10/05/09 12:09:45 | 8460 | 13.04 | 2.33 | 0.01 | 0.79 | 5.12 |
| 10/05/09 12:10:15 | 8490 | 13.03 | 2.34 | -0.08 | 0.74 | 5.12 |
| *10/05/09 12:10:45* | *8520* | *13.06* | *2.33* | *-0.05* | *0.78* | *5.10* |
| 10/05/09 12:11:15 | 8550 | 13.04 | 2.27 | 0.00 | 0.75 | 5.13 |
| 10/05/09 12:11:45 | 8580 | 13.03 | 2.30 | -0.02 | 0.81 | 5.15 |
| 10/05/09 12:12:15 | 8610 | 13.04 | 2.31 | -0.01 | 0.81 | 5.15 |
| 10/05/09 12:12:45 | 8640 | 13.05 | 2.35 | -0.02 | 0.82 | 5.12 |
| 10/05/09 12:13:15 | 8670 | 13.05 | 2.36 | 0.03 | 0.81 | 5.10 |
| 10/05/09 12:13:45 | 8700 | 13.04 | 2.39 | -0.02 | 0.78 | 5.09 |
| 10/05/09 12:14:15 | 8730 | 13.03 | 2.35 | -0.01 | 0.77 | 5.10 |
| 10/05/09 12:14:45 | 8760 | 13.03 | 2.45 | -0.08 | 0.84 | 5.13 |
| 10/05/09 12:15:15 | 8790 | 13.03 | 2.35 | -0.03 | 0.81 | 5.17 |
| 10/05/09 12:15:45 | 8820 | 13.06 | 2.40 | 0.00 | 0.81 | 5.13 |
| 10/05/09 12:16:15 | 8850 | 13.06 | 2.37 | -0.13 | 0.89 | 5.07 |
| 10/05/09 12:16:45 | 8880 | 13.05 | 2.31 | -0.03 | 0.84 | 5.09 |
| 10/05/09 12:17:15 | 8910 | 13.05 | 2.35 | -0.02 | 0.86 | 5.12 |
| 10/05/09 12:17:45 | 8940 | 13.06 | 2.45 | 0.01 | 0.81 | 5.11 |
| 10/05/09 12:18:15 | 8970 | 13.05 | 2.49 | 0.00 | 0.86 | 5.13 |
| 10/05/09 12:18:45 | 9000 | 13.05 | 2.50 | -0.01 | 0.82 | 5.14 |
| 10/05/09 12:19:15 | 9030 | 13.04 | 2.44 | -0.03 | 0.81 | 5.12 |
| 10/05/09 12:19:45 | 9060 | 13.04 | 2.43 | 0.00 | 0.87 | 5.11 |
| 10/05/09 12:20:15 | 9090 | 13.04 | 2.40 | -0.05 | 0.85 | 5.15 |
| 10/05/09 12:20:45 | 9120 | 13.04 | 2.27 | -0.06 | 0.81 | 5.17 |
| 10/05/09 12:21:15 | 9150 | 13.02 | 2.23 | -0.02 | 0.81 | 5.12 |
| 10/05/09 12:21:45 | 9180 | 13.02 | 2.27 | -0.03 | 0.80 | 5.05 |
| 10/05/09 12:22:15 | 9210 | 13.03 | 2.32 | -0.06 | 0.83 | 5.09 |
| 10/05/09 12:22:45 | 9240 | 13.05 | 2.36 | -0.04 | 0.81 | 5.08 |
| 10/05/09 12:23:15 | 9270 | 13.07 | 2.29 | -0.04 | 0.81 | 5.07 |
| 10/05/09 12:23:45 | 9300 | 13.07 | 2.27 | -0.03 | 0.78 | 5.09 |
| 10/05/09 12:24:15 | 9330 | 13.07 | 2.24 | -0.01 | 0.78 | 5.09 |
| 10/05/09 12:24:45 | 9360 | 13.05 | 2.22 | -0.05 | 0.77 | 5.08 |
| 10/05/09 12:25:15 | 9390 | 13.04 | 2.36 | -0.05 | 0.81 | 5.12 |
| 10/05/09 12:25:45 | 9420 | 13.05 | 2.45 | -0.03 | 0.76 | 5.11 |
| 10/05/09 12:26:15 | 9450 | 13.05 | 2.41 | -0.03 | 0.80 | 5.11 |
| 10/05/09 12:26:45 | 9480 | 13.05 | 2.42 | -0.03 | 0.79 | 5.11 |

Florida Power and Light
October 5, 2009
Mitsubishi, 501G, Unit #1C
West County Energy Center

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8,644 | SCF exh/MMBtu |
| Fuel Heating Value (HHV) | 996 | Btu/SCF fuel |
| Turbine Fuel Flow | 1,779 | lb/min |
| *Duct Burner Fuel Flow* | *0* | *lb/min* |
| Total Fuel Flow | 2,470,180 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.91 | in. Hg |
| Relative Humidity | 52 | % |
| Ambient Temperature | 97 | °F |
| *Specific Humidity* | *0.019710* | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 240.8 | megawatts |
| Combustor Inlet Pressure | 260 | psig |
| Meas. Stack Moisture | 10.2 | % |
| Stack Exhaust Flow (M19) | 56,255,179 | SCFH |

Data from: NH3 Run 2

Base W/O Db Load, Run - 1-2

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/05/09 12:27:15 | 9510 | 13.06 | 2.33 | -0.03 | 0.78 | 5.12 |
| 10/05/09 12:27:45 | 9540 | 13.06 | 2.32 | -0.08 | 0.83 | 5.11 |
| 10/05/09 12:28:15 | 9570 | 13.05 | 2.29 | -0.08 | 0.76 | 5.11 |
| 10/05/09 12:28:45 | 9600 | 13.03 | 2.33 | -0.13 | 0.78 | 5.11 |
| 10/05/09 12:29:15 | 9630 | 13.04 | 2.37 | -0.10 | 0.82 | 5.09 |
| 10/05/09 12:29:45 | 9660 | 13.06 | 2.50 | -0.21 | 0.79 | 5.06 |
| 10/05/09 12:30:15 | 9690 | 13.07 | 2.53 | -0.07 | 0.81 | 5.00 |
| 10/05/09 12:30:45 | 9720 | 13.06 | 2.42 | 0.00 | 0.80 | 5.06 |
| 10/05/09 12:31:15 | 9750 | 13.04 | 2.40 | -0.04 | 0.77 | 5.06 |
| 10/05/09 12:31:45 | 9780 | 13.03 | 2.47 | -0.03 | 0.75 | 5.06 |
| 10/05/09 12:32:15 | 9810 | 13.03 | 2.52 | -0.07 | 0.88 | 5.02 |
| 10/05/09 12:32:45 | 9840 | 13.03 | 2.55 | -0.05 | 0.80 | 5.01 |
| 10/05/09 12:33:15 | 9870 | 13.02 | 2.37 | -0.09 | 0.80 | 5.01 |
| 10/05/09 12:33:45 | 9900 | 13.02 | 2.35 | -0.02 | 0.78 | 5.03 |
| 10/05/09 12:34:15 | 9930 | 13.04 | 2.40 | -0.03 | 0.81 | 5.06 |
| 10/05/09 12:34:45 | 9960 | 13.05 | 2.41 | -0.01 | 0.77 | 5.08 |
| 10/05/09 12:35:15 | 9990 | 13.05 | 2.40 | -0.02 | 0.73 | 5.10 |
| 10/05/09 12:35:45 | 10020 | 13.05 | 2.36 | -0.05 | 0.77 | 5.07 |
| 10/05/09 12:36:15 | 10050 | 13.04 | 2.33 | -0.02 | 0.71 | 5.09 |
| 10/05/09 12:36:45 | 10080 | 13.03 | 2.33 | -0.07 | 0.76 | 5.10 |
| 10/05/09 12:37:15 | 10110 | 13.03 | 2.40 | -0.05 | 0.74 | 5.08 |
| 10/05/09 12:37:45 | 10140 | 13.05 | 2.49 | -0.05 | 0.76 | 5.07 |
| 10/05/09 12:38:15 | 10170 | 13.05 | 2.45 | -0.07 | 0.77 | 5.06 |
| 10/05/09 12:38:45 | 10200 | 13.05 | 2.30 | -0.05 | 0.80 | 5.09 |
| 10/05/09 12:39:15 | 10230 | 13.04 | 2.23 | -0.03 | 0.78 | 5.10 |
| 10/05/09 12:39:45 | 10260 | 13.05 | 2.28 | -0.03 | 0.75 | 5.12 |
| 10/05/09 12:40:15 | 10290 | 13.05 | 2.34 | -0.07 | 0.84 | 5.06 |
| 10/05/09 12:40:45 | 10320 | 13.05 | 2.33 | -0.08 | 0.90 | 5.06 |
| 10/05/09 12:41:15 | 10350 | 13.03 | 2.34 | -0.08 | 0.82 | 5.09 |
| 10/05/09 12:41:45 | 10380 | 13.04 | 2.43 | -0.08 | 0.93 | 5.10 |
| 10/05/09 12:42:15 | 10410 | 13.04 | 2.42 | -0.09 | 0.97 | 5.10 |
| 10/05/09 12:42:45 | 10440 | 13.04 | 2.46 | -0.06 | 0.84 | 5.10 |
| 10/05/09 12:43:15 | 10470 | 13.04 | 2.39 | -0.14 | 0.83 | 5.10 |
| 10/05/09 12:43:45 | 10500 | 13.04 | 2.36 | -0.07 | 0.84 | 5.15 |
| 10/05/09 12:44:15 | 10530 | 13.04 | 2.33 | -0.08 | 0.81 | 5.14 |
| 10/05/09 12:44:45 | 10560 | 13.04 | 2.30 | -0.10 | 0.84 | 5.13 |
| **RAW AVERAGE** | | **13.04** | **2.35** | **-0.03** | **0.73** | **5.08** |

| | Serial Number: | $O_2$ INST-22-0001 (%) | NOx INST-NX-0010 (ppmvd) | CO INST-CO-0008 (ppmvd) | VOC INST-TH-0010 (ppmvw) | $CO_2$ INST-22-0001 (%) |
|---|---|---|---|---|---|---|
| Bias | Initial Zero | -0.01 | -0.03 | -0.44 | 0.50 | 0.41 |
| | Final Zero | -0.03 | -0.02 | -0.45 | 0.44 | 0.56 |
| | Avg. Zero | -0.02 | -0.03 | -0.45 | 0.47 | 0.49 |
| | Initial UpScale | 12.03 | 4.83 | 4.70 | 3.07 | 9.55 |
| | Final UpScale | 12.04 | 4.78 | 4.55 | 2.95 | 9.61 |
| | Avg. UpScale | 12.04 | 4.81 | 4.63 | 3.01 | 9.58 |
| **Upscale Cal Gas** | | 12.00 | 4.99 | 4.94 | 3.00 | 9.20 |

| EMISSIONS DATA | $O_2$ | NOx | CO | VOC | $CO_2$ |
|---|---|---|---|---|---|
| Corrected Raw Average (ppm/% dry basis) | 13.00 | 2.46 | 0.41 | 0.41 | 4.65 |
| Concentration (ppm@ 15%$O_2$) | N/A | 1.84 | 0.31 | 0.30 | N/A |
| Concentration (ppm@ 15%$O_2$ &ISO) | N/A | 2.12 | 0.35 | 0.35 | N/A |
| Emission Rate (lb/hr) | N/A | 16.51 | 1.67 | 0.95 | N/A |
| Emission Rate (tons/year) at 8760 hr/yr | N/A | 72.30 | 7.33 | 4.16 | N/A |
| Emission Rate (lb/MMBtu) | N/A | 0.007 | 0.001 | 0.000 | N/A |

**Florida Power and Light**
**October 5, 2009**
**Mitsubishi, 501G, Unit #1C**
**West County Energy Center**

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8,644 | SCF ext/MMBtu |
| Fuel Heating Value (HHV) | 998 | Btu/SCF fuel |
| Turbine Fuel Flow | 1,771 | lb/min |
| Duct Burner Fuel Flow | 0 | lb/min |
| Total Fuel Flow | 2,459,303 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.88 | In. Hg |
| Relative Humidity | 44 | % |
| Ambient Temperature | 98 | °F |
| Specific Humidity | 0.017141 | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 238.9 | megawatts |
| Combustor Inlet Pressure | 259 | psig |
| Meas. Stack Moisture | 8.7 | % |
| Stack Exhaust Flow (M19) | 56,038,976 | SCFH |

Data from: NH3 Run 3

Base W/O Db Load, Run - 1-3

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/05/09 13:30:15 | 13290 | 13.05 | 2.41 | -0.15 | 0.86 | 5.18 |
| 10/05/09 13:30:45 | 13320 | 13.04 | 2.35 | -0.15 | 0.92 | 5.20 |
| 10/05/09 13:31:15 | 13350 | 13.04 | 2.35 | -0.11 | 0.93 | 5.17 |
| 10/05/09 13:31:45 | 13380 | 13.06 | 2.36 | -0.11 | 0.97 | 5.17 |
| 10/05/09 13:32:15 | 13410 | 13.05 | 2.30 | -0.13 | 0.88 | 5.16 |
| 10/05/09 13:32:45 | 13440 | 13.05 | 2.23 | -0.18 | 0.93 | 5.15 |
| 10/05/09 13:33:15 | 13470 | 13.04 | 2.21 | -0.07 | 0.90 | 5.19 |
| 10/05/09 13:33:45 | 13500 | 13.05 | 2.30 | -0.11 | 0.89 | 5.16 |
| 10/05/09 13:34:15 | 13530 | 13.04 | 2.29 | -0.10 | 0.89 | 5.17 |
| 10/05/09 13:34:45 | 13560 | 13.02 | 2.28 | -0.11 | 0.99 | 5.18 |
| 10/05/09 13:35:15 | 13590 | 13.01 | 2.40 | -0.10 | 0.97 | 5.17 |
| 10/05/09 13:35:45 | 13620 | 13.03 | 2.43 | -0.11 | 0.94 | 5.17 |
| 10/05/09 13:36:15 | 13650 | 13.04 | 2.36 | -0.10 | 0.98 | 5.15 |
| 10/05/09 13:36:45 | 13680 | 13.04 | 2.31 | -0.09 | 0.97 | 5.16 |
| 10/05/09 13:37:15 | 13710 | 13.03 | 2.35 | -0.10 | 0.93 | 5.16 |
| 10/05/09 13:37:45 | 13740 | 13.05 | 2.30 | -0.12 | 0.92 | 5.16 |
| 10/05/09 13:38:15 | 13770 | 13.06 | 2.20 | -0.13 | 0.99 | 5.17 |
| 10/05/09 13:38:45 | 13800 | 13.03 | 2.15 | -0.12 | 1.02 | 5.17 |
| 10/05/09 13:39:15 | 13830 | 13.02 | 2.28 | -0.13 | 1.07 | 5.14 |
| 10/05/09 13:39:45 | 13860 | 13.04 | 2.41 | -0.14 | 1.05 | 5.14 |
| 10/05/09 13:40:15 | 13890 | 13.03 | 2.37 | -0.08 | 1.06 | 5.13 |
| 10/05/09 13:40:45 | 13920 | 13.03 | 2.33 | -0.10 | 1.05 | 5.16 |
| 10/05/09 13:41:15 | 13950 | 13.04 | 2.39 | -0.15 | 1.07 | 5.22 |
| 10/05/09 13:41:45 | 13980 | 13.05 | 2.43 | -0.16 | 1.09 | 5.22 |
| 10/05/09 13:42:15 | 14010 | 13.04 | 2.40 | -0.14 | 1.07 | 5.23 |
| 10/05/09 13:42:45 | 14040 | 13.02 | 2.34 | -0.14 | 1.05 | 5.21 |
| 10/05/09 13:43:15 | 14070 | 13.03 | 2.33 | -0.20 | 1.05 | 5.21 |
| 10/05/09 13:43:45 | 14100 | 13.04 | 2.35 | -0.14 | 0.97 | 5.19 |
| 10/05/09 13:44:15 | 14130 | 13.07 | 2.31 | -0.12 | 0.95 | 5.21 |
| 10/05/09 13:44:45 | 14160 | 13.05 | 2.28 | -0.10 | 0.99 | 5.23 |
| 10/05/09 13:45:15 | 14190 | 13.02 | 2.30 | -0.09 | 1.00 | 5.25 |
| 10/05/09 13:45:45 | 14220 | 13.01 | 2.40 | -0.17 | 1.05 | 5.21 |
| 10/05/09 13:46:15 | 14250 | 13.02 | 2.49 | -0.16 | 1.02 | 5.24 |
| 10/05/09 13:46:45 | 14280 | 13.03 | 2.46 | -0.16 | 1.05 | 5.21 |
| 10/05/09 13:47:15 | 14310 | 13.05 | 2.40 | -0.17 | 1.03 | 5.20 |
| 10/05/09 13:47:45 | 14340 | 13.05 | 2.33 | -0.11 | 1.03 | 5.21 |
| 10/05/09 13:48:15 | 14370 | 13.04 | 2.24 | -0.18 | 1.04 | 5.22 |
| 10/05/09 13:48:45 | 14400 | 13.05 | 2.23 | -0.15 | 1.08 | 5.25 |
| 10/05/09 13:49:15 | 14430 | 13.05 | 2.22 | -0.15 | 1.08 | 5.24 |
| 10/05/09 13:49:45 | 14460 | 13.05 | 2.23 | -0.14 | 1.09 | 5.24 |
| 10/05/09 13:50:15 | 14490 | 13.04 | 2.26 | -0.14 | 1.12 | 5.22 |
| 10/05/09 13:50:45 | 14520 | 13.04 | 2.33 | -0.16 | 1.17 | 5.19 |
| 10/05/09 13:51:15 | 14550 | 13.03 | 2.36 | -0.16 | 1.19 | 5.21 |
| 10/05/09 13:51:45 | 14580 | 13.03 | 2.37 | -0.17 | 1.08 | 5.19 |
| 10/05/09 13:52:15 | 14610 | 13.04 | 2.30 | -0.18 | 1.10 | 5.24 |
| 10/05/09 13:52:45 | 14640 | 13.05 | 2.39 | -0.12 | 1.15 | 5.21 |
| 10/05/09 13:53:15 | 14670 | 13.03 | 2.34 | -0.15 | 1.10 | 5.18 |
| 10/05/09 13:53:45 | 14700 | 13.01 | 2.36 | -0.19 | 1.09 | 5.19 |
| 10/05/09 13:54:15 | 14730 | 13.03 | 2.41 | -0.15 | 1.10 | 5.18 |
| 10/05/09 13:54:45 | 14760 | 13.02 | 2.40 | -0.17 | 1.10 | 5.18 |
| 10/05/09 13:55:15 | 14790 | 13.04 | 2.46 | -0.14 | 1.09 | 5.20 |
| 10/05/09 13:55:45 | 14820 | 13.03 | 2.33 | -0.15 | 1.13 | 5.21 |
| 10/05/09 13:56:15 | 14850 | 13.05 | 2.33 | -0.17 | 1.09 | 5.19 |
| 10/05/09 13:56:45 | 14880 | 13.04 | 2.23 | -0.23 | 1.11 | 5.22 |
| 10/05/09 13:57:15 | 14910 | 13.04 | 2.23 | -0.21 | 1.14 | 5.19 |
| 10/05/09 13:57:45 | 14940 | 13.01 | 2.28 | -0.15 | 1.14 | 5.17 |
| 10/05/09 13:58:15 | 14970 | 13.03 | 2.39 | -0.16 | 1.10 | 5.23 |
| 10/05/09 13:58:45 | 15000 | 13.03 | 2.36 | -0.18 | 1.14 | 5.25 |
| 10/05/09 13:59:15 | 15030 | 13.04 | 2.36 | -0.12 | 1.20 | 5.22 |
| 10/05/09 13:59:45 | 15060 | 13.06 | 2.35 | -0.12 | 1.12 | 5.22 |
| 10/05/09 14:00:15 | 15090 | 13.02 | 2.27 | -0.16 | 1.14 | 5.22 |
| 10/05/09 14:00:45 | 15120 | 13.03 | 2.35 | -0.19 | 1.13 | 5.19 |
| 10/05/09 14:01:15 | 15150 | 13.01 | 2.37 | -0.18 | 1.17 | 5.20 |
| 10/05/09 14:01:45 | 15180 | 13.03 | 2.45 | -0.20 | 1.13 | 5.19 |
| 10/05/09 14:02:15 | 15210 | 13.04 | 2.47 | -0.19 | 1.10 | 5.17 |
| 10/05/09 14:02:45 | 15240 | 13.05 | 2.35 | -0.16 | 1.10 | 5.16 |
| 10/05/09 14:03:15 | 15270 | 13.05 | 2.22 | -0.14 | 1.17 | 5.16 |
| 10/05/09 14:03:45 | 15300 | 13.03 | 2.21 | -0.16 | 1.16 | 5.19 |
| 10/05/09 14:04:15 | 15330 | 13.03 | 2.28 | -0.17 | 1.19 | 5.15 |
| 10/05/09 14:04:45 | 15360 | 13.04 | 2.31 | -0.18 | 1.23 | 5.16 |
| 10/05/09 14:05:15 | 15390 | 13.05 | 2.34 | -0.18 | 1.14 | 5.19 |
| 10/05/09 14:05:45 | 15420 | 13.07 | 2.32 | -0.15 | 1.18 | 5.16 |
| 10/05/09 14:06:15 | 15450 | 13.04 | 2.28 | -0.14 | 1.23 | 5.20 |
| 10/05/09 14:06:45 | 15480 | 13.04 | 2.27 | -0.20 | 1.23 | 5.22 |
| 10/05/09 14:07:15 | 15510 | 13.04 | 2.29 | -0.16 | 1.17 | 5.19 |
| 10/05/09 14:07:45 | 15540 | 13.00 | 2.34 | -0.20 | 1.20 | 5.21 |
| 10/05/09 14:08:15 | 15570 | 13.00 | 2.40 | -0.32 | 1.16 | 5.17 |
| 10/05/09 14:08:45 | 15600 | 13.00 | 2.46 | -0.19 | 1.24 | 5.20 |
| 10/05/09 14:09:15 | 15630 | 13.03 | 2.47 | -0.20 | 1.16 | 5.20 |
| 10/05/09 14:09:45 | 15660 | 13.03 | 2.40 | -0.15 | 1.22 | 5.16 |
| 10/05/09 14:10:15 | 15690 | 13.05 | 2.36 | -0.22 | 1.19 | 5.13 |
| 10/05/09 14:10:45 | 15720 | 13.06 | 2.25 | -0.15 | 1.18 | 5.17 |
| 10/05/09 14:11:15 | 15750 | 13.03 | 2.24 | -0.22 | 1.14 | 5.13 |
| 10/05/09 14:11:45 | 15780 | 13.04 | 2.27 | -0.21 | 1.21 | 5.14 |

**Florida Power and Light**
**October 5, 2009**
**Mitsubishi, 501G, Unit #1C**
**West County Energy Center**

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8,644 | SCF exh/MMBtu |
| Fuel Heating Value (HHV) | 996 | Btu/SCF fuel |
| Turbine Fuel Flow | 1,771 | lb/min |
| Duct Burner Fuel Flow | 0 | lb/min |
| Total Fuel Flow | 2,459,303 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.88 | In. Hg |
| Relative Humidity | 44 | % |
| Ambient Temperature | 98 | °F |
| Specific Humidity | 0.017141 | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 238.9 | megawatts |
| Combustor Inlet Pressure | 259 | psig |
| Meas. Stack Moisture | 8.7 | % |
| Stack Exhaust Flow (M19) | 56,038,978 | SCFH |

Data from: NH3 Run 3

Base W/O Db Load, Run - 1-3

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/05/09 14:12:15 | 15810 | 13.02 | 2.27 | -0.23 | 1.26 | 5.07 |
| 10/05/09 14:12:45 | 15840 | 13.03 | 2.31 | -0.20 | 1.29 | 5.03 |
| 10/05/09 14:13:15 | 15870 | 13.05 | 2.29 | -0.22 | 1.28 | 5.04 |
| 10/05/09 14:13:45 | 15900 | 13.05 | 2.28 | -0.26 | 1.18 | 5.11 |
| 10/05/09 14:14:15 | 15930 | 13.04 | 2.32 | -0.28 | 1.20 | 5.15 |
| 10/05/09 14:14:45 | 15960 | 13.05 | 2.30 | -0.14 | 1.22 | 5.18 |
| 10/05/09 14:15:15 | 15990 | 13.02 | 2.26 | -0.21 | 1.27 | 5.19 |
| 10/05/09 14:15:45 | 16020 | 13.02 | 2.31 | -0.14 | 1.23 | 5.20 |
| 10/05/09 14:16:15 | 16050 | 13.03 | 2.37 | -0.16 | 1.28 | 5.16 |
| 10/05/09 14:16:45 | 16080 | 13.02 | 2.45 | -0.27 | 1.22 | 5.14 |
| 10/05/09 14:17:15 | 16110 | 13.03 | 2.48 | -0.18 | 1.13 | 5.14 |
| 10/05/09 14:17:45 | 16140 | 13.04 | 2.45 | -0.16 | 1.19 | 5.14 |
| 10/05/09 14:18:15 | 16170 | 13.05 | 2.40 | -0.18 | 1.13 | 5.08 |
| 10/05/09 14:18:45 | 16200 | 13.03 | 2.29 | -0.20 | 1.26 | 5.12 |
| 10/05/09 14:19:15 | 16230 | 13.02 | 2.23 | -0.13 | 1.15 | 5.20 |
| 10/05/09 14:19:45 | 16260 | 13.03 | 2.30 | -0.17 | 1.21 | 5.21 |
| 10/05/09 14:20:15 | 16290 | 13.06 | 2.30 | -0.18 | 1.13 | 5.17 |
| 10/05/09 14:20:45 | 16320 | 13.04 | 2.32 | -0.17 | 1.22 | 5.17 |
| 10/05/09 14:21:15 | 16350 | 13.01 | 2.25 | -0.14 | 1.22 | 5.22 |
| 10/05/09 14:21:45 | 16380 | 13.02 | 2.28 | -0.22 | 1.14 | 5.24 |
| 10/05/09 14:22:15 | 16410 | 13.05 | 2.32 | -0.19 | 1.22 | 5.20 |
| 10/05/09 14:22:45 | 16440 | 13.05 | 2.32 | -0.25 | 1.28 | 5.23 |
| 10/05/09 14:23:15 | 16470 | 13.05 | 2.27 | -0.13 | 1.20 | 5.27 |
| 10/05/09 14:23:45 | 16500 | 13.04 | 2.28 | -0.17 | 1.11 | 5.27 |
| 10/05/09 14:24:15 | 16530 | 13.04 | 2.34 | -0.25 | 1.14 | 5.22 |
| 10/05/09 14:24:45 | 16560 | 13.03 | 2.30 | -0.19 | 1.19 | 5.21 |
| 10/05/09 14:25:15 | 16590 | 13.03 | 2.33 | -0.18 | 1.24 | 5.19 |
| 10/05/09 14:25:45 | 16620 | 13.04 | 2.41 | -0.21 | 1.29 | 5.12 |
| 10/05/09 14:26:15 | 16650 | 13.04 | 2.43 | -0.22 | 1.22 | 5.13 |
| 10/05/09 14:26:45 | 16680 | 13.02 | 2.39 | -0.25 | 1.26 | 5.15 |
| 10/05/09 14:27:15 | 16710 | 13.02 | 2.42 | -0.33 | 1.25 | 5.16 |
| 10/05/09 14:27:45 | 16740 | 13.02 | 2.46 | -0.28 | 1.24 | 5.18 |
| 10/05/09 14:28:15 | 16770 | 13.04 | 2.55 | -0.28 | 1.28 | 5.19 |
| 10/05/09 14:28:45 | 16800 | 13.04 | 2.47 | -0.23 | 1.26 | 5.24 |
| 10/05/09 14:29:15 | 16830 | 13.02 | 2.44 | -0.19 | 1.23 | 5.25 |
| 10/05/09 14:29:45 | 16860 | 13.03 | 2.28 | -0.25 | 1.24 | 5.27 |
| **RAW AVERAGE** | | **13.04** | **2.34** | **-0.17** | **1.12** | **5.19** |

| | | $O_2$ | NOx | CO | VOC | $CO_2$ |
|---|---|---|---|---|---|---|
| | Serial Number: | INST-22-0001 | INST-NX-0010 | INST-CO-0008 | INST-TH-0010 | INST-22-0001 |
| | | (%) | (ppmvd) | (ppmvd) | (ppmvw) | (%) |
| Bias | Initial Zero | -0.03 | -0.02 | -0.45 | 0.44 | 0.56 |
| | Final Zero | -0.04 | -0.02 | -0.30 | 0.34 | 0.67 |
| | Avg. Zero | -0.04 | -0.02 | -0.38 | 0.39 | 0.62 |
| | Initial UpScale | 12.04 | 4.78 | 4.55 | 2.95 | 9.61 |
| | Final UpScale | 12.01 | 4.76 | 4.40 | 3.26 | 9.67 |
| | Avg. UpScale | 12.03 | 4.77 | 4.48 | 3.11 | 9.64 |
| **Upscale Cal Gas** | | 12.00 | 4.99 | 4.94 | 3.00 | 9.20 |

| EMISSIONS DATA | $O_2$ | NOx | CO | VOC | $CO_2$ |
|---|---|---|---|---|---|
| Corrected Raw Average (ppm/% dry basis) | 13.01 | 2.46 | 0.21 | 0.92 | 4.66 |
| Concentration (ppm@ 15%$O_2$) | N/A | 1.83 | 0.16 | 0.69 | N/A |
| Concentration (ppm@ 15%$O_2$ &ISO) | N/A | 2.02 | 0.17 | 0.76 | N/A |
| Emission Rate (lb/hr) | N/A | 16.43 | 0.85 | 2.15 | N/A |
| Emission Rate (tons/year) at 8760 hr/yr | N/A | 71.97 | 3.74 | 9.42 | N/A |
| Emission Rate (lb/MMBtu) | N/A | 0.007 | 0.000 | 0.001 | N/A |

# TEST RESULTS

## NOx, CO, VOC, $CO_2$, and $O_2$ Emissions
## Base Load with Duct Burners

Florida Power and Light
October 5, 2009
Mitsubishi, 501G, Unit #1C
West County Energy Center

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8,649 | SCF ext/MMBtu |
| Fuel Heating Value (HHV) | 988 | Btu/SCF fuel |
| Turbine Fuel Flow | 1,614 | lb/min |
| Duct Burner Fuel Flow | 198 | lb/min |
| Total Fuel Flow | 2,516,237 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.80 | in. Hg |
| Relative Humidity | 52 | % |
| Ambient Temperature | 93 | °F |
| Specific Humidity | 0.017433 | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 247.3 | megawatts |
| Combustor Inlet Pressure | 264 | psig |
| Meas. Stack Moisture | 11.8 | % |
| Stack Exhaust Flow (M19) | 50,530,276 | SCFH |

Data from: NH3 Run 1

Base W/Db Load, Run - 2-1

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/05/09 17:51:15 | 28950 | 11.99 | 2.51 | 4.24 | 1.64 | 5.02 |
| 10/05/09 17:51:45 | 28980 | 11.99 | 2.47 | 4.10 | 1.89 | 5.06 |
| 10/05/09 17:52:15 | 29010 | 11.99 | 2.51 | 4.29 | 1.80 | 5.03 |
| 10/05/09 17:52:45 | 29040 | 12.00 | 2.49 | 4.22 | 1.84 | 5.07 |
| 10/05/09 17:53:15 | 29070 | 12.01 | 2.51 | 4.27 | 1.93 | 4.99 |
| 10/05/09 17:53:45 | 29100 | 12.02 | 2.43 | 4.29 | 1.90 | 4.98 |
| 10/05/09 17:54:15 | 29130 | 11.98 | 2.40 | 4.23 | 2.12 | 5.05 |
| 10/05/09 17:54:45 | 29160 | 11.99 | 2.46 | 4.41 | 1.98 | 5.10 |
| 10/05/09 17:55:15 | 29190 | 12.01 | 2.48 | 4.25 | 1.66 | 5.14 |
| 10/05/09 17:55:45 | 29220 | 12.00 | 2.47 | 4.07 | 1.72 | 5.11 |
| 10/05/09 17:56:15 | 29250 | 12.00 | 2.55 | 4.16 | 1.61 | 5.09 |
| 10/05/09 17:56:45 | 29280 | 12.00 | 2.58 | 4.11 | 1.95 | 5.07 |
| 10/05/09 17:57:15 | 29310 | 12.00 | 2.53 | 4.26 | 1.72 | 5.05 |
| 10/05/09 17:57:45 | 29340 | 12.00 | 2.52 | 4.15 | 1.87 | 5.00 |
| 10/05/09 17:58:15 | 29370 | 12.00 | 2.51 | 4.09 | 1.49 | 4.99 |
| 10/05/09 17:58:45 | 29400 | 12.01 | 2.52 | 4.12 | 1.89 | 4.99 |
| 10/05/09 17:59:15 | 29430 | 12.00 | 2.51 | 4.16 | 1.39 | 4.98 |
| 10/05/09 17:59:45 | 29460 | 12.01 | 2.52 | 3.98 | 1.70 | 5.00 |
| 10/05/09 18:00:15 | 29490 | 11.98 | 2.50 | 4.12 | 1.71 | 4.95 |
| 10/05/09 18:00:45 | 29520 | 11.99 | 2.47 | 4.15 | 1.94 | 4.91 |
| 10/05/09 18:01:15 | 29550 | 12.00 | 2.49 | 4.23 | 1.94 | 4.77 |
| 10/05/09 18:01:45 | 29580 | 12.00 | 2.52 | 4.28 | 2.00 | 4.94 |
| 10/05/09 18:02:15 | 29610 | 12.00 | 2.51 | 4.32 | 1.80 | 4.93 |
| 10/05/09 18:02:45 | 29640 | 12.00 | 2.53 | 4.28 | 1.85 | 4.94 |
| 10/05/09 18:03:15 | 29670 | 11.99 | 2.48 | 4.29 | 1.87 | 4.96 |
| 10/05/09 18:03:45 | 29700 | 11.99 | 2.52 | 4.23 | 1.94 | 4.82 |
| 10/05/09 18:04:15 | 29730 | 11.99 | 2.56 | 4.25 | 1.78 | 4.93 |
| 10/05/09 18:04:45 | 29760 | 12.00 | 2.53 | 4.35 | 2.21 | 4.96 |
| 10/05/09 18:05:15 | 29790 | 12.00 | 2.50 | 4.41 | 1.67 | 4.88 |
| 10/05/09 18:05:45 | 29820 | 12.00 | 2.51 | 4.19 | 1.81 | 4.97 |
| 10/05/09 18:06:15 | 29850 | 12.00 | 2.46 | 4.24 | 1.85 | 5.01 |
| 10/05/09 18:06:45 | 29880 | 12.00 | 2.50 | 4.17 | 1.90 | 4.98 |
| 10/05/09 18:07:15 | 29910 | 12.00 | 2.52 | 4.17 | 1.70 | 4.96 |
| 10/05/09 18:07:45 | 29940 | 11.99 | 2.52 | 4.05 | 1.43 | 5.02 |
| 10/05/09 18:08:15 | 29970 | 11.99 | 2.53 | 3.95 | 1.78 | 5.01 |
| 10/05/09 18:08:45 | 30000 | 11.99 | 2.58 | 4.21 | 1.58 | 5.04 |
| 10/05/09 18:09:15 | 30030 | 12.01 | 2.60 | 4.10 | 1.70 | 5.05 |
| 10/05/09 18:09:45 | 30060 | 12.01 | 2.49 | 4.18 | 1.82 | 4.97 |
| 10/05/09 18:10:15 | 30090 | 12.01 | 2.44 | 4.25 | 1.76 | 4.95 |
| 10/05/09 18:10:45 | 30120 | 12.01 | 2.41 | 4.27 | 1.77 | 4.99 |
| 10/05/09 18:11:15 | 30150 | 12.00 | 2.46 | 4.16 | 1.42 | 4.98 |
| 10/05/09 18:11:45 | 30180 | 11.99 | 2.55 | 4.14 | 1.87 | 4.99 |
| 10/05/09 18:12:15 | 30210 | 11.99 | 2.67 | 4.26 | 1.79 | 4.98 |
| 10/05/09 18:12:45 | 30240 | 11.98 | 2.72 | 4.18 | 1.77 | 4.99 |
| 10/05/09 18:13:15 | 30270 | 11.99 | 2.76 | 4.15 | 1.59 | 5.00 |
| 10/05/09 18:13:45 | 30300 | 11.98 | 2.76 | 4.12 | 1.46 | 5.07 |
| 10/05/09 18:14:15 | 30330 | 11.98 | 2.77 | 4.04 | 1.65 | 5.06 |
| 10/05/09 18:14:45 | 30360 | 11.99 | 2.74 | 4.04 | 1.58 | 5.05 |
| 10/05/09 18:15:15 | 30390 | 12.00 | 2.64 | 4.04 | 1.54 | 5.01 |
| 10/05/09 18:15:45 | 30420 | 12.01 | 2.64 | 4.06 | 1.58 | 5.02 |
| 10/05/09 18:16:15 | 30450 | 11.98 | 2.60 | 4.02 | 1.53 | 4.98 |
| 10/05/09 18:16:45 | 30480 | 11.98 | 2.63 | 4.03 | 1.58 | 4.95 |
| 10/05/09 18:17:15 | 30510 | 11.97 | 2.67 | 4.12 | 1.83 | 3.69 |
| 10/05/09 18:17:45 | 30540 | 11.98 | 2.70 | 4.21 | 1.55 | 4.75 |
| 10/05/09 18:18:15 | 30570 | 12.00 | 2.68 | 4.08 | 1.53 | 5.03 |
| 10/05/09 18:18:45 | 30600 | 12.00 | 2.65 | 4.00 | 1.74 | 5.00 |
| 10/05/09 18:19:15 | 30630 | 12.00 | 2.59 | 4.01 | 1.55 | 4.94 |
| 10/05/09 18:19:45 | 30660 | 11.99 | 2.60 | 4.03 | 1.80 | 4.96 |
| 10/05/09 18:20:15 | 30690 | 11.99 | 2.63 | 4.24 | 1.81 | 4.92 |
| 10/05/09 18:20:45 | 30720 | 11.99 | 2.64 | 4.30 | 1.72 | 4.77 |
| 10/05/09 18:21:15 | 30750 | 11.99 | 2.66 | 4.28 | 1.73 | 4.92 |
| 10/05/09 18:21:45 | 30780 | 11.99 | 2.67 | 4.23 | 1.74 | 4.93 |
| 10/05/09 18:22:15 | 30810 | 11.98 | 2.64 | 4.18 | 1.91 | 4.83 |
| 10/05/09 18:22:45 | 30840 | 12.00 | 2.61 | 4.32 | 1.58 | 4.92 |
| 10/05/09 18:23:15 | 30870 | 11.99 | 2.58 | 4.15 | 1.74 | 5.04 |
| 10/05/09 18:23:45 | 30900 | 12.00 | 2.58 | 4.13 | 1.17 | 5.00 |
| 10/05/09 18:24:15 | 30930 | 12.01 | 2.59 | 3.83 | 1.41 | 5.02 |
| 10/05/09 18:24:45 | 30960 | 12.01 | 2.57 | 3.98 | 1.71 | 5.05 |
| 10/05/09 18:25:15 | 30990 | 11.99 | 2.52 | 4.14 | 1.75 | 5.00 |
| 10/05/09 18:25:45 | 31020 | 11.99 | 2.53 | 4.22 | 1.75 | 4.99 |
| 10/05/09 18:26:15 | 31050 | 12.01 | 2.58 | 4.14 | 2.02 | 5.05 |
| 10/05/09 18:26:45 | 31080 | 12.00 | 2.58 | 4.28 | 1.87 | 5.08 |
| 10/05/09 18:27:15 | 31110 | 11.98 | 2.61 | 4.24 | 1.80 | 5.04 |
| 10/05/09 18:27:45 | 31140 | 11.98 | 2.57 | 4.26 | 1.63 | 4.99 |
| 10/05/09 18:28:15 | 31170 | 11.98 | 2.57 | 4.17 | 1.89 | 5.03 |
| 10/05/09 18:28:45 | 31200 | 11.99 | 2.58 | 4.23 | 1.90 | 5.03 |
| 10/05/09 18:29:15 | 31230 | 12.00 | 2.62 | 4.22 | 1.53 | 5.06 |
| 10/05/09 18:29:45 | 31260 | 12.00 | 2.62 | 4.05 | 1.87 | 5.10 |
| 10/05/09 18:30:15 | 31290 | 12.00 | 2.62 | 4.22 | 1.83 | 5.08 |
| 10/05/09 18:30:45 | 31320 | 12.00 | 2.54 | 4.21 | 1.60 | 5.06 |
| 10/05/09 18:31:15 | 31350 | 12.01 | 2.58 | 4.16 | 1.69 | 5.00 |
| 10/05/09 18:31:45 | 31380 | 12.01 | 2.53 | 4.12 | 1.66 | 5.00 |
| 10/05/09 18:32:15 | 31410 | 12.00 | 2.52 | 4.07 | 1.34 | 4.98 |
| 10/05/09 18:32:45 | 31440 | 12.01 | 2.52 | 3.95 | 1.49 | 5.01 |

*Florida Power and Light*
**October 5, 2009**
**Mitsubishi, 501G, Unit #1C**
**West County Energy Center**

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8.649 | SCF o/v/MMBtu |
| *Fuel Heating Value (HHV)* | *988* | *Btu/SCF fuel* |
| Turbine Fuel Flow | 1,614 | lb/min |
| Duct Burner Fuel Flow | 196 | lb/min |
| Total Fuel Flow | 2,518,237 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.80 | in. Hg |
| Relative Humidity | 52 | % |
| Ambient Temperature | 93 | °F |
| Specific Humidity | 0.017433 | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 247.3 | megawatts |
| *Combustor Inlet Pressure* | *264* | *psig* |
| Meas. Stack Moisture | 11.6 | % |
| Stack Exhaust Flow (M19) | 50,530,276 | SCFH |

Data from: NH3 Run 1

Base W/Db Load, Run - 2-1

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/05/09 18:33:15 | 31470 | 12.01 | 2.55 | 4.04 | 1.65 | 5.02 |
| 10/05/09 18:33:45 | 31500 | 12.00 | 2.54 | 4.02 | 1.12 | 4.74 |
| 10/05/09 18:34:15 | 31530 | 12.00 | 2.52 | 3.78 | 1.51 | 5.02 |
| 10/05/09 18:34:45 | 31560 | 11.99 | 2.53 | 3.95 | 1.54 | 5.06 |
| 10/05/09 18:35:15 | 31590 | 12.00 | 2.59 | 4.07 | 1.73 | 5.09 |
| 10/05/09 18:35:45 | 31620 | 12.00 | 2.50 | 4.12 | 1.62 | 5.02 |
| 10/05/09 18:36:15 | 31650 | 12.01 | 2.46 | 4.10 | 1.36 | 5.00 |
| 10/05/09 18:36:45 | 31680 | 12.02 | 2.46 | 4.02 | 1.77 | 4.59 |
| 10/05/09 18:37:15 | 31710 | 12.01 | 2.50 | 4.17 | 1.89 | 5.08 |
| 10/05/09 18:37:45 | 31740 | 12.00 | 2.54 | 4.32 | 1.79 | 5.07 |
| 10/05/09 18:38:15 | 31770 | 11.99 | 2.58 | 4.27 | 1.81 | 5.08 |
| 10/05/09 18:38:45 | 31800 | 12.01 | 2.58 | 4.21 | 1.60 | 5.07 |
| 10/05/09 18:39:15 | 31830 | 12.01 | 2.55 | 4.13 | 1.87 | 5.05 |
| 10/05/09 18:39:45 | 31860 | 12.01 | 2.49 | 4.28 | 1.95 | 5.02 |
| 10/05/09 18:40:15 | 31890 | 12.00 | 2.52 | 4.22 | 1.53 | 4.98 |
| 10/05/09 18:40:45 | 31920 | 12.00 | 2.50 | 4.04 | 1.77 | 5.06 |
| 10/05/09 18:41:15 | 31950 | 12.03 | 2.49 | 4.16 | 1.79 | 4.97 |
| 10/05/09 18:41:45 | 31980 | 12.01 | 2.50 | 4.25 | 1.75 | 5.13 |
| 10/05/09 18:42:15 | 32010 | 12.00 | 2.50 | 4.27 | 1.87 | 5.14 |
| 10/05/09 18:42:45 | 32040 | 12.00 | 2.56 | 4.28 | 1.57 | 5.08 |
| 10/05/09 18:43:15 | 32070 | 11.99 | 2.62 | 4.05 | 1.35 | 5.09 |
| 10/05/09 18:43:45 | 32100 | 12.00 | 2.64 | 3.98 | 1.73 | 5.13 |
| 10/05/09 18:44:15 | 32130 | 12.00 | 2.70 | 4.11 | 1.48 | 5.11 |
| 10/05/09 18:44:45 | 32160 | 12.00 | 2.58 | 4.10 | 1.86 | 5.12 |
| 10/05/09 18:45:15 | 32190 | 12.00 | 2.53 | 4.32 | 2.07 | 5.06 |
| 10/05/09 18:45:45 | 32220 | 12.00 | 2.56 | 4.45 | 1.76 | 5.10 |
| 10/05/09 18:46:15 | 32250 | 12.02 | 2.48 | 4.29 | 1.68 | 5.12 |
| 10/05/09 18:46:45 | 32280 | 12.03 | 2.53 | 4.18 | 1.93 | 5.14 |
| 10/05/09 18:47:15 | 32310 | 11.99 | 2.52 | 4.33 | 1.59 | 5.14 |
| 10/05/09 18:47:45 | 32340 | 11.99 | 2.57 | 4.14 | 1.42 | 5.06 |
| 10/05/09 18:48:15 | 32370 | 12.01 | 2.63 | 4.14 | 1.75 | 5.04 |
| 10/05/09 18:48:45 | 32400 | 12.00 | 2.61 | 4.36 | 2.13 | 5.05 |
| 10/05/09 18:49:15 | 32430 | 12.01 | 2.61 | 4.45 | 1.63 | 5.06 |
| 10/05/09 18:49:45 | 32460 | 12.01 | 2.54 | 4.24 | 1.67 | 5.04 |
| 10/05/09 18:50:15 | 32490 | 11.99 | 2.57 | 4.16 | 1.81 | 5.01 |
| 10/05/09 18:50:45 | 32520 | 12.00 | 2.59 | 4.23 | 1.81 | 5.03 |
| **RAW AVERAGE** | | **12.00** | **2.56** | **4.17** | **1.72** | **5.00** |

| | | $O_2$ | NOx | CO | VOC | $CO_2$ |
|---|---|---|---|---|---|---|
| | Serial Number: | INST-22-0001 | INST-NX-0010 | INST-CO-0008 | INST-TH-0010 | INST-22-0001 |
| | | (%) | (ppmvd) | (ppmvd) | (ppmvw) | (%) |
| Bias | Initial Zero | -0.05 | 0.00 | -0.45 | 0.00 | 0.01 |
| | Final Zero | -0.03 | 0.01 | -0.45 | -0.01 | 0.05 |
| | Avg. Zero | -0.04 | 0.01 | -0.45 | -0.01 | 0.03 |
| | Initial UpScale | 12.00 | 4.81 | 4.47 | 2.87 | 9.06 |
| | Final UpScale | 11.99 | 4.79 | 4.45 | 3.07 | 8.96 |
| | Avg. UpScale | 12.00 | 4.80 | 4.46 | 2.97 | 9.01 |
| **Upscale Cal Gas** | | *12.00* | *4.99* | *4.94* | *3.00* | 9.20 |

| EMISSIONS DATA | $O_2$ | NOx | CO | VOC | $CO_2$ |
|---|---|---|---|---|---|
| Corrected Raw Average (ppm/% dry basis) | 12.00 | 2.66 | 4.65 | 1.97 | 5.09 |
| Concentration (ppm@ 15%$O_2$) | N/A | 1.76 | 3.08 | 1.31 | N/A |
| Concentration (ppm@ 15%$O_2$ &ISO) | N/A | 1.97 | 3.45 | 1.46 | N/A |
| Emission Rate (lb/hr) | N/A | 16.03 | 17.07 | 4.13 | N/A |
| Emission Rate (tons/year) at 8760 hr/yr | N/A | 70.23 | 74.77 | 18.10 | N/A |
| Emission Rate (lb/MMBtu) | N/A | 0.006 | 0.007 | 0.002 | N/A |

**Florida Power and Light**
***October 5, 2009***
**Mitsubishi, 501G, Unit #1C**
**West County Energy Center**

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8,649 | SCF exh/MMBtu |
| Fuel Heating Value (HHV) | 988 | Btu/SCF fuel |
| Turbine Fuel Flow | 1,624 | lb/min |
| Duct Burner Fuel Flow | 198 | lb/min |
| Total Fuel Flow | 2,530,124 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.83 | in. Hg |
| Relative Humidity | 74 | % |
| Ambient Temperature | 87 | °F |
| Specific Humidity | 0.020635 | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 248.2 | megawatts |
| Combustor Inlet Pressure | 265 | psig |
| Meas. Stack Moisture | 11.3 | % |
| Stack Exhaust Flow (M19) | 50,665,020 | SCFH |

Data from: NH3 Run 2

Base W/Db Load, Run - 2-2

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/05/09 19:05:15 | 33390 | 11.97 | 2.61 | 4.36 | 2.26 | 5.06 |
| 10/05/09 19:05:45 | 33420 | 11.98 | 2.60 | 4.21 | 1.81 | 5.11 |
| 10/05/09 19:06:15 | 33450 | 12.01 | 2.60 | 4.07 | 2.06 | 5.13 |
| 10/05/09 19:06:45 | 33480 | 12.00 | 2.59 | 4.20 | 2.09 | 5.13 |
| 10/05/09 19:07:15 | 33510 | 12.00 | 2.56 | 4.24 | 1.98 | 5.13 |
| 10/05/09 19:07:45 | 33540 | 12.00 | 2.53 | 4.12 | 2.13 | 5.08 |
| 10/05/09 19:08:15 | 33570 | 11.99 | 2.54 | 4.18 | 2.35 | 5.11 |
| 10/05/09 19:08:45 | 33600 | 12.00 | 2.60 | 4.23 | 1.83 | 5.13 |
| 10/05/09 19:09:15 | 33630 | 12.00 | 2.55 | 4.10 | 2.14 | 5.16 |
| 10/05/09 19:09:45 | 33660 | 12.01 | 2.57 | 4.16 | 1.84 | 5.16 |
| 10/05/09 19:10:15 | 33690 | 11.99 | 2.50 | 4.04 | 2.29 | 5.16 |
| 10/05/09 19:10:45 | 33720 | 12.01 | 2.58 | 4.27 | 1.83 | 5.13 |
| 10/05/09 19:11:15 | 33750 | 11.99 | 2.50 | 4.08 | 2.32 | 5.14 |
| 10/05/09 19:11:45 | 33780 | 11.99 | 2.56 | 4.35 | 2.08 | 5.10 |
| 10/05/09 19:12:15 | 33810 | 12.00 | 2.52 | 4.34 | 2.47 | 5.12 |
| 10/05/09 19:12:45 | 33840 | 12.00 | 2.52 | 4.46 | 2.20 | 5.11 |
| 10/05/09 19:13:15 | 33870 | 12.00 | 2.58 | 4.30 | 2.08 | 5.15 |
| 10/05/09 19:13:45 | 33900 | 11.98 | 2.51 | 4.22 | 2.15 | 5.19 |
| 10/05/09 19:14:15 | 33930 | 12.00 | 2.56 | 4.34 | 2.24 | 5.20 |
| 10/05/09 19:14:45 | 33960 | 11.98 | 2.56 | 4.29 | 0.93 | 5.13 |
| 10/05/09 19:15:15 | 33990 | 12.00 | 2.52 | 4.28 | 0.90 | 5.11 |
| 10/05/09 19:15:45 | 34020 | 12.00 | 2.53 | 4.10 | 0.88 | 5.14 |
| 10/05/09 19:16:15 | 34050 | 12.07 | 2.56 | 4.21 | 0.97 | 5.10 |
| 10/05/09 19:16:45 | 34080 | 12.01 | 2.52 | 4.13 | 0.98 | 5.19 |
| 10/05/09 19:17:15 | 34110 | 11.98 | 2.57 | 4.26 | 1.03 | 5.13 |
| 10/05/09 19:17:45 | 34140 | 11.98 | 2.66 | 4.37 | 0.92 | 4.97 |
| 10/05/09 19:18:15 | 34170 | 11.97 | 2.61 | 4.28 | 0.77 | 4.99 |
| 10/05/09 19:18:45 | 34200 | 11.99 | 2.61 | 4.10 | 0.97 | 5.02 |
| 10/05/09 19:19:15 | 34230 | 11.99 | 2.56 | 4.35 | 0.88 | 5.05 |
| 10/05/09 19:19:45 | 34260 | 11.99 | 2.58 | 4.28 | 0.90 | 5.11 |
| 10/05/09 19:20:15 | 34290 | 11.99 | 2.59 | 4.18 | 0.84 | 5.10 |
| 10/05/09 19:20:45 | 34320 | 11.98 | 2.57 | 4.28 | 1.00 | 5.07 |
| 10/05/09 19:21:15 | 34350 | 11.98 | 2.66 | 4.39 | 0.80 | 5.08 |
| 10/05/09 19:21:45 | 34380 | 11.98 | 2.66 | 4.25 | 0.90 | 5.12 |
| 10/05/09 19:22:15 | 34410 | 11.98 | 2.68 | 4.25 | 0.86 | 5.20 |
| 10/05/09 19:22:45 | 34440 | 11.98 | 2.68 | 4.17 | 0.87 | 5.12 |
| 10/05/09 19:23:15 | 34470 | 11.96 | 2.69 | 4.25 | 1.02 | 5.09 |
| 10/05/09 19:23:45 | 34500 | 11.97 | 2.67 | 4.38 | 0.88 | 5.12 |
| 10/05/09 19:24:15 | 34530 | 11.99 | 2.62 | 4.24 | 0.77 | 4.98 |
| 10/05/09 19:24:45 | 34560 | 11.99 | 2.56 | 4.16 | 0.86 | 5.03 |
| 10/05/09 19:25:15 | 34590 | 11.99 | 2.59 | 4.25 | 0.80 | 5.05 |
| 10/05/09 19:25:45 | 34620 | 11.98 | 2.58 | 4.20 | 0.80 | 5.04 |
| 10/05/09 19:26:15 | 34650 | 11.98 | 2.59 | 4.15 | 0.90 | 5.06 |
| 10/05/09 19:26:45 | 34680 | 11.97 | 2.55 | 4.25 | 0.90 | 5.04 |
| 10/05/09 19:27:15 | 34710 | 12.00 | 2.60 | 4.18 | 0.85 | 5.00 |
| 10/05/09 19:27:45 | 34740 | 12.00 | 2.62 | 4.21 | 0.88 | 4.93 |
| 10/05/09 19:28:15 | 34770 | 11.99 | 2.63 | 4.29 | 0.67 | 4.85 |
| 10/05/09 19:28:45 | 34800 | 12.00 | 2.61 | 4.13 | 0.85 | 4.89 |
| 10/05/09 19:29:15 | 34830 | 12.00 | 2.57 | 4.21 | 0.58 | 4.89 |
| 10/05/09 19:29:45 | 34860 | 11.99 | 2.58 | 4.12 | 0.73 | 4.92 |
| 10/05/09 19:30:15 | 34890 | 12.00 | 2.57 | 4.12 | 0.59 | 4.77 |
| 10/05/09 19:30:45 | 34920 | 11.99 | 2.58 | 3.97 | 0.63 | 4.97 |
| 10/05/09 19:31:15 | 34950 | 12.01 | 2.62 | 4.14 | 0.61 | 5.01 |
| 10/05/09 19:31:45 | 34980 | 11.99 | 2.53 | 4.06 | 0.77 | 5.06 |
| 10/05/09 19:32:15 | 35010 | 11.99 | 2.48 | 4.19 | 0.60 | 5.04 |
| 10/05/09 19:32:45 | 35040 | 12.00 | 2.41 | 4.11 | 0.58 | 5.00 |
| 10/05/09 19:33:15 | 35070 | 12.00 | 2.56 | 4.12 | 0.67 | 4.99 |
| 10/05/09 19:33:45 | 35100 | 12.01 | 2.65 | 4.28 | 0.49 | 4.97 |
| 10/05/09 19:34:15 | 35130 | 12.00 | 2.59 | 4.08 | 0.75 | 5.00 |
| 10/05/09 19:34:45 | 35160 | 12.00 | 2.63 | 4.26 | 0.69 | 5.00 |
| 10/05/09 19:35:15 | 35190 | 11.99 | 2.56 | 4.18 | 0.57 | 5.00 |
| 10/05/09 19:35:45 | 35220 | 12.00 | 2.58 | 4.11 | 0.70 | 5.01 |
| 10/05/09 19:36:15 | 35250 | 12.01 | 2.55 | 4.12 | 0.58 | 5.01 |
| 10/05/09 19:36:45 | 35280 | 12.01 | 2.57 | 3.99 | 0.53 | 4.97 |
| 10/05/09 19:37:15 | 35310 | 12.01 | 2.61 | 3.99 | 0.60 | 4.99 |
| 10/05/09 19:37:45 | 35340 | 12.01 | 2.58 | 3.97 | 0.57 | 5.00 |
| 10/05/09 19:38:15 | 35370 | 12.00 | 2.64 | 3.96 | 0.54 | 5.03 |
| 10/05/09 19:38:45 | 35400 | 12.01 | 2.64 | 4.00 | 0.51 | 5.00 |
| 10/05/09 19:39:15 | 35430 | 12.02 | 2.56 | 3.83 | 0.59 | 5.01 |
| 10/05/09 19:39:45 | 35460 | 12.02 | 2.59 | 3.79 | 0.47 | 4.98 |
| 10/05/09 19:40:15 | 35490 | 12.01 | 2.55 | 3.77 | 0.65 | 4.97 |
| 10/05/09 19:40:45 | 35520 | 12.02 | 2.57 | 3.91 | 0.67 | 5.00 |
| 10/05/09 19:41:15 | 35550 | 12.02 | 2.60 | 3.97 | 0.64 | 5.05 |
| 10/05/09 19:41:45 | 35580 | 12.02 | 2.65 | 3.85 | 0.62 | 5.04 |
| 10/05/09 19:42:15 | 35610 | 12.01 | 2.64 | 3.92 | 0.46 | 5.02 |
| 10/05/09 19:42:45 | 35640 | 12.01 | 2.65 | 3.70 | 0.52 | 5.00 |
| 10/05/09 19:43:15 | 35670 | 12.02 | 2.57 | 3.72 | 0.49 | 5.01 |
| 10/05/09 19:43:45 | 35700 | 12.01 | 2.58 | 3.75 | 0.40 | 4.97 |
| 10/05/09 19:44:15 | 35730 | 12.02 | 2.60 | 3.81 | 0.62 | 4.92 |
| 10/05/09 19:44:45 | 35760 | 12.01 | 2.55 | 3.98 | 0.54 | 5.01 |
| 10/05/09 19:45:15 | 35790 | 12.03 | 2.58 | 3.86 | 0.46 | 5.04 |
| 10/05/09 19:45:45 | 35820 | 12.03 | 2.62 | 3.86 | 0.56 | 5.00 |
| 10/05/09 19:46:15 | 35850 | 12.02 | 2.63 | 3.86 | 0.50 | 4.96 |
| 10/05/09 19:46:45 | 35880 | 12.02 | 2.53 | 3.85 | 0.41 | 5.02 |

**Florida Power and Light**
**October 5, 2009**
**Mitsubishi, 501G, Unit #1C**
**West County Energy Center**

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8,649 | SCF exh/MMBtu |
| Fuel Heating Value (HHV) | 988 | Btu/SCF fuel |
| Turbine Fuel Flow | 1,624 | lb/min |
| Duct Burner Fuel Flow | 198 | lb/min |
| Total Fuel Flow | 2,530,124 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.83 | in. Hg |
| Relative Humidity | 74 | % |
| Ambient Temperature | 87 | °F |
| Specific Humidity | 0.020635 | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 248.2 | megawatts |
| Combustor Inlet Pressure | 265 | psig |
| Meas. Stack Moisture | 11.3 | % |
| Stack Exhaust Flow (M19) | 50,885,020 | SCFH |

Data from: NH3 Run 2

Base W/Db Load, Run - 2-2

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/05/09 19:47:15 | 35910 | 12.04 | 2.55 | 3.74 | 0.49 | 4.99 |
| 10/05/09 19:47:45 | 35940 | 12.04 | 2.54 | 3.75 | 0.53 | 4.99 |
| 10/05/09 19:48:15 | 35970 | 12.03 | 2.58 | 3.87 | 0.47 | 5.01 |
| 10/05/09 19:48:45 | 36000 | 12.04 | 2.60 | 3.87 | 0.49 | 4.95 |
| 10/05/09 19:49:15 | 36030 | 12.03 | 2.64 | 3.86 | 0.56 | 4.95 |
| 10/05/09 19:49:45 | 36060 | 12.02 | 2.59 | 3.91 | 0.44 | 4.96 |
| 10/05/09 19:50:15 | 36090 | 12.01 | 2.59 | 3.75 | 0.55 | 4.93 |
| 10/05/09 19:50:45 | 36120 | 12.01 | 2.57 | 3.84 | 0.43 | 4.90 |
| 10/05/09 19:51:15 | 36150 | 12.02 | 2.54 | 3.79 | 0.57 | 4.94 |
| 10/05/09 19:51:45 | 36180 | 12.02 | 2.57 | 3.90 | 0.43 | 5.01 |
| 10/05/09 19:52:15 | 36210 | 12.01 | 2.55 | 3.84 | 0.42 | 5.01 |
| 10/05/09 19:52:45 | 36240 | 12.01 | 2.59 | 3.81 | 0.62 | 4.98 |
| 10/05/09 19:53:15 | 36270 | 12.02 | 2.58 | 3.85 | 0.34 | 5.03 |
| 10/05/09 19:53:45 | 36300 | 12.03 | 2.66 | 3.59 | 0.56 | 5.03 |
| 10/05/09 19:54:15 | 36330 | 12.03 | 2.59 | 3.96 | 0.49 | 5.04 |
| 10/05/09 19:54:45 | 36360 | 12.02 | 2.52 | 3.77 | 0.57 | 5.03 |
| 10/05/09 19:55:15 | 36390 | 12.04 | 2.58 | 3.95 | 0.63 | 5.05 |
| 10/05/09 19:55:45 | 36420 | 12.03 | 2.57 | 4.08 | 0.39 | 5.02 |
| 10/05/09 19:56:15 | 36450 | 12.03 | 2.57 | 3.77 | 0.49 | 5.03 |
| 10/05/09 19:56:45 | 36480 | 12.02 | 2.60 | 3.75 | 0.50 | 5.03 |
| 10/05/09 19:57:15 | 36510 | 12.02 | 2.62 | 3.76 | 0.58 | 5.04 |
| 10/05/09 19:57:45 | 36540 | 12.02 | 2.62 | 3.92 | 0.64 | 5.00 |
| 10/05/09 19:58:15 | 36570 | 12.01 | 2.64 | 3.92 | 0.48 | 5.01 |
| 10/05/09 19:58:45 | 36600 | 12.02 | 2.66 | 3.80 | 0.43 | 5.01 |
| 10/05/09 19:59:15 | 36630 | 12.03 | 2.59 | 3.83 | 0.47 | 4.98 |
| 10/05/09 19:59:45 | 36660 | 12.02 | 2.53 | 3.83 | 0.54 | 5.00 |
| 10/05/09 20:00:15 | 36690 | 12.03 | 2.56 | 3.89 | 0.48 | 4.96 |
| 10/05/09 20:00:45 | 36720 | 12.03 | 2.59 | 3.86 | 0.51 | 4.96 |
| 10/05/09 20:01:15 | 36750 | 12.03 | 2.59 | 4.06 | 0.49 | 4.92 |
| 10/05/09 20:01:45 | 36780 | 12.03 | 2.57 | 3.86 | 0.52 | 4.90 |
| 10/05/09 20:02:15 | 36810 | 12.02 | 2.59 | 3.95 | 0.48 | 4.93 |
| 10/05/09 20:02:45 | 36840 | 12.03 | 2.56 | 4.05 | 0.53 | 4.95 |
| 10/05/09 20:03:15 | 36870 | 12.01 | 2.56 | 4.00 | 0.56 | 4.96 |
| 10/05/09 20:03:45 | 36900 | 12.01 | 2.66 | 4.02 | 0.58 | 5.00 |
| 10/05/09 20:04:15 | 36930 | 12.03 | 2.64 | 4.06 | 0.52 | 4.97 |
| 10/05/09 20:04:45 | 36960 | 12.01 | 2.59 | 4.01 | 0.48 | 5.00 |
| **RAW AVERAGE** | | **12.01** | **2.58** | **4.05** | **0.87** | **5.03** |

| | | $O_2$ | NOx | CO | VOC | $CO_2$ |
|---|---|---|---|---|---|---|
| | Serial Number: | INST-22-0001 | INST-NX-0010 | INST-CO-0008 | INST-TH-0010 | INST-22-0001 |
| | | (%) | (ppmvd) | (ppmvd) | (ppmvw) | (%) |
| Bias | Initial Zero | -0.03 | 0.01 | -0.45 | -0.01 | 0.05 |
| | Final Zero | -0.06 | 0.06 | -0.44 | 0.01 | -0.15 |
| | Avg. Zero | -0.05 | 0.04 | -0.45 | 0.00 | -0.05 |
| | Initial UpScale | 11.99 | 4.79 | 4.45 | 3.07 | 8.96 |
| | Final UpScale | 11.99 | 4.79 | 4.48 | 2.78 | 9.00 |
| | Avg. UpScale | 11.99 | 4.79 | 4.47 | 2.93 | 8.98 |
| **Upscale Cal Gas** | | 12.00 | 4.99 | 4.94 | 3.00 | 9.20 |

| EMISSIONS DATA | $O_2$ | NOx | CO | VOC | $CO_2$ |
|---|---|---|---|---|---|
| Corrected Raw Average (ppm/% dry basis) | 12.02 | 2.68 | 4.52 | 1.01 | 5.17 |
| Concentration (ppm@ 15%$O_2$) | N/A | 1.78 | 3.00 | 0.67 | N/A |
| Concentration (ppm@ 15%$O_2$ &ISO) | N/A | 2.15 | 3.63 | 0.81 | N/A |
| Emission Rate (lb/hr) | N/A | 16.26 | 16.73 | 2.14 | N/A |
| Emission Rate (tons/year) at 8760 hr/yr | N/A | 71.21 | 73.27 | 9.35 | N/A |
| Emission Rate (lb/MMBtu) | N/A | 0.007 | 0.007 | 0.001 | N/A |

Florida Power and Light
October 6, 2009
Mitsubishi, 501G, Unit #1C
West County Energy Center

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8,649 | SCF ext/MMBtu |
| Fuel Heating Value (HHV) | 988 | Btu/SCF fuel |
| Turbine Fuel Flow | 1,638 | lb/min |
| Duct Burner Fuel Flow | 192 | lb/min |
| Total Fuel Flow | 2,541,002 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.88 | In. Hg |
| Relative Humidity | 88 | % |
| Ambient Temperature | 88 | °F |
| Specific Humidity | 0.023849 | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 248.9 | megawatts |
| Combustor Inlet Pressure | 266 | psig |
| Meas. Stack Moisture | 11.0 | % |
| Stack Exhaust Flow (M19) | 51,341,833 | SCFH |

Data from NH3 Run 3

Base W/Db Load, Run - 2-3

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/06/09 09:57:28 | 9000 | 12.07 | 2.64 | 2.90 | 1.67 | 5.45 |
| 10/06/09 09:57:58 | 9030 | 12.07 | 2.62 | 2.93 | 1.85 | 5.46 |
| 10/06/09 09:58:28 | 9060 | 12.06 | 2.59 | 3.06 | 1.65 | 5.45 |
| 10/06/09 09:58:58 | 9090 | 12.06 | 2.66 | 2.88 | 1.64 | 5.45 |
| 10/06/09 09:59:28 | 9120 | 12.06 | 2.64 | 2.93 | 1.66 | 5.39 |
| 10/06/09 09:59:58 | 9150 | 12.06 | 2.66 | 2.95 | 1.61 | 5.52 |
| 10/06/09 10:00:28 | 9180 | 12.08 | 2.63 | 2.93 | 1.54 | 5.45 |
| 10/06/09 10:00:58 | 9210 | 12.08 | 2.60 | 2.76 | 1.72 | 5.36 |
| 10/06/09 10:01:28 | 9240 | 12.08 | 2.58 | 3.00 | 1.79 | 5.29 |
| 10/06/09 10:01:58 | 9270 | 12.06 | 2.63 | 3.01 | 1.74 | 5.40 |
| 10/06/09 10:02:28 | 9300 | 12.06 | 2.66 | 2.96 | 1.58 | 5.36 |
| 10/06/09 10:02:58 | 9330 | 12.07 | 2.69 | 2.87 | 1.75 | 5.45 |
| 10/06/09 10:03:28 | 9360 | 12.05 | 2.69 | 2.97 | 1.69 | 5.45 |
| 10/06/09 10:03:58 | 9390 | 12.05 | 2.71 | 2.87 | 1.63 | 5.46 |
| 10/06/09 10:04:28 | 9420 | 12.06 | 2.68 | 2.82 | 1.65 | 5.46 |
| 10/06/09 10:04:58 | 9450 | 12.05 | 2.62 | 2.76 | 1.71 | 5.51 |
| 10/06/09 10:05:28 | 9480 | 12.06 | 2.62 | 2.95 | 1.84 | 5.52 |
| 10/06/09 10:05:58 | 9510 | 12.08 | 2.60 | 2.96 | 1.56 | 5.48 |
| 10/06/09 10:06:28 | 9540 | 12.06 | 2.59 | 2.75 | 1.55 | 5.44 |
| 10/06/09 10:06:58 | 9570 | 12.07 | 2.66 | 2.83 | 1.59 | 5.47 |
| 10/06/09 10:07:28 | 9600 | 12.08 | 2.71 | 2.75 | 1.57 | 5.52 |
| 10/06/09 10:07:58 | 9630 | 12.08 | 2.64 | 2.76 | 1.68 | 5.52 |
| 10/06/09 10:08:28 | 9660 | 12.07 | 2.62 | 2.81 | 1.69 | 5.55 |
| 10/06/09 10:08:58 | 9690 | 12.06 | 2.64 | 2.96 | 2.00 | 5.52 |
| 10/06/09 10:09:28 | 9720 | 12.06 | 2.64 | 3.20 | 1.75 | 5.52 |
| 10/06/09 10:09:58 | 9750 | 12.07 | 2.67 | 2.87 | 1.58 | 5.58 |
| 10/06/09 10:10:28 | 9780 | 12.07 | 2.61 | 2.74 | 1.79 | 5.39 |
| 10/06/09 10:10:58 | 9810 | 12.07 | 2.58 | 2.87 | 1.76 | 5.48 |
| 10/06/09 10:11:28 | 9840 | 12.06 | 2.63 | 2.88 | 1.78 | 5.47 |
| 10/06/09 10:11:58 | 9870 | 12.07 | 2.65 | 2.98 | 1.83 | 5.48 |
| 10/06/09 10:12:28 | 9900 | 12.07 | 2.65 | 2.93 | 1.75 | 5.48 |
| 10/06/09 10:12:58 | 9930 | 12.06 | 2.62 | 2.90 | 1.82 | 5.46 |
| 10/06/09 10:13:28 | 9960 | 12.07 | 2.56 | 2.89 | 1.81 | 5.37 |
| 10/06/09 10:13:58 | 9990 | 12.06 | 2.57 | 2.86 | 1.91 | 5.48 |
| 10/06/09 10:14:28 | 10020 | 12.06 | 2.58 | 2.87 | 1.77 | 5.53 |
| 10/06/09 10:14:58 | 10050 | 12.06 | 2.68 | 2.83 | 1.85 | 5.53 |
| 10/06/09 10:15:28 | 10080 | 12.08 | 2.73 | 2.85 | 1.86 | 5.50 |
| 10/06/09 10:15:58 | 10110 | 12.08 | 2.70 | 2.86 | 1.80 | 5.52 |
| 10/06/09 10:16:28 | 10140 | 12.08 | 2.64 | 2.79 | 1.83 | 5.48 |
| 10/06/09 10:16:58 | 10170 | 12.07 | 2.62 | 2.82 | 1.89 | 5.57 |
| 10/06/09 10:17:28 | 10200 | 12.07 | 2.60 | 2.89 | 1.82 | 5.50 |
| 10/06/09 10:17:58 | 10230 | 12.05 | 2.64 | 2.81 | 1.91 | 5.54 |
| 10/06/09 10:18:28 | 10260 | 12.04 | 2.65 | 2.86 | 1.98 | 5.59 |
| 10/06/09 10:18:58 | 10290 | 12.08 | 2.66 | 3.05 | 1.94 | 5.51 |
| 10/06/09 10:19:28 | 10320 | 12.08 | 2.64 | 2.99 | 1.94 | 5.37 |
| 10/06/09 10:19:58 | 10350 | 12.08 | 2.59 | 2.86 | 1.91 | 5.51 |
| 10/06/09 10:20:28 | 10380 | 12.09 | 2.61 | 2.93 | 1.98 | 5.48 |
| 10/06/09 10:20:58 | 10410 | 12.07 | 2.62 | 2.93 | 1.91 | 5.43 |
| 10/06/09 10:21:28 | 10440 | 12.07 | 2.57 | 2.77 | 2.01 | 5.37 |
| 10/06/09 10:21:58 | 10470 | 12.07 | 2.62 | 2.81 | 2.04 | 5.39 |
| 10/06/09 10:22:28 | 10500 | 12.07 | 2.66 | 2.84 | 2.07 | 5.42 |
| 10/06/09 10:22:58 | 10530 | 12.08 | 2.65 | 2.90 | 2.05 | 5.51 |
| 10/06/09 10:23:28 | 10560 | 12.09 | 2.69 | 2.87 | 1.90 | 5.55 |
| 10/06/09 10:23:58 | 10590 | 12.08 | 2.63 | 2.82 | 2.14 | 5.37 |
| 10/06/09 10:24:28 | 10620 | 12.08 | 2.63 | 3.01 | 2.00 | 5.50 |
| 10/06/09 10:24:58 | 10650 | 12.08 | 2.61 | 2.94 | 2.09 | 5.59 |
| 10/06/09 10:25:28 | 10680 | 12.07 | 2.56 | 2.94 | 1.82 | 5.53 |
| 10/06/09 10:25:58 | 10710 | 12.07 | 2.56 | 2.96 | 1.66 | 5.41 |
| 10/06/09 10:26:28 | 10740 | 12.07 | 2.62 | 2.86 | 1.80 | 5.56 |
| 10/06/09 10:26:58 | 10770 | 12.07 | 2.63 | 3.05 | 1.89 | 5.58 |
| 10/06/09 10:27:28 | 10800 | 12.06 | 2.65 | 3.10 | 1.82 | 5.52 |
| 10/06/09 10:27:58 | 10830 | 12.06 | 2.66 | 3.09 | 1.85 | 5.48 |
| 10/06/09 10:28:28 | 10860 | 12.05 | 2.64 | 3.11 | 1.91 | 5.60 |
| 10/06/09 10:28:58 | 10890 | 12.07 | 2.58 | 3.29 | 1.98 | 5.59 |
| 10/06/09 10:29:28 | 10920 | 12.06 | 2.61 | 3.39 | 1.87 | 5.65 |
| 10/06/09 10:29:58 | 10950 | 12.06 | 2.63 | 3.22 | 1.85 | 5.59 |
| 10/06/09 10:30:28 | 10980 | 12.07 | 2.66 | 3.10 | 1.86 | 5.64 |
| 10/06/09 10:30:58 | 11010 | 12.06 | 2.58 | 3.08 | 1.85 | 5.69 |
| 10/06/09 10:31:28 | 11040 | 12.07 | 2.55 | 3.19 | 1.89 | 5.65 |
| 10/06/09 10:31:58 | 11070 | 12.06 | 2.56 | 3.28 | 1.88 | 5.64 |
| 10/06/09 10:32:28 | 11100 | 12.05 | 2.58 | 3.22 | 1.88 | 5.63 |
| 10/06/09 10:32:58 | 11130 | 12.06 | 2.57 | 3.36 | 1.89 | 5.65 |
| 10/06/09 10:33:28 | 11160 | 12.05 | 2.64 | 3.32 | 1.98 | 5.67 |
| 10/06/09 10:33:58 | 11190 | 12.04 | 2.67 | 3.43 | 2.01 | 5.64 |
| 10/06/09 10:34:28 | 11220 | 12.04 | 2.66 | 3.46 | 2.03 | 5.65 |
| 10/06/09 10:34:58 | 11250 | 12.04 | 2.67 | 3.59 | 1.91 | 5.64 |
| 10/06/09 10:35:28 | 11280 | 12.03 | 2.64 | 3.45 | 1.97 | 5.64 |
| 10/06/09 10:35:58 | 11310 | 12.04 | 2.62 | 3.47 | 1.98 | 5.59 |
| 10/06/09 10:36:28 | 11340 | 12.03 | 2.63 | 3.51 | 2.09 | 5.62 |
| 10/06/09 10:36:58 | 11370 | 12.02 | 2.57 | 3.49 | 2.01 | 5.63 |
| 10/06/09 10:37:28 | 11400 | 12.02 | 2.66 | 3.46 | 2.08 | 5.50 |
| 10/06/09 10:37:58 | 11430 | 12.05 | 2.70 | 3.63 | 1.98 | 5.64 |
| 10/06/09 10:38:28 | 11460 | 12.04 | 2.68 | 3.60 | 2.05 | 5.63 |
| 10/06/09 10:38:58 | 11490 | 12.03 | 2.76 | 3.61 | 2.06 | 5.62 |

Florida Power and Light
October 6, 2009
Mitsubishi, 501G, Unit #1C
West County Energy Center

**Fuel Data**

| | | |
|---|---|---|
| Fuel Fd factor | 8.649 | SCF exh/MMBtu |
| Fuel Heating Value (HHV) | 988 | Btu/SCF fuel |
| Turbine Fuel Flow | 1,638 | lb/min |
| Duct Burner Fuel Flow | 192 | lb/min |
| Total Fuel Flow | 2,541,002 | SCFH |

**Weather Data**

| | | |
|---|---|---|
| Barometric Pressure | 29.88 | in. Hg |
| Relative Humidity | 88 | % |
| Ambient Temperature | 86 | °F |
| Specific Humidity | 0.023849 | lb $H_2O$ / lb air |

**Unit Data**

| | | |
|---|---|---|
| Unit Load | 248.9 | megawatts |
| Combustor Inlet Pressure | 266 | psig |
| Meas. Stack Moisture | 11.0 | % |
| Stack Exhaust Flow (M19) | 51,341,833 | SCFH |

Data from: NH3 Run 3

Base W/Db Load, Run - 2-3

| Date/Time (mm/dd/yy hh:mm:ss) | Elapsed Time (seconds) | $O_2$ (%) | NOx (ppmvd) | CO (ppmvd) | VOC (ppmvw) | $CO_2$ (%) |
|---|---|---|---|---|---|---|
| 10/06/09 10:39:28 | 11520 | 12.04 | 2.76 | 3.52 | 2.03 | 5.55 |
| 10/06/09 10:39:58 | 11550 | 12.03 | 2.74 | 3.56 | 2.13 | 5.55 |
| 10/06/09 10:40:28 | 11580 | 12.03 | 2.76 | 3.64 | 2.16 | 5.54 |
| 10/06/09 10:40:58 | 11610 | 12.03 | 2.81 | 3.65 | 2.09 | 5.56 |
| 10/06/09 10:41:28 | 11640 | 12.03 | 2.75 | 3.62 | 1.93 | 5.51 |
| 10/06/09 10:41:58 | 11670 | 12.04 | 2.74 | 3.45 | 2.05 | 5.57 |
| 10/06/09 10:42:28 | 11700 | 12.04 | 2.68 | 3.54 | 2.07 | 5.63 |
| 10/06/09 10:42:58 | 11730 | 12.03 | 2.76 | 3.62 | 2.12 | 5.44 |
| 10/06/09 10:43:28 | 11760 | 12.03 | 2.77 | 3.58 | 2.06 | 5.64 |
| 10/06/09 10:43:58 | 11790 | 12.02 | 2.75 | 3.53 | 2.13 | 5.61 |
| 10/06/09 10:44:28 | 11820 | 12.01 | 2.73 | 3.53 | 2.23 | 5.58 |
| 10/06/09 10:44:58 | 11850 | 12.02 | 2.69 | 3.64 | 1.78 | 5.60 |
| 10/06/09 10:45:28 | 11880 | 12.01 | 2.69 | 3.59 | 1.64 | 5.59 |
| 10/06/09 10:45:58 | 11910 | 12.01 | 2.68 | 3.66 | 1.64 | 5.58 |
| 10/06/09 10:46:28 | 11940 | 12.03 | 2.68 | 3.48 | 1.75 | 5.59 |
| 10/06/09 10:46:58 | 11970 | 12.01 | 2.71 | 3.64 | 1.71 | 5.61 |
| 10/06/09 10:47:28 | 12000 | 12.01 | 2.67 | 3.61 | 1.69 | 5.63 |
| 10/06/09 10:47:58 | 12030 | 12.02 | 2.69 | 3.40 | 1.67 | 5.56 |
| 10/06/09 10:48:28 | 12060 | 12.03 | 2.72 | 3.64 | 1.70 | 5.56 |
| 10/06/09 10:48:58 | 12090 | 12.04 | 2.75 | 3.56 | 1.61 | 5.58 |
| 10/06/09 10:49:28 | 12120 | 12.04 | 2.79 | 3.54 | 1.74 | 5.61 |
| 10/06/09 10:49:58 | 12150 | 12.03 | 2.73 | 3.64 | 1.69 | 5.60 |
| 10/06/09 10:50:28 | 12180 | 12.02 | 2.71 | 3.61 | 1.77 | 5.58 |
| 10/06/09 10:50:58 | 12210 | 12.02 | 2.75 | 3.60 | 1.69 | 5.60 |
| 10/06/09 10:51:28 | 12240 | 12.02 | 2.82 | 3.54 | 1.77 | 5.60 |
| 10/06/09 10:51:58 | 12270 | 12.03 | 2.80 | 3.62 | 1.68 | 5.61 |
| 10/06/09 10:52:28 | 12300 | 12.04 | 2.74 | 3.50 | 1.73 | 5.61 |
| 10/06/09 10:52:58 | 12330 | 12.03 | 2.77 | 3.48 | 1.70 | 5.59 |
| 10/06/09 10:53:28 | 12360 | 12.02 | 2.76 | 3.50 | 1.74 | 5.59 |
| 10/06/09 10:53:58 | 12390 | 12.01 | 2.75 | 3.61 | 1.84 | 5.64 |
| 10/06/09 10:54:28 | 12420 | 12.04 | 2.76 | 3.74 | 1.88 | 5.61 |
| 10/06/09 10:54:58 | 12450 | 12.06 | 2.81 | 3.62 | 1.84 | 5.57 |
| 10/06/09 10:55:28 | 12480 | 12.06 | 2.77 | 3.31 | 1.82 | 5.59 |
| 10/06/09 10:55:58 | 12510 | 12.03 | 2.75 | 3.47 | 1.87 | 5.41 |
| 10/06/09 10:56:28 | 12540 | 12.03 | 2.80 | 3.51 | 1.78 | 5.59 |
| 10/06/09 10:56:58 | 12570 | 12.05 | 2.77 | 3.43 | 1.88 | 5.59 |
| **RAW AVERAGE** | | **12.05** | **2.67** | **3.19** | **1.84** | **5.53** |

| | | $O_2$ | NOx | CO | VOC | $CO_2$ |
|---|---|---|---|---|---|---|
| | Serial Number: | INST-22-0001 | INST-NX-0010 | INST-CO-0008 | INST-TH-0010 | INST-22-0001 |
| | | (%) | (ppmvd) | (ppmvd) | (ppmvw) | (%) |
| Bias | Initial Zero | 0.04 | 0.06 | 0.28 | 0.25 | 0.26 |
| | Final Zero | 0.01 | 0.06 | -0.22 | 0.49 | 0.43 |
| | Avg. Zero | 0.03 | 0.06 | 0.03 | 0.37 | 0.35 |
| | Initial UpScale | 12.01 | 4.97 | 5.13 | 3.19 | 9.42 |
| | Final UpScale | 11.98 | 4.90 | 4.84 | 3.15 | 9.48 |
| | Avg. UpScale | 12.00 | 4.94 | 4.99 | 3.17 | 9.45 |
| **Upscale Cal Gas** | | 12.00 | 4.99 | 4.94 | 3.00 | 9.20 |

| EMISSIONS DATA | $O_2$ | NOx | CO | VOC | $CO_2$ |
|---|---|---|---|---|---|
| Corrected Raw Average (ppm/% dry basis) | 12.06 | 2.67 | 3.15 | 1.82 | 5.24 |
| Concentration (ppm@ 15%$O_2$) | N/A | 1.78 | 2.10 | 1.22 | N/A |
| Concentration (ppm@ 15%$O_2$ &ISO) | N/A | 2.30 | 2.71 | 1.57 | N/A |
| Emission Rate (lb/hr) | N/A | 16.36 | 11.74 | 3.89 | N/A |
| Emission Rate (tons/year) at 8760 hr/yr | N/A | 71.65 | 51.41 | 17.03 | N/A |
| Emission Rate (lb/MMBtu) | N/A | 0.007 | 0.005 | 0.002 | N/A |

# TEST RESULTS

## $NH_3$ Emissions
## Base Load

# AMMONIA ANALYSIS

Air Hygiene International, Inc.
5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
(888) 461-8778
www.airhygiene.com

| PARAMETER | UNITS | RUN | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | | 2 | | 3 | | BLANK |
| | | Front (f) | Back (b) | Front (f) | Back (b) | Front (f) | Back (b) | |
| Sample Number | | 02 | 03 | 04 | 05 | 06 | 07 | 01 |
| Lab Log Number | | U1C-R1-FH | U1C-R1-BH | U1C-R2-FH | U1C-R2-BH | U1C-R3-FH | U1C-R3-BH | BLANK |
| Results ($C_f$ or $C_b$) | (mg/L) | 8.2500 | 0.1400 | 11.1000 | 0.1000 | 11.0000 | 0.1900 | 0.1000 |
| Practical Quantitation Limit (PQL) | (mg/L) | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 |
| Sample Volume ($V_{NH3}$) | (ml) | 270 | 150 | 200 | 190 | 210 | 200 | 80 |
| DGM Volume $(V_m)_{dscf}$ | (dscf) | 54.99 | | 54.24 | | 55.20 | | 55.20 |
| DGM Volume $(V_m)_{dstdL}$ | ($L_{dstd}$) | 1557.27 | | 1535.86 | | 1563.01 | | 1563.01 |
| Sum of $NH_3$ Ion (N) | (mg/L) | 8.2500 | 0.1400 | 11.1000 | 0.1000 | 11.0000 | 0.1900 | 0.1000 |
| Total Sample Volume (S) | (ml) | 270 | 150 | 200 | 190 | 210 | 200 | 80 |
| Volume of $NH_3$ ($V_a$) | (L) | 0.00293 | 0.00003 | 0.00292 | 0.00002 | 0.00304 | 0.00005 | 0.00001 |
| $O_2$ Concentration | (%) | 12.97 | | 13.00 | | 13.01 | | N/A |
| $NH_3$ Concentration ($C_{NH3}$) | (ppmvd) | 1.90 | | 1.92 | | 1.98 | | 0.007 |
| $C_{NH3}$ @ 15% $O_2$ | (ppmvd) | 1.41 | | 1.43 | | 1.48 | | N/A |

## Equations & Constants:

**Example Using Data from the 1st run**

**DGM Volume ($L_{dstd}$)**

$$(V_m)_{dstdL}(L_{dstd}) = (V_m)_{dscf} \times 28.31685$$

$(V_m)_{dstdL}$ ($L_{dstd}$) = 54.99 dscf x 28.31685 L/ft$^3$ = 1557.27 $L_{dstd}$

$(V_m)_{dscf}$ = Volume of gas sample measured by the DGM, corrected to standard conditions.

MW = molecular weight (ref. ASTM D 3588)

$C_f$ = Concentration of NH3 ion in the front half of train (main catch)

$C_b$ = Concentration of NH3 ion in the back half of train (breakthrough)

**Volume of $NH_3$ (L)**

$$V_a(L) = \frac{\frac{N \times S}{1000}}{MW \times 1000} \times 22.4$$

$$V_a\,(L) = \frac{8.25\ mg}{L} \times 270\ ml \times \frac{L}{1000\ ml} \times \frac{22.4\ L\ ideal\ gas}{g\text{-}mol\ substance} \times \frac{g\text{-}mol\ NH_3}{17.03\ g} \times \frac{g}{1000\ mg} = 0.00293\ L$$

**$NH_3$ Concentration (ppmvd)**

$$C_{NH3}(ppmvd) = \frac{V_{a(front)} + V_{a(back)}}{(V_m)_{dstdL}} \times 10^6$$

$$C_{NH3}\ (ppmvd) = \frac{0.00293\ L + 0.00003\ L}{1557.27\ L_{dstd}} \times \frac{10^6\ parts}{1\ part} = 1.899\ ppmvd$$

22.4 = liters of ideal gas per mol of substance at 0°C and 1 atm (ref. Civil Engineering Reference Manual, 7th ed. - Michael R. Lindeburg)

## CTM 027 (AMMONIA) - RESULTS

| | | | |
|---|---|---|---|
| **Plant Name** | West County Energy Center | **Date** | 10/05/09 |
| **Sampling Location** | Unit 1 | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Operator** | TP | **Stack Type** | Circular |

| **Historical Data** | | | | | | |
|---|---|---|---|---|---|---|
| **Run Number** | | Base W/O DB-1 | Base W/O DB-2 | Base W/O DB-3 | **Average** | |
| **Run Start Time** | | 10:00 | 11:55 | 13:30 | | hh:mm |
| **Run Stop Time** | | 11:34 | 13:15 | 14:50 | | hh:mm |
| **Meter Calibration Factor** | (Y) | 1.054 | 1.054 | 1.054 | | |
| **Pitot Tube Coefficient** | ($C_p$) | 0.840 | 0.840 | 0.840 | | |
| **Average Nozzle Diameter** | ($D_{na}$) | 0.248 | 0.248 | 0.248 | | in |
| **Stack Test Data** | | | | | | |
| **Initial Meter Volume** | ($V_m$)$_i$ | 267.800 | 320.278 | 372.628 | | ft3 |
| **Final Meter Volume** | ($V_m$)$_f$ | 319.900 | 372.199 | 425.770 | | ft3 |
| **Total Meter Volume** | ($V_m$) | 52.100 | 51.921 | 53.142 | 52.388 | ft3 |
| **Total Sampling Time** | (Θ) | 60.0 | 60.0 | 60.0 | 60.0 | min |
| **Average Meter Temperature** | ($t_m$)$_{avg}$ | 69.7 | 75.8 | 78.9 | 74.8 | oF |
| **Average Stack Temperature** | ($t_s$)$_{avg}$ | 182.5 | 184.8 | 186.3 | 184.5 | oF |
| **Barometric Pressure** | ($P_b$) | 29.88 | 29.90 | 29.90 | 29.89 | in Hg |
| **Stack Static Pressure** | ($P_{static}$) | -0.70 | -0.70 | -0.70 | -0.70 | in H2O |
| **Absolute Stack Pressure** | ($P_s$) | 29.83 | 29.85 | 29.85 | 29.84 | in Hg |
| **Average Orifice Pressure Drop** | ($\Delta H$)$_{avg}$ | 2.59 | 2.54 | 2.65 | 2.59 | in H2O |
| **Absolute Meter Pressure** | ($P_m$) | 30.00 | 30.02 | 30.02 | 30.02 | in Hg |
| **Avg Square Root Pitot Pressure** | ($\Delta p^{1/2}$)$_{avg}$ | 0.97 | 0.96 | 0.98 | 0.97 | (in H2O)1/2 |
| ***Moisture Content Data*** | | | | | | |
| **Impingers 1-3 Water Volume Gain** | ($V_n$) | 131.7 | 111.9 | 104.1 | 115.9 | ml |
| **Impinger 4 Silica Gel Weight Gain** | ($W_n$) | 13.4 | 19.5 | 7.9 | 13.6 | g |
| **Total Water Volume Collected** | ($V_{lc}$) | 145.2 | 131.4 | 112.0 | 129.5 | ml |
| **Standard Water Vapor Volume** | ($V_w$)$_{std}$ | 6.833 | 6.187 | 5.272 | 6.097 | scf |
| **Standard Meter Volume** | ($V_m$)$_{std}$ | 54.994 | 54.238 | 55.197 | 54.810 | dscf |
| **Calculated Stack Moisture** | ($B_{ws(calc)}$) | 11.05 | 10.24 | 8.72 | 10.00 | % |
| **Saturated Stack Moisture** | ($B_{ws(svp)}$) | 54.1 | 56.8 | 58.6 | 56.5 | % |
| **Reported Stack Moisture Content** | ($B_{ws}$) | 11.05 | 10.24 | 8.72 | 10.00 | % |
| **Gas Analysis Data** | | | | | | |
| **Carbon Dioxide Percentage** | (%$CO_2$) | 4.7 | 4.7 | 4.7 | 4.7 | % |
| **Oxygen Percentage** | (%$O_2$) | 13.0 | 13.0 | 13.0 | 13.0 | % |
| **Carbon Monoxide Percentage** | (%CO) | 0.0 | 0.0 | 0.0 | 0.0 | % |
| **Nitrogen Percentage** | (%$N_2$) | 82.3 | 82.3 | 82.3 | 82.3 | % |
| **Dry Gas Molecular Weight** | ($M_d$) | 29.28 | 29.26 | 29.27 | 29.27 | lb/lb-mole |
| **Wet Stack Gas Molecular Weight** | ($M_s$) | 28.03 | 28.11 | 28.28 | 28.14 | lb/lb-mole |
| **Calculated Fuel Factor** | ($F_o$) | 1.673 | 1.699 | 1.693 | 1.688 | |
| **Fuel F-Factor** | ($F_d$) | 8644 | 8644 | 8644 | 8644 | dscf/MMBtu |
| **Percent Excess Air** | (%EA) | 148.2 | 148.7 | 149.1 | 148.7 | % |
| **Volumetric Flow Rate Data** | | | | | | |
| **Average Stack Gas Velocity** | ($v_s$) | 61.21 | 60.44 | 61.74 | 61.13 | ft/sec |
| **Stack Cross-Sectional Area** | ($A_s$) | 378.35 | 378.35 | 378.35 | 378.35 | ft2 |
| **Actual Stack Flow Rate** | ($Q_{aw}$) | 1,389,526 | 1,372,077 | 1,401,471 | 1,387,692 | acfm |
| **Wet Standard Stack Flow Rate** | ($Q_{sw}$) | 68,304 | 67,252 | 68,538 | 68,031 | wkscfh |
| **Dry Standard Stack Flow Rate** | ($Q_{sd}$) | 1,012,641 | 1,006,095 | 1,042,717 | 1,020,484 | dscfm |
| **Percent of Isokinetic Rate** | (I) | 104.3 | 103.6 | 103.5 | 103.8 | % |
| **Ammonia Rate Data** | | | | | | |
| **Stack Ammonia Concentration** | ($c_{NH3}$) | 1.90 | 1.92 | 1.98 | 1.93 | ppm |
| | ($c_{NH3}$) | 1.41 | 1.43 | 1.48 | 1.44 | ppm@15%$O_2$ |

## CTM 027 (AMMONIA) SOURCE SAMPLING TITLE PAGE

**ALARMS exist and have been acknowledged.**

| Source Information | | | | |
|---|---|---|---|---|
| Plant Name | West County Energy Center | | | |
| Sampling Location | Unit 1 | | | |
| Fuel or Source Type | Gas, Natural | | | |
| Fuel F-Factor | 8644 | 8644 | 8644 | |

| Test Information | | | |
|---|---|---|---|
| Starting Test Date | | 10/05/09 | |
| Project # | | bv-09-westcounty.fl-comp#1 | |
| Operator | | TP | |
| Standard Temperature | | 68 | oF |
| Standard Pressure | | 29.92 | in Hg |
| Minimum Required Sample Vol. | indust. spec. | 35 | scf |
| Run Duration | chk Subpart | 60 | minutes |
| Unit Number | | 1C | |
| Load | % or w/DB | Base W/O DB | |
| Base Run Number | | Base W/O DB | |
| Number of Ports Available | | 4 | |
| Number of Ports Used | | 4 | |
| Port Inside Diameter | | 6.00 | in |
| Circular Stack | | | |

| Test Equipment Information | | | | | |
|---|---|---|---|---|---|
| Run | | 1 | 2 | 3 | |
| Meter Box Number | from ACS | samp-cp-0005 | samp-cp-0005 | samp-cp-0005 | |
| Meter Calibration Factor | (Y) | 1.054 | 1.054 | 1.054 | |
| Orifice Meter Coefficient | (ΔH@) | 1.694 | 1.694 | 1.694 | in $H_2O$ |
| Pitot Identification | from ACS | samp-up-0002 | samp-up-0002 | samp-up-0002 | |
| Pitot Tube Coefficient | ($C_p$) | 0.840 | 0.840 | 0.840 | |
| Nozzle Diameter | ($D_n$) | 0.248 | 0.248 | 0.248 | in |
| Probe Number | from ACS | samp-up-0002 | samp-up-0002 | samp-up-0002 | |
| Probe Length | | 120.00 | 120.00 | 120.00 | in |
| (SS, Glass .... ) Liner Material | from list | inconel | inconel | inconel | |
| Sample Case / Oven Number | from ACS | samp-bh-0006 | samp-bh-0006 | samp-bc-0006 | |
| Impinger Case Number | from ACS | samp-bc-0006 | samp-bc-0002 | samp-bc-0006 | |

| Testing Company Information | |
|---|---|
| Company Name | Air Hygiene International, Inc. (Tulsa, Oklahoma) |
| Address | 5634 S. 122nd East Ave., Suite F |
| City, State Country Zip | Tulsa, Oklahoma 74146 |
| Project Manager | Jake Fahlenkamp |
| Phone Number | (918) 307-8865 |
| Fax Number | (918) 307-9131 |

## METHOD 2 - DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Plant Name | West County Energy Center | | | | Date | 10/05/09 |
| Sampling Location | Unit 1 | | | | Project # | bv-09-westcounty.fl-comp#1 |
| Operator | TP | | | | # of Ports Used | 4 |
| Stack Type | Circular | | | | Pitot Identification | samp-up-0002 |
| Pitot Leak Check | ☑ | PreTest | ☑ | PostTest | Pitot Coefficient ($C_p$) | 0.84 |

| Stack Dimensions | | | |
|---|---|---|---|
| Diameter or Length of Stack | (D) | 263.38 | in |
| Width of Stack | (W) | | in |
| Area of Stack | ($A_s$) | 378.35 | ft2 |

| Pressures | | | |
|---|---|---|---|
| Barometric Pressure | ($P_b$) | 29.80 | in Hg |
| Static Pressure | ($P_{static}$) | -0.70 | in H2O |
| Absolute Stack Pressure | ($P_s$) | 29.75 | in Hg |

| Stack Gas Composition | | | |
|---|---|---|---|
| Composition Data: | | Estimated Composition | |
| Carbon Dioxide Concentration | (%$CO_2$) | 4.7 | % |
| Oxygen Concentration | (%$O_2$) | 13.0 | % |
| Carbon Monoxide Concentration | (%CO) | 0.0 | % |
| Nitrogen Concentration | (%$N_2$) | 82.3 | % |
| Stack Moisture Content | ($B_{ws}$) | 10.000 | % |
| Stack Dry Molecular Weight | ($M_d$) | 29.27 | lb/lb-mole |
| Stack Wet Molecular Weight | ($M_s$) | 28.14 | lb/lb-mole |

| Results | | | |
|---|---|---|---|
| Avg Stack Gas Velocity | ($v_s$) | 60.5 | ft/sec |
| Avg Stack Dry Std Flow Rate | ($Q_{sd}$) | 60,257,560 | dscf/hr |
| Avg Stack Dry Std Flow Rate | ($Q_{sd}$) | 1,004,293 | dscf/min |
| Avg Stack Wet Flow Rate | ($Q_{aw}$) | 1,373,044 | acf/min |
| Avg Stack Wet Std Flow Rate | ($Q_{sw}$) | 66,952,844 | ascf/hr |

Stack Cross Section Schematic

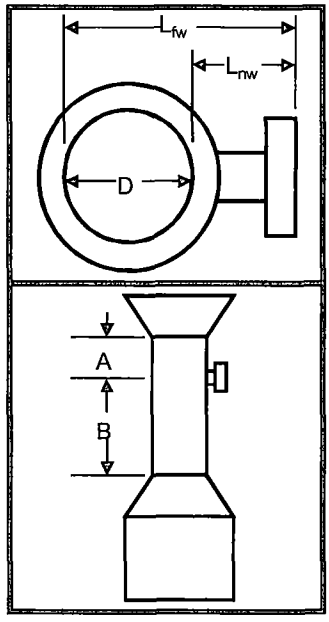
| Velocity Traverse Data | | | | |
|---|---|---|---|---|
| Run Number | | Base W/O DB-V1 | | |
| Run Time | 7:00 | Start | 7:40 | End |
| Traverse Point | Velocity Head ($\Delta p$) | Null Angle ($N_a$) | Stack Temp ($t_s$) | Local Velocity ($v_{s(l)}$) |
| | in H2O | deg | oF | ft/sec |
| A-1 | 0.65 | 0 | 180 | 50.6 |
| A-2 | 0.73 | -5 | 182 | 53.7 |
| A-3 | 0.80 | 5 | 184 | 56.3 |
| A-4 | 0.87 | 10 | 183 | 58.7 |
| A-5 | 0.89 | 5 | 186 | 59.5 |
| A-6 | 0.81 | 0 | 187 | 56.8 |
| B-1 | 0.54 | 0 | 184 | 46.3 |
| B-2 | 0.64 | 0 | 191 | 50.7 |
| B-3 | 0.70 | 5 | 192 | 53.0 |
| B-4 | 0.74 | 0 | 190 | 54.4 |
| B-5 | 0.77 | 5 | 191 | 55.6 |
| B-6 | 0.75 | 0 | 192 | 54.9 |
| C-1 | 1.00 | -5 | 177 | 62.6 |
| C-2 | 1.10 | -5 | 183 | 66.0 |
| C-3 | 1.20 | 5 | 184 | 69.0 |
| C-4 | 1.20 | 5 | 185 | 69.0 |
| C-5 | 1.10 | 5 | 186 | 66.2 |
| C-6 | 0.90 | 5 | 187 | 59.9 |
| D-1 | 0.90 | 0 | 181 | 59.6 |
| D-2 | 1.10 | -5 | 183 | 66.0 |
| D-3 | 1.30 | 10 | 187 | 72.0 |
| D-4 | 1.30 | 5 | 188 | 72.0 |
| D-5 | 1.20 | 5 | 189 | 69.3 |
| D-6 | 1.20 | 0 | 191 | 69.4 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Average | 0.93 | 4 | 186 | |
| | 0.96 | = Square roots of $\Delta p$ | | |

## METHOD 1 - SAMPLE AND VELOCITY TRAVERSES FOR CIRCULAR SOURCES

| | | | |
|---|---|---|---|
| **Plant Name** | West County Energy Center | **Date** | 10/05/09 |
| **Sampling Location** | Unit 1 | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Operator** | TP | **# of Ports Available** | 4 |
| **Stack Type** | Circular | **# of Ports Used** | 4 |
| **Stack Size** | Large | **Port Inside Diameter** | 6.00 |

| Circular Stack or Duct Diameter | | | |
|---|---|---|---|
| Distance to Far Wall of Stack | ($L_{fw}$) | 282.38 | in |
| Distance to Near Wall of Stack | ($L_{nw}$) | 19.00 | in |
| Diameter of Stack | (D) | 263.38 | in |
| Area of Stack | ($A_s$) | 378.35 | ft2 |

| Distance from Port to Disturbances | | | |
|---|---|---|---|
| Distance Upstream | (A) | 144.00 | in |
| Diameters Upstream | ($A_D$) | 0.55 | diameters |
| Distance Downstream | (B) | 531.75 | in |
| Diameters Downstream | ($B_D$) | 2.02 | diameters |




| Number of Traverse Points Required | | | |
|---|---|---|---|
| Diameters to Flow Disturbance | | Minimum Number of[1] Traverse Points | |
| Down Stream | Up Stream | Particulate Points | Velocity Points |
| 2.00-4.99 | 0.50-1.24 | 24 | 16 |
| 5.00-5.99 | 1.25-1.49 | 20 | 16 |
| 6.00-6.99 | 1.50-1.74 | 16 | 12 |
| 7.00-7.99 | 1.75-1.99 | 12 | 12 |
| >= 8.00 | >=2.00 | 8 or 12[2] | 8 or 12[2] |
| Upstream Spec | | 24 | 16 |
| Downstream Spec | | 24 | 16 |
| Traverse Pts Required | | 24 | 16 |

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches

| Number of Traverse Points Used | | | |
|---|---|---|---|
| 4 | Ports by | 6 | Across |
| 24 | Pts Used | 24 | Required |
| | | Particulate Traverse | |

| Location of Traverse Points in Circular Stacks | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Traverse Point | (Fraction of Stack Dimension from Inside Wall to Traverse Point) | | | | | | | | |
| | Number of Traverse Points Across the Stack | | | | | | | | |
| Number | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 1 | .146 | .067 | .044 | .032 | .026 | .021 | .018 | .016 | .014 |
| 2 | .854 | .250 | .146 | .105 | .082 | .067 | .057 | .049 | .044 |
| 3 | | .750 | .296 | .194 | .146 | .118 | .099 | .085 | .075 |
| 4 | | .933 | .704 | .323 | .226 | .177 | .146 | .125 | .109 |
| 5 | | | .854 | .677 | .342 | .250 | .201 | .169 | .146 |
| 6 | | | .956 | .806 | .658 | .356 | .269 | .220 | .188 |
| 7 | | | | .895 | .774 | .644 | .366 | .283 | .236 |
| 8 | | | | .968 | .854 | .750 | .634 | .375 | .296 |
| 9 | | | | | .918 | .823 | .731 | .625 | .382 |
| 10 | | | | | .974 | .882 | .799 | .717 | .618 |
| 11 | | | | | | .933 | .854 | .780 | .704 |
| 12 | | | | | | .979 | .901 | .831 | .764 |

| Traverse Point Locations | | | |
|---|---|---|---|
| Traverse Point Number | Fraction of Stack Diameter | Distance from Inside Wall | Distance Including Reference Length |
| | | in | in |
| 1 | 0.02 | 5 4/8 | 24 4/8 |
| 2 | 0.07 | 17 5/8 | 36 5/8 |
| 3 | 0.12 | 31 1/8 | 50 1/8 |
| 4 | 0.18 | 46 5/8 | 65 5/8 |
| 5 | 0.25 | 65 7/8 | 84 7/8 |
| 6 | 0.36 | 93 6/8 | 112 6/8 |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| 11 | | | |
| 12 | | | |

## METHOD 3a - DETERMINATION OF DRY MOLECULAR WEIGHT BY ANALYZER

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Plant Name** | West County Energy Center | | | | **Date** | 10/05/09 | |
| **Sampling Location** | Unit 1 | | | | **Project #** | bv-09-westcounty.fl-comp#1 | |
| **Operator** | TP | | | | **# of Ports Used** | 4 | |
| **Fuel Type** | Gas, Natural | **Minimum Fuel Factor** | | 1.600 | **Maximum Fuel Factor** | | 1.836 |
| **Orsat Leak Check** | ☑ | **PreTest** | ☑ | **PostTest** | **Orsat Identification** | N/A | |

| Gas Analysis Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Run Number** | Base W/O DB-1 | | | **Run Start Time** | | 10:00 | **Run Stop Time** | | 11:34 |
| **Sample Analysis Time** | **Carbon Dioxide Conc.** (%CO2) | **Oxygen Conc.** (%O2) | **Carbon Monoxide Conc.** (ppmCO) | **Carbon Dioxide Conc.** ($\%CO_2$) | **Oxygen Conc.** ($\%O_2$) | **Carbon Monoxide Conc.** (%CO) | **Nitrogen Conc.** ($\%N_2$) | **Dry Molecular Weight** ($M_d$) | **Molecular Weight Deviation** ($\Delta M_d$) |
| hh:mm | percent | percent | ppm | percent | percent | percent | percent | lb/lb-mole | lb/lb-mole |
| 1:34 | 4.7 | 13.0 | 0.4 | 4.7 | 13.0 | 0.0 | 82.3 | 29.28 | 0.00 |
| **Results** | | | **Averages** | 4.7 | 13.0 | 0.0 | 82.3 | 29.28 | |
| **Average Calculated Fuel Factor** | | | $(F_o)_{avg}$ | 1.673 | | **Molecular Wt Deviation < 0.3?** | | | ☑ |
| **Average Excess Air** | | | $(\%EA)_{avg}$ | 148.2 | percent | **Fuel Factor in Handbook Range?** | | | ☑ |

| Gas Analysis Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Run Number** | Base W/O DB-2 | | | **Run Start Time** | | 11:55 | **Run Stop Time** | | 13:15 |
| **Sample Analysis Time** | **Carbon Dioxide Conc.** (%CO2) | **Oxygen Conc.** (%O2) | **Carbon Monoxide Conc.** (ppmCO) | **Carbon Dioxide Conc.** ($\%CO_2$) | **Oxygen Conc.** ($\%O_2$) | **Carbon Monoxide Conc.** (%CO) | **Nitrogen Conc.** ($\%N_2$) | **Dry Molecular Weight** ($M_d$) | **Molecular Weight Deviation** ($\Delta M_d$) |
| hh:mm | percent | percent | ppm | percent | percent | percent | percent | lb/lb-mole | lb/lb-mole |
| 1:20 | 4.7 | 13.0 | 0.4 | 4.7 | 13.0 | 0.0 | 82.3 | 29.26 | 0.00 |
| **Results** | | | **Averages** | 4.7 | 13.0 | 0.0 | 82.3 | 29.26 | |
| **Average Calculated Fuel Factor** | | | $(F_o)_{avg}$ | 1.699 | | **Molecular Wt Deviation < 0.3?** | | | ☑ |
| **Average Excess Air** | | | $(\%EA)_{avg}$ | 148.7 | percent | **Fuel Factor in Handbook Range?** | | | ☑ |

| Gas Analysis Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Run Number** | Base W/O DB-3 | | | **Run Start Time** | | 13:30 | **Run Stop Time** | | 14:50 |
| **Sample Analysis Time** | **Carbon Dioxide Conc.** (%CO2) | **Oxygen Conc.** (%O2) | **Carbon Monoxide Conc.** (ppmCO) | **Carbon Dioxide Conc.** ($\%CO_2$) | **Oxygen Conc.** ($\%O_2$) | **Carbon Monoxide Conc.** (%CO) | **Nitrogen Conc.** ($\%N_2$) | **Dry Molecular Weight** ($M_d$) | **Molecular Weight Deviation** ($\Delta M_d$) |
| hh:mm | percent | percent | ppm | percent | percent | percent | percent | lb/lb-mole | lb/lb-mole |
| 1:20 | 4.7 | 13.0 | 0.2 | 4.7 | 13.0 | 0.0 | 82.3 | 29.27 | 0.00 |
| **Results** | | | **Averages** | 4.7 | 13.0 | 0.0 | 82.3 | 29.27 | |
| **Average Calculated Fuel Factor** | | | $(F_o)_{avg}$ | 1.693 | | **Molecular Wt Deviation < 0.3?** | | | ☑ |
| **Average Excess Air** | | | $(\%EA)_{avg}$ | 149.1 | percent | **Fuel Factor in Handbook Range?** | | | ☑ |

| Fuel Factor Fo | | |
|---|---|---|
| **Fuel Type** | **Minimum** | **Maximum** |
| **Coal, Anthracite** | 1.016 | 1.130 |
| **Coal, Lignite** | 1.016 | 1.130 |
| **Coal, Bituminous** | 1.083 | 1.230 |
| **Oil, Distillate** | 1.260 | 1.413 |
| **Oil, Residual** | 1.210 | 1.370 |
| **Gas, Natural** | 1.600 | 1.836 |
| **Gas, Propane** | 1.434 | 1.586 |
| **Gas, Butane** | 1.405 | 1.553 |
| **Wood** | 1.000 | 1.120 |
| **Wood Bark** | 1.003 | 1.130 |

## METHOD 4 - DETERMINATION OF MOISTURE CONTENT IN STACK GASES

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Plant Name | West County Energy Center | | | | Date | 10/05/09 | |
| Sampling Location | Unit 1 | | | | Project # | bv-09-westcounty.fl-comp#1 | |
| Operator | TP | | | | # of Ports Used | 4 | |
| Stack Type | Circular | | | | Meter Box Number | samp-cp-0005 | |
| Train Leak Check | ☑ | PreTest | ☑ | PostTest | Meter Cal Factor (Y) | 1.054 | |

| Moisture Content Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Run Number | | Base W/O DB-1 | | | Run Start Time | 10:00 | Run Stop Time | | 11:34 |
| Total Meter Volume | $(V_m)$ | 52.100 | dcf | | Barometric Press. | $(P_b)$ | 29.88 | | in Hg |
| Avg Stack Temp | $(t_s)_{avg}$ | 183 | oF | | Stack Static Press. | $(P_{static})$ | -0.70 | | in H2O |
| Avg Meter Temp | $(t_m)_{avg}$ | 70 | oF | | Avg Orifice Press. | $(\Delta H)_{avg}$ | 2.59 | | in H2O |
| | | Impinger 1 | Impinger 2 | Impinger 3 | Impinger 4 | Impinger 5 | Impinger 6 | Impinger 7 | Impinger 8 |
| | | g | g | g | g | g | g | g | g |
| Contents | | H2SO4 | H2SO4 | | Sil Gel | | | | |
| Final Value | $(V_f),(W_f)$ | 818.20 | 734.00 | 645.00 | 931.80 | | | | |
| Initial Value | $(V_i),(W_i)$ | 708.50 | 715.80 | 641.40 | 918.40 | | | | |
| Net Value | $(V_n),(W_n)$ | 109.7 | 18.2 | 3.6 | 13.4 | | | | |
| Results | | | | | | | | | |
| Total Weight | $(W_t)$ | 144.90 | g | | Water Vol Weighed | $(V_{wsg(std)})$ | 6.832 | scf | |
| Std Meter Volume | $(V_{m(std)})$ | 55.010 | dscf | | Sat. Moisture Content | $(B_{ws(svp)})$ | 54.1 | % | |
| Calc Moisture Content | $(B_{ws(calc)})$ | 11.0 | % | | Final Moisture Content | $(B_{ws})$ | 11.0 | % | |

| Moisture Content Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Run Number | | Base W/O DB-2 | | | Run Start Time | 11:55 | Run Stop Time | | 13:15 |
| Total Meter Volume | $(V_m)$ | 51.921 | dcf | | Barometric Press. | $(P_b)$ | 29.90 | | in Hg |
| Avg Stack Temp | $(t_s)_{avg}$ | 185 | oF | | Stack Static Press. | $(P_{static})$ | -0.70 | | in H2O |
| Avg Meter Temp | $(t_m)_{avg}$ | 76 | oF | | Avg Orifice Press. | $(\Delta H)_{avg}$ | 2.54 | | in H2O |
| | | Impinger 1 | Impinger 2 | Impinger 3 | Impinger 4 | Impinger 5 | Impinger 6 | Impinger 7 | Impinger 8 |
| | | g | g | g | g | g | g | g | g |
| Contents | | H2SO4 | H2SO4 | | Sil Gel | | | | |
| Final Value | $(V_f),(W_f)$ | 824.80 | 721.60 | 613.10 | 923.40 | | | | |
| Initial Value | $(V_i),(W_i)$ | 769.80 | 678.00 | 600.00 | 903.90 | | | | |
| Net Value | $(V_n),(W_n)$ | 55.0 | 43.6 | 13.1 | 19.5 | | | | |
| Results | | | | | | | | | |
| Total Weight | $(W_t)$ | 131.20 | g | | Water Vol Weighed | $(V_{wsg(std)})$ | 6.186 | scf | |
| Std Meter Volume | $(V_{m(std)})$ | 54.227 | dscf | | Sat. Moisture Content | $(B_{ws(svp)})$ | 56.8 | % | |
| Calc Moisture Content | $(B_{ws})$ | 10.2 | % | | Final Moisture Content | $(B_{ws})$ | 10.2 | % | |

| Moisture Content Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Run Number | | Base W/O DB-3 | | | Run Start Time | 13:30 | Run Stop Time | | 14:50 |
| Total Meter Volume | $(V_m)$ | 53.142 | dcf | | Barometric Press. | $(P_b)$ | 29.90 | | in Hg |
| Avg Stack Temp | $(t_s)_{avg}$ | 186 | oF | | Stack Static Press. | $(P_{static})$ | -0.70 | | in H2O |
| Avg Meter Temp | $(t_m)_{avg}$ | 79 | oF | | Avg Orifice Press. | $(\Delta H)_{avg}$ | 2.65 | | in H2O |
| | | Impinger 1 | Impinger 2 | Impinger 3 | Impinger 4 | Impinger 5 | Impinger 6 | Impinger 7 | Impinger 8 |
| | | g | g | g | g | g | g | g | g |
| Contents | | H2SO4 | H2SO4 | | Sil Gel | | | | |
| Final Value | $(V_f),(W_f)$ | 787.60 | 720.60 | 650.10 | 939.70 | | | | |
| Initial Value | $(V_i),(W_i)$ | 708.90 | 700.50 | 645.00 | 931.80 | | | | |
| Net Value | $(V_n),(W_n)$ | 78.7 | 20.1 | 5.1 | 7.9 | | | | |
| Results | | | | | | | | | |
| Total Weight | $(W_t)$ | 111.80 | g | | Water Vol Weighed | $(V_{wsg(std)})$ | 5.271 | scf | |
| Std Meter Volume | $(V_{m(std)})$ | 55.198 | dscf | | Sat. Moisture Content | $(B_{ws(svp)})$ | 58.6 | % | |
| Calc Moisture Content | $(B_{ws})$ | 8.7 | % | | Final Moisture Content | $(B_{ws})$ | 8.7 | % | |

# CTM 027 (AMMONIA) ISOKINETIC SAMPLING DATA

| | | | |
|---|---|---|---|
| Plant Name | West County Energy Center | Date | 10/5/2009 |
| Sampling Location | Unit 1 | Project # | bv-09-westcounty.fl-comp#1 |
| Operator | TP | Run # | Base W/O DB-1 |
| # of Points Across | 6 | # of Ports Used | 4 |

| Leak Checks | | | | | |
|---|---|---|---|---|---|
| Train | Pre | 0.005 | ft3/min @ | 15 | in Hg |
| OK? ☑ | Post | 0 | ft3/min @ | 15 | in Hg |
| Pitot | Pre | 7.1/6.3 | in. $H_2O$ for | 15 | sec |
| OK? ☑ | Post | 6.6/5.8 | in. $H_2O$ for | 15 | sec |
| Orsat | OK? ☐ | | | | |

| Nozzle Measurements | | | | |
|---|---|---|---|---|
| Pre | 0.248 | 0.248 | 0.248 | PASS |
| Post | 0.248 | 0.248 | 0.248 | PASS |

| Run Time | | | |
|---|---|---|---|
| Start | 10:00 | End | 11:34 |

| Sampling Equipment | | | |
|---|---|---|---|
| Meter # | samp-cp-0005 | | |
| Meterbox Cal. Factor | (Y) | 1.054 | |
| Nozzle # | N/A | | |
| Average Nozzle Diameter | ($D_{na}$) | 0.2480 | in |
| Rec. Nozzle Diameter | ($D_{ni}$) | 0.2288 | in |
| Probe # / Length | samp-up-0002 | / 120 | in |
| Liner Material | inconel | | |
| Sample Case / Oven # | samp-bh-0006 | | |
| Impinger Case # | samp-bc-0006 | | |

| Ideal Nozzle Diameter and IsoKinetic Factor Setup | | | |
|---|---|---|---|
| Pitot Tube Coefficient | ($C_p$) | 0.84 | |
| Avg Stack Temp | ($t_s$) | 186 | oF |
| Avg Gas Meter Temp | ($t_m$) | 68 | |
| DH @ 0.75 SCFM | ($\Delta H@$) | 1.69 | in H2O |
| Avg Pitot Tube Diff. Pressure | ($\Delta p_{avg}$) | 0.93 | in H2O |
| Stack Moisture Content | ($B_{ws}$) | 11.60 | % |
| Stack Dry Molecular Weight | ($M_d$) | 29.28 | lb/lb-mole |
| Estimated Orifice Flow Rate | ($Q_m$) | 0.750 | acfm |
| DP to DH Isokinetic Factor | (K) | 2.55 | |

| Pressures | | | |
|---|---|---|---|
| Barometric Pressure | ($P_b$) | 29.88 | in Hg |
| Stack Static Pressure | ($P_{static}$) | -0.70 | in H2O |
| Absolute Stack Pressure | ($P_s$) | 29.83 | in Hg |
| Absolute Meter Pressure | ($P_m$) | 30.00 | in Hg |

| Weights | Imp 1 | Imp 2 | Imp 3 | Imp 4 | Imp 5 | Imp 6 | Imp 7 | Imp 8 |
|---|---|---|---|---|---|---|---|---|
| Pre | 708.50 | 715.80 | 641.40 | 918.40 | | | | |
| Post | 818.20 | 734.00 | 645.00 | 931.80 | | | | |

| Wash Volume | | | |
|---|---|---|---|
| | $H_2O$ | 50.0 | ml |
| | MeCl | | ml |

| Filter # |
|---|
| |

| Traverse Point # | Sampling Time (Θ) | Timer Time | Dry Gas Meter Reading ($V_m$) | Velocity Head ($\Delta p$) | Desired Orifice ΔH ($\Delta H_{ni}$) | Actual Orifice ΔH ($\Delta H_a$) | Stack Temp ($t_s$) | Probe Temp | Filter Temp | Impinger Exit Temp | Aux Temp | Meter Inlet Temp ($t_{mi}$) | Meter Outlet Temp ($t_{mo}$) | Pump Vacuum | Square Root ΔP ($\Delta p^{1/2}$) | Local Stack Velocity ($v_s$)$_l$ | Cumulative Meter Volume ($V_m$)$_{std}$ | Cumulative Percent IsoKinetic (I) | Est-Run Meter Volume ($V_m$)$_{std}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | min | hh:mm:ss | ft3 | in H2O | in H2O | in H2O | oF | oF | oF | oF | oF | oF | oF | in Hg | (in H2O)1/2 | ft/sec | scf | % | scf |
| A-1 | 0.0 | 0:00:00 | 267.800 | 0.850 | 2.171 | 2.300 | 185 | 250 | 263 | 57 | | 65 | 64 | 2.5 | 0.92 | 58.21 | 2.094 | 99.1 | 50.254 |
| A-2 | 2.5 | 0:02:30 | 269.765 | 0.870 | 2.222 | 2.300 | 193 | 249 | 269 | 52 | | 67 | 64 | 2.5 | 0.93 | 59.26 | 4.106 | 97.0 | 49.275 |
| A-3 | 5.0 | 0:05:00 | 271.657 | 0.820 | 2.094 | 2.200 | 184 | 248 | 268 | 55 | | 66 | 64 | 2.0 | 0.91 | 57.13 | 6.227 | 98.8 | 49.820 |
| A-4 | 7.5 | 0:07:30 | 273.650 | 0.720 | 1.839 | 1.900 | 198 | 247 | 258 | 53 | | 68 | 64 | 1.5 | 0.85 | 54.12 | 8.351 | 101.7 | 50.103 |
| A-5 | 10.0 | 0:10:00 | 275.650 | 0.580 | 1.481 | 1.600 | 185 | 246 | 257 | 54 | | 68 | 65 | 1.0 | 0.76 | 48.09 | 10.258 | 103.1 | 49.239 |
| A-6 | 12.5 | 0:12:30 | 277.450 | 0.550 | 1.405 | 1.500 | 184 | 245 | 255 | 55 | | 69 | 65 | 1.0 | 0.74 | 46.79 | 12.333 | 106.3 | 49.331 |
| B-1 | 15.0 | 0:15:00 | 279.410 | 0.770 | 1.966 | 2.100 | 179 | 251 | 254 | 60 | | 70 | 66 | 2.0 | 0.88 | 55.15 | 14.385 | 105.6 | 49.321 |
| B-2 | 17.5 | 0:17:30 | 281.350 | 0.750 | 1.915 | 2.000 | 180 | 248 | 257 | 56 | | 70 | 67 | 2.0 | 0.87 | 54.47 | 16.002 | 103.2 | 48.006 |
| B-3 | 20.0 | 0:20:00 | 282.880 | 0.740 | 1.890 | 2.000 | 178 | 247 | 257 | 56 | | 71 | 67 | 2.0 | 0.86 | 54.02 | 17.987 | 102.8 | 47.965 |
| B-4 | 22.5 | 0:22:30 | 284.760 | 0.730 | 1.864 | 2.000 | 179 | 247 | 257 | 58 | | 71 | 67 | 2.0 | 0.85 | 53.70 | 20.035 | 103.0 | 48.084 |
| B-5 | 25.0 | 0:25:00 | 286.700 | 0.700 | 1.788 | 1.900 | 178 | 250 | 258 | 58 | | 72 | 68 | 2.0 | 0.84 | 52.54 | 22.458 | 105.4 | 49.000 |
| B-6 | 27.5 | 0:27:30 | 289.000 | 0.520 | 1.328 | 1.400 | 177 | 249 | 258 | 58 | | 72 | 68 | 2.0 | 0.72 | 45.25 | 24.183 | 105.3 | 48.366 |
| C-1 | 30.0 | 0:30:00 | 290.639 | 1.300 | 3.320 | 3.500 | 177 | 255 | 257 | 60 | | 71 | 68 | 5.5 | 1.14 | 71.55 | 26.936 | 105.3 | 49.729 |
| C-2 | 32.5 | 0:32:30 | 293.240 | 1.300 | 3.320 | 3.500 | 181 | 256 | 260 | 55 | | 73 | 69 | 5.5 | 1.14 | 71.77 | 30.109 | 106.9 | 51.615 |
| C-3 | 35.0 | 0:35:00 | 296.245 | 1.300 | 3.320 | 3.500 | 179 | 255 | 261 | 57 | | 73 | 69 | 5.5 | 1.14 | 71.66 | 31.845 | 104.7 | 50.952 |
| C-4 | 37.5 | 0:37:30 | 297.890 | 1.300 | 3.320 | 3.500 | 186 | 253 | 259 | 59 | | 74 | 69 | 5.5 | 1.14 | 72.05 | 34.492 | 104.4 | 51.739 |
| C-5 | 40.0 | 0:40:00 | 300.400 | 1.200 | 3.065 | 3.200 | 179 | 253 | 263 | 63 | | 74 | 70 | 5.5 | 1.10 | 68.85 | 37.098 | 104.4 | 52.374 |
| C-6 | 42.5 | 0:42:30 | 302.875 | 1.100 | 2.809 | 3.000 | 182 | 254 | 258 | 65 | | 74 | 70 | 5.0 | 1.05 | 66.07 | 39.582 | 104.3 | 52.776 |
| D-1 | 45.0 | 0:45:00 | 305.235 | 1.200 | 3.065 | 3.200 | 180 | 251 | 260 | 63 | | 73 | 71 | 5.5 | 1.10 | 68.90 | 42.167 | 104.2 | 53.263 |
| D-2 | 47.5 | 0:47:30 | 307.690 | 1.200 | 3.065 | 3.200 | 181 | 249 | 258 | 58 | | 74 | 70 | 5.5 | 1.10 | 68.95 | 45.073 | 104.9 | 54.087 |
| D-3 | 50.0 | 0:50:00 | 310.450 | 1.200 | 3.065 | 3.200 | 183 | 253 | 260 | 61 | | 75 | 71 | 5.5 | 1.10 | 69.06 | 47.280 | 104.1 | 54.034 |
| D-4 | 52.5 | 0:52:30 | 312.550 | 1.200 | 3.065 | 3.200 | 183 | 249 | 260 | 63 | | 76 | 71 | 5.5 | 1.10 | 69.06 | 49.852 | 104.0 | 54.384 |
| D-5 | 55.0 | 0:55:00 | 315.000 | 1.100 | 2.809 | 3.000 | 185 | 249 | 259 | 67 | | 76 | 71 | 5.5 | 1.05 | 66.22 | 52.565 | 104.5 | 54.850 |
| D-6 | 57.5 | 0:57:30 | 317.585 | 1.100 | 2.809 | 3.000 | 184 | 249 | 261 | 68 | | 76 | 71 | 5.5 | 1.05 | 66.17 | 54.994 | 104.3 | 54.994 |
| Last Pt | 60.0 | 1:00:00 | 319.900 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| Final Val | 60.0 | 1:00:00 | 319.900 | | | | | | | | | | Max Vac | 5.5 | Final Values | | 54.994 | 104.3 | |
| Average Values | | | | 0.96 | | 2.59 | 183 | 250 | 259 | 59 | | 72 | 68 | | 0.97 | 61.21 | | | |
| | | | | | | | | | | | | | 70 | | | | | | |

# CTM 027 (AMMONIA) ISOKINETIC SAMPLING DATA

| | | | |
|---|---|---|---|
| Plant Name | West County Energy Center | Date | 10/5/2009 |
| Sampling Location | Unit 1 | Project # | bv-09-westcounty.fl-comp#1 |
| Operator | TP | Run # | Base W/O DB-2 |
| # of Points Across | 6 | # of Ports Used | 4 |

| Ideal Nozzle Diameter and IsoKinetic Factor Setup | | | |
|---|---|---|---|
| Pitot Tube Coefficient | ($C_p$) | 0.84 | |
| Avg Stack Temp | ($t_s$) | 183 | oF |
| Avg Gas Meter Temp | ($t_m$) | 70 | |
| DH @ 0.75 SCFM | ($\Delta H@$) | 1.69 | in H2O |
| Avg Pitot Tube Diff. Pressure | ($\Delta p_{avg}$) | 0.97 | in H2O |
| Stack Moisture Content | ($B_{ws}$) | 11.60 | % |
| Stack Dry Molecular Weight | ($M_d$) | 29.28 | lb/lb-mole |
| Estimated Orifice Flow Rate | ($Q_m$) | 0.868 | acfm |
| DP to DH Isokinetic Factor | (K) | 2.58 | |

| Leak Checks | | | | | |
|---|---|---|---|---|---|
| Train | Pre | 0.0075 | ft3/min @ | 15 | in Hg |
| OK? ☑ | Post | 0 | ft3/min @ | 15 | in Hg |
| Pitot | Pre | 6.5/7.2 | in. $H_2O$ for | 15 | sec |
| OK? ☑ | Post | 6.0/6.4 | in. $H_2O$ for | 15 | sec |
| Orsat | OK? ☐ | | | | |

| Sampling Equipment | | | |
|---|---|---|---|
| Meter # | samp-cp-0005 | | |
| Meterbox Cal. Factor | (Y) | 1.054 | |
| Nozzle # | N/A | | |
| Average Nozzle Diameter | ($D_{na}$) | 0.2480 | in |
| Rec. Nozzle Diameter | ($D_{ni}$) | 0.2429 | in |
| Probe # / Length | samp-up-0002 | / 120 | in |
| Liner Material | inconel | | |
| Sample Case / Oven # | samp-bh-0006 | | |
| Impinger Case # | samp-bc-0002 | | |

| Pressures | | | |
|---|---|---|---|
| Barometric Pressure | ($P_b$) | 29.90 | in Hg |
| Stack Static Pressure | ($P_{static}$) | -0.70 | in H2O |
| Absolute Stack Pressure | ($P_s$) | 29.85 | in Hg |
| Absolute Meter Pressure | ($P_m$) | 30.02 | in Hg |

| Nozzle Measurements | | | | |
|---|---|---|---|---|
| Pre | 0.248 | 0.248 | 0.248 | PASS |
| Post | 0.248 | 0.248 | 0.248 | PASS |

| Run Time | | | |
|---|---|---|---|
| Start | 11:55 | End | 13:15 |

| Weights | Imp 1 | Imp 2 | Imp 3 | Imp 4 | Imp 5 | Imp 6 | Imp 7 | Imp 8 |
|---|---|---|---|---|---|---|---|---|
| Pre | 769.80 | 678.00 | 600.00 | 903.90 | | | | |
| Post | 824.80 | 721.60 | 613.10 | 923.40 | | | | |

| | | | |
|---|---|---|---|
| Wash Volume | $H_2O$ | 50.0 | ml |
| | MeCl | | ml |

| Filter # |
|---|
| |

| Traverse Point # | Sampling Time (Θ) | Timer Time | Dry Gas Meter Reading ($V_m$) | Velocity Head ($\Delta p$) | Desired Orifice ΔH ($\Delta H_d$) | Actual Orifice ΔH ($\Delta H_a$) | Stack Temp ($t_s$) | Probe Temp | Filter Temp | Impinger Exit Temp | Aux Temp | Meter Inlet Temp ($t_{mi}$) | Meter Outlet Temp ($t_{mo}$) | Pump Vacuum | Square Root ΔP ($\Delta p^{1/2}$) | Local Stack Velocity ($v_s$)$_l$ | Cumulative Meter Volume ($V_m$)$_{std}$ | Cumulative Percent IsoKinetic (I) | Est-Run Meter Volume ($V_m$)$_{std}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | min | hh:mm:ss | ft3 | in H2O | in H2O | in H2O | oF | oF | oF | oF | oF | oF | oF | in Hg | (in H2O)1/2 | ft/sec | scf | % | scf |
| A-1 | 0.0 | 0:00:00 | 320.278 | 1.200 | 3.091 | 3.300 | 179 | 252 | 241 | 64 | | 76 | 73 | 5.5 | 1.10 | 68.82 | 2.577 | 102.2 | 61.853 |
| A-2 | 2.5 | 0:02:30 | 322.735 | 1.300 | 3.349 | 3.500 | 183 | 252 | 248 | 64 | | 77 | 73 | 6.0 | 1.14 | 71.86 | 4.994 | 97.4 | 59.927 |
| A-3 | 5.0 | 0:05:00 | 325.040 | 1.300 | 3.349 | 3.500 | 189 | 254 | 251 | 64 | | 77 | 72 | 6.0 | 1.14 | 72.19 | 7.612 | 98.5 | 60.898 |
| A-4 | 7.5 | 0:07:30 | 327.535 | 1.300 | 3.349 | 3.500 | 182 | 251 | 255 | 66 | | 77 | 72 | 6.0 | 1.14 | 71.80 | 10.225 | 98.8 | 61.352 |
| A-5 | 10.0 | 0:10:00 | 330.025 | 1.200 | 3.091 | 3.300 | 183 | 249 | 256 | 65 | | 78 | 73 | 1.2 | 1.10 | 69.04 | 12.817 | 99.7 | 61.520 |
| A-6 | 12.5 | 0:12:30 | 332.500 | 0.980 | 2.525 | 2.700 | 186 | 235 | 256 | 65 | | 79 | 73 | 5.0 | 0.99 | 62.54 | 15.579 | 103.6 | 62.317 |
| B-1 | 15.0 | 0:15:00 | 335.145 | 0.880 | 2.267 | 2.400 | 180 | 246 | 235 | 58 | | 76 | 74 | 3.5 | 0.94 | 58.98 | 17.775 | 103.4 | 60.943 |
| B-2 | 17.5 | 0:17:30 | 337.245 | 0.900 | 2.319 | 2.400 | 182 | 247 | 245 | 55 | | 77 | 74 | 3.5 | 0.95 | 59.74 | 20.408 | 105.6 | 61.223 |
| B-3 | 20.0 | 0:20:00 | 339.765 | 1.300 | 3.349 | 3.500 | 180 | 248 | 246 | 54 | | 82 | 74 | 6.5 | 1.14 | 71.69 | 22.894 | 104.5 | 61.052 |
| B-4 | 22.5 | 0:22:30 | 342.150 | 1.300 | 3.349 | 3.500 | 185 | 248 | 248 | 54 | | 79 | 74 | 6.5 | 1.14 | 71.97 | 25.210 | 103.0 | 60.504 |
| B-5 | 25.0 | 0:25:00 | 344.365 | 1.100 | 2.834 | 3.000 | 183 | 249 | 243 | 54 | | 79 | 74 | 6.5 | 1.05 | 66.10 | 27.737 | 103.2 | 60.518 |
| B-6 | 27.5 | 0:27:30 | 346.785 | 1.100 | 2.834 | 3.000 | 184 | 245 | 239 | 57 | | 79 | 74 | 5.5 | 1.05 | 66.15 | 30.320 | 103.5 | 60.639 |
| C-1 | 30.0 | 0:30:00 | 349.258 | 0.560 | 1.443 | 1.500 | 181 | 259 | 268 | 62 | | 76 | 74 | 2.0 | 0.75 | 47.09 | 32.346 | 104.4 | 59.716 |
| C-2 | 32.5 | 0:32:30 | 351.200 | 0.580 | 1.494 | 1.600 | 181 | 256 | 260 | 56 | | 78 | 74 | 2.0 | 0.76 | 47.92 | 34.143 | 104.3 | 58.530 |
| C-3 | 35.0 | 0:35:00 | 352.925 | 0.670 | 1.726 | 1.800 | 182 | 256 | 263 | 55 | | 77 | 74 | 2.0 | 0.82 | 51.55 | 36.026 | 104.1 | 57.641 |
| C-4 | 37.5 | 0:37:30 | 354.730 | 0.700 | 1.803 | 1.900 | 182 | 256 | 263 | 57 | | 78 | 74 | 2.5 | 0.84 | 52.69 | 37.975 | 104.0 | 56.962 |
| C-5 | 40.0 | 0:40:00 | 356.600 | 0.750 | 1.932 | 2.000 | 183 | 258 | 255 | 58 | | 79 | 74 | 3.0 | 0.87 | 54.58 | 39.965 | 103.8 | 56.421 |
| C-6 | 42.5 | 0:42:30 | 358.510 | 0.760 | 1.958 | 2.100 | 188 | 254 | 254 | 60 | | 79 | 74 | 3.5 | 0.87 | 55.16 | 42.054 | 103.8 | 56.072 |
| D-1 | 45.0 | 0:45:00 | 360.515 | 0.630 | 1.623 | 1.700 | 186 | 256 | 259 | 61 | | 77 | 74 | 2.5 | 0.79 | 50.14 | 44.087 | 104.2 | 55.689 |
| D-2 | 47.5 | 0:47:30 | 362.465 | 0.680 | 1.752 | 1.800 | 189 | 252 | 254 | 58 | | 77 | 74 | 2.5 | 0.82 | 52.21 | 46.106 | 104.3 | 55.327 |
| D-3 | 50.0 | 0:50:00 | 364.400 | 0.760 | 1.958 | 2.100 | 189 | 254 | 256 | 61 | | 79 | 74 | 2.5 | 0.87 | 55.20 | 48.033 | 104.0 | 54.895 |
| D-4 | 52.5 | 0:52:30 | 366.250 | 0.800 | 2.061 | 2.200 | 191 | 252 | 255 | 60 | | 78 | 74 | 3.0 | 0.89 | 56.72 | 50.042 | 103.8 | 54.591 |
| D-5 | 55.0 | 0:55:00 | 368.175 | 0.830 | 2.138 | 2.300 | 190 | 253 | 257 | 63 | | 78 | 74 | 3.5 | 0.91 | 57.73 | 52.102 | 103.6 | 54.368 |
| D-6 | 57.5 | 0:57:30 | 370.150 | 0.850 | 2.190 | 2.300 | 197 | 251 | 255 | 64 | | 79 | 74 | 4.0 | 0.92 | 58.73 | 54.238 | 103.6 | 54.238 |
| Last Pt | 60.0 | 1:00:00 | 372.199 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| Final Val | 60.0 | 1:00:00 | 372.199 | | | | | | | | | | Max Vac | 6.5 | Final Values | | 54.238 | 103.6 | |
| Average Values | | | | 0.93 | | 2.54 | 185 | 251 | 253 | 60 | | 78 | 74 | | 0.96 | 60.44 | | | |
| | | | | | | | | | | | | 76 | | | | | | | |

# CTM 027 (AMMONIA) ISOKINETIC SAMPLING DATA

| | | | |
|---|---|---|---|
| **Plant Name** | West County Energy Center | **Date** | 10/5/2009 |
| **Sampling Location** | Unit 1 | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Operator** | TP | **Run #** | Base W/O DB-3 |
| **# of Points Across** | 6 | **# of Ports Used** | 4 |

| **Ideal Nozzle Diameter and IsoKinetic Factor Setup** | | | |
|---|---|---|---|
| **Pitot Tube Coefficient** | ($C_p$) | 0.84 | |
| **Avg Stack Temp** | ($t_s$) | 185 | oF |
| **Avg Gas Meter Temp** | ($t_m$) | 76 | |
| **DH @ 0.75 SCFM** | ($\Delta H@$) | 1.69 | in H2O |
| **Avg Pitot Tube Diff. Pressure** | ($\Delta p_{avg}$) | 0.96 | in H2O |
| **Stack Moisture Content** | ($B_{ws}$) | 11.60 | % |
| **Stack Dry Molecular Weight** | ($M_d$) | 29.26 | lb/lb-mole |
| **Estimated Orifice Flow Rate** | ($Q_m$) | 0.865 | acfm |
| **DP to DH Isokinetic Factor** | (K) | 2.60 | |

| **Leak Checks** | | | | | |
|---|---|---|---|---|---|
| **Train** | **Pre** | 0 | ft3/min @ | 15 | in Hg |
| OK? ☑ | **Post** | 0 | ft3/min @ | 15 | in Hg |
| **Pitot** | **Pre** | 6.4/5.9 | in. $H_2O$ for | 15 | sec |
| OK? ☑ | **Post** | 6.3/7.2 | in. $H_2O$ for | 15 | sec |
| **Orsat** | OK? ☐ | | | | |

| **Sampling Equipment** | | | |
|---|---|---|---|
| **Meter #** | samp-cp-0005 | | |
| **Meterbox Cal. Factor** | (Y) | 1.054 | |
| **Nozzle #** | N/A | | |
| **Average Nozzle Diameter** | ($D_{na}$) | 0.2480 | in |
| **Rec. Nozzle Diameter** | ($D_{ni}$) | 0.2421 | in |
| **Probe # / Length** | samp-up-0002 | / 120 | in |
| **Liner Material** | inconel | | |
| **Sample Case / Oven #** | samp-bc-0006 | | |
| **Impinger Case #** | samp-bc-0006 | | |

| **Pressures** | | | |
|---|---|---|---|
| **Barometric Pressure** | ($P_b$) | 29.90 | in Hg |
| **Stack Static Pressure** | ($P_{static}$) | -0.70 | in H2O |
| **Absolute Stack Pressure** | ($P_s$) | 29.85 | in Hg |
| **Absolute Meter Pressure** | ($P_m$) | 30.02 | in Hg |

| **Nozzle Measurements** | | | | |
|---|---|---|---|---|
| **Pre** | 0.248 | 0.248 | 0.248 | **PASS** |
| **Post** | 0.248 | 0.248 | 0.248 | **PASS** |

| **Run Time** | | | |
|---|---|---|---|
| **Start** | 13:30 | **End** | 14:50 |

| **Weights** | **Imp 1** | **Imp 2** | **Imp 3** | **Imp 4** | **Imp 5** | **Imp 6** | **Imp 7** | **Imp 8** |
|---|---|---|---|---|---|---|---|---|
| **Pre** | 708.90 | 700.50 | 645.00 | 931.80 | | | | |
| **Post** | 787.60 | 720.60 | 650.10 | 939.70 | | | | |

| **Wash Volume** | | | |
|---|---|---|---|
| | **$H_2O$** | 50.0 | ml |
| | **MeCl** | | ml |

| **Filter #** |
|---|
| |

| Traverse Point # | Sampling Time (Θ) | Timer Time | Dry Gas Meter Reading ($V_m$) | Velocity Head ($\Delta p$) | Desired Orifice ΔH ($\Delta H_d$) | Actual Orifice ΔH ($\Delta H_a$) | Stack Temp ($t_s$) | Probe Temp | Filter Temp | Impinger Exit Temp | Aux Temp | Meter Inlet Temp ($t_{mi}$) | Meter Outlet Temp ($t_{mo}$) | Pump Vacuum | Square Root ΔP ($\Delta p^{1/2}$) | Local Stack Velocity ($v_s$)$_l$ | Cumulative Meter Volume ($V_m$)$_{std}$ | Cumulative Percent IsoKinetic (I) | Est-Run Meter Volume ($V_m$)$_{std}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | min | hh:mm:ss | ft3 | in H2O | in H2O | in H2O | oF | oF | oF | oF | oF | oF | oF | in Hg | (in H2O)1/2 | ft/sec | scf | % | scf |
| A-1 | 0.0 | 0:00:00 | 372.628 | 0.780 | 2.025 | 2.100 | 188 | 251 | 235 | 67 | | 77 | 75 | 2.0 | 0.88 | 55.89 | 2.020 | 100.0 | 48.484 |
| A-2 | 2.5 | 0:02:30 | 374.565 | 0.860 | 2.233 | 2.400 | 191 | 252 | 246 | 65 | | 87 | 75 | 3.0 | 0.93 | 58.82 | 4.383 | 106.3 | 52.596 |
| A-3 | 5.0 | 0:05:00 | 376.850 | 0.820 | 2.129 | 2.200 | 190 | 249 | 266 | 64 | | 80 | 75 | 3.0 | 0.91 | 57.39 | 6.193 | 100.8 | 49.544 |
| A-4 | 7.5 | 0:07:30 | 378.590 | 0.850 | 2.207 | 2.300 | 190 | 251 | 249 | 66 | | 80 | 75 | 3.0 | 0.92 | 58.43 | 8.337 | 101.1 | 50.019 |
| A-5 | 10.0 | 0:10:00 | 380.650 | 0.900 | 2.337 | 2.400 | 190 | 252 | 245 | 63 | | 80 | 77 | 3.0 | 0.95 | 60.13 | 10.487 | 100.7 | 50.337 |
| A-6 | 12.5 | 0:12:30 | 382.720 | 0.880 | 2.285 | 2.400 | 194 | 248 | 241 | 61 | | 82 | 76 | 3.5 | 0.94 | 59.64 | 12.705 | 101.3 | 50.820 |
| B-1 | 15.0 | 0:15:00 | 384.857 | 0.540 | 1.402 | 1.500 | 180 | 246 | 254 | 61 | | 79 | 76 | 3.5 | 0.73 | 46.21 | 14.930 | 105.8 | 51.190 |
| B-2 | 17.5 | 0:17:30 | 387.000 | 0.640 | 1.662 | 1.800 | 183 | 250 | 260 | 59 | | 79 | 76 | 2.5 | 0.80 | 50.43 | 16.947 | 106.3 | 50.840 |
| B-3 | 20.0 | 0:20:00 | 388.940 | 0.690 | 1.792 | 1.900 | 183 | 253 | 258 | 59 | | 80 | 76 | 2.5 | 0.83 | 52.36 | 18.967 | 106.2 | 50.578 |
| B-4 | 22.5 | 0:22:30 | 390.885 | 0.710 | 1.843 | 1.900 | 185 | 254 | 258 | 61 | | 81 | 77 | 2.5 | 0.84 | 53.20 | 20.988 | 106.1 | 50.371 |
| B-5 | 25.0 | 0:25:00 | 392.835 | 0.720 | 1.869 | 2.000 | 184 | 254 | 252 | 63 | | 81 | 77 | 2.5 | 0.85 | 53.53 | 22.994 | 105.8 | 50.169 |
| B-6 | 27.5 | 0:27:30 | 394.770 | 0.740 | 1.921 | 2.000 | 184 | 255 | 253 | 66 | | 81 | 77 | 3.0 | 0.86 | 54.27 | 25.053 | 105.7 | 50.105 |
| C-1 | 30.0 | 0:30:00 | 396.755 | 1.200 | 3.116 | 3.300 | 180 | 253 | 256 | 68 | | 79 | 77 | 6.0 | 1.10 | 68.89 | 27.595 | 105.3 | 50.945 |
| C-2 | 32.5 | 0:32:30 | 399.195 | 1.200 | 3.116 | 3.300 | 182 | 249 | 257 | 68 | | 81 | 77 | 6.0 | 1.10 | 69.00 | 30.191 | 105.1 | 51.755 |
| C-3 | 35.0 | 0:35:00 | 401.690 | 1.200 | 3.116 | 3.300 | 184 | 249 | 252 | 66 | | 81 | 81 | 6.0 | 1.10 | 69.11 | 32.724 | 104.7 | 52.359 |
| C-4 | 37.5 | 0:37:30 | 404.135 | 1.200 | 3.116 | 3.300 | 183 | 250 | 251 | 66 | | 82 | 78 | 6.0 | 1.10 | 69.05 | 35.221 | 104.4 | 52.832 |
| C-5 | 40.0 | 0:40:00 | 406.540 | 1.200 | 3.116 | 3.300 | 183 | 251 | 251 | 68 | | 82 | 77 | 6.0 | 1.10 | 69.05 | 37.908 | 104.5 | 53.517 |
| C-6 | 42.5 | 0:42:30 | 409.125 | 1.000 | 2.596 | 2.700 | 186 | 249 | 251 | 67 | | 82 | 77 | 5.0 | 1.00 | 63.18 | 40.403 | 104.8 | 53.871 |
| D-1 | 45.0 | 0:45:00 | 411.530 | 1.100 | 2.856 | 3.000 | 184 | 248 | 259 | 67 | | 81 | 77 | 5.0 | 1.05 | 66.16 | 42.659 | 104.2 | 53.885 |
| D-2 | 47.5 | 0:47:30 | 413.700 | 1.200 | 3.116 | 3.300 | 188 | 248 | 260 | 68 | | 81 | 77 | 6.0 | 1.10 | 69.32 | 44.843 | 103.4 | 53.812 |
| D-3 | 50.0 | 0:50:00 | 415.800 | 1.200 | 3.116 | 3.300 | 188 | 250 | 260 | 66 | | 81 | 77 | 6.0 | 1.10 | 69.32 | 47.412 | 103.3 | 54.186 |
| D-4 | 52.5 | 0:52:30 | 418.270 | 1.200 | 3.116 | 3.300 | 190 | 247 | 260 | 67 | | 82 | 77 | 6.0 | 1.10 | 69.43 | 50.005 | 103.4 | 54.551 |
| D-5 | 55.0 | 0:55:00 | 420.765 | 1.200 | 3.116 | 3.300 | 189 | 248 | 265 | 68 | | 82 | 78 | 6.0 | 1.10 | 69.37 | 52.793 | 103.8 | 55.088 |
| D-6 | 57.5 | 0:57:30 | 423.450 | 1.200 | 3.116 | 3.300 | 191 | 249 | 250 | 68 | | 82 | 80 | 6.0 | 1.10 | 69.48 | 55.197 | 103.5 | 55.197 |
| Last Pt | 60.0 | 1:00:00 | 425.770 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| **Final Val** | 60.0 | 1:00:00 | 425.770 | | | | | | | | | | **Max Vac** | 6.0 | **Final Values** | | 55.197 | 103.5 | |
| **Average Values** | | | | 0.968 | | 2.650 | 186 | 250 | 254 | 65 | | 81 | 77 | | 0.98 | 61.74 | | | |
| | | | | | | | | | | | | 79 | | | | | | | |

## CTM 027 (AMMONIA) - SAMPLE RECOVERY AND INTEGRITY DATA SHEET

| | | | |
|---|---|---|---|
| **Plant Name** | West County Energy Center | **Date** | 10/05/09 |
| **Sampling Location** | Unit 1 | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Operator** | TP | **Acetone Lot Number** | N/A |

| **Run History Data** | | | | |
|---|---|---|---|---|
| **Run Number** | Base W/O DB-1 | Base W/O DB-2 | Base W/O DB-3 | |
| **Run Start Time** | 10:00 | 11:55 | 13:30 | (hh:mm) |
| **Run Stop Time** | 11:34 | 13:15 | 14:50 | (hh:mm) |
| **Train Prepared By** | AS | AS | AS | |
| **Train Recovered By** | AS | AS | AS | |
| **Recovery Date** | 10/5/2009 | 10/5/2009 | 10/5/2009 | (mm/dd/yy) |

| ***Moisture Content Data*** | | | | | |
|---|---|---|---|---|---|
| **Impingers 1, 2, and 3 - Liquid Volume** | | | | | |
| **Final Volume** | ($V_f$) | 2201.2 | 2163.4 | 2162.2 | ml |
| **Initial Volume** | ($V_i$) | 2069.4 | 2051.5 | 2058.1 | ml |
| **Net Volume** | ($V_n$) | 131.7 | 111.9 | 104.1 | ml |
| **Comments** | | | | | |
| **Impinger 4 - Silica Gel Weight** | | | | | |
| **Final Weight** | ($W_f$) | 931.8 | 923.4 | 939.7 | g |
| **Initial Weight** | ($W_i$) | 918.4 | 903.9 | 931.8 | g |
| **Net Weight** | ($W_n$) | 13.4 | 19.5 | 7.9 | g |
| **Comments** | | | | | |
| **Total Water Collected** | | | | | |
| **Total Volume** | ($V_{lc}$) | 145.2 | 131.4 | 112.0 | ml |

☑

# TEST RESULTS

## $NH_3$ Emissions
## Base Load with Duct Burners

# AMMONIA ANALYSIS

Air Hygiene International, Inc.
5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
(888) 461-8778
www.airhygiene.com

| PARAMETER | UNITS | RUN | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | | 2 | | 3 | | BLANK |
| | | Front (f) | Back (b) | Front (f) | Back (b) | Front (f) | Back (b) | |
| **Sample Number** | | 10 | 11 | 12 | 13 | 14 | 15 | 01 |
| **Lab Log Number** | | U1C-FH-R1 | U1C-BH-R1 | U1C-FH-R2 | U1C-BH-R2 | U1C-FH-R3 | U1C-BH-R3 | BLANK |
| **Results ($C_f$ or $C_b$)** | (mg/L) | 8.8800 | 0.1100 | 10.6000 | 0.1200 | 11.8000 | 0.1600 | 0.1000 |
| **Practical Quantitation Limit (PQL)** | (mg/L) | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 |
| **Sample Volume ($V_{NH3}$)** | (ml) | 240 | 200 | 200 | 220 | 200 | 250 | 80 |
| **DGM Volume $(V_m)_{dscf}$** | (dscf) | 56.17 | | 54.39 | | 55.45 | | 56.17 |
| **DGM Volume $(V_m)_{dstdL}$** | ($L_{dstd}$) | 1590.62 | | 1540.29 | | 1570.30 | | 1590.62 |
| **Sum of $NH_3$ Ion (N)** | (mg/L) | 8.8800 | 0.1100 | 10.6000 | 0.1200 | 11.8000 | 0.1600 | 0.1000 |
| **Total Sample Volume (S)** | (ml) | 240 | 200 | 200 | 220 | 200 | 250 | 80 |
| **Volume of $NH_3$ ($V_a$)** | (L) | 0.00280 | 0.00003 | 0.00279 | 0.00003 | 0.00310 | 0.00005 | 0.00001 |
| **$O_2$ Concentration** | (%) | 12.00 | | 12.02 | | 12.06 | | N/A |
| **$NH_3$ Concentration ($C_{NH3}$)** | (ppmvd) | 1.78 | | 1.83 | | 2.01 | | 0.007 |
| **$C_{NH3}$ @ 15% $O_2$** | (ppmvd) | 1.18 | | 1.22 | | 1.34 | | N/A |

## Equations & Constants:

**Example Using Data from the 1st run**

**DGM Volume ($L_{dstd}$)**

$$(V_m)_{dstdL}(L_{dstd}) = (V_m)_{dscf} \times 28.31685$$

$(V_m)_{dstdL}$ ($L_{dstd}$) = 56.17 dscf x 28.31685 L/ft$^3$ = 1590.62 $L_{dstd}$

$(V_m)_{dscf}$ = Volume of gas sample measured by the DGM, corrected to standard conditions.

MW = molecular weight (ref. ASTM D 3588)

$C_f$ = Concentration of NH3 ion in the front half of train (main catch)

$C_b$ = Concentration of NH3 ion in the back half of train (breakthrough)

**Volume of $NH_3$ (L)**

$$V_a(L) = \frac{\frac{N \times S}{1000} \times 22.4}{MW \times 1000}$$

$$V_a\,(L) = \frac{8.88\ mg}{L} \times 240\ ml \times \frac{L}{1000\ ml} \times \frac{22.4\ L\ ideal\ gas}{g\text{-}mol\ substance} \times \frac{g\text{-}mol\ NH_3}{17.03\ g} \times \frac{g}{1000\ mg} = 0.00280\ L$$

**$NH_3$ Concentration (ppmvd)**

$$C_{NH3}(ppmvd) = \frac{V_{a(front)} + V_{a(back)}}{(V_m)_{dstdL}} \times 10^6$$

$$C_{NH3}\ (ppmvd) = \frac{0.0028\ L + 0.00003\ L}{1590.62\ L_{dstd}} \times \frac{10^6\ parts}{1\ part} = 1.781\ ppmvd$$

22.4 = liters of ideal gas per mol of substance at 0°C and 1 atm (ref. Civil Engineering Reference Manual, 7th ed. - Michael R. Lindeburg)

## CTM 027 (AMMONIA) - RESULTS

| | | | |
|---|---|---|---|
| **Plant Name** | West County Energy Center | **Date** | 10/5/2009 - 10/6/2009 |
| **Sampling Location** | Unit 1C | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Operator** | TP | **Stack Type** | Circular |

| Historical Data | | | | | | |
|---|---|---|---|---|---|---|
| **Run Number** | | Base W/DB-1 | Base W/DB-2 | Base W/DB-3 | **Average** | |
| **Run Start Time** | | 17:51 | 19:18 | 9:57 | | hh:mm |
| **Run Stop Time** | | 19:03 | 20:30 | 11:10 | | hh:mm |
| **Meter Calibration Factor** | (Y) | 1.054 | 1.054 | 1.054 | | |
| **Pitot Tube Coefficient** | ($C_p$) | 0.840 | 0.840 | 0.840 | | |
| **Average Nozzle Diameter** | ($D_{na}$) | 0.248 | 0.248 | 0.248 | | in |
| **Stack Test Data** | | | | | | |
| **Initial Meter Volume** | ($V_m$)$_i$ | 479.088 | 533.303 | 586.721 | | ft3 |
| **Final Meter Volume** | ($V_m$)$_f$ | 532.798 | 585.280 | 639.468 | | ft3 |
| **Total Meter Volume** | ($V_m$) | 53.710 | 51.977 | 52.747 | 52.811 | ft3 |
| **Total Sampling Time** | ($\Theta$) | 60.0 | 60.0 | 60.0 | 60.0 | min |
| **Average Meter Temperature** | ($t_m$)$_{avg}$ | 73.8 | 73.1 | 70.8 | 72.5 | oF |
| **Average Stack Temperature** | ($t_s$)$_{avg}$ | 172.8 | 172.9 | 180.9 | 175.5 | oF |
| **Barometric Pressure** | ($P_b$) | 29.80 | 29.80 | 29.80 | 29.80 | in Hg |
| **Stack Static Pressure** | ($P_{static}$) | -0.70 | -0.70 | -0.70 | -0.70 | in H2O |
| **Absolute Stack Pressure** | ($P_s$) | 29.75 | 29.75 | 29.75 | 29.75 | in Hg |
| **Average Orifice Pressure Drop** | ($\Delta H$)$_{avg}$ | 2.79 | 2.59 | 2.70 | 2.69 | in H2O |
| **Absolute Meter Pressure** | ($P_m$) | 29.92 | 29.92 | 29.92 | 29.92 | in Hg |
| **Avg Square Root Pitot Pressure** | ($\Delta p^{1/2}$)$_{avg}$ | 1.00 | 0.97 | 1.00 | 0.99 | (in H2O)1/2 |
| **Moisture Content Data** | | | | | | |
| **Impingers 1-3 Water Volume Gain** | ($V_n$) | 142.6 | 128.5 | 126.1 | 132.4 | ml |
| **Impinger 4 Silica Gel Weight Gain** | ($W_n$) | 13.4 | 18.1 | 19.3 | 16.9 | g |
| **Total Water Volume Collected** | ($V_{lc}$) | 156.0 | 146.7 | 145.5 | 149.4 | ml |
| **Standard Water Vapor Volume** | ($V_w$)$_{std}$ | 7.342 | 6.903 | 6.847 | 7.031 | scf |
| **Standard Meter Volume** | ($V_m$)$_{std}$ | 56.172 | 54.395 | 55.455 | 55.341 | dscf |
| **Calculated Stack Moisture** | ($B_{ws(calc)}$) | 11.56 | 11.26 | 10.99 | 11.27 | % |
| **Saturated Stack Moisture** | ($B_{ws(svp)}$) | 43.7 | 43.7 | 52.3 | 46.6 | % |
| **Reported Stack Moisture Content** | ($B_{ws}$) | 11.56 | 11.26 | 10.99 | 11.27 | % |
| **Gas Analysis Data** | | | | | | |
| **Carbon Dioxide Percentage** | (%$CO_2$) | 5.1 | 5.2 | 5.2 | 5.2 | % |
| **Oxygen Percentage** | (%$O_2$) | 12.0 | 12.0 | 12.1 | 12.0 | % |
| **Carbon Monoxide Percentage** | (%CO) | 0.0 | 0.0 | 0.0 | 0.0 | % |
| **Nitrogen Percentage** | (%$N_2$) | 82.9 | 82.8 | 82.7 | 82.8 | % |
| **Dry Gas Molecular Weight** | ($M_d$) | 29.29 | 29.31 | 29.32 | 29.31 | lb/lb-mole |
| **Wet Stack Gas Molecular Weight** | ($M_s$) | 27.99 | 28.03 | 28.08 | 28.03 | lb/lb-mole |
| **Calculated Fuel Factor** | ($F_o$) | 1.748 | 1.717 | 1.687 | 1.718 | |
| **Fuel F-Factor** | ($F_d$) | 8644 | 8644 | 8644 | 8644 | dscf/MMBtu |
| **Percent Excess Air** | (%EA) | 121.4 | 122.1 | 123.4 | 122.3 | % |
| **Volumetric Flow Rate Data** | | | | | | |
| **Average Stack Gas Velocity** | ($v_s$) | 62.62 | 60.33 | 62.64 | 61.86 | ft/sec |
| **Stack Cross-Sectional Area** | ($A_s$) | 378.35 | 378.35 | 378.35 | 378.35 | ft2 |
| **Actual Stack Flow Rate** | ($Q_{aw}$) | 1,421,507 | 1,369,592 | 1,421,878 | 1,404,326 | acfm |
| **Wet Standard Stack Flow Rate** | ($Q_{sw}$) | 70,754 | 68,165 | 69,880 | 69,599 | wkscfh |
| **Dry Standard Stack Flow Rate** | ($Q_{sd}$) | 1,042,898 | 1,008,144 | 1,036,672 | 1,029,238 | dscfm |
| **Percent of Isokinetic Rate** | (I) | 100.0 | 100.6 | 99.7 | 100.1 | % |
| **Ammonia Rate Data** | | | | | | |
| **Stack Ammonia Concentration** | ($c_{NH3}$) | 1.78 | 1.83 | 2.01 | 1.87 | ppm |
| | ($c_{NH3}$) | 1.18 | 1.22 | 1.34 | 1.25 | ppm@15%$O_2$ |
| **Ammonia Emission Rate** | ($E_{NH3}$) | 4.93 | 4.90 | 5.53 | 5.12 | lbs/hr |

## CTM 027 (AMMONIA) SOURCE SAMPLING TITLE PAGE

**ALARMS exist and have been acknowledged.**

| Source Information | | | | |
|---|---|---|---|---|
| Plant Name | West County Energy Center | | | |
| Sampling Location | Unit 1C | | | |
| Fuel or Source Type | Gas, Natural | | | |
| Fuel F-Factor | 8644 | 8644 | 8644 | |

| Test Information | | | |
|---|---|---|---|
| Starting Test Date | | 10/5/2009 - 10/6/2009 | |
| Project # | | bv-09-westcounty.fl-comp#1 | |
| Operator | | TP | |
| Standard Temperature | | 68 | oF |
| Standard Pressure | | 29.92 | in Hg |
| Minimum Required Sample Vol. | indust. spec. | 35 | scf |
| Run Duration | chk Subpart | 60 | minutes |
| Unit Number | | 1C | |
| Load | % or w/DB | Base W/DB | |
| Base Run Number | | Base W/DB | |
| Number of Ports Available | | 4 | |
| Number of Ports Used | | 4 | |
| Port Inside Diameter | | 6.00 | in |
| Circular Stack | | | |

| Test Equipment Information | | | | | |
|---|---|---|---|---|---|
| Run | | 1 | 2 | 3 | |
| Meter Box Number | from ACS | samp-cp-0005 | samp-cp-0005 | samp-cp-0005 | |
| Meter Calibration Factor | (Y) | 1.054 | 1.054 | 1.054 | |
| Orifice Meter Coefficient | (ΔH@) | 1.694 | 1.694 | 1.694 | in $H_2O$ |
| Pitot Identification | from ACS | samp-up-0002 | samp-up-0002 | samp-up-0002 | |
| Pitot Tube Coefficient | ($C_p$) | 0.840 | 0.840 | 0.840 | |
| Nozzle Diameter | ($D_n$) | 0.248 | 0.248 | 0.248 | in |
| Probe Number | from ACS | samp-up-0002 | samp-up-0002 | samp-up-0002 | |
| Probe Length | | 120.00 | 120.00 | 120.00 | in |
| (SS, Glass .... ) Liner Material | from list | inconel | inconel | inconel | |
| Sample Case / Oven Number | from ACS | samp-bh-0006 | samp-bh-0006 | samp-bh-0006 | |
| Impinger Case Number | from ACS | samp-bc-0002 | samp-bc-0006 | samp-bc-0002 | |

| Testing Company Information | |
|---|---|
| Company Name | Air Hygiene International, Inc. (Tulsa, Oklahoma) |
| Address | 5634 S. 122nd East Ave., Suite F |
| City, State Country Zip | Tulsa, Oklahoma 74146 |
| Project Manager | Jake Fahlenkamp |
| Phone Number | (918) 307-8865 |
| Fax Number | (918) 307-9131 |

## METHOD 2 - DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Plant Name | West County Energy Center | | | | Date | 10/5/2009 - 10/6/2009 |
| Sampling Location | Unit 1C | | | | Project # | bv-09-westcounty.fl-comp#1 |
| Operator | TP | | | | # of Ports Used | 4 |
| Stack Type | Circular | | | | Pitot Identification | samp-up-0002 |
| Pitot Leak Check | ☑ | PreTest | ☑ | PostTest | Pitot Coefficient ($C_p$) | 0.84 |

| Stack Dimensions | | | |
|---|---|---|---|
| Diameter or Length of Stack | (D) | 263.38 | in |
| Width of Stack | (W) | | in |
| Area of Stack | ($A_s$) | 378.35 | ft2 |

| Pressures | | | |
|---|---|---|---|
| Barometric Pressure | ($P_b$) | 29.80 | in Hg |
| Static Pressure | ($P_{static}$) | -0.70 | in H2O |
| Absolute Stack Pressure | ($P_s$) | 29.75 | in Hg |

| Stack Gas Composition | | | |
|---|---|---|---|
| Composition Data: | | Estimated Composition | |
| Carbon Dioxide Concentration | (%$CO_2$) | 5.0 | % |
| Oxygen Concentration | (%$O_2$) | 12.0 | % |
| Carbon Monoxide Concentration | (%CO) | 0.0 | % |
| Nitrogen Concentration | (%$N_2$) | 83.0 | % |
| Stack Moisture Content | ($B_{ws}$) | 10.000 | % |
| Stack Dry Molecular Weight | ($M_d$) | 29.28 | lb/lb-mole |
| Stack Wet Molecular Weight | ($M_s$) | 28.15 | lb/lb-mole |

| Results | | | |
|---|---|---|---|
| Avg Stack Gas Velocity | ($v_s$) | 60.5 | ft/sec |
| Avg Stack Dry Std Flow Rate | ($Q_{sd}$) | 60,246,386 | dscf/hr |
| Avg Stack Dry Std Flow Rate | ($Q_{sd}$) | 1,004,106 | dscf/min |
| Avg Stack Wet Flow Rate | ($Q_{sw}$) | 1,372,789 | acf/min |
| Avg Stack Wet Std Flow Rate | ($Q_{sw}$) | 66,940,428 | ascf/hr |

Stack Cross Section Schematic

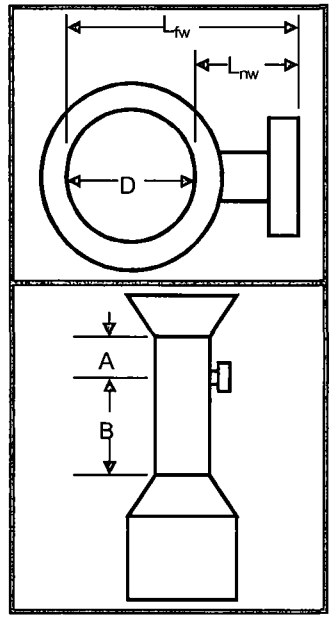
| Velocity Traverse Data | | | | |
|---|---|---|---|---|
| Run Number | | Base W/DB-V1 | | |
| Run Time | 7:00 | Start | 7:40 | End |
| Traverse Point | Velocity Head ($\Delta p$) | Null Angle ($N_a$) | Stack Temp ($t_s$) | Local Velocity ($v_{s(l)}$) |
| | in H2O | deg | oF | ft/sec |
| A-1 | 0.65 | 0 | 180 | 50.6 |
| A-2 | 0.73 | -5 | 182 | 53.7 |
| A-3 | 0.80 | 5 | 184 | 56.3 |
| A-4 | 0.87 | 10 | 183 | 58.7 |
| A-5 | 0.89 | 5 | 186 | 59.5 |
| A-6 | 0.81 | 0 | 187 | 56.8 |
| B-1 | 0.54 | 0 | 184 | 46.3 |
| B-2 | 0.64 | 0 | 191 | 50.7 |
| B-3 | 0.70 | 5 | 192 | 53.0 |
| B-4 | 0.74 | 0 | 190 | 54.4 |
| B-5 | 0.77 | 5 | 191 | 55.6 |
| B-6 | 0.75 | 0 | 192 | 54.9 |
| C-1 | 1.00 | -5 | 177 | 62.6 |
| C-2 | 1.10 | -5 | 183 | 66.0 |
| C-3 | 1.20 | 5 | 184 | 69.0 |
| C-4 | 1.20 | 5 | 185 | 69.0 |
| C-5 | 1.10 | 5 | 186 | 66.1 |
| C-6 | 0.90 | 5 | 187 | 59.9 |
| D-1 | 0.90 | 0 | 181 | 59.6 |
| D-2 | 1.10 | -5 | 183 | 66.0 |
| D-3 | 1.30 | 10 | 187 | 72.0 |
| D-4 | 1.30 | 5 | 188 | 72.0 |
| D-5 | 1.20 | 5 | 189 | 69.3 |
| D-6 | 1.20 | 0 | 191 | 69.4 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Average | 0.93 | 4 | 186 | |
| | 0.96 | = Square roots of $\Delta p$ | | |

## METHOD 1 - SAMPLE AND VELOCITY TRAVERSES FOR CIRCULAR SOURCES

| | | | |
|---|---|---|---|
| **Plant Name** | West County Energy Center | **Date** | 10/5/2009 - 10/6/2009 |
| **Sampling Location** | Unit 1C | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Operator** | TP | **# of Ports Available** | 4 |
| **Stack Type** | Circular | **# of Ports Used** | 4 |
| **Stack Size** | Large | **Port Inside Diameter** | 6.00 |

| Circular Stack or Duct Diameter | | | |
|---|---|---|---|
| **Distance to Far Wall of Stack** | ($L_{fw}$) | 282.38 | in |
| **Distance to Near Wall of Stack** | ($L_{nw}$) | 19.00 | in |
| **Diameter of Stack** | (D) | 263.38 | in |
| **Area of Stack** | ($A_s$) | 378.35 | ft2 |

| Distance from Port to Disturbances | | | |
|---|---|---|---|
| **Distance Upstream** | (A) | 144.00 | in |
| **Diameters Upstream** | ($A_D$) | 0.55 | diameters |
| **Distance Downstream** | (B) | 531.75 | in |
| **Diameters Downstream** | ($B_D$) | 2.02 | diameters |




| Number of Traverse Points Required | | | |
|---|---|---|---|
| **Diameters to Flow Disturbance** | | **Minimum Number of[1] Traverse Points** | |
| **Down Stream** | **Up Stream** | **Particulate Points** | **Velocity Points** |
| 2.00-4.99 | 0.50-1.24 | 24 | 16 |
| 5.00-5.99 | 1.25-1.49 | 20 | 16 |
| 6.00-6.99 | 1.50-1.74 | 16 | 12 |
| 7.00-7.99 | 1.75-1.99 | 12 | 12 |
| >= 8.00 | >=2.00 | 8 or 12[2] | 8 or 12[2] |
| **Upstream Spec** | | 24 | 16 |
| **Downstream Spec** | | 24 | 16 |
| **Traverse Pts Required** | | 24 | 16 |

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches

| Number of Traverse Points Used | | | |
|---|---|---|---|
| 4 | **Ports by** | 6 | **Across** |
| 24 | **Pts Used** | 24 | **Required** |
| | | **Particulate Traverse** | |

| Location of Traverse Points in Circular Stacks | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Traverse Point Number** | (Fraction of Stack Dimension from Inside Wall to Traverse Point) Number of Traverse Points Across the Stack | | | | | | | | |
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 1 | .146 | .067 | .044 | .032 | .026 | .021 | .018 | .016 | .014 |
| 2 | .854 | .250 | .146 | .105 | .082 | .067 | .057 | .049 | .044 |
| 3 | | .750 | .296 | .194 | .146 | .118 | .099 | .085 | .075 |
| 4 | | .933 | .704 | .323 | .226 | .177 | .146 | .125 | .109 |
| 5 | | | .854 | .677 | .342 | .250 | .201 | .169 | .146 |
| 6 | | | .956 | .806 | .658 | .356 | .269 | .220 | .188 |
| 7 | | | | .895 | .774 | .644 | .366 | .283 | .236 |
| 8 | | | | .968 | .854 | .750 | .634 | .375 | .296 |
| 9 | | | | | .918 | .823 | .731 | .625 | .382 |
| 10 | | | | | .974 | .882 | .799 | .717 | .618 |
| 11 | | | | | | .933 | .854 | .780 | .704 |
| 12 | | | | | | .979 | .901 | .831 | .764 |

| Traverse Point Locations | | | |
|---|---|---|---|
| **Traverse Point Number** | **Fraction of Stack Diameter** | **Distance from Inside Wall** | **Distance Including Reference Length** |
| | | in | in |
| **1** | 0.02 | 5 4/8 | 24 4/8 |
| **2** | 0.07 | 17 5/8 | 36 5/8 |
| **3** | 0.12 | 31 1/8 | 50 1/8 |
| **4** | 0.18 | 46 5/8 | 65 5/8 |
| **5** | 0.25 | 65 7/8 | 84 7/8 |
| **6** | 0.36 | 93 6/8 | 112 6/8 |
| **7** | | | |
| **8** | | | |
| **9** | | | |
| **10** | | | |
| **11** | | | |
| **12** | | | |

## METHOD 3a - DETERMINATION OF DRY MOLECULAR WEIGHT BY ANALYZER

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Plant Name** | West County Energy Center | | | | **Date** | 10/5/2009 - 10/6/2009 | |
| **Sampling Location** | Unit 1C | | | | **Project #** | bv-09-westcounty.fl-comp#1 | |
| **Operator** | TP | | | | **# of Ports Used** | 4 | |
| **Fuel Type** | Gas, Natural | **Minimum Fuel Factor** | 1.600 | **Maximum Fuel Factor** | 1.836 | | |
| **Orsat Leak Check** | ☑ | **PreTest** | ☑ | **PostTest** | **Orsat Identification** | N/A | |

| Gas Analysis Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Run Number** | | Base W/DB-1 | | **Run Start Time** | | 17:51 | **Run Stop Time** | | 19:03 |
| **Sample Analysis Time** | **Carbon Dioxide Conc.** (%CO2) | **Oxygen Conc.** (%O2) | **Carbon Monoxide Conc.** (ppmCO) | **Carbon Dioxide Conc.** ($\%CO_2$) | **Oxygen Conc.** ($\%O_2$) | **Carbon Monoxide Conc.** (%CO) | **Nitrogen Conc.** ($\%N_2$) | **Dry Molecular Weight** ($M_d$) | **Molecular Weight Deviation** ($\Delta M_d$) |
| hh:mm | percent | percent | ppm | percent | percent | percent | percent | lb/lb-mole | lb/lb-mole |
| 1:12 | 5.1 | 12.0 | 4.7 | 5.1 | 12.0 | 0.0 | 82.9 | 29.29 | 0.00 |
| **Results** | | | **Averages** | 5.1 | 12.0 | 0.0 | 82.9 | 29.29 | |
| **Average Calculated Fuel Factor** | | | $(F_o)_{avg}$ | 1.748 | | **Molecular Wt Deviation < 0.3?** | | | ☑ |
| **Average Excess Air** | | | $(\%EA)_{avg}$ | 121.4 | percent | **Fuel Factor in Handbook Range?** | | | ☑ |

| Gas Analysis Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Run Number** | | Base W/DB-2 | | **Run Start Time** | | 19:18 | **Run Stop Time** | | 20:30 |
| **Sample Analysis Time** | **Carbon Dioxide Conc.** (%CO2) | **Oxygen Conc.** (%O2) | **Carbon Monoxide Conc.** (ppmCO) | **Carbon Dioxide Conc.** ($\%CO_2$) | **Oxygen Conc.** ($\%O_2$) | **Carbon Monoxide Conc.** (%CO) | **Nitrogen Conc.** ($\%N_2$) | **Dry Molecular Weight** ($M_d$) | **Molecular Weight Deviation** ($\Delta M_d$) |
| hh:mm | percent | percent | ppm | percent | percent | percent | percent | lb/lb-mole | lb/lb-mole |
| 1:12 | 5.2 | 12.0 | 4.5 | 5.2 | 12.0 | 0.0 | 82.8 | 29.31 | 0.00 |
| **Results** | | | **Averages** | 5.2 | 12.0 | 0.0 | 82.8 | 29.31 | |
| **Average Calculated Fuel Factor** | | | $(F_o)_{avg}$ | 1.717 | | **Molecular Wt Deviation < 0.3?** | | | ☑ |
| **Average Excess Air** | | | $(\%EA)_{avg}$ | 122.1 | percent | **Fuel Factor in Handbook Range?** | | | ☑ |

| Gas Analysis Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Run Number** | | Base W/DB-3 | | **Run Start Time** | | 9:57 | **Run Stop Time** | | 11:10 |
| **Sample Analysis Time** | **Carbon Dioxide Conc.** (%CO2) | **Oxygen Conc.** (%O2) | **Carbon Monoxide Conc.** (ppmCO) | **Carbon Dioxide Conc.** ($\%CO_2$) | **Oxygen Conc.** ($\%O_2$) | **Carbon Monoxide Conc.** (%CO) | **Nitrogen Conc.** ($\%N_2$) | **Dry Molecular Weight** ($M_d$) | **Molecular Weight Deviation** ($\Delta M_d$) |
| hh:mm | percent | percent | ppm | percent | percent | percent | percent | lb/lb-mole | lb/lb-mole |
| 1:13 | 5.2 | 12.1 | 2.1 | 5.2 | 12.1 | 0.0 | 82.7 | 29.32 | 0.00 |
| **Results** | | | **Averages** | 5.2 | 12.1 | 0.0 | 82.7 | 29.32 | |
| **Average Calculated Fuel Factor** | | | $(F_o)_{avg}$ | 1.687 | | **Molecular Wt Deviation < 0.3?** | | | ☑ |
| **Average Excess Air** | | | $(\%EA)_{avg}$ | 123.4 | percent | **Fuel Factor in Handbook Range?** | | | ☑ |

| Fuel Factor Fo | | |
|---|---|---|
| **Fuel Type** | **Minimum** | **Maximum** |
| **Coal, Anthracite** | 1.016 | 1.130 |
| **Coal, Lignite** | 1.016 | 1.130 |
| **Coal, Bituminous** | 1.083 | 1.230 |
| **Oil, Distillate** | 1.260 | 1.413 |
| **Oil, Residual** | 1.210 | 1.370 |
| **Gas, Natural** | 1.600 | 1.836 |
| **Gas, Propane** | 1.434 | 1.586 |
| **Gas, Butane** | 1.405 | 1.553 |
| **Wood** | 1.000 | 1.120 |
| **Wood Bark** | 1.003 | 1.130 |

## METHOD 4 - DETERMINATION OF MOISTURE CONTENT IN STACK GASES

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Plant Name | West County Energy Center | | | | Date | 10/5/2009 - 10/6/2009 | |
| Sampling Location | Unit 1C | | | | Project # | bv-09-westcounty.fl-comp#1 | |
| Operator | TP | | | | # of Ports Used | 4 | |
| Stack Type | Circular | | | | Meter Box Number | samp-cp-0005 | |
| Train Leak Check | ☑ | PreTest | ☑ | PostTest | Meter Cal Factor (Y) | 1.054 | |

| Moisture Content Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Run Number | | Base W/DB-1 | | | Run Start Time | 17:51 | | Run Stop Time | 19:03 |
| Total Meter Volume | $(V_m)$ | 53.710 | dcf | | Barometric Press. | $(P_b)$ | 29.80 | | in Hg |
| Avg Stack Temp | $(t_s)_{avg}$ | 173 | oF | | Stack Static Press. | $(P_{static})$ | -0.70 | | in H2O |
| Avg Meter Temp | $(t_m)_{avg}$ | 74 | oF | | Avg Orifice Press. | $(\Delta H)_{avg}$ | 2.79 | | in H2O |
| | | Impinger 1 | Impinger 2 | Impinger 3 | Impinger 4 | Impinger 5 | Impinger 6 | Impinger 7 | Impinger 8 |
| | | g | g | g | g | g | g | g | g |
| Contents | | H2SO4 | H2SO4 | | Sil Gel | | | | |
| Final Value | $(V_f),(W_f)$ | 834.00 | 743.50 | 650.20 | 978.50 | | | | |
| Initial Value | $(V_i),(W_i)$ | 722.70 | 717.40 | 645.30 | 965.10 | | | | |
| Net Value | $(V_n),(W_n)$ | 111.3 | 26.1 | 4.9 | 13.4 | | | | |
| Results | | | | | | | | | |
| Total Weight | $(W_t)$ | 155.70 | g | | Water Vol Weighed | $(V_{wsg(std)})$ | 7.341 | scf | |
| Std Meter Volume | $(V_{m(std)})$ | 56.160 | dscf | | Sat. Moisture Content | $(B_{ws(svp)})$ | 43.7 | % | |
| Calc Moisture Content | $(B_{ws(calc)})$ | 11.6 | % | | Final Moisture Content | $(B_{ws})$ | 11.6 | % | |

| Moisture Content Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Run Number | | Base W/DB-2 | | | Run Start Time | 19:18 | | Run Stop Time | 20:30 |
| Total Meter Volume | $(V_m)$ | 51.977 | dcf | | Barometric Press. | $(P_b)$ | 29.80 | | in Hg |
| Avg Stack Temp | $(t_s)_{avg}$ | 173 | oF | | Stack Static Press. | $(P_{static})$ | -0.70 | | in H2O |
| Avg Meter Temp | $(t_m)_{avg}$ | 73 | oF | | Avg Orifice Press. | $(\Delta H)_{avg}$ | 2.59 | | in H2O |
| | | Impinger 1 | Impinger 2 | Impinger 3 | Impinger 4 | Impinger 5 | Impinger 6 | Impinger 7 | Impinger 8 |
| | | g | g | g | g | g | g | g | g |
| Contents | | H2SO4 | H2SO4 | | Sil Gel | | | | |
| Final Value | $(V_f),(W_f)$ | 790.50 | 764.00 | 616.70 | 944.20 | | | | |
| Initial Value | $(V_i),(W_i)$ | 723.50 | 715.60 | 603.80 | 926.10 | | | | |
| Net Value | $(V_n),(W_n)$ | 67.0 | 48.4 | 12.9 | 18.1 | | | | |
| Results | | | | | | | | | |
| Total Weight | $(W_t)$ | 146.40 | g | | Water Vol Weighed | $(V_{wsg(std)})$ | 6.903 | scf | |
| Std Meter Volume | $(V_{m(std)})$ | 54.391 | dscf | | Sat. Moisture Content | $(B_{ws(svp)})$ | 43.7 | % | |
| Calc Moisture Content | $(B_{ws})$ | 11.3 | % | | Final Moisture Content | $(B_{ws})$ | 11.3 | % | |

| Moisture Content Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Run Number | | Base W/DB-3 | | | Run Start Time | 9:57 | | Run Stop Time | 11:10 |
| Total Meter Volume | $(V_m)$ | 52.747 | dcf | | Barometric Press. | $(P_b)$ | 29.80 | | in Hg |
| Avg Stack Temp | $(t_s)_{avg}$ | 181 | oF | | Stack Static Press. | $(P_{static})$ | -0.70 | | in H2O |
| Avg Meter Temp | $(t_m)_{avg}$ | 71 | oF | | Avg Orifice Press. | $(\Delta H)_{avg}$ | 2.70 | | in H2O |
| | | Impinger 1 | Impinger 2 | Impinger 3 | Impinger 4 | Impinger 5 | Impinger 6 | Impinger 7 | Impinger 8 |
| | | g | g | g | g | g | g | g | g |
| Contents | | H2SO4 | H2SO4 | | Sil Gel | | | | |
| Final Value | $(V_f),(W_f)$ | 755.60 | 747.50 | 664.10 | 982.70 | | | | |
| Initial Value | $(V_i),(W_i)$ | 691.80 | 702.00 | 647.50 | 963.40 | | | | |
| Net Value | $(V_n),(W_n)$ | 63.8 | 45.5 | 16.6 | 19.3 | | | | |
| Results | | | | | | | | | |
| Total Weight | $(W_t)$ | 145.20 | g | | Water Vol Weighed | $(V_{wsg(std)})$ | 6.846 | scf | |
| Std Meter Volume | $(V_{m(std)})$ | 55.453 | dscf | | Sat. Moisture Content | $(B_{ws(svp)})$ | 52.3 | % | |
| Calc Moisture Content | $(B_{ws})$ | 11.0 | % | | Final Moisture Content | $(B_{ws})$ | 11.0 | % | |

# CTM 027 (AMMONIA) ISOKINETIC SAMPLING DATA

| | | | |
|---|---|---|---|
| Plant Name | West County Energy Center | Date | 10/5/2009 - 10/6/2009 |
| Sampling Location | Unit 1C | Project # | bv-09-westcounty.fl-comp#1 |
| Operator | TP | Run # | Base W/DB-1 |
| # of Points Across | 6 | # of Ports Used | 4 |

| Ideal Nozzle Diameter and IsoKinetic Factor Setup | | | |
|---|---|---|---|
| Pitot Tube Coefficient | ($C_p$) | 0.84 | |
| Avg Stack Temp | ($t_s$) | 173 | oF |
| Avg Gas Meter Temp | ($t_m$) | 74 | |
| DH @ 0.75 SCFM | ($\Delta H@$) | 1.69 | in H2O |
| Avg Pitot Tube Diff. Pressure | ($\Delta p_{avg}$) | 1.00 | in H2O |
| Stack Moisture Content | ($B_{ws}$) | 10.00 | % |
| Stack Dry Molecular Weight | ($M_d$) | 29.29 | lb/lb-mole |
| Estimated Orifice Flow Rate | ($Q_m$) | 0.750 | acfm |
| DP to DH Isokinetic Factor | (K) | 2.71 | |

| Leak Checks | | | | | |
|---|---|---|---|---|---|
| Train | Pre | 0.005 | ft3/min @ | 15 | in Hg |
| OK? ☑ | Post | 0 | ft3/min @ | 15 | in Hg |
| Pitot | Pre | 6.6/5.7 | in. $H_2O$ for | 15 | sec |
| OK? ☑ | Post | 5.9/6.0 | in. $H_2O$ for | 15 | sec |
| Orsat | OK? ☐ | | | | |

| Sampling Equipment | | | |
|---|---|---|---|
| Meter # | samp-cp-0005 | | |
| Meterbox Cal. Factor | (Y) | 1.054 | |
| Nozzle # | N/A | | |
| Average Nozzle Diameter | ($D_{na}$) | 0.2480 | in |
| Rec. Nozzle Diameter | ($D_{ri}$) | 0.2206 | in |
| Probe # / Length | samp-up-0002 | / 120 | in |
| Liner Material | inconel | | |
| Sample Case / Oven # | samp-bh-0006 | | |
| Impinger Case # | samp-bc-0002 | | |

| Pressures | | | |
|---|---|---|---|
| Barometric Pressure | ($P_b$) | 29.80 | in Hg |
| Stack Static Pressure | ($P_{static}$) | -0.70 | in H2O |
| Absolute Stack Pressure | ($P_s$) | 29.75 | in Hg |
| Absolute Meter Pressure | ($P_m$) | 29.92 | in Hg |

| Nozzle Measurements | | | | |
|---|---|---|---|---|
| Pre | 0.248 | 0.248 | 0.248 | PASS |
| Post | 0.248 | 0.248 | 0.248 | PASS |

| Run Time | | | |
|---|---|---|---|
| Start | 17:51 | End | 19:03 |

| Weights | Imp 1 | Imp 2 | Imp 3 | Imp 4 | Imp 5 | Imp 6 | Imp 7 | Imp 8 |
|---|---|---|---|---|---|---|---|---|
| Pre | 722.70 | 717.40 | 645.30 | 965.10 | | | | |
| Post | 834.00 | 743.50 | 650.20 | 978.50 | | | | |

| Wash Volume | | | |
|---|---|---|---|
| | $H_2O$ | 50.0 | ml |
| | MeCl | | ml |

| Filter # |
|---|
| |

| Traverse Point # | Sampling Time (Θ) | Timer Time | Dry Gas Meter Reading ($V_m$) | Velocity Head ($\Delta p$) | Desired Orifice ΔH ($\Delta H_d$) | Actual Orifice ΔH ($\Delta H_a$) | Stack Temp ($t_s$) | Probe Temp | Filter Temp | Impinger Exit Temp | Aux Temp | Meter Inlet Temp ($t_{mi}$) | Meter Outlet Temp ($t_{mo}$) | Pump Vacuum | Square Root ΔP ($\Delta p^{1/2}$) | Local Stack Velocity ($v_s$)l | Cumulative Meter Volume ($V_m$)std | Cumulative Percent IsoKinetic (I) | Est-Run Meter Volume ($V_m$)std |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | min | hh:mm:ss | ft3 | in H2O | in H2O | in H2O | oF | oF | oF | oF | oF | oF | oF | in Hg | (in H2O)1/2 | ft/sec | scf | % | scf |
| A-1 | 0.0 | 0:00:00 | 479.088 | 0.600 | 1.629 | 1.600 | 170 | 247 | 257 | 68 | | 74 | 72 | 1.5 | 0.77 | 48.23 | 1.960 | 107.7 | 47.031 |
| A-2 | 2.5 | 0:02:30 | 480.965 | 0.610 | 1.656 | 1.700 | 174 | 247 | 258 | 64 | | 74 | 72 | 1.5 | 0.78 | 48.79 | 3.944 | 108.1 | 47.325 |
| A-3 | 5.0 | 0:05:00 | 482.865 | 0.730 | 1.981 | 2.000 | 174 | 247 | 260 | 59 | | 75 | 72 | 2.0 | 0.85 | 53.37 | 5.494 | 99.5 | 43.954 |
| A-4 | 7.5 | 0:07:30 | 484.350 | 0.800 | 2.171 | 2.200 | 176 | 249 | 259 | 57 | | 75 | 73 | 2.5 | 0.89 | 55.96 | 7.618 | 100.1 | 45.708 |
| A-5 | 10.0 | 0:10:00 | 486.385 | 0.850 | 2.307 | 2.300 | 175 | 246 | 257 | 56 | | 76 | 72 | 3.0 | 0.92 | 57.64 | 9.753 | 99.8 | 46.813 |
| A-6 | 12.5 | 0:12:30 | 488.430 | 0.880 | 2.388 | 2.400 | 175 | 249 | 260 | 56 | | 76 | 72 | 3.0 | 0.94 | 58.65 | 11.909 | 99.5 | 47.635 |
| B-1 | 15.0 | 0:15:00 | 490.495 | 0.620 | 1.683 | 1.700 | 170 | 249 | 259 | 68 | | 75 | 72 | 1.5 | 0.79 | 49.03 | 13.881 | 100.6 | 47.591 |
| B-2 | 17.5 | 0:17:30 | 492.385 | 0.740 | 2.009 | 2.000 | 171 | 246 | 256 | 64 | | 75 | 72 | 2.5 | 0.86 | 53.61 | 15.864 | 100.3 | 47.593 |
| B-3 | 20.0 | 0:20:00 | 494.285 | 0.810 | 2.199 | 2.200 | 171 | 243 | 249 | 64 | | 75 | 72 | 2.5 | 0.90 | 56.09 | 17.969 | 100.2 | 47.918 |
| B-4 | 22.5 | 0:22:30 | 496.300 | 0.810 | 2.199 | 2.200 | 171 | 241 | 253 | 64 | | 75 | 72 | 2.5 | 0.90 | 56.09 | 20.048 | 100.0 | 48.115 |
| B-5 | 25.0 | 0:25:00 | 498.290 | 0.800 | 2.171 | 2.200 | 172 | 244 | 258 | 65 | | 76 | 73 | 2.5 | 0.89 | 55.78 | 22.144 | 100.0 | 48.314 |
| B-6 | 27.5 | 0:27:30 | 500.300 | 0.800 | 2.171 | 2.200 | 172 | 243 | 251 | 66 | | 76 | 72 | 2.5 | 0.89 | 55.78 | 24.266 | 100.1 | 48.533 |
| C-1 | 30.0 | 0:30:00 | 502.334 | 1.300 | 3.528 | 3.500 | 169 | 254 | 263 | 64 | | 79 | 72 | 5.5 | 1.14 | 70.94 | 26.841 | 99.7 | 49.552 |
| C-2 | 32.5 | 0:32:30 | 504.800 | 1.300 | 3.528 | 3.500 | 171 | 252 | 263 | 56 | | 75 | 72 | 5.5 | 1.14 | 71.05 | 29.545 | 99.8 | 50.648 |
| C-3 | 35.0 | 0:35:00 | 507.380 | 1.300 | 3.528 | 3.500 | 173 | 254 | 259 | 53 | | 75 | 73 | 5.5 | 1.14 | 71.17 | 32.460 | 100.7 | 51.936 |
| C-4 | 37.5 | 0:37:30 | 510.165 | 1.300 | 3.528 | 3.500 | 173 | 253 | 260 | 56 | | 75 | 72 | 5.5 | 1.14 | 71.17 | 34.698 | 99.6 | 52.046 |
| C-5 | 40.0 | 0:40:00 | 512.300 | 1.300 | 3.528 | 3.500 | 172 | 254 | 260 | 55 | | 75 | 73 | 5.5 | 1.14 | 71.11 | 37.393 | 99.7 | 52.791 |
| C-6 | 42.5 | 0:42:30 | 514.875 | 1.300 | 3.528 | 3.500 | 173 | 254 | 268 | 55 | | 75 | 72 | 5.5 | 1.14 | 71.17 | 40.031 | 99.6 | 53.375 |
| D-1 | 45.0 | 0:45:00 | 517.392 | 1.400 | 3.800 | 3.800 | 171 | 238 | 254 | 56 | | 74 | 72 | 6.0 | 1.18 | 73.74 | 42.769 | 99.6 | 54.024 |
| D-2 | 47.5 | 0:47:30 | 520.000 | 1.400 | 3.800 | 3.800 | 172 | 240 | 255 | 55 | | 74 | 72 | 6.0 | 1.18 | 73.80 | 45.529 | 99.6 | 54.635 |
| D-3 | 50.0 | 0:50:00 | 522.630 | 1.300 | 3.528 | 3.500 | 175 | 239 | 256 | 57 | | 75 | 73 | 6.0 | 1.14 | 71.28 | 48.377 | 100.0 | 55.288 |
| D-4 | 52.5 | 0:52:30 | 525.350 | 1.300 | 3.528 | 3.500 | 175 | 242 | 253 | 58 | | 75 | 73 | 5.5 | 1.14 | 71.28 | 50.942 | 99.8 | 55.573 |
| D-5 | 55.0 | 0:55:00 | 527.800 | 1.200 | 3.257 | 3.300 | 177 | 240 | 253 | 59 | | 76 | 73 | 5.5 | 1.10 | 68.59 | 53.556 | 99.9 | 55.884 |
| D-6 | 57.5 | 0:57:30 | 530.300 | 1.200 | 3.257 | 3.300 | 176 | 239 | 257 | 60 | | 75 | 72 | 5.5 | 1.10 | 68.54 | 56.172 | 100.0 | 56.172 |
| Last Pt | 60.0 | 1:00:00 | 532.798 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| Final Val | 60.0 | 1:00:00 | 532.798 | | | | | | | | | | Max Vac | 6.0 | Final Values | | 56.172 | 100.0 | |
| Average Values | | | | 1.03 | | 2.79 | 173 | 246 | 257 | 60 | | 75 | 72 | | 1.00 | 62.62 | | | |
| | | | | | | | | | | | | 74 | | | | | | | |

# CTM 027 (AMMONIA) ISOKINETIC SAMPLING DATA

| | | | |
|---|---|---|---|
| **Plant Name** | West County Energy Center | **Date** | 10/5/2009 - 10/6/2009 |
| **Sampling Location** | Unit 1C | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Operator** | TP | **Run #** | Base W/DB-2 |
| **# of Points Across** | 6 | **# of Ports Used** | 4 |

| Ideal Nozzle Diameter and IsoKinetic Factor Setup | | | |
|---|---|---|---|
| **Pitot Tube Coefficient** | ($C_p$) | 0.84 | |
| **Avg Stack Temp** | ($t_s$) | 173 | oF |
| **Avg Gas Meter Temp** | ($t_m$) | 74 | |
| **DH @ 0.75 SCFM** | ($\Delta H@$) | 1.69 | in H2O |
| **Avg Pitot Tube Diff. Pressure** | ($\Delta p_{avg}$) | 1.00 | in H2O |
| **Stack Moisture Content** | ($B_{ws}$) | 10.00 | % |
| **Stack Dry Molecular Weight** | ($M_d$) | 29.29 | lb/lb-mole |
| **Estimated Orifice Flow Rate** | ($Q_m$) | 0.895 | acfm |
| **DP to DH Isokinetic Factor** | (K) | 2.71 | |

| Leak Checks | | | | | |
|---|---|---|---|---|---|
| **Train** | **Pre** | 0.0075 | ft3/min @ | 15 | in Hg |
| OK? ☑ | **Post** | 0.015 | ft3/min @ | 15 | in Hg |
| **Pitot** | **Pre** | 6.2/5.8 | in. $H_2O$ for | 15 | sec |
| OK? ☑ | **Post** | 6.7/5.6 | in. $H_2O$ for | 15 | sec |
| **Orsat** | OK? ☐ | | | | |

| Sampling Equipment | | | |
|---|---|---|---|
| **Meter #** | samp-cp-0005 | | |
| **Meterbox Cal. Factor** | (Y) | 1.054 | |
| **Nozzle #** | N/A | | |
| **Average Nozzle Diameter** | ($D_{na}$) | 0.2480 | in |
| **Rec. Nozzle Diameter** | ($D_{ni}$) | 0.2408 | in |
| **Probe # / Length** | samp-up-0002 | / 120 | in |
| **Liner Material** | inconel | | |
| **Sample Case / Oven #** | samp-bh-0006 | | |
| **Impinger Case #** | samp-bc-0006 | | |

| Pressures | | | |
|---|---|---|---|
| **Barometric Pressure** | ($P_b$) | 29.80 | in Hg |
| **Stack Static Pressure** | ($P_{static}$) | -0.70 | in H2O |
| **Absolute Stack Pressure** | ($P_s$) | 29.75 | in Hg |
| **Absolute Meter Pressure** | ($P_m$) | 29.92 | in Hg |

| Nozzle Measurements | | | | |
|---|---|---|---|---|
| **Pre** | 0.248 | 0.248 | 0.248 | **PASS** |
| **Post** | 0.248 | 0.248 | 0.248 | **PASS** |

| Run Time | | | |
|---|---|---|---|
| **Start** | 19:18 | **End** | 20:30 |

| Weights | Imp 1 | Imp 2 | Imp 3 | Imp 4 | Imp 5 | Imp 6 | Imp 7 | Imp 8 |
|---|---|---|---|---|---|---|---|---|
| **Pre** | 723.50 | 715.60 | 603.80 | 926.10 | | | | |
| **Post** | 790.50 | 764.00 | 616.70 | 944.20 | | | | |

| | | | |
|---|---|---|---|
| **Wash Volume** | $H_2O$ | 50.0 | ml |
| | MeCl | | ml |

| **Filter #** |
|---|
| |

| Traverse Point # | Sampling Time (Θ) | Timer Time | Dry Gas Meter Reading ($V_m$) | Velocity Head ($\Delta p$) | Desired Orifice ΔH ($\Delta H_d$) | Actual Orifice ΔH ($\Delta H_a$) | Stack Temp ($t_s$) | Probe Temp | Filter Temp | Impinger Exit Temp | Aux Temp | Meter Inlet Temp ($t_{mi}$) | Meter Outlet Temp ($t_{mo}$) | Pump Vacuum | Square Root ΔP ($\Delta p^{1/2}$) | Local Stack Velocity ($v_s$)$_l$ | Cumulative Meter Volume ($V_m$)$_{std}$ | Cumulative Percent IsoKinetic (I) | Est-Run Meter Volume ($V_m$)$_{std}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | min | hh:mm:ss | ft3 | in H2O | in H2O | in H2O | oF | oF | oF | oF | oF | oF | oF | in Hg | (in H2O)1/2 | ft/sec | scf | % | scf |
| A-1 | 0.0 | 0:00:00 | 533.303 | 1.200 | 3.253 | 3.300 | 171 | 223 | 225 | 58 | | 74 | 72 | 4.5 | 1.10 | 68.27 | 2.539 | 98.8 | 60.941 |
| A-2 | 2.5 | 0:02:30 | 535.725 | 1.300 | 3.524 | 3.500 | 173 | 234 | 223 | 53 | | 75 | 73 | 5.0 | 1.14 | 71.17 | 5.235 | 99.9 | 62.821 |
| A-3 | 5.0 | 0:05:00 | 538.300 | 1.300 | 3.524 | 3.500 | 173 | 234 | 226 | 54 | | 75 | 72 | 5.0 | 1.14 | 71.17 | 7.792 | 98.5 | 62.336 |
| A-4 | 7.5 | 0:07:30 | 540.740 | 1.200 | 3.253 | 3.300 | 176 | 238 | 228 | 56 | | 75 | 72 | 5.0 | 1.10 | 68.54 | 10.411 | 99.5 | 62.463 |
| A-5 | 10.0 | 0:10:00 | 543.240 | 1.200 | 3.253 | 3.300 | 176 | 243 | 227 | 59 | | 76 | 72 | 5.0 | 1.10 | 68.54 | 13.048 | 100.2 | 62.628 |
| A-6 | 12.5 | 0:12:30 | 545.760 | 1.100 | 2.982 | 3.000 | 177 | 239 | 227 | 63 | | 76 | 72 | 5.0 | 1.05 | 65.67 | 15.599 | 100.8 | 62.396 |
| B-1 | 15.0 | 0:15:00 | 548.200 | 1.100 | 2.982 | 3.000 | 170 | 249 | 231 | 63 | | 79 | 72 | 5.0 | 1.05 | 65.31 | 18.247 | 101.8 | 62.563 |
| B-2 | 17.5 | 0:17:30 | 550.740 | 1.200 | 3.253 | 3.300 | 171 | 251 | 237 | 62 | | 75 | 72 | 5.0 | 1.10 | 68.27 | 20.840 | 101.7 | 62.519 |
| B-3 | 20.0 | 0:20:00 | 553.215 | 1.300 | 3.524 | 3.500 | 171 | 253 | 246 | 63 | | 75 | 72 | 5.0 | 1.14 | 71.05 | 23.475 | 101.3 | 62.601 |
| B-4 | 22.5 | 0:22:30 | 555.730 | 1.300 | 3.524 | 3.500 | 173 | 254 | 249 | 66 | | 75 | 72 | 5.0 | 1.14 | 71.17 | 26.116 | 101.1 | 62.679 |
| B-5 | 25.0 | 0:25:00 | 558.250 | 1.200 | 3.253 | 3.300 | 173 | 256 | 252 | 67 | | 75 | 72 | 5.0 | 1.10 | 68.38 | 28.708 | 101.1 | 62.637 |
| B-6 | 27.5 | 0:27:30 | 560.725 | 1.000 | 2.711 | 2.700 | 174 | 253 | 244 | 68 | | 75 | 72 | 3.5 | 1.00 | 62.47 | 31.062 | 101.0 | 62.123 |
| C-1 | 30.0 | 0:30:00 | 562.975 | 0.550 | 1.491 | 1.500 | 169 | 247 | 243 | 68 | | 73 | 72 | 1.0 | 0.74 | 46.14 | 33.125 | 102.1 | 61.154 |
| C-2 | 32.5 | 0:32:30 | 564.950 | 0.550 | 1.491 | 1.500 | 170 | 251 | 248 | 67 | | 74 | 73 | 1.0 | 0.74 | 46.18 | 34.872 | 102.0 | 59.780 |
| C-3 | 35.0 | 0:35:00 | 566.625 | 0.710 | 1.925 | 1.900 | 171 | 252 | 247 | 67 | | 73 | 71 | 1.0 | 0.84 | 52.51 | 36.625 | 101.4 | 58.600 |
| C-4 | 37.5 | 0:37:30 | 568.300 | 0.700 | 1.897 | 1.900 | 172 | 249 | 244 | 67 | | 73 | 71 | 1.0 | 0.84 | 52.18 | 38.405 | 100.9 | 57.607 |
| C-5 | 40.0 | 0:40:00 | 570.000 | 0.750 | 2.033 | 2.000 | 172 | 252 | 245 | 67 | | 75 | 72 | 1.0 | 0.87 | 54.01 | 40.226 | 100.4 | 56.790 |
| C-6 | 42.5 | 0:42:30 | 571.745 | 0.800 | 2.168 | 2.200 | 172 | 249 | 241 | 67 | | 73 | 71 | 1.0 | 0.89 | 55.78 | 42.047 | 99.8 | 56.063 |
| D-1 | 45.0 | 0:45:00 | 573.483 | 0.530 | 1.437 | 1.400 | 171 | 242 | 242 | 59 | | 73 | 71 | 2.0 | 0.73 | 45.37 | 44.130 | 100.8 | 55.743 |
| D-2 | 47.5 | 0:47:30 | 575.475 | 0.680 | 1.843 | 1.800 | 173 | 241 | 240 | 55 | | 73 | 70 | 1.0 | 0.82 | 51.47 | 46.068 | 100.8 | 55.281 |
| D-3 | 50.0 | 0:50:00 | 577.325 | 0.760 | 2.060 | 2.100 | 174 | 245 | 238 | 54 | | 73 | 72 | 2.0 | 0.87 | 54.46 | 48.082 | 100.7 | 54.950 |
| D-4 | 52.5 | 0:52:30 | 579.250 | 0.760 | 2.060 | 2.100 | 175 | 242 | 233 | 54 | | 73 | 72 | 2.0 | 0.87 | 54.50 | 50.122 | 100.7 | 54.678 |
| D-5 | 55.0 | 0:55:00 | 581.200 | 0.850 | 2.304 | 2.300 | 177 | 242 | 233 | 57 | | 73 | 72 | 2.5 | 0.92 | 57.73 | 52.320 | 100.8 | 54.595 |
| D-6 | 57.5 | 0:57:30 | 583.300 | 0.850 | 2.304 | 2.300 | 175 | 245 | 230 | 57 | | 74 | 70 | 2.5 | 0.92 | 57.64 | 54.395 | 100.6 | 54.395 |
| Last Pt | 60.0 | 1:00:00 | 585.280 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| **Final Val** | 60.0 | 1:00:00 | 585.280 | | | | | | | | | | **Max Vac** | 5.0 | **Final Values** | | 54.395 | 100.6 | |
| **Average Values** | | | | 0.95 | | 2.59 | 173 | 245 | 237 | 61 | | 74 | 72 | | 0.97 | 60.33 | | | |
| | | | | | | | | | | | | | 73 | | | | | | |

# CTM 027 (AMMONIA) ISOKINETIC SAMPLING DATA

| | | | |
|---|---|---|---|
| Plant Name | West County Energy Center | Date | 10/6/2009 |
| Sampling Location | Unit 1C | Project # | bv-09-westcounty.fl-comp#1 |
| Operator | TP | Run # | Base W/DB-3 |
| # of Points Across | 6 | # of Ports Used | 4 |

| Ideal Nozzle Diameter and IsoKinetic Factor Setup | | | |
|---|---|---|---|
| Pitot Tube Coefficient | ($C_p$) | 0.84 | |
| Avg Stack Temp | ($t_s$) | 173 | oF |
| Avg Gas Meter Temp | ($t_m$) | 73 | |
| DH @ 0.75 SCFM | ($\Delta H@$) | 1.69 | in H2O |
| Avg Pitot Tube Diff. Pressure | ($\Delta p_{avg}$) | 0.97 | in H2O |
| Stack Moisture Content | ($B_{ws}$) | 10.00 | % |
| Stack Dry Molecular Weight | ($M_d$) | 29.31 | lb/lb-mole |
| Estimated Orifice Flow Rate | ($Q_m$) | 0.866 | acfm |
| DP to DH Isokinetic Factor | (K) | 2.71 | |

| Leak Checks | | | | | |
|---|---|---|---|---|---|
| Train | Pre | 0.015 | ft3/min @ | 15 | in Hg |
| OK? ☑ | Post | 0 | ft3/min @ | 15 | in Hg |
| Pitot | Pre | 5.4/7.0 | in. H2O for | 15 | sec |
| OK? ☑ | Post | 6.3/6.5 | in. H2O for | 15 | sec |
| Orsat | OK? ☐ | | | | |

| Sampling Equipment | | | |
|---|---|---|---|
| Meter # | samp-cp-0005 | | |
| Meterbox Cal. Factor | (Y) | 1.054 | |
| Nozzle # | N/A | | |
| Average Nozzle Diameter | ($D_{na}$) | 0.2480 | in |
| Rec. Nozzle Diameter | ($D_{ni}$) | 0.2393 | in |
| Probe # / Length | samp-up-0002 | / 120 | in |
| Liner Material | inconel | | |
| Sample Case / Oven # | samp-bh-0006 | | |
| Impinger Case # | samp-bc-0002 | | |

| Pressures | | | |
|---|---|---|---|
| Barometric Pressure | ($P_b$) | 29.80 | in Hg |
| Stack Static Pressure | ($P_{static}$) | -0.70 | in H2O |
| Absolute Stack Pressure | ($P_s$) | 29.75 | in Hg |
| Absolute Meter Pressure | ($P_m$) | 29.92 | in Hg |

| Nozzle Measurements | | | | |
|---|---|---|---|---|
| Pre | 0.248 | 0.248 | 0.248 | PASS |
| Post | 0.248 | 0.248 | 0.248 | PASS |

| Run Time | | | |
|---|---|---|---|
| Start | 9:57 | End | 11:10 |

| Weights | Imp 1 | Imp 2 | Imp 3 | Imp 4 | Imp 5 | Imp 6 | Imp 7 | Imp 8 |
|---|---|---|---|---|---|---|---|---|
| Pre | 691.80 | 702.00 | 647.50 | 963.40 | | | | |
| Post | 755.60 | 747.50 | 664.10 | 982.70 | | | | |

| Wash Volume | | | |
|---|---|---|---|
| | $H_2O$ | 50.0 | ml |
| | MeCl | | ml |

| Filter # |
|---|
| |

| Traverse Point # | Sampling Time (Θ) | Timer Time | Dry Gas Meter Reading ($V_m$) | Velocity Head ($\Delta p$) | Desired Orifice ΔH ($\Delta H_d$) | Actual Orifice ΔH ($\Delta H_a$) | Stack Temp ($t_s$) | Probe Temp | Filter Temp | Impinger Exit Temp | Aux Temp | Meter Inlet Temp ($t_{mi}$) | Meter Outlet Temp ($t_{mo}$) | Pump Vacuum | Square Root ΔP ($\Delta p^{1/2}$) | Local Stack Velocity ($v_s$)$_l$ | Cumulative Meter Volume ($V_m$)$_{std}$ | Cumulative Percent IsoKinetic (I) | Est-Run Meter Volume ($V_m$)$_{std}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | min | hh:mm:ss | ft3 | in H2O | in H2O | in H2O | oF | oF | oF | oF | oF | oF | oF | in Hg | (in H2O)1/2 | ft/sec | scf | % | scf |
| A-1 | 0.0 | 0:00:00 | 586.721 | 1.100 | 2.954 | 3.000 | 183 | 252 | 260 | 60 | | 68 | 67 | 4.0 | 1.05 | 65.97 | 2.412 | 99.0 | 57.898 |
| A-2 | 2.5 | 0:02:30 | 589.000 | 1.000 | 2.685 | 2.700 | 184 | 253 | 258 | 54 | | 70 | 67 | 3.5 | 1.00 | 62.94 | 4.788 | 100.6 | 57.455 |
| A-3 | 5.0 | 0:05:00 | 591.250 | 0.940 | 2.524 | 2.500 | 184 | 250 | 259 | 54 | | 71 | 68 | 3.5 | 0.97 | 61.03 | 7.105 | 101.4 | 56.841 |
| A-4 | 7.5 | 0:07:30 | 593.450 | 0.850 | 2.282 | 2.300 | 184 | 249 | 254 | 57 | | 72 | 67 | 2.5 | 0.92 | 58.03 | 9.263 | 101.2 | 55.579 |
| A-5 | 10.0 | 0:10:00 | 595.500 | 0.800 | 2.148 | 2.100 | 186 | 244 | 239 | 66 | | 72 | 69 | 2.0 | 0.89 | 56.39 | 11.322 | 100.9 | 54.344 |
| A-6 | 12.5 | 0:12:30 | 597.460 | 0.760 | 2.041 | 2.100 | 186 | 244 | 253 | 66 | | 73 | 68 | 2.0 | 0.87 | 54.96 | 13.355 | 100.8 | 53.420 |
| B-1 | 15.0 | 0:15:00 | 599.396 | 0.750 | 2.014 | 2.000 | 180 | 251 | 240 | 68 | | 70 | 67 | 1.5 | 0.87 | 54.34 | 15.499 | 101.6 | 53.138 |
| B-2 | 17.5 | 0:17:30 | 601.430 | 0.750 | 2.014 | 2.000 | 182 | 250 | 244 | 59 | | 71 | 67 | 1.5 | 0.87 | 54.43 | 17.468 | 101.1 | 52.403 |
| B-3 | 20.0 | 0:20:00 | 603.300 | 0.740 | 1.987 | 2.000 | 179 | 250 | 247 | 55 | | 72 | 68 | 2.5 | 0.86 | 53.94 | 19.517 | 101.3 | 52.046 |
| B-4 | 22.5 | 0:22:30 | 605.250 | 0.730 | 1.960 | 1.900 | 182 | 253 | 255 | 55 | | 72 | 68 | 1.5 | 0.85 | 53.70 | 21.513 | 101.2 | 51.632 |
| B-5 | 25.0 | 0:25:00 | 607.150 | 0.600 | 1.611 | 1.600 | 178 | 253 | 251 | 56 | | 74 | 68 | 1.0 | 0.77 | 48.53 | 23.347 | 101.2 | 50.940 |
| B-6 | 27.5 | 0:27:30 | 608.900 | 0.550 | 1.477 | 1.500 | 178 | 253 | 252 | 55 | | 73 | 68 | 1.0 | 0.74 | 46.46 | 25.151 | 101.4 | 50.302 |
| C-1 | 30.0 | 0:30:00 | 610.620 | 1.100 | 2.954 | 2.700 | 180 | 257 | 258 | 56 | | 72 | 70 | 3.0 | 1.05 | 65.81 | 27.389 | 100.6 | 50.565 |
| C-2 | 32.5 | 0:32:30 | 612.750 | 1.200 | 3.222 | 3.200 | 179 | 254 | 259 | 55 | | 75 | 69 | 4.0 | 1.10 | 68.68 | 29.647 | 99.7 | 50.824 |
| C-3 | 35.0 | 0:35:00 | 614.900 | 1.300 | 3.491 | 3.500 | 179 | 255 | 256 | 55 | | 74 | 69 | 5.5 | 1.14 | 71.49 | 32.408 | 100.0 | 51.853 |
| C-4 | 37.5 | 0:37:30 | 617.525 | 1.300 | 3.491 | 3.500 | 179 | 254 | 255 | 57 | | 74 | 72 | 5.5 | 1.14 | 71.49 | 34.847 | 99.5 | 52.270 |
| C-5 | 40.0 | 0:40:00 | 619.850 | 1.300 | 3.491 | 3.500 | 178 | 255 | 255 | 59 | | 74 | 69 | 5.5 | 1.14 | 71.43 | 37.487 | 99.5 | 52.923 |
| C-6 | 42.5 | 0:42:30 | 622.360 | 1.300 | 3.491 | 3.500 | 177 | 255 | 254 | 65 | | 74 | 70 | 5.5 | 1.14 | 71.38 | 40.130 | 99.4 | 53.507 |
| D-1 | 45.0 | 0:45:00 | 624.875 | 1.000 | 2.685 | 2.700 | 182 | 257 | 250 | 68 | | 73 | 69 | 3.5 | 1.00 | 62.85 | 42.468 | 99.5 | 53.644 |
| D-2 | 47.5 | 0:47:30 | 627.100 | 1.200 | 3.222 | 3.200 | 183 | 258 | 255 | 68 | | 73 | 70 | 4.5 | 1.10 | 68.90 | 44.954 | 99.4 | 53.945 |
| D-3 | 50.0 | 0:50:00 | 629.465 | 1.300 | 3.491 | 3.500 | 182 | 258 | 251 | 67 | | 75 | 71 | 5.5 | 1.14 | 71.66 | 47.560 | 99.3 | 54.355 |
| D-4 | 52.5 | 0:52:30 | 631.950 | 1.300 | 3.491 | 3.500 | 180 | 256 | 256 | 66 | | 74 | 70 | 5.5 | 1.14 | 71.54 | 50.188 | 99.3 | 54.750 |
| D-5 | 55.0 | 0:55:00 | 634.450 | 1.200 | 3.222 | 3.200 | 179 | 257 | 256 | 67 | | 74 | 70 | 5.5 | 1.10 | 68.68 | 52.813 | 99.5 | 55.109 |
| D-6 | 57.5 | 0:57:30 | 636.950 | 1.200 | 3.222 | 3.200 | 178 | 257 | 254 | 67 | | 74 | 71 | 5.5 | 1.10 | 68.63 | 55.455 | 99.7 | 55.455 |
| Last Pt | 60.0 | 1:00:00 | 639.468 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | |
| Final Val | 60.0 | 1:00:00 | 639.468 | | | | | | | | | | Max Vac | 5.5 | Final Values | | 55.455 | 99.7 | |
| Average Values | | | | 1.011 | | 2.704 | 181 | 253 | 253 | 61 | | 73 | 69 | | 1.00 | 62.64 | | | |
| | | | | | | | | | | | | 71 | | | | | | | |

## CTM 027 (AMMONIA) - SAMPLE RECOVERY AND INTEGRITY DATA SHEET

| | | | |
|---|---|---|---|
| **Plant Name** | West County Energy Center | **Date** | 10/5/2009 - 10/6/2009 |
| **Sampling Location** | Unit 1C | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Operator** | TP | **Acetone Lot Number** | N/A |

| Run History Data | | | | |
|---|---|---|---|---|
| **Run Number** | Base W/DB-1 | Base W/DB-2 | Base W/DB-3 | |
| **Run Start Time** | 17:51 | 19:18 | 9:57 | (hh:mm) |
| **Run Stop Time** | 19:03 | 20:30 | 11:10 | (hh:mm) |
| **Train Prepared By** | AS | AS | AS | |
| **Train Recovered By** | AS | AS | AS | |
| **Recovery Date** | 10/5/2009 | 10/5/2009 | 10/5/2009 | (mm/dd/yy) |

☑

| Moisture Content Data | | | | | |
|---|---|---|---|---|---|
| **Impingers 1, 2, and 3 - Liquid Volume** | | | | | |
| **Final Volume** | ($V_f$) | 2231.7 | 2175.1 | 2171.1 | ml |
| **Initial Volume** | ($V_i$) | 2089.2 | 2046.6 | 2045.0 | ml |
| **Net Volume** | ($V_n$) | 142.6 | 128.5 | 126.1 | ml |
| **Comments** | | | | | |
| **Impinger 4 - Silica Gel Weight** | | | | | |
| **Final Weight** | ($W_f$) | 978.5 | 944.2 | 982.7 | g |
| **Initial Weight** | ($W_i$) | 965.1 | 926.1 | 963.4 | g |
| **Net Weight** | ($W_n$) | 13.4 | 18.1 | 19.3 | g |
| **Comments** | | | | | |
| **Total Water Collected** | | | | | |
| **Total Volume** | ($V_{tc}$) | 156.0 | 146.7 | 145.5 | ml |

# Ammonia Sample Log-In Sheet

Lab Tech: Albert Septiano
Project: bv-09-westcounty.fl-comp#1
Collected by: Albert Septiano
Date Received: 10/5/2009 and 10/6/2009

AIR HYGIENE

**BLANKS**

| AHI Lab # | Sample ID | Sample Source Description | Run # | Filter Contents | Sample Date | Comments | Volume (ml) |
|---|---|---|---|---|---|---|---|
| BLANK | 01 | Unit 1C w/o DB | | $H_2SO_4$, $H_2O$ | 10/5/2009 | Normal | 80 |

**SAMPLES**

| AHI Lab # | Sample ID | Sample Source Description | Run # | Contents | Sample Date | Comments | Volume (ml) |
|---|---|---|---|---|---|---|---|
| U1C-R1-FH | 02 | Unit 1C Run 1 w/o DB Front Half | 1 | $H_2SO_4$, $H_2O$ | 10/5/2009 | Normal | 270 |
| U1C-R1-BH | 03 | Unit 1C Run 1 w/o DB Back Half | 1 | $H_2SO_4$, $H_2O$ | 10/5/2009 | Normal | 150 |
| U1C-R2-FH | 04 | Unit 1C Run 2 w/o DB Front Half | 2 | $H_2SO_4$, $H_2O$ | 10/5/2009 | Normal | 200 |
| U1C-R2-BH | 05 | Unit 1C Run 2 w/o DB Back Half | 2 | $H_2SO_4$, $H_2O$ | 10/5/2009 | Normal | 190 |
| U1C-R3-FH | 06 | Unit 1C Run 3 w/o DB Front Half | 3 | $H_2SO_4$, $H_2O$ | 10/5/2009 | Normal | 210 |
| U1C-R3-BH | 07 | Unit 1C Run 3 w/o DB Back Half | 3 | $H_2SO_4$, $H_2O$ | 10/5/2009 | Normal | 200 |
| U1C-FH-R1 | 10 | Unit 1C Run 1 w/DB Front Half | 1 | $H_2SO_4$, $H_2O$ | 10/5/2009 | Normal | 240 |
| U1C-BH-R1 | 11 | Unit 1C Run 1 w/DB Back Half | 1 | $H_2SO_4$, $H_2O$ | 10/5/2009 | Normal | 200 |
| U1C-FH-R2 | 12 | Unit 1C Run 2 w/DB Front Half | 2 | $H_2SO_4$, $H_2O$ | 10/5/2009 | Normal | 200 |
| U1C-BH-R2 | 13 | Unit 1C Run 2 w/DB Back Half | 2 | $H_2SO_4$, $H_2O$ | 10/5/2009 | Normal | 220 |
| U1C-FH-R3 | 14 | Unit 1C Run 3 w/DB Front Half | 3 | $H_2SO_4$, $H_2O$ | 10/6/2009 | Normal | 200 |
| U1C-BH-R3 | 15 | Unit 1C Run 3 w/DB Back Half | 3 | $H_2SO_4$, $H_2O$ | 10/6/2009 | Normal | 250 |
| | | | | | | | |
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# Ammonia Sample Measurement

| | |
|---|---|
| Lab Tech: | Albert Septiano |
| Project: | bv-09-westcounty.fl-comp#1 |
| Date Analyzed: | 10/5/2009 |
| Time Analyzed: | 2:30 PM |
| Temp (°F) | 74.0 |
| Humidity | 45% |
| BP (In HG) | 29.80 |
| Analysis Method | 350.3 |


| Calibration Data | | |
|---|---|---|
| Concentration (ppm) | Pre-Cal (ppm) | Pre-Cal (mV) |
| 0.0 | 0.0 | 145.8 |
| 1.0 | 1.0 | 9.3 |
| 5.0 | 5.0 | -30.0 |
| 10.0 | 10.0 | -49.3 |
| 20.0 | 20.0 | -69.1 |
| Slope | | |
| Linearity | 1.0000 | N/A |

| Sample ID | Sample Amt Used (ml) | ISA/pH Volume (ml) | Meter Reading (mg/L) | Time Analyzed (hh:mm:ss) | Dilution Factor | Sample Volume | MQL (mg/L) | PQL (mg/L) | Final Conc. (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| BLANK | 80.0 | 2.0 | 0.0 | 15:00:00 | 1.0 | 80.0 | 0.10 | 0.1 | BPQL |
| U1C-R1-FH | 90.0 | 2.0 | 8.3 | 15:10:00 | 1.0 | 270.0 | 0.10 | 0.1 | 8.3 |
| U1C-R1-BH | 80.0 | 2.0 | 0.1 | 15:21:00 | 1.0 | 150.0 | 0.10 | 0.1 | 0.1 |
| U1C-R2-FH | 80.0 | 2.0 | 11.1 | 15:42:00 | 1.0 | 200.0 | 0.10 | 0.1 | 11.1 |
| U1C-R2-BH | 80.0 | 2.0 | 0.1 | 15:59:00 | 1.0 | 190.0 | 0.10 | 0.1 | BPQL |
| U1C-R3-FH | 85.0 | 2.0 | 11.0 | 16:15:00 | 1.0 | 210.0 | 0.10 | 0.1 | 11.0 |
| U1C-R3-BH | 90.0 | 2.0 | 0.2 | 16:30:00 | 1.0 | 200.0 | 0.10 | 0.1 | 0.2 |
| U1C-FH-R1 | 90.0 | 2.0 | 8.9 | 9:12:00 | 1.0 | 240.0 | 0.10 | 0.1 | 8.9 |
| U1C-BH-R1 | 90.0 | 2.0 | 0.1 | 9:17:00 | 1.0 | 200.0 | 0.10 | 0.1 | 0.1 |
| U1C-FH-R2 | 90.0 | 2.0 | 10.6 | 9:25:00 | 1.0 | 200.0 | 0.10 | 0.1 | 10.6 |
| U1C-BH-R2 | 90.0 | 2.0 | 0.1 | 9:30:00 | 1.0 | 220.0 | 0.10 | 0.1 | 0.1 |
| U1C-FH-R3 | 90.0 | 2.0 | 11.8 | 14:20:00 | 1.0 | 200.0 | 0.10 | 0.1 | 11.8 |
| U1C-BH-R3 | 90.0 | 2.0 | 0.2 | 14:28:00 | 1.0 | 250.0 | 0.10 | 0.1 | 0.2 |

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Tulsa, OK 74146
888-461-8778

AIR HYGIENE

# *Ammonia Analysis*

**Project Name:** bv-09-westcounty.fl-comp#1
Date Received: 10/5/2009 and 10/6/2009

AHI Lab No.: BLANK
Sample ID: 01
Sampling Date: 10/5/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | BPQL | 0.10 | 10/5/09 15:00 |
| Volume | Volume in ml | N/A | 80 | N/A | 10/5/09 14:30 |

AHI Lab No.: U1C-R1-FH
Sample ID: 02
Sampling Date: 10/5/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | 8.25 | 0.10 | 10/5/09 15:10 |
| Volume | Volume in ml | N/A | 270 | N/A | 10/5/09 14:30 |

AHI Lab No.: U1C-R1-BH
Sample ID: 03
Sampling Date: 10/5/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | 0.14 | 0.10 | 10/5/09 15:21 |
| Volume | Volume in ml | N/A | 150 | N/A | 10/5/09 14:30 |

AHI Lab No.: U1C-R2-FH
Sample ID: 04
Sampling Date: 10/5/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | 11.1 | 0.10 | 10/5/09 15:42 |
| Volume | Volume in ml | N/A | 200 | N/A | 10/5/09 14:30 |

AHI Lab No.: U1C-R2-BH
Sample ID: 05
Sampling Date: 10/5/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | BPQL | 0.10 | 10/5/09 15:59 |
| Volume | Volume in ml | N/A | 190 | N/A | 10/5/09 14:30 |

AHI Lab No.: U1C-R3-FH
Sample ID: 06
Sampling Date: 10/5/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | 11 | 0.10 | 10/5/09 16:15 |
| Volume | Volume in ml | N/A | 210 | N/A | 10/5/09 14:30 |

AHI Lab No.: U1C-R3-BH
Sample ID: 07
Sampling Date: 10/5/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | 0.19 | 0.10 | 10/5/09 16:30 |
| Volume | Volume in ml | N/A | 200 | N/A | 10/5/09 14:30 |

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AIR HYGIENE

# *Ammonia Analysis*

AHI Lab No.: U1C-FH-R1
Sample ID: 10
Sampling Date: 10/5/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | 8.88 | 0.10 | 10/5/09 9:12 |
| Volume | Volume in ml | N/A | 240 | N/A | 10/5/09 14:30 |

AHI Lab No.: U1C-BH-R1
Sample ID: 11
Sampling Date: 10/5/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | 0.11 | 0.10 | 10/5/09 9:17 |
| Volume | Volume in ml | N/A | 200 | N/A | 10/5/09 14:30 |

AHI Lab No.: U1C-FH-R2
Sample ID: 12
Sampling Date: 10/5/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | 10.6 | 0.10 | 10/5/09 9:25 |
| Volume | Volume in ml | N/A | 200 | N/A | 10/5/09 14:30 |

AHI Lab No.: U1C-BH-R2
Sample ID: 13
Sampling Date: 10/5/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | 0.12 | 0.10 | 10/5/09 9:30 |
| Volume | Volume in ml | N/A | 220 | N/A | 10/5/09 14:30 |

AHI Lab No.: U1C-FH-R3
Sample ID: 14
Sampling Date: 10/6/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | 11.8 | 0.10 | 10/5/09 14:20 |
| Volume | Volume in ml | N/A | 200 | N/A | 10/5/09 14:30 |

AHI Lab No.: U1C-BH-R3
Sample ID: 15
Sampling Date: 10/6/2009

| Test Requested | Method Parameter | Prep Info | Result | PQL* | Analysis Date |
|---|---|---|---|---|---|
| Ammonia Nitrogen | EPA 350.3 Ammonia | N/A | 0.16 | 0.10 | 10/5/09 14:28 |
| Volume | Volume in ml | N/A | 250 | N/A | 10/5/09 14:30 |

# TEST RESULTS

## Opacity
## Base Load

| | |
|---|---|
| **Company:** | Florida Power and Light |
| **Equipment:** | Mitsubishi 501G, Unit 1C base load w/o DB |
| **Location:** | West County Energy Center |
| **Date:** | October 8, 2009 |
| **Project #:** | bv-09-westcounty.fl-comp#1 |

Run 1

| | |
|---|---|
| **Average Opacity:** | 0.00 % |
| **Maximum Opacity:** | 0 % |
| **6 Minute Average:** | 0.00 % |
| **6 Minute Maximum:** | 0.00 % |
| **Max Time w/ Opacity:** | 0.00 minutes |

| TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0 | N/A | 15.00 | 0 | 0.00 | 30.00 | 0 | 0.00 | 45.00 | 0 | 0.00 |
| 0.25 | 0 | N/A | 15.25 | 0 | 0.00 | 30.25 | 0 | 0.00 | 45.25 | 0 | 0.00 |
| 0.50 | 0 | N/A | 15.50 | 0 | 0.00 | 30.50 | 0 | 0.00 | 45.50 | 0 | 0.00 |
| 0.75 | 0 | N/A | 15.75 | 0 | 0.00 | 30.75 | 0 | 0.00 | 45.75 | 0 | 0.00 |
| 1.00 | 0 | N/A | 16.00 | 0 | 0.00 | 31.00 | 0 | 0.00 | 46.00 | 0 | 0.00 |
| 1.25 | 0 | N/A | 16.25 | 0 | 0.00 | 31.25 | 0 | 0.00 | 46.25 | 0 | 0.00 |
| 1.50 | 0 | N/A | 16.50 | 0 | 0.00 | 31.50 | 0 | 0.00 | 46.50 | 0 | 0.00 |
| 1.75 | 0 | N/A | 16.75 | 0 | 0.00 | 31.75 | 0 | 0.00 | 46.75 | 0 | 0.00 |
| 2.00 | 0 | N/A | 17.00 | 0 | 0.00 | 32.00 | 0 | 0.00 | 47.00 | 0 | 0.00 |
| 2.25 | 0 | N/A | 17.25 | 0 | 0.00 | 32.25 | 0 | 0.00 | 47.25 | 0 | 0.00 |
| 2.50 | 0 | N/A | 17.50 | 0 | 0.00 | 32.50 | 0 | 0.00 | 47.50 | 0 | 0.00 |
| 2.75 | 0 | N/A | 17.75 | 0 | 0.00 | 32.75 | 0 | 0.00 | 47.75 | 0 | 0.00 |
| 3.00 | 0 | N/A | 18.00 | 0 | 0.00 | 33.00 | 0 | 0.00 | 48.00 | 0 | 0.00 |
| 3.25 | 0 | N/A | 18.25 | 0 | 0.00 | 33.25 | 0 | 0.00 | 48.25 | 0 | 0.00 |
| 3.50 | 0 | N/A | 18.50 | 0 | 0.00 | 33.50 | 0 | 0.00 | 48.50 | 0 | 0.00 |
| 3.75 | 0 | N/A | 18.75 | 0 | 0.00 | 33.75 | 0 | 0.00 | 48.75 | 0 | 0.00 |
| 4.00 | 0 | N/A | 19.00 | 0 | 0.00 | 34.00 | 0 | 0.00 | 49.00 | 0 | 0.00 |
| 4.25 | 0 | N/A | 19.25 | 0 | 0.00 | 34.25 | 0 | 0.00 | 49.25 | 0 | 0.00 |
| 4.50 | 0 | N/A | 19.50 | 0 | 0.00 | 34.50 | 0 | 0.00 | 49.50 | 0 | 0.00 |
| 4.75 | 0 | N/A | 19.75 | 0 | 0.00 | 34.75 | 0 | 0.00 | 49.75 | 0 | 0.00 |
| 5.00 | 0 | N/A | 20.00 | 0 | 0.00 | 35.00 | 0 | 0.00 | 50.00 | 0 | 0.00 |
| 5.25 | 0 | N/A | 20.25 | 0 | 0.00 | 35.25 | 0 | 0.00 | 50.25 | 0 | 0.00 |
| 5.50 | 0 | N/A | 20.50 | 0 | 0.00 | 35.50 | 0 | 0.00 | 50.50 | 0 | 0.00 |
| 5.75 | 0 | 0.00 | 20.75 | 0 | 0.00 | 35.75 | 0 | 0.00 | 50.75 | 0 | 0.00 |
| 6.00 | 0 | 0.00 | 21.00 | 0 | 0.00 | 36.00 | 0 | 0.00 | 51.00 | 0 | 0.00 |
| 6.25 | 0 | 0.00 | 21.25 | 0 | 0.00 | 36.25 | 0 | 0.00 | 51.25 | 0 | 0.00 |
| 6.50 | 0 | 0.00 | 21.50 | 0 | 0.00 | 36.50 | 0 | 0.00 | 51.50 | 0 | 0.00 |
| 6.75 | 0 | 0.00 | 21.75 | 0 | 0.00 | 36.75 | 0 | 0.00 | 51.75 | 0 | 0.00 |
| 7.00 | 0 | 0.00 | 22.00 | 0 | 0.00 | 37.00 | 0 | 0.00 | 52.00 | 0 | 0.00 |
| 7.25 | 0 | 0.00 | 22.25 | 0 | 0.00 | 37.25 | 0 | 0.00 | 52.25 | 0 | 0.00 |
| 7.50 | 0 | 0.00 | 22.50 | 0 | 0.00 | 37.50 | 0 | 0.00 | 52.50 | 0 | 0.00 |
| 7.75 | 0 | 0.00 | 22.75 | 0 | 0.00 | 37.75 | 0 | 0.00 | 52.75 | 0 | 0.00 |
| 8.00 | 0 | 0.00 | 23.00 | 0 | 0.00 | 38.00 | 0 | 0.00 | 53.00 | 0 | 0.00 |
| 8.25 | 0 | 0.00 | 23.25 | 0 | 0.00 | 38.25 | 0 | 0.00 | 53.25 | 0 | 0.00 |
| 8.50 | 0 | 0.00 | 23.50 | 0 | 0.00 | 38.50 | 0 | 0.00 | 53.50 | 0 | 0.00 |
| 8.75 | 0 | 0.00 | 23.75 | 0 | 0.00 | 38.75 | 0 | 0.00 | 53.75 | 0 | 0.00 |
| 9.00 | 0 | 0.00 | 24.00 | 0 | 0.00 | 39.00 | 0 | 0.00 | 54.00 | 0 | 0.00 |
| 9.25 | 0 | 0.00 | 24.25 | 0 | 0.00 | 39.25 | 0 | 0.00 | 54.25 | 0 | 0.00 |
| 9.50 | 0 | 0.00 | 24.50 | 0 | 0.00 | 39.50 | 0 | 0.00 | 54.50 | 0 | 0.00 |
| 9.75 | 0 | 0.00 | 24.75 | 0 | 0.00 | 39.75 | 0 | 0.00 | 54.75 | 0 | 0.00 |
| 10.00 | 0 | 0.00 | 25.00 | 0 | 0.00 | 40.00 | 0 | 0.00 | 55.00 | 0 | 0.00 |
| 10.25 | 0 | 0.00 | 25.25 | 0 | 0.00 | 40.25 | 0 | 0.00 | 55.25 | 0 | 0.00 |
| 10.50 | 0 | 0.00 | 25.50 | 0 | 0.00 | 40.50 | 0 | 0.00 | 55.50 | 0 | 0.00 |
| 10.75 | 0 | 0.00 | 25.75 | 0 | 0.00 | 40.75 | 0 | 0.00 | 55.75 | 0 | 0.00 |
| 11.00 | 0 | 0.00 | 26.00 | 0 | 0.00 | 41.00 | 0 | 0.00 | 56.00 | 0 | 0.00 |
| 11.25 | 0 | 0.00 | 26.25 | 0 | 0.00 | 41.25 | 0 | 0.00 | 56.25 | 0 | 0.00 |
| 11.50 | 0 | 0.00 | 26.50 | 0 | 0.00 | 41.50 | 0 | 0.00 | 56.50 | 0 | 0.00 |
| 11.75 | 0 | 0.00 | 26.75 | 0 | 0.00 | 41.75 | 0 | 0.00 | 56.75 | 0 | 0.00 |
| 12.00 | 0 | 0.00 | 27.00 | 0 | 0.00 | 42.00 | 0 | 0.00 | 57.00 | 0 | 0.00 |
| 12.25 | 0 | 0.00 | 27.25 | 0 | 0.00 | 42.25 | 0 | 0.00 | 57.25 | 0 | 0.00 |
| 12.50 | 0 | 0.00 | 27.50 | 0 | 0.00 | 42.50 | 0 | 0.00 | 57.50 | 0 | 0.00 |
| 12.75 | 0 | 0.00 | 27.75 | 0 | 0.00 | 42.75 | 0 | 0.00 | 57.75 | 0 | 0.00 |
| 13.00 | 0 | 0.00 | 28.00 | 0 | 0.00 | 43.00 | 0 | 0.00 | 58.00 | 0 | 0.00 |
| 13.25 | 0 | 0.00 | 28.25 | 0 | 0.00 | 43.25 | 0 | 0.00 | 58.25 | 0 | 0.00 |
| 13.50 | 0 | 0.00 | 28.50 | 0 | 0.00 | 43.50 | 0 | 0.00 | 58.50 | 0 | 0.00 |
| 13.75 | 0 | 0.00 | 28.75 | 0 | 0.00 | 43.75 | 0 | 0.00 | 58.75 | 0 | 0.00 |
| 14.00 | 0 | 0.00 | 29.00 | 0 | 0.00 | 44.00 | 0 | 0.00 | 59.00 | 0 | 0.00 |
| 14.25 | 0 | 0.00 | 29.25 | 0 | 0.00 | 44.25 | 0 | 0.00 | 59.25 | 0 | 0.00 |
| 14.50 | 0 | 0.00 | 29.50 | 0 | 0.00 | 44.50 | 0 | 0.00 | 59.50 | 0 | 0.00 |
| 14.75 | 0 | 0.00 | 29.75 | 0 | 0.00 | 44.75 | 0 | 0.00 | 59.75 | 0 | 0.00 |

| | |
|---|---|
| **Company:** | Florida Power and Light |
| **Equipment:** | Mitsubishi 501G, Unit 1C base load w/o DB |
| **Location:** | West County Energy Center |
| **Date:** | October 8, 2009 |
| **Project #:** | bv-09-westcounty.fl-comp#1 |

Run 2

| | |
|---|---|
| **Average Opacity:** | 0.00 % |
| **Maximum Opacity:** | 0 % |
| **6 Minute Average:** | 0.00 % |
| **6 Minute Maximum:** | 0.00 % |
| **Max Time w/ Opacity:** | 0.00 minutes |

| TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0 | N/A | 15.00 | 0 | 0.00 | 30.00 | 0 | 0.00 | 45.00 | 0 | 0.00 |
| 0.25 | 0 | N/A | 15.25 | 0 | 0.00 | 30.25 | 0 | 0.00 | 45.25 | 0 | 0.00 |
| 0.50 | 0 | N/A | 15.50 | 0 | 0.00 | 30.50 | 0 | 0.00 | 45.50 | 0 | 0.00 |
| 0.75 | 0 | N/A | 15.75 | 0 | 0.00 | 30.75 | 0 | 0.00 | 45.75 | 0 | 0.00 |
| 1.00 | 0 | N/A | 16.00 | 0 | 0.00 | 31.00 | 0 | 0.00 | 46.00 | 0 | 0.00 |
| 1.25 | 0 | N/A | 16.25 | 0 | 0.00 | 31.25 | 0 | 0.00 | 46.25 | 0 | 0.00 |
| 1.50 | 0 | N/A | 16.50 | 0 | 0.00 | 31.50 | 0 | 0.00 | 46.50 | 0 | 0.00 |
| 1.75 | 0 | N/A | 16.75 | 0 | 0.00 | 31.75 | 0 | 0.00 | 46.75 | 0 | 0.00 |
| 2.00 | 0 | N/A | 17.00 | 0 | 0.00 | 32.00 | 0 | 0.00 | 47.00 | 0 | 0.00 |
| 2.25 | 0 | N/A | 17.25 | 0 | 0.00 | 32.25 | 0 | 0.00 | 47.25 | 0 | 0.00 |
| 2.50 | 0 | N/A | 17.50 | 0 | 0.00 | 32.50 | 0 | 0.00 | 47.50 | 0 | 0.00 |
| 2.75 | 0 | N/A | 17.75 | 0 | 0.00 | 32.75 | 0 | 0.00 | 47.75 | 0 | 0.00 |
| 3.00 | 0 | N/A | 18.00 | 0 | 0.00 | 33.00 | 0 | 0.00 | 48.00 | 0 | 0.00 |
| 3.25 | 0 | N/A | 18.25 | 0 | 0.00 | 33.25 | 0 | 0.00 | 48.25 | 0 | 0.00 |
| 3.50 | 0 | N/A | 18.50 | 0 | 0.00 | 33.50 | 0 | 0.00 | 48.50 | 0 | 0.00 |
| 3.75 | 0 | N/A | 18.75 | 0 | 0.00 | 33.75 | 0 | 0.00 | 48.75 | 0 | 0.00 |
| 4.00 | 0 | N/A | 19.00 | 0 | 0.00 | 34.00 | 0 | 0.00 | 49.00 | 0 | 0.00 |
| 4.25 | 0 | N/A | 19.25 | 0 | 0.00 | 34.25 | 0 | 0.00 | 49.25 | 0 | 0.00 |
| 4.50 | 0 | N/A | 19.50 | 0 | 0.00 | 34.50 | 0 | 0.00 | 49.50 | 0 | 0.00 |
| 4.75 | 0 | N/A | 19.75 | 0 | 0.00 | 34.75 | 0 | 0.00 | 49.75 | 0 | 0.00 |
| 5.00 | 0 | N/A | 20.00 | 0 | 0.00 | 35.00 | 0 | 0.00 | 50.00 | 0 | 0.00 |
| 5.25 | 0 | N/A | 20.25 | 0 | 0.00 | 35.25 | 0 | 0.00 | 50.25 | 0 | 0.00 |
| 5.50 | 0 | N/A | 20.50 | 0 | 0.00 | 35.50 | 0 | 0.00 | 50.50 | 0 | 0.00 |
| 5.75 | 0 | 0.00 | 20.75 | 0 | 0.00 | 35.75 | 0 | 0.00 | 50.75 | 0 | 0.00 |
| 6.00 | 0 | 0.00 | 21.00 | 0 | 0.00 | 36.00 | 0 | 0.00 | 51.00 | 0 | 0.00 |
| 6.25 | 0 | 0.00 | 21.25 | 0 | 0.00 | 36.25 | 0 | 0.00 | 51.25 | 0 | 0.00 |
| 6.50 | 0 | 0.00 | 21.50 | 0 | 0.00 | 36.50 | 0 | 0.00 | 51.50 | 0 | 0.00 |
| 6.75 | 0 | 0.00 | 21.75 | 0 | 0.00 | 36.75 | 0 | 0.00 | 51.75 | 0 | 0.00 |
| 7.00 | 0 | 0.00 | 22.00 | 0 | 0.00 | 37.00 | 0 | 0.00 | 52.00 | 0 | 0.00 |
| 7.25 | 0 | 0.00 | 22.25 | 0 | 0.00 | 37.25 | 0 | 0.00 | 52.25 | 0 | 0.00 |
| 7.50 | 0 | 0.00 | 22.50 | 0 | 0.00 | 37.50 | 0 | 0.00 | 52.50 | 0 | 0.00 |
| 7.75 | 0 | 0.00 | 22.75 | 0 | 0.00 | 37.75 | 0 | 0.00 | 52.75 | 0 | 0.00 |
| 8.00 | 0 | 0.00 | 23.00 | 0 | 0.00 | 38.00 | 0 | 0.00 | 53.00 | 0 | 0.00 |
| 8.25 | 0 | 0.00 | 23.25 | 0 | 0.00 | 38.25 | 0 | 0.00 | 53.25 | 0 | 0.00 |
| 8.50 | 0 | 0.00 | 23.50 | 0 | 0.00 | 38.50 | 0 | 0.00 | 53.50 | 0 | 0.00 |
| 8.75 | 0 | 0.00 | 23.75 | 0 | 0.00 | 38.75 | 0 | 0.00 | 53.75 | 0 | 0.00 |
| 9.00 | 0 | 0.00 | 24.00 | 0 | 0.00 | 39.00 | 0 | 0.00 | 54.00 | 0 | 0.00 |
| 9.25 | 0 | 0.00 | 24.25 | 0 | 0.00 | 39.25 | 0 | 0.00 | 54.25 | 0 | 0.00 |
| 9.50 | 0 | 0.00 | 24.50 | 0 | 0.00 | 39.50 | 0 | 0.00 | 54.50 | 0 | 0.00 |
| 9.75 | 0 | 0.00 | 24.75 | 0 | 0.00 | 39.75 | 0 | 0.00 | 54.75 | 0 | 0.00 |
| 10.00 | 0 | 0.00 | 25.00 | 0 | 0.00 | 40.00 | 0 | 0.00 | 55.00 | 0 | 0.00 |
| 10.25 | 0 | 0.00 | 25.25 | 0 | 0.00 | 40.25 | 0 | 0.00 | 55.25 | 0 | 0.00 |
| 10.50 | 0 | 0.00 | 25.50 | 0 | 0.00 | 40.50 | 0 | 0.00 | 55.50 | 0 | 0.00 |
| 10.75 | 0 | 0.00 | 25.75 | 0 | 0.00 | 40.75 | 0 | 0.00 | 55.75 | 0 | 0.00 |
| 11.00 | 0 | 0.00 | 26.00 | 0 | 0.00 | 41.00 | 0 | 0.00 | 56.00 | 0 | 0.00 |
| 11.25 | 0 | 0.00 | 26.25 | 0 | 0.00 | 41.25 | 0 | 0.00 | 56.25 | 0 | 0.00 |
| 11.50 | 0 | 0.00 | 26.50 | 0 | 0.00 | 41.50 | 0 | 0.00 | 56.50 | 0 | 0.00 |
| 11.75 | 0 | 0.00 | 26.75 | 0 | 0.00 | 41.75 | 0 | 0.00 | 56.75 | 0 | 0.00 |
| 12.00 | 0 | 0.00 | 27.00 | 0 | 0.00 | 42.00 | 0 | 0.00 | 57.00 | 0 | 0.00 |
| 12.25 | 0 | 0.00 | 27.25 | 0 | 0.00 | 42.25 | 0 | 0.00 | 57.25 | 0 | 0.00 |
| 12.50 | 0 | 0.00 | 27.50 | 0 | 0.00 | 42.50 | 0 | 0.00 | 57.50 | 0 | 0.00 |
| 12.75 | 0 | 0.00 | 27.75 | 0 | 0.00 | 42.75 | 0 | 0.00 | 57.75 | 0 | 0.00 |
| 13.00 | 0 | 0.00 | 28.00 | 0 | 0.00 | 43.00 | 0 | 0.00 | 58.00 | 0 | 0.00 |
| 13.25 | 0 | 0.00 | 28.25 | 0 | 0.00 | 43.25 | 0 | 0.00 | 58.25 | 0 | 0.00 |
| 13.50 | 0 | 0.00 | 28.50 | 0 | 0.00 | 43.50 | 0 | 0.00 | 58.50 | 0 | 0.00 |
| 13.75 | 0 | 0.00 | 28.75 | 0 | 0.00 | 43.75 | 0 | 0.00 | 58.75 | 0 | 0.00 |
| 14.00 | 0 | 0.00 | 29.00 | 0 | 0.00 | 44.00 | 0 | 0.00 | 59.00 | 0 | 0.00 |
| 14.25 | 0 | 0.00 | 29.25 | 0 | 0.00 | 44.25 | 0 | 0.00 | 59.25 | 0 | 0.00 |
| 14.50 | 0 | 0.00 | 29.50 | 0 | 0.00 | 44.50 | 0 | 0.00 | 59.50 | 0 | 0.00 |
| 14.75 | 0 | 0.00 | 29.75 | 0 | 0.00 | 44.75 | 0 | 0.00 | 59.75 | 0 | 0.00 |

**Company:** Florida Power and Light
**Equipment:** Mitsubishi 501G, Unit 1C base load w/o DB
**Location:** West County Energy Center
**Date:** October 8, 2009
**Project #:** bv-09-westcounty.fl-comp#1

Run 3

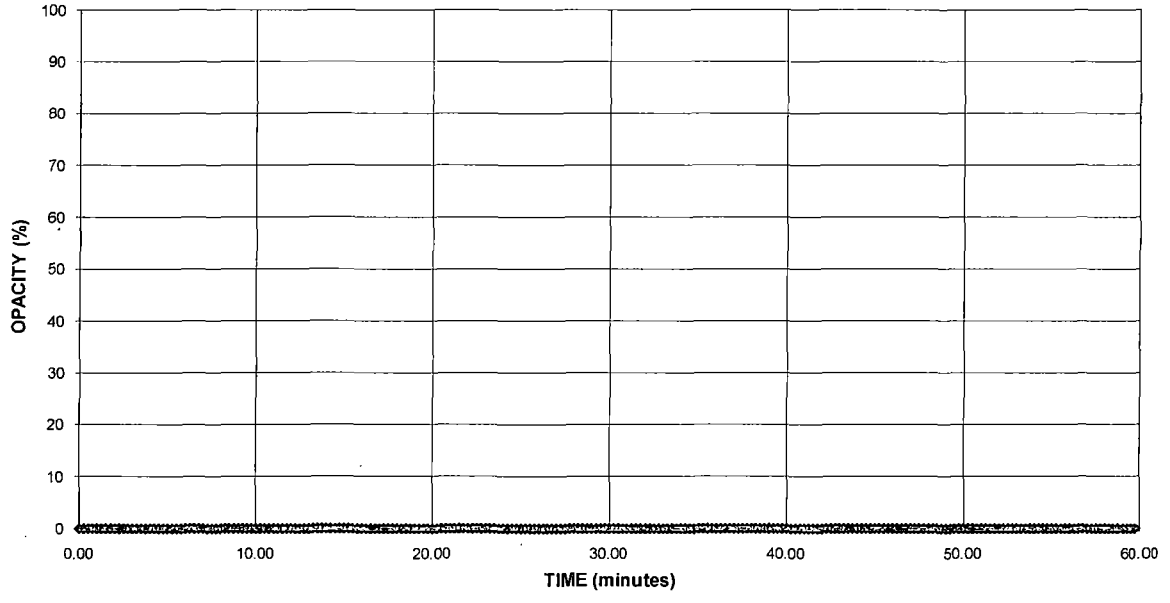
**Average Opacity:** 0.00 %
**Maximum Opacity:** 0 %
**6 Minute Average:** 0.00 %
**6 Minute Maximum:** 0.00 %
**Max Time w/ Opacity:** 0.00 minutes

| TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0 | N/A | 15.00 | 0 | 0.00 | 30.00 | 0 | 0.00 | 45.00 | 0 | 0.00 |
| 0.25 | 0 | N/A | 15.25 | 0 | 0.00 | 30.25 | 0 | 0.00 | 45.25 | 0 | 0.00 |
| 0.50 | 0 | N/A | 15.50 | 0 | 0.00 | 30.50 | 0 | 0.00 | 45.50 | 0 | 0.00 |
| 0.75 | 0 | N/A | 15.75 | 0 | 0.00 | 30.75 | 0 | 0.00 | 45.75 | 0 | 0.00 |
| 1.00 | 0 | N/A | 16.00 | 0 | 0.00 | 31.00 | 0 | 0.00 | 46.00 | 0 | 0.00 |
| 1.25 | 0 | N/A | 16.25 | 0 | 0.00 | 31.25 | 0 | 0.00 | 46.25 | 0 | 0.00 |
| 1.50 | 0 | N/A | 16.50 | 0 | 0.00 | 31.50 | 0 | 0.00 | 46.50 | 0 | 0.00 |
| 1.75 | 0 | N/A | 16.75 | 0 | 0.00 | 31.75 | 0 | 0.00 | 46.75 | 0 | 0.00 |
| 2.00 | 0 | N/A | 17.00 | 0 | 0.00 | 32.00 | 0 | 0.00 | 47.00 | 0 | 0.00 |
| 2.25 | 0 | N/A | 17.25 | 0 | 0.00 | 32.25 | 0 | 0.00 | 47.25 | 0 | 0.00 |
| 2.50 | 0 | N/A | 17.50 | 0 | 0.00 | 32.50 | 0 | 0.00 | 47.50 | 0 | 0.00 |
| 2.75 | 0 | N/A | 17.75 | 0 | 0.00 | 32.75 | 0 | 0.00 | 47.75 | 0 | 0.00 |
| 3.00 | 0 | N/A | 18.00 | 0 | 0.00 | 33.00 | 0 | 0.00 | 48.00 | 0 | 0.00 |
| 3.25 | 0 | N/A | 18.25 | 0 | 0.00 | 33.25 | 0 | 0.00 | 48.25 | 0 | 0.00 |
| 3.50 | 0 | N/A | 18.50 | 0 | 0.00 | 33.50 | 0 | 0.00 | 48.50 | 0 | 0.00 |
| 3.75 | 0 | N/A | 18.75 | 0 | 0.00 | 33.75 | 0 | 0.00 | 48.75 | 0 | 0.00 |
| 4.00 | 0 | N/A | 19.00 | 0 | 0.00 | 34.00 | 0 | 0.00 | 49.00 | 0 | 0.00 |
| 4.25 | 0 | N/A | 19.25 | 0 | 0.00 | 34.25 | 0 | 0.00 | 49.25 | 0 | 0.00 |
| 4.50 | 0 | N/A | 19.50 | 0 | 0.00 | 34.50 | 0 | 0.00 | 49.50 | 0 | 0.00 |
| 4.75 | 0 | N/A | 19.75 | 0 | 0.00 | 34.75 | 0 | 0.00 | 49.75 | 0 | 0.00 |
| 5.00 | 0 | N/A | 20.00 | 0 | 0.00 | 35.00 | 0 | 0.00 | 50.00 | 0 | 0.00 |
| 5.25 | 0 | N/A | 20.25 | 0 | 0.00 | 35.25 | 0 | 0.00 | 50.25 | 0 | 0.00 |
| 5.50 | 0 | N/A | 20.50 | 0 | 0.00 | 35.50 | 0 | 0.00 | 50.50 | 0 | 0.00 |
| 5.75 | 0 | 0.00 | 20.75 | 0 | 0.00 | 35.75 | 0 | 0.00 | 50.75 | 0 | 0.00 |
| 6.00 | 0 | 0.00 | 21.00 | 0 | 0.00 | 36.00 | 0 | 0.00 | 51.00 | 0 | 0.00 |
| 6.25 | 0 | 0.00 | 21.25 | 0 | 0.00 | 36.25 | 0 | 0.00 | 51.25 | 0 | 0.00 |
| 6.50 | 0 | 0.00 | 21.50 | 0 | 0.00 | 36.50 | 0 | 0.00 | 51.50 | 0 | 0.00 |
| 6.75 | 0 | 0.00 | 21.75 | 0 | 0.00 | 36.75 | 0 | 0.00 | 51.75 | 0 | 0.00 |
| 7.00 | 0 | 0.00 | 22.00 | 0 | 0.00 | 37.00 | 0 | 0.00 | 52.00 | 0 | 0.00 |
| 7.25 | 0 | 0.00 | 22.25 | 0 | 0.00 | 37.25 | 0 | 0.00 | 52.25 | 0 | 0.00 |
| 7.50 | 0 | 0.00 | 22.50 | 0 | 0.00 | 37.50 | 0 | 0.00 | 52.50 | 0 | 0.00 |
| 7.75 | 0 | 0.00 | 22.75 | 0 | 0.00 | 37.75 | 0 | 0.00 | 52.75 | 0 | 0.00 |
| 8.00 | 0 | 0.00 | 23.00 | 0 | 0.00 | 38.00 | 0 | 0.00 | 53.00 | 0 | 0.00 |
| 8.25 | 0 | 0.00 | 23.25 | 0 | 0.00 | 38.25 | 0 | 0.00 | 53.25 | 0 | 0.00 |
| 8.50 | 0 | 0.00 | 23.50 | 0 | 0.00 | 38.50 | 0 | 0.00 | 53.50 | 0 | 0.00 |
| 8.75 | 0 | 0.00 | 23.75 | 0 | 0.00 | 38.75 | 0 | 0.00 | 53.75 | 0 | 0.00 |
| 9.00 | 0 | 0.00 | 24.00 | 0 | 0.00 | 39.00 | 0 | 0.00 | 54.00 | 0 | 0.00 |
| 9.25 | 0 | 0.00 | 24.25 | 0 | 0.00 | 39.25 | 0 | 0.00 | 54.25 | 0 | 0.00 |
| 9.50 | 0 | 0.00 | 24.50 | 0 | 0.00 | 39.50 | 0 | 0.00 | 54.50 | 0 | 0.00 |
| 9.75 | 0 | 0.00 | 24.75 | 0 | 0.00 | 39.75 | 0 | 0.00 | 54.75 | 0 | 0.00 |
| 10.00 | 0 | 0.00 | 25.00 | 0 | 0.00 | 40.00 | 0 | 0.00 | 55.00 | 0 | 0.00 |
| 10.25 | 0 | 0.00 | 25.25 | 0 | 0.00 | 40.25 | 0 | 0.00 | 55.25 | 0 | 0.00 |
| 10.50 | 0 | 0.00 | 25.50 | 0 | 0.00 | 40.50 | 0 | 0.00 | 55.50 | 0 | 0.00 |
| 10.75 | 0 | 0.00 | 25.75 | 0 | 0.00 | 40.75 | 0 | 0.00 | 55.75 | 0 | 0.00 |
| 11.00 | 0 | 0.00 | 26.00 | 0 | 0.00 | 41.00 | 0 | 0.00 | 56.00 | 0 | 0.00 |
| 11.25 | 0 | 0.00 | 26.25 | 0 | 0.00 | 41.25 | 0 | 0.00 | 56.25 | 0 | 0.00 |
| 11.50 | 0 | 0.00 | 26.50 | 0 | 0.00 | 41.50 | 0 | 0.00 | 56.50 | 0 | 0.00 |
| 11.75 | 0 | 0.00 | 26.75 | 0 | 0.00 | 41.75 | 0 | 0.00 | 56.75 | 0 | 0.00 |
| 12.00 | 0 | 0.00 | 27.00 | 0 | 0.00 | 42.00 | 0 | 0.00 | 57.00 | 0 | 0.00 |
| 12.25 | 0 | 0.00 | 27.25 | 0 | 0.00 | 42.25 | 0 | 0.00 | 57.25 | 0 | 0.00 |
| 12.50 | 0 | 0.00 | 27.50 | 0 | 0.00 | 42.50 | 0 | 0.00 | 57.50 | 0 | 0.00 |
| 12.75 | 0 | 0.00 | 27.75 | 0 | 0.00 | 42.75 | 0 | 0.00 | 57.75 | 0 | 0.00 |
| 13.00 | 0 | 0.00 | 28.00 | 0 | 0.00 | 43.00 | 0 | 0.00 | 58.00 | 0 | 0.00 |
| 13.25 | 0 | 0.00 | 28.25 | 0 | 0.00 | 43.25 | 0 | 0.00 | 58.25 | 0 | 0.00 |
| 13.50 | 0 | 0.00 | 28.50 | 0 | 0.00 | 43.50 | 0 | 0.00 | 58.50 | 0 | 0.00 |
| 13.75 | 0 | 0.00 | 28.75 | 0 | 0.00 | 43.75 | 0 | 0.00 | 58.75 | 0 | 0.00 |
| 14.00 | 0 | 0.00 | 29.00 | 0 | 0.00 | 44.00 | 0 | 0.00 | 59.00 | 0 | 0.00 |
| 14.25 | 0 | 0.00 | 29.25 | 0 | 0.00 | 44.25 | 0 | 0.00 | 59.25 | 0 | 0.00 |
| 14.50 | 0 | 0.00 | 29.50 | 0 | 0.00 | 44.50 | 0 | 0.00 | 59.50 | 0 | 0.00 |
| 14.75 | 0 | 0.00 | 29.75 | 0 | 0.00 | 44.75 | 0 | 0.00 | 59.75 | 0 | 0.00 |

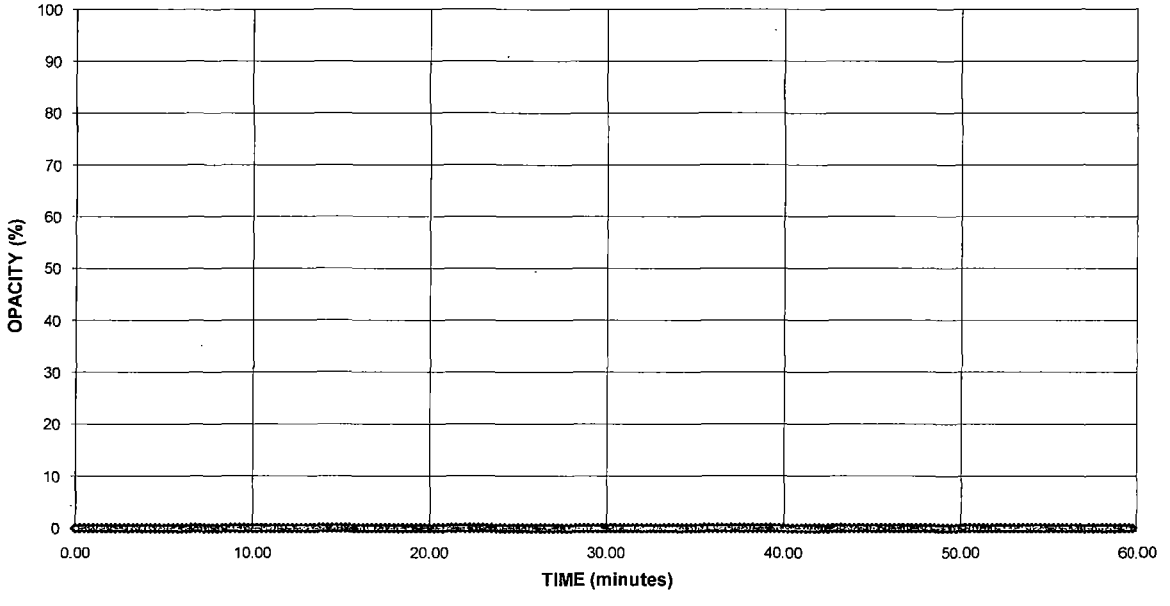
| | |
|---|---|
| **Company:** | Florida Power and Light |
| **Equipment:** | Mitsubishi 501G, Unit 1C base load w/o DB |
| **Location:** | West County Energy Center |
| **Date:** | October 8, 2009 |
| **Project #:** | bv-09-westcounty.fl-comp#1 |

| | | |
|---|---|---|
| Run 1 | **Average Opacity:** | 0.00 % |
| | **Maximum Opacity:** | 0 % |
| | **6 Minute Average:** | 0.00 % |
| | **6 Minute Maximum:** | 0.00 % |
| | **Max Time w/ Opacity:** | 0.00 minutes |

**OPACITY READINGS**
**(15 second intervals)**



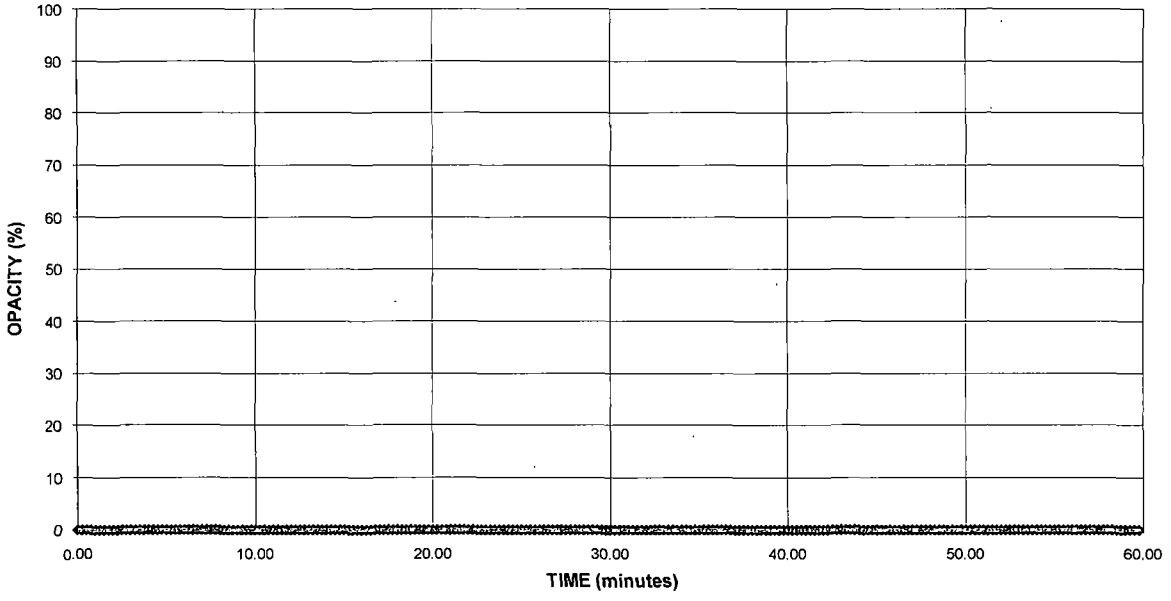

**OPACITY RESULTS**
**(6 minute averages)**



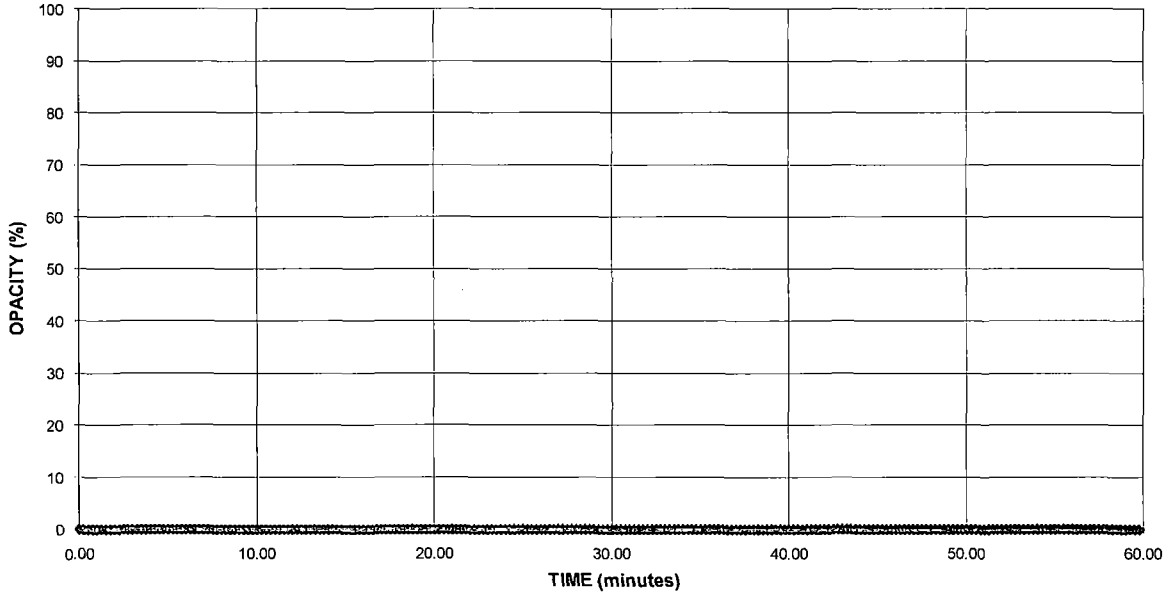
| | |
|---|---|
| **Company:** | Florida Power and Light |
| **Equipment:** | Mitsubishi 501G, Unit 1C base load w/o DB |
| **Location:** | West County Energy Center |
| **Date:** | October 8, 2009 |
| **Project #:** | bv-09-westcounty.fl-comp#1 |

| | | |
|---|---|---|
| Run 2 | **Average Opacity:** | 0.00 % |
| | **Maximum Opacity:** | 0 % |
| | **6 Minute Average:** | 0.00 % |
| | **6 Minute Maximum:** | 0.00 % |
| | **Max Time w/ Opacity:** | 0.00 minutes |

**OPACITY READINGS**
**(15 second intervals)**



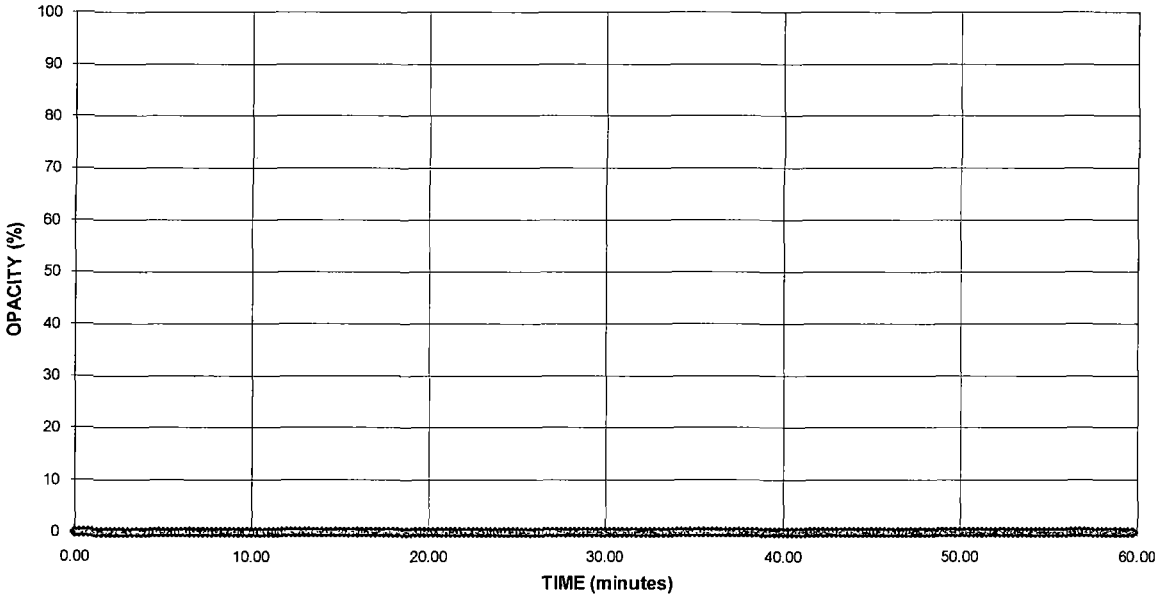

**OPACITY RESULTS**
**(6 minute averages)**



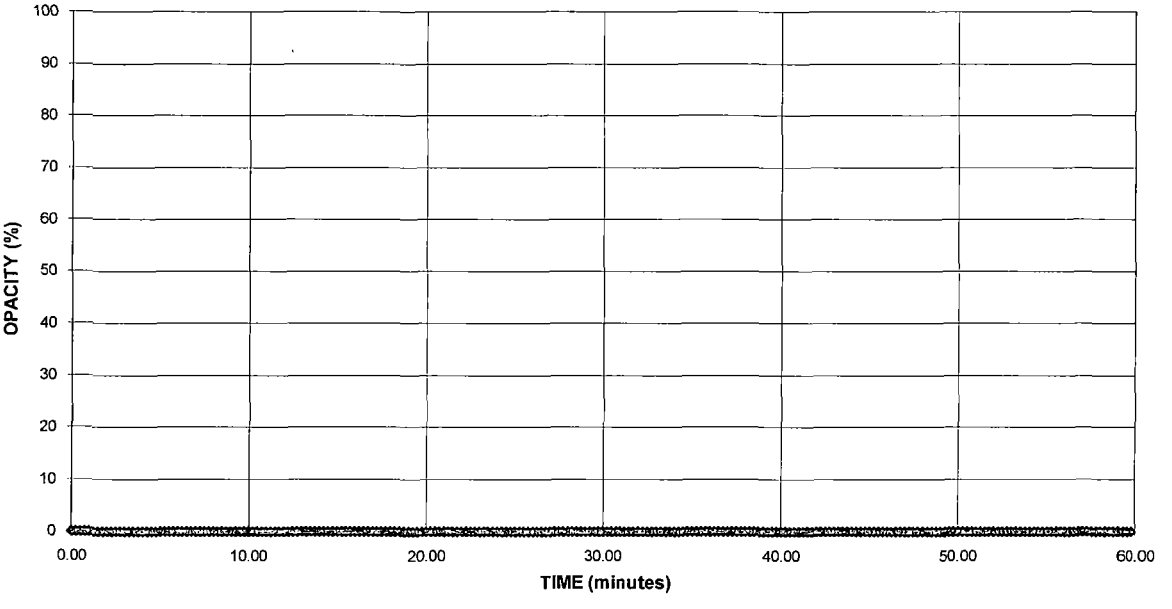
| | |
|---|---|
| **Company:** | Florida Power and Light |
| **Equipment:** | Mitsubishi 501G, Unit 1C base load w/o DB |
| **Location:** | West County Energy Center |
| **Date:** | October 8, 2009 |
| **Project #:** | bv-09-westcounty.fl-comp#1 |

| | | |
|---|---|---|
| Run 3 | **Average Opacity:** | 0.00 % |
| | **Maximum Opacity:** | 0 % |
| | **6 Minute Average:** | 0.00 % |
| | **6 Minute Maximum:** | 0.00 % |
| | **Max Time w/ Opacity:** | 0.00 minutes |

**OPACITY READINGS**
**(15 second intervals)**




**OPACITY RESULTS**
**(6 minute averages)**



Method Used (Circle One): Method 9 | 203A | 203B | Other: _____

# VISUAL EMISSIONS OBSERVATION FORM

Form Number | Page 1 of 6

Continued on Form Number

Company Name: Florida Power & Light
Facility Name: West County Energy Center
Street Address: 20505 State Road 80
City: Loxahatchee, State: Florida Zip: 33470

Process: Electricity Production Unit #: C Operating Mode: Base W/O Duct
Control Equipment: Ammonia Injection Operating Mode: Normal

Describe Emissions Point: most southern stack of three

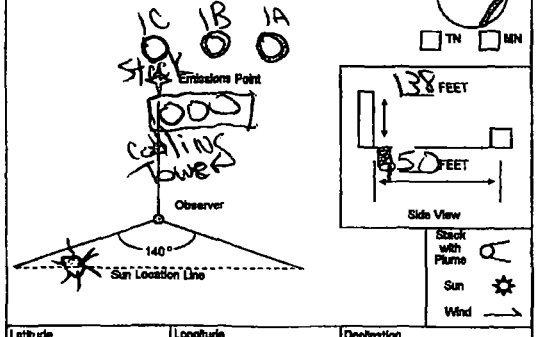
Height of Emiss. Pt. Start: 138 End: 138 | Height of Emiss. Pt. Rel. to Observer Start: 138 End: 138
Distance to Emiss. Pt. Start: ~850 End: ~850 | Direction to Emiss. Pt. (Degrees) Start: 31 End: 31

Vertical Angle to Obs. Pt. Start: 10 End: 10 | Direction to Obs. Pt. (Degrees) Start: 34 End: 34
Distance and Direction to Observation Point from Emission Point: Start: ~850 SW End: ~850 SW

Describe Emissions: Start N/V End N/V
Emission Color: Start N/V End N/V | Water Droplet Plume: Start None End None
N/V - non visible

Describe Plume Background: Start Bar Sky End Blue Sky
Background Color: Start Blue End Blue | Sky Conditions: Start Scattered End Same
Wind Speed: Start 10-15 End 10-15 | Wind Direction: Start NE End NE
Ambient Temp.: Start 91 End 91 | Wet Bulb Temp. | RH Percent: 69

Source Layout Sketch




Latitude | Longitude | Destination

Additional Information

| Observation Date | Time Zone | | Start Time | End Time |
|---|---|---|---|---|
| 10/5/09 | EST | | 10:00 | 10:30 |

| Min. \ Sec. | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Observer's Name (Print): Darin Grimes
Observer's Signature: [signature] Date: 10/5/09
Organization: Air Hygiene Inc.
Certified By: Eastern Technical Associates Date: 9/22/09

# VISUAL EMISSIONS OBSERVATION FORM

Method Used (Circle One): **Method 9** 203A 203B Other: _____

Company Name: Florida Power & Light
Facility Name: West County Energy Center
Street Address: 20505 State Road 80
City: Loxahatchee, State: Florida Zip: 33470

Process: Electricity Production Unit #: C Operating Mode: Base Load
Control Equipment: Ammonia Injection Operating Mode: Normal

Describe Emissions Point: most Southern Stack of three

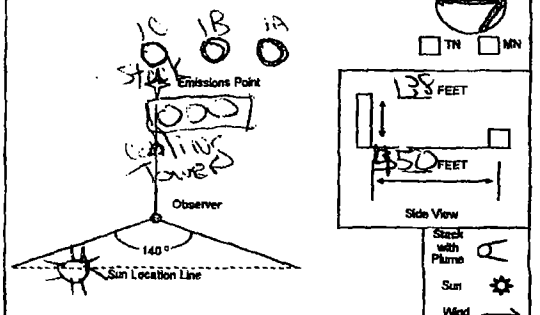
Height of Emiss. Pt. Start: 158 End: 158 Height of Emiss. Pt. Rel. to Observer Start: 152 End: 152
Distance to Emiss. Pt. Start: 350 End: 350 Direction to Emiss. Pt. (Degrees) Start: 31 End: 31

Vertical Angle to Obs. Pt. Start: 16 End: 16 Direction to Obs. Pt. (Degrees) Start: 29 End: 34
Distance and Direction to Observation Point from Emission Point Start: 350 SW End: 350 SW

Describe Emissions Start: N/V End: N/V
Emission Color Start: N/V End: N/V Water Droplet Plume Start: None End: None

Describe Plume Background Start: Blue Sky End: Blue Sky
Background Color Start: Blue End: Blue Sky Conditions Start: Scattered End: Same
Wind Speed Start: 10-15 End: 10-15 Wind Direction Start: NE End: NE
Ambient Temp. Start: 91 End: 91 Wet Bulb Temp. RH Percent: 69

Source Layout Sketch




Latitude | Longitude | Declination

Additional Information

Form Number: Page 2 of 6
Continued on Form Number

Observation Date: 10/5/09 Time Zone: EST Start Time: 10:31 End Time: 11:01

| Min \ Sec | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Observer's Name (Print): Darin Grimes
Observer's Signature: [signature] Date: 10/5/09
Organization: Air Hygiene Inc.
Certified By: Eastern Technical Associates Date: 9/22/09

Method Used (Circle One): Method 9 | 203A | 203B | Other: _____

# VISUAL EMISSIONS OBSERVATION FORM

Company Name: Florida Power & Light
Facility Name: West County Energy Center
Street Address: 20505 State Road 80
City: Loxahatchee, State: Florida Zip: 33470

Process: Electricity Production Unit #: C Operating Mode: Base Load
Control Equipment: Ammonia Injection Operating Mode: Normal

Describe Emissions Point: Most Southern stack of three

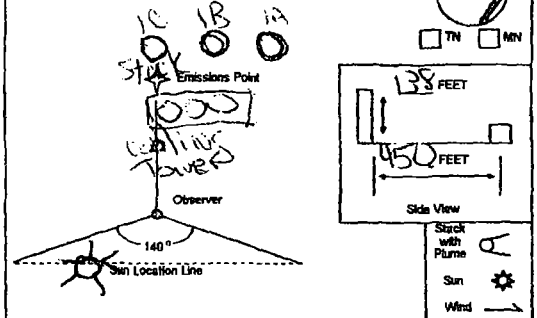
Height of Emiss. Pt. Start: 138 End: 138 Height of Emiss. Pt. Rel. to Observer Start: 132 End: 750
Distance to Emiss. Pt. Start: 950 End: 950 Direction to Emiss. Pt. (Degrees) Start: 31 End: 31

Vector Arrive to Obs. Pt. Start: 16 End: 16 Direction to Obs. Pt. (Degrees) Start: 29 End: 29
Distance and Direction to Observation Point from Emission Point Start: 950 SW End: 950 SW

Describe Emissions Start: N/V End: N/V
Emission Color Start: N/V End: N/V Water Droplet Plume Start: None End: None

Describe Plume Background Start: Blue Sky End: Blue Sky
Background Color Start: Blue End: Blue Sky Conditions Start: Scattered End: Same
Wind Speed Start: 10-15 End: 10-15 Wind Direction Start: NE End: NE
Ambient Temp. Start: 93 End: 93 Wet Bulb Temp. RH Percent: 52

Source Layout Sketch




Latitude | Longitude | Declination

Additional Information

Form Number | Page 3 of 6
Continued on Form Number

| Observation Date | Time Zone | Start Time | End Time |
|---|---|---|---|
| 10/5/09 | EST | 11:05 | 11:35 |

| Min \ Src | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Observer's Name (Print): Darin Loomes
Observer's Signature: [signature] Date: 10/5/09
Organization: Air Hygiene Inc.
Certified By: Eastern Technical Associates Date: 9/22/09

# VISUAL EMISSIONS OBSERVATION FORM

Method Used (Circle One): Method 9 | 203A | 203B | Other: _____

Company Name: Florida Power & Light
Facility Name: West County Energy Center
Street Address: 20505 State Road 80
City: Loxahatchee, State: Florida Zip: 33470

Process: Electricity Production Unit #: C Operating Mode: Base Load
Control Equipment: Ammonia Injection Operating Mode: Normal

Describe Emissions Point: most Souther stack of three

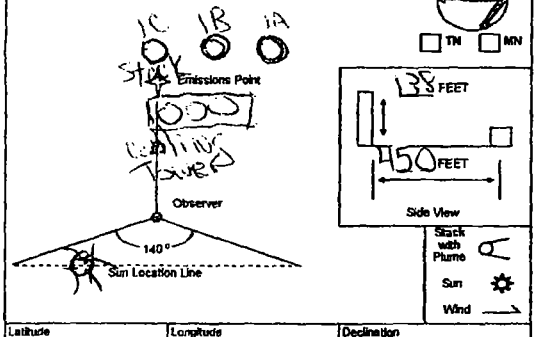
Height of Emiss. Pt. Start: 138 End: 138 Height of Emiss. Pt. Rel. to Observer Start: 138 End: 138
Distance to Emiss. Pt. Start: 450 End: 450 Direction to Emiss. Pt. (Degrees) Start: 31 End: 31

Direction to Obs. Pt. (Degrees) Start: 34 End: 34
Distance and Direction to Observation Point from Emission Point Start: 450 SW End: 450 SW

Describe Emissions: Start N/V End N/V
Emission Color: Start N/V End N/V Water Droplet Plume: Start NONE End NONE

Describe Plume Background: Start Blue Sky End Blue Sky
Background Color: Start Blue End Blue Sky Conditions: Start Scattered End Same
Wind Speed: Start 10-15 End 10-15 Wind Direction: Start NE End NE
Ambient Temp.: Start 93 End 91 Wet Bulb Temp. 77 RH Percent 52

Source Layout Sketch




Latitude | Longitude | Declination

Additional Information

Form Number | Page 4 of 6
Continued on Form Number
Observation Date: 10/5/09 Time Zone: EST Start Time: 11:36 End Time: 12:04

| Min \ Sec. | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Observer's Name (Print): Darin Grimes
Observer's Signature: [signature] Date: 10/5/09
Organization: Air Hygiene Inc.
Certified By: Eastern Technical Associates Date: 9/22/09

Method Used (Circle One)
Method 9 203A 203B Other: _____

# VISUAL EMISSIONS OBSERVATION FORM

Form Number Page 5 of 6

Continued on Form Number

Company Name: Florida Power & Light
Facility Name: West County Energy Center
Street Address: 20505 State Road 80
City: Loxahatchee, State: Florida Zip: 33470

Observation Date: 10/5/09 Time Zone: EST Start Time: 12:08 End Time: 13:08

| Min \ Sec | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Process: Electricity Production Unit # C Operating Mode: Base Work
Control Equipment: Ammonia Injection Operating Mode: Normal

Describe Emissions Point: Southern of three stacks

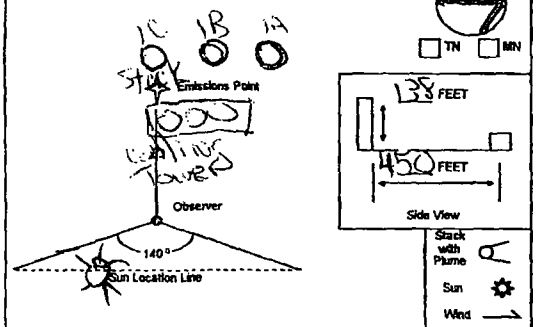
Height of Emiss. Pt. Start 158 End 158
Height of Emiss. Pt. Rel. to Observer Start 158 End 158
Distance to Emiss. Pt. Start 950 End 950
Direction to Emiss. Pt. (Degrees) Start 31 End 31

Vetical Angle to Obs. Pt. Start 16 End 16
Direction to Obs. Pt. (Degrees) Start 34 End 34
Distance and Direction to Observation Point from Emission Point Start 950 SW End 950 SW

Describe Emissions Start N/V End N/V
Emission Color Start N/V End N/V
Water Droplet Plume Start None End None

Describe Plume Background Start Blue Sky End Blue Sky
Background Color Start Blue End Blue
Sky Conditions Start Scattered End Same
Wind Speed Start 10-15 End 10-15
Wind Direction Start NE End NE
Ambient Temp. Start 80 End 80
Wet Bulb Temp.
RH Percent 41

Source Layout Sketch




Latitude | Longitude | Declination

Additional Information

Observer's Name (Print): Darin Grimes
Observer's Signature
Date: 10/5/09
Organization: Air Hygiene Inc.
Certified By: Eastern Technical Associates
Date: 4/22/09

# VISUAL EMISSIONS OBSERVATION FORM

Method Used (Circle One): Method 9 | 203A | 203B | Other: _____

Company Name: Florida Power & Light
Facility Name: West County Energy Center
Street Address: 20505 State Road 80
City: Loxahatchee, State: Florida Zip: 33470

Process: Electricity Production Unit #: C Operating Mode: Base Work
Control Equipment: Ammonia Injection Operating Mode: Normal

Describe Emissions Point: most southern stack of three

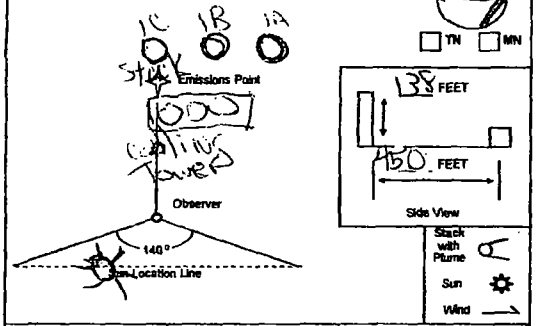
Height of Emiss. Pt. Start: ~150 End: ~150 Height of Emiss. Pt. Rel. to Observer Start: ~152 End: ~152
Distance to Emiss. Pt. Start: ~450 End: ~450 Direction to Emiss. Pt. (Degrees) Start: 31 End: 31

Vertical Angle to Obs. Pt. Start: 16 End: 16 Direction to Obs. Pt. (Degrees) Start: 29 End: 29
Distance and Direction to Observation Point from Emission Point Start: ~350 SW End: ~350 SW

Describe Emissions Start: N/V End: N/V
Emission Color Start: N/V End: N/V Water Droplet Plume Start: None End: None

Describe Plume Background Start: Blue Sky End: Blue Sky
Background Color Start: Blue End: Blue Sky Conditions Start: Scattered End: Same
Wind Speed Start: 10-15 End: 10-15 Wind Direction Start: NE End: NE
Ambient Temp. Start: 100 End: 100 Wet Bulb Temp. RH Percent: 41

Source Layout Sketch




Latitude | Longitude | Declination

Additional Information

Form Number | Page 6 of 6
Continued on Form Number

Observation Date: 10/5/09 Time Zone: EST Start Time: 13:09 End Time: 13:39

| Min \ Sec | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Observer's Name (Print): Darin Grimes
Observer's Signature: [signature] Date: 10/5/09
Organization: Air Hygiene Inc.
Certified By: Eastern Technical Associates Date: 10/22/09

# TEST RESULTS

## Opacity
## Base Load with Duct Burners

| | |
|---|---|
| **Company:** | Florida Power and Light |
| **Equipment:** | Mitsubishi 501G, Unit 1C base load w/DB |
| **Location:** | West County Energy Center |
| **Date:** | October 7, 2009 |
| **Project #:** | bv-09-westcounty.fl-comp#1 |

| | | |
|---|---|---|
| Run 1 | **Average Opacity:** | 0.00 % |
| | **Maximum Opacity:** | 0 % |
| | **6 Minute Average:** | 0.00 % |
| | **6 Minute Maximum:** | 0.00 % |
| | **Max Time w/ Opacity:** | 0.00 minutes |

| TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0 | N/A | 15.00 | 0 | 0.00 | 30.00 | 0 | 0.00 | 45.00 | 0 | 0.00 |
| 0.25 | 0 | N/A | 15.25 | 0 | 0.00 | 30.25 | 0 | 0.00 | 45.25 | 0 | 0.00 |
| 0.50 | 0 | N/A | 15.50 | 0 | 0.00 | 30.50 | 0 | 0.00 | 45.50 | 0 | 0.00 |
| 0.75 | 0 | N/A | 15.75 | 0 | 0.00 | 30.75 | 0 | 0.00 | 45.75 | 0 | 0.00 |
| 1.00 | 0 | N/A | 16.00 | 0 | 0.00 | 31.00 | 0 | 0.00 | 46.00 | 0 | 0.00 |
| 1.25 | 0 | N/A | 16.25 | 0 | 0.00 | 31.25 | 0 | 0.00 | 46.25 | 0 | 0.00 |
| 1.50 | 0 | N/A | 16.50 | 0 | 0.00 | 31.50 | 0 | 0.00 | 46.50 | 0 | 0.00 |
| 1.75 | 0 | N/A | 16.75 | 0 | 0.00 | 31.75 | 0 | 0.00 | 46.75 | 0 | 0.00 |
| 2.00 | 0 | N/A | 17.00 | 0 | 0.00 | 32.00 | 0 | 0.00 | 47.00 | 0 | 0.00 |
| 2.25 | 0 | N/A | 17.25 | 0 | 0.00 | 32.25 | 0 | 0.00 | 47.25 | 0 | 0.00 |
| 2.50 | 0 | N/A | 17.50 | 0 | 0.00 | 32.50 | 0 | 0.00 | 47.50 | 0 | 0.00 |
| 2.75 | 0 | N/A | 17.75 | 0 | 0.00 | 32.75 | 0 | 0.00 | 47.75 | 0 | 0.00 |
| 3.00 | 0 | N/A | 18.00 | 0 | 0.00 | 33.00 | 0 | 0.00 | 48.00 | 0 | 0.00 |
| 3.25 | 0 | N/A | 18.25 | 0 | 0.00 | 33.25 | 0 | 0.00 | 48.25 | 0 | 0.00 |
| 3.50 | 0 | N/A | 18.50 | 0 | 0.00 | 33.50 | 0 | 0.00 | 48.50 | 0 | 0.00 |
| 3.75 | 0 | N/A | 18.75 | 0 | 0.00 | 33.75 | 0 | 0.00 | 48.75 | 0 | 0.00 |
| 4.00 | 0 | N/A | 19.00 | 0 | 0.00 | 34.00 | 0 | 0.00 | 49.00 | 0 | 0.00 |
| 4.25 | 0 | N/A | 19.25 | 0 | 0.00 | 34.25 | 0 | 0.00 | 49.25 | 0 | 0.00 |
| 4.50 | 0 | N/A | 19.50 | 0 | 0.00 | 34.50 | 0 | 0.00 | 49.50 | 0 | 0.00 |
| 4.75 | 0 | N/A | 19.75 | 0 | 0.00 | 34.75 | 0 | 0.00 | 49.75 | 0 | 0.00 |
| 5.00 | 0 | N/A | 20.00 | 0 | 0.00 | 35.00 | 0 | 0.00 | 50.00 | 0 | 0.00 |
| 5.25 | 0 | N/A | 20.25 | 0 | 0.00 | 35.25 | 0 | 0.00 | 50.25 | 0 | 0.00 |
| 5.50 | 0 | N/A | 20.50 | 0 | 0.00 | 35.50 | 0 | 0.00 | 50.50 | 0 | 0.00 |
| 5.75 | 0 | 0.00 | 20.75 | 0 | 0.00 | 35.75 | 0 | 0.00 | 50.75 | 0 | 0.00 |
| 6.00 | 0 | 0.00 | 21.00 | 0 | 0.00 | 36.00 | 0 | 0.00 | 51.00 | 0 | 0.00 |
| 6.25 | 0 | 0.00 | 21.25 | 0 | 0.00 | 36.25 | 0 | 0.00 | 51.25 | 0 | 0.00 |
| 6.50 | 0 | 0.00 | 21.50 | 0 | 0.00 | 36.50 | 0 | 0.00 | 51.50 | 0 | 0.00 |
| 6.75 | 0 | 0.00 | 21.75 | 0 | 0.00 | 36.75 | 0 | 0.00 | 51.75 | 0 | 0.00 |
| 7.00 | 0 | 0.00 | 22.00 | 0 | 0.00 | 37.00 | 0 | 0.00 | 52.00 | 0 | 0.00 |
| 7.25 | 0 | 0.00 | 22.25 | 0 | 0.00 | 37.25 | 0 | 0.00 | 52.25 | 0 | 0.00 |
| 7.50 | 0 | 0.00 | 22.50 | 0 | 0.00 | 37.50 | 0 | 0.00 | 52.50 | 0 | 0.00 |
| 7.75 | 0 | 0.00 | 22.75 | 0 | 0.00 | 37.75 | 0 | 0.00 | 52.75 | 0 | 0.00 |
| 8.00 | 0 | 0.00 | 23.00 | 0 | 0.00 | 38.00 | 0 | 0.00 | 53.00 | 0 | 0.00 |
| 8.25 | 0 | 0.00 | 23.25 | 0 | 0.00 | 38.25 | 0 | 0.00 | 53.25 | 0 | 0.00 |
| 8.50 | 0 | 0.00 | 23.50 | 0 | 0.00 | 38.50 | 0 | 0.00 | 53.50 | 0 | 0.00 |
| 8.75 | 0 | 0.00 | 23.75 | 0 | 0.00 | 38.75 | 0 | 0.00 | 53.75 | 0 | 0.00 |
| 9.00 | 0 | 0.00 | 24.00 | 0 | 0.00 | 39.00 | 0 | 0.00 | 54.00 | 0 | 0.00 |
| 9.25 | 0 | 0.00 | 24.25 | 0 | 0.00 | 39.25 | 0 | 0.00 | 54.25 | 0 | 0.00 |
| 9.50 | 0 | 0.00 | 24.50 | 0 | 0.00 | 39.50 | 0 | 0.00 | 54.50 | 0 | 0.00 |
| 9.75 | 0 | 0.00 | 24.75 | 0 | 0.00 | 39.75 | 0 | 0.00 | 54.75 | 0 | 0.00 |
| 10.00 | 0 | 0.00 | 25.00 | 0 | 0.00 | 40.00 | 0 | 0.00 | 55.00 | 0 | 0.00 |
| 10.25 | 0 | 0.00 | 25.25 | 0 | 0.00 | 40.25 | 0 | 0.00 | 55.25 | 0 | 0.00 |
| 10.50 | 0 | 0.00 | 25.50 | 0 | 0.00 | 40.50 | 0 | 0.00 | 55.50 | 0 | 0.00 |
| 10.75 | 0 | 0.00 | 25.75 | 0 | 0.00 | 40.75 | 0 | 0.00 | 55.75 | 0 | 0.00 |
| 11.00 | 0 | 0.00 | 26.00 | 0 | 0.00 | 41.00 | 0 | 0.00 | 56.00 | 0 | 0.00 |
| 11.25 | 0 | 0.00 | 26.25 | 0 | 0.00 | 41.25 | 0 | 0.00 | 56.25 | 0 | 0.00 |
| 11.50 | 0 | 0.00 | 26.50 | 0 | 0.00 | 41.50 | 0 | 0.00 | 56.50 | 0 | 0.00 |
| 11.75 | 0 | 0.00 | 26.75 | 0 | 0.00 | 41.75 | 0 | 0.00 | 56.75 | 0 | 0.00 |
| 12.00 | 0 | 0.00 | 27.00 | 0 | 0.00 | 42.00 | 0 | 0.00 | 57.00 | 0 | 0.00 |
| 12.25 | 0 | 0.00 | 27.25 | 0 | 0.00 | 42.25 | 0 | 0.00 | 57.25 | 0 | 0.00 |
| 12.50 | 0 | 0.00 | 27.50 | 0 | 0.00 | 42.50 | 0 | 0.00 | 57.50 | 0 | 0.00 |
| 12.75 | 0 | 0.00 | 27.75 | 0 | 0.00 | 42.75 | 0 | 0.00 | 57.75 | 0 | 0.00 |
| 13.00 | 0 | 0.00 | 28.00 | 0 | 0.00 | 43.00 | 0 | 0.00 | 58.00 | 0 | 0.00 |
| 13.25 | 0 | 0.00 | 28.25 | 0 | 0.00 | 43.25 | 0 | 0.00 | 58.25 | 0 | 0.00 |
| 13.50 | 0 | 0.00 | 28.50 | 0 | 0.00 | 43.50 | 0 | 0.00 | 58.50 | 0 | 0.00 |
| 13.75 | 0 | 0.00 | 28.75 | 0 | 0.00 | 43.75 | 0 | 0.00 | 58.75 | 0 | 0.00 |
| 14.00 | 0 | 0.00 | 29.00 | 0 | 0.00 | 44.00 | 0 | 0.00 | 59.00 | 0 | 0.00 |
| 14.25 | 0 | 0.00 | 29.25 | 0 | 0.00 | 44.25 | 0 | 0.00 | 59.25 | 0 | 0.00 |
| 14.50 | 0 | 0.00 | 29.50 | 0 | 0.00 | 44.50 | 0 | 0.00 | 59.50 | 0 | 0.00 |
| 14.75 | 0 | 0.00 | 29.75 | 0 | 0.00 | 44.75 | 0 | 0.00 | 59.75 | 0 | 0.00 |

| | |
|---|---|
| **Company:** | Florida Power and Light |
| **Equipment:** | Mitsubishi 501G, Unit 1C base load w/DB |
| **Location:** | West County Energy Center |
| **Date:** | October 7, 2009 |
| **Project #:** | bv-09-westcounty.fl-comp#1 |

Run 2

| | |
|---|---|
| **Average Opacity:** | 0.00 % |
| **Maximum Opacity:** | 0 % |
| **6 Minute Average:** | 0.00 % |
| **6 Minute Maximum:** | 0.00 % |
| **Max Time w/ Opacity:** | 0.00 minutes |

| TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0 | N/A | 15.00 | 0 | 0.00 | 30.00 | 0 | 0.00 | 45.00 | 0 | 0.00 |
| 0.25 | 0 | N/A | 15.25 | 0 | 0.00 | 30.25 | 0 | 0.00 | 45.25 | 0 | 0.00 |
| 0.50 | 0 | N/A | 15.50 | 0 | 0.00 | 30.50 | 0 | 0.00 | 45.50 | 0 | 0.00 |
| 0.75 | 0 | N/A | 15.75 | 0 | 0.00 | 30.75 | 0 | 0.00 | 45.75 | 0 | 0.00 |
| 1.00 | 0 | N/A | 16.00 | 0 | 0.00 | 31.00 | 0 | 0.00 | 46.00 | 0 | 0.00 |
| 1.25 | 0 | N/A | 16.25 | 0 | 0.00 | 31.25 | 0 | 0.00 | 46.25 | 0 | 0.00 |
| 1.50 | 0 | N/A | 16.50 | 0 | 0.00 | 31.50 | 0 | 0.00 | 46.50 | 0 | 0.00 |
| 1.75 | 0 | N/A | 16.75 | 0 | 0.00 | 31.75 | 0 | 0.00 | 46.75 | 0 | 0.00 |
| 2.00 | 0 | N/A | 17.00 | 0 | 0.00 | 32.00 | 0 | 0.00 | 47.00 | 0 | 0.00 |
| 2.25 | 0 | N/A | 17.25 | 0 | 0.00 | 32.25 | 0 | 0.00 | 47.25 | 0 | 0.00 |
| 2.50 | 0 | N/A | 17.50 | 0 | 0.00 | 32.50 | 0 | 0.00 | 47.50 | 0 | 0.00 |
| 2.75 | 0 | N/A | 17.75 | 0 | 0.00 | 32.75 | 0 | 0.00 | 47.75 | 0 | 0.00 |
| 3.00 | 0 | N/A | 18.00 | 0 | 0.00 | 33.00 | 0 | 0.00 | 48.00 | 0 | 0.00 |
| 3.25 | 0 | N/A | 18.25 | 0 | 0.00 | 33.25 | 0 | 0.00 | 48.25 | 0 | 0.00 |
| 3.50 | 0 | N/A | 18.50 | 0 | 0.00 | 33.50 | 0 | 0.00 | 48.50 | 0 | 0.00 |
| 3.75 | 0 | N/A | 18.75 | 0 | 0.00 | 33.75 | 0 | 0.00 | 48.75 | 0 | 0.00 |
| 4.00 | 0 | N/A | 19.00 | 0 | 0.00 | 34.00 | 0 | 0.00 | 49.00 | 0 | 0.00 |
| 4.25 | 0 | N/A | 19.25 | 0 | 0.00 | 34.25 | 0 | 0.00 | 49.25 | 0 | 0.00 |
| 4.50 | 0 | N/A | 19.50 | 0 | 0.00 | 34.50 | 0 | 0.00 | 49.50 | 0 | 0.00 |
| 4.75 | 0 | N/A | 19.75 | 0 | 0.00 | 34.75 | 0 | 0.00 | 49.75 | 0 | 0.00 |
| 5.00 | 0 | N/A | 20.00 | 0 | 0.00 | 35.00 | 0 | 0.00 | 50.00 | 0 | 0.00 |
| 5.25 | 0 | N/A | 20.25 | 0 | 0.00 | 35.25 | 0 | 0.00 | 50.25 | 0 | 0.00 |
| 5.50 | 0 | N/A | 20.50 | 0 | 0.00 | 35.50 | 0 | 0.00 | 50.50 | 0 | 0.00 |
| 5.75 | 0 | 0.00 | 20.75 | 0 | 0.00 | 35.75 | 0 | 0.00 | 50.75 | 0 | 0.00 |
| 6.00 | 0 | 0.00 | 21.00 | 0 | 0.00 | 36.00 | 0 | 0.00 | 51.00 | 0 | 0.00 |
| 6.25 | 0 | 0.00 | 21.25 | 0 | 0.00 | 36.25 | 0 | 0.00 | 51.25 | 0 | 0.00 |
| 6.50 | 0 | 0.00 | 21.50 | 0 | 0.00 | 36.50 | 0 | 0.00 | 51.50 | 0 | 0.00 |
| 6.75 | 0 | 0.00 | 21.75 | 0 | 0.00 | 36.75 | 0 | 0.00 | 51.75 | 0 | 0.00 |
| 7.00 | 0 | 0.00 | 22.00 | 0 | 0.00 | 37.00 | 0 | 0.00 | 52.00 | 0 | 0.00 |
| 7.25 | 0 | 0.00 | 22.25 | 0 | 0.00 | 37.25 | 0 | 0.00 | 52.25 | 0 | 0.00 |
| 7.50 | 0 | 0.00 | 22.50 | 0 | 0.00 | 37.50 | 0 | 0.00 | 52.50 | 0 | 0.00 |
| 7.75 | 0 | 0.00 | 22.75 | 0 | 0.00 | 37.75 | 0 | 0.00 | 52.75 | 0 | 0.00 |
| 8.00 | 0 | 0.00 | 23.00 | 0 | 0.00 | 38.00 | 0 | 0.00 | 53.00 | 0 | 0.00 |
| 8.25 | 0 | 0.00 | 23.25 | 0 | 0.00 | 38.25 | 0 | 0.00 | 53.25 | 0 | 0.00 |
| 8.50 | 0 | 0.00 | 23.50 | 0 | 0.00 | 38.50 | 0 | 0.00 | 53.50 | 0 | 0.00 |
| 8.75 | 0 | 0.00 | 23.75 | 0 | 0.00 | 38.75 | 0 | 0.00 | 53.75 | 0 | 0.00 |
| 9.00 | 0 | 0.00 | 24.00 | 0 | 0.00 | 39.00 | 0 | 0.00 | 54.00 | 0 | 0.00 |
| 9.25 | 0 | 0.00 | 24.25 | 0 | 0.00 | 39.25 | 0 | 0.00 | 54.25 | 0 | 0.00 |
| 9.50 | 0 | 0.00 | 24.50 | 0 | 0.00 | 39.50 | 0 | 0.00 | 54.50 | 0 | 0.00 |
| 9.75 | 0 | 0.00 | 24.75 | 0 | 0.00 | 39.75 | 0 | 0.00 | 54.75 | 0 | 0.00 |
| 10.00 | 0 | 0.00 | 25.00 | 0 | 0.00 | 40.00 | 0 | 0.00 | 55.00 | 0 | 0.00 |
| 10.25 | 0 | 0.00 | 25.25 | 0 | 0.00 | 40.25 | 0 | 0.00 | 55.25 | 0 | 0.00 |
| 10.50 | 0 | 0.00 | 25.50 | 0 | 0.00 | 40.50 | 0 | 0.00 | 55.50 | 0 | 0.00 |
| 10.75 | 0 | 0.00 | 25.75 | 0 | 0.00 | 40.75 | 0 | 0.00 | 55.75 | 0 | 0.00 |
| 11.00 | 0 | 0.00 | 26.00 | 0 | 0.00 | 41.00 | 0 | 0.00 | 56.00 | 0 | 0.00 |
| 11.25 | 0 | 0.00 | 26.25 | 0 | 0.00 | 41.25 | 0 | 0.00 | 56.25 | 0 | 0.00 |
| 11.50 | 0 | 0.00 | 26.50 | 0 | 0.00 | 41.50 | 0 | 0.00 | 56.50 | 0 | 0.00 |
| 11.75 | 0 | 0.00 | 26.75 | 0 | 0.00 | 41.75 | 0 | 0.00 | 56.75 | 0 | 0.00 |
| 12.00 | 0 | 0.00 | 27.00 | 0 | 0.00 | 42.00 | 0 | 0.00 | 57.00 | 0 | 0.00 |
| 12.25 | 0 | 0.00 | 27.25 | 0 | 0.00 | 42.25 | 0 | 0.00 | 57.25 | 0 | 0.00 |
| 12.50 | 0 | 0.00 | 27.50 | 0 | 0.00 | 42.50 | 0 | 0.00 | 57.50 | 0 | 0.00 |
| 12.75 | 0 | 0.00 | 27.75 | 0 | 0.00 | 42.75 | 0 | 0.00 | 57.75 | 0 | 0.00 |
| 13.00 | 0 | 0.00 | 28.00 | 0 | 0.00 | 43.00 | 0 | 0.00 | 58.00 | 0 | 0.00 |
| 13.25 | 0 | 0.00 | 28.25 | 0 | 0.00 | 43.25 | 0 | 0.00 | 58.25 | 0 | 0.00 |
| 13.50 | 0 | 0.00 | 28.50 | 0 | 0.00 | 43.50 | 0 | 0.00 | 58.50 | 0 | 0.00 |
| 13.75 | 0 | 0.00 | 28.75 | 0 | 0.00 | 43.75 | 0 | 0.00 | 58.75 | 0 | 0.00 |
| 14.00 | 0 | 0.00 | 29.00 | 0 | 0.00 | 44.00 | 0 | 0.00 | 59.00 | 0 | 0.00 |
| 14.25 | 0 | 0.00 | 29.25 | 0 | 0.00 | 44.25 | 0 | 0.00 | 59.25 | 0 | 0.00 |
| 14.50 | 0 | 0.00 | 29.50 | 0 | 0.00 | 44.50 | 0 | 0.00 | 59.50 | 0 | 0.00 |
| 14.75 | 0 | 0.00 | 29.75 | 0 | 0.00 | 44.75 | 0 | 0.00 | 59.75 | 0 | 0.00 |

**Company:** Florida Power and Light
**Equipment:** Mitsubishi 501G, Unit 1C base load w/DB
**Location:** West County Energy Center
**Date:** October 7, 2009
**Project #:** bv-09-westcounty.fl-comp#1

Run 3

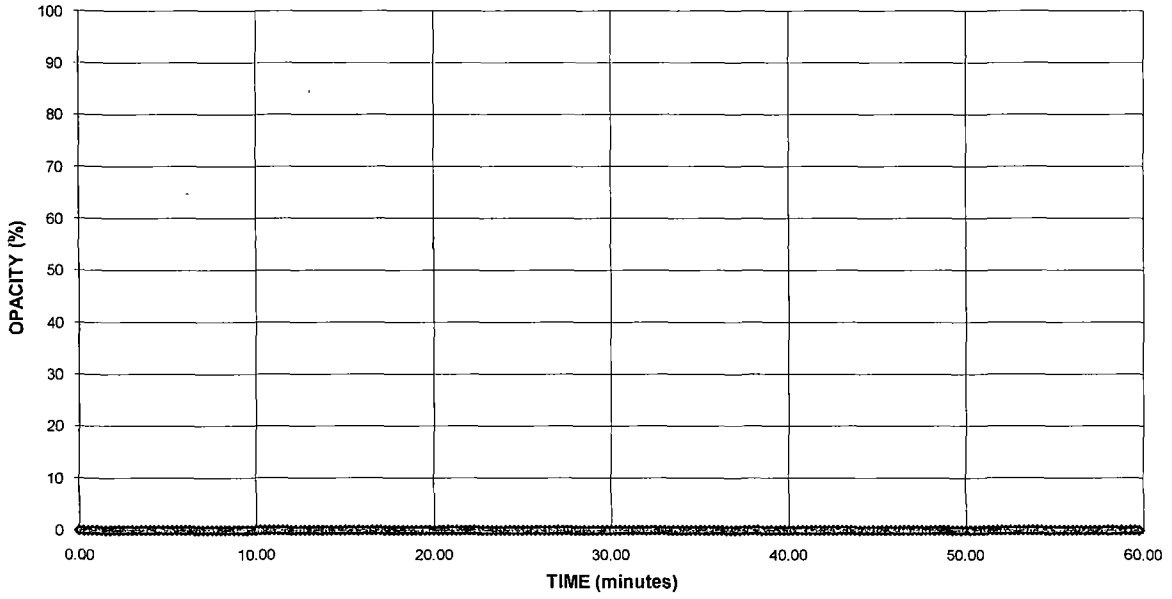
**Average Opacity:** 0.00 %
**Maximum Opacity:** 0 %
**6 Minute Average:** 0.00 %
**6 Minute Maximum:** 0.00 %
**Max Time w/ Opacity:** 0.00 minutes

| TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. | TIME (min) | OPACITY (%) | 6 MIN AVG. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0 | N/A | 15.00 | 0 | 0.00 | 30.00 | 0 | 0.00 | 45.00 | 0 | 0.00 |
| 0.25 | 0 | N/A | 15.25 | 0 | 0.00 | 30.25 | 0 | 0.00 | 45.25 | 0 | 0.00 |
| 0.50 | 0 | N/A | 15.50 | 0 | 0.00 | 30.50 | 0 | 0.00 | 45.50 | 0 | 0.00 |
| 0.75 | 0 | N/A | 15.75 | 0 | 0.00 | 30.75 | 0 | 0.00 | 45.75 | 0 | 0.00 |
| 1.00 | 0 | N/A | 16.00 | 0 | 0.00 | 31.00 | 0 | 0.00 | 46.00 | 0 | 0.00 |
| 1.25 | 0 | N/A | 16.25 | 0 | 0.00 | 31.25 | 0 | 0.00 | 46.25 | 0 | 0.00 |
| 1.50 | 0 | N/A | 16.50 | 0 | 0.00 | 31.50 | 0 | 0.00 | 46.50 | 0 | 0.00 |
| 1.75 | 0 | N/A | 16.75 | 0 | 0.00 | 31.75 | 0 | 0.00 | 46.75 | 0 | 0.00 |
| 2.00 | 0 | N/A | 17.00 | 0 | 0.00 | 32.00 | 0 | 0.00 | 47.00 | 0 | 0.00 |
| 2.25 | 0 | N/A | 17.25 | 0 | 0.00 | 32.25 | 0 | 0.00 | 47.25 | 0 | 0.00 |
| 2.50 | 0 | N/A | 17.50 | 0 | 0.00 | 32.50 | 0 | 0.00 | 47.50 | 0 | 0.00 |
| 2.75 | 0 | N/A | 17.75 | 0 | 0.00 | 32.75 | 0 | 0.00 | 47.75 | 0 | 0.00 |
| 3.00 | 0 | N/A | 18.00 | 0 | 0.00 | 33.00 | 0 | 0.00 | 48.00 | 0 | 0.00 |
| 3.25 | 0 | N/A | 18.25 | 0 | 0.00 | 33.25 | 0 | 0.00 | 48.25 | 0 | 0.00 |
| 3.50 | 0 | N/A | 18.50 | 0 | 0.00 | 33.50 | 0 | 0.00 | 48.50 | 0 | 0.00 |
| 3.75 | 0 | N/A | 18.75 | 0 | 0.00 | 33.75 | 0 | 0.00 | 48.75 | 0 | 0.00 |
| 4.00 | 0 | N/A | 19.00 | 0 | 0.00 | 34.00 | 0 | 0.00 | 49.00 | 0 | 0.00 |
| 4.25 | 0 | N/A | 19.25 | 0 | 0.00 | 34.25 | 0 | 0.00 | 49.25 | 0 | 0.00 |
| 4.50 | 0 | N/A | 19.50 | 0 | 0.00 | 34.50 | 0 | 0.00 | 49.50 | 0 | 0.00 |
| 4.75 | 0 | N/A | 19.75 | 0 | 0.00 | 34.75 | 0 | 0.00 | 49.75 | 0 | 0.00 |
| 5.00 | 0 | N/A | 20.00 | 0 | 0.00 | 35.00 | 0 | 0.00 | 50.00 | 0 | 0.00 |
| 5.25 | 0 | N/A | 20.25 | 0 | 0.00 | 35.25 | 0 | 0.00 | 50.25 | 0 | 0.00 |
| 5.50 | 0 | N/A | 20.50 | 0 | 0.00 | 35.50 | 0 | 0.00 | 50.50 | 0 | 0.00 |
| 5.75 | 0 | 0.00 | 20.75 | 0 | 0.00 | 35.75 | 0 | 0.00 | 50.75 | 0 | 0.00 |
| 6.00 | 0 | 0.00 | 21.00 | 0 | 0.00 | 36.00 | 0 | 0.00 | 51.00 | 0 | 0.00 |
| 6.25 | 0 | 0.00 | 21.25 | 0 | 0.00 | 36.25 | 0 | 0.00 | 51.25 | 0 | 0.00 |
| 6.50 | 0 | 0.00 | 21.50 | 0 | 0.00 | 36.50 | 0 | 0.00 | 51.50 | 0 | 0.00 |
| 6.75 | 0 | 0.00 | 21.75 | 0 | 0.00 | 36.75 | 0 | 0.00 | 51.75 | 0 | 0.00 |
| 7.00 | 0 | 0.00 | 22.00 | 0 | 0.00 | 37.00 | 0 | 0.00 | 52.00 | 0 | 0.00 |
| 7.25 | 0 | 0.00 | 22.25 | 0 | 0.00 | 37.25 | 0 | 0.00 | 52.25 | 0 | 0.00 |
| 7.50 | 0 | 0.00 | 22.50 | 0 | 0.00 | 37.50 | 0 | 0.00 | 52.50 | 0 | 0.00 |
| 7.75 | 0 | 0.00 | 22.75 | 0 | 0.00 | 37.75 | 0 | 0.00 | 52.75 | 0 | 0.00 |
| 8.00 | 0 | 0.00 | 23.00 | 0 | 0.00 | 38.00 | 0 | 0.00 | 53.00 | 0 | 0.00 |
| 8.25 | 0 | 0.00 | 23.25 | 0 | 0.00 | 38.25 | 0 | 0.00 | 53.25 | 0 | 0.00 |
| 8.50 | 0 | 0.00 | 23.50 | 0 | 0.00 | 38.50 | 0 | 0.00 | 53.50 | 0 | 0.00 |
| 8.75 | 0 | 0.00 | 23.75 | 0 | 0.00 | 38.75 | 0 | 0.00 | 53.75 | 0 | 0.00 |
| 9.00 | 0 | 0.00 | 24.00 | 0 | 0.00 | 39.00 | 0 | 0.00 | 54.00 | 0 | 0.00 |
| 9.25 | 0 | 0.00 | 24.25 | 0 | 0.00 | 39.25 | 0 | 0.00 | 54.25 | 0 | 0.00 |
| 9.50 | 0 | 0.00 | 24.50 | 0 | 0.00 | 39.50 | 0 | 0.00 | 54.50 | 0 | 0.00 |
| 9.75 | 0 | 0.00 | 24.75 | 0 | 0.00 | 39.75 | 0 | 0.00 | 54.75 | 0 | 0.00 |
| 10.00 | 0 | 0.00 | 25.00 | 0 | 0.00 | 40.00 | 0 | 0.00 | 55.00 | 0 | 0.00 |
| 10.25 | 0 | 0.00 | 25.25 | 0 | 0.00 | 40.25 | 0 | 0.00 | 55.25 | 0 | 0.00 |
| 10.50 | 0 | 0.00 | 25.50 | 0 | 0.00 | 40.50 | 0 | 0.00 | 55.50 | 0 | 0.00 |
| 10.75 | 0 | 0.00 | 25.75 | 0 | 0.00 | 40.75 | 0 | 0.00 | 55.75 | 0 | 0.00 |
| 11.00 | 0 | 0.00 | 26.00 | 0 | 0.00 | 41.00 | 0 | 0.00 | 56.00 | 0 | 0.00 |
| 11.25 | 0 | 0.00 | 26.25 | 0 | 0.00 | 41.25 | 0 | 0.00 | 56.25 | 0 | 0.00 |
| 11.50 | 0 | 0.00 | 26.50 | 0 | 0.00 | 41.50 | 0 | 0.00 | 56.50 | 0 | 0.00 |
| 11.75 | 0 | 0.00 | 26.75 | 0 | 0.00 | 41.75 | 0 | 0.00 | 56.75 | 0 | 0.00 |
| 12.00 | 0 | 0.00 | 27.00 | 0 | 0.00 | 42.00 | 0 | 0.00 | 57.00 | 0 | 0.00 |
| 12.25 | 0 | 0.00 | 27.25 | 0 | 0.00 | 42.25 | 0 | 0.00 | 57.25 | 0 | 0.00 |
| 12.50 | 0 | 0.00 | 27.50 | 0 | 0.00 | 42.50 | 0 | 0.00 | 57.50 | 0 | 0.00 |
| 12.75 | 0 | 0.00 | 27.75 | 0 | 0.00 | 42.75 | 0 | 0.00 | 57.75 | 0 | 0.00 |
| 13.00 | 0 | 0.00 | 28.00 | 0 | 0.00 | 43.00 | 0 | 0.00 | 58.00 | 0 | 0.00 |
| 13.25 | 0 | 0.00 | 28.25 | 0 | 0.00 | 43.25 | 0 | 0.00 | 58.25 | 0 | 0.00 |
| 13.50 | 0 | 0.00 | 28.50 | 0 | 0.00 | 43.50 | 0 | 0.00 | 58.50 | 0 | 0.00 |
| 13.75 | 0 | 0.00 | 28.75 | 0 | 0.00 | 43.75 | 0 | 0.00 | 58.75 | 0 | 0.00 |
| 14.00 | 0 | 0.00 | 29.00 | 0 | 0.00 | 44.00 | 0 | 0.00 | 59.00 | 0 | 0.00 |
| 14.25 | 0 | 0.00 | 29.25 | 0 | 0.00 | 44.25 | 0 | 0.00 | 59.25 | 0 | 0.00 |
| 14.50 | 0 | 0.00 | 29.50 | 0 | 0.00 | 44.50 | 0 | 0.00 | 59.50 | 0 | 0.00 |
| 14.75 | 0 | 0.00 | 29.75 | 0 | 0.00 | 44.75 | 0 | 0.00 | 59.75 | 0 | 0.00 |

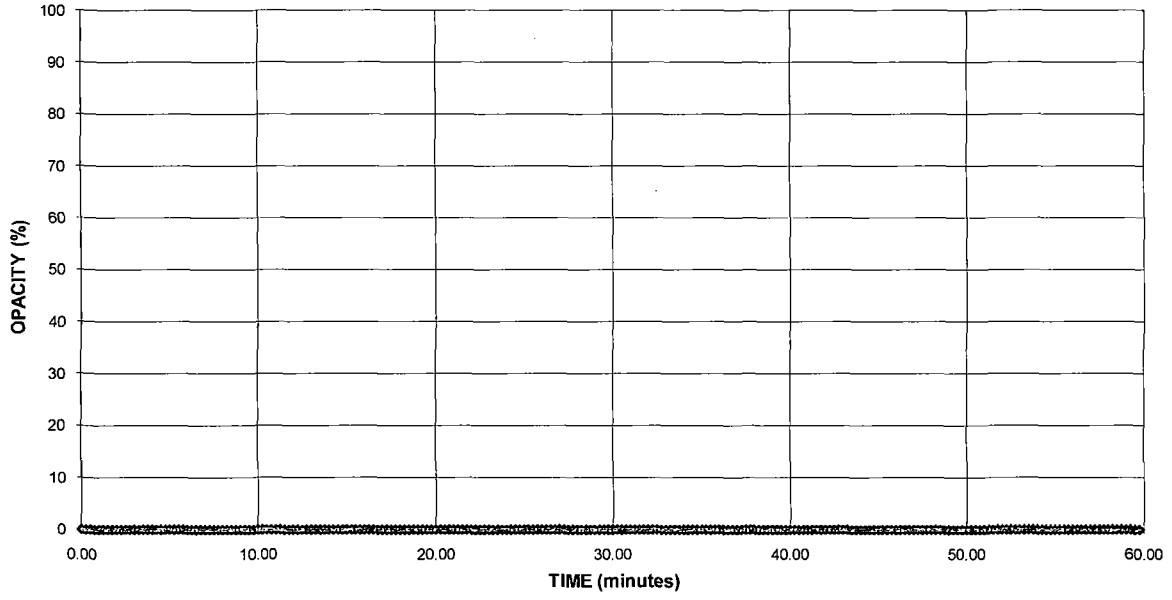
| | |
|---|---|
| **Company:** | Florida Power and Light |
| **Equipment:** | Mitsubishi 501G, Unit 1C base load w/DB |
| **Location:** | West County Energy Center |
| **Date:** | October 7, 2009 |
| **Project #:** | bv-09-westcounty.fl-comp#1 |

| | | |
|---|---|---|
| Run 1 | **Average Opacity:** | 0.00 % |
| | **Maximum Opacity:** | 0 % |
| | **6 Minute Average:** | 0.00 % |
| | **6 Minute Maximum:** | 0.00 % |
| | **Max Time w/ Opacity:** | 0.00 minutes |

**OPACITY READINGS**
**(15 second intervals)**



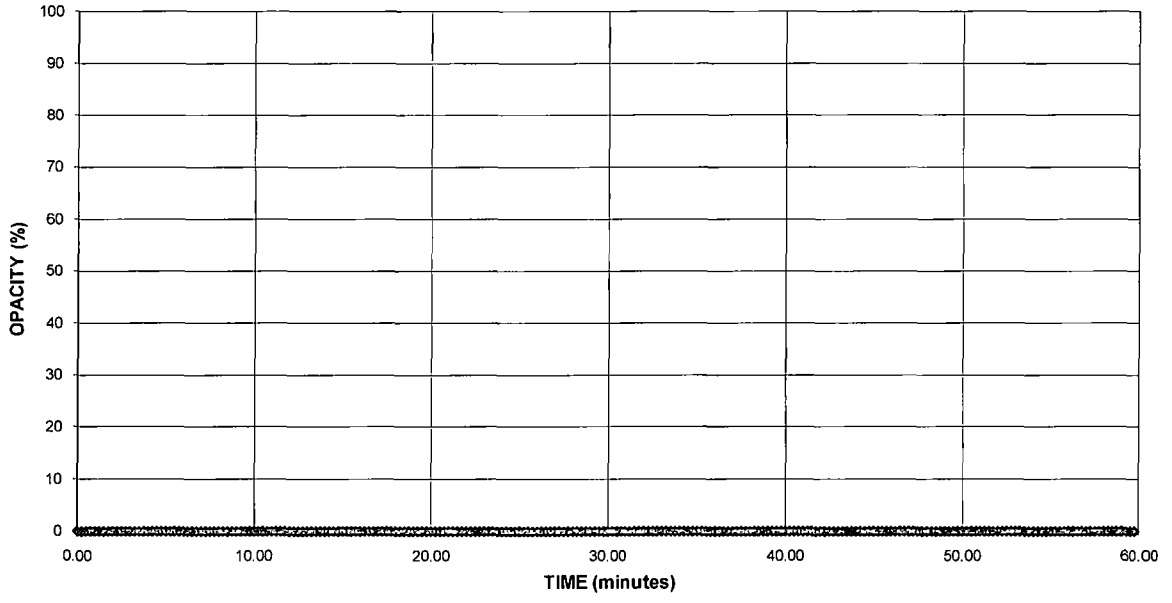

**OPACITY RESULTS**
**(6 minute averages)**



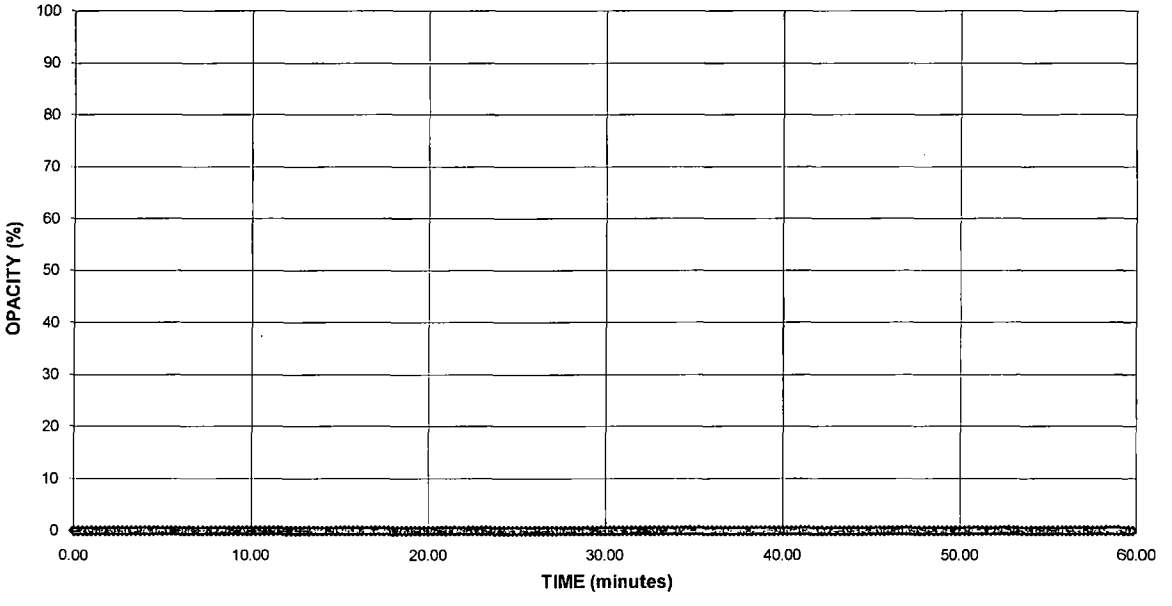
| | |
|---|---|
| **Company:** | Florida Power and Light |
| **Equipment:** | Mitsubishi 501G, Unit 1C base load w/DB |
| **Location:** | West County Energy Center |
| **Date:** | October 7, 2009 |
| **Project #:** | bv-09-westcounty.fl-comp#1 |

| | | |
|---|---|---|
| Run 2 | **Average Opacity:** | 0.00 % |
| | **Maximum Opacity:** | 0 % |
| | **6 Minute Average:** | 0.00 % |
| | ***6 Minute Maximum:*** | 0.00 % |
| | **Max Time w/ Opacity:** | 0.00 minutes |

**OPACITY READINGS**
**(15 second intervals)**



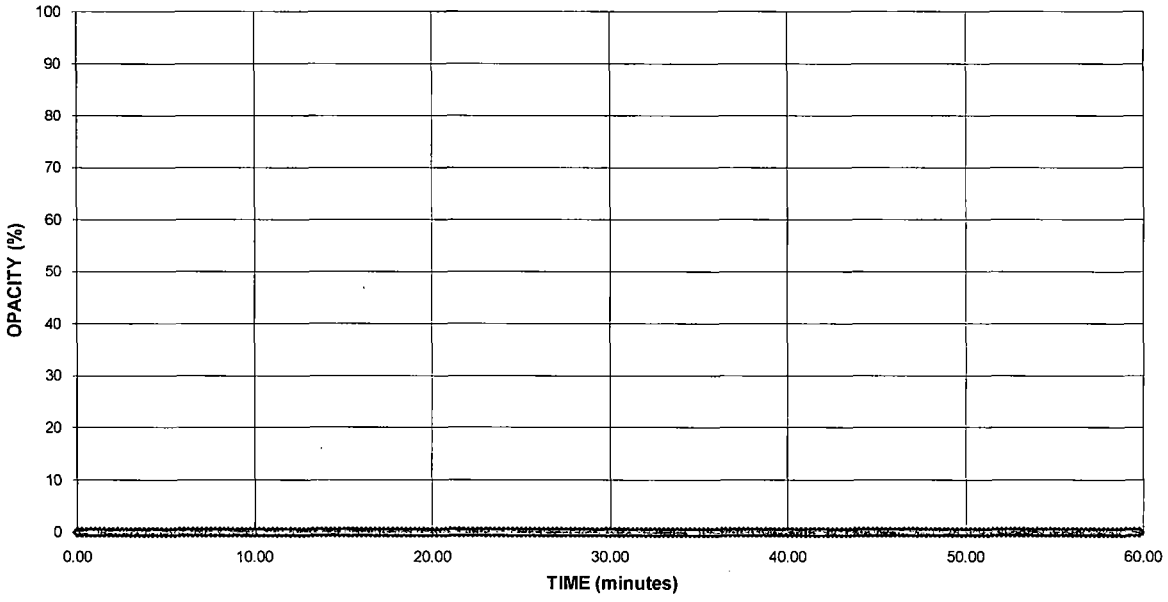

**OPACITY RESULTS**
**(6 minute averages)**



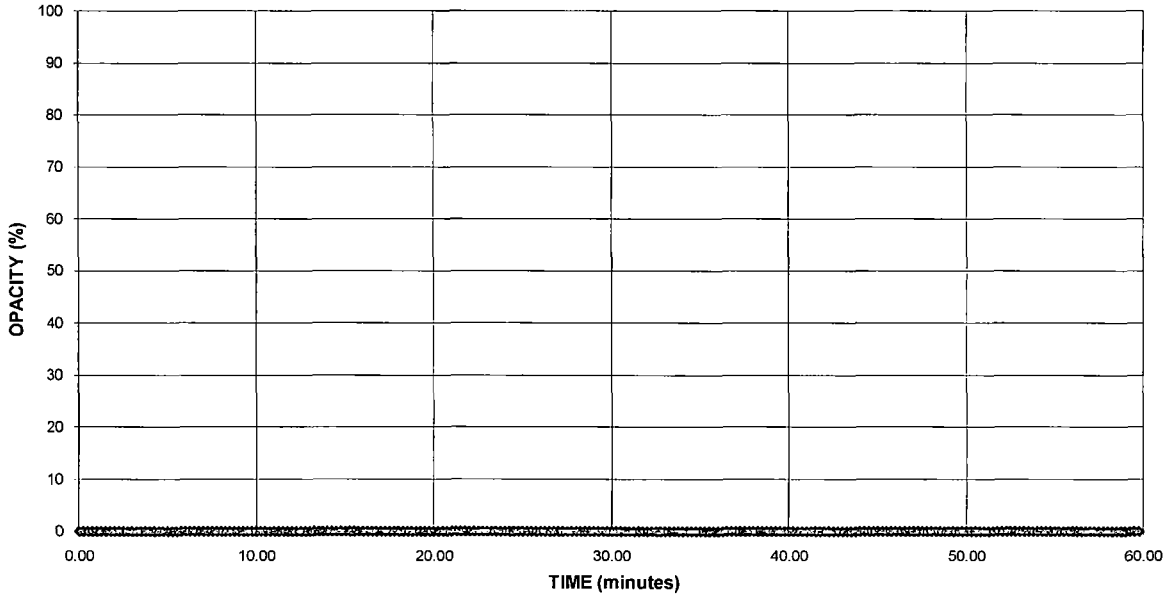
| | |
|---|---|
| **Company:** | Florida Power and Light |
| **Equipment:** | Mitsubishi 501G, Unit 1C base load w/DB |
| **Location:** | West County Energy Center |
| **Date:** | October 7, 2009 |
| **Project #:** | bv-09-westcounty.fl-comp#1 |

| | | |
|---|---|---|
| Run 3 | **Average Opacity:** | 0.00 % |
| | **Maximum Opacity:** | 0 % |
| | **6 Minute Average:** | 0.00 % |
| | **6 Minute Maximum:** | 0.00 % |
| | **Max Time w/ Opacity:** | 0.00 minutes |

**OPACITY READINGS**
**(15 second intervals)**




**OPACITY RESULTS**
**(6 minute averages)**



# VISUAL EMISSIONS OBSERVATION FORM

Method Used (Circle One): **Method 9** 203A 203B Other: _____

Company Name: Florida Power & Light
Facility Name: West County Energy Center
Street Address: 20505 State Road 80
City: Loxahatchee, State: Florida Zip: 33470

Process: Electricity Production Unit #: C Operating Mode: With Duct Burners
Control Equipment: Ammonia Injection Operating Mode: Normal

Describe Emissions Point: Southern stack of three

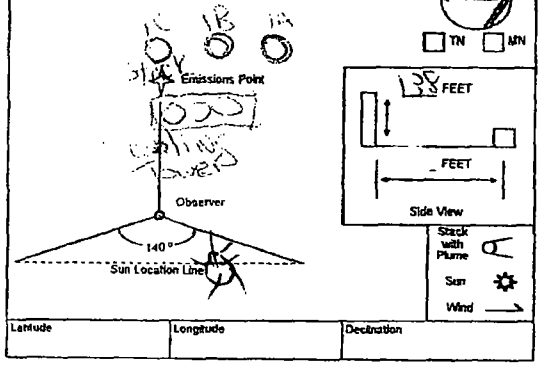
Height of Emiss. Pt. Start: 138 End: 138
Height of Emiss. Pt. Rel. to Observer Start: 132 End: 132
Distance to Emiss. Pt. Start: 2450 End: 2450
Direction to Emiss. Pt. (Degrees) Start: 28 End: 28

Vertical Angle to Obs. Pt Start: 16 End: 16
Direction to Obs. Pt. (Degrees) Start: 20 End: 20
Distance and Direction to Observation Point from Emission Point Start: 450SE End: 450SE

Describe Emissions
Start: N/V End: N/V
Emission Color Start: N/V End: N/V
Water Droplet Plume Start: None End: None

Describe Plume Background
Start: Blue Sky End: Blue Sky
Background Color Start: Blue End: Blue
Sky Conditions Start: Scattered End: Same
Wind Speed Start: 10-15 End: 10-15
Wind Direction Start: NE End: NE
Ambient Temp. Start: 97 End: 97
Wet Bulb Temp. RH Percent: 52

Source Layout Sketch




Latitude | Longitude | Declination

Additional Information

Form Number: Page 3 of 6
Continued on Form Number

Observation Date: 10/5/09 Time Zone: EST Start Time: 16:40 End Time: 17:10

| Min \ Sec | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Observer's Name (Print): David Grimes
Observer's Signature: [signature] Date: 10/5/09
Organization: Air Hygienic Inc.
Certified By: Eastern Technical Associates Date: 9/22/09

# VISUAL EMISSIONS OBSERVATION FORM

Method Used (Circle One): Method 9 | 203A | 203B | Other: _____

Company Name: Florida Power & Light
Facility Name: West County Energy Center
Street Address: 20505 State Road 80
City: Loxahatchee, State: Florida Zip: 33470

Process: Electricity Production Unit #: C Operating Mode: With Duct Burners
Control Equipment: Ammonia Injection Operating Mode: Normal

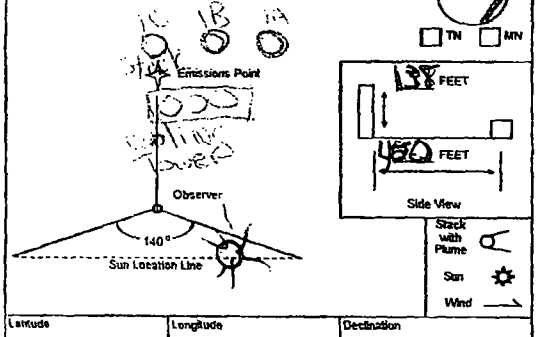
Describe Emissions Point: Southern stack of three
Height of Emiss. Pt. Start: 138 End: 138 Height of Emiss. Pt. Rel. to Observer Start: 132 End: 132
Distance to Emiss. Pt. Start: 450 End: 450 Direction to Emiss. Pt. (Degrees) Start: 28 End: 28

Vertical Angle to Obs. Pt Start: 16 End: 16 Direction to Obs. Pt. (Degrees) Start: 20 End: 20
Distance and Direction to Observation Point from Emission Point Start: 450 SE End: 450 SE

Describe Emissions Start: N/V End: N/V
Emission Color Start: N/V End: N/V Water Droplet Plume Start: None End: None

Describe Plume Background Start: Blue Sky End: Blue Sky
Background Color Start: Blue End: Blue Sky Conditions Start: Scattered End: Same
Wind Speed Start: 10-15 End: 10-15 Wind Direction Start: NE End: NE
Ambient Temp. Start: 97 End: 97 Wet Bulb Temp.: 52 RH Percent:

Source Layout Sketch




Latitude | Longitude | Declination

Additional Information

Form Number | Page 4 of 16
Continued on Form Number
Observation Date: 10/5/09 Time Zone: EST Start Time: 17:11 End Time: 17:31

| Min \ Sec | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Observer's Name (Print): Darin Grimes
Observer's Signature: _____ Date: 10/5/09
Organization: Air Assistant Inc.
Certified By: Eastern Technical Associates Date: 9/22/09

# VISUAL EMISSIONS OBSERVATION FORM

Method Used (Circle One): Method 9 | 203A | 203B | Other: _____

Company Name: Florida Power & Light
Facility Name: West County Energy Center
Street Address: 20505 State Road 80
City: Loxahatchee, State: Florida Zip: 33470

Process: Electricity Production Unit #: C Operating Mode: With Bypass Stack
Control Equipment: Ammonia Injection Operating Mode: Normal

Describe Emissions Point: Southern stack of three

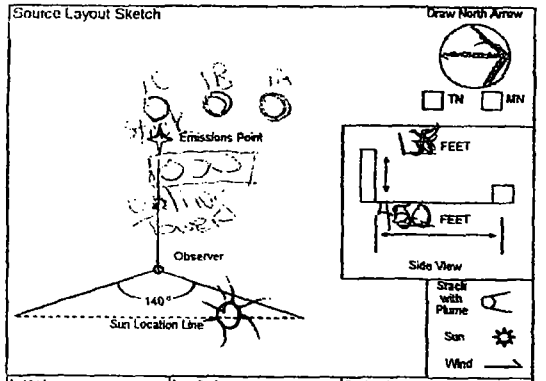
Height of Emiss. Pt. Start: 138 End: 138
Height of Emiss. Pt. Rel. to Observer Start: 132 End: 132
Distance to Emiss. Pt. Start: 450 End: 450
Direction to Emiss. Pt. (Degrees) Start: 38 End: 38

Vertical Angle to Obs. Pt. Start: 16 End: 16
Direction to Obs. Pt. (Degrees) Start: 28 End: 30
Distance and Direction to Observation Point from Emissions Point Start: 450 SE End: 450 SE

Describe Emissions Start: N/V End: N/V
Emission Color Start: N/V End: N/V
Water Droplet Plume Start: None End: None

Describe Plume Background Start: Blue Sky End: Blue Sky
Background Color Start: Blue End: Blue
Sky Conditions Start: Scattered End: Same
Wind Speed Start: 10-15 End: 10-15
Wind Direction Start: NE End: NE
Ambient Temp. Start: 98 End: 98
Wet Bulb Temp. RH Percent: 44

Source Layout Sketch




Latitude | Longitude | Declination

Additional Information

Form Number | Page 5 of 6
Continued on Form Number

Observation Date: 10/5/09 | Time Zone: EST | Start Time: 17:32 | End Time: 18:02

| Min \ Sec | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Observer's Name (Print): Darin Loomis
Observer's Signature: [signature] Date: 10/5/09
Organization: Air Hygiene Inc.
Certified By: Eastern Technical Associates Date: 9/22/09

# VISUAL EMISSIONS OBSERVATION FORM

Method Used (Circle One): Method 9 | 203A | 203B | Other: _____

Company Name: Florida Power & Light
Facility Name: West County Energy Center
Street Address: 20505 State Road 80
City: Loxahatchee, State: Florida Zip: 33470

Process: Electricity Production Unit #: C Operating Mode: With Backup Duct Burners
Control Equipment: Ammonia Injection Operating Mode: Normal

Describe Emissions Point: Southern stack of three

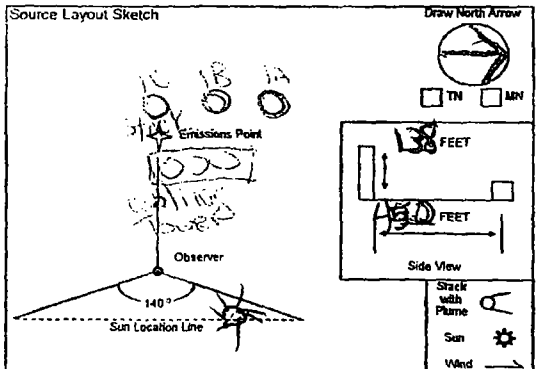
Height of Emiss. Pt. Start: 138 End: 138
Height of Emiss. Pt. Rel. to Observer Start: 132 End: 132
Distance to Emiss. Pt. Start: 450 End: 450
Direction to Emiss. Pt. (Degrees) Start: 28 End: 28

Vertical Angle to Obs. Pt. Start: 16 End: 16
Direction to Obs. Pt. (Degrees) Start: 20 End: 20
Distance and Dir. to Observation Point from Emission Point Start: 450.0 SE End: 450.0 SE

Describe Emissions Start: N/V End: N/V
Emission Color Start: N/V End: N/V
Water Droplet Plume Start: None End: None

Describe Plume Background Start: Blue Sky End: Blue Sky
Background Color Start: Blue End: Blue
Sky Conditions Start: Scattered End: Same
Wind Speed Start: 10-15 End: 10-15
Wind Direction Start: NE End: NE
Ambient Temp. Start: 98 End: 98
Wet Bulb Temp.
RH Percent: 44

Source Layout Sketch




Latitude | Longitude | Declination

Additional Information

Form Number | Page 6 of 16
Continued on Form Number

Observation Date: 10/5/09 | Time Zone: EST | Start Time: 18:03 | End Time: 19:33

| Min \ Sec | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Observer's Name (Print): Darin Cosmos
Observer's Signature: [signature] Date: 10/5/09
Organization: Air Hygiene Inc.
Certified By: Eastern Technical Associates 9/22/09

# VISUAL EMISSIONS OBSERVATION FORM

Method Used (Circle One): **Method 9** 203A 203B Other: _____

Company Name: [illegible] Power & Light

Facility Name: [illegible] Energy Center

Street Address: [illegible] State Rd 80

City: [illegible] State: Florida Zip: 3347[illegible]

Process: Electricity Production Unit #: 15 Operating Mode: Base Loads

Control Equipment: [illegible] Injection Operating Mode: Normal

Describe Emissions Point: Southern stack of three

Height of Emiss. Pt: Start 138 End 138 Height of Emiss. Pt. Rel. to Observer: Start 132 End 132

Distance to Emiss. Pt: Start 450 End 450 Direction to Emiss. Pt. (Degrees): Start 30 End 30

Vertical Angle to Obs. Pt: Start 16 End 16 Direction to Obs. Pt. (Degrees): Start 21 End 21

Distance and Direction to Observation Point from Emission Point: Start 450 SE End 450 SE

Describe Emissions: Start N/V End N/V

Emission Color: Start N/V End N/V Water Droplet Plume: Start None End None

Describe Plume Background: Start Blue Sky End Blue Sky

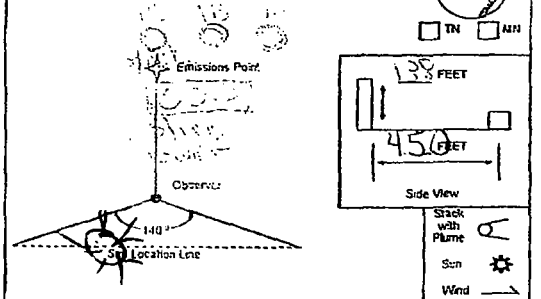
Background Color: Start Blue End Blue Sky Conditions: Start Sct. Haze End Same

Wind Speed: Start 10-15 End 10-15 Wind Direction: Start NE End NE

Ambient Temp.: Start 86 End 84 Wet Bulb Temp. RH Percent 38

Source Layout Sketch

Draw North Arrow ☐ TN ☐ MN




Latitude | Longitude | Declination

Additional Information

Form Number: _____ Page 1 of 2

Continued on Form Number: _____

Observation Date: 10/6/07 Time Zone: EST Start Time: 10:00 End Time: 10:30

| Sec \ Min | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Observer's Name (Print): [illegible]

Observer's Signature: [illegible] Date: 10/6/09

Organization: [illegible] Environmental Inc.

Certified By: [illegible] Associates Date: 9/22/09

Method Used (Circle One)
Method 9 203A 203B Other: _____

Company Name: [illegible] Power & Light
Facility Name: [illegible] Energy Center
Street Address: 5[illegible] State Rd 80
City: [illegible] Tree State: Florida Zip: 3247[illegible]

Process: [illegible] Production Unit #: 12 Operating Mode: With Bag Leaks
Control Equipment: [illegible] Injection Operating Mode: Normal

Describe Emissions Point: Southern stack of three

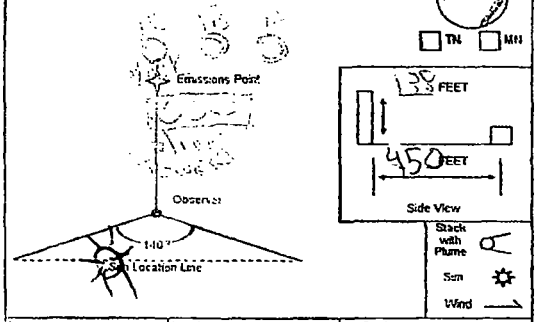
Height of Emiss. Pt. Start: 138 End: 138 Height of Emiss. Pt. Rel. to Observer Start: 132 End: 132
Distance to Emiss. Pt. Start: 450 End: 450 Direction to Emiss. Pt. (Degrees) Start: 30 End: 30

Vertical Angle to Obs. Pt. Start: 16 End: 16 Direction to Obs. Pt. (Degrees) Start: 21 End: 21
Distance and Direction to Observation Point from Emission Point Start: 450 SE End: 450 SE

Describe Emissions Start: N/V End: N/V
Emission Color Start: N/V End: N/V Water Droplet Plume Start: None End: None

Describe Plume Background Start: Blue Sky End: Blue Sky
Background Color Start: Blue End: Blue Sky Conditions Start: Sct. Haze End: Same
Wind Speed Start: 10-15 End: 10-15 Wind Direction Start: NE End: NE
Ambient Temp. Start: 86 End: 86 Wet Bulb Temp RH Percent: 88

Source Layout Sketch




Latitude | Longitude | Declination

Additional Information

# VISUAL EMISSIONS OBSERVATION FORM

Form Number: _____ Page 2 of 2
Continued on Form Number: _____

Observation Date: 10/6/09 Time Zone: EST Start Time: 10:31 End Time: 11:01

| Sec / Min | 0 | 15 | 30 | 45 | Comments |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | |
| 2 | 0 | 0 | 0 | 0 | |
| 3 | 0 | 0 | 0 | 0 | |
| 4 | 0 | 0 | 0 | 0 | |
| 5 | 0 | 0 | 0 | 0 | |
| 6 | 0 | 0 | 0 | 0 | |
| 7 | 0 | 0 | 0 | 0 | |
| 8 | 0 | 0 | 0 | 0 | |
| 9 | 0 | 0 | 0 | 0 | |
| 10 | 0 | 0 | 0 | 0 | |
| 11 | 0 | 0 | 0 | 0 | |
| 12 | 0 | 0 | 0 | 0 | |
| 13 | 0 | 0 | 0 | 0 | |
| 14 | 0 | 0 | 0 | 0 | |
| 15 | 0 | 0 | 0 | 0 | |
| 16 | 0 | 0 | 0 | 0 | |
| 17 | 0 | 0 | 0 | 0 | |
| 18 | 0 | 0 | 0 | 0 | |
| 19 | 0 | 0 | 0 | 0 | |
| 20 | 0 | 0 | 0 | 0 | |
| 21 | 0 | 0 | 0 | 0 | |
| 22 | 0 | 0 | 0 | 0 | |
| 23 | 0 | 0 | 0 | 0 | |
| 24 | 0 | 0 | 0 | 0 | |
| 25 | 0 | 0 | 0 | 0 | |
| 26 | 0 | 0 | 0 | 0 | |
| 27 | 0 | 0 | 0 | 0 | |
| 28 | 0 | 0 | 0 | 0 | |
| 29 | 0 | 0 | 0 | 0 | |
| 30 | 0 | 0 | 0 | 0 | |

Observer's Name (Print): [illegible]
Observer's Signature: [signature] Date: 10/6/09
Organization: [illegible] Environmental Services
Certified By: Eastern Technical Associates Date: 9/22/09

# CALCULATIONS

**EXAMPLE CALCULATIONS (FFACTOR)**

RM 19, (07-19-06),
2.0 Summary of Method,
2.1 Emission Rates. Oxygen ($O_2$) or carbon dioxide ($CO_2$) concentrations and appropriate F factors (ratios of combustion gas volumes to heat inputs) are used to calculate pollutant emission rates from pollutant concentrations.

Mark's Std Hdbk, 10th ed.,pg 4-26
**High Heat Value Dry** ($HHV_{dry}$), calc for Methane (single component for the fuel gas)

$$HHV_{dry}(Btu/SCF) = \left[\left(\frac{M_{\%}}{100}\right) \times GCM\right]$$

$HHV_{dry}$ = 96.84 % / 100.00 x 994.85 Btu/SCF = 963.40 Btu/SCF

Mark's Std Hdbk, 10th ed., pg 4-26
**Low Heat Value Dry** ($LHV_{dry}$), calc for Methane (single component for the fuel gas)

$$LHV_{dry}(Btu/SCF) = \left[\left(\frac{M_{\%}}{100}\right) \times NCM\right]$$

$LHV_{dry}$ = 96.84 % / 100.00 x 895.75 Btu/SCF = 867.44 Btu/SCF

RM 19, (07-19-06),
12.2 Emission Rates of PM, $SO_2$, and NOx. Select from the following sections the applicable procedure to compute the PM, $SO_2$, or NOx emission rate (E) in lb/MMBtu. The pollutant concentration must be in lb/scf and the F factor must be in scf/MMBtu. If the pollutant concentration (C) is not in the appropriate units, use Table 19–1 in Section 17.0 to make the proper conversion. An F factor is the ratio of the gas volume of the products of combustion to the heat content of the fuel. The dry F factor ($F_d$) includes all components of combustion less water, the wet F factor ($F_w$) includes all components of combustion, and the carbon F factor ($F_c$) includes only carbon dioxide.

Civil Eng. Ref. Man.,7th Ed.,pg 14-9/GPA Ref. Bulletin 181-86, App. C
**High Heat Value Wet** ($HHV_{wet}$), calc for entire sample (all components of the fuel gas)

$$HHV_{wet}(Btu/SCF) = \frac{HHV_{dry}}{W/D.factor}$$

$HHV_{wet}$ = 995.66 Btu/SCF / 1.0236 = 972.70 Btu/SCF

Civil Eng. Ref. Man.,7th Ed.,pg 14-9/GPA Ref. Bulletin 181-86, App. C
**Low Heat Value Wet** ($LHV_{wet}$), calc for entire sample (all components of the fuel gas)

$$LHV_{wet}(Btu/SCF) = \frac{LHV_{dry}}{W/D.factor}$$

$LHV_{wet}$ = 897.00 Btu/SCF / 1.0236 = 876.32 Btu/SCF

**Lbs Component per Lb-Mol of Gas** (CM), calc for Methane (single component for the fuel gas)

$$CM(lb/lb-mol) = \left[\left(\frac{M_{\%}}{100}\right) \times MW\right]$$

CM = 96.84 % / 100.00 x 16.04 lb/lb-mol = 15.54 lb/lb-mol

ASTM D 3588
**Fuel Molecular Weight** ($MW_{Fuel}$)

$$MW_{Fuel}(lb/lb \cdot mol) = \left[\sum(CM)\right]$$

$MW_{Fuel}$ = 15.54 lb/lb-mol
\+ 0.42 lb/lb-mol
\+ etc. = 16.645 lb/lb-mol

Btu per Lb of Gas Gross (**GCV**)

$$GCV(Btu/lb) = \left[\frac{HHV_{dry} \times G}{MW_{Fuel}}\right]$$

GCV = 995.66 Btu/SCF x 385.23 $ft^3$/lbmol / 16.645 lb/lb-mol = 23,043.75 Btu/lb

ASTM D 3588 (SG)
**Specific Gravity**

$$SG = \left[\frac{MW_{Fuel}}{MW_{AIR}}\right]$$

SG = 16.64 lb/lb-mol / 28.96 lb/lb-mol = 0.5747

Btu per Lb of Gas Net (**NCV**)

$$NCV(Btu/lb) = \left[\frac{LHV_{dry} \times G}{MW_{Fuel}}\right]$$

NCV = 897.00 Btu/SCF x 385.23 $ft^3$/lbmol / 16.645 lb/lb-mol = 20,760.39 Btu/lb

**Weight Percent** of Component ($C_{\%}$), methane

$$C_{\%}(\%) = \left[\left(\frac{CM}{MW_{Fuel}}\right) \times 100\right]$$

$C_{\%}$ = 15.54 lb/lb-mol / 16.64 lb/lb-mol x 100 = 93.34 %

RM 19, (07-19-06), **Weight Percent of Volatile Organic Compounds** ($VOC_{\%}$)

$$VOC_{\%}(\%) = \left[\sum_{C_3H_8}^{C_8H_{18}} M_{\%}\right]$$

$VOC_{\%}$ = 0.50 % + 0.10 % + 0.10 % + etc. = 0.83 %

RM 19, (07-19-06), 12.3.2 Determined **F Factors**. If the fuel burned is not listed in Table 19–2 or if the owner or operator chooses to determine an F factor rather than use the values in Table 19–2, use the procedure below: 12.3.2.1 Equations. Use the eq

RM 19, (07-19-6),
12.1 Nomenclature

| K (scf/lb)/% | |
|---|---|
| H | 3.64 |
| C | 1.53 |
| S | 0.57 |
| $N_2$ | 0.14 |
| $O_2$ | 0.46 |

$$F_d = \frac{K(K_{hd}\%H + K_c\%C + K_s\%S + K_n\%N - K_o\%O)}{GCV} \quad \text{Eq. 19-13}$$

$F_d$ = $\frac{10^6 Btu}{MMBtu}$ x [ 3.64 SCF/lb·% x 24.12 % + 1.53 SCF/lb·% x 73.19 % + 0.57 SCF/lb·% x 0.00 % + 0.14 SCF/lb·% x 1.10 % - 0.46 SCF/lb·% x 1.59 % ] x lb/23,043.75 Btu = 8,644.29 SCF/MMBtu

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

## EXAMPLE CALCULATIONS (INFORMATION)

**Specific Humidity ($RH_{sp}$)**

Note: RHsp (gr/lb) calculated using temperature, relative humidity, and barometric pressure with psychrometric chart, psychrometric calculator, or built in psychrometric algorithm.

$$RH_{sp}(lb/lb) = \left[\left(\frac{gr}{lb}\right) \times \frac{lb}{7000 gr}\right]$$

$$RH_{sp} = \frac{141.36\ gr}{lb} \times \frac{1\ lb}{7000\ gr} = 0.020195 \frac{lb\ H_2O}{lb\ Air}$$

**Fuel Flow Conversion ($Q_f$)**

Note: Qf(lb/min) is a value uptained from the source operator.

$$Q_f = \left[Q_f \times G \times \left(\frac{1}{MW_{Fuel}}\right)\right]$$

$$Q_f = \frac{1{,}798.50\ lb}{min} \times \frac{60\ min}{hr} \times \frac{385.23\ ft^3}{lb\text{-}mol} \times \frac{lb\text{-}mol}{16.64\ lb} = 2{,}497{,}491\ SCFH$$

**Combustor Inlet Pressure / Compressor Discharge Pressure (CIP / CDP)**
(corrected from gauge to atmospheric pres. and conv. to mm Hg.)

Note: CIP / CDP (psig) is a value obtained from the source operator.

$$CIP/CDP = \left[(psig + P) \times \frac{51.71493 mmHg}{1 psi}\right]$$

$$CIP/CDP = \left(262.6\ psig + 14.6757\right) \times \frac{51.71493\ mmHg}{1\ psia} = 14{,}340\ mmHg\ (abs)$$

## EXAMPLE CALCULATIONS (CALIBRATION)

**Analyzer Calibration Error**

RM 7E, (08-15-06), 12.2 Analyzer Calibration Error. For non-dilution systems, use Equation 7E-1 to calculate the analyzer calibration error for the low-, mid-, and high-level calibration gases. (calc for NOx analyzer mid gas, if applicable)

$$ACE = \left(\frac{C_{Dir} - C_V}{CS}\right) \times 100 \qquad \text{Eq. 7E-1}$$

$$ACE = \frac{5.11\ ppm - 4.99\ ppm}{12.10\ ppm} \times 100 = 0.99\ \%$$

**Calibration Error and Estimated Point, RM 25A, THC Analyzer**

RM 25A, (07-19-06), 8.4 Calibration Error Test. Immediately prior to the test series (within 2 hours of the start of the test), introduce zero gas and high-level calibration gas at the calibration valve assembly. Adjust the analyzer output to the appropriate levels, if necessary. Calculate the predicted response for the low-level and mid-level gases based on a linear response line between the zero and high-level response. Then introduce low-level and mid-level calibration gases successively to the measurement system. ... These differences must be less than 5 percent of the respective calibration gas value. (calc for THC analyzer mid gas, if applicable)

$$E_p = \frac{C_{Dir(H)} - C_{Dir(Z)}}{C_{V(H)} - C_{V(Z)}} \times C_{Dir(M)} + C_{Dir(Z)}$$

Eq. of a line
y=mx+b

$$E_p = \frac{8.40\ ppm - 0.09\ ppm}{8.40\ ppm - 0.00\ ppm} \times 4.94\ ppm + 0.09 = 4.98\ ppm$$

$$ACE = \left(\frac{C_{Dir} - C_V}{CS}\right) \times 100 \qquad \text{Eq. 7E-1}$$

$$ACE_{THC} = \frac{4.88\ ppm - 4.98\ ppm}{4.94\ ppm} \times 100 = -1.97\ \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

## EXAMPLE CALCULATIONS (BIAS, DRIFT, AND CORRECTED RAW AVERAGE)

### System Bias

RM 7E, (08-15-06), 12.3 System Bias. For non-dilution systems, use Equation 7E-2 to calculate the system bias separately for the low-level and upscale calibration gases. (calc for NOx analyzer upscale gas, Run 1 initial bias, if applicable)

$$SB = \left(\frac{C_S - C_{Dir}}{CS}\right) \times 100$$ Eq. 7E-2

SB = $\frac{4.92 \text{ ppm} - 5.11 \text{ ppm}}{12.10 \text{ ppm}}$ x 100 = -1.57 %

### Alternative Drift and Bias

RM 7E, (08-15-06), 13.2 / 13.3 System Bias and Drift. Alternatively, the results are acceptable if |Cs – Cdir| is ≤ 0.5 ppmv or if |Cs – Cv| is ≤ 0.5 ppmv (as applicable). (calc for NOx analyzer initial upscale, Run 1, if applicable)

$$SB / D_{Alt} = |C_S - C_{Dir}|$$ Eq. Section 13.2 and 13.3

SB / $D_{Alt}$ = | 4.92 ppm - 5.11 ppm | = 0.19 ppm

### Bias Adjusted Average

RM 7E, (08-15-06), 12.6 Effluent Gas Concentration. For each test run, calculate Cavg, the arithmetic average of all valid NOx concentration values (e.g., 1-minute averages). Then adjust the value of Cavg for bias, using Equation 7E-5. (calc for NOx analyzer, Run 1, if applicable)

$$C_{Gas} = (C_{Avg} - C_O) \times \left(\frac{C_{M1}}{C_M - C_O}\right)$$ Eq. 7E-5

$C_{Gas}$ = [ 2.30 ppm - 0.00 ppm ] x [ $\frac{4.99 \text{ ppm}}{4.88 \text{ ppm} - 0.00 \text{ ppm}}$ ] = 2.36 ppm

## EXAMPLE CALCULATIONS (RUNS)

### Stack Exhaust Flow ($Q_S$) - RM19

$$Q_S = \left(\frac{FFactor \times Q_f \times HHV}{1{,}000{,}000}\right) \times \left(\frac{20.9\%}{20.9\% - C_{Gas(O2)}}\right)$$

$Q_S$ = $\frac{8{,}644.29 \text{ SCF}}{\text{MMBtu}}$ x $\frac{2{,}497{,}490.52 \text{ SCF}}{\text{hr}}$ x $\frac{995.66 \text{ Btu}}{\text{SCF}}$

x $\frac{\text{MMBtu}}{10^6 \text{ Btu}}$ x [ $\frac{20.90\%}{20.9\% - 13.0\ \%}$ ] = 56,670,296.55 SCFH

### Diluent-Corrected Pollutant Concentration, $O_2$ Based

RM 20, (11-26-02), 7.3.1 Correction of Pollutant Concentration Using $O_2$ Concentration. Calculate the $O_2$ corrected pollutant concentration, as follows: (calc for NOx gas, Run 1, if applicable)

$$C_{adj} = C_{Gas(Target)} \times \left(\frac{20.9\% - AdjFactor}{20.9\% - C_{Gas(O2)}}\right)$$ Eq. 20-4

$C_{adj}$ = 2.36 ppm x [ $\frac{20.9\% - 15.00\ \%}{20.9\% - 12.97\ \%}$ ] = 1.75 ppm@15%$O_2$

### Diluent-Corrected Polutant Concentration Corrected to ISO Conditions

40CFR60.335(b)(1), Conversion for conc. at ISO Conditions (68°F, 1 atm). Calculate, as follows: (calc for NOx@15% with Run 1 data, if applicable)

$$C_{ISO} = C_{Adj} \times \sqrt{\frac{P_r}{P_a}} \times e^{(19 \times (H_a - 0.00633))} \times \left(\frac{288}{T_a}\right)^{1.53}$$

$C_{ISO}$ = 1.75 ppm@15%$O_2$ x $\left(\sqrt{\frac{262.6 \text{ psig} + 14.69232 \text{ psi}}{0.01933677 \text{ psi/mm Hg.}}} \Big/ \sqrt{\frac{262.6 \text{ psig} + 14.6757 \text{ psi}}{0.01933677 \text{ psi/mm Hg.}}}\right)$ x $2.718^{(19 \times (0.020195 \text{ lb/lb} - 0.00633))}$ x $\left(\frac{288 \text{ K}}{306 \text{ K}}\right)^{1.53}$ = 2.08 ppm@15% and ISO

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

**EXAMPLE CALCULATIONS (RUNS)**

**Emissions Rate (lb/hr)**

Calculation for pound per hour emission rate. Calculate, as follows: (calc for NOx gas Run 1, if applicable)

$$E_{lb/hr} = \frac{C_{Gas}}{10^6} \times \frac{Q_S \times MW}{G}$$

$$E_{lb/hr} = \frac{2.36 \text{ ppm}}{10^6 \text{ ppm/part}} \times \frac{56{,}670{,}297 \text{ SCFH} \times 46.01 \text{ lb/lb-mol}}{385.23 \text{ SCF/lb-mol}} = \frac{15.96 \text{ lb}}{\text{hr}}$$

**Emissions Rate (ton/year)**

Calculation for tons per year emission rate based on 8760 hours per year. Calculate, as follows: (calc for NOx gas Run 1, if applicable)

$$E_{ton/yr} = \frac{E_{lb/hr} \times hr_{year}}{2000}$$

$$E_{ton/yr} = \frac{15.96 \text{ lb}}{\text{hr}} \times \frac{8{,}760 \text{ hr}}{\text{year}} \times \frac{\text{ton}}{2000 \text{ lb}} = \frac{69.89 \text{ ton}}{\text{year}}$$

**Emissions Rate (lb/MMBtu)**

RM 19, (07-19-06), 12.2 Emission Rates of PM, $SO_2$, and NOx. Select from the following sections the applicable procedure to compute the PM, $SO_2$, or NOx emission rate (E) in ng/J (lb/million Btu). (calc for NOx gas Run 1, if applicable)

**Oxygen Based**

12.2.1 Oxygen-Based F Factor, Dry Basis. When measurements are on a dry basis for both $O_2$ ($\%O_2d$) and pollutant (Cd) concentrations, use the following equation:

$$E_{lb/MMBtu} = \frac{C_{Gas} \times F_d Factor \times Conv_C \times 20.9\%}{20.9\% - C_{Gas(O2)}} \qquad \text{Eq. 19-1}$$

$$E_{lb/MMBtu} = \frac{2.36 \text{ ppm} \times 8{,}644.29 \text{ SCF/MMBtu} \times 0.0000001194 \text{ lb/ppm*ft}^3 \times 20.9\%}{20.9\% - 12.97 \%} = \frac{0.006 \text{ lb}}{\text{MMBtu}}$$

**Conversion Constant**

Convc for NOx

$$Conv_c(lb/ppm \cdot ft^3) = \frac{\frac{MW}{G}}{10^6}$$

$$Conv_c = \frac{\frac{46.01 \text{ lb}}{\text{lb•mole}} \times \frac{\text{lb•mole}}{385.23 \text{ SCF}}}{10^6} = \frac{0.0000001194 \text{ lb}}{\text{ppm-ft}^3}$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

**RM 7E, (08-15-06), 12.1 Nomenclature. The terms used in the equations are defined as follows:**

ACE = Analyzer calibration error, percent of calibration span.
$B_{WS}$ = Moisture content of sample gas as measured by Method 4 or other approved method, percent/100.
$C_{Avg}$ = Average unadjusted gas concentration indicated by data recorder for the test run.
$C_D$ = Pollutant concentration adjusted to dry conditions.
$C_{Dir}$ = Measured concentration of a calibration gas (low, mid, or high) when introduced in direct calibration mode.
$C_{Gas}$ = Average effluent gas concentration adjusted for bias.
$C_M$ = Average of initial and final system calibration bias (or 2-point system calibration error) check responses for the upscale calibration gas.
$C_{MA}$ = Actual concentration of the upscale calibration gas, ppmv.
$C_O$ = Average of the initial and final system calibration bias (or 2-point system calibration error) check responses from the low-level (or zero) calibration gas.
$C_S$ = Measured concentration of a calibration gas (low, mid, or high) when introduced in system calibration mode.
$C_{SS}$ = Concentration of NOx measured in the spiked sample.
$C_{Spike}$ = Concentration of NOx in the undiluted spike gas.
$C_{Calc}$ = Calculated concentration of NOx in the spike gas diluted in the sample.
$C_V$ = Manufacturer certified concentration of a calibration gas (low, mid, or high).
$C_W$ = Pollutant concentration measured under moist sample conditions, wet basis.
CS = Calibration span.
D = Drift assessment, percent of calibration span.
$E_p$ = The predicted response for the low-level and mid-level gases based on a linear response line between the zero and high-level response.
$Eff_{NO2}$ = $NO_2$ to NO converter efficiency, percent.
H = High calibration gas, designator.
L = Low calibration gas, designator.
M = Mid calibration gas, designator.
NOFinal = The average NO concentration observed with the analyzer in the NO mode during the converter efficiency test in Section 16.2.2.
NOxCorr = The NOx concentration corrected for the converter efficiency.
NOxFinal = The final NOx concentration observed during the converter efficiency test in Section 16.2.2.
NOxPeak = The highest NOx concentration observed during the converter efficiency test in Section 16.2.2.
$Q_{Spike}$ = Flow rate of spike gas introduced in system calibration mode, L/min.
$Q_{Total}$ = Total sample flow rate during the spike test, L/min.
R = Spike recovery, percent.
SB = System bias, percent of calibration span.
$SB_i$ = Pre-run system bias, percent of calibration span.
$SB_f$ = Post-run system bias, percent of calibration span.
SB / $D_{Alt}$ = Alternative absolute difference criteria to pass bias and/or drift checks.
SCE = System calibration error, percent of calibration span.
$SCE_i$ = Pre-run system calibration error, percent of calibration span.
$SCE_{final}$ = Post-run system calibration error, percent of calibration span.
Z = Zero calibration gas, designator.

**40CFR60.355(b)(1), (09-20-06), Nomenclature. The terms used in the equations are defined as follows:**

$P_r$ = reference combustor inlet absolute pressure at 101.3 kilopascals ambient pressure, mm Hg
$P_o$ = observed combustor inlet absolute pressure at test, mm Hg
$H_o$ = observed humidity of ambient air, g $H_2O$/g air
e = transcendental constant, 2.718
$T_a$ = ambient temperature, K

**RM 19, (07-29-06), 12.1 Nomenclature. The terms used in the equations are defined as follows:**

AdjFactor = Percent oxygen or carbon dioxide adjustment applied to a target pollutant
$B_{ws}$ = Moisture fraction of ambient air, percent.
Btu = British thermal unit
$\%_C$ = Concentration of carbon from an ultimate analysis of fuel, weight percent.
$\%_{CO2d}$, $\%_{CO2w}$ = Concentration of carbon dioxide on a dry and wet basis, respectively, percent.
CIP / CDP = Combustor inlet pressure / compressor discharge pressure (mm Hg); note, some manufactures reference as PCD.
E = Pollutant emission rate, ng/J (lb/million Btu).
$E_a$ = Average pollutant rate for the specified performance test period, ng/J (lb/million Btu).
$E_{ao}$, $E_{ai}$ = Average pollutant rate of the control device, outlet and inlet, respectively, for the performance test period, ng/J (lb/million Btu).
$E_{bi}$ = Pollutant rate from the steam generating unit, ng/J (lb/million Btu).
$E_{bo}$ = Pollutant emission rate from the steam generating unit, ng/J (lb/million Btu).
$E_{ci}$ = Pollutant rate in combined effluent, ng/J (lb/million Btu).
$E_{co}$ = Pollutant emission rate in combined effluent, ng/J (lb/million Btu).
$E_d$ = Average pollutant rate for each sampling period (e.g.,24-hr Method 6B sample or 24-hr fuel sample) or for each fuel lot (e.g., amount of fuel bunkered), ng/J (lb/million Btu).
$E_{di}$ = Average inlet $SO_2$ rate for each sampling period d, ng/J (lb/million Btu).
$E_{gi}$ = Pollutant rate from gas turbine, ng/J (lb/million Btu).
$E_{ga}$ = Daily geometric average pollutant rate, ng/J (lbs/million Btu) or ppm corrected to 7 percent $O_2$.
$E_{jo}$,$E_{ji}$ = Matched pair hourly arithmetic average pollutant rate, outlet and inlet, respectively, ng/J (lb/million Btu) or ppm corrected to 7 percent $O_2$.
$E_h$ = Hourly average pollutant, ng/J (lb/million Btu).
$E_{hj}$ = Hourly arithmetic average pollutant rate for hour "j," ng/J (lb/million Btu) or ppm corrected to 7 percent $O_2$.
EXP = Natural logarithmic base (2.718) raised to the value enclosed by brackets.
Fc = Ratio of the volume of carbon dioxide produced to the gross calorific value of the fuel from Method 19
$F_d$, $F_w$, $F_c$ = Volumes of combustion components per unit of heat content, scm/J (scf/million Btu).
$ft^3$ = cubic feet
G = ideal gas conversion factor
(385.23 SCF/lb-mol at 68 deg F & 14.696 psia)
GCM = gross Btu per SCF (constant, compound based)
GCV = Gross calorific value of the fuel consistent with the ultimate analysis, kJ/kg (Btu/lb).
$GCV_p$, $GCV_r$ = Gross calorific value for the product and raw fuel lots, respectively, dry basis, kJ/kg (Btu/lb).
$\%_H$ = Concentration of hydrogen from an ultimate analysis of fuel, weight percent.
$H_b$ = Heat input rate to the steam generating unit from fuels fired in the steam generating unit, J/hr (million Btu/hr).
$H_g$ = Heat input rate to gas turbine from all fuels fired in the gas turbine, J/hr (million Btu/hr).
$\%_{H2O}$ = Concentration of water from an ultimate analysis of fuel, weight percent.
$H_r$ = Total numbers of hours in the performance test period (e.g., 720 hours for 30-day performance test period).
K = volume of combustion component per pound of component (constant)
K = Conversion factor, $10^{-5}$ (kJ/J)/(%) [$10^6$ Btu/million Btu].
$K_c$ = (9.57 scm/kg)/% [(1.53 scf/lb)/%].
$K_{cc}$ = (2.0 scm/kg)/% [(0.321 scf/lb)/%].
$K_{hd}$ = (22.7 scm/kg)/% [(3.64 scf/lb)/%].
$K_{hw}$ = (34.74 scm/kg)/% [(5.57 scf/lb)/%].
$K_n$ = (0.86 scm/kg)/% [(0.14 scf/lb)/%].
$K_o$ = (2.85 scm/kg)/% [(0.46 scf/lb)/%].
$K_s$ = (3.54 scm/kg)/% [(0.57 scf/lb)/%].
$K_{sulfur}$ = $2x10^4$ Btu/wt%-MMBtu
$K_w$ = (1.30 scm/kg)/% [(0.21 scf/lb)/%].
lb = pound
ln = Natural log of indicated value.
$L_p$,$L_r$ = Weight of the product and raw fuel lots, respectively, metric ton (ton).
$\%_N$ = Concentration of nitrogen from an ultimate analysis of fuel, weight percent.
$M_{\%}$ = mole percent
mol = mole
MW = molecular weight (lb/lb-mol)
$MW_{AIR}$ = molecular weight of air ( 28.9625 lb/lb-mole)[1]
NCM = net Btu per SCF (constant based on compound)
$\%_O$ = Concentration of oxygen from an ultimate analysis of fuel, weight percent.
$\%_{O2d}$, $\%_{O2w}$ = Concentration of oxygen on a dry and wet basis, respectively, percent.
$P_B$ = barometirc pressure, in Hg
$P_s$ = Potential SO2 emissions, percent.
$\%_S$ = Sulfur content of as-fired fuel lot, dry basis, weight percent.
$S_a$ = Standard deviation of the hourly average pollutant rates for each performance test period, ng/J (lb/million Btu).
$\%_{Sf}$ = Concentration of sulfur from an ultimate analysis of fuel, weight percent.
S(wt%) = weight percent of sulfur, per lab analysis by appropriate ASTM standard
$S_i$ = Standard deviation of the hourly average inlet pollutant rates for each performance test period, ng/J (lb/million Btu).
$S_o$ = Standard deviation of the hourly average emission rates for each performance test period, ng/J (lb/million Btu).
$\%S_p$, $\%S_r$ = Sulfur content of the product and raw fuel lots respectively, dry basis, weight percent.
SCF = standard cubic feet
SH = specific humidity, pounds of water per pound of air
$t_{0.95}$ = Values shown in Table 19-3 for the indicated number of data points n.
$T_{amb}$ = ambient temperature, °F
W/D Factor = 1.0236 = conv. at 14.696 psia and
68 deg F (ref. Civil Eng. Ref. Manual, 7th Ed.)
$X_{CO2}$=$CO_2$ Correction factor, percent.
$X_k$ = Fraction of total heat input from each type of fuel k.

# Calculations, Formulas, and Constants

The following information supports the spreadsheets for this testing project.

## Given Data:

Ideal Gas Conversion Factor = 385.23 SCF/lb-mol at 68 deg F & 14.696 psia

Fuel Heating Value is based upon Air Hygiene's fuel gas calculation sheet. All calculations are based upon a correction to 68 deg F & 14.696 psia

High Heating Values (HHV) are used for the Fuel Heating Value, F-Factor, and Fuel Flow Data per EPA requirements.

**ASTM D 3588**

Molecular Weight of NOx (lb/lb-mole) = 46.01
Molecular Weight of CO (lb/lb-mole) = 28.00
Molecular Weight of $SO_2$ (lb/lb-mole) = 64.00
Molecular Weight of THC (propane) (lb/lb-mole) = 44.00
Molecular Weight of VOC (methane) (lb/lb-mole) = 16.00
Molecular Weight of $NH_3$ (lb/lb-mole) = 17.03
Molecular Weight of HCHO (lb/lb-mole) = 30.03

**40CFR60, App. A., RM 19, Table 19-1**

Conversion Constant for NOx = 0.0000001194351
Conversion Constant for CO = 0.0000000726839
Conversion Constant for $SO_2$ = 0.0000001661345
Conversion Constant for THC = 0.0000001142175
Conversion Constant for VOC (methane) = 0.0000000415336
Conversion Constant for $NH_3$ = 0.0000000442074
Conversion Constant for HCHO = 0.0000000779534

NOTE: units are lb/ppm*ft$^3$

## Formulas:

1. Corrected Raw Average ($C_{Gas}$), 40CFR60, App. A, RM 7E, Eq. 7E-5 (08/15/06)

$$C_{Gas} = (C_{Avg} - C_O) \times \left( \frac{C_{MA}}{C_M - C_O} \right)$$

2. Correction to % $O_2$, 40CFR60, App. A, RM 20, Eq. 20-5 (11/26/02)

$$C_{adj} = C_{Gas(Target)} \times \left( \frac{20.9\% - AdjFactor}{20.9\% - C_{Gas(O2)}} \right)$$

3. Correction to % $O_2$ and ISO Conditions

$$C_{ISO} = C_{Adj} \times \sqrt{\frac{P_r}{P_o}} \times e^{(19 \times (H_O - 0.00633))} \times \left( \frac{288}{T_a} \right)^{1.53}$$

4. Method 19 stack exhaust flow (scfh)

$$Q_S = \left( \frac{FFactor \times Q_f \times HHV}{1{,}000{,}000} \right) \times \left( \frac{20.9\%}{20.9\% - C_{Gas(O2)}} \right)$$

5. Emission Rate in lb/hr

$$E_{lb/hr} = \frac{C_{Gas}}{10^6} \times \frac{Q_S \times MW}{G}$$

6. Emission Rate in tons per year

$$E_{ton/yr} = \frac{E_{lb/hr} \times hr_{year}}{2000}$$

7. Emission Concentration in lb/MMBtu ($O_2$ based)

$$E_{lb/MMBtu} = \frac{C_{Gas} \times F_d Factor \times Conv_C \times 20.9\%}{20.9\% - C_{Gas(O2)}}$$

8. Emission Concentration in g/hp*hr

$$E_{g/hp \cdot hr} = \frac{E_{lb/hr} \times 453.6}{mw \times 1314.022} \; or \; \frac{E_{lb/hr} \times 453.6}{hp}$$

# APPENDIX B

# UNIT OPERATION PARAMETERS

# Florida Power and Light

| | |
|---|---|
| **Air Permit # :** | PSD-FL-354 |
| **Plant Name or Location:** | West County Energy Center |
| **Date:** | October 5-6, 2009 |
| **Project Number:** | bv-09-westcounty.fl-comp#1 |
| **Manufacturer & Equipment:** | Mitsubishi |
| **Model:** | 501G |
| **Unit Number:** | 1C |
| **Test Load:** | Base with and without Duct Burners |
| **Tester(s) / Test Unit(s):** | JRF/TP 210 |

| | | RUN | | | | | |
|---|---|---|---|---|---|---|---|
| | **UNITS** | **1-1** | **1-2** | **1-3** | **2-1** | **2-2** | **2-3** |
| **Start Time** | hh:mm:ss | 10:00:15 | 11:55:15 | 13:30:15 | 17:51:15 | 19:05:15 | 09:57:28 |
| **End Time** | hh:mm:ss | 10:59:45 | 12:54:45 | 14:29:45 | 18:50:45 | 20:04:45 | 10:56:58 |
| **Bar. Pressure** | in. Hg | 29.88 | 29.91 | 29.88 | 29.80 | 29.83 | 29.88 |
| **Amb. Temp.** | °F | 91 | 97 | 98 | 93 | 87 | 86 |
| **Rel. Humidity** | % | 64 | 52 | 44 | 52 | 74 | 88 |
| **Spec. Humidity** | lb water / lb air | 0.020195 | 0.019710 | 0.017141 | 0.017433 | 0.020635 | 0.023849 |
| **Date** | mm/dd/yy | 10/05/09 | 10/05/09 | 10/05/09 | 10/05/09 | 10/05/09 | 10/06/09 |
| **Load Designator** | | Base w/o DB | Base w/o DB | Base w/o DB | Base w/DB | Base w/DB | Base w/DB |
| **Comb. Inlet Pres.** | psig | 262.6 | 260.4 | 259.0 | 264.4 | 265.2 | 266.0 |
| **Turbine Fuel Flow** | lb/min | 1,799 | 1,779 | 1,771 | 1,614 | 1,624 | 1,638 |
| **Duct Burner Fuel Flow** | lb/min | 0 | 0 | 0 | 198 | 198 | 192 |
| **Total Fuel Flow** | SCFH | 2,497,491 | 2,470,180 | 2,459,303 | 2,516,237 | 2,530,124 | 2,541,002 |
| **Stack Moisture** | % Method 4 | 11.0 | 10.2 | 8.7 | 11.6 | 11.3 | 11.0 |
| **Power Output** | megawatts | 244.1 | 240.8 | 238.9 | 247.3 | 248.2 | 248.9 |

# UNIT OPERATION PARAMETERS

## Base Load

| | Combustor Inlet Pressure C | CT C Gas Flow | DB C Gas Flow | CT C Load |
|---|---|---|---|---|
| | psig | KPPH | KPPH | MW |
| 05-Oct-09 10:00:15 | 263.24 | 108.21 | 0.00 | 244.90 |
| 05-Oct-09 10:01:15 | 263.09 | 108.21 | 0.00 | 244.67 |
| 05-Oct-09 10:02:15 | 263.18 | 109.87 | 0.00 | 245.48 |
| 05-Oct-09 10:03:15 | 263.10 | 108.24 | 0.00 | 245.29 |
| 05-Oct-09 10:04:15 | 262.85 | 108.09 | 0.00 | 244.30 |
| 05-Oct-09 10:05:15 | 262.94 | 107.54 | 0.00 | 243.91 |
| 05-Oct-09 10:06:15 | 263.07 | 108.04 | 0.00 | 244.71 |
| 05-Oct-09 10:07:15 | 262.94 | 107.96 | 0.00 | 244.54 |
| 05-Oct-09 10:08:15 | 262.89 | 111.49 | 0.00 | 244.73 |
| 05-Oct-09 10:09:15 | 262.98 | 109.49 | 0.00 | 245.05 |
| 05-Oct-09 10:10:15 | 263.04 | 106.44 | 0.00 | 244.61 |
| 05-Oct-09 10:11:15 | 262.86 | 108.37 | 0.00 | 244.54 |
| 05-Oct-09 10:12:15 | 262.95 | 107.27 | 0.00 | 244.62 |
| 05-Oct-09 10:13:15 | 263.03 | 108.56 | 0.00 | 244.85 |
| 05-Oct-09 10:14:15 | 262.92 | 107.92 | 0.00 | 244.43 |
| 05-Oct-09 10:15:15 | 263.03 | 105.37 | 0.00 | 244.35 |
| 05-Oct-09 10:16:15 | 263.11 | 104.45 | 0.00 | 244.22 |
| 05-Oct-09 10:17:15 | 263.14 | 108.74 | 0.00 | 245.01 |
| 05-Oct-09 10:18:15 | 263.24 | 108.97 | 0.00 | 244.98 |
| 05-Oct-09 10:19:15 | 263.06 | 108.10 | 0.00 | 244.72 |
| 05-Oct-09 10:20:15 | 263.04 | 108.47 | 0.00 | 244.90 |
| 05-Oct-09 10:21:15 | 263.00 | 110.30 | 0.00 | 245.16 |
| 05-Oct-09 10:22:15 | 262.86 | 109.53 | 0.00 | 244.22 |
| 05-Oct-09 10:23:15 | 262.94 | 108.02 | 0.00 | 244.59 |
| 05-Oct-09 10:24:15 | 263.07 | 108.07 | 0.00 | 244.50 |
| 05-Oct-09 10:25:15 | 262.88 | 107.89 | 0.00 | 244.87 |
| 05-Oct-09 10:26:15 | 262.87 | 108.17 | 0.00 | 244.72 |
| 05-Oct-09 10:27:15 | 262.73 | 109.49 | 0.00 | 244.49 |
| 05-Oct-09 10:28:15 | 262.61 | 108.48 | 0.00 | 244.47 |
| 05-Oct-09 10:29:15 | 262.66 | 107.72 | 0.00 | 244.32 |
| 05-Oct-09 10:30:15 | 262.75 | 106.75 | 0.00 | 244.01 |
| 05-Oct-09 10:31:15 | 262.74 | 107.66 | 0.00 | 243.98 |
| 05-Oct-09 10:32:15 | 262.78 | 103.56 | 0.00 | 244.36 |
| 05-Oct-09 10:33:15 | 262.74 | 107.62 | 0.00 | 244.40 |
| 05-Oct-09 10:34:15 | 262.46 | 106.84 | 0.00 | 244.06 |
| 05-Oct-09 10:35:15 | 262.25 | 107.78 | 0.00 | 243.78 |
| 05-Oct-09 10:36:15 | 262.32 | 106.46 | 0.00 | 243.77 |
| 05-Oct-09 10:37:15 | 262.28 | 108.49 | 0.00 | 243.64 |
| 05-Oct-09 10:38:15 | 262.42 | 108.23 | 0.00 | 243.63 |
| 05-Oct-09 10:39:15 | 262.31 | 107.84 | 0.00 | 243.86 |
| 05-Oct-09 10:40:15 | 262.33 | 107.78 | 0.00 | 243.65 |
| 05-Oct-09 10:41:15 | 262.34 | 107.37 | 0.00 | 243.56 |
| 05-Oct-09 10:42:15 | 262.17 | 108.38 | 0.00 | 243.82 |
| 05-Oct-09 10:43:15 | 262.24 | 106.44 | 0.00 | 243.88 |
| 05-Oct-09 10:44:15 | 262.09 | 107.97 | 0.00 | 243.31 |
| 05-Oct-09 10:45:15 | 262.18 | 107.89 | 0.00 | 243.63 |
| 05-Oct-09 10:46:15 | 261.94 | 108.43 | 0.00 | 243.57 |
| 05-Oct-09 10:47:15 | 262.07 | 107.44 | 0.00 | 243.20 |
| 05-Oct-09 10:48:15 | 262.18 | 108.92 | 0.00 | 243.44 |
| 05-Oct-09 10:49:15 | 262.24 | 107.44 | 0.00 | 243.58 |
| 05-Oct-09 10:50:15 | 262.32 | 107.66 | 0.00 | 243.36 |
| 05-Oct-09 10:51:15 | 262.22 | 107.85 | 0.00 | 243.26 |
| 05-Oct-09 10:52:15 | 262.16 | 107.02 | 0.00 | 243.61 |
| 05-Oct-09 10:53:15 | 262.13 | 108.36 | 0.00 | 243.69 |
| 05-Oct-09 10:54:15 | 262.03 | 107.98 | 0.00 | 243.25 |
| 05-Oct-09 10:55:15 | 261.87 | 108.05 | 0.00 | 243.08 |
| 05-Oct-09 10:56:15 | 261.85 | 107.76 | 0.00 | 242.82 |
| 05-Oct-09 10:57:15 | 261.99 | 107.71 | 0.00 | 243.06 |
| 05-Oct-09 10:58:15 | 261.93 | 107.91 | 0.00 | 243.18 |
| 05-Oct-09 10:59:15 | 261.66 | 107.82 | 0.00 | 242.82 |
| Average | 262.61 | 107.91 | 0.00 | 244.12 |

| | Combustor Inlet Pressure C | CT C Gas Flow | DB C Gas Flow | CT C Load |
|---|---|---|---|---|
| | psig | KPPH | KPPH | MW |
| 05-Oct-09 11:55:15 | 260.68 | 106.62 | 0.00 | 241.06 |
| 05-Oct-09 11:56:15 | 260.70 | 106.80 | 0.00 | 241.34 |
| 05-Oct-09 11:57:15 | 260.91 | 107.51 | 0.00 | 241.37 |
| 05-Oct-09 11:58:15 | 260.90 | 106.87 | 0.00 | 241.85 |
| 05-Oct-09 11:59:15 | 260.64 | 106.50 | 0.00 | 241.27 |
| 05-Oct-09 12:00:15 | 260.33 | 106.73 | 0.00 | 240.79 |
| 05-Oct-09 12:01:15 | 260.35 | 106.30 | 0.00 | 240.63 |
| 05-Oct-09 12:02:15 | 260.58 | 106.67 | 0.00 | 241.25 |
| 05-Oct-09 12:03:15 | 260.48 | 106.68 | 0.00 | 240.97 |
| 05-Oct-09 12:04:15 | 260.57 | 106.14 | 0.00 | 240.97 |
| 05-Oct-09 12:05:15 | 260.65 | 106.04 | 0.00 | 241.31 |
| 05-Oct-09 12:06:15 | 260.83 | 106.89 | 0.00 | 241.55 |
| 05-Oct-09 12:07:15 | 260.82 | 106.84 | 0.00 | 241.85 |
| 05-Oct-09 12:08:15 | 260.66 | 106.84 | 0.00 | 241.52 |
| 05-Oct-09 12:09:15 | 260.66 | 106.66 | 0.00 | 241.35 |
| 05-Oct-09 12:10:15 | 260.60 | 106.88 | 0.00 | 241.37 |
| 05-Oct-09 12:11:15 | 260.57 | 106.87 | 0.00 | 241.26 |
| 05-Oct-09 12:12:15 | 260.67 | 106.95 | 0.00 | 240.95 |
| 05-Oct-09 12:13:15 | 260.70 | 107.19 | 0.00 | 241.47 |
| 05-Oct-09 12:14:15 | 260.74 | 107.22 | 0.00 | 240.98 |
| 05-Oct-09 12:15:15 | 260.56 | 107.22 | 0.00 | 241.40 |
| 05-Oct-09 12:16:15 | 260.32 | 106.95 | 0.00 | 240.96 |
| 05-Oct-09 12:17:15 | 260.50 | 106.81 | 0.00 | 240.47 |
| 05-Oct-09 12:18:15 | 260.65 | 106.58 | 0.00 | 241.09 |
| 05-Oct-09 12:19:15 | 260.79 | 106.73 | 0.00 | 241.05 |
| 05-Oct-09 12:20:15 | 260.56 | 106.20 | 0.00 | 240.94 |
| 05-Oct-09 12:21:15 | 260.38 | 106.74 | 0.00 | 240.82 |
| 05-Oct-09 12:22:15 | 260.34 | 107.15 | 0.00 | 240.71 |
| 05-Oct-09 12:23:15 | 260.30 | 107.28 | 0.00 | 240.83 |
| 05-Oct-09 12:24:15 | 260.42 | 106.86 | 0.00 | 240.60 |
| 05-Oct-09 12:25:15 | 260.58 | 106.52 | 0.00 | 240.60 |
| 05-Oct-09 12:26:15 | 260.74 | 107.10 | 0.00 | 241.43 |
| 05-Oct-09 12:27:15 | 260.47 | 107.01 | 0.00 | 240.94 |
| 05-Oct-09 12:28:15 | 260.47 | 106.60 | 0.00 | 240.69 |
| 05-Oct-09 12:29:15 | 260.58 | 106.71 | 0.00 | 240.87 |
| 05-Oct-09 12:30:15 | 260.33 | 106.53 | 0.00 | 241.25 |
| 05-Oct-09 12:31:15 | 260.47 | 106.34 | 0.00 | 240.70 |
| 05-Oct-09 12:32:15 | 260.47 | 106.76 | 0.00 | 240.88 |
| 05-Oct-09 12:33:15 | 260.46 | 107.16 | 0.00 | 241.28 |
| 05-Oct-09 12:34:15 | 260.20 | 106.99 | 0.00 | 240.58 |
| 05-Oct-09 12:35:15 | 259.99 | 107.23 | 0.00 | 240.36 |
| 05-Oct-09 12:36:15 | 260.08 | 106.64 | 0.00 | 240.45 |
| 05-Oct-09 12:37:15 | 260.20 | 106.65 | 0.00 | 240.29 |
| 05-Oct-09 12:38:15 | 260.12 | 107.20 | 0.00 | 240.98 |
| 05-Oct-09 12:39:15 | 259.94 | 106.26 | 0.00 | 240.19 |
| 05-Oct-09 12:40:15 | 260.24 | 106.40 | 0.00 | 240.48 |
| 05-Oct-09 12:41:15 | 260.28 | 106.71 | 0.00 | 240.64 |
| 05-Oct-09 12:42:15 | 260.18 | 106.64 | 0.00 | 240.70 |
| 05-Oct-09 12:43:15 | 259.96 | 106.65 | 0.00 | 240.70 |
| 05-Oct-09 12:44:15 | 259.67 | 106.55 | 0.00 | 239.97 |
| 05-Oct-09 12:45:15 | 259.61 | 106.36 | 0.00 | 239.84 |
| 05-Oct-09 12:46:15 | 259.49 | 106.25 | 0.00 | 240.17 |
| 05-Oct-09 12:47:15 | 259.54 | 106.12 | 0.00 | 239.59 |
| 05-Oct-09 12:48:15 | 259.86 | 106.72 | 0.00 | 240.11 |
| 05-Oct-09 12:49:15 | 260.11 | 106.71 | 0.00 | 240.12 |
| 05-Oct-09 12:50:15 | 260.27 | 106.85 | 0.00 | 240.46 |
| 05-Oct-09 12:51:15 | 260.26 | 107.14 | 0.00 | 241.14 |
| 05-Oct-09 12:52:15 | 260.01 | 106.81 | 0.00 | 240.63 |
| 05-Oct-09 12:53:15 | 259.92 | 106.36 | 0.00 | 240.12 |
| 05-Oct-09 12:54:15 | 259.94 | 106.12 | 0.00 | 239.96 |
| Average | 260.37 | 106.73 | 0.00 | 240.84 |

| | Combustor Inlet Pressure C | CT C Gas Flow | DB C Gas Flow | CT C Load |
|---|---|---|---|---|
| | psig | KPPH | KPPH | MW |
| 05-Oct-09 13:30:15 | 259.50 | 106.57 | 0.00 | 240.08 |
| 05-Oct-09 13:31:15 | 259.39 | 106.00 | 0.00 | 239.26 |
| 05-Oct-09 13:32:15 | 259.12 | 106.41 | 0.00 | 239.48 |
| 05-Oct-09 13:33:15 | 259.21 | 105.90 | 0.00 | 238.87 |
| 05-Oct-09 13:34:15 | 259.42 | 106.32 | 0.00 | 239.46 |
| 05-Oct-09 13:35:15 | 259.52 | 106.05 | 0.00 | 239.51 |
| 05-Oct-09 13:36:15 | 259.35 | 106.44 | 0.00 | 240.07 |
| 05-Oct-09 13:37:15 | 259.14 | 106.30 | 0.00 | 239.11 |
| 05-Oct-09 13:38:15 | 258.98 | 106.20 | 0.00 | 239.14 |
| 05-Oct-09 13:39:15 | 259.27 | 106.25 | 0.00 | 238.91 |
| 05-Oct-09 13:40:15 | 259.33 | 106.54 | 0.00 | 239.75 |
| 05-Oct-09 13:41:15 | 259.25 | 106.40 | 0.00 | 238.93 |
| 05-Oct-09 13:42:15 | 259.15 | 106.05 | 0.00 | 239.31 |
| 05-Oct-09 13:43:15 | 259.15 | 106.39 | 0.00 | 239.00 |
| 05-Oct-09 13:44:15 | 258.87 | 106.34 | 0.00 | 239.26 |
| 05-Oct-09 13:45:15 | 259.18 | 106.11 | 0.00 | 238.96 |
| 05-Oct-09 13:46:15 | 259.42 | 106.45 | 0.00 | 239.51 |
| 05-Oct-09 13:47:15 | 259.05 | 106.37 | 0.00 | 239.76 |
| 05-Oct-09 13:48:15 | 258.84 | 106.35 | 0.00 | 238.74 |
| 05-Oct-09 13:49:15 | 258.83 | 105.95 | 0.00 | 238.68 |
| 05-Oct-09 13:50:15 | 259.31 | 106.12 | 0.00 | 239.11 |
| 05-Oct-09 13:51:15 | 259.52 | 105.50 | 0.00 | 239.39 |
| 05-Oct-09 13:52:15 | 259.52 | 109.17 | 0.00 | 240.00 |
| 05-Oct-09 13:53:15 | 259.43 | 106.98 | 0.00 | 239.38 |
| 05-Oct-09 13:54:15 | 259.31 | 105.77 | 0.00 | 238.99 |
| 05-Oct-09 13:55:15 | 259.06 | 105.92 | 0.00 | 239.33 |
| 05-Oct-09 13:56:15 | 258.83 | 106.18 | 0.00 | 239.09 |
| 05-Oct-09 13:57:15 | 258.88 | 106.45 | 0.00 | 238.93 |
| 05-Oct-09 13:58:15 | 258.95 | 106.23 | 0.00 | 238.98 |
| 05-Oct-09 13:59:15 | 258.82 | 106.36 | 0.00 | 239.08 |
| 05-Oct-09 14:00:15 | 258.81 | 106.60 | 0.00 | 238.75 |
| 05-Oct-09 14:01:15 | 258.91 | 105.91 | 0.00 | 238.71 |
| 05-Oct-09 14:02:15 | 258.66 | 105.26 | 0.00 | 238.43 |
| 05-Oct-09 14:03:15 | 258.44 | 105.49 | 0.00 | 238.50 |
| 05-Oct-09 14:04:15 | 258.48 | 105.23 | 0.00 | 237.94 |
| 05-Oct-09 14:05:15 | 258.33 | 105.66 | 0.00 | 238.23 |
| 05-Oct-09 14:06:15 | 258.57 | 105.68 | 0.00 | 238.17 |
| 05-Oct-09 14:07:15 | 258.91 | 105.93 | 0.00 | 238.50 |
| 05-Oct-09 14:08:15 | 259.27 | 105.69 | 0.00 | 239.36 |
| 05-Oct-09 14:09:15 | 258.95 | 106.43 | 0.00 | 239.75 |
| 05-Oct-09 14:10:15 | 258.53 | 105.89 | 0.00 | 238.68 |
| 05-Oct-09 14:11:15 | 258.35 | 107.62 | 0.00 | 238.42 |
| 05-Oct-09 14:12:15 | 258.35 | 105.50 | 0.00 | 237.80 |
| 05-Oct-09 14:13:15 | 258.51 | 106.75 | 0.00 | 238.50 |
| 05-Oct-09 14:14:15 | 258.71 | 107.24 | 0.00 | 238.50 |
| 05-Oct-09 14:15:15 | 258.86 | 106.28 | 0.00 | 238.73 |
| 05-Oct-09 14:16:15 | 259.07 | 106.86 | 0.00 | 238.71 |
| 05-Oct-09 14:17:15 | 259.00 | 106.04 | 0.00 | 239.08 |
| 05-Oct-09 14:18:15 | 258.46 | 106.92 | 0.00 | 238.86 |
| 05-Oct-09 14:19:15 | 258.37 | 105.38 | 0.00 | 237.89 |
| 05-Oct-09 14:20:15 | 258.38 | 105.67 | 0.00 | 238.34 |
| 05-Oct-09 14:21:15 | 258.48 | 106.10 | 0.00 | 238.18 |
| 05-Oct-09 14:22:15 | 258.63 | 106.30 | 0.00 | 238.77 |
| 05-Oct-09 14:23:15 | 258.59 | 106.49 | 0.00 | 238.53 |
| 05-Oct-09 14:24:15 | 258.79 | 106.43 | 0.00 | 238.30 |
| 05-Oct-09 14:25:15 | 258.96 | 106.36 | 0.00 | 238.55 |
| 05-Oct-09 14:26:15 | 259.03 | 106.46 | 0.00 | 238.92 |
| 05-Oct-09 14:27:15 | 259.08 | 106.58 | 0.00 | 238.81 |
| 05-Oct-09 14:28:15 | 259.01 | 106.49 | 0.00 | 239.26 |
| 05-Oct-09 14:29:15 | 258.64 | 106.50 | 0.00 | 238.73 |
| Average | 258.95 | 106.26 | 0.00 | 238.93 |

# UNIT OPERATION PARAMETERS

## Base Load with Duct Burners

| | Combustor Inlet Pressure C | CT C Gas Flow | DB C Gas Flow | CT C Load |
|---|---|---|---|---|
| | psig | KPPH | KPPH | MW |
| 05-Oct-09 17:51:15 | 264.85 | 96.95 | 11.89 | 247.81 |
| 05-Oct-09 17:52:15 | 264.64 | 97.03 | 11.88 | 247.53 |
| 05-Oct-09 17:53:15 | 264.52 | 96.71 | 11.88 | 247.57 |
| 05-Oct-09 17:54:15 | 264.49 | 96.66 | 11.86 | 247.32 |
| 05-Oct-09 17:55:15 | 264.35 | 96.65 | 11.86 | 247.08 |
| 05-Oct-09 17:56:15 | 264.37 | 96.65 | 11.86 | 246.94 |
| 05-Oct-09 17:57:15 | 264.39 | 96.81 | 11.86 | 247.30 |
| 05-Oct-09 17:58:15 | 264.43 | 96.73 | 11.87 | 247.10 |
| 05-Oct-09 17:59:15 | 264.32 | 96.82 | 11.88 | 247.38 |
| 05-Oct-09 18:00:15 | 264.35 | 97.06 | 11.88 | 247.45 |
| 05-Oct-09 18:01:15 | 264.35 | 96.72 | 11.89 | 247.26 |
| 05-Oct-09 18:02:15 | 264.25 | 96.95 | 11.89 | 247.26 |
| 05-Oct-09 18:03:15 | 264.32 | 96.91 | 11.91 | 247.27 |
| 05-Oct-09 18:04:15 | 264.32 | 96.55 | 11.92 | 246.89 |
| 05-Oct-09 18:05:15 | 264.18 | 96.32 | 11.92 | 246.87 |
| 05-Oct-09 18:06:15 | 264.10 | 96.52 | 11.91 | 247.02 |
| 05-Oct-09 18:07:15 | 264.13 | 96.52 | 11.90 | 247.05 |
| 05-Oct-09 18:08:15 | 264.17 | 96.66 | 11.90 | 247.20 |
| 05-Oct-09 18:09:15 | 264.07 | 96.76 | 11.90 | 247.02 |
| 05-Oct-09 18:10:15 | 264.21 | 96.53 | 11.90 | 247.18 |
| 05-Oct-09 18:11:15 | 264.17 | 96.57 | 11.89 | 246.84 |
| 05-Oct-09 18:12:15 | 264.40 | 96.67 | 11.86 | 247.12 |
| 05-Oct-09 18:13:15 | 264.41 | 96.70 | 11.86 | 247.08 |
| 05-Oct-09 18:14:15 | 264.25 | 96.95 | 11.85 | 247.40 |
| 05-Oct-09 18:15:15 | 264.15 | 96.61 | 11.86 | 247.29 |
| 05-Oct-09 18:16:15 | 264.25 | 96.63 | 11.85 | 246.68 |
| 05-Oct-09 18:17:15 | 264.25 | 96.63 | 11.86 | 247.23 |
| 05-Oct-09 18:18:15 | 264.15 | 96.83 | 11.86 | 247.25 |
| 05-Oct-09 18:19:15 | 264.29 | 96.79 | 11.86 | 247.02 |
| 05-Oct-09 18:20:15 | 264.40 | 96.80 | 11.86 | 247.03 |
| 05-Oct-09 18:21:15 | 264.58 | 96.74 | 11.89 | 247.50 |
| 05-Oct-09 18:22:15 | 264.44 | 96.76 | 11.89 | 247.17 |
| 05-Oct-09 18:23:15 | 264.42 | 97.15 | 11.88 | 247.57 |
| 05-Oct-09 18:24:15 | 264.29 | 96.68 | 11.88 | 247.41 |
| 05-Oct-09 18:25:15 | 264.31 | 96.70 | 11.88 | 246.96 |
| 05-Oct-09 18:26:15 | 264.48 | 96.70 | 11.88 | 247.06 |
| 05-Oct-09 18:27:15 | 264.48 | 96.98 | 11.85 | 247.41 |
| 05-Oct-09 18:28:15 | 264.43 | 96.93 | 11.86 | 247.39 |
| 05-Oct-09 18:29:15 | 264.43 | 96.99 | 11.85 | 247.21 |
| 05-Oct-09 18:30:15 | 264.25 | 96.74 | 11.86 | 247.44 |
| 05-Oct-09 18:31:15 | 264.35 | 96.76 | 11.85 | 247.15 |
| 05-Oct-09 18:32:15 | 264.31 | 96.80 | 11.85 | 247.28 |
| 05-Oct-09 18:33:15 | 264.35 | 96.75 | 11.85 | 247.18 |
| 05-Oct-09 18:34:15 | 264.50 | 97.10 | 11.85 | 247.16 |
| 05-Oct-09 18:35:15 | 264.48 | 96.71 | 11.86 | 247.34 |
| 05-Oct-09 18:36:15 | 264.48 | 97.00 | 11.85 | 247.60 |
| 05-Oct-09 18:37:15 | 264.45 | 97.46 | 11.85 | 247.45 |
| 05-Oct-09 18:38:15 | 264.49 | 96.71 | 11.86 | 246.98 |
| 05-Oct-09 18:39:15 | 264.29 | 96.86 | 11.86 | 247.58 |
| 05-Oct-09 18:40:15 | 264.32 | 96.52 | 11.85 | 247.02 |
| 05-Oct-09 18:41:15 | 264.29 | 96.95 | 11.86 | 247.32 |
| 05-Oct-09 18:42:15 | 264.46 | 96.79 | 11.86 | 246.98 |
| 05-Oct-09 18:43:15 | 264.46 | 96.66 | 11.87 | 247.43 |
| 05-Oct-09 18:44:15 | 264.51 | 97.04 | 11.85 | 247.60 |
| 05-Oct-09 18:45:15 | 264.40 | 97.35 | 11.85 | 247.40 |
| 05-Oct-09 18:46:15 | 264.33 | 97.37 | 11.86 | 247.22 |
| 05-Oct-09 18:47:15 | 264.45 | 98.41 | 11.85 | 247.73 |
| 05-Oct-09 18:48:15 | 264.38 | 97.42 | 11.85 | 247.18 |
| 05-Oct-09 18:49:15 | 264.54 | 96.85 | 11.85 | 247.40 |
| 05-Oct-09 18:50:15 | 264.47 | 97.40 | 11.86 | 247.70 |
| Average | 264.37 | 96.85 | 11.87 | 247.25 |

| | Combustor Inlet Pressure C | CT C Gas Flow | DB C Gas Flow | CT C Load |
|---|---|---|---|---|
| | psig | KPPH | KPPH | MW |
| 05-Oct-09 19:05:15 | 264.35 | 97.22 | 11.85 | 247.87 |
| 05-Oct-09 19:06:15 | 264.33 | 96.92 | 11.85 | 247.07 |
| 05-Oct-09 19:07:15 | 264.26 | 97.32 | 11.85 | 247.35 |
| 05-Oct-09 19:08:15 | 264.38 | 96.79 | 11.85 | 246.99 |
| 05-Oct-09 19:09:15 | 264.43 | 97.18 | 11.86 | 247.56 |
| 05-Oct-09 19:10:15 | 264.59 | 98.09 | 11.86 | 247.53 |
| 05-Oct-09 19:11:15 | 264.51 | 97.53 | 11.86 | 247.33 |
| 05-Oct-09 19:12:15 | 264.45 | 97.13 | 11.85 | 247.43 |
| 05-Oct-09 19:13:15 | 264.43 | 96.74 | 11.86 | 247.50 |
| 05-Oct-09 19:14:15 | 264.42 | 97.05 | 11.86 | 247.40 |
| 05-Oct-09 19:15:15 | 264.43 | 97.29 | 11.86 | 247.59 |
| 05-Oct-09 19:16:15 | 264.37 | 97.45 | 11.88 | 247.38 |
| 05-Oct-09 19:17:15 | 264.42 | 97.51 | 11.88 | 247.18 |
| 05-Oct-09 19:18:15 | 264.36 | 97.85 | 11.88 | 247.42 |
| 05-Oct-09 19:19:15 | 264.36 | 97.66 | 11.88 | 247.09 |
| 05-Oct-09 19:20:15 | 264.31 | 97.21 | 11.88 | 246.97 |
| 05-Oct-09 19:21:15 | 264.46 | 96.22 | 11.87 | 246.90 |
| 05-Oct-09 19:22:15 | 264.49 | 96.42 | 11.87 | 247.40 |
| 05-Oct-09 19:23:15 | 264.50 | 95.92 | 11.85 | 247.41 |
| 05-Oct-09 19:24:15 | 264.31 | 97.98 | 11.85 | 247.65 |
| 05-Oct-09 19:25:15 | 264.37 | 97.23 | 11.84 | 247.24 |
| 05-Oct-09 19:26:15 | 264.31 | 97.21 | 11.85 | 247.25 |
| 05-Oct-09 19:27:15 | 264.41 | 96.98 | 11.85 | 247.13 |
| 05-Oct-09 19:28:15 | 264.55 | 97.56 | 11.85 | 247.77 |
| 05-Oct-09 19:29:15 | 264.36 | 96.88 | 11.85 | 247.26 |
| 05-Oct-09 19:30:15 | 264.58 | 98.10 | 11.86 | 247.74 |
| 05-Oct-09 19:31:15 | 264.70 | 97.30 | 11.85 | 247.58 |
| 05-Oct-09 19:32:15 | 264.74 | 97.40 | 11.85 | 247.43 |
| 05-Oct-09 19:33:15 | 264.93 | 97.57 | 11.85 | 247.77 |
| 05-Oct-09 19:34:15 | 264.85 | 97.94 | 11.85 | 248.09 |
| 05-Oct-09 19:35:15 | 264.78 | 96.78 | 11.85 | 247.65 |
| 05-Oct-09 19:36:15 | 264.78 | 98.46 | 11.85 | 247.64 |
| 05-Oct-09 19:37:15 | 264.93 | 97.15 | 11.85 | 247.73 |
| 05-Oct-09 19:38:15 | 265.17 | 95.58 | 11.85 | 247.88 |
| 05-Oct-09 19:39:15 | 265.18 | 97.16 | 11.85 | 248.04 |
| 05-Oct-09 19:40:15 | 265.45 | 98.61 | 11.86 | 248.77 |
| 05-Oct-09 19:41:15 | 265.62 | 97.37 | 11.86 | 248.24 |
| 05-Oct-09 19:42:15 | 265.79 | 98.21 | 11.88 | 249.32 |
| 05-Oct-09 19:43:15 | 265.86 | 98.04 | 11.89 | 249.07 |
| 05-Oct-09 19:44:15 | 265.93 | 97.29 | 11.90 | 249.11 |
| 05-Oct-09 19:45:15 | 265.98 | 98.25 | 11.90 | 248.98 |
| 05-Oct-09 19:46:15 | 266.12 | 98.00 | 11.90 | 249.14 |
| 05-Oct-09 19:47:15 | 266.13 | 97.25 | 11.91 | 249.61 |
| 05-Oct-09 19:48:15 | 265.98 | 96.87 | 11.91 | 249.21 |
| 05-Oct-09 19:49:15 | 266.01 | 97.43 | 11.91 | 249.45 |
| 05-Oct-09 19:50:15 | 266.19 | 97.12 | 11.91 | 249.43 |
| 05-Oct-09 19:51:15 | 266.18 | 97.25 | 11.91 | 249.52 |
| 05-Oct-09 19:52:15 | 266.18 | 97.82 | 11.91 | 249.54 |
| 05-Oct-09 19:53:15 | 266.09 | 97.64 | 11.91 | 249.30 |
| 05-Oct-09 19:54:15 | 266.03 | 98.22 | 11.91 | 249.51 |
| 05-Oct-09 19:55:15 | 266.25 | 98.16 | 11.92 | 249.50 |
| 05-Oct-09 19:56:15 | 266.32 | 98.21 | 11.91 | 249.82 |
| 05-Oct-09 19:57:15 | 266.35 | 98.42 | 11.92 | 249.56 |
| 05-Oct-09 19:58:15 | 266.36 | 97.52 | 11.92 | 249.68 |
| 05-Oct-09 19:59:15 | 266.09 | 98.09 | 11.92 | 249.84 |
| 05-Oct-09 20:00:15 | 266.03 | 98.37 | 11.90 | 249.50 |
| 05-Oct-09 20:01:15 | 266.08 | 98.28 | 11.90 | 249.43 |
| 05-Oct-09 20:02:15 | 265.90 | 97.28 | 11.91 | 248.79 |
| 05-Oct-09 20:03:15 | 265.96 | 96.22 | 11.90 | 248.79 |
| 05-Oct-09 20:04:15 | 265.86 | 97.49 | 11.91 | 249.07 |
| Average | 265.16 | 97.44 | 11.88 | 248.22 |

| | Combustor Inlet Pressure C | CT C Gas Flow | DB C Gas Flow | CT C Load |
|---|---|---|---|---|
| | psig | KPPH | KPPH | MW |
| 06-Oct-09 09:57:28 | 265.90 | 98.75 | 11.30 | 248.93 |
| 06-Oct-09 09:58:28 | 265.83 | 98.30 | 11.30 | 249.07 |
| 06-Oct-09 09:59:28 | 265.90 | 98.34 | 11.30 | 248.36 |
| 06-Oct-09 10:00:28 | 265.80 | 98.41 | 11.30 | 248.75 |
| 06-Oct-09 10:01:28 | 265.79 | 98.33 | 11.30 | 248.28 |
| 06-Oct-09 10:02:28 | 265.97 | 98.38 | 11.31 | 248.63 |
| 06-Oct-09 10:03:28 | 266.05 | 98.35 | 11.31 | 248.75 |
| 06-Oct-09 10:04:28 | 265.86 | 98.48 | 11.32 | 248.89 |
| 06-Oct-09 10:05:28 | 265.74 | 98.50 | 11.31 | 248.47 |
| 06-Oct-09 10:06:28 | 265.74 | 98.37 | 11.31 | 248.50 |
| 06-Oct-09 10:07:28 | 265.86 | 98.27 | 11.32 | 248.59 |
| 06-Oct-09 10:08:28 | 265.84 | 98.38 | 11.32 | 248.79 |
| 06-Oct-09 10:09:28 | 265.81 | 98.11 | 11.31 | 248.48 |
| 06-Oct-09 10:10:28 | 265.84 | 98.52 | 11.32 | 249.07 |
| 06-Oct-09 10:11:28 | 265.76 | 98.46 | 11.32 | 248.79 |
| 06-Oct-09 10:12:28 | 265.59 | 98.54 | 11.32 | 248.70 |
| 06-Oct-09 10:13:28 | 265.66 | 98.24 | 11.32 | 248.48 |
| 06-Oct-09 10:14:28 | 265.76 | 98.54 | 11.31 | 248.51 |
| 06-Oct-09 10:15:28 | 265.85 | 98.77 | 11.31 | 248.73 |
| 06-Oct-09 10:16:28 | 265.78 | 98.55 | 11.31 | 248.69 |
| 06-Oct-09 10:17:28 | 265.77 | 98.69 | 11.31 | 248.70 |
| 06-Oct-09 10:18:28 | 265.74 | 98.42 | 11.31 | 248.67 |
| 06-Oct-09 10:19:28 | 265.76 | 98.43 | 11.31 | 248.68 |
| 06-Oct-09 10:20:28 | 265.76 | 98.35 | 11.30 | 248.75 |
| 06-Oct-09 10:21:28 | 265.95 | 98.37 | 11.31 | 248.59 |
| 06-Oct-09 10:22:28 | 265.94 | 98.40 | 11.31 | 248.80 |
| 06-Oct-09 10:23:28 | 265.98 | 98.14 | 11.30 | 248.69 |
| 06-Oct-09 10:24:28 | 265.88 | 97.99 | 11.31 | 248.68 |
| 06-Oct-09 10:25:28 | 265.96 | 98.15 | 11.39 | 248.88 |
| 06-Oct-09 10:26:28 | 266.09 | 98.53 | 11.43 | 248.98 |
| 06-Oct-09 10:27:28 | 266.14 | 98.21 | 11.47 | 248.80 |
| 06-Oct-09 10:28:28 | 266.16 | 98.50 | 11.50 | 249.52 |
| 06-Oct-09 10:29:28 | 266.02 | 98.20 | 11.51 | 248.87 |
| 06-Oct-09 10:30:28 | 265.99 | 98.11 | 11.52 | 248.88 |
| 06-Oct-09 10:31:28 | 265.92 | 97.92 | 11.55 | 249.02 |
| 06-Oct-09 10:32:28 | 265.86 | 98.24 | 11.57 | 248.49 |
| 06-Oct-09 10:33:28 | 266.04 | 98.39 | 11.62 | 248.89 |
| 06-Oct-09 10:34:28 | 266.08 | 98.42 | 11.68 | 248.87 |
| 06-Oct-09 10:35:28 | 266.06 | 97.88 | 11.73 | 249.16 |
| 06-Oct-09 10:36:28 | 266.04 | 98.02 | 11.77 | 248.91 |
| 06-Oct-09 10:37:28 | 266.11 | 97.56 | 11.80 | 248.72 |
| 06-Oct-09 10:38:28 | 266.07 | 97.87 | 11.83 | 248.98 |
| 06-Oct-09 10:39:28 | 266.16 | 97.92 | 11.83 | 248.73 |
| 06-Oct-09 10:40:28 | 266.11 | 98.07 | 11.84 | 248.97 |
| 06-Oct-09 10:41:28 | 266.16 | 97.71 | 11.84 | 248.96 |
| 06-Oct-09 10:42:28 | 266.20 | 98.03 | 11.84 | 249.16 |
| 06-Oct-09 10:43:28 | 266.28 | 98.08 | 11.85 | 249.37 |
| 06-Oct-09 10:44:28 | 266.24 | 98.09 | 11.87 | 249.21 |
| 06-Oct-09 10:45:28 | 266.24 | 97.61 | 11.87 | 249.25 |
| 06-Oct-09 10:46:28 | 266.18 | 97.76 | 11.87 | 249.24 |
| 06-Oct-09 10:47:28 | 266.31 | 98.30 | 11.86 | 249.31 |
| 06-Oct-09 10:48:28 | 266.27 | 98.02 | 11.87 | 249.27 |
| 06-Oct-09 10:49:28 | 266.33 | 98.18 | 11.86 | 249.30 |
| 06-Oct-09 10:50:28 | 266.36 | 98.19 | 11.87 | 249.22 |
| 06-Oct-09 10:51:28 | 266.43 | 98.38 | 11.87 | 249.51 |
| 06-Oct-09 10:52:28 | 266.54 | 98.28 | 11.86 | 249.31 |
| 06-Oct-09 10:53:28 | 266.51 | 98.27 | 11.85 | 249.81 |
| 06-Oct-09 10:54:28 | 266.61 | 98.18 | 11.86 | 249.68 |
| 06-Oct-09 10:55:28 | 266.52 | 98.80 | 11.85 | 249.51 |
| 06-Oct-09 10:56:28 | 266.57 | 97.70 | 11.85 | 249.32 |
| Average | 266.03 | 98.25 | 11.54 | 248.92 |

# APPENDIX C

# CALIBRATION GAS CERTIFICATIONS

AIR LIQUIDE

# CERTIFICATE of ANALYSIS

## Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

**Cylinder Number: CC54452**

| | | | |
|---|---|---|---|
| **Customer:** | AIR HYGIENE | **Shipping Order #:** | 32650786 |
| **P.O. Number:** | 9021401 | **Transfer #:** | 32640786 |
| **Item Number:** | SGZCAH094 | **LOT #:** | LPX249096 |
| **Notes:** | | **Valve:** | CGA590 |
| **File Name:** | 326407864E | **Cyl. Pressure:*** | 1900psig |
| **Assay Date:** | 17-Mar-09 | **Expiration Date: 16-Mar-12** | *Cylinder should not be used when gas pressure is below 150 psig |

| Component | Requested Concentration | Assay Concentration |
|---|---|---|
| **Carbon Dioxide** | **9 %** | **9.20 ±0.17 %** |
| **Oxygen** | **12 %** | **12.0 ±0.1 %** |
| **Nitrogen** | **Balance** | **Balance** |

**Reference Standard(s) Employed For Analysis:**

| Std name | Std # | Conc. | Units | Std. Error | Comp. | Balance | Cyl. No. | Exp. Date | Sample No. |
|---|---|---|---|---|---|---|---|---|---|
| GMIS105 | GMIS105 | 8.02 | % | 0.05 | CO2 | N2 | AL-0105 | 10/27/2010 | N.A. |
| SRM128 | 2658a | 9.397 | % | 0.049 | O2 | N2 | CAL014583 | 7/1/2011 | 72-C-45 |

**Analysis Information:**

| Component 1: | Carbon Dioxide | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyzer Information | | | First Triad Analysis On: | | 3/16/2009 | | Second Triad Analysis On: | | | | |
| Manufacturer: | KVB/Analect | | Trial 1 | Trial 2 | Trial 3 | Units | | Trial 1 | Trial 2 | Trial 3 | Units |
| Model Number: | EN3024 | Zero | 0.18 | 0.28 | 0.20 | | Zero | | | | |
| Serial Number: | 3024 | Reference | 7.62 | 7.59 | 7.66 | | Reference | | | | |
| Analytical Principle: | FTIR | Candidate | 8.75 | 8.60 | 8.78 | | Candidate | | | | |
| MPC Calibrated: | 02/18/09 | Result | 9.25 | 9.09 | 9.28 | % | Result | | | | |
| | | | | Mean Result: | 9.20 | % | | | Mean Result: | | |

| Component 2: | Oxygen | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyzer Information | | | First Triad Analysis On: | | 3/17/2009 | | Second Triad Analysis On: | | | | |
| Manufacturer: | Servomex | | Trial 1 | Trial 2 | Trial 3 | Units | | Trial 1 | Trial 2 | Trial 3 | Units |
| Model Number: | 4605C | Zero | 0.02 | 0.01 | 0.02 | | Zero | | | | |
| Serial Number: | 1101 | Reference | 9.30 | 9.31 | 9.31 | | Reference | | | | |
| Analytical Principle: | Paramag. | Candidate | 11.84 | 11.84 | 11.85 | | Candidate | | | | |
| MPC Calibrated: | 02/24/09 | Result | 11.96 | 11.96 | 11.97 | % | Result | | | | |
| | | | | Mean Result: | 11.96 | % | | | Mean Result: | | |

Analyst Signature: _____ M. Adnane

Calculated by: _____ M. Adnane

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

AIR LIQUIDE

# CERTIFICATE of ANALYSIS

## Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

**Cylinder Number: AL-2533**

| | | | |
|---|---|---|---|
| **Customer:** | AIR HYGIENE | **Shipping Order #:** | 27432766 |
| **P.O. Number:** | 110207 | **Transfer #:** | 27432766 |
| **Item Number:** | SGZCAH095 | **LOT #:** | LPX229603 |
| **Notes:** | | **Valve:** | CGA590 |
| | | **Cyl. Pressure:*** | 1900psig |

*Cylinder should not be used when gas pressure is below 150 psig

**Assay Date:** 16-Nov-07 **Expiration Date: 15-Nov-10**

| Component | Requested Concentration | Assay Concentration |
|---|---|---|
| **Carbon Dioxide** | **19 %** | **19.3 ±0.1 %** |
| **Oxygen** | **21 %** | **20.9 ±0.2 %** |
| **Nitrogen** | **Balance** | **Balance** |

**Reference Standard(s) Employed For Analysis:**

| Std name | Std # | Conc. | Units | Std. Error | Comp. | Balance | Cyl. No. | Exp. Date | Sample No. |
|---|---|---|---|---|---|---|---|---|---|
| GMIS327 | GMIS327 | 14.05 | % | 0.06 | CO2 | N2 | CC180047 | 7/24/2008 | N.A. |
| GMIS355 | GMIS355 | 10.0 | % | 0.1 | O2 | N2 | CC180358 | 4/14/2009 | N.A |

**Analysis Information:**

| Component 1: | Carbon Dioxide | | First Triad Analysis On: | | 11/9/2007 | | Second Triad Analysis On: | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Analyzer Information | | | Trial 1 | Trial 2 | Trial 3 | Units | Trial 1 | Trial 2 | Trial 3 | Units |
| Manufacturer: | KVB/Analect | | | | | | | | | |
| Model Number: | EN3024 | Zero | 0.29 | 0.30 | 0.31 | | Zero | | | |
| Serial Number: | 3024 | Reference | 16.07 | 16.08 | 16.17 | | Reference | | | |
| Analytical Principle: | FTIR | Candidate | 21.93 | 22.11 | 21.98 | | Candidate | | | |
| MPC Calibrated: | 10/11/07 | Result | 19.22 | 19.38 | 19.27 | % | Result | | | |
| | | | | Mean Result: | 19.29 | % | | Mean Result: | | |

| Component 2: | Oxygen | | First Triad Analysis On: | | 11/16/2007 | | Second Triad Analysis On: | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Analyzer Information | | | Trial 1 | Trial 2 | Trial 3 | Units | Trial 1 | Trial 2 | Trial 3 | Units |
| Manufacturer: | Servomex | | | | | | | | | |
| Model Number: | 4605C | Zero | 0.05 | 0.05 | 0.05 | | Zero | | | |
| Serial Number: | 1101 | Reference | 9.92 | 9.92 | 9.91 | | Reference | | | |
| Analytical Principle: | Paramag. | Candidate | 20.68 | 20.70 | 20.69 | | Candidate | | | |
| MPC Calibrated: | 11/06/07 | Result | 20.91 | 20.93 | 20.91 | % | Result | | | |
| | | | | Mean Result: | 20.92 | % | | Mean Result: | | |

**Analyst Signature:** _____ M. Adnane **Calculated by:** _____ M Adnane

**Mix Assayed At: Air Liquide America** 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

AIR LIQUIDE | Air Liquide America Specialty Gases LLC | Scott

# RATA CLASS

*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**

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
1290 COMBERMERE STREET
TROY, MI 48083

P.O. No.: ALAS-47882
Project No.: 05-76528-008

**Customer**

AIR LIQUIDE AMERICA L.P.

ATTN: STEPHANIE PADGETT
801 W NORTH CARRIER PKWY
GRAND PRAIRIE TX 75050-1003

### 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:** AAL069415 **Certification Date:** 01Jun2009 **Exp. Date:** 30Nov2009
**Cylinder Pressure***:** 2000 PSIG

| COMPONENT | CERTIFIED CONCENTRATION (Moles) | | ACCURACY** | TRACEABILITY |
|---|---|---|---|---|
| CARBON MONOXIDE | 4.94 | PPM | +/- 1% | Direct NIST and NMi |
| NITRIC OXIDE | 4.96 | PPM | +/- 1% | Direct NIST and NMi |
| NITROGEN - OXYGEN FREE | | BALANCE | | |
| TOTAL OXIDES OF NITROGEN | 4.99 | PPM | | Reference Value Only |

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

### REFERENCE STANDARD

| TYPE/SRM NO. | EXPIRATION DATE | CYLINDER NUMBER | CONCENTRATION | COMPONENT |
|---|---|---|---|---|
| NTRM 2635 | 02Oct2010 | KAL003090 | 25.21 PPM | CARBON MONOXIDE |
| NTRM 2629 | 15Aug2013 | KAL003016 | 19.83 PPM | NITRIC OXIDE |

### INSTRUMENTATION

| INSTRUMENT/MODEL/SERIAL# | DATE LAST CALIBRATED | ANALYTICAL PRINCIPLE |
|---|---|---|
| HORIBA/APMA-360/42244670011 | 08May2009 | NDIR |
| ECO PHYSICS/CLD 84M/84M0359 | 19May2009 | CHEMI |

### ANALYZER READINGS

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

**CARBON MONOXIDE**

| First Triad Analysis | Second Triad Analysis | Calibration Curve |
|---|---|---|
| Date: 27May2009 Response Unit:MV | Date: 03Jun2009 Response Unit: MV | Concentration = A + Bx + Cx2 + Dx3 + Ex4 |
| Z1 = 0.00000 R1 = 25.22000 T1 = 5.01200 | Z1 = 0.00000 R1 = 10.02000 T1 = 4.93600 | r = 0.999978 |
| R2 = 25.21000 Z2 = 0.00000 T2 = 5.01300 | R2 = 10.00000 Z2 = 0.00000 T2 = 4.94200 | Constants: A = -0.01235827 |
| Z3 = 0.00000 T3 = 5.01500 R3 = 25.21000 | Z3 = 0.00000 T3 = 4.94000 R3 = 10.00000 | B = 0.985727112 C = 0.0015772 |
| Avg. Concentration: 4.963 PPM | Avg. Concentration: 4.916 PPM | D = 0 E = 0 |

**NITRIC OXIDE**

| | | |
|---|---|---|
| Date: 27May2009 Response Unit:MV | Date: 03Jun2009 Response Unit: MV | Concentration = A + Bx + Cx2 + Dx3 + Ex4 |
| Z1 = 0.00000 R1 = 19.83000 T1 = 4.94500 | Z1 = 0.00000 R1 = 19.83000 T1 = 4.94800 | r = 0.999996 |
| R2 = 19.86000 Z2 = 0.00000 T2 = 4.93500 | R2 = 19.84000 Z2 = 0.00000 T2 = 4.94500 | Constants: A = 0.021602025 |
| Z3 = 0.00000 T3 = 4.95100 R3 = 19.78000 | Z3 = 0.00000 T3 = 4.94300 R3 = 19.87000 | B = 1.002315407 C = 0 |
| Avg. Concentration: 4.966 PPM | Avg. Concentration: 4.962 PPM | D = 0 E = 0 |

**Special Notes:** AIR HYGIENE PART #SGZCAH070

APPROVED BY: _____
JEFF CROTEAU

AIR LIQUIDE

# CERTIFICATION OF ANALYSIS

## Interference Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section 2.2, Procedure G-1

**Cylinder S/N: CC60943**

**Customer:** AIR HYGIENE
**Location:** TULSA, OK

**P.O. Number:** 9021401
**Item Number:** SGZCAH072

**Assay Date:** 26-Mar-2009

**Expiration Date: 26-Mar-2011**

**Shipping Order Number:** 32650834
***Transfer Number:*** *32650934*
**Lot Number:** SFS130142
**Valve:** CGA 660
**Cylinder Pressure*:** 2000 PSIG
**Cylinder should not be used when gas pressure is below 150 psig*

| Components | Requested Concentration | Assay Concentration |
|---|---|---|
| **Nitrogen** | **Balance** | **Balance** |
| **Carbon Monoxide** | **12 ppm** | **12.1 ± 0.1 ppm** |
| **Nitric Oxide** | **12 ppm** | **12.1 ± 0.2 ppm** |
| **NOx** | | **12.1 ppm** |

**Reference Standard(s) Employed For Analysis**

| *Certified Concentration and Uncertainty* | | | *Component* | *Balance* | *Cyl. No.* | *SRM/PRM/Mix No.* | *Exp. Date* | *Sample No.* | *Type* |
|---|---|---|---|---|---|---|---|---|---|
| 10.03 | ± 0.06 | ppm | Carbon Monoxide | Nitrogen | CC99308 | SFS114251 | 5-Aug-2010 | DT | GMIS |
| 7.61 | ± 0.07 | ppm | Nitric Oxide | Nitrogen | EB0010197 | SFS119011 | 3-Oct-2010 | CJ | GMIS |

**Analytical Data**

| Component: | Carbon Monoxide | | FIRST TRIAD ANALYSIS 17-Mar-2009 | | | | | SECOND TRIAD ANALYSIS 26-Mar-2009 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyzer Information | | | Trial 1 | Trial 2 | Trial 3 | Units | | Trial 1 | Trial 2 | Trial 3 | Units | |
| Analyzer Type: | Fourier Transform IR | Zero | -0.0011 | 0.0147 | 0.0136 | ppm | Zero | 0.0031 | -0.0024 | -0.0046 | ppm | |
| Manufacturer: | MKS Instruments | Reference | 9.8709 | 9.8655 | 9.8760 | ppm | Reference | 9.8678 | 9.8818 | 9.8751 | ppm | |
| Model Number: | 2031 | Candidate | 11.888 | 11.880 | 11.871 | ppm | Candidate | 11.889 | 11.878 | 11.882 | ppm | |
| Serial Number: | 10387278 | Result | 12.08 | 12.08 | 12.06 | ppm | Result | 12.09 | 12.06 | 12.07 | ppm | |
| MPR Last Calibrated: | 12-Mar-2009 | Evaluation | Valid | Valid | Valid | | Evaluation | Valid | Valid | Valid | | |
| Analytical Principle: | FTIR | | | Mean Analytical Result: | | 12.07 | ppm | | Mean Analytical Result: | | 12.07 | ppm |

| Component: | Nitric Oxide | | FIRST TRIAD ANALYSIS 17-Mar-2009 | | | | | SECOND TRIAD ANALYSIS 26-Mar-2009 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyzer Information | | | Trial 1 | Trial 2 | Trial 3 | Units | | Trial 1 | Trial 2 | Trial 3 | Units | |
| Analyzer Type: | Fourier Transform IR | Zero | -0.0100 | -0.0102 | -0.0512 | ppm | Zero | 0.0094 | -0.0040 | -0.0134 | ppm | |
| Manufacturer: | MKS Instruments | Reference | 7.6970 | 7.7482 | 7.7055 | ppm | Reference | 7.7043 | 7.7086 | 7.7108 | ppm | |
| Model Number: | 2031 | Candidate | 12.292 | 12.294 | 12.290 | ppm | Candidate | 12.181 | 12.136 | 12.171 | ppm | |
| Serial Number: | 10387278 | Result | 12.15 | 12.07 | 12.11 | ppm | Result | 12.04 | 11.98 | 12.00 | ppm | |
| MPR Last Calibrated: | 22-Mar-2009 | Evaluation | Valid | Valid | Valid | | Evaluation | Valid | Valid | Valid | | |
| Analytical Principle: | FTIR | | | Mean Analytical Result: | | 12.11 | ppm | | Mean Analytical Result: | | 12.01 | ppm |

Analyst: _____ Tan Ngo

Approved by: _____ Thuan Tran

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# CERTIFICATION OF ANALYSIS

## Interference Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section 2.2, Procedure G-1

**Cylinder S/N: CC150921**

**Customer:** AIR HYGIENE
**Location:** TULSA, OK

**P.O. Number:** 8080801
**Item Number:** SGZCAH001

**Assay Date:** 25-Aug-2008 **Expiration Date:** 25-Aug-2011

**Shipping Order Number:** 30555150
**Transfer Number:** 30555150
**Lot Number:** SFS124130
**Valve:** CGA 350
**Cylinder Pressure*:** 2000 PSIG
*Cylinder should not be used when gas pressure is below 150 psig

| Components | Requested Concentration | Assay Concentration |
|---|---|---|
| Nitrogen | Balance | Balance |
| Methane | 3 ppm | 3.00 ± 0.03 ppm |

**Reference Standard(s) Employed For Analysis**

| Certified Concentration and Uncertainty | | | Component | Balance | Cyl. No. | SRM/PRM/Mix No. | Exp. Date | Sample No. | Type |
|---|---|---|---|---|---|---|---|---|---|
| 9.863 | ± 0.030 | ppm | Methane | Air | FF28576 | 1659a | 25-Apr-2012 | 11-G-24 | SRM |

**Analytical Data**

| Component: | Methane | | FIRST TRIAD ANALYSIS 25-Aug-2008 | | | |
|---|---|---|---|---|---|---|
| Analyzer Information | | | Trial 1 | Trial 2 | Trial 3 | Units |
| Analyzer Type: | Gas Chromatograph | Zero | 0.058 | 0.0000 | 0.161 | Area |
| Manufacturer: | Hewlett Packard | Reference | 87.036 | 87.257 | 87.485 | Area |
| Model Number: | G1540A | Candidate | 26.557 | 26.535 | 26.651 | Area |
| Serial Number: | US00003390/Meth | Result | 3.005 | 2.999 | 2.992 | ppm |
| MPR Last Calibrated: | 12-Aug-2008 | Evaluation | Valid | Valid | Valid | |
| Analytical Principle: | FID & TCD | | | Mean Analytical Result: | 2.999 | ppm |

Analyst: _____ Tan Ngo

Approved by: _____ Thuan Tran

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# CERTIFICATION OF ANALYSIS

## Interference Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section 2.2, Procedure G-1

**Cylinder S/N: CC150841**

**Customer:** AIR HYGIENE
**Location:** TULSA, OK

**P.O. Number:** 807.1801
**Item Number:** SGZCAH002

**Assay Date:** 4-Aug-2008 **Expiration Date:** 4-Aug-2011

**Shipping Order Number:** 30336104
**Transfer Number:** 30336104
**Lot Number:** SFS123631
**Valve:** CGA 350
**Cylinder Pressure*:** 2000 PSIG
*Cylinder should not be used when gas pressure is below 150 psig

| Components | Requested Concentration | Assay Concentration |
|---|---|---|
| *Nitrogen* | *Balance* | *Balance* |
| Methane | 5 ppm | 4.94 ± 0.06 ppm |

**Reference Standard(s) Employed For Analysis**

| Certified Concentration and Uncertainty | | | Component | Balance | Cyl. No. | SRM/PRM/Mix No. | Exp. Date | Sample No. | Type |
|---|---|---|---|---|---|---|---|---|---|
| 9.863 | ± 0.030 | ppm | Methane | Air | FF28576 | 1659a | 25-Apr-2012 | 11-G-24 | SRM |

**Analytical Data**

| Component: | Methane | | FIRST TRIAD ANALYSIS 4-Aug-2008 | | | |
|---|---|---|---|---|---|---|
| Analyzer Information | | | Trial 1 | Trial 2 | Trial 3 | Units |
| Analyzer Type: | Gas Chromatograph | Zero | 0.114 | 0.073 | 0.022 | Area |
| Manufacturer: | Howlett Packard | Reference | 91.233 | 91.401 | 91.269 | Area |
| Model Number: | G1540A | Candidate | 45.834 | 45.728 | 45.799 | Area |
| Serial Number: | US00003390/Meth | Result | 4.949 | 4.931 | 4.948 | ppm |
| MPR Last Calibrated: | 11-Jul-2008 | Evaluation | Valid | Valid | Valid | |
| Analytical Principle: | FID & TCD | | | Mean Analytical Result: | 4.943 | ppm |

Analyst: _____ Gary Williams

Approved by: _____ Thuen Tran

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# CERTIFICATION OF ANALYSIS

## Interference Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section 2.2, Procedure G-1

**Cylinder S/N:** CC53032

**Customer:** AIR HYGIENE
**Location:** TULSA, OK

**P.O. Number:** 8082701
**Item Number:** SGZCAH006

**Shipping Order Number:** 30736937
**Transfer Number:** 30736937
**Lot Number:** SFS125022
**Valve:** CGA 350
**Cylinder Pressure*:** 2000 PSIG
*Cylinder should not be used when gas pressure is below 150 psig

**Assay Date:** 25-Sep-2008 **Expiration Date:** 25-Sep-2011

| Components | Requested Concentration | Assay Concentration |
|---|---|---|
| Nitrogen | Balance | Balance |
| Methane | 8.5 ppm | 8.40 ± 0.10 ppm |

**Reference Standard(s) Employed For Analysis**

| Certified Concentration and Uncertainty | | | Component | Balance | Cyl. No. | SRM/PRM/Mix No. | Exp. Date | Sample No. | Type |
|---|---|---|---|---|---|---|---|---|---|
| 10.06 | ± 0.04 | ppm | Methane | Air | CC52347 | SFS103877 | 18-Mar-2010 | NK | GMIS |

**Analytical Data**

| Component: | Methane | | FIRST TRIAD ANALYSIS 25-Sep-2008 | | | |
|---|---|---|---|---|---|---|
| Analyzer Information | | | Trial 1 | Trial 2 | Trial 3 | Units |
| Analyzer Type: | Gas Chromatograph | Zero | 0.0000 | 0.009 | 0.0000 | Area |
| Manufacturer: | Hewlett Packard | Reference | 95.357 | 95.042 | 95.188 | Area |
| Model Number: | G1540A | Candidate | 79.484 | 79.558 | 79.410 | Area |
| Serial Number: | US00003390/Meth | Result | 8.385 | 8.421 | 8.392 | ppm |
| MPR Last Calibrated: | 24-Sep-2008 | Evaluation | Valid | Valid | Valid | |
| Analytical Principle: | FID & TCD | | | Mean Analytical Result: | 8.399 | ppm |

Analyst: _____ Tan Ngo

Approved by: _____ Thuan Tran

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# CERTIFICATION OF ANALYSIS

## Interference Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section 2.2, Procedure G-1

**Cylinder S/N: EB0011231**

**Customer:** AIR HYGIENE
**Location:** TULSA, OK

**P.O. Number:** 9042601
**Item Number:** SGZCAH032

**Assay Date:** 21-May-2009

**Expiration Date: 21-Nov-2009**

**Shipping Order Number:** 33431111
**Transfer Number:** 33431111
**Lot Number:** SFS131864
**Valve:** CGA 660
**Cylinder Pressure*:** 2000 PSIG
*Cylinder should not be used when gas pressure is below 150 psig

| Components | Requested Concentration | Assay Concentration |
|---|---|---|
| Nitrogen | Balance | Balance |
| Nitrogen Dioxide | 45-50 ppm | 48.0 ± 1.2 ppm |

**Reference Standard(s) Employed For Analysis**

| Certified Concentration and Uncertainty | | | | Component | Balance | Cyl. No. | SRM/PRM/Mix No. | Exp. Date | Sample No. | Type |
|---|---|---|---|---|---|---|---|---|---|---|
| 51.4 | ± | 1.2 | ppm | Nitrogen Dioxide | Nitrogen | EB0009973 | SFS119543 | 12-Jul-2010 | BI | GMIS |

**Analytical Data**

| Component: | Nitrogen Dioxide | | FIRST TRIAD ANALYSIS 13-May-2009 | | | | | SECOND TRIAD ANALYSIS 21-May-2009 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyzer Information | | | Trial 1 | Trial 2 | Trial 3 | Units | | Trial 1 | Trial 2 | Trial 3 | Units | |
| Analyzer Type: | Fourier Transform IR | Zero | -0.006 | -0.012 | -0.011 | ppm | Zero | 0.048 | 0.021 | 0.030 | ppm | |
| Manufacturer: | MKS Instruments | Reference | 50.127 | 50.162 | 50.262 | ppm | Reference | 50.071 | 50.164 | 50.252 | ppm | |
| Model Number: | 2031 | Candidate | 46.799 | 46.807 | 46.814 | ppm | Candidate | 46.904 | 46.907 | 46.886 | ppm | |
| Serial Number: | 10387278 | Result | 47.99 | 47.96 | 47.87 | ppm | Result | 48.15 | 48.06 | 47.96 | ppm | |
| MPR Last Calibrated: | 29-Apr-2009 | Evaluation | Valid | Valid | Valid | | Evaluation | Valid | Valid | Valid | | |
| Analytical Principle: | FTIR | | | Mean Analytical Result: | | 47.94 | ppm | | Mean Analytical Result: | | 48.06 | ppm |

Analyst: _____ Tan Ngo

Approved by: _____ Thuan Tran

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# APPENDIX D

# QUALITY ASSURANCE AND QUALITY CONTROL DATA

# QA/QC PROGRAM

Air Hygiene ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by an internal QA team and encompasses five major areas:

1. QA reviews of reports, laboratory work, and field testing
2. Equipment calibration and maintenance
3. Chain-of-custody
4. Training
5. Knowledge of current test methods

Each of these areas is discussed individually below.

## QA Reviews

Air Hygiene's review procedure includes review of each source test report, along with laboratory and fieldwork, by the QA Team. The most important review is the one that takes place before a test program begins. The QA Team works closely with technical division personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

## Equipment Calibration and Maintenance

The equipment used to conduct the emission measurements is maintained according to the manufacturer's instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined by the Environmental Protection Agency. Quality control checks are also conducted in the field for each test program.

## Chain-of-Custody

Air Hygiene maintains full chain-of-custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, Air Hygiene documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.). Samples are stored in a locked area to which only Air Hygiene personnel have access. Field data sheets are secured at Air Hygiene's offices upon return from the field.

## Training

Personnel's training is essential to ensure quality testing. Air Hygiene has formal and informal training programs, which include:

1. Attendance at EPA-sponsored training courses
2. Enrollment in EPA correspondence courses
3 A requirement for all technicians to read and understand Air Hygiene's QA manual
4. In-house training and QA meetings on a regular basis
5. Maintenance of training records

## Knowledge of Current Test Methods

With the constant updating of standard test methods and the wide variety of emerging test procedures, it is essential that any qualified source tester keep abreast of new developments. Air Hygiene subscribes to services, which provide updates on EPA reference methods, rules, and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences. Air Hygiene personnel maintain membership in the Air and Waste Management Association and the American Industrial Hygiene Association.

## COMBUSTION TESTING QUALITY ASSURANCE ACTIVITIES

A number of quality assurance activities were undertaken before, during, and after this testing project. This section of the report combined with the documentation in Appendix C describes each of those activities.

Each instrument's response was checked and adjusted in the field prior to the collection of data via multi-point calibration. The instrument's linearity was checked by adjusting its zero and span responses to zero nitrogen and an upscale calibration gas in the range of the expected concentrations. The instrument response was then challenged with other calibration gases of known concentration and accepted as being linear if the response of the other calibration gases agreed within plus or minus two percent of the range of predicted values. $NO_2$ to NO conversion was checked via direct connect with an EPA Protocol certified concentration of $NO_2$ in a balance of nitrogen. Conversion was verified to be between 90 and 110 percent.

After each test run, the analyzers were checked for zero and span drift. This allowed each test run to be bracketed by calibrations and documents the precision of the data just collected. The criterion for acceptable data is that the instrument drift is no more than three percent of the full-scale response. The quality assurance worksheets in the following pages summarize all multipoint calibration checks and zero to span checks performed during the tests. These worksheets (as prepared from the data records of Appendix A) show that no drifts in excess of three percent occurred in the zero to span checks following each test run.

The sampling systems were leak checked by demonstrating that a vacuum greater than 10 in Hg could be held for at least one minute with a decline of less than one inch of Hg. A leak test was conducted after the sample system was set up and before the system was dismantled. This test was conducted to ensure that ambient air had not diluted the sample. Any leakage detected prior to the tests would be repaired and another leak check conducted before testing commenced. No leaks were found during the pre or post-test leak checks.

The absence of leaks in the sampling system was also verified by a sampling system bias check. The sampling system's integrity was tested by comparing the responses of the analyzers to the calibration gases introduced via two paths. The first path was directly into the analyzer and the second path via the sample system at the sample probe. Any difference in the instrument responses by these two methods was attributed to sampling system bias or leakage. The criterion for acceptance is agreement within five percent of the span of the analyzer.

The control gases used to calibrate the instruments were analyzed and certified by the compressed gas vendors to plus or minus one percent accuracy for all gases. EPA Protocol No. 1 was used, where applicable to assign the concentration values traceable to the National Institute of Standards and Technology (NIST), Standard Reference Materials (SRM's). The gas calibration sheets as prepared by the vendor are contained in Appendix C.

Air Hygiene collected and reported the enclosed test data in accordance with the procedures and quality assurance activities described in this test report. Air Hygiene makes no warranty as to the suitability of the test methods. Air Hygiene also assumes no liability relating to the interpretation and use of the test data.

### INSTRUMENTAL ANALYSIS QUALITY ASSURANCE DATA

Date: October 5-6, 2009
Company: Florida Power and Light
Location: Loxahatchee, Florida
Techs: JRF/TP

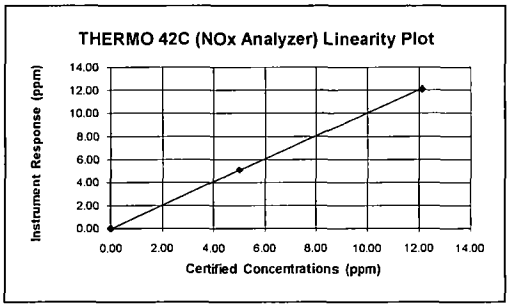
**Sample System Leak Check**

| Date | Sample System | Leak Rate (l/min) |
|---|---|---|
| October 5-6, 2009 | 1 | 0 |

**Calibration Date: October 5, 2009**
**Client: Florida Power and Light**

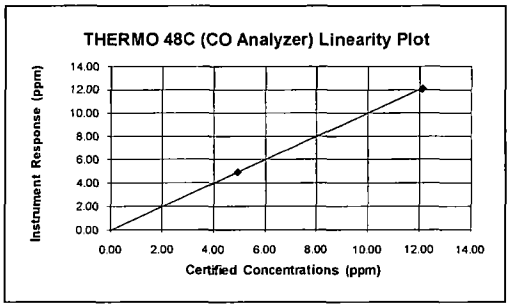
NOx Span (ppm) = 12.10

| THERMO 42C (NOx Analyzer) | | | | |
|---|---|---|---|---|
| Certified Concentration (ppm) | Instrument Response (ppm) | Calibration Error (%) | Absolute Conc. (ppm) | Pass or Fail (±2%, ≤0.5ppm) |
| 0.00 | 0.00 | 0.00 | 0.00 | YES (%) |
| 4.99 | 5.11 | 0.99 | 0.12 | YES (%) |
| 12.10 | 12.11 | 0.08 | 0.01 | YES (%) |
| Linearity = 1.000 | | | | |



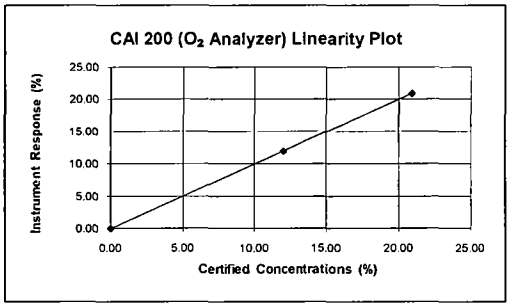

CO Span (ppm) = 12.10

| THERMO 48C (CO Analyzer) | | | | |
|---|---|---|---|---|
| Certified Concentration (ppm) | Instrument Response (ppm) | Calibration Error (%) | Absolute Conc. (ppm) | Pass or Fail (±2%, ≤0.5ppm) |
| 0.00 | -0.03 | -0.25 | 0.03 | YES (%) |
| 4.94 | 4.95 | 0.08 | 0.01 | YES (%) |
| 12.10 | 12.08 | -0.17 | 0.02 | YES (%) |
| Linearity = 1.000 | | | | |




$O_2$ Span (%) = 20.90

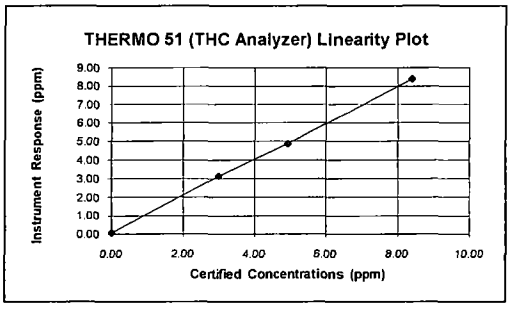
| CAI 200 ($O_2$ Analyzer) | | | | |
|---|---|---|---|---|
| Certified Concentration (%) | Instrument Response (%) | Calibration Error (%) | Absolute Conc. (%) | Pass or Fail (±2%, ≤0.5%) |
| 0.00 | 0.04 | 0.19 | 0.04 | YES (%) |
| 12.00 | 11.96 | -0.19 | 0.04 | YES (%) |
| 20.90 | 20.91 | 0.05 | 0.01 | YES (%) |
| Linearity = 1.002 | | | | |




THC Range (ppm) = 10.5

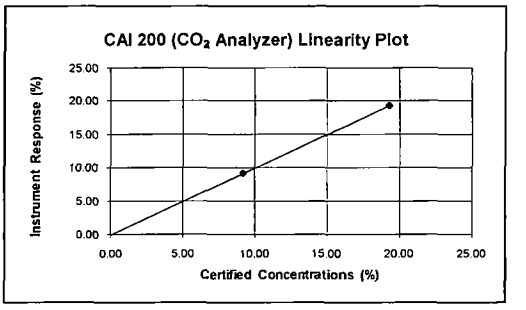
| THERMO 51 (THC Analyzer) | | | | |
|---|---|---|---|---|
| Certified Concentration (ppm) | Instrument Response (ppm) | Calibration Error (%) | Estimated Point (ppm) | Pass or Fail (±2,5%)[1] |
| 0.00 | 0.09 | 0.86 | N/A | YES |
| 3.00 | 3.15 | 3.07 | 3.06 | YES |
| 4.94 | 4.88 | -1.97 | 4.98 | YES |
| 8.40 | 8.40 | 0.00 | N/A | YES |
| Linearity = 1.022 | | | | |

[1]-zero/high based on 2% of span,low/mid based on 5% of concentration




$CO_2$ Span (%) = 19.30

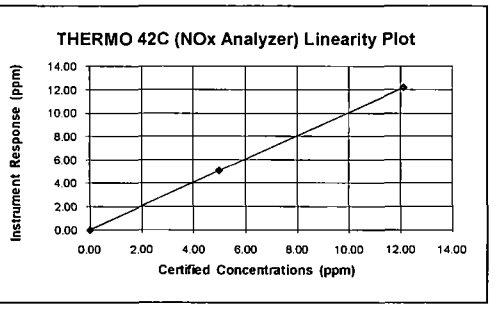
| CAI 200 ($CO_2$ Analyzer) | | | | |
|---|---|---|---|---|
| Certified Concentration (%) | Instrument Response (%) | Calibration Error (%) | Absolute Conc. (%) | Pass or Fail (±2%, ≤0.5%) |
| 0.00 | -0.01 | -0.05 | 0.01 | YES (%) |
| 9.20 | 9.22 | 0.10 | 0.02 | YES (%) |
| 19.30 | 19.26 | -0.21 | 0.04 | YES (%) |
| Linearity = 1.002 | | | | |



**Calibration Date: October 6, 2009**
**Client: Florida Power and Light**

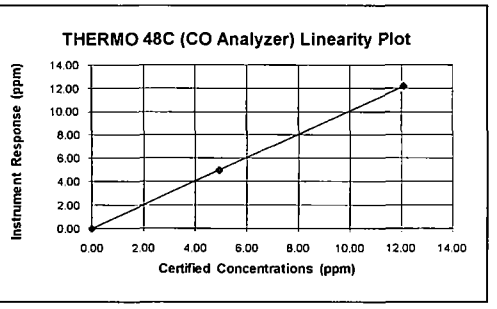
NOx Span (ppm) = 12.10

| THERMO 42C (NOx Analyzer) | | | | |
|---|---|---|---|---|
| Certified Concentration (ppm) | Instrument Response (ppm) | Calibration Error (%) | Absolute Conc. (ppm) | Pass or Fail (±2%, ≤0.5ppm) |
| 0.00 | 0.02 | 0.17 | 0.02 | YES (%) |
| 4.99 | 5.08 | 0.74 | 0.09 | YES (%) |
| 12.10 | 12.17 | 0.58 | 0.07 | YES (%) |
| Linearity = 0.996 | | | | |



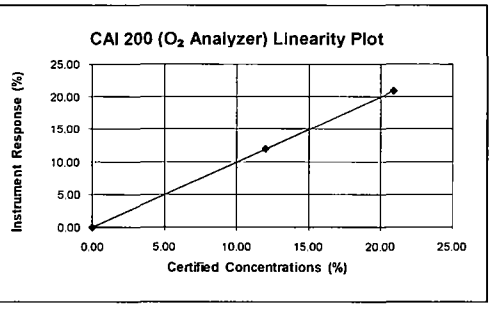

CO Span (ppm) = 12.10

| THERMO 48C (CO Analyzer) | | | | |
|---|---|---|---|---|
| Certified Concentration (ppm) | Instrument Response (ppm) | Calibration Error (%) | Absolute Conc. (ppm) | Pass or Fail (±2%, ≤0.5ppm) |
| 0.00 | 0.03 | 0.25 | 0.03 | YES (%) |
| 4.94 | 5.00 | 0.50 | 0.06 | YES (%) |
| 12.10 | 12.18 | 0.66 | 0.08 | YES (%) |
| Linearity = 0.996 | | | | |




O2 Span (%) = 20.90

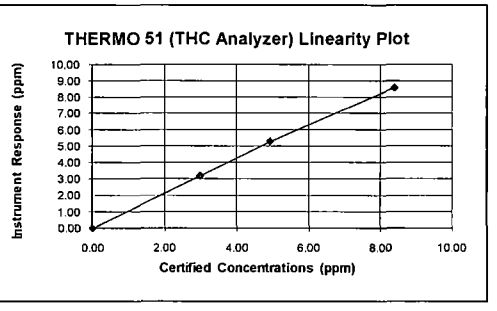
| CAI 200 ($O_2$ Analyzer) | | | | |
|---|---|---|---|---|
| Certified Concentration (%) | Instrument Response (%) | Calibration Error (%) | Absolute Conc. (%) | Pass or Fail (±2%, ≤0.5%) |
| 0.00 | 0.04 | 0.19 | 0.04 | YES (%) |
| 12.00 | 11.97 | -0.14 | 0.03 | YES (%) |
| 20.90 | 20.91 | 0.05 | 0.01 | YES (%) |
| Linearity = 1.002 | | | | |




THC Range (ppm) = 10.5

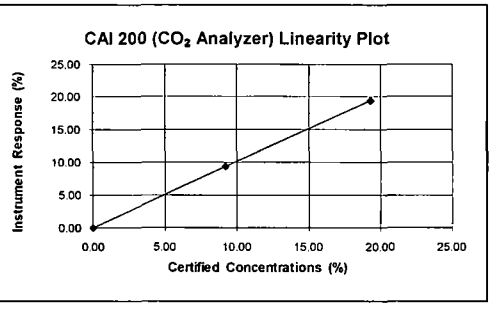
| THERMO 51 (THC Analyzer) | | | | |
|---|---|---|---|---|
| Certified Concentration (ppm) | Instrument Response (ppm) | Calibration Error (%) | Estimated Point (ppm) | Pass or Fail (±2,5%)[1] |
| 0.00 | 0.00 | 0.00 | N/A | YES |
| 3.00 | 3.19 | 3.95 | 3.07 | YES |
| 4.94 | 5.29 | 4.70 | 5.06 | YES |
| 8.40 | 8.60 | 1.90 | N/A | YES |
| Linearity = 1.002 | | | | |

[1]-zero/high based on 2% of span,low/mid based on 5% of concentration




CO2 Span (%) = 19.30

| CAI 200 ($CO_2$ Analyzer) | | | | |
|---|---|---|---|---|
| Certified Concentration (%) | Instrument Response (%) | Calibration Error (%) | Absolute Conc. (%) | Pass or Fail (±2%, ≤0.5%) |
| 0.00 | 0.05 | 0.26 | 0.05 | YES (%) |
| 9.20 | 9.42 | 1.14 | 0.22 | YES (%) |
| 19.30 | 19.39 | 0.47 | 0.09 | YES (%) |
| Linearity = 0.998 | | | | |



**NOx Converter Efficiency**

**Date:** October 5, 2009

**Analyzer:** INST-NX-0010

RM 7E, (08-15-06), 8.2.4.1 Introduce a concentration of 40 to 60 ppmv $NO_2$ to the analyzer in direct calibration mode and record the NOx concentration displayed by the analyzer. ... Calculate the converter efficiency using Equation 7E-7 in Section 12.7. The specification for converter efficiency in Section 13.5 must be met. ... The $NO_2$ must be prepared according to the EPA Traceability Protocol and have an accuracy within 2.0 percent.

| | | |
|---|---|---|
| **Audit Gas:** | $NO_2$ Concentration ($C_v$), ppmvd | **48.00** |
| **Converter Efficiency Calculations:** | | |
| | Analyzer Reading, NO Channel, ppmvd | **2.17** |
| | Analyzer Reading, NOx Channel, ppmvd | **48.96** |
| | Analyzer Reading, $NO_2$ Channel ($C_{Dir(NO2)}$), ppmvd | **46.79** |
| | Converter Efficiency, % | **97.48** |

RM 7E, (08-15-06), 13.5 NO2 to NO Conversion Efficiency Test (as applicable). The NO2 to NO conversion efficiency, calculated according to Equation 7E-7 or Equation 7E-9, must be greater than or equal to 90 percent.

$$Eff_{NO2} = \left(\frac{C_{Dir}}{C_V}\right) \times 100$$

Eq. 7E-7 = $\frac{46.79 \text{ ppmvd}}{48.00 \text{ ppmvd}}$ x 100 = 97.48%

| Date/Time | Elapsed Time | NOx | NO |
|---|---|---|---|
| mm/dd/yy hh:mm:ss | Seconds | ppmvd | ppmvd |
| 10/05/09 6:30:45 | 1528 | 30.96 | 3.33 |
| 10/05/09 6:31:15 | 1558 | 42.61 | 3.28 |
| 10/05/09 6:31:45 | 1588 | 45.32 | 2.90 |
| 10/05/09 6:32:15 | 1618 | 46.82 | 2.63 |
| 10/05/09 6:32:45 | 1648 | 47.72 | 2.45 |
| 10/05/09 6:33:15 | 1678 | 48.42 | 2.32 |
| 10/05/09 6:33:45 | 1708 | 48.96 | 2.17 |

**NOx Converter Efficiency**

**Date:** October 6, 2009

**Analyzer:** INST-NX-0010

RM 7E, (08-15-06), 8.2.4.1 Introduce a concentration of 40 to 60 ppmv $NO_2$ to the analyzer in direct calibration mode and record the NOx concentration displayed by the analyzer. ... Calculate the converter efficiency using Equation 7E-7 in Section 12.7. The specification for converter efficiency in Section 13.5 must be met. ... The $NO_2$ must be prepared according to the EPA Traceability Protocol and have an accuracy within 2.0 percent.

| | | |
|---|---|---|
| **Audit Gas:** | $NO_2$ Concentration ($C_v$), ppmvd | **48.00** |
| **Converter Efficiency Calculations:** | | |
| | Analyzer Reading, NO Channel, ppmvd | **2.32** |
| | Analyzer Reading, NOx Channel, ppmvd | **49.74** |
| | Analyzer Reading, $NO_2$ Channel ($C_{Dir(NO2)}$), ppmvd | **47.42** |
| | Converter Efficiency, % | **98.79** |

RM 7E, (08-15-06), 13.5 NO2 to NO Conversion Efficiency Test (as applicable). The NO2 to NO conversion efficiency, calculated according to Equation 7E-7 or Equation 7E-9, must be greater than or equal to 90 percent.

$$Eff_{NO2} = \left(\frac{C_{Dir}}{C_V}\right) \times 100$$

Eq. 7E-7 = $\frac{47.42 \text{ ppmvd}}{48.00 \text{ ppmvd}}$ x 100 = 98.79%

| Date/Time | Elapsed Time | NOx | NO |
|---|---|---|---|
| mm/dd/yy hh:mm:ss | Seconds | ppmvd | ppmvd |
| 10/06/09 07:48:58 | 1290 | 5.10 | 4.98 |
| 10/06/09 07:49:28 | 1320 | 23.89 | 3.81 |
| 10/06/09 07:49:58 | 1350 | 45.70 | 2.27 |
| 10/06/09 07:50:28 | 1380 | 48.48 | 2.17 |
| 10/06/09 07:50:58 | 1410 | 49.65 | 2.03 |
| 10/06/09 07:51:28 | 1440 | 49.33 | 1.93 |
| 10/06/09 07:51:58 | 1470 | 49.73 | 1.87 |
| 10/06/09 07:52:28 | 1500 | 49.74 | 2.32 |

| DRIFT AND BIAS CHECK | | |
|---|---|---|
| **Strat Test Pre and Post QA/QC Check** | **O2** | **NOx** |
| **Initial Zero** | 0.02 | 0.03 |
| **Final Zero** | -0.01 | -0.03 |
| **Avg. Zero** | 0.01 | 0.00 |
| **Initial UpScale** | 12.01 | 11.80 |
| **Final UpScale** | 12.03 | 11.76 |
| **Avg. UpScale** | 12.02 | 11.78 |
| **Sys Resp (Zero)** | 0.04 | 0.00 |
| **Sys Resp (Upscale)** | 11.96 | 12.11 |
| **Upscale Cal Gas** | 12.00 | 12.10 |
| **Initial Zero Bias** | -0.10% | 0.25% |
| **Final Zero Bias** | -0.24% | -0.25% |
| **Zero Drift** | 0.14% | 0.50% |
| **Initial Upscale Bias** | 0.24% | -2.56% |
| **Final Upscale Bias** | 0.33% | -2.89% |
| **Upscale Drift** | 0.10% | 0.33% |
| Alternative Specification Abs Diff **Initial Zero** | 0.02 | 0.03 |
| **Final Zero** | 0.05 | 0.03 |
| **Initial Upscale** | 0.05 | 0.31 |
| **Final Upscale** | 0.07 | 0.35 |
| **Calibration Span** | 20.90 | 12.10 |
| **3% of Range (drift)** | 0.63 | 0.36 |
| **5% of Range (bias)** | 1.05 | 0.61 |

| | | |
|---|---|---|
| **Respone Time (min)** | 0.5 | 1.2 |
| **Sys. Response (min)** | 1.2 | |

| Date/Time mm/dd/yy hh:mm:ss | z | O2 % | s | z | NOx PPM | s | INJECTIONS |
|---|---|---|---|---|---|---|---|
| 10/05/09 07:07:37 | | 21.04 | | | **0.04** | | x |
| 10/05/09 07:07:47 | | 17.24 | | | **0.04** | | |
| 10/05/09 07:07:57 | | 0.94 | | | **0.08** | | |
| 10/05/09 07:08:07 | x | **0.11** | | | **-0.14** | | |
| 10/05/09 07:08:17 | | **0.07** | | | 1.53 | | |
| 10/05/09 07:08:27 | | **0.05** | | | 6.96 | | |
| 10/05/09 07:08:37 | | **0.05** | | | 10.68 | | |
| 10/05/09 07:08:47 | | **0.04** | | | **11.30** | x | |
| 10/05/09 07:08:57 | | **0.02** | | | **11.73** | | |
| 10/05/09 07:09:07 | | **0.02** | | | **11.77** | | |
| 10/05/09 07:09:17 | | **0.01** | | | **11.82** | | |
| 10/05/09 07:09:27 | | **0.01** | | | **11.87** | | |
| 10/05/09 07:09:37 | | **0.01** | | | **11.85** | | |
| 10/05/09 07:09:47 | | **0.01** | | | **11.83** | | |
| 10/05/09 07:09:57 | | **0.01** | | | **11.83** | | |
| 10/05/09 07:10:07 | | **0.00** | | | **11.86** | | |
| 10/05/09 07:10:17 | | **0.26** | | | **11.86** | | x |
| 10/05/09 07:10:27 | | 9.97 | | | **11.83** | | |
| 10/05/09 07:10:37 | | **11.95** | x | | 9.71 | | |
| 10/05/09 07:10:47 | | **11.99** | | | 5.91 | | |
| 10/05/09 07:10:57 | | **12.00** | | | 3.41 | | |
| 10/05/09 07:11:07 | | **12.00** | | | 1.42 | | |
| 10/05/09 07:11:17 | | **12.02** | | x | **0.19** | | |

| DRIFT AND BIAS CHECK | | | | | |
|---|---|---|---|---|---|
| Base W/O Db Load, Run - 1-1 | $O_2$ | NOx | CO | VOC | $CO_2$ |
| Raw Average | 12.99 | 2.30 | 0.17 | 0.77 | 4.94 |
| Corrected Average | 12.97 | 2.36 | 0.37 | 0.47 | 4.74 |
| Initial Zero | 0.02 | 0.03 | 0.03 | 0.29 | 0.06 |
| Final Zero | -0.01 | -0.03 | -0.44 | 0.50 | 0.41 |
| Avg. Zero | 0.01 | 0.00 | -0.21 | 0.40 | 0.24 |
| Initial UpScale | 12.01 | 4.92 | 4.91 | 3.26 | 9.19 |
| Final UpScale | 12.03 | 4.83 | 4.70 | 3.52 | 9.55 |
| Avg. UpScale | 12.02 | 4.88 | 4.81 | 3.39 | 9.37 |
| Sys Resp (Zero) | 0.04 | 0.00 | -0.03 | 0.09 | -0.01 |
| Sys Resp (Upscale) | 11.96 | 5.11 | 4.95 | 3.15 | 9.22 |
| Upscale Cal Gas | 12.00 | 4.99 | 4.94 | 3.00 | 9.20 |
| Initial Zero Bias | -0.10% | 0.25% | 0.50% | 1.90% | 0.36% |
| Final Zero Bias | -0.24% | -0.25% | -3.39% | 3.90% | 2.18% |
| Zero Drift | 0.14% | 0.50% | 3.88% | 2.00% | 1.81% |
| Initial Upscale Bias | 0.24% | -1.57% | -0.33% | 1.05% | -0.16% |
| Final Upscale Bias | 0.33% | -2.31% | -2.07% | 3.52% | 1.71% |
| Upscale Drift | 0.10% | 0.74% | 1.74% | 2.48% | 1.87% |
| Alternative Specification Abs Diff: Initial Zero | 0.02 | 0.03 | 0.06 | -- | 0.07 |
| Alternative Specification Abs Diff: Final Zero | 0.05 | 0.03 | 0.41 | -- | 0.42 |
| Alternative Specification Abs Diff: Initial Upscale | 0.05 | 0.19 | 0.04 | -- | 0.03 |
| Alternative Specification Abs Diff: Final Upscale | 0.07 | 0.28 | 0.25 | -- | 0.33 |
| Calibration Span | 20.90 | 12.10 | 12.10 | 10.50 | 19.30 |
| 3% of Cal. Span (drift) | 0.63 | 0.36 | 0.36 | 0.32 | 0.58 |
| 5% of Cal. Span (bias) | 1.05 | 0.61 | 0.61 | 0.53 | 0.97 |

| DRIFT AND BIAS CHECK | | | | | |
|---|---|---|---|---|---|
| Base W/O Db Load, Run - 1-2 | $O_2$ | NOx | CO | VOC | $CO_2$ |
| Raw Average | 13.04 | 2.35 | -0.03 | 0.73 | 5.08 |
| Corrected Average | 13.00 | 2.46 | 0.41 | 0.41 | 4.65 |
| Initial Zero | -0.01 | -0.03 | -0.44 | 0.50 | 0.41 |
| Final Zero | -0.03 | -0.02 | -0.45 | 0.44 | 0.56 |
| Avg. Zero | -0.02 | -0.03 | -0.45 | 0.47 | 0.49 |
| Initial UpScale | 12.03 | 4.83 | 4.70 | 3.07 | 9.55 |
| Final UpScale | 12.04 | 4.78 | 4.55 | 2.95 | 9.61 |
| Avg. UpScale | 12.04 | 4.81 | 4.63 | 3.01 | 9.58 |
| Sys Resp (Zero) | 0.04 | 0.00 | -0.03 | 0.09 | -0.01 |
| Sys Resp (Upscale) | 11.96 | 5.11 | 4.95 | 3.15 | 9.22 |
| Upscale Cal Gas | 12.00 | 4.99 | 4.94 | 3.00 | 9.20 |
| Initial Zero Bias | -0.24% | -0.25% | -3.39% | 3.90% | 2.18% |
| Final Zero Bias | -0.33% | -0.17% | -3.47% | 3.33% | 2.95% |
| Zero Drift | 0.10% | 0.08% | 0.08% | 0.57% | 0.78% |
| Initial Upscale Bias | 0.33% | -2.31% | -2.07% | -0.76% | 1.71% |
| Final Upscale Bias | 0.38% | -2.73% | -3.31% | -1.90% | 2.02% |
| Upscale Drift | 0.05% | 0.41% | 1.24% | 1.14% | 0.31% |
| Alternative Specification Abs Diff: Initial Zero | 0.05 | 0.03 | 0.41 | -- | 0.42 |
| Alternative Specification Abs Diff: Final Zero | 0.07 | 0.02 | 0.42 | -- | 0.57 |
| Alternative Specification Abs Diff: Initial Upscale | 0.07 | 0.28 | 0.25 | -- | 0.33 |
| Alternative Specification Abs Diff: Final Upscale | 0.08 | 0.33 | 0.40 | -- | 0.39 |
| Calibration Span | 20.90 | 12.10 | 12.10 | 10.50 | 19.30 |
| 3% of Cal. Span (drift) | 0.63 | 0.36 | 0.36 | 0.32 | 0.58 |
| 5% of Cal. Span (bias) | 1.05 | 0.61 | 0.61 | 0.53 | 0.97 |

| DRIFT AND BIAS CHECK | | | | | |
|---|---|---|---|---|---|
| Base W/O Db Load, Run - 1-3 | $O_2$ | NOx | CO | VOC | $CO_2$ |
| Raw Average | 13.04 | 2.34 | -0.17 | 1.12 | 5.19 |
| Corrected Average | 13.01 | 2.46 | 0.21 | 0.92 | 4.66 |
| Initial Zero | -0.03 | -0.02 | -0.45 | 0.44 | 0.56 |
| Final Zero | -0.04 | -0.02 | -0.30 | 0.34 | 0.67 |
| Avg. Zero | -0.04 | -0.02 | -0.38 | 0.39 | 0.62 |
| Initial UpScale | 12.04 | 4.78 | 4.55 | 2.95 | 9.61 |
| Final UpScale | 12.01 | 4.76 | 4.40 | 3.26 | 9.67 |
| Avg. UpScale | 12.03 | 4.77 | 4.48 | 3.11 | 9.64 |
| Sys Resp (Zero) | 0.04 | 0.00 | -0.03 | 0.09 | -0.01 |
| Sys Resp (Upscale) | 11.96 | 5.11 | 4.95 | 3.15 | 9.22 |
| Upscale Cal Gas | 12.00 | 4.99 | 4.94 | 3.00 | 9.20 |
| Initial Zero Bias | -0.33% | -0.17% | -3.47% | 3.33% | 2.95% |
| Final Zero Bias | -0.38% | -0.17% | -2.23% | 2.38% | 3.52% |
| Zero Drift | 0.05% | 0.00% | 1.24% | 0.95% | 0.57% |
| Initial Upscale Bias | 0.38% | -2.73% | -3.31% | -1.90% | 2.02% |
| Final Upscale Bias | 0.24% | -2.89% | -4.55% | 1.05% | 2.33% |
| Upscale Drift | 0.14% | 0.17% | 1.24% | 2.95% | 0.31% |
| Alternative Specification Abs Diff: Initial Zero | 0.07 | 0.02 | 0.42 | -- | 0.57 |
| Alternative Specification Abs Diff: Final Zero | 0.08 | 0.02 | 0.27 | -- | 0.68 |
| Alternative Specification Abs Diff: Initial Upscale | 0.08 | 0.33 | 0.40 | -- | 0.39 |
| Alternative Specification Abs Diff: Final Upscale | 0.05 | 0.35 | 0.55 | -- | 0.45 |
| Calibration Span | 20.90 | 12.10 | 12.10 | 10.50 | 19.30 |
| 3% of Cal. Span (drift) | 0.63 | 0.36 | 0.36 | 0.32 | 0.58 |
| 5% of Cal. Span (bias) | 1.05 | 0.61 | 0.61 | 0.53 | 0.97 |

| DRIFT AND BIAS CHECK | | | | | |
|---|---|---|---|---|---|
| Base W/Db Load, Run - 2-1 | $O_2$ | NOx | CO | VOC | $CO_2$ |
| Raw Average | 12.00 | 2.56 | 4.17 | 1.72 | 5.00 |
| Corrected Average | 12.00 | 2.66 | 4.65 | 1.97 | 5.09 |
| Initial Zero | -0.05 | 0.00 | -0.45 | 0.00 | 0.01 |
| Final Zero | -0.03 | 0.01 | -0.45 | -0.01 | 0.05 |
| Avg. Zero | -0.04 | 0.01 | -0.45 | -0.01 | 0.03 |
| Initial UpScale | 12.00 | 4.81 | 4.47 | 2.87 | 9.06 |
| Final UpScale | 11.99 | 4.79 | 4.45 | 3.07 | 8.96 |
| Avg. UpScale | 12.00 | 4.80 | 4.46 | 2.97 | 9.01 |
| Sys Resp (Zero) | 0.04 | 0.00 | -0.03 | 0.09 | -0.01 |
| Sys Resp (Upscale) | 11.96 | 5.11 | 4.95 | 3.15 | 9.22 |
| Upscale Cal Gas | 12.00 | 4.99 | 4.94 | 3.00 | 9.20 |
| Initial Zero Bias | -0.43% | 0.00% | -3.47% | -0.86% | 0.10% |
| Final Zero Bias | -0.33% | 0.08% | -3.47% | -0.95% | 0.31% |
| Zero Drift | 0.10% | 0.08% | 0.00% | 0.10% | 0.21% |
| Initial Upscale Bias | 0.19% | -2.48% | -3.97% | -2.67% | -0.83% |
| Final Upscale Bias | 0.14% | -2.64% | -4.13% | -0.76% | -1.35% |
| Upscale Drift | 0.05% | 0.17% | 0.17% | 1.90% | 0.52% |
| Alternative Specification Abs Diff: Initial Zero | 0.09 | 0.00 | 0.42 | -- | 0.02 |
| Alternative Specification Abs Diff: Final Zero | 0.07 | 0.01 | 0.42 | -- | 0.06 |
| Alternative Specification Abs Diff: Initial Upscale | 0.04 | 0.30 | 0.48 | -- | 0.16 |
| Alternative Specification Abs Diff: Final Upscale | 0.03 | 0.32 | 0.50 | -- | 0.26 |
| Calibration Span | 20.90 | 12.10 | 12.10 | 10.50 | 19.30 |
| 3% of Cal. Span (drift) | 0.63 | 0.36 | 0.36 | 0.32 | 0.58 |
| 5% of Cal. Span (bias) | 1.05 | 0.61 | 0.61 | 0.53 | 0.97 |

| DRIFT AND BIAS CHECK | | | | | |
|---|---|---|---|---|---|
| Base W/Db Load, Run - 2-2 | $O_2$ | NOx | CO | VOC | $CO_2$ |
| Raw Average | 12.01 | 2.58 | 4.05 | 0.87 | 5.03 |
| Corrected Average | 12.02 | 2.68 | 4.52 | 1.01 | 5.17 |
| Initial Zero | -0.03 | 0.01 | -0.45 | -0.01 | 0.05 |
| Final Zero | -0.06 | 0.06 | -0.44 | 0.01 | -0.15 |
| Avg. Zero | -0.05 | 0.04 | -0.45 | 0.00 | -0.05 |
| Initial UpScale | 11.99 | 4.79 | 4.45 | 3.07 | 8.96 |
| Final UpScale | 11.99 | 4.79 | 4.48 | 2.78 | 9.00 |
| Avg. UpScale | 11.99 | 4.79 | 4.47 | 2.93 | 8.98 |
| Sys Resp (Zero) | 0.04 | 0.00 | -0.03 | 0.09 | -0.01 |
| Sys Resp (Upscale) | 11.96 | 5.11 | 4.95 | 3.15 | 9.22 |
| Upscale Cal Gas | 12.00 | 4.99 | 4.94 | 3.00 | 9.20 |
| Initial Zero Bias | -0.33% | 0.08% | -3.47% | -0.95% | 0.31% |
| Final Zero Bias | -0.48% | 0.50% | -3.39% | -0.76% | -0.73% |
| Zero Drift | 0.14% | 0.41% | 0.08% | 0.19% | 1.04% |
| Initial Upscale Bias | 0.14% | -2.64% | -4.13% | -0.76% | -1.35% |
| Final Upscale Bias | 0.14% | -2.64% | -3.88% | -3.52% | -1.14% |
| Upscale Drift | 0.00% | 0.00% | 0.25% | 2.76% | 0.21% |
| Alternative Specification Abs Diff: Initial Zero | 0.07 | 0.01 | 0.42 | -- | 0.06 |
| Alternative Specification Abs Diff: Final Zero | 0.10 | 0.06 | 0.41 | -- | 0.14 |
| Alternative Specification Abs Diff: Initial Upscale | 0.03 | 0.32 | 0.50 | -- | 0.26 |
| Alternative Specification Abs Diff: Final Upscale | 0.03 | 0.32 | 0.47 | -- | 0.22 |
| Calibration Span | 20.90 | 12.10 | 12.10 | 10.50 | 19.30 |
| 3% of Cal. Span (drift) | 0.63 | 0.36 | 0.36 | 0.32 | 0.58 |
| 5% of Cal. Span (bias) | 1.05 | 0.61 | 0.61 | 0.53 | 0.97 |

| DRIFT AND BIAS CHECK | | | | | |
|---|---|---|---|---|---|
| Base W/Db Load, Run - 2-3 | $O_2$ | NOx | CO | VOC | $CO_2$ |
| Raw Average | 12.05 | 2.67 | 3.19 | 1.84 | 5.53 |
| Corrected Average | 12.06 | 2.67 | 3.15 | 1.82 | 5.24 |
| Initial Zero | 0.04 | 0.06 | 0.28 | 0.25 | 0.26 |
| Final Zero | 0.01 | 0.06 | -0.22 | 0.49 | 0.43 |
| Avg. Zero | 0.03 | 0.06 | 0.03 | 0.37 | 0.35 |
| Initial UpScale | 12.01 | 4.97 | 5.13 | 3.19 | 9.42 |
| Final UpScale | 11.98 | 4.90 | 4.84 | 3.15 | 9.48 |
| Avg. UpScale | 12.00 | 4.94 | 4.99 | 3.17 | 9.45 |
| Sys Resp (Zero) | 0.04 | 0.02 | 0.03 | 0.00 | 0.05 |
| Sys Resp (Upscale) | 11.97 | 5.08 | 5.00 | 3.19 | 9.42 |
| Upscale Cal Gas | 12.00 | 4.99 | 4.94 | 3.00 | 9.20 |
| Initial Zero Bias | 0.00% | 0.33% | 2.07% | 2.38% | 1.09% |
| Final Zero Bias | -0.14% | 0.33% | -2.07% | 4.67% | 1.97% |
| Zero Drift | 0.14% | 0.00% | 4.13% | 2.29% | 0.88% |
| Initial Upscale Bias | 0.19% | -0.91% | 1.07% | 0.00% | 0.00% |
| Final Upscale Bias | 0.05% | -1.49% | -1.32% | -0.38% | 0.31% |
| Upscale Drift | 0.14% | 0.58% | 2.40% | 0.38% | 0.31% |
| Alternative Specification Abs Diff: Initial Zero | 0.00 | 0.04 | 0.25 | -- | 0.21 |
| Alternative Specification Abs Diff: Final Zero | 0.03 | 0.04 | 0.25 | -- | 0.38 |
| Alternative Specification Abs Diff: Initial Upscale | 0.04 | 0.11 | 0.13 | -- | 0.00 |
| Alternative Specification Abs Diff: Final Upscale | 0.01 | 0.18 | 0.16 | -- | 0.06 |
| Calibration Span | 20.90 | 12.10 | 12.10 | 10.50 | 19.30 |
| 3% of Cal. Span (drift) | 0.63 | 0.36 | 0.36 | 0.32 | 0.58 |
| 5% of Cal. Span (bias) | 1.05 | 0.61 | 0.61 | 0.53 | 0.97 |

**METERING SYSTEM CALIBRATION SHEET**
**EPA Reference Method 5**
**Metering System Pre-Test Calibration**
**Air Hygiene Assett ID: samp-cp-0005**

Filename: \\SERVER2\public\Shared\QAQC\Calibrations\PM-Equipment\M-5 Consoles\Calibration Sheet v4.0\Current\[SAMP-CP-0005 Calibration 7-16-09.xls]Original (5 point)

Make: ES
Model #: C-5000-XS
Serial #: 1418

Date: 07/16/09
Barometric Pressure: 29.12 (in. Hg)
Theoretical Critical Vacuum: 13.74 (in. Hg)

**DRY GAS METER READINGS**

| ΔH (in H2O) | Time (min) | Volume Initial (cu ft) | Volume Final (cu ft) | Volume Total (cu ft) | Initial Temps. Inlet (deg F) | Initial Temps. Outlet (deg F) |
|---|---|---|---|---|---|---|
| 0.26 | 17.00 | 234.230 | 239.240 | 5.010 | 85.0 | 83.0 |
| 0.57 | 12.00 | 239.240 | 244.490 | 5.250 | 85.0 | 84.0 |
| 1.00 | 10.00 | 244.490 | 250.160 | 5.670 | 85.0 | 84.0 |
| 1.80 | 10.00 | 250.160 | 257.480 | 7.320 | 87.0 | 85.0 |
| 3.30 | 10.00 | 257.480 | 267.360 | 9.880 | 88.0 | 86.0 |

| Final Temps. Inlet (deg F) | Final Temps. Outlet (deg F) | Orifice Serial# (number) | K' Orifice Coefficient (see above) | Actual Vacuum (in Hg) | Ambient Temperature Initial (deg F) | Ambient Temperature Final (deg F) | Ambient Temperature Average (deg F) |
|---|---|---|---|---|---|---|---|
| 85.0 | 83.0 | 40 | 0.2354 | 16.0 | 85.6 | 86.2 | 85.9 |
| 86.0 | 85.0 | 48 | 0.3491 | 16.0 | 86.4 | 86.5 | 86.5 |
| 87.0 | 85.0 | 55 | 0.4530 | 16.0 | 86.9 | 87.3 | 87.1 |
| 88.0 | 86.0 | 63 | 0.5840 | 16.0 | 87.3 | 87.8 | 87.6 |
| 89.0 | 86.0 | 73 | 0.7945 | 16.0 | 87.8 | 88.3 | 88.1 |

**RESULTS**

| DRY GAS METER VOLUME CORRECTED Vm(std) (cu ft) | DRY GAS METER VOLUME CORRECTED Vm(std) (liters) | ORIFICE VOLUME CORRECTED Vcr(std) (cu ft) | ORIFICE VOLUME CORRECTED Vcr(std) (liters) | ORIFICE VOLUME NOMINAL Vcr (cu ft) |
|---|---|---|---|---|
| 4.734 | 134.06 | 4.988 | 141.2 | 5.300 |
| 4.955 | 140.34 | 5.219 | 147.8 | 5.551 |
| 5.355 | 151.66 | 5.640 | 159.7 | 6.007 |
| 6.912 | 195.74 | 7.268 | 205.8 | 7.747 |
| 9.351 | 264.82 | 9.883 | 279.9 | 10.544 |

| DRY GAS METER CALIBRATION FACTOR Y Variation (number) | DRY GAS METER CALIBRATION FACTOR Y Value (number) | ORIFICE CALIBRATION FACTOR ΔH@ Value (in H2O) | ORIFICE CALIBRATION FACTOR ΔH@ Value (mm H2O) | ORIFICE CALIBRATION FACTOR ΔH@ Variation (in H2O) |
|---|---|---|---|---|
| 0.000 | 1.054 | 1.608 | 40.84 | -0.086 |
| -0.001 | 1.053 | 1.600 | 40.64 | -0.094 |
| -0.001 | 1.053 | 1.669 | 42.39 | -0.025 |
| -0.002 | 1.052 | 1.806 | 45.87 | 0.111 |
| 0.003 | 1.057 | 1.789 | 45.43 | 0.094 |
| **AVERAGE:** | **1.054** | **1.694** | 43.04 | **PASSED** |

Notes: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter,acceptable tolerance of individual values from the average is +/- 0.02. For Orifice Calibration Factor dH@, the orifice differential pressure in inches of $H_20$ that equates to 0.75 cfm of air at 68 °F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/- 0.2. For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above. The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

SIGNATURE: Craig McCarley DATE: 07/16/09

**METERING SYSTEM CALIBRATION SHEET**
**EPA Reference Method 5**
**Metering System Post-Test Calibration**
**Air Hygiene Assett ID: samp-cp-0005**

Filename: \\SERVER2\public\Shared\QAQC\Calibrations\PM-Equipment\M-5 Consoles\Calibration Sheet v4.0\Current\[SAMP-CP-0005 Calibration 7-16-09.xls]10-16-09 (3 point)

Make: ES
Model #: C-5000-XS
Serial #: 1418

Date: 10/16/09
Barometric Pressure: 29.15 (in. Hg)
Theoretical Critical Vacuum: 13.75 (in. Hg)

**DRY GAS METER READINGS**

| -H (in H2O) | Time (min) | Volume Initial (cu ft) | Volume Final (cu ft) | Volume Total (cu ft) | Initial Temps. Inlet (deg F) | Initial Temps. Outlet (deg F) |
|---|---|---|---|---|---|---|
| 3.20 | 10.00 | 477.110 | 487.020 | 9.910 | 65.0 | 60.0 |
| 3.20 | 10.00 | 487.020 | 496.930 | 9.910 | 63.0 | 60.0 |
| 3.20 | 10.00 | 496.930 | 506.860 | 9.930 | 64.0 | 61.0 |

| Final Temps. Inlet (deg F) | Final Temps. Outlet (deg F) | Orifice Serial# (number) | K' Orifice Coefficient (see above) | Actual Vacuum (in Hg) | Ambient Temperature Initial (deg F) | Ambient Temperature Final (deg F) | Ambient Temperature Average (deg F) |
|---|---|---|---|---|---|---|---|
| 63.0 | 60.0 | 73 | 0.7945 | 16.0 | 63.0 | 63.0 | 63.0 |
| 65.0 | 62.0 | 73 | 0.7945 | 16.0 | 63.0 | 63.0 | 63.0 |
| 65.0 | 61.0 | 73 | 0.7945 | 16.0 | 63.0 | 63.0 | 63.0 |

**RESULTS**

| DRY GAS METER VOLUME CORRECTED Vm(std) (cu ft) | DRY GAS METER VOLUME CORRECTED Vm(std) (liters) | ORIFICE VOLUME CORRECTED Vcr(std) (cu ft) | ORIFICE VOLUME CORRECTED Vcr(std) (liters) | ORIFICE VOLUME NOMINAL Vcr (cu ft) |
|---|---|---|---|---|
| 9.841 | 278.69 | 10.127 | 286.8 | 10.300 |
| 9.831 | 278.43 | 10.127 | 286.8 | 10.300 |
| 9.847 | 278.85 | 10.127 | 286.8 | 10.300 |

| DRY GAS METER CALIBRATION FACTOR Y Variation (number) | DRY GAS METER CALIBRATION FACTOR Y Value (number) | ORIFICE CALIBRATION FACTOR -H@ Value (in H2O) | ORIFICE CALIBRATION FACTOR -H@ Value (mm H2O) | ORIFICE CALIBRATION FACTOR -H@ Variation (in H2O) |
|---|---|---|---|---|
| 0.000 | 1.029 | 1.736 | 44.10 | 0.002 |
| 0.001 | 1.030 | 1.733 | 44.02 | -0.001 |
| -0.001 | 1.028 | 1.733 | 44.02 | -0.001 |
| **AVERAGE:** | **1.029** | **1.734** | 44.04 | **PASSED** |
| **LAST 5-PT:** | **1.054** | **1.694** | **PASSED** | 5-PT Date: |
| **% DIFF:** | **2.4%** | **2.3%** | | 07/16/09 |

40 CFR - CHAPTER I - PART 60
Appendix A, Method 5
10.3.2 Calibration After Use
After each field use, the calibration of the metering system shall be checked by performing three calibration runs at a single, intermediate orifice setting (based on the previous field test)....Calculate the average value of the DGM calibration factor. If the value has changed by more than 5 percent, recalibrate the meter over the full range of orifice settings, as detailed in Section 10.3.1.

10.3.3 Acceptable Variation in Calibration
If the DGM coefficient values obtained before and after a test series differ by more than 5 percent, the test series shall either be voided, or calculations for the test series shall be performed using whichever meter coefficient value (i.e., before or after) gives the lower value of total sample volume.

Notes: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter,acceptable tolerance of individual values from the average is +/- 0.02. For Orifice Calibration Factor dH@, the orifice differential pressure in inches of $H_20$ that equates to 0.75 cfm of air at 68 °F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/- 0.2. For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above. The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

SIGNATURE: Craig McCarty DATE: 10/16/09

# VISIBLE EMISSIONS EVALUATOR

This is to certify that

## DARIN GRIMES

met the specifications of Federal Reference Method 9 and qualifies as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, NC. This certificate is valid for six months from date of issue.

374248
CERT NUMBER

4/22/2009
DATE OF SCHOOL

TULSA, OK
SCHOOL LOCATION

10/22/2009
CERTIFICATION EXP DATE

GRI748589
STUDENT ID NUMBER

Michael A. Lunsford
MANAGER OF TRAINING SERVICES

# APPENDIX E

# FUEL ANALYSIS RECORDS

**Client:** Florida Power and Light
**Location:** West County Energy Center
**Date:** October 5, 2009
**Project #:** bv-09-westcounty.fl-comp#1

**Natural Gas - Fuel Analysis**

Standardized to 68 deg F and 14.696 psia - EPA Standards

| Gas Component | | Mole (%) | Molecular[1] Weight (lb/lb-mole) | Lbs Component per Lb-Mole of Gas | Wt. % of Component | Ideal Gross[1,3] Heating Value (Btu/ft$^3$) | Fuel Heat Value [HHV] (Btu/SCF) | Ideal Net[1,3] Heating Value (Btu/ft$^3$) | Fuel Heat Value [LHV] (Btu/SCF) |
|---|---|---|---|---|---|---|---|---|---|
| Methane | $CH_4$ | 96.839 | 16.0430 | 15.54 | 93.34 | 994.85 | 963.40 | 895.75 | 867.44 |
| Ethane | $C_2H_6$ | 1.410 | 30.0700 | 0.42 | 2.55 | 1,743.15 | 24.58 | 1,594.41 | 22.48 |
| Propane | $C_3H_8$ | 0.187 | 44.0970 | 0.08 | 0.50 | 2,478.35 | 4.63 | 2,280.17 | 4.26 |
| iso-Butane | $iC_4H_{10}$ | 0.029 | 58.1230 | 0.02 | 0.10 | 3,203.11 | 0.93 | 2,955.38 | 0.86 |
| *n*-Butane | $nC_4H_{10}$ | 0.029 | 58.1230 | 0.02 | 0.10 | 3,213.35 | 0.93 | 2,965.62 | 0.86 |
| Iso-Pentane | $iC_5H_{12}$ | 0.004 | 72.1500 | 0.00 | 0.02 | 3,940.87 | 0.16 | 3,643.50 | 0.15 |
| n-Pentane | $nC_5H_{12}$ | 0.000 | 72.1500 | 0.00 | 0.00 | 3,948.75 | 0.00 | 3,648.32 | 0.00 |
| Hexanes | $C_6H_{14}$ | 0.022 | 86.1770 | 0.02 | 0.11 | 4,684.54 | 1.03 | 4,337.82 | 0.95 |
| Heptanes | $C_7H_{16}$ | 0.000 | 100.2040 | 0.00 | 0.00 | 5,419.94 | 0.00 | 5,023.77 | 0.00 |
| Octanes | $C_8H_{18}$ | 0.000 | 114.2310 | 0.00 | 0.00 | 6,155.14 | 0.00 | 5,709.23 | 0.00 |
| Carbon Dioxide | $CO_2$ | 0.827 | 44.0100 | 0.36 | 2.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nitrogen | $N_2$ | 0.653 | 28.0134 | 0.18 | 1.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hydrogen Sulfide | $H_2S$ | 0.000 | 34.0800 | 0.00 | 0.00 | 627.54 | 0.00 | 578.00 | 0.00 |
| Oxygen | $O_2$ | 0.000 | 31.9988 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Helium | He | 0.000 | 4.0026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hydrogen | $H_2$ | 0.000 | 2.0159 | 0.00 | 0.00 | 319.34 | 0.00 | 269.82 | 0.00 |
| **Totals** | | **100.000** | | **16.64** | **100.00** | **dry** | **995.66** | **dry** | **897.00** |
| | | | | | | **wet[2,5]** | **972.70** | **wet[2,5]** | **876.32** |

| Characteristics of Fuel Gas | | |
|---|---|---|
| Molecular Weight of gas = | 16.645 | lb/lb-mole |
| Btu per lb. of gas[4] = | 23,043.749 | gross (HHV) |
| Btu per lb. of gas[4] = | 20,760.392 | net (LHV) |
| Density of fuel gas[2] = | 0.0432 | lb/cu. ft |
| Wt % VOC in fuel gas = | 0.83 | % |
| Specific Gravity[1] = | 0.5747 | |

| Component | Wt% |
|---|---|
| carbon | 73.19 |
| oxygen | 1.59 |
| hydrogen | 24.12 |
| nitrogen | 1.10 |
| helium | 0.00 |
| sulfur | 0.00 |
| **Total** | **100.00** |

**F-Factor (SCF dry exhaust per MMBtu [HHV]) = 8,644.29**
(Based on EPA RM-19) at 68 deg F and 14.696 psia

**F-Factor Calculation:**

F-Factor = 1,000,000*((3.64*%H)+(1.53*%C)+(0.57*%S)+(0.14*%N)-(0.46*%O))/GCV

GCV = Gross Btu per lb. of gas (HHV)

%H, %C, %S, %N, & %O are percent weight values calculated from fuel analysis and have units of (scf/lb)/%

Density of natural gas based on specific gravity multiplied by density of air at 68 deg F and 14.696 psia.

**References:**


[1] ASTM D 3588

[2] Civil Engineering Reference Manual, 7th ed. - Michael R. Lindeburg

[3] Mark's Standard Handbook for Mechanical Engineers, 10th ed. - Eugene A. Avallone, Theodore Baumeister III

[4] Introduction to Fluid Mechanics, 3rd ed. - William S. Janna

[5] GPA Reference Bulletin 181-86, revised 1986, reprinted 1995

HOUSTON LABORATORIES
8820 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

# Certificate of Analysis

Number: 1030-2009100200-001A

Mars Sharief
Air Hygiene
5634 S. 122nd East Ave.
Suite F
Tulsa OK 74146

October 14, 2009

Sample ID:
Station Name : Unit 1 C and w/o DB
Station Number :
Station Location : Tulsa, Oklahoma
Sample Point:

Sampled By:
Sample Of: Gas Spot
Sample Date: 10/05/2009
Sample Conditions: N.G. Pres., N.G. Temp.
PO / Ref. No:
COC. No:

## ANALYTICAL DATA

| Components | Mol % | Wt % | GPM at 14.696 psia | Method | Lab Tech. | Date Analyzed |
|---|---|---|---|---|---|---|
| | | | | GPA-2261 M | PW | 10/13/2009 2:14:17 |
| Nitrogen | 0.653 | 1.099 | | | | |
| Carbon Dioxide | 0.827 | 2.187 | | | | |
| Methane | 96.839 | 93.330 | | | | |
| Ethane | 1.410 | 2.547 | 0.376 | | | |
| Propane | 0.187 | 0.495 | 0.051 | | | |
| Iso Butane | 0.029 | 0.101 | 0.009 | | | |
| n-Butane | 0.029 | 0.101 | 0.009 | | | |
| Iso Pentane | 0.004 | 0.017 | 0.001 | | | |
| Hexanes Plus | 0.022 | 0.123 | 0.010 | | | |
| | 100.000 | 100.000 | 0.456 | | | |
| | C2 + | C3 + | iC5 + | | | |
| GPM TOTAL : | 0.456 | 0.080 | 0.011 | | | |
| Relative Density | Real Gas | | | 0.5757 | | |
| Calculated Molecular Weight | | | | 16.65 | | |
| Compressibility Factor | | | | 0.9979 | | |

Calculated Gross BTU per ft³ @14.696 psia & 60°F
Real Gas Dry Basis 1013
Saturated Basis 995

**Comments :**
Cylinder Number 1175

Hydrocarbon Laboratory Manager

**Quality Assurance:** The above analyses are performed in accordance with ASTM, UOP or GPA guidelines for quality assurance, unless otherwise stated

HOUSTON LABORATORIES
8820 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

# Certificate of Analysis

Number: 1030-2009100200-001A

Mars Sharief
Air Hygiene
5634 S. 122nd East Ave.
Suite F
Tulsa OK 74146

October 14, 2009

| | | | |
|---|---|---|---|
| Sample ID: | | Sampled By: | |
| Station Name: | Unit 1 C and w/o DB | Sample Of: | Gas |
| Station Number : | | Sample Date: | 10/05/2009 |
| Location: | Tulsa, Oklahoma | Sample Condition: | |
| Sample Point: | | PO / Ref. No: | |

## ANALYTICAL DATA

| Test | Method | Result | Unit | Detection Limit | Lab Tech. | Date Analyzed |
|---|---|---|---|---|---|---|
| Total Sulfur By UV | ASTM-D-6667 | <1.0 | PPMW | 1.0 | EM | 10/14/09 |
| Total Sulfur By UV | ASTM-D-6667 | <0.0001 | Wt%. | | EM | 10/14/09 |
| Total Sulfur By UV | ASTM-D-6667 | <0.032 | gr/100 cu.ft. | | EM | 10/14/09 |

**Comments:** Cylinder Number: 1175
Sample On: 10/05/2009

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP or GPA guidelines for quality assurance, unless otherwise stated.

**Client:** Florida Power and Light
**Location:** West County Energy Center
**Date:** October 6, 2009
**Project #:** bv-09-westcounty.fl-comp#1

**Natural Gas - Fuel Analysis**

Standardized to 68 deg F and 14.696 psia - EPA Standards

| Gas Component | | Mole (%) | Molecular[1] Weight (lb/lb-mole) | Lbs Component per Lb-Mole of Gas | Wt. % of Component | Ideal Gross[1,3] Heating Value (Btu/ft$^3$) | Fuel Heat Value [HHV] (Btu/SCF) | Ideal Net[1,3] Heating Value (Btu/ft$^3$) | Fuel Heat Value [LHV] (Btu/SCF) |
|---|---|---|---|---|---|---|---|---|---|
| Methane | $CH_4$ | 96.570 | 16.0430 | 15.49 | 93.04 | 994.85 | 960.72 | 895.75 | 865.03 |
| Ethane | $C_2H_6$ | 1.280 | 30.0700 | 0.38 | 2.31 | 1,743.15 | 22.31 | 1,594.41 | 20.41 |
| Propane | $C_3H_8$ | 0.121 | 44.0970 | 0.05 | 0.32 | 2,478.35 | 3.00 | 2,280.17 | 2.76 |
| iso-Butane | $iC_4H_{10}$ | 0.020 | 58.1230 | 0.01 | 0.07 | 3,203.11 | 0.64 | 2,955.38 | 0.59 |
| n-Butane | $nC_4H_{10}$ | 0.019 | 58.1230 | 0.01 | 0.07 | 3,213.35 | 0.61 | 2,965.62 | 0.56 |
| Iso-Pentane | $iC_5H_{12}$ | 0.007 | 72.1500 | 0.01 | 0.03 | 3,940.87 | 0.28 | 3,643.50 | 0.26 |
| n-Pentane | $nC_5H_{12}$ | 0.000 | 72.1500 | 0.00 | 0.00 | 3,948.75 | 0.00 | 3,648.32 | 0.00 |
| Hexanes | $C_6H_{14}$ | 0.018 | 86.1770 | 0.02 | 0.09 | 4,684.54 | 0.84 | 4,337.82 | 0.78 |
| Heptanes | $C_7H_{16}$ | 0.000 | 100.2040 | 0.00 | 0.00 | 5,419.94 | 0.00 | 5,023.77 | 0.00 |
| Octanes | $C_8H_{18}$ | 0.000 | 114.2310 | 0.00 | 0.00 | 6,155.14 | 0.00 | 5,709.23 | 0.00 |
| Carbon Dioxide | $CO_2$ | 0.799 | 44.0100 | 0.35 | 2.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nitrogen | $N_2$ | 1.166 | 28.0134 | 0.33 | 1.96 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hydrogen Sulfide | $H_2S$ | 0.000 | 34.0800 | 0.00 | 0.00 | 627.54 | 0.00 | 578.00 | 0.00 |
| Oxygen | $O_2$ | 0.000 | 31.9988 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Helium | He | 0.000 | 4.0026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hydrogen | $H_2$ | 0.000 | 2.0159 | 0.00 | 0.00 | 319.34 | 0.00 | 269.82 | 0.00 |
| **Totals** | | **100.000** | | **16.65** | **100.00** | **dry** | **988.40** | **dry** | **890.39** |
| | | | | | | **wet[2,5]** | **965.61** | **wet[2,5]** | **869.86** |

| Characteristics of Fuel Gas | | |
|---|---|---|
| Molecular Weight of gas = | 16.652 | lb/lb-mole |
| Btu per lb. of gas[4] = | 22,865.208 | gross (HHV) |
| Btu per lb. of gas[4] = | 20,597.777 | net (LHV) |
| Density of fuel gas[2] = | 0.0432 | lb/cu. ft |
| Wt % VOC in fuel gas = | 0.58 | % |
| Specific Gravity[1] = | 0.5750 | |

| Component | Wt% |
|---|---|
| carbon | 72.55 |
| oxygen | 1.54 |
| hydrogen | 23.95 |
| nitrogen | 1.96 |
| helium | 0.00 |
| sulfur | 0.00 |
| **Total** | **100.00** |

**F-Factor (SCF dry exhaust per MMBtu [HHV]) = 8,648.59**
(Based on EPA RM-19) at 68 deg F and 14.696 psia

**F-Factor Calculation:**

F-Factor = 1,000,000*((3.64*%H)+(1.53*%C)+(0.57*%S)+(0.14*%N)-(0.46*%O))/GCV

GCV = Gross Btu per lb. of gas (HHV)

%H, %C, %S, %N, & %O are percent weight values calculated from fuel analysis and have units of (scf/lb)/%

Density of natural gas based on specific gravity multiplied by density of air at 68 deg F and 14.696 psia.

**References:**


[1] ASTM D 3588

[2] Civil Engineering Reference Manual, 7th ed. - Michael R. Lindeburg

[3] Mark's Standard Handbook for Mechanical Engineers, 10th ed. - Eugene A. Avallone, Theodore Baumeister III

[4] Introduction to Fluid Mechanics, 3rd ed. - William S. Janna

[5] GPA Reference Bulletin 181-86, revised 1986, reprinted 1995

HOUSTON LABORATORIES
8820 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

# Certificate of Analysis

Number: 1030-2009100200-002A

Mars Sharief
Air Hygiene
5634 S. 122nd East Ave.
Suite F
Tulsa OK 74146

October 14, 2009

| | | | | |
|---|---|---|---|---|
| Sample ID: | | Sampled By: | | |
| Station Name : | Unit 1 C w/DB and Unit 1B w/DB | Sample Of: | Gas | Spot |
| Station Number : | | Sample Date: | 10/06/2009 | |
| Station Location : | Tulsa, Oklahoma | Sample Conditions: | N.G. Pres. , | N.G. Temp. |
| Sample Point: | | PO / Ref. No: | | |
| | | COC. No: | | |

## ANALYTICAL DATA

| Components | Mol % | Wt % | GPM at 14.696 psia | Method | Lab Tech. | Date Analyzed |
|---|---|---|---|---|---|---|
| | | | | GPA-2261 M | PW | 10/13/2009 2:14:17 |
| Nitrogen | 1.166 | 1.961 | | | | |
| Carbon Dioxide | 0.799 | 2.112 | | | | |
| Methane | 96.570 | 93.029 | | | | |
| Ethane | 1.280 | 2.311 | 0.341 | | | |
| Propane | 0.121 | 0.320 | 0.033 | | | |
| Iso Butane | 0.020 | 0.070 | 0.007 | | | |
| n-Butane | 0.019 | 0.066 | 0.006 | | | |
| Iso Pentane | 0.007 | 0.030 | 0.003 | | | |
| Hexanes Plus | 0.018 | 0.101 | 0.008 | | | |
| | 100.000 | 100.000 | 0.398 | | | |
| | **C2 +** | **C3 +** | **iC5 +** | | | |
| GPM TOTAL : | 0.398 | 0.057 | 0.011 | | | |
| Relative Density | Real Gas | | | 0.5759 | | |
| Calculated Molecular Weight | | | | 16.65 | | |
| Compressibility Factor | | | | 0.9980 | | |

Calculated Gross BTU per ft³ @14.696 psia & 60°F
Real Gas Dry Basis 1006
Saturated Basis 988

**Comments :** valves ok ; Note Nitrogen. ; Insufficient Sample For Rerun.
Cylinder Number 767

Hydrocarbon Laboratory Manager

**Quality Assurance:** The above analyses are performed in accordance with ASTM, UOP or GPA guidelines for quality assurance, unless otherwise stated

HOUSTON LABORATORIES
8820 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

# Certificate of Analysis

Number: 1030-2009100200-002A

Mars Sharief
Air Hygiene
5634 S. 122nd East Ave.
Suite F
Tulsa OK 74146

October 14, 2009

| | | | |
|---|---|---|---|
| Sample ID: | | Sampled By: | |
| Station Name: | Unit 1 C w/DB and Unit 1B w/DB | Sample Of: | Gas |
| Station Number : | | Sample Date: | 10/06/2009 |
| Location: | Tulsa, Oklahoma | Sample Condition: | |
| Sample Point: | | PO / Ref. No: | |

## ANALYTICAL DATA

| Test | Method | Result | Unit | Detection Limit | Lab Tech. | Date Analyzed |
|---|---|---|---|---|---|---|
| Total Sulfur By UV | ASTM-D-6667 | NR | PPMW | 1.0 | EM | 10/14/09 |
| Total Sulfur By UV | ASTM-D-6667 | NR | Wt%. | | EM | 10/14/09 |
| Total Sulfur By UV | ASTM-D-6667 | NR | gr/100 cu.ft. | | EM | 10/14/09 |

**Comments:** Cylinder Number: 767
NR= No result ( Insufficient sample )
Sample On: 10/06/2009

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP or GPA guidelines for quality assurance, unless otherwise stated.

# SAMPLE DESCRIPTION AND CHAIN OF CUSTODY RECORD

Air Hygiene International, Inc.
5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
(888) 461-8778
www.airhygiene.com

| Project Number: | bv-09-westcounty.fl-comp#1 | Laboratory Analysis Requested: | |
|---|---|---|---|
| Person Taking Samples: | JRF | ASTM 6667 and GPA-2261 M | |

| Sample Number | Location | Date | Volume | Analysis Method | | | |
|---|---|---|---|---|---|---|---|
| | | | | ASTM 6667 | GPA 2261 M | | |
| 001175 | Unit 1C w and w/o DB | 10/5/2009 | | x | x | | |
| 000767 | Unit 1C w/DB and Unit 1B w/DB | 10/6/2009 | | x | x | | |
| 003764 | Unit 1B w/oDB and Unit 1A w/DB | 10/7/2009 | | x | x | | |
| 000152 | Unit 1A w/o DB | 10/8/2009 | | x | x | | |
| | | | | | | | |
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| | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Relinquished by: (Signature) | Date: 10/12/09 | Time: 12:30 | Received by: (Signature) Martin Cisneros | Date: 10/13/09 | Time: 12:00 |
| Relinquished by: (Signature) | Date: | Time: | Received by: (Signature) | Date: | Time: |

Chain of Custody-AHI v1.1

# APPENDIX F

# STRATIFICATION TEST DATA

| Source Information | |
|---|---|
| **Company** | Florida Power and Light |
| **Plant Name** | West County Energy Center |
| **Equipment** | Mistubishi 501G |
| **Location** | Loxahatchee, Florida |

| Test Information | |
|---|---|
| **Date** | 10/05/09 |
| **Project #** | bv-09-westcounty.fl-comp#1 |
| **Unit Number** | 1C |
| **Load** | Base Load |
| **Number of Ports Available** | 4 |
| **Number of Ports Used** | 4 |

| Stack and Test Type | | | | |
|---|---|---|---|---|
| ○ | Isokinetic Traverse (Wet Chemistry Testing) | | | **Circular Stack** |
| ○ | Velocity Traverse (Flow and Flow RATA Test) | | | |
| ◉ | **Stratification Traverse (Compliance Test)** | ☑ RM 20 | | |
| ○ | Stratification Traverse (RATA) | ☐ Part 60 | ☐ Part 75 | |

## METHOD 1 - STRATIFICATION TEST FOR A CIRCULAR SOURCE

| | | | |
|---|---|---|---|
| **Company** | Florida Power and Light | **Date** | 10/05/09 |
| **Plant Name** | West County Energy Center | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Equipment** | Mistubishi 501G | **# of Ports Available** | 4 |
| **Location** | Loxahatchee, Florida | **# of Ports Used** | 4 |

| Circular Stack or Duct Diameter | | | |
|---|---|---|---|
| **Distance to Far Wall of Stack** | ($L_{fw}$) | 282.38 | in. |
| **Distance to Near Wall of Stack** | ($L_{nw}$) | 19.00 | in. |
| **Diameter of Stack** | (D) | 263.38 | in. |
| **Area of Stack** | ($A_s$) | 378.35 | $ft^2$ |

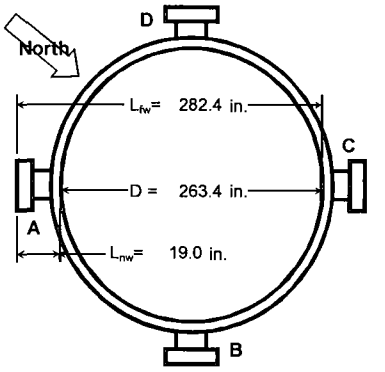
| Distance from Disturbances to Port | | | |
|---|---|---|---|
| **Distance Upstream** | (A) | 144.00 | in. |
| **Diameters Upstream** | ($A_D$) | 0.55 | diameters |
| **Distance Downstream** | (B) | 531.75 | in. |
| **Diameters Downstream** | ($B_D$) | 2.02 | diameters |

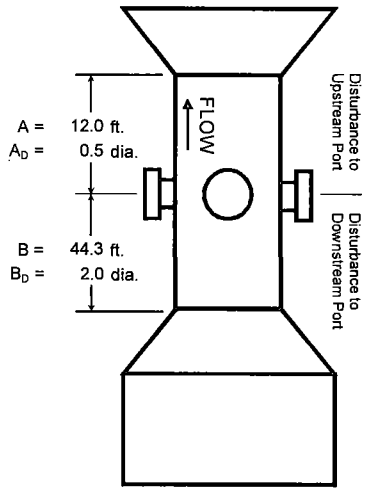
| Number of Traverse Points Required | | | | | |
|---|---|---|---|---|---|
| Diameters to Flow Disturbance | | Minimum Number of[1] Traverse Points | | **Minimum Number of Traverse Points** | |
| Down ($B_D$) Stream | Up ($A_D$) Stream | Particulate Points | Velocity Points | **Comp Stratification Criteria** | **Points** |
| 2.00-4.99 | 0.50-1.24 | 24 | 16 | ◉ RM 7E 8.1.2 | 12 RM1 pts |
| 5.00-5.99 | 1.25-1.49 | 20 | 16 | ○ Alt 7E 8.1.2 | 3 points |
| 6.00-6.99 | 1.50-1.74 | 16 | 12 | 12 points | |
| 7.00-7.99 | 1.75-1.99 | 12 | 12 | | |
| >= 8.00 | >=2.00 | 8 or 12[2] | 8 or 12[2] | Minimum Number of | |
| Upstream Spec | | 24 | 16 | Traverse Points | |
| Downstream Spec | | 24 | 16 | RATA Stratification | |
| Traverse Pts Required | | 24 | 16 | Criteria | Points |
| | | | | ○ Part75/60 | 12 RM1 pts |
| | | | | ○ 75 abrv (a) | 3 points |
| | | | | ○ 75 abrv (b) | 6 points |

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches

| Number of Traverse Points Used | | | | |
|---|---|---|---|---|
| 4 | **Ports by** | 3 | **Pts / port** | **Stratification Traverse (Compliance Test)** |
| 12 | **Pts Used** | 12 | **Required** | |




| Traverse Point Locations | | | |
|---|---|---|---|
| **Traverse Point Number** | **Percent of Stack Diameter** | **Distance from Inside Wall** | **Distance Including Reference Length** |
| | % | in. | in. |
| 1 | 4.4% | 11 5/8 | 30 5/8 |
| 2 | 14.6% | 38 4/8 | 57 4/8 |
| 3 | 29.6% | 78 | 97 |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| 11 | | | |
| 12 | | | |
| 13 | | | |
| 14 | | | |
| 15 | | | |
| 16 | | | |
| 17 | | | |
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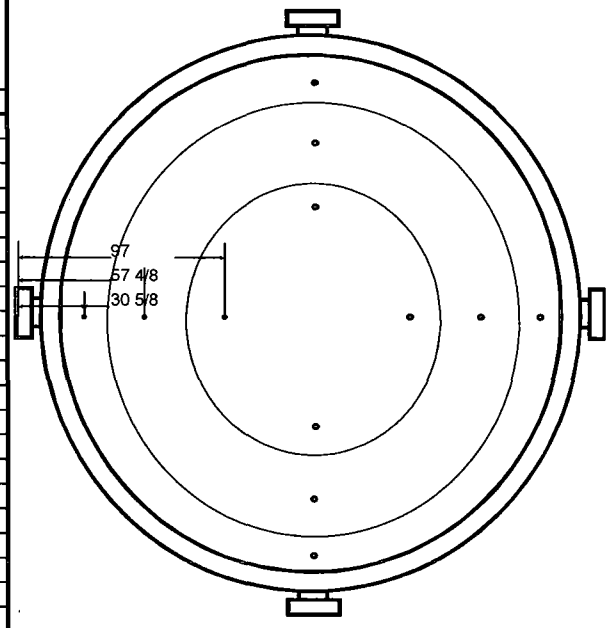
| 23 | | | |
| 24 | | | |



## STRATIFICATION TRAVERSE (COMPLIANCE TEST) RESULTS

| | | | |
|---|---|---|---|
| **Company** | Florida Power and Light | **Date** | 10/05/09 |
| **Plant Name** | West County Energy Center | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Equipment** | Mistubishi 501G | **# of Ports Available** | 4 |
| **Location** | Loxahatchee, Florida | **# of Ports Used** | 4 |

| **Stack Dimensions** | | | | **Traverse Data** | | | |
|---|---|---|---|---|---|---|---|
| **Diameter or Length of Stack** | (D) | 263.38 | in. | 4 | **Ports by** | 3 | **Pts / port** |
| **Width of Stack** | (W) | | in. | 12 | **Pts Used** | 12 | **Required** |
| **Area of Stack** | ($A_s$) | 378.35 | $ft^2$ | **Run Start** | 7:20:07 | **Run End** | 8:12:07 |

| **Traverse Point** | **Time Per Point** | **Point Start Time** | **Point Stop Time (Reading)** | **O2** | **Percent Difference** | **NOx** | **Percent Difference** |
|---|---|---|---|---|---|---|---|
| | min. | hh:mm:ss | hh:mm:ss | % | % | ppm | % |
| D-3 | 3.00 | 7:20:07 | 7:23:07 | 12.94 | 0.12% | 2.84 | 16.31% |
| D-2 | 3.00 | 7:23:07 | 7:26:07 | 12.95 | 0.05% | 2.62 | 7.30% |
| D-1 | 3.00 | 7:26:07 | 7:29:07 | 12.97 | 0.11% | 2.33 | 4.57% |
| C-3 | 9.00 | 7:29:07 | 7:38:07 | 12.98 | **0.19%** | 2.29 | 6.21% |
| C-2 | 3.00 | 7:38:07 | 7:41:07 | 12.95 | 0.05% | 2.15 | 11.95% |
| C-1 | 3.00 | 7:41:07 | 7:44:07 | 12.95 | 0.05% | 2.21 | 9.49% |
| B-3 | 7.00 | 7:44:07 | 7:51:07 | 12.95 | 0.05% | 2.79 | 14.27% |
| B-2 | 3.00 | 7:51:07 | 7:54:07 | 12.97 | 0.11% | 2.74 | 12.22% |
| B-1 | 3.00 | 7:54:07 | 7:57:07 | 12.94 | 0.12% | 2.82 | 15.49% |
| A-3 | 9.00 | 7:57:07 | 8:06:07 | 12.95 | 0.05% | 2.51 | 2.80% |
| A-2 | 3.00 | 8:06:07 | 8:09:07 | 12.96 | 0.03% | 2.11 | 13.58% |
| A-1 | 3.00 | 8:09:07 | 8:12:07 | 12.96 | 0.03% | 1.89 | **22.59%** |
| **Correct to** | **15** | **% O2** | **Average** | 12.96 | | 2.44 | |

## STRATIFICATION TRAVERSE (COMPLIANCE TEST) RESULTS

| | | | |
|---|---|---|---|
| **Company** | Florida Power and Light | **Date** | 10/05/09 |
| **Plant Name** | West County Energy Center | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Equipment** | Mistubishi 501G | **# of Ports Available** | 4 |
| **Location** | Loxahatchee, Florida | **# of Ports Used** | 4 |

| **Stack Dimensions** | | | | **Traverse Data** | | | |
|---|---|---|---|---|---|---|---|
| **Diameter or Length of Stack** | (D) | 263.38 | in. | 4 | **Ports by** | 3 | **Pts / port** |
| **Width of Stack** | (W) | | in. | 12 | **Pts Used** | 12 | **Required** |
| **Area of Stack** | ($A_s$) | 378.35 | $ft^2$ | **Run Start** | 7:20:07 | **Run End** | 8:12:07 |

| **Traverse Point** | **Time Per Point** | **Point Start Time** | **Point Stop Time (Reading)** | **O2** | **Percent Difference** | **NOx** | **Percent Difference** |
|---|---|---|---|---|---|---|---|
| | min. | hh:mm:ss | hh:mm:ss | % | % | ppm@15%O2 | % |
| D-3 | 3.00 | 7:20:07 | 7:23:07 | 12.94 | 0.12% | 2.11 | 16.09% |
| D-2 | 3.00 | 7:23:07 | 7:26:07 | 12.95 | 0.05% | 1.94 | 7.23% |
| D-1 | 3.00 | 7:26:07 | 7:29:07 | 12.97 | 0.11% | 1.73 | 4.40% |
| C-3 | 6.00 | 7:29:07 | 7:38:07 | 12.98 | **0.19%** | 1.71 | 5.92% |
| C-2 | 3.00 | 7:38:07 | 7:41:07 | 12.95 | 0.05% | 1.60 | 12.00% |
| C-1 | 3.00 | 7:41:07 | 7:44:07 | 12.95 | 0.05% | 1.64 | 9.55% |
| B-3 | 7.00 | 7:44:07 | 7:51:07 | 12.95 | 0.05% | 2.07 | 14.19% |
| B-2 | 3.00 | 7:51:07 | 7:54:07 | 12.97 | 0.11% | 2.04 | 12.43% |
| B-1 | 3.00 | 7:54:07 | 7:57:07 | 12.94 | 0.12% | 2.09 | 15.27% |
| A-3 | 9.00 | 7:57:07 | 8:06:07 | 12.95 | 0.05% | 1.86 | 2.73% |
| A-2 | 3.00 | 8:06:07 | 8:09:07 | 12.96 | 0.03% | 1.57 | 13.53% |
| A-1 | 3.00 | 8:09:07 | 8:12:07 | 12.96 | 0.03% | 1.40 | **22.55%** |
| **Average** | | | | 12.96 | | 1.81 | |

## STRAT TEST DETERMINED SAMPLE POINTS FOR CIRCULAR STACK

| | | | |
|---|---|---|---|
| **Company** | Florida Power and Light | **Date** | 10/05/09 |
| **Plant Name** | West County Energy Center | **Project #** | bv-09-westcounty.fl-comp#1 |
| **Equipment** | Mistubishi 501G | **# of Ports Available** | 4 |
| **Location** | Loxahatchee, Florida | **# of Ports Used** | 4 |

| **Stack Dimensions** | | | | **Traverse Data** | | | |
|---|---|---|---|---|---|---|---|
| **Diameter or Length of Stack** | (D) | 263.38 | in. | 4 | **Ports by** | 3 | **Pts / port** |
| **Width of Stack** | (W) | | in. | 12 | **Pts Used** | 12 | **Required** |
| **Area of Stack** | ($A_s$) | 378.35 | $ft^2$ | **Run Start** | 7:20:07 | **Run End** | 8:12:07 |

**40 CFR 60, Appendix A, Method 7E Criteria**

| **Stratification Results** | |
|---|---|
| **Maximum Percent Difference** | 22.55 % for NOx |
| **Maximum Pollutant Conc. Diff.** | 0.41 ppm@15%O2 for NOx |
| **Maximum Diluent Conc. Diff.** | 0.02 % for O2 |
| **Stack Diameter** | 263.38 in. |

| **Stratification Conclusions** | |
|---|---|
| **Maximum % Diff.** | Percent Diff. >10% Failed Stratification Test |
| **Maximum Conc. Diff.** | Conc. Diff. ≤ 0.5ppm Passed 8.1.2 Single Pt. Criteria |
| **Stack Diameter** | D > 93.6 in. |

Passed Strat. Test Under RM 7E 8.1.2 Single Pt. Criteria
Sample from the point that most closely matches the average

| **Traverse Point Number** | **Percent of Stack Diameter** | **Distance from Inside Wall** | **Distance Including Reference Length** |
|---|---|---|---|
| | % | in. | in. |
| **1** | | | |
| **2** | | | |
| **3** | | | |

| | |
|---|---|
| Test Type | Use 6.5.6.3(a) points? 6.5.6(b)(2) alt. points could apply |