Syed

TAMPA ELECTRIC

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JUN 06 2001

BUREAU OF AIR REGULATION

June 5, 2001

Mr. Clair Fancy
Florida Department of Environmental Protection
2600 Blair Stone Road
Twin Towers Office Building
Tallahassee, Florida 32399-2400

Via Fed Ex
Airbill No. 7915 7699 6507

Re: Tampa Electric Company (TEC) – Hookers Point Power Station
Diesel Fired Internal Combustion Engine Generator Sets
Proposed Initial NO_x Compliance Testing Protocol
FDEP Permit No. 0570038-002-AC

Dear Mr. Fancy:

Please find enclosed the oxides of nitrogen (NO_x) emissions test protocol for the Hookers Point Power Station Diesel Fired Internal Combustion Engine Generator Sets. As required by specific condition 20 of the above referenced air construction permit, TEC is required to conduct initial compliance testing for NO_x on five randomly selected units.

The enclosed document describes the protocol for this testing, and TEC requests approval from the Department as soon as possible so that the testing can be scheduled and performed as outlined by the above referenced permit condition.

If you have any questions, please feel free to contact Shannon Todd or me at (813) 641-5125.

Sincerely,

Laura R. Crouch

Laura R. Crouch
Manager - Air Programs
Environmental Affairs

EP\tl\SKT259

Enclosure

c/enc: Mr. Al Linero - FDEP
Mr. Syed Arif - FDEP
Mr. Joseph Kahn - FDEP
Mr. Jerry Kissel - FDEP SW
Mr. Steve Pak - EPCHC

NO_x Emission Test Protocol
For
Ringhaver – Caterpillar Power
Diesel Fired Internal Combustion Engine Generator Sets
At

Hookers Point Station

Tampa, Florida

TAMPA ELECTRIC

Prepared for
Tampa Electric Company
By
Environmental Affairs
Of
Tampa Electric Company

June 5, 2001

Introduction

As required by the Florida Department of Environmental Protection (FDEP) air construction permit (ARMS 0570038-002-AC), Tampa Electric Company (TEC) is planning to perform NO_x emissions testing on five (5) randomly selected Ringhaver Caterpillar diesel fired internal combustion engine generator sets, for the purpose of determining initial compliance. Each engine will be tested using United States Environmental Protection Agency (USEPA) Reference Method 7E – Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure). As stated in specific condition 20 of the permit and under Rule 62-297.310 (7)(a)1., F.A.C.:

> *"Initial performance tests to demonstrate compliance with the emission standards specified in this permit shall be conducted within 60 days after achieving at least 90% of permitted capacity, but not later than 180 days after initial operation of the emissions unit."*

Using the certified flow test data from the manufacturer in conjunction with the measured NO_x concentrations, the NO_x emission rate in pounds per hour will be calculated and compared to the limit of 53 pounds of NO_x emitted per hour.

Submission of this document ensures that the Department is provided with the test protocol, including a time schedule, 15 days prior to the initial test. Tampa Electric Company will provide the Department with the emissions test results 45 days after the test is performed. The Department shall be notified and the reasons provided if a scheduled test is delayed or canceled.

Facility Description

Source: Hookers Point Station consists of six oil-fired boilers (units 1 through 6) that are fired with No. 6 fuel oil. The total generation of these boilers is 227 megawatts. In addition, thirty Caterpillar XQ2000 Power Modules are installed with a total generation capacity of 54.75 megawatts. Each Power Module consists of a Caterpillar 3516B 16-cylinder, 4-stroke cycle diesel internal combustion engine and a Caterpillar SR4B generator. The Caterpillar engine has a power rating of 2,593 brake horsepower (bhp) at 100 percent load. The Caterpillar SR4B generator has a power output rating of 1,825 kilowatts at 100 percent load. Each IC engine will be fired exclusively with low-sulfur diesel fuel oil.

Location:	Hookers Point Station is located at 1700 Hemlock Street, Tampa, in Hillsborough County Florida. UTM Coordinates, Zone 17, 358.0 km East and 3091.0 km North.
Regulation:	Acid Rain provisions of the Clean Air Act, Title V major source of air pollution and PSD major source.
Test Coordinator:	Air Services- Environmental Affairs Tampa Electric Company

Proposed Testing Schedule

The final testing schedule is yet to be determined based on unit operation, resource availability, equipment availability, and approval of this testing protocol by the Department. Once begun, testing will continue on all five units for a period of at least 3 days and no more than 5 days until completed. Upon finalizing the testing schedule, TEC will notify the Department at least 15 days prior to the test.

Testing Protocol

1) Gaseous Emission Test Matrix & Gas Sample Strategy
   A) Three test runs will be performed with each unit operating at maximum load. The average of the three runs will be used for reporting purposes.
   B) Gaseous emission test runs will be measured at the exhaust outlet of the engine for a minimum of 1 hour in duration.

2) Turbine Exhaust Gas Measurements – A transportable laboratory grade analyzer system (see enclosed diagram) will be used with continuous monitors capable of measuring NO_x emissions. The analyzer and system will be calibrated in the field and QA/QC procedures will be performed as required by the EPA test method. Following initial calibrations of the equipment, a sample of exhaust gas will be continuously extracted from the exhaust stack and delivered to the individual analyzer at the same flow rate as used for instrument calibration. The results of these measurements will be recorded on a portable personal computer to document the sample analysis, calibrations and quality assurance activities conducted during the tests. All results are stored on the hard drive and printed on a dot matrix printer.

   A) EPA Method 7-E for NO_x
      NO_x will be measured using a Thermo Environmental 42 CHL NO/NO_x analyzer that uses the measurement technique of chemiluminescence. The NO_x concentration is also measured on a dry basis. The measurement range of the analyzer will be

determined such that the pollutant gas concentration is not less than the instrument span.

3) Gaseous Samples Quality Assurance/Quality Control

A) Zero and span calibration drift checks before and after each test run. Test run validated by $\pm$ 3% drift from full scale response. Emission concentration measurements corrected for zero and span drift.
B) NO_x analyzer NO_2 to NO converter efficiency check results to verify a minimum 90% converter efficiency.
C) Calibration gases traceable to EPA Protocol 1 and the National Institute of Standards and Technology.
D) Multi-point instrument calibration error test $\pm$ 2% linearity check.
E) Interference response test of the analyzer prior to it's initial use in the field.
F) Sample system bias check before each series of tests to $\pm$ 5% of span.
G) All sampling and analysis conducted on site with on-site results.

In accordance with specific condition 17 (enclosed) of the governing air construction permit, TEC requests that the Department provide written approval to move forward with the initial compliance testing as soon as possible.

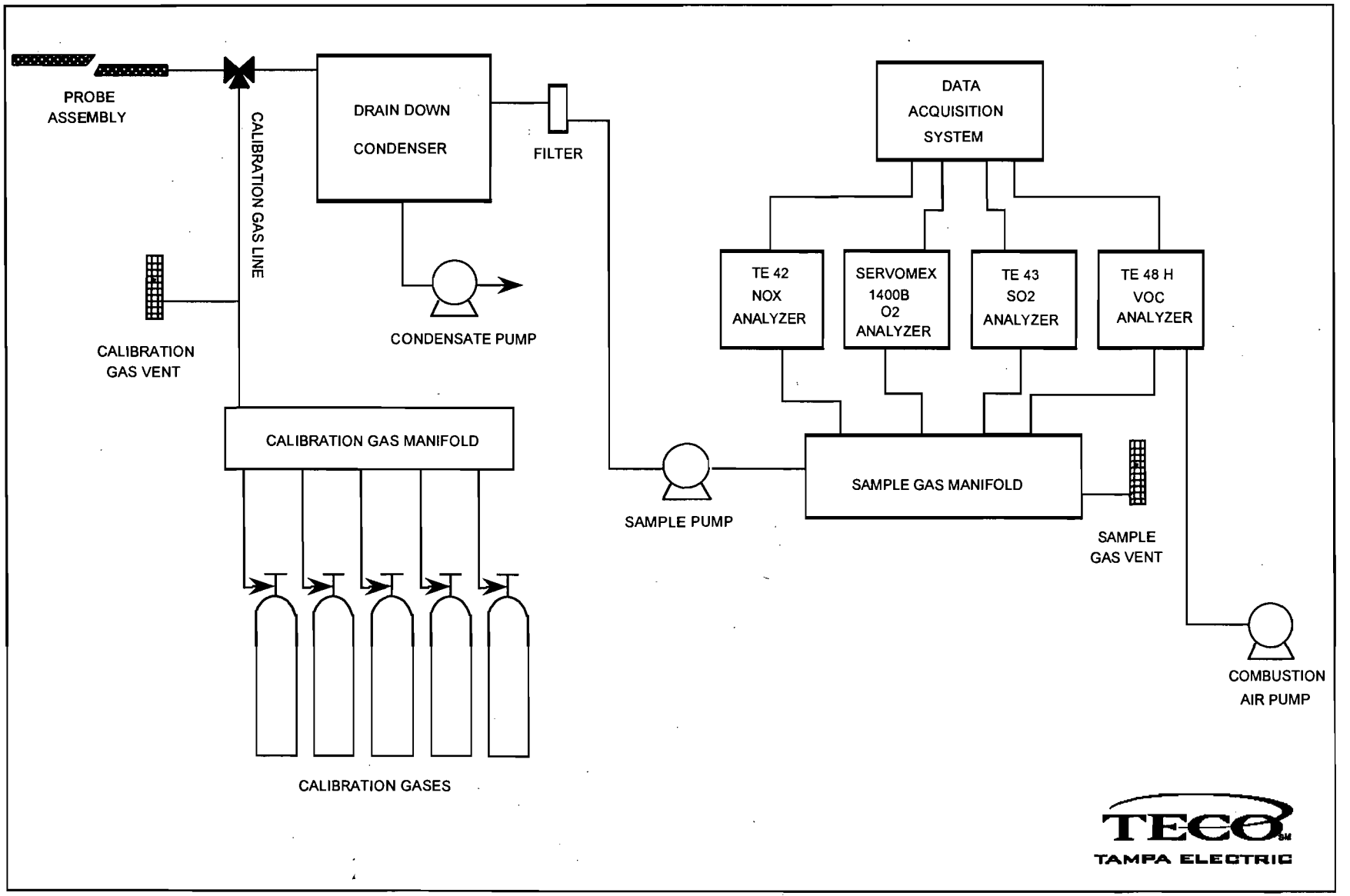

FIGURE 1

USEPA METHODS 3A, 6C, 7E CEM SYSTEM LAYOUT

method for visible emissions shall be EPA Method 9, incorporated and adopted by reference in Chapter 62-297, F.A.C. Test procedures shall meet all applicable requirements of Chapter 62-297, F.A.C. **[Rule 62-296.320(4)(b)1, F.A.C.]**

EXCESS EMISSIONS

9. Excess Emissions Prohibited: Excess emissions caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure that may reasonably be prevented during startup, shutdown or malfunction, shall be prohibited. **[Rule 62-210.700(4), F.A.C.]**

10. Excess Emissions Allowed: Providing the permittee adheres to best operational practices to minimize the amount and duration of excess emissions, the following conditions shall apply:

    (a) During startup and shutdown, visible emissions shall not exceed 20% opacity for up to 2 hours in any 24-hour period. **[Design; Rule 62-210.700(1), F.A.C.]**

OPERATIONAL LIMITATIONS

11. Fuel Oil Specification: Only No. 2 fuel oil can be fired in the internal combustion engines. The maximum sulfur content of the No. 2 fuel oil shall not exceed 0.05 percent, by weight. **[Rule 62-210.200, F.A.C. (Definitions – PTE)]**

12. Fuel Oil Consumption: The maximum No. 2 fuel oil allowed to be burned in thirty internal combustion engines combined is 3,180,152 gallons per year, which is equivalent to 25,897 engine-hours per year at 100% load. **[Rule 62-210.200, F.A.C. (Definitions – PTE)]**

13. Permitted Capacity: The heat input to each internal combustion engine from firing No. 2 fuel oil shall not exceed 17 MMBtu per hour at 100% load. **[Design, Rule 62-210.200, F.A.C. (Definition - PTE)]**

14. Hours of Operation: The thirty internal combustion engines shall operate no more than 25,897 engine-hours during any consecutive 12-month period. The permittee shall install, calibrate, operate and maintain a monitoring system to measure the hours of operation on each internal combustion engine. **[Rule 62-210.200, F.A.C. (Definitions - PTE)]**

15. Operational Period: The thirty internal combustion engines shall cease operation in June 2003. **[Applicant Request]**

EMISSIONS PERFORMANCE TESTING

16. Sampling Facilities: The permittee shall design the internal combustion engine stack to accommodate adequate testing and sampling locations in order to determine compliance with the applicable emission limits specified by this permit. **[Rule 62-297.310(6), F.A.C.]**

17. Performance Test Methods: Initial (I) and Annual (A) compliance tests shall be performed in accordance with the following reference methods as described in 40 CFR 60, Appendix A, and adopted by reference in Chapter 62-204.800, F.A.C.

    (a) EPA Method 7 or 7E – Determination of Nitrogen Oxide Emissions from Stationary Sources (I, A);

    (b) EPA Method 9 - Visual Determination of the Opacity of Emissions from Stationary Sources (I, A);

    No other test methods may be used for compliance testing unless prior DEP approval is received, in writing, from the DEP Emissions Monitoring Section Administrator in accordance with an alternate sampling procedure specified in Rule 62-297.620, F.A.C.

18. Fuel Oil Monitoring: The fuel shall be monitored initially and annually for the sulfur content using ASTM D4294 Method (or equivalent). The permittee shall also maintain daily records of fuel oil consumption for the emission units. **[Rules 62-297.440, F.A.C., and 62-210.200, F.A.C.]**

19. Test Notification: The permittee shall notify the Compliance Authority in writing at least 15 days prior to the date on which each formal compliance test is to begin, of the date, time, and place of each such test, and the test contact person who will be responsible for coordinating and having such test conducted for the owner or operator. **[Rule 62-297.310(7)(a)9., F.A.C.]**

20. Initial Tests Required: Initial performance tests to demonstrate compliance with the emission standards specified in this permit shall be conducted within 60 days after achieving at least 90% of permitted capacity, but not later than 180 days after initial operation of the emissions unit. Initial performance tests shall be conducted for NO_X and visible emissions on one of the internal combustion engines. **[Rule 62-297.310(7)(a)1., F.A.C.]**

21. Annual Performance Tests: To demonstrate compliance with the emission standards specified in this permit, the permittee shall conduct annual performance tests for NO_X and visible emissions on the emission units that operated for more than 400 hours in the preceding 12-month period. Tests required on an annual basis shall be conducted at least once during each federal fiscal year (October 1st to September 30th). **[Rule 62-297.310(7)(a)4., F.A.C.]**

22. Tests Prior to Permit Renewal: Prior to renewing the air operation permit, the permittee shall conduct performance tests for NO_X and visible emissions on one of the internal combustion engines. These tests shall be conducted within the 12-month period prior to renewing the air operation permit. For pollutants required to be tested annually, the permittee may submit the most recent annual compliance test to satisfy the requirements of this provision. **[Rule 62-297.310(7)(a)3., F.A.C.]**

23. Internal Combustion Engine Testing Capacity: Performance tests for compliance with standards specified in this permit shall be conducted with the emission unit operating at permitted capacity. Permitted capacity is defined as 90-100 percent of the maximum heat input rate allowed by the permit. If it is impracticable to test at permitted capacity, the source may be tested at less than permitted capacity. However, subsequent operation is limited to 110 percent of the value reached during the test until a new test is conducted. Once the unit is so limited, operation at higher capacities is allowed for no more than 15 consecutive days for the purposes of additional compliance testing to regain the permitted capacity. Emissions performance tests shall meet all applicable requirements of Chapters 62-204 and 62-297, F.A.C. **[Rule 62-297.310(2), F.A.C.]**

24. Calculation of Emission Rate: For each emissions performance test, the indicated emission rate or concentration shall be the arithmetic average of the emission rate or concentration determined by each of the three separate test runs unless otherwise specified in a particular test method or applicable rule. **[Rule 62-297.310(3), F.A.C.]**

25. Applicable Test Procedures

    (a) Required Sampling Time.

        1. Unless otherwise specified in the applicable rule, the required sampling time for each test run shall be no less than one hour and no greater than four hours, and the sampling time at each sampling point shall be of equal intervals of at least two minutes. **[Rule 62-297.310(4)(a)1., F.A.C.]**

        2. The minimum observation period for a visible emissions compliance test shall be thirty (30) minutes. The observation period shall include the period during which the highest opacity can reasonably be expected to occur. **[Rule 62-297.310(4)(a)2., F.A.C.]**

PLEASE FOLD THIS SHIPPING DOCUMENT IN HALF AND PLACE IT IN A WAYBILL POUCH AFFIXED TO YOUR SHIPMENT SO THAT THE BAR-CODE PORTION OF THE LABEL CAN BE READ AND SCANNED.
***WARNING: USE ONLY THE PRINTED ORIGINAL LABEL FOR SHIPPING. USING A PHOTOCOPY OF THIS LABEL FOR SHIPPING PURPOSES IS FRAUDULENT AND COULD RESULT IN ADDITIONAL BILLING CHARGES, ALONG WITH THE CANCELLATION OF YOUR FEDEX ACCOUNT NUMBER.

FROM: Gina Morales (813)641-5036
Tampa Electric Company
6944 U.S. Highway 41 North

Apollo Beach, FL 33572

SHIPPER'S FEDEX ACCOUNT NUMBER

FedEx
Federal Express

TO: Mr. Clair Fancy (850)488-1344
Fla. Dept. of Env. Protection
111 S. Magnolia Dr.
Ste. 4

Tallahassee, FL 32301-

SHIP DATE: 22JAN01
MAN-WGT: 1 LBS

REF: 445-506-68-18-369

DELIVERY ADDRESS BARCODE (FEDEX-EDR)

CAD # 3093289 **PRIORITY OVERNIGHT** **TUE**
AA

TRK # **7904 5117 9175** FORM 0201 **TLH** Deliver By: 23JAN01

32301-FL-US **XB TLHA**

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JAN 23 2001
BUREAU OF AIR REGULATION

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Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

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Sent To Karen Sheffield

Street, Apt. No.; or PO Box No. PO Box 111

City, State, ZIP+ 4 Tampa, FL 33601-0111

PS Form 3800, May 2000 — See Reverse for Instructions

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1 Article Addressed to:

Ms. Karen Sheffield
General Manager
Gannon Power Station
Tampa Electric Company
P. O. Box 111
Tampa, FL 33601-0111

COMPLETE THIS SECTION ON DELIVERY

A. Received by *(Please Print Clearly)*

B. Date of Delivery 11-26-01

C. Signature
X
☐ Agent
☐ Addressee

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2 Article Number *(Copy from service label)*
7000 2870 0000 7028 2911

PS Form 3811, July 1999 — Domestic Return Receipt — 102595-99-M-1789

UNITED STATES POSTAL SERVICE

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Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

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BUREAU OF AIR REGULATION

Dept. of Environmental Protection
Division of Air Resources Mgt.
Bureau of Air Regulation, NSR
2600 Blair Stone Rd., MS 5505
Tallahassee, FL 32399-2400

01

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

November 20, 2001

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Ms. Karen Sheffield, General Manager
Gannon Power Station
Tampa Electric Company
Post Office Box 111
Tampa, Florida 33601-0111

Re: Extension Request – Hookers Point Station IC Engines
DEP File No. 0570038-002-AC

Dear Ms. Sheffield:

The Department reviewed your request dated October 18, 2001 for an extension of the expiration date of the referenced air construction permit to install thirty (30) diesel IC engines at the Hookers Point Station in Hillsborough County.

For construction permits, an extension shall be granted if the applicant can demonstrate that, upon completion, the extended permit will comply with the standards and conditions required by the applicable regulations. [Rule 62-4.080(3), F.A.C.]

The construction is complete and the compliance test on five IC engines was conducted as required by the construction permit. The initial emissions performance test demonstrated that the IC engines were operating in compliance with permit limits for NO_x and visible emissions. The permit extension is sought to file a Title V air operation permit revision application to include the new IC engines. The expiration date is hereby extended from December 1, 2001 to March 1, 2002 to allow sufficient time for submission of the Title V Operation Permit Application.

A copy of this letter shall be filed with the referenced permit and shall become part of the permit. This permitting decision is issued pursuant to Chapter 403, Florida Statutes.

A person whose substantial interests are affected by the proposed permitting decision may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida, 32399-3000. Petitions filed by the permit applicant or any of the parties listed below must be filed within fourteen days of receipt of this notice of intent. Petitions filed by any persons other than those entitled to written notice under section 120.60(3) of the Florida Statutes must be filed within fourteen days of publication of the public notice or within fourteen days of receipt of this notice of intent, whichever occurs first. Under section 120.60(3), however, any person who asked the Department for notice of agency action may file a petition within fourteen days of receipt of that notice, regardless of the date of publication. A petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under

sections 120.569 and 120.57 F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention will be only at the approval of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205 of the Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner, the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination; (c) A statement of how and when petitioner received notice of the agency action or proposed action; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the agency's proposed action; (f) A statement of the specific rules or statutes the petitioner contends require reversal or modification of the agency's proposed action; and (g) A statement of the relief sought by the petitioner, stating precisely the action petitioner wishes the agency to take with respect to the agency's proposed action.

A petition that does not dispute the material facts upon which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department on the application have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above. Mediation is not available in this proceeding.

In addition to the above, a person subject to regulation has a right to apply for a variance from or waiver of the requirements of particular rules, on certain conditions, under Section 120.542 F.S. The relief provided by this state statute applies only to state rules, not statutes, and not to any federal regulatory requirements. Applying for a variance or waiver does not substitute or extend the time for filing a petition for an administrative hearing or exercising any other right that a person may have in relation to the action proposed in this notice of intent.

The application for a variance or waiver is made by filing a petition with the Office of General Counsel of the Department, 3900 Commonwealth Boulevard, Mail Station #35, Tallahassee, Florida 32399-3000. The petition must specify the following information: (a) The name, address, and telephone number of the petitioner; (b) The name, address, and telephone number of the attorney or qualified representative of the petitioner, if any; (c) Each rule or portion of a rule from which a variance or waiver is requested; (d) The citation to the statute underlying (implemented by) the rule identified in (c) above; (e) The type of action requested; (f) The specific facts that would justify a variance or waiver for the petitioner; (g) The reason why the variance or waiver would serve the purposes of the underlying statute (implemented by the rule); and (h) A statement whether the variance or waiver is permanent or temporary and, if temporary, a statement of the dates showing the duration of the variance or waiver requested.

The Department will grant a variance or waiver when the petition demonstrates both that the application of the rule would create a substantial hardship or violate principles of fairness, as each of those terms is defined in Section 120.542(2) F.S., and that the purpose of the underlying statute will be or has been achieved by other means by the petitioner.

Persons subject to regulation pursuant to any federally delegated or approved air program should be aware that Florida is specifically not authorized to issue variances or waivers from any requirements of any such federally delegated or approved program. The requirements of the program remain fully enforceable by the Administrator of the EPA and by any person under the Clean Air Act unless and until the Administrator separately approves any variance or waiver in accordance with the procedures of the federal program.

This permitting decision is final and effective on the date filed with the clerk of the Department unless a petition is filed in accordance with the above paragraphs or unless a request for extension of time in which to file a petition is filed within the time specified for filing a petition pursuant to Rule 62-110.106, F.A.C., and the petition conforms to the content requirements of Rules 28-106.201 and 28-106.301, F.A.C. Upon timely filing of a petition or a request for extension of time, this order will not be effective until further order of the Department.

Any party to this permitting decision (order) has the right to seek judicial review of it under section 120.68 of the Florida Statutes, by filing a notice of appeal under Rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department of Environmental Protection in the Office of General Counsel, Mail Station #35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000, and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The notice must be filed within thirty days after this order is filed with the clerk of the Department.

Executed in Tallahassee, Florida.

Howard L. Rhodes

Howard L. Rhodes, Director
Division of Air Resources
Management

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this PERMIT MODIFICATION was sent by certified mail (*) and copies were mailed by U.S. Mail before the close of business on 11/21/01 to the person(s) listed:

Karen Sheffield, TECO*
Bill Thomas, DEP SWD
A. Harmon, EPCHC
Shannon Todd, TECO

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to §120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Victoria Gibson 11/21/01
(Clerk) (Date)

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OCT 22 2001
BUREAU OF AIR REGULATION

October 18, 2001

Mr. Clair Fancy, P.E., Chief
Bureau of Air Regulation
Florida Department of Environmental Protection
111 South Magnolia Drive, Suite 4
Tallahassee, Florida 32301

Via FedEx
Airbill No. 7924 5905 8568

Re: Tampa Electric Company
Hookers Point Station Internal Combustion Engines
Final Permit No. 0570038-002-AC

Dear Mr. Fancy:

Final Permit No. 0570038-002-AC was issued to Tampa Electric Company (TEC) on April 20, 2001 authorizing the installation and initial operation of thirty (30) diesel internal combustion (IC) engines at its Hookers Point Station in Tampa, Hillsborough County. Final Permit No. 0570038-002-AC expires on December 1, 2001.

As required by Final Permit No. 0570038-002-AC, Section III., Condition No. 20, initial performance testing of five IC engines was conducted during July 16 – 19, 2001. The initial emissions performance testing demonstrated that the IC engines were operating in compliance with permit limits for nitrogen oxides (NO_x) and visible emissions. A report of the initial performance testing was submitted to the Department on August 21, 2001.

Operation of the Hookers Point Station is currently authorized by Title V Final Permit No. 0570038-001-AV. Final Permit No. 0570038-001-AV was issued with an effective date of January 1, 1998 and expires on January 1, 2003. TEC plans to file a Title V air operation permit revision application to include the new IC engines during the week of October 22nd. Because issuance of a revised Title V permit is expected to take place after the December 1, 2001 expiration date of Final Permit No. 0570038-002-AC, TEC requests an extension of the expiration date to March 1, 2002. This extension will allow an adequate amount of time for Department and EPA processing of the Title V permit revision application.

If you have any questions, please contact Shelly Castro (813) 641-5033.

Sincerely,

Karen Sheffield

Karen Sheffield
General Manager
Gannon Power Station

EA/br/SSC102

Enclosure

c: J. Kissel, SWD
J. Campbell, EPCHC
A. Harman, EPCHC
S. Arif, FDEP

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OCT 22 2001
BUREAU OF AIR REGULATION

October 18, 2001

Mr. Clair Fancy, P.E., Chief
Bureau of Air Regulation
Florida Department of Environmental Protection
111 South Magnolia Drive, Suite 4
Tallahassee, Florida 32301

Via FedEx
Airbill No. 7924 5905 8568

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Hookers Point Station Internal Combustion Engines
Final Permit No. 0570038-002-AC

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If you have any questions, please contact Shelly Castro (813) 641-5033.

Sincerely,

Karen Sheffield

Karen Sheffield
General Manager
Gannon Power Station

EA/br/SSC102

Enclosure

c: J. Kissel, SWD
J. Campbell, EPCHC
A. Harman, EPCHC
S. Arif, FDEP

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BUREAU OF AIR REGULATION

February 6, 2001

Mr. A.A. Linero
New Source Review Section
Bureau of Air Regulation
Florida Department of Environmental Protection
111 South Magnolia Avenue, Suite 4
Tallahassee, FL 32301

Via FedEx
Airbill No. 7904 6459 9513

Re: Request for Additional Information
DEP File No. 0570038-002-AC
Hookers Point Station - Installation of 30 Internal Combustion Engines

Dear Mr. Linero:

Tampa Electric Company has received your letter dated January 30, 2001 regarding the above referenced project and offers the following responses to the issues raised by the Department:

FDEP Issue 1
Page 14 of the application requests 8,760 hours per year operation for the referenced internal combustion engines. Based on full time operation of the engines, the facility will not have enough offsets available, specifically for NO_x, to remain below the PSD significant emission rate thresholds for major modification. If the intent of the project is to limit the hours of operation of the thirty internal combustion engines, then resubmit the maximum operating schedule and recalculate emissions for all the affected pollutants.

TEC Response 1
Section III, Emissions Unit Information, of the application provides information for each of the proposed internal combustion (IC) engines. To provide flexibility in operation of the IC engines, a Hookers Point Station facility-wide cap on NO_x emissions of 682.4 tons per year was proposed. Under this approach, each IC engine could operate up to 8,760 hr/yr as long as the cap was not exceeded. As shown on the potential emission inventory worksheet, all 30 IC engines could not operate concurrently for a full 8,760 hr/yr and still remain below the facility-wide NO_x emissions cap. Assuming the existing Hookers Point Station Units 1 through 6 do not operate, the 30 IC engines would be limited to a total of 25,897 engine-hours or approximately ten percent of the total available engine-hours. This operating limit is equivalent to 863 hr/yr/engine, assuming all thirty engines operate for the same amount of time. NO_x was selected for the facility-wide cap because NO_x is the predominant pollutant emitted by the IC engines and because existing Units 1 through 6 are equipped with NO_x continuous emissions monitoring systems (CEMS). Compliance with the facility-wide station NO_x cap will ensure that the remaining PSD pollutants do not

TAMPA ELECTRIC COMPANY
P. O. BOX 111 TAMPA, FL 33601-0111
(813) 228-4111

exceed their significant net emission increase thresholds. Assuming 863 hr/yr/engine, total IC engine emissions (for all 30 engines) are 12.6 tpy (for CO and VOC), 13.6 tpy (for SO_2), and 6.2 tpy (for PM/PM_{10}). These rates are well below the levels that would trigger PSD review as a major modification.

TEC understands that the Department would prefer to have the operating constraint on the IC engines expressed in annual engine-hours, rather than a facility-wide NO_x cap, in order to provide reasonable assurance that emissions of the remaining PSD pollutants will remain below the significant net emission increase thresholds. Because TEC wishes to retain the option to operate existing Units 1 through 6 in the future, a limit on total IC engine operations of 25,897 engine-hours would need to include a permit condition allowing for commensurate operation of existing Units 1 through 6 in the event total IC engine annual operating hours were less than the 25,897 engine-hours limit in any particular 12-month period.

Based on the IC engine electrical generation rate of 1.825 megawatts (MW) per engine, IC engine NO_x emissions are 28.88 lb/MW-hr. The average 1998/1999 electrical generation for the Hookers Point Station existing Units 1 through 6 is 186,923 MW-hr/yr. 1998/1999 average emission rates for the existing units are calculated to be 6.87 lb/MW-hr (for NO_x), 0.47 lb/MW-hr (for CO), 16.32 lb/MW-hr (for SO_2), 2.06 lb/MW-hr (for PM/PM_{10}), and 0.08 lb/MW-hr (for VOC). Because the NO_x emission rate of existing Units 1 through 6 is 23.8 percent of the IC engine rate on a lb/MW-hr basis, TEC proposes the following:

(1) IC engine operations (for all 30 engines) be limited to a total of 25,897 engine-hours and 47,262 MW-hr/yr; and

(2) For each 12-month period that the IC engines operate below 47,262 MW-hr/yr, existing Units 1 through 6 may generate 4.20 MW-hr/yr for each MW-hr/yr that the IC engines are below 47,262 MW-hr/yr. In any 12-month period, existing Units 1 through 6 may not generate more than 186,923 MW-hr/yr [equal to the 1998/1999 average].

Due to the added complexity of tracking and calculating emissions on a lb/MW-hr/yr basis, TEC requests that the Department give additional consideration to the original proposal of a facility-wide NO_x cap. Compliance with the facility-wide NO_x cap can be verified easily using the existing Unit 1 through 6 NO_x CEMS and run-time meters for the IC engines. Assurance that emissions of the remaining PSD pollutants do not exceed the significant net emission rate increase thresholds is provided by evaluating maximum IC engine emission rates for these pollutants while operating under the facility-wide NO_x cap.

FDEP Issue 2

If available, please provide emissions data for the six boilers for the year 2000. Also, provide the operating hours history for all six boilers. Please explain the reasons for the pollutant emissions, specifically NO_x and SO_2, to be high in 1999 for boilers number 3, 4, 5 and 6 as compared to other years.

TEC Response 2

The final emissions data for the year 2000 will not be available until mid February 2001. Emissions of NO_x and SO_2 during 1999 were higher than those in 1998 due to normal demand and weather related increases in electrical generation during 1999.

FDEP Issue 3

The Caterpillar Diesel Generator Set Performance Data as submitted with the application indicates that the diesel engine NO_x emission limit in California is 6.9 g/hp-hr whereas for this project an emission limit of 9.22 g/hp-hr is being proposed. Please indicate if the California emission limit is established with some add-on controls. If not, then why is the same limit not proposed for this project.

TEC Response 3

The California NO_x emission limit was not established with add on controls. Rather, the limit is a composite of NO_x emission rates tested at 25%, 50%, 75%, and 100% load. The proposed units to be sited at Hooker's Point will only run at 100% load, so in an effort to be conservative, the NO_x emission rate at 100% load was used to calculate the potential annual emissions.

TEC appreciates the opportunity to comment on these issues and understands that the satisfaction of these issues will allow the Department to continue processing the application. If you have questions, please feel free to call Shannon Todd or me at (813) 641-5125.

Sincerely,

Darryl Scott
General Manager
Hookers Point Station

EP\gm\SKT231

c: J. Kissel, SWD
J. Campbell, EPCHC
A. Harman, EPCHC
S. Arif, FDEP

TAMPA ELECTRIC

RECEIVED

AUG 22 2001

BUREAU OF AIR REGULATION

August 21, 2001

Mr. Clair Fancy
Florida Department of Environmental Protection
111 South Magnolia Drive, Suite 4
Tallahassee, Florida 32301

Via Fed Ex
Airbill No. 7909 5206 3655

Re: Tampa Electric Company
Hookers Point Station
Temporary Mobile Generation Project - Initial Compliance Test Report Submittal
FDEP File No. 0570038-002-AC

Dear Mr. Fancy:

Please find enclosed the above referenced initial compliance test report for five randomly selected Caterpillar XQ2000 Power Modules located at Hookers Point Station. Each unit was tested for emissions of oxides of nitrogen and visible emissions between July 16, 2001 and July 19, 2001. Based on the emissions limits found in the air construction permit, each unit is operating in compliance with its respective emission limit for oxides of nitrogen and visible emissions.

If you have any questions, please telephone Shannon Todd or me at (813) 641-5125.

Sincerely,

Laura R. Crouch

Laura R. Crouch
Manager - Air Programs
Environmental Affairs

Patty - To
Tampa Electric
Hookers Pt project
file -
al

EP\gm\SKT272

Enclosure

c/enc: Jerry Campbell, EPCHC
Joseph Kahn, FDEP
Syed Arif, FDEP
Bill Proses, FDEP - SWD

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A2

EMISSIONS TEST REPORT
OXIDES OF NITROGEN
JULY 16-19, 2001
HOOKERS POINT STATION
DIESEL COMBUSTION ENGINE GENERATOR SETS
UNITS 26 - 30

Prepared For:
Tampa Electric Company

Prepared By:
Environmental Affairs Department
of

Tampa Electric Company

TECO
TAMPA ELECTRIC

Environmental Services
Air Services Group
5010 Causeway Boulevard
Tampa, Florida 33619- 6130

EMISSIONS TEST REPORT
OXIDES of NITROGEN
JULY 16-19, 2001
TAMPA ELECTRIC COMPANY
HOOKERS POINT STATION
FACILITY ID NUMBER: 0570038
UNITS 26 - 30

RECEIVED
AUG 22 2001
BUREAU OF AIR REGULATION

Prepared For:
Tampa Electric Company
Hookers Point Power Station
1700 Hemlock Street
Tampa, Florida 33601

Prepared By:
Tampa Electric Company
Environmental Affairs Department
Environmental Services, Air Services Group

TECO
TAMPA ELECTRIC

Environmental Services
Air Services Group
5010 Causeway Boulevard
Tampa, Florida 33619- 6130

REPORT CERTIFICATION

I have reviewed the test performance, the resulting calculations, and contents of this report, and verified that all project quality objectives have been met.

Date 8/15/2001 Signature _____

Senior Environmental Technician
Quality Assurance/Quality Control Specialist
Air Services
Environmental Affairs
Tampa Electric Company

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

Date 8/15/01 Signature _____

Coordinator – Air Services
Environmental Services
Environmental Affairs
Tampa Electric Company

TABLE OF CONTENTS

1.0 SUMMARY OF RESULTS

On July 16 through July 19, 2001, the Environmental Services group of Tampa Electric Company performed initial NO_x source emission tests on five (5) randomly selected Caterpillar SR4B generators, located at Hookers Point Station. The generators selected were units 26 through 30, operating on diesel fuel with a full load generating capacity of 1.825 megawatts each. Testing was conducted according to United States Environmental Protection Agency (USEPA) test methods stipulated in 40 CFR Part 60, Appendix A and air construction permit ARMS 0570038-002-AC.

The initial Nitrogen Oxides (NO_x) emission concentration for unit 26 was derived from three test runs. The calculated average was 564 ppmvd, and the corresponding emission rate was 38.2 pounds per hour at an average exhaust temperature of 851 degrees Fahrenheit. The Florida Department of Environmental Protection (FDEP) permit limit is 53 pounds per hour. The average opacity observed during the thirty minute visible emissions test was 6 percent. The FDEP permit limit is 20 percent.

The initial NO_x emission concentration for unit 27 was derived from three test runs. The calculated average was 568 ppmvd, and the corresponding emission rate was 39.2 pounds per hour at an average exhaust temperature of 828 degrees Fahrenheit. The FDEP permit limit is 53 pounds per hour. The average opacity observed during the thirty minute visible emissions test was 6 percent. The FDEP permit limit is 20 percent.

The initial NO_x emission concentration for unit 28 was derived from three test runs. The calculated average was 540 ppmvd, and the corresponding emission rate was 36.8 pounds per hour at an average exhaust temperature of 850 degrees Fahrenheit. The FDEP permit limit is 53 pounds per hour. The average opacity observed during the thirty minute visible emissions test was 5 percent. The FDEP permit limit is 20 percent.

The initial NO_x emission concentration for unit 29 was derived from three test runs. The calculated average was 557 ppmvd, and the corresponding emission rate was 36.3

pounds per hour at an average exhaust temperature of 905 degrees Fahrenheit. The FDEP permit limit is 53 pounds per hour. The average opacity observed during the thirty minute visible emissions test was 6 percent. The FDEP permit limit is 20 percent.

The initial NO_x emission concentration for unit 30 was derived from three test runs. The calculated average was 569 ppmvd, and the corresponding emission rate was 38.8 pounds per hour at an average exhaust temperature of 847 degrees Fahrenheit. The FDEP permit limit is 53 pounds per hour. The average opacity observed during the thirty minute visible emissions test was 5 percent. The FDEP permit limit is 20 percent.

During the tests on July 18, 2001, each combustion engine was operated at an average load of 1,825 kilowatts and the average quantity of fuel burned was 123 gallons per hour of diesel fuel.

2.0 SOURCE DESCRIPTION/TEST PROCEDURES

The Caterpillar generator field of thirty power modules is located at the Hookers Point Station on Hemlock Street, Tampa, Florida at UTM coordinates East 358.0 North 3091.0. Each generating unit, XQ2000 Power Module, consists of a 4-stroke cycle diesel engine with a generation capacity of 1.825 megawatts or a total generation capacity of 54.75 megawatts. Source sampling was performed from the rectangular exhaust vent on the roof of each engine compartment housed in a semi-tractor trailer.

Nitrogen Oxides sampling was performed in accordance with USEPA Reference Method 7E (40 CFR Part 60, Appendix A) "Determination of Nitrogen Oxides Emissions from Stationary Sources". Testing was performed using an Advanced Pollution Instruments model 200AH Chemiluminescent NO-NO_2-NO_x Gas Analyzer.

A visible emission test was performed using FDEP Method 9 "Visual Determination of the Opacity of Emissions from Stationary Sources".

TCEMS Description

The following discussion briefly outlines the operation principles of Environmental Services Transportable Continuous Emissions Monitoring System (TCEMS). Additional information on instrument operation may be found in the individual instrument manuals provided by the manufacturers. A schematic of the TCEMS set-up is presented in Figure 1.

Advanced Pollution Instruments Model 200AH NO/NO_x Analyzer

The Advanced Pollution Instruments model 200AH NO/NO_x analyzer automatically and continuously determines the concentration of nitric oxide (NO) and/or oxides of nitrogen (NO_x) in a flowing gas mixture. The analytical technique is chemiluminescence.

To measure NO concentrations, the gas sample to be analyzed is blended with ozone (O_3) in a reaction chamber. The resulting chemiluminescence activity is monitored through an optical filter by a high sensitivity photomultiplier tube positioned at one end of the chamber.

This filter and photomultiplier combination responds to light of a narrow wavelength band unique to the NO/O_3 reaction, producing an interference free signal. The output from the photomultiplier is linearly proportional to the NO concentration.

To measure NO_x concentrations (i.e., NO plus NO_2), the sample gas flow is diverted through an NO_2-to-NO converter. The Chemiluminescent action in the reaction chamber to the converter effluent is linearly proportional to the NO_x concentration entering the converter.

Data Acquisition System

The data acquisition system (DAS) developed by Entropy Environmentalists Inc., uses a portable personal computer with an internal 32 bit analog-to-digital converter with an external 16 channel multiplexer. In addition to providing an instantaneous display of analyzer responses, the DAS can average data, calculate emission rates, and document analyzer calibrations. The test results and calibrations are stored on the hard disk and printed on a dot matrix printer.

TCEMS Sample Handling System

The extractive monitors utilized in the TCEMS require that the effluent stream be conditioned to eliminate any possible interference (i.e., water vapor and particulate matter), before being transported and injected into each analyzer. Figure 1 depicts a schematic of the entire sample handling system. The major components of this system are listed below:

- Gas transport tubing
- Moisture removal system
- Sampling pump

Gas Transport Tubing

Two separate 1/4 inch O.D. Teflon tubes were used for the sample gas transport.

Moisture Removal System

The moisture removal system was comprised of an ice bath condenser, constructed of a 30-foot section of 3/8 inch O.D. Teflon tubing wrapped in a 12-inch coil. Effluent travels through this coil and then passes, in series, through two stainless steel moisture traps where the condensate drops out and is removed via a condensate discharge pump. With the exception of the discharge pump, the entire assembly is chilled in an ice bath.

Sampling Pump

The Thomas Model 2107CE20-TFE pump is used to transport the effluent sample through the conditioning system to the analyzers. All internal parts of the pump that come into contact with the gas sample are constructed of 316 stainless steel or Teflon.

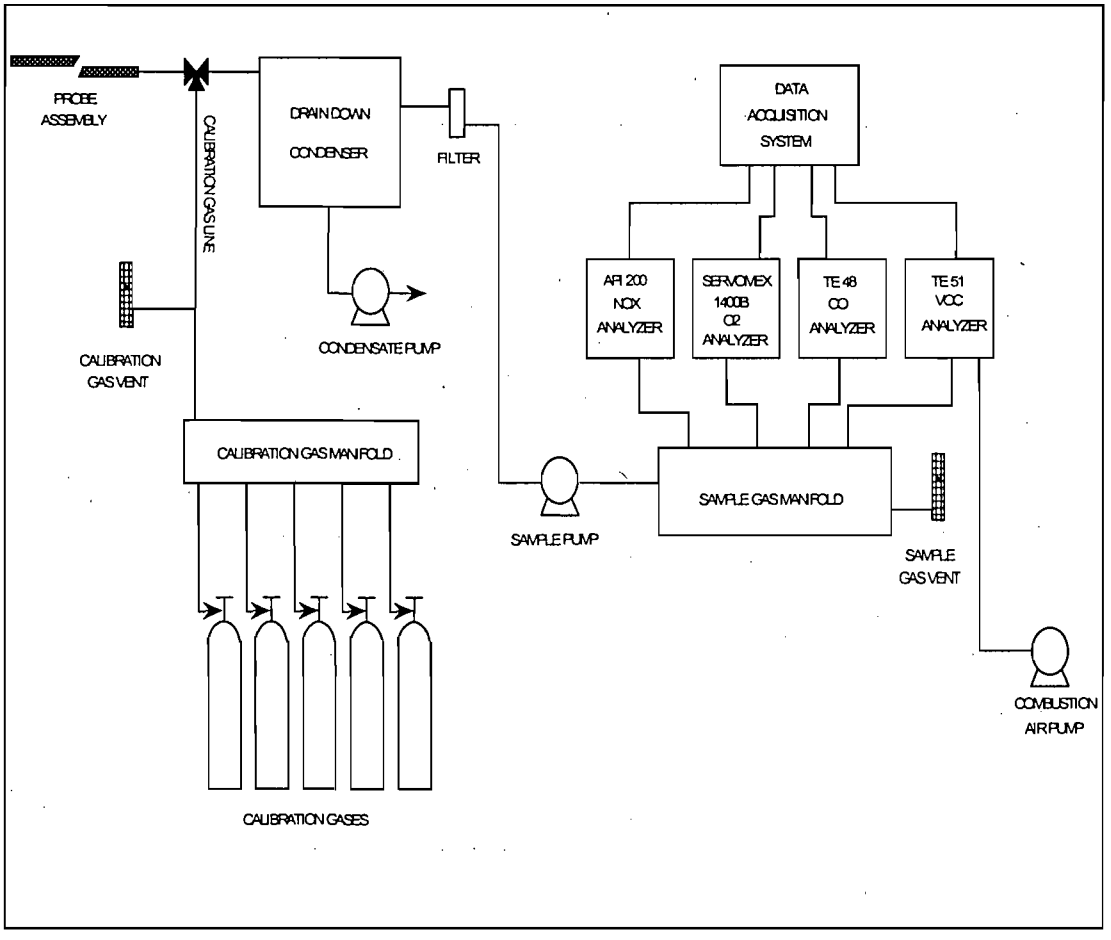

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FIGURE 1
Carbon Monoxide and Nitrogen Oxide Sampling Trains

USEPA METHODS 3A, 10, 20, 25 CEM SYSTEM LAYOUT

3.0 TEST RESULTS

HOOKERS POINT CATERPILLAR GENERATING FIELD

NITROGEN OXIDES TESTING

XP2000 COMBUSTION ENGINE UNIT 26
JULY 19, 2001

RUN NO.	TIME	Exhaust Temperature Degrees F	ppm NO_x Dry	ppm NO_x Corrected to lbs/Hr
1	11:40 –12:40	846.2	570	38.8
2	13:01 –14:01	852.6	506	34.3
3	14:18 –15:18	853.2	615	41.6
	Average	850.6	564	38.2

NO_x corrected to lbs/Hr.
by
NO_x Mass Flow Rate:

$$Flow\left[\frac{\mu g}{\min}\right] = \frac{GMW\left[\frac{g}{mol}\right] \times NO_x\ concentration\ [ppm] \times \frac{Vc\left[\frac{ft^3}{\min}\right]}{35.31\left[\frac{ft^3}{m^3}\right]} \times 1{,}000\left[\frac{L}{m^3}\right]}{22.414\left[\frac{L}{mol}\right] \times \frac{T_{ref}\,[K]}{273.15\,[K]}}$$

$$Flow\left[\frac{lb}{hr}\right] = Flow\left[\frac{\mu g}{\min}\right] \times \frac{1}{1{,}000{,}000}\left[\frac{g}{\mu g}\right] \times \frac{1}{454}\left[\frac{lb}{g}\right] \times \frac{60}{1}\left[\frac{\min}{hr}\right]$$

where:

GMW = gram molecular weight of NOx = 76 g/mol
V_c = temperature corrected volumetric flow rate of flue gas
T_{ref} = ambient temperature

XP2000 COMBUSTION ENGINE UNIT 27
JULY 16, 2001

RUN NO.	TIME	Exhaust Temperature Degrees F	ppm NO_X Dry	ppm NO_X Corrected to lbs/Hr
1	12:46 –13:46	820.4	504	35.0
2	14:06 –15:06	830.6	693	47.8
3	15:18 –16:18	833.0	507	34.9
	Average	828.0	568	39.2

NO_x corrected to lbs/Hr.
by
NO_x Mass Flow Rate:

$$Flow\left[\frac{\mu g}{\min}\right] = \frac{GMW\left[\frac{g}{mol}\right] \times NO_x\ concentration\,[ppm] \times \frac{Vc\left[\frac{ft^3}{\min}\right]}{35.31\left[\frac{ft^3}{m^3}\right]} \times 1{,}000\left[\frac{L}{m^3}\right]}{22.414\left[\frac{L}{mol}\right] \times \frac{T_{ref}\,[K]}{273.15\,[K]}}$$

$$Flow\left[\frac{lb}{hr}\right] = Flow\left[\frac{\mu g}{\min}\right] \times \frac{1}{1{,}000{,}000}\left[\frac{g}{\mu g}\right] \times \frac{1}{454}\left[\frac{lb}{g}\right] \times \frac{60}{1}\left[\frac{\min}{hr}\right]$$

where:

GMW = gram molecular weight of NOx = 76 g/mol
V_c = temperature corrected volumetric flow rate of flue gas
T_{ref} = ambient temperature

XP2000 COMBUSTION ENGINE UNIT 28
JULY 18, 2001

RUN NO.	TIME	Exhaust Temperature Degrees F	ppm NO_X Dry	ppm NO_X Corrected to lbs/Hr
1	09:28 –10:28	846.7	589	40.3
2	10:46 –11:46	850.0	523	35.6
3	12:07 –13:07	854.6	508	34.4
	Average	850.4	540	36.8

NO_x corrected to lbs/Hr.
by

NO_x Mass Flow Rate:

$$Flow\left[\frac{\mu g}{\min}\right] = \frac{GMW\left[\frac{g}{mol}\right] \times NO_x\ concentration\,[ppm] \times \frac{Vc\left[\frac{ft^3}{\min}\right]}{35.31\left[\frac{ft^3}{m^3}\right]} \times 1{,}000\left[\frac{L}{m^3}\right]}{22.414\left[\frac{L}{mol}\right] \times \frac{T_{ref}\,[K]}{273.15\,[K]}}$$

$$Flow\left[\frac{lb}{hr}\right] = Flow\left[\frac{\mu g}{\min}\right] \times \frac{1}{1{,}000{,}000}\left[\frac{g}{\mu g}\right] \times \frac{1}{454}\left[\frac{lb}{g}\right] \times \frac{60}{1}\left[\frac{\min}{hr}\right]$$

where:

GMW = gram molecular weight of NOx = 76 g/mol
V_c = temperature corrected volumetric flow rate of flue gas
T_{ref} = ambient temperature

XP2000 COMBUSTION ENGINE UNIT 29
JULY 18, 2001

RUN NO.	TIME	Exhaust Temperature Degrees F	ppm NO_X Dry	ppm NO_X Corrected to lbs/Hr
1	14:15 –15:15	906.4	561	36.6
2	15:33 –16:33	907.1	561	36.5
3	16:51 –17:51	902.2	550	35.9
	Average	905.2	557	36.3

NO_x corrected to lbs/Hr.
by
NO_x Mass Flow Rate:

$$Flow\left[\frac{\mu g}{\min}\right] = \frac{GMW\left[\frac{g}{mol}\right] \times NO_x\ concentration\,[ppm] \times \frac{Vc\left[\frac{ft^3}{\min}\right]}{35.31\left[\frac{ft^3}{m^3}\right]} \times 1{,}000\left[\frac{L}{m^3}\right]}{22.414\left[\frac{L}{mol}\right] \times \frac{T_{ref}\,[K]}{273.15\,[K]}}$$

$$Flow\left[\frac{lb}{hr}\right] = Flow\left[\frac{\mu g}{\min}\right] \times \frac{1}{1{,}000{,}000}\left[\frac{g}{\mu g}\right] \times \frac{1}{454}\left[\frac{lb}{g}\right] \times \frac{60}{1}\left[\frac{\min}{hr}\right]$$

where:

GMW = gram molecular weight of NOx = 76 g/mol
V_c = temperature corrected volumetric flow rate of flue gas
T_{ref} = ambient temperature

XP2000 COMBUSTION ENGINE UNIT 30
JULY 19, 2001

RUN NO.	TIME	Exhaust Temperature Degrees F	ppm NO_X Dry	ppm NO_X Corrected to lbs/Hr
1	06:50 –07:50	839.1	569	39.0
2	08:07 –09:07	849.4	531	36.1
3	09:27 –10:27	853.2	608	41.2
	Average	847.2	569	38.8

NO_x corrected to lbs/Hr.
by
NO_x Mass Flow Rate:

$$Flow\left[\frac{\mu g}{\min}\right] = \frac{GMW\left[\frac{g}{mol}\right] \times NO_x\ concentration\,[ppm] \times \frac{Vc\left[\frac{ft^3}{\min}\right]}{35.31\left[\frac{ft^3}{m^3}\right]} \times 1{,}000\left[\frac{L}{m^3}\right]}{22.414\left[\frac{L}{mol}\right] \times \frac{T_{ref}\,[K]}{273.15\,[K]}}$$

$$Flow\left[\frac{lb}{hr}\right] = Flow\left[\frac{\mu g}{\min}\right] \times \frac{1}{1{,}000{,}000}\left[\frac{g}{\mu g}\right] \times \frac{1}{454}\left[\frac{lb}{g}\right] \times \frac{60}{1}\left[\frac{\min}{hr}\right]$$

where:

GMW = gram molecular weight of NOx = 76 g/mol
V_c = temperature corrected volumetric flow rate of flue gas
T_{ref} = ambient temperature

Volumetric Flow Rate Temperature Correction

$$V_c = \frac{T_{ref} + 460°R}{T_s + 460°R} \times Q_{ref} \left[\frac{ft^3}{\min} \right]$$

where:

T_{ref} = ambient temperature
T_s = stack temperature
Q_{ref} = 14,267 = manufacturer's specification wet exhaust flow

A. NITROGEN OXIDES CALCULATIONS

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 1

SOURCE: HOOKERS POINT POWER CAT UNIT 26

TEST DATE: 7/19/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	3.1	4.6	3.9
1268.0 ppm NOx	1277.2	1276.9	1277.1
0.00 ppmNO	3.10	3.10	3.1
1268.00 ppmNO	1279.50	1277.90	1278.7

$\bar{C}$(NOx) = 576.6 $\bar{C}$(NO) = 563.9

CORRECTED RESULTS

570 ppm NOx
558 ppmNO
13 ppm NO2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - Cm) + $\bar{C}$ma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 2

SOURCE: HOOKERS POINT POWER CAT UNIT 26

TEST DATE: 7/19/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	4.6	6.0	5.3
1268.0 ppm NOx	1276.9	1275.7	1276.3
0.00 ppmNO	3.10	3.10	3.1
1268.00 ppmNO	1277.90	1276.30	1277.1

$\bar{C}$(NOx) = 512.5 $\bar{C}$(NO) = 502.5

CORRECTED RESULTS

506 ppm NOx
497 ppmNO
9 ppm NO2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 3

SOURCE: HOOKERS POINT POWER CAT UNIT 26

TEST DATE: 7/19/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	6.0	6.0	6.0
1268.0 ppm NOx	1275.7	1272.6	1274.2
0.00 ppmNO	3.10	4.60	3.9
1268.00 ppmNO	1276.30	1273.30	1274.8

$\bar{C}$(NOx) = 621.0 $\bar{C}$(NO) = 607.2

CORRECTED RESULTS

615 ppm NOx
602 ppmNO
13 ppm NO2

Corr. Conc. = $\overline{Cma}$(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\overline{Cm}$) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 1

SOURCE: RING-HAVER CAT POWER, UNIT 27

TEST DATE: 7/16/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	-9.8	6.9	-1.5
1268.0 ppm NOx	1240.1	1281.0	1260.6

$\bar{C}$(NOx) = 500.2

CORRECTED RESULTS

504 ppm NOx

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 2

SOURCE: RING-HAVER CAT POWER, UNIT 27

TEST DATE: 7/16/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	6.9	5.8	6.4
1268.0 ppm NOx	1281.0	1278.2	1279.6

$\bar{C}$(NOx) = 702.0

CORRECTED RESULTS

693 ppm NOx

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 3

SOURCE: RING-HAVER CAT POWER, UNIT 27

TEST DATE: 7/16/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	5.8	1.7	3.8
1268.0 ppm NOx	1278.2	1279.9	1279.1

$\bar{C}$(NOx) = 513.9

CORRECTED RESULTS

507 ppm NOx

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 1

SOURCE: H.P RING-HAVER CAT POWER UNIT 28

TEST DATE: 7/18/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	1.5	3.0	2.3
1268.0 ppm NOx	1280.1	1269.7	1274.9
1.50 ppmNO	1.5	3.1	2.3
1268.00 ppmNO	1279.3	1271.9	1275.6

$\bar{C}$(NOx) = 593.4 $\bar{C}$(NO) = 582.9

CORRECTED RESULTS

589 ppm NOx
579 ppmNO
10 ppm NO2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - Cm) + $\bar{C}$ma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 2

SOURCE: H.P RING-HAVER CAT POWER UNIT 28

TEST DATE: 7/18/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	3.0	-1.9	0.6
1268.0 ppm NOx	1269.7	1266.8	1268.3
1.50 ppmNO	3.1	0.0	1.6
1268.00 ppmNO	1271.9	1267.6	1269.8

$\bar{C}$(NOx) = 523.5 $\bar{C}$(NO) = 515.9

CORRECTED RESULTS

523 ppm NOx
515 ppmNO
8 ppm NO2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 3

SOURCE: H.P RING-HAVER CAT POWER UNIT 28

TEST DATE: 7/18/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	-1.9	-0.2	-1.1
1268.0 ppm NOx	1266.8	1262.5	1264.7
1.50 ppmNO	0.0	1.5	0.8
1268.00 ppmNO	1267.6	1264.6	1266.1

$\bar{C}$(NOx) = 506.4 $\bar{C}$(NO) = 499.2

CORRECTED RESULTS

508 ppm NOx
500 ppmNO
8 ppm NO2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 1

SOURCE: HOOKERS POINT POWER CAT UNIT 29 TEST

TEST DATE: 7/18/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	6.0	3.1	4.6
1268.0 ppm NOx	1275.8	1277.1	1276.5
0.00 ppmNO	4.6	3.1	3.9
1268.00 ppmNO	1276.4	1279.4	1277.9

$\bar{C}$(NOx) = 567.0 $\bar{C}$(NO) = 557.3

CORRECTED RESULTS

561 ppm NOx
551 ppmNO
10 ppm NO2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 2

SOURCE: HOOKERS POINT POWER CAT UNIT 29 TEST

TEST DATE: 7/18/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	3.1	4.6	3.9
1268.0 ppm NOx	1277.1	1272.7	1274.9
0.00 ppmNO	3.1	3.1	3.1
1268.00 ppmNO	1279.4	1270.5	1275.0

$\bar{C}$(NOx) = 565.8 $\bar{C}$(NO) = 556.2

CORRECTED RESULTS

561 ppm NOx
551 ppmNO
10 ppm NO2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 3

SOURCE: HOOKERS POINT POWER CAT UNIT 29 TEST

TEST DATE: 7/18/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	4.6	4.4	4.5
1268.0 ppm NOx	1272.7	1269.7	1271.2
0.00 ppmNO	3.1	3.1	3.1
1268.00 ppmNO	1270.5	1271.9	1271.2

$\bar{C}$(NOx) = 554.4 $\bar{C}$(NO) = 544.9

CORRECTED RESULTS

550 ppm NOx
542 ppmNO
8 ppm NO2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 1

SOURCE: HOOKERS POINTCAT POWER UNIT 30

TEST DATE: 7/19/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	4.6	4.5	4.6
1268.0 ppm NOx	1275.7	1275.6	1275.7
0.00 ppmNO	2.9	3.0	3.0
1268.00 ppmNO	1276.4	1274.4	1275.4

$\bar{C}$(NOx) = 575.1 $\bar{C}$(NO) = 562.9

CORRECTED RESULTS

569 ppm NOx
558 ppmNO
11 ppm NO2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 2

SOURCE: HOOKERS POINT CAT POWER UNIT 30

TEST DATE: 7/19/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	4.5	4.6	4.6
1268.0 ppm NOx	1275.6	1274.2	1274.9
0.00 ppmNO	3.0	3.1	3.1
1268.00 ppmNO	1274.4	1273.5	1274.0

$\bar{C}$(NOx) = 536.6 $\bar{C}$(NO) = 525.9

CORRECTED RESULTS

531 ppm NOx
522 ppmNO
9 ppm NO2

Corr. Conc. = $\overline{Cma}$(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\overline{Cm}$) + Cma (for O2)

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

1420
1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 3

SOURCE: HOOKERS POINT CAT POWER UNIT 30

TEST DATE: 7/19/01

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	4.6	3.1	3.9
1268.0 ppm NOx	1274.2	1271.2	1272.7
0.00 ppmNO	3.1	2.8	3.0
1268.00 ppmNO	1273.5	1267.6	1270.6

$\bar{C}$(NOx) = 612.1 $\bar{C}$(NO) = 599.0

CORRECTED RESULTS

608 ppm NOx
596 ppmNO
12 ppm NO2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

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

1420
1.194E-07

B. UNCORRECTED REFERENCE METHOD DATA

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
11:40	649.8	633.5
11:41	644.0	630.8
11:42	641.7	628.0
11:43	641.5	626.0
11:44	636.3	619.9
11:45	630.3	615.6
11:46	628.7	612.2
11:47	621.3	606.3
11:48	614.7	599.9
11:49	614.7	601.7
11:50	617.3	603.8
11:51	615.7	600.7
11:52	611.2	596.2
11:53	607.8	593.1
11:54	603.1	590.9
11:55	599.1	585.2
11:56	596.9	583.7
11:57	597.2	583.6
11:58	593.1	579.0
11:59	588.6	576.0
12:00	590.4	575.7
12:01	584.8	570.7
12:02	582.3	570.0
12:03	582.6	568.3
12:04	579.4	565.2
12:05	574.3	561.3
12:06	567.2	555.1
12:07	565.9	553.5
12:08	567.0	553.8
12:09	565.7	552.6
12:10	563.2	551.7
12:11	560.9	548.4
12:12	558.6	545.7
12:13	557.3	544.0
12:14	556.7	543.0
12:15	556.3	542.9
12:16	553.8	541.8
12:17	552.4	540.1
12:18	550.6	540.4
12:19	553.8	543.4
12:20	551.4	539.1
12:21	549.0	537.5
12:22	553.4	545.9
12:23	546.3	541.5
12:24	548.9	536.7
12:25	545.4	532.9
12:26	545.4	534.7
12:27	546.2	534.7
12:28	544.0	533.4
12:29	544.9	533.3
12:30	546.0	534.8
12:31	548.2	535.7
12:32	546.5	533.9
12:33	543.8	533.4
12:34	544.9	534.6

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
12:35	544.9	533.3
12:36	542.8	530.8
12:37	541.6	530.7
12:38	541.8	531.8
12:39	541.9	530.9

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

12:39	576.6	563.9
~~12:40~~	~~540.0~~	~~529.0~~

DNB

COMMENTS: END RUN ONE
UNIT 26

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
13:02	523.6	512.7
13:03	523.1	511.1
13:04	521.4	510.8
13:05	520.0	509.7
13:06	518.7	509.2
13:07	519.4	508.9
13:08	516.6	507.3
13:09	516.9	508.1
13:10	516.5	505.6
13:11	516.6	507.4
13:12	518.0	508.8
13:13	520.1	510.6
13:14	518.9	507.7
13:15	515.8	505.4
13:16	515.4	507.5
13:17	515.6	505.1
13:18	512.7	503.4
13:19	514.6	504.6
13:20	512.2	502.0
13:21	511.8	502.2
13:22	509.8	499.2
13:23	507.9	498.6
13:24	509.6	500.4
13:25	512.0	502.3
13:26	511.3	500.1
13:27	511.8	501.3
13:28	512.4	502.6
13:29	513.9	505.5
13:30	515.4	506.9
13:31	516.3	506.8
13:32	517.4	506.9
13:33	516.9	505.4
13:34	512.8	502.3
13:35	513.9	505.1
13:36	515.7	505.9
13:37	515.6	504.6
13:38	510.8	499.3
13:39	505.9	494.9
13:40	506.5	498.7
13:41	510.2	500.1
13:42	509.3	498.5
13:43	506.9	497.5
13:44	508.1	497.4
13:45	507.3	497.7
13:46	506.8	497.4
13:47	506.6	496.7
13:48	508.6	499.4
13:49	509.7	499.7
13:50	506.7	497.6
13:51	506.5	497.4
13:52	507.8	498.2
13:53	509.1	499.5
13:54	508.1	498.5
13:55	506.9	496.0
13:56	507.1	497.2

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
13:57	509.1	497.8
13:58	509.2	498.0
13:59	507.2	496.9
14:00	506.7	496.5
14:01	507.8	498.6

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

14:01	512.5	502.5

COMMENTS: END RUN 2
UNIT 26

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
14:19	649.0	632.9
14:20	639.3	624.8
14:21	639.6	623.4
14:22	637.3	622.8
14:23	639.9	626.3
14:24	637.6	623.4
14:25	633.1	618.7
14:26	633.3	618.2
14:27	630.6	615.8
14:28	627.6	612.7
14:29	623.8	610.6
14:30	623.0	609.0
14:31	619.7	607.9
14:32	622.1	608.9
14:33	625.6	613.2
14:34	632.6	620.4
14:35	636.5	621.4
14:36	632.3	618.6
14:37	630.7	615.9
14:38	628.4	615.0
14:39	630.7	616.1
14:40	628.7	614.9
14:41	628.1	614.1
14:42	625.1	613.1
14:43	625.9	612.6
14:44	625.7	612.0
14:45	625.9	610.8
14:46	624.8	611.1
14:47	623.2	609.9
14:48	621.1	608.5
14:49	622.2	607.8
14:50	621.9	607.0
14:51	619.0	604.9
14:52	618.2	604.3
14:53	619.6	605.3
14:54	617.5	603.4
14:55	617.0	603.1
14:56	614.7	599.7
14:57	612.5	599.1
14:58	609.7	597.2
14:59	613.3	600.0
15:00	612.8	599.9
15:01	611.6	597.7
15:02	608.6	594.8
15:03	610.2	597.6
15:04	609.2	595.5
15:05	606.7	594.6
15:06	610.1	596.7
15:07	611.8	597.7
15:08	609.8	595.6
15:09	606.9	593.4
15:10	607.5	593.5
15:11	607.9	594.7
15:12	607.6	596.0
15:13	608.6	595.5

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
15:14	609.1	594.9
15:15	606.7	595.1
15:16	608.5	594.1
15:17	609.6	595.4
15:18	610.0	596.3

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

15:18	621.0	607.2

COMMENTS: END RUN 3
UNIT 26

RING-HAVER POWER CAT TESTING 07-16-2001

TIME	CHAN 6 OUTLET ppmNOX
12:47	503.6
12:48	500.5
12:49	492.3
12:50	499.7
12:51	495.5
12:52	489.4
12:53	487.2
12:54	481.8
12:55	476.0
12:56	478.4
12:57	483.7
12:58	481.9
12:59	480.5
13:00	477.1
13:01	477.8
13:02	480.9
13:03	487.1
13:04	484.0
13:05	483.4
13:06	483.4
13:07	481.5
13:08	488.0
13:09	486.5
13:10	489.3
13:11	489.8
13:12	488.9
13:13	482.2
13:14	485.2
13:15	486.5
13:16	486.9
13:17	484.2
13:18	482.3
13:19	486.5
13:20	487.5
13:21	484.9
13:22	483.3
13:23	484.2
13:24	487.4
13:25	488.4
13:26	515.6
13:27	546.2
13:28	542.7
13:29	544.0
13:30	539.5
13:31	534.8
13:32	536.9
13:33	529.9
13:34	522.2
13:35	518.4
13:36	524.2
13:37	524.5
13:38	520.8
13:39	519.0
13:40	512.7
13:41	523.7

RING-HAVER POWER CAT TESTING 07-16-2001

TIME	CHAN 6 OUTLET ppmNOX
14:07	710.6
14:08	716.9
14:09	713.4
14:10	710.2
14:11	715.0
14:12	708.5
14:13	708.7
14:14	711.6
14:15	712.6
14:16	713.5
14:17	707.9
14:18	709.6
14:19	708.3
14:20	707.6
14:21	719.5
14:22	716.2
14:23	710.2
14:24	706.2
14:25	703.3
14:26	703.9
14:27	702.5
14:28	697.7
14:29	697.9
14:30	692.8
14:31	687.1
14:32	694.3
14:33	686.3
14:34	716.7
14:35	709.0
14:36	712.1
14:37	707.2
14:38	710.8
14:39	706.3
14:40	710.1
14:41	716.0
14:42	703.3
14:43	705.1
14:44	709.9
14:45	713.0
14:46	719.2
14:47	702.2
14:48	702.0
14:49	694.7
14:50	695.2
14:51	690.3
14:52	703.1
14:53	694.2
14:54	690.8
14:55	703.2
14:56	697.3
14:57	696.0
14:58	689.1
14:59	684.0
15:00	687.5
15:01	678.0

RING-HAVER POWER CAT TESTING 07-16-2001

TIME	CHAN 6 OUTLET ppmNOX
15:02	680.5
15:03	681.8
15:04	682.8
15:05	680.2
15:06	676.9

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

15:06	702.0

COMMENTS: END RUN TWO
CAT UNIT 27

RING-HAVER POWER CAT TESTING 07-16-2001

TIME	CHAN 6 OUTLET ppmNOX
15:19	513.8
15:20	527.5
15:21	515.8
15:22	506.3
15:23	508.2
15:24	512.9
15:25	518.1
15:26	509.6
15:27	502.5
15:28	514.6
15:29	510.4
15:30	499.2
15:31	504.3
15:32	509.3
15:33	514.3
15:34	514.6
15:35	519.4
15:36	522.1
15:37	510.1
15:38	502.5
15:39	492.5
15:40	505.9
15:41	511.6
15:42	512.3
15:43	513.7
15:44	514.3
15:45	494.7
15:46	520.1
15:47	511.5
15:48	518.1
15:49	517.1
15:50	506.7
15:51	510.0
15:52	530.1
15:53	525.1
15:54	519.8
15:55	525.8
15:56	522.8
15:57	525.1
15:58	525.4
15:59	518.3
16:00	507.9
16:01	515.0
16:02	525.9
16:03	514.4
16:04	517.4
16:05	514.1
16:06	509.7
16:07	507.8
16:08	528.8
16:09	508.3
16:10	503.5
16:11	515.1
16:12	512.3
16:13	511.7

RING-HAVER POWER CAT TESTING 07-16-2001

TIME	CHAN 6 OUTLET ppmNOX
16:14	521.4
16:15	515.9
16:16	520.1
16:17	512.5
16:18	515.6

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

16:18	513.9

COMMENTS: END RUN THREE
CAT UNIT 27

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
09:29	675.4	661.1
09:30	668.7	656.4
09:31	682.4	672.1
09:32	676.6	659.3
09:33	663.1	648.2
09:34	653.1	640.7
09:35	650.8	639.0
09:36	646.5	634.5
09:37	643.9	632.6
09:38	639.0	626.4
09:39	633.9	621.3
09:40	627.9	616.7
09:41	624.0	611.7
09:42	620.0	608.9
09:43	615.6	605.4
09:44	614.2	602.8
09:45	611.3	600.4
09:46	610.9	601.4
09:47	608.1	597.2
09:48	605.7	594.2
09:49	603.5	594.0
09:50	602.6	591.9
09:51	600.1	589.0
09:52	595.4	585.7
09:53	592.4	582.1
09:54	587.7	577.6
09:55	587.0	576.4
09:56	586.2	575.8
09:57	581.1	571.5
09:58	579.0	568.7
09:59	576.5	566.2
10:00	576.3	565.5
10:01	575.6	565.2
10:02	572.6	562.3
10:03	571.6	560.3
10:04	567.4	557.4
10:05	569.1	559.5
10:06	567.2	557.5
10:07	565.8	558.6
10:08	566.8	557.3
10:09	564.1	554.1
10:10	561.9	552.4
10:11	562.6	553.1
10:12	565.3	555.9
10:13	571.2	560.9
10:14	570.3	559.7
10:15	566.0	556.5
10:16	562.4	554.1
10:17	562.9	554.4
10:18	562.5	553.1
10:19	559.6	551.0
10:20	557.7	548.2
10:21	555.0	548.3
10:22	558.5	551.5
10:23	557.7	547.8

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
10:24	554.8	546.1
10:25	555.0	547.3
10:26	552.3	542.5
10:27	553.3	544.3
10:28	553.5	542.6

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

10:28	593.4	582.9

COMMENTS: END RUN ONE
CAT UNIT 28

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
10:46	542.9	534.8
10:47	541.1	532.2
10:48	543.0	534.0
10:49	540.0	532.3
10:50	540.5	531.8
10:51	538.6	531.5
10:52	536.7	529.7
10:53	535.6	527.4
10:54	535.9	528.1
10:55	532.3	524.1
10:56	527.1	518.9
10:57	528.3	520.3
10:58	528.4	521.2
10:59	528.0	519.8
11:00	528.0	518.8
11:01	524.9	516.3
11:02	522.9	514.9
11:03	523.8	515.0
11:04	526.9	518.3
11:05	526.1	517.9
11:06	525.3	517.4
11:07	524.0	516.3
11:08	520.2	512.7
11:09	518.8	512.2
11:10	522.7	516.1
11:11	523.3	516.9
11:12	518.8	512.8
11:13	518.4	512.4
11:14	518.0	512.5
11:15	520.7	512.8
11:16	521.2	515.4
11:17	522.6	515.8
11:18	522.0	514.4
11:19	519.9	513.1
11:20	521.0	513.8
11:21	520.8	513.6
11:22	519.1	510.4
11:23	519.5	511.0
11:24	520.8	512.7
11:25	522.9	514.6
11:26	521.0	512.7
11:27	518.5	510.9
11:28	515.8	507.9
11:29	516.4	509.5
11:30	516.4	510.4
11:31	514.2	506.9
11:32	515.1	507.2
11:33	513.9	507.8
11:34	516.6	509.3
11:35	517.3	509.6
11:36	518.9	511.1
11:37	517.8	510.7
11:38	520.4	513.1
11:39	517.2	509.7
11:40	516.1	508.5

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
11:41	515.0	507.1
11:42	515.3	507.9
11:43	516.7	509.2
11:44	515.8	509.9
11:45	520.0	512.3

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

11:45	523.5	515.9

COMMENTS: END RUN TWO
CAT UNIT 28

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
12:07	539.6	530.2
12:08	539.0	530.3
12:09	536.2	528.0
12:10	532.3	524.3
12:11	526.8	518.8
12:12	525.0	517.7
12:13	522.7	514.5
12:14	520.8	512.4
12:15	519.9	511.6
12:16	517.7	509.1
12:17	515.8	508.3
12:18	514.1	506.8
12:19	516.3	509.7
12:20	517.8	510.9
12:21	516.9	509.1
12:22	518.3	512.7
12:23	525.3	517.9
12:24	523.0	513.7
12:25	516.1	508.5
12:26	513.9	508.0
12:27	519.4	512.7
12:28	519.4	511.2
12:29	515.5	507.0
12:30	517.0	509.8
12:31	516.2	508.8
12:32	513.6	507.5
12:33	514.2	507.6
12:34	514.4	506.2
12:35	512.8	504.1
12:36	512.2	504.9
12:37	509.3	501.8
12:38	506.3	498.5
12:39	504.5	497.9
12:40	504.6	498.1
12:41	504.8	497.6
12:42	505.3	497.9
12:43	503.5	496.1
12:44	505.0	498.2
12:45	503.8	498.5
12:46	505.7	498.7
12:47	506.8	498.6
12:48	504.7	497.5
12:49	504.4	496.7
12:50	502.7	495.2
12:51	502.1	492.3
12:52	489.1	480.1
12:53	482.6	476.3
12:54	479.7	473.5
12:55	478.2	472.0
12:56	478.7	472.0
12:57	478.7	472.7
12:58	479.2	473.1
12:59	479.9	476.2
13:00	480.5	474.4
13:01	480.1	473.4

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
13:02	479.8	473.7
13:03	478.7	472.0
13:04	477.8	471.5
13:05	478.3	471.6
13:06	478.5	472.1

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

13:06	506.4	499.2

COMMENTS: END RUN THREE
CAT UNIT 28

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
14:16	563.2	552.2
14:17	559.3	547.9
14:18	556.6	548.1
14:19	558.5	548.8
14:20	558.0	548.4
14:21	558.4	549.1
14:22	562.3	552.6
14:23	562.1	553.7
14:24	566.7	557.8
14:25	567.8	559.3
14:26	567.3	556.4
14:27	565.1	556.3
14:28	566.7	557.2
14:29	566.0	555.6
14:30	563.5	553.9
14:31	565.9	557.0
14:32	573.1	564.1
14:33	574.4	562.7
14:34	573.0	564.5
14:35	577.4	569.1
14:36	577.3	567.4
14:37	573.7	565.8
14:38	576.0	567.4
14:39	575.7	566.2
14:40	576.3	566.1
14:41	573.5	563.2
14:42	573.6	564.3
14:43	575.5	564.8
14:44	573.7	561.5
14:45	569.7	558.5
14:46	567.7	557.9
14:47	566.6	555.6
14:48	566.4	556.2
14:49	573.8	564.3
14:50	572.8	562.6
14:51	570.3	560.0
14:52	569.6	559.9
14:53	570.4	559.9
14:54	568.8	558.5
14:55	568.1	557.2
14:56	566.1	555.3
14:57	565.9	555.8
14:58	566.4	556.7
14:59	565.0	554.8
15:00	561.8	551.8
15:01	561.3	552.2
15:02	559.5	549.7
15:03	563.2	554.0
15:04	564.8	554.1
15:05	563.8	553.8
15:06	558.7	549.0
15:07	561.9	554.3
15:08	567.7	558.7
15:09	561.6	551.5
15:10	565.3	556.6

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
15:11	564.6	554.2
15:12	565.4	556.9
15:13	566.0	557.5
15:14	564.1	556.2
15:15	564.5	555.6

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

15:15	567.0	557.3

COMMENTS: END RUN ONE
CAT UNIT 29

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
15:34	587.7	577.3
15:35	587.6	575.9
15:36	583.4	573.4
15:37	581.9	572.6
15:38	582.7	570.6
15:39	576.9	566.5
15:40	577.2	566.2
15:41	580.4	569.4
15:42	574.3	564.9
15:43	571.9	562.3
15:44	572.2	561.8
15:45	568.4	558.5
15:46	569.7	561.1
15:47	574.3	565.1
15:48	572.7	563.7
15:49	572.5	560.7
15:50	566.9	556.9
15:51	564.2	554.6
15:52	563.6	553.6
15:53	563.8	553.6
15:54	560.7	552.4
15:55	563.0	554.5
15:56	564.7	554.2
15:57	563.0	552.7
15:58	562.3	551.8
15:59	558.9	549.7
16:00	558.6	550.1
16:01	557.5	549.9
16:02	560.3	551.0
16:03	559.5	549.5
16:04	558.2	548.6
16:05	558.8	550.2
16:06	559.3	550.1
16:07	559.8	551.5
16:08	561.5	553.4
16:09	560.1	550.1
16:10	561.2	553.4
16:11	563.5	553.1
16:12	562.3	552.2
16:13	563.4	553.0
16:14	561.3	552.5
16:15	563.5	551.4
16:16	559.2	549.1
16:17	561.6	552.4
16:18	561.4	551.9
16:19	560.0	551.2
16:20	561.8	552.2
16:21	561.1	551.5
16:22	556.8	548.4
16:23	559.5	552.0
16:24	560.6	551.6
16:25	561.1	551.0
16:26	560.6	549.7
16:27	558.7	550.3
16:28	565.5	556.6

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
16:29	565.1	556.5
16:30	565.7	557.7
16:31	566.8	558.7
16:32	561.8	553.5
16:33	564.2	554.4

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

16:33	565.8	556.2

COMMENTS: END RUN TWO
CAT UNIT 29

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
16:51	571.5	561.2
16:52	569.3	558.2
16:53	565.7	556.6
16:54	568.6	559.3
16:55	569.7	559.9
16:56	567.3	557.0
16:57	562.3	552.2
16:58	560.1	552.7
16:59	562.4	552.0
17:00	559.6	550.9
17:01	558.8	548.1
17:02	557.6	549.0
17:03	558.1	548.0
17:04	558.3	548.2
17:05	557.0	545.0
17:06	554.5	545.1
17:07	554.3	543.9
17:08	553.3	542.7
17:09	554.0	543.0
17:10	552.6	543.2
17:11	552.2	543.3
17:12	551.9	544.2
17:13	551.4	543.9
17:14	550.7	541.6
17:15	550.3	540.8
17:16	553.3	544.8
17:17	552.2	542.2
17:18	551.6	542.0
17:19	551.8	542.8
17:20	553.4	544.4
17:21	554.4	544.5
17:22	553.1	543.5
17:23	553.3	543.1
17:24	551.9	542.2
17:25	551.7	542.8
17:26	549.9	541.9
17:27	547.7	539.5
17:28	546.2	537.7
17:29	549.6	540.4
17:30	548.9	538.3
17:31	544.6	535.3
17:32	549.7	540.7
17:33	552.2	541.8
17:34	552.8	542.9
17:35	552.6	542.5
17:36	550.2	541.2
17:37	553.3	544.8
17:38	553.1	543.8
17:39	553.0	544.0
17:40	553.9	543.5
17:41	552.8	543.0
17:42	549.7	540.6
17:43	549.3	541.2
17:44	551.1	541.8
17:45	550.0	541.5

RING-HAVER POWER CAT TESTING 07-18-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
17:46	548.6	539.5
17:47	550.4	541.4
17:48	553.0	542.8
17:49	552.3	541.5
17:50	549.3	540.0

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

17:50	554.4	544.9

COMMENTS: END RUN THREE
CAT UNIT 29

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
06:51	638.5	624.2
06:52	634.5	618.5
06:53	629.6	614.2
06:54	625.6	610.9
06:55	622.6	608.3
06:56	619.6	606.2
06:57	617.5	603.2
06:58	614.6	600.4
06:59	612.7	598.2
07:00	608.9	595.1
07:01	605.6	592.3
07:02	601.7	589.8
07:03	597.6	584.8
07:04	597.6	583.5
07:05	596.2	582.6
07:06	591.2	577.9
07:07	586.6	573.3
07:08	583.7	570.9
07:09	580.6	569.1
07:10	578.5	566.6
07:11	577.8	565.6
07:12	576.7	565.3
07:13	576.2	564.0
07:14	573.8	563.2
07:15	571.9	560.2
07:16	570.7	559.4
07:17	569.4	557.4
07:18	566.8	555.6
07:19	566.8	556.7
07:20	566.4	555.0
07:21	564.0	552.7
07:22	563.4	552.5
07:23	565.2	552.5
07:24	565.4	552.3
07:25	563.9	552.6
07:26	564.1	551.2
07:27	562.0	549.4
07:28	560.3	549.0
07:29	559.4	547.2
07:30	558.5	546.4
07:31	557.8	545.8
07:32	557.9	546.0
07:33	556.1	545.0
07:34	556.8	546.1
07:35	555.6	545.6
07:36	554.6	543.3
07:37	553.1	542.8
07:38	551.6	541.0
07:39	551.2	539.1
07:40	549.1	537.2
07:41	548.0	535.9
07:42	547.3	536.1
07:43	546.0	535.9
07:44	546.1	536.3
07:45	545.3	535.2

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
07:46	546.7	535.6
07:47	549.2	538.3
07:48	549.2	538.4
07:49	548.6	536.9
07:50	548.1	535.9

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

07:50	575.1	562.9

COMMENTS: END RUN ONE
CAT UNIT 30

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
08:08	561.2	549.8
08:09	558.9	548.0
08:10	556.3	545.8
08:11	554.1	543.7
08:12	554.2	542.5
08:13	553.1	540.3
08:14	551.2	538.2
08:15	548.2	536.0
08:16	545.2	534.5
08:17	545.3	534.3
08:18	546.9	537.4
08:19	546.6	534.9
08:20	542.8	532.3
08:21	542.8	531.3
08:22	539.7	529.9
08:23	538.9	528.6
08:24	538.8	527.3
08:25	538.4	527.3
08:26	537.9	527.0
08:27	537.1	525.9
08:28	533.7	523.6
08:29	533.0	522.6
08:30	531.3	521.0
08:31	529.9	519.7
08:32	532.3	521.8
08:33	534.1	524.3
08:34	533.7	524.2
08:35	533.9	524.1
08:36	534.6	524.8
08:37	537.0	526.6
08:38	534.4	524.5
08:39	533.0	521.7
08:40	547.4	535.0
08:41	547.6	536.8
08:42	544.1	533.7
08:43	542.9	532.4
08:44	539.4	527.7
08:45	537.6	525.7
08:46	535.1	523.4
08:47	531.8	520.5
08:48	531.4	520.7
08:49	532.6	522.9
08:50	532.4	522.1
08:51	531.5	520.9
08:52	532.3	521.5
08:53	530.4	519.8
08:54	529.2	518.2
08:55	527.5	516.8
08:56	527.3	517.9
08:57	528.6	518.0
08:58	527.1	516.3
08:59	525.6	514.1
09:00	525.1	514.7
09:01	522.6	512.7
09:02	522.4	512.6

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
09:03	522.9	511.6
09:04	522.6	511.5
09:05	521.7	511.0
09:06	519.7	510.8
09:07	521.4	512.3

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

09:07	536.6	525.9

COMMENTS: END RUN TWO
CAT UNIT 30

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
09:28	643.0	627.9
09:29	642.0	627.3
09:30	639.4	624.7
09:31	633.5	619.0
09:32	637.6	626.2
09:33	640.2	624.7
09:34	632.9	617.1
09:35	630.6	615.6
09:36	625.1	610.7
09:37	621.0	605.9
09:38	616.2	603.1
09:39	615.3	603.7
09:40	619.0	606.5
09:41	621.9	609.0
09:42	620.1	606.1
09:43	616.0	601.6
09:44	612.5	598.8
09:45	609.3	596.2
09:46	606.1	594.1
09:47	607.9	596.1
09:48	615.1	602.4
09:49	618.5	606.7
09:50	620.9	606.8
09:51	615.6	600.8
09:52	609.6	596.3
09:53	612.1	600.3
09:54	613.9	600.0
09:55	611.5	598.9
09:56	611.6	600.2
09:57	614.9	601.6
09:58	612.8	599.2
09:59	612.3	599.3
10:00	611.2	597.3
10:01	609.6	596.8
10:02	610.2	597.1
10:03	607.0	594.6
10:04	607.8	596.6
10:05	612.6	599.8
10:06	612.8	599.1
10:07	610.3	597.1
10:08	608.8	596.9
10:09	610.9	598.1
10:10	606.8	593.1
10:11	601.9	589.4
10:12	600.6	589.3
10:13	601.5	588.2
10:14	600.0	586.9
10:15	601.0	589.5
10:16	600.9	589.0
10:17	600.5	587.5
10:18	598.8	585.0
10:19	600.1	587.3
10:20	601.1	586.2
10:21	598.0	585.1
10:22	600.0	587.7

RING-HAVER POWER CAT TESTING 07-19-2001

TIME	CHAN 4 OUTLET ppmNOX	CHAN 5 OUTLET ppmNO
10:23	601.2	588.9
10:24	600.5	586.2
10:25	588.3	574.9
10:26	582.2	570.5
10:27	584.6	572.6

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

10:27	612.1	599.0

COMMENTS: END RUN THREE
CAT UNIT 30

C. VISIBLE EMISSIONS DATA SHEETS

TAMPA ELECTRIC
A TECO ENERGY COMPANY

VISIBLE EMISSION OBSERVATION

E-496 R 10/85

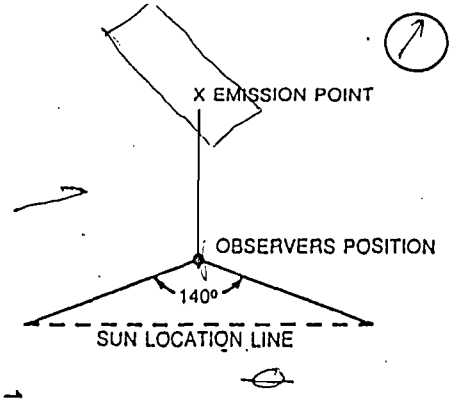
SOURCE NAME	SOURCE LOCATION	OBSERVATION DATE	START TIME	STOP TIME
Hookers Point IC Engines	Tampa	7/19/2001	11:23	11:53

TYPE OF FACILITY: Trailered Diesel Generator

DISTANCE FROM OBSERVER: ~70'

SKY CONDITIONS/PLUME BACKGROUND: broken / tampa skyline as background (gray/green)

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



AVERAGE OPACITY: 5.8%

WIND SPEED (EST.): light ~3-8 mph

WIND DIRECTION (EST.): ~SSW to S variable

OBSERVER'S NAME (PRINT): R.A. McDarby

OBSERVER'S SIGNATURE: R A McDarby

DATE: 7/19/2001

COMMENTS: Power Unit #26.

SEC. MIN	0	15	30	45	SEC MIN	0	15	30	45
1	5	Ø	5	5	31				
2	5	5	5	5	32				
3	Ø	5	5	5	33				
4	5	5	5	5	34				
5	10	10	5	10	35				
6	10	10	10	5	36				
7	5	5	5	5	37				
8	5	5	5	5	38				
9	5	5	5	5	39				
10	5	5	5	5	40				
11	5	5	10	5	41				
12	10	5	5	5	42				
13	5	5	5	10	43				
14	5	5	10	5	44				
15	5	5	5	5	45				
16	5	10	10	5	46				
17	5	5	5	5	47				
18	10	5	5	5	48				
19	5	10	10	5	49				
20	5	5	5	5	50				
21	5	5	5	5	51				
22	5	5	5	5	52				
23	10	5	5	5	53				
24	10	10	5	5	54				
25	5	5	5	5	55				
26	5	10	5	5	56				
27	5	5	5	5	57				
28	10	5	5	5	58				
29	5	5	5	5	59				
30	10	5	5	5	60				

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This Certificate Expires Aug 22, 2001

Certificate Officer — Bearer's Signature

TAMPA ELECTRIC
A TECO ENERGY COMPANY

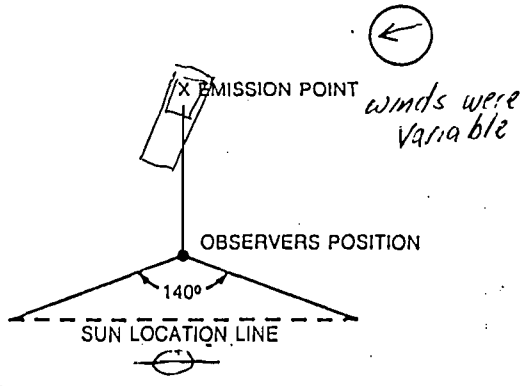
VISIBLE EMISSION OBSERVATION

E-496 R 10/85

SOURCE NAME	Hooks Pt. IC Engine
SOURCE LOCATION	Tampa
OBSERVATION DATE	7/16/2001
START TIME	14:49
STOP TIME	15:19
TYPE OF FACILITY	Trailered Diesel Generator
DISTANCE FROM OBSERVER	~100'
SKY CONDITIONS/PLUME BACKGROUND	Overcast / green (trees)

SOURCE LAYOUT SKETCH

DRAW NORTH ARROW



AVERAGE OPACITY	6.2%
WIND SPEED (EST.)	light ~3 to 8 mph
WIND DIRECTION (EST.)	variable
OBSERVER'S NAME (PRINT)	R.A. McDarby
OBSERVER'S SIGNATURE	R.A. McDarby
DATE	7/16/2001

COMMENTS

Power Unit #27

Thunderstorms forming + moving to NNW

Exhaust temperatures ~800°F, some "swirling" of plume.

SEC. MIN	0	15	30	45	SEC MIN	0	15	30	45
1	5	5	5	5	31				
2	5	5	5	5	32				
3	5	10	5	10	33				
4	5	5	10	10	34				
5	5	5	5	5	35				
6	5	10	10	10	36				
7	5	10	5	10	37				
8	5	10	5	5	38				
9	10	5	5	5	39				
10	10	5	5	5	40				
11	10	10	10	10	41				
12	5	5	10	10	42				
13	5	5	5	5	43				
14	5	10	5	5	44				
15	5	5	5	10	45				
16	5	5	5	5	46				
17	5	5	5	5	47				
18	10	5	10	10	48				
19	5	5	5	5	49				
20	5	5	10	5	50				
21	5	5	5	10	51				
22	5	5	5	5	52				
23	5	5	5	5	53				
24	5	10	5	5	54				
25	5	5	5	5	55				
26	5	5	10	5	56				
27	5	5	5	5	57				
28	5	10	5	5	58				
29	5	5	5	5	59				
30	10	5	5	5	60				

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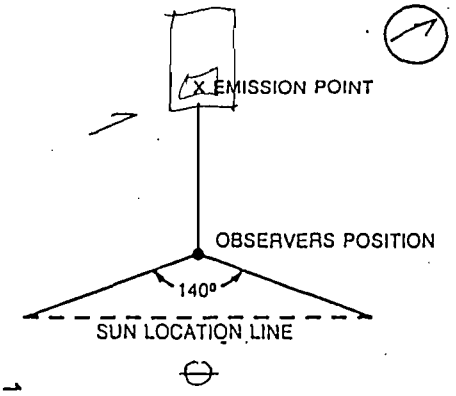
TAMPA ELECTRIC
A TECO ENERGY COMPANY

VISIBLE EMISSION OBSERVATION

E-496 R 10/85

SOURCE NAME	Hookers Point HC Engine
SOURCE LOCATION	Tampa
TYPE OF FACILITY	Trailed Diesel Generator
DISTANCE FROM OBSERVER	~90'
SKY CONDITIONS/PLUME BACKGROUND	clear skies / background is Tampa skyline

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



AVERAGE OPACITY	4.9%
WIND SPEED (EST.)	light / variable ~3-8 mph
WIND DIRECTION (EST.)	~S
OBSERVER'S NAME (PRINT)	R.A. McDarby
OBSERVER'S SIGNATURE	R.A. McDarby
DATE	7/18/2001
COMMENTS	Power Unit #28

OBSERVATION DATE	START TIME	STOP TIME
7/18/2001	10 15	10 45

SEC. / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	5	5	5	5	31				
2	5	Ø	5	5	32				
3	5	5	5	5	33				
4	5	5	5	10	34				
5	5	5	5	Ø	35				
6	5	5	5	5	36				
7	5	5	5	5	37				
8	5	5	5	5	38				
9	5	10	5	5	39				
10	5	5	5	5	40				
11	5	5	5	5	41				
12	Ø	Ø	5	5	42				
13	5	5	5	5	43				
14	5	5	5	Ø	44				
15	Ø	5	5	5	45				
16	Ø	Ø	5	10	46				
17	5	5	5	5	47				
18	5	5	5	5	48				
19	5	5	5	5	49				
20	10	5	5	5	50				
21	5	5	5	5	51				
22	10	5	5	5	52				
23	5	5	5	5	53				
24	5	5	10	5	54				
25	5	5	5	5	55				
26	5	5	5	5	56				
27	5	5	5	5	57				
28	5	5	5	5	58				
29	5	5	5	5	59				
30	5	5	5	5	60				

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TAMPA ELECTRIC
A TECO ENERGY COMPANY

VISIBLE EMISSION OBSERVATION

E-496 R 10/85

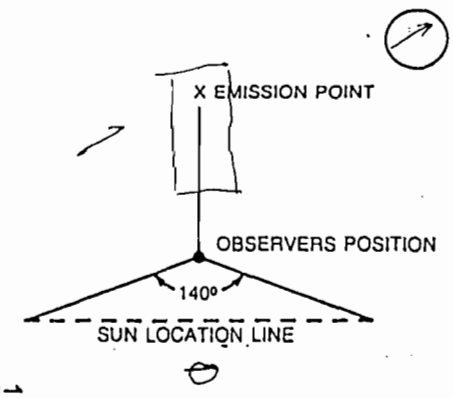
SOURCE NAME	SOURCE LOCATION	OBSERVATION DATE	START TIME	STOP TIME
Hookers Point IC Engine	Tampa	7/18/2001.	1015	1045

TYPE OF FACILITY: Trailend Diesel Generator

DISTANCE FROM OBSERVER: ~ 90'

SKY CONDITIONS/PLUME BACKGROUND: clear skies / background is Tampa skyline

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



AVERAGE OPACITY: 5.7

WIND SPEED (EST.): light / variable ~3-8mph

WIND DIRECTION (EST.): ~S

OBSERVER'S NAME (PRINT): R.A. McDarby

OBSERVER'S SIGNATURE: RAMcDarby

DATE: 7/18/2001

COMMENTS: Power unit #29

SEC. MIN	0	15	30	45	SEC MIN	0	15	30	45
1	5	Ø	5	5	31				
2	5	5	5	5	32				
3	5	Ø	5	5	33				
4	10	5	5	5	34				
5	5	5	5	5	35				
6	5	10	5	5	36				
7	5	10	5	10	37				
8	5	5	10	5	38				
9	10	10	5	10	39				
10	5	10	5	5	40				
11	Ø	5	5	5	41				
12	5	5	5	5	42				
13	5	10	5	10	43				
14	5	5	5	5	44				
15	Ø	5	5	5	45				
16	5	5	5	10	46				
17	5	5	5	5	47				
18	5	10	5	5	48				
19	5	5	10	5	49				
20	5	5	5	5	50				
21	5	5	5	5	51				
22	10	10	5	10	52				
23	5	5	5	5	53				
24	5	5	5	5	54				
25	5	5	5	5	55				
26	5	5	10	5	56				
27	5	5	5	5	57				
28	5	5	5	5	58				
29	5	5	5	5	59				
30	5	10	5	10	60				

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TAMPA ELECTRIC
A TECO ENERGY COMPANY

VISIBLE EMISSION OBSERVATION

E-496 R 10/85

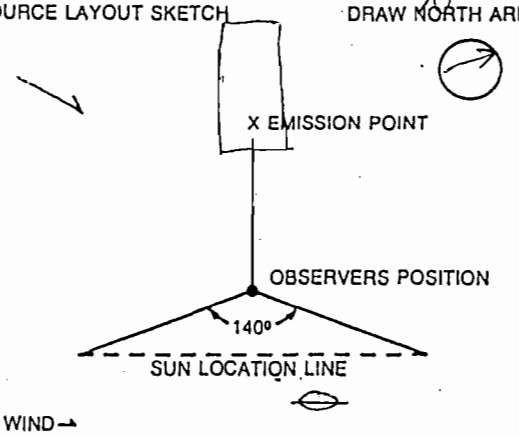
SOURCE NAME	SOURCE LOCATION	OBSERVATION DATE	START TIME	STOP TIME
Hookers Point I.C Engine	Tampa	7/19/2001	10:29	10:59

TYPE OF FACILITY: Trailered Diesel Generator

DISTANCE FROM OBSERVER: ~70'

SKY CONDITIONS/PLUME BACKGROUND: broken / background is Hookers Point facility tan/green

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



AVERAGE OPACITY: 5.3%

WIND SPEED (EST.): light ~3-8 mph

WIND DIRECTION (EST.): ~S to SSW variable

OBSERVER'S NAME (PRINT): R.A. McDarby

OBSERVER'S SIGNATURE: RAMcDarby

DATE: 7/19/2001

COMMENTS: Power Unit #30

SEC. MIN	0	15	30	45	SEC MIN	0	15	30	45
1	5	5	5	5	31				
2	5	5	5	5	32				
3	5	5	5	5	33				
4	5	5	5	5	34				
5	5	5	5	5	35				
6	5	5	5	5	36				
7	5	5	5	5	37				
8	5	10	5	5	38				
9	5	5	5	10	39				
10	5	5	5	5	40				
11	10	5	5	5	41				
12	5	5	5	5	42				
13	5	10	5	5	43				
14	5	5	5	5	44				
15	5	5	5	5	45				
16	5	5	5	5	46				
17	5	5	5	5	47				
18	5	5	10	5	48				
19	5	5	5	5	49				
20	5	5	5	5	50				
21	5	5	5	5	51				
22	5	5	5	5	52				
23	5	5	5	10	53				
24	5	5	5	5	54				
25	5	5	5	5	55				
26	5	5	5	5	56				
27	5	5	5	5	57				
28	5	5	5	5	58				
29	10	5	5	5	59				
30	5	5	5	5	60				

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D. TCEMS CALIBRATION DATA

D.1 INITIAL/FINAL TCEMS CALIBRATIONS

D.2 SYSTEM BIAS TESTS

D.3 SYSTEM BIAS AND DRIFT CALCULATIONS

D.1 INITIAL/FINAL TCEMS CALIBRATIONS

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: INITIAL DAILY CAL UNIT 26

DATE : 07-19-2001 TIME: 11:04 - 11:37

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	3.1
4	OUTLET	ppmNOX	1268.0	1277.2
4	OUTLET	ppmNOX	2224.0	2222.6
5	OUTLET	ppmNO	0.0	3.1
5	OUTLET	ppmNO	1268.0	1279.5
5	OUTLET	ppmNO	2224.0	2226.5

CONTINUOUS EMISSIONS MONITORING SET-UP

SOURCE: RING-HAVER POWER CAT TESTING

DATE: 07-16-2001 TIME: 12:09

A/D CHAN	DESCRIP	UNITS	SPAN	INPUT VOLTAGE	ZERO OFFSET
6	OUTLET	ppmNOX	2500	10.00 V	0%

AVERAGING PERIODS: ONE HOUR,
NO EMISSION RATE CALCULATIONS

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: INITIAL DAILY CAL UNIT 27

DATE : 07-16-2001 TIME: 10:14 - 10:19

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
6	OUTLET	ppmNOX	0.0	0.3
6	OUTLET	ppmNOX	44.7	42.8
6	OUTLET	ppmNOX	92.4	92.8

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: INITIAL DAILY CAL

DATE : 07-16-2001 TIME: 12:10 - 12:24

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
6	OUTLET	ppmNOX	0.0	0.6
6	OUTLET	ppmNOX	1268.0	1239.8
6	OUTLET	ppmNOX	2224.0	2221.3

RING-HAVER POWER CAT TESTING 07-16-2001

TIME	CHAN 6 OUTLET ppmNOX
10:42	46.0
10:43	46.2
10:44	46.3
10:45	46.4
10:46	46.5
10:47	46.6
10:48	46.7
10:49	46.7
10:50	46.8
10:51	46.9
10:52	46.9
10:53	47.0
10:54	47.0
10:55	47.0
10:56	47.0
10:57	47.1
10:58	47.1
10:59	47.1
11:00	47.1
11:01	47.1
11:02	47.0
11:03	46.8
11:04	46.6
11:05	46.5
11:06	46.3
11:07	46.0
11:08	45.8
11:09	45.8
11:10	45.4
11:11	45.4

AVERAGE VALUES FOR THE LAST 30 MINUTES

11:11 46.6

COMMENTS: END CONVERTER EFFICIENCY TEST

CONTINUOUS EMISSIONS MONITORING SET-UP

SOURCE: RING-HAVER POWER CAT TESTING

DATE: 07-18-2001 TIME: 08:48

A/D CHAN	DESCRIP	UNITS	SPAN	INPUT VOLTAGE	ZERO OFFSET
4	OUTLET	ppmNOX	2500	5.00 V	0%
5	OUTLET	ppmNO	2500	5.00 V	0%

AVERAGING PERIODS: ONE HOUR,
NO EMISSION RATE CALCULATIONS

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: INITIAL DAILY CAL

DATE : 07-18-2001 TIME: 08:48 - 09:04

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	1.5
4	OUTLET	ppmNOX	1268.0	1293.2
4	OUTLET	ppmNOX	2224.0	2234.2
5	OUTLET	ppmNO	0.0	1.5
5	OUTLET	ppmNO	1268.0	1286.6
5	OUTLET	ppmNO	2224.0	2230.9

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: INITIAL CALIBRATION UNIT 29

DATE : 07-18-2001 TIME: 13:35 - 13:57

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	1.5
4	OUTLET	ppmNOX	1268.0	1285.9
4	OUTLET	ppmNOX	2224.0	2222.9
5	OUTLET	ppmNO	0.0	1.5
5	OUTLET	ppmNO	1268.0	1285.2
5	OUTLET	ppmNO	2224.0	2226.5

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: INITIAL DAILY CAL

DATE : 07-19-2001 TIME: 05:56 - 06:22

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	1.7
4	OUTLET	ppmNOX	1268.0	1271.2
4	OUTLET	ppmNOX	2224.0	2229.8
5	OUTLET	ppmNO	0.0	1.7
5	OUTLET	ppmNO	1268.0	1271.8
5	OUTLET	ppmNO	2224.0	2224.8

D.2 SYSTEM BIAS TESTS

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN ONE BIAS CAL UNIT 26

DATE : 07-19-2001 TIME: 12:44 - 12:51

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	4.6
4	OUTLET	ppmNOX	1268.0	1276.9
5	OUTLET	ppmNO	0.0	3.1
5	OUTLET	ppmNO	1268.0	1277.9

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: BIAS CHECKS BETWEEN RUNS 2 AND 3

DATE : 07-19-2001 TIME: 14:02 - 14:08

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	6.0
4	OUTLET	ppmNOX	1268.0	1275.7
5	OUTLET	ppmNO	0.0	3.1
5	OUTLET	ppmNO	1268.0	1276.3

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: BIAS CHECK END OF RUN 3

DATE : 07-19-2001 TIME: 15:18 - 15:26

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	6.0
4	OUTLET	ppmNOX	1268.0	1272.6
5	OUTLET	ppmNO	0.0	4.6
5	OUTLET	ppmNO	1268.0	1273.3

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: INITIAL BIAS CAL UNIT 27

DATE : 07-16-2001 TIME: 12:32 - 12:35

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
6	OUTLET	ppmNOX	0.0	-9.8
6	OUTLET	ppmNOX	1268.0	1240.1

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN 2 BIAS CAL UNIT 27

DATE : 07-16-2001 TIME: 13:47 - 13:58

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
6	OUTLET	ppmNOX	0.0	6.9
6	OUTLET	ppmNOX	1268.0	1281.0

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN TWO BIAS CAL UNIT 27

DATE : 07-16-2001 TIME: 15:07 - 15:11

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
6	OUTLET	ppmNOX	0.0	5.8
6	OUTLET	ppmNOX	1268.0	1278.2

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN THREE BIAS UNIT 27

DATE : 07-16-2001 TIME: 16:18 - 16:20

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
6	OUTLET	ppmNOX	0.0	1.7
6	OUTLET	ppmNOX	1268.0	1279.9

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: INITIAL BIAS CAL UNIT 28

DATE : 07-18-2001 TIME: 09:13 - 09:21

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	1.5
4	OUTLET	ppmNOX	1268.0	1280.1
5	OUTLET	ppmNO	0.0	1.5
5	OUTLET	ppmNO	1268.0	1279.3

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN ONE BIAS CAL UNIT 28

DATE : 07-18-2001 TIME: 10:31 - 10:37

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	3.0
4	OUTLET	ppmNOX	1268.0	1269.7
5	OUTLET	ppmNO	0.0	3.1
5	OUTLET	ppmNO	1268.0	1271.9

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN TWO BIAS CAL UNIT 28

DATE : 07-18-2001 TIME: 11:49 - 11:59

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	-1.9
4	OUTLET	ppmNOX	1268.0	1266.8
5	OUTLET	ppmNO	0.0	-0.0
5	OUTLET	ppmNO	1268.0	1267.6

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN THREE BIAS CAL UNIT 28

DATE : 07-18-2001 TIME: 13:09 - 13:16

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	-0.2
4	OUTLET	ppmNOX	1268.0	1262.5
5	OUTLET	ppmNO	0.0	1.5
5	OUTLET	ppmNO	1268.0	1264.6

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: INITIAL BIAS CAL UNIT 29

DATE : 07-18-2001 TIME: 13:59 - 14:07

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	6.0
4	OUTLET	ppmNOX	1268.0	1275.8
5	OUTLET	ppmNO	0.0	4.6
5	OUTLET	ppmNO	1268.0	1276.4

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN ONE BIAS CAL UNIT 29

DATE : 07-18-2001 TIME: 15:18 - 15:27

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	3.1
4	OUTLET	ppmNOX	1268.0	1277.1
5	OUTLET	ppmNO	0.0	3.1
5	OUTLET	ppmNO	1268.0	1279.4

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN TWO BIAS CAL UNIT 29

DATE : 07-18-2001 TIME: 16:34 - 16:41

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	4.6
4	OUTLET	ppmNOX	1268.0	1272.7
5	OUTLET	ppmNO	0.0	3.1
5	OUTLET	ppmNO	1268.0	1270.5

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN THREE BIAS CAL UNIT 29

DATE : 07-18-2001 TIME: 17:52 - 17:58

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	4.4
4	OUTLET	ppmNOX	1268.0	1269.7
5	OUTLET	ppmNO	0.0	3.1
5	OUTLET	ppmNO	1268.0	1271.9

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: INITIAL BIAS CAL UNIT 30

DATE : 07-19-2001 TIME: 06:32 - 06:40

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	4.6
4	OUTLET	ppmNOX	1268.0	1275.7
5	OUTLET	ppmNO	0.0	2.9
5	OUTLET	ppmNO	1268.0	1276.4

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN ONE BIAS CAL UNIT 30

DATE : 07-19-2001 TIME: 07:51 - 07:56

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	4.5
4	OUTLET	ppmNOX	1268.0	1275.6
5	OUTLET	ppmNO	0.0	3.0
5	OUTLET	ppmNO	1268.0	1274.4

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN TWO BIAS CAL UNIT 30

DATE : 07-19-2001 TIME: 09:13 - 09:21

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	4.6
4	OUTLET	ppmNOX	1268.0	1274.2
5	OUTLET	ppmNO	0.0	3.1
5	OUTLET	ppmNO	1268.0	1273.5

CALIBRATION SUMMARY

SOURCE: RING-HAVER POWER CAT TESTING

REASON: RUN THREE BIAS CAL UNIT 30

DATE : 07-19-2001 TIME: 10:28 - 10:36

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
4	OUTLET	ppmNOX	0.0	3.1
4	OUTLET	ppmNOX	1268.0	1271.2
5	OUTLET	ppmNO	0.0	2.8
5	OUTLET	ppmNO	1268.0	1267.6

D.3 SYSTEM BIAS AND DRIFT CALCULATIONS

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: HOOKERS POINT POWER CAT UNIT 26

TEST DATE: 7/19/01

RUN NUMBER: 1

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	3.1	3.1	0.00	4.6	0.06	0.06
NOx UP-SCALE	1277.2	1277.2	0.00	1276.9	-0.01	-0.01
NO ZERO GAS	3.10	3.10	0.00	3.10	0.00	0.00
NO UP-SCALE	1279.50	1279.50	0.00	1277.90	-0.06	-0.06

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: HOOKERS POINT POWER CAT UNIT 26

TEST DATE: 7/19/01

RUN NUMBER: 2

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	3.1	4.6	0.06	6.0	0.12	0.06
NOx UP-SCALE	1277.2	1276.9	-0.01	1275.7	-0.06	-0.05
NO ZERO GAS	3.10	3.10	0.00	3.10	0.00	0.00
NO UP-SCALE	1279.50	1277.90	-0.06	1276.30	-0.13	-0.06

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: HOOKERS POINT POWER CAT UNIT 26

TEST DATE: 7/19/01

RUN NUMBER: 3

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	3.1	6.0	0.12	6.0	0.12	0.00
NOx UP-SCALE	1277.2	1275.7	-0.06	1272.6	-0.18	-0.12
NO ZERO GAS	3.10	3.10	0.00	4.60	0.06	0.06
NO UP-SCALE	1279.50	1276.30	-0.13	1273.30	-0.25	-0.12

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: RING-HAVER CAT POWER, UNIT 27

TEST DATE: 7/16/01

RUN NUMBER: 1

SPAN VALUES: 2500 ppm NOx

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	-9.8	-9.8	0.00	6.9	0.67	0.67
NOx UP-SCALE	1240.1	1240.1	0.00	1281.0	1.64	1.64

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: RING-HAVER CAT POWER, UNIT 27

TEST DATE: 7/16/01

RUN NUMBER: 2

SPAN VALUES: 2500 ppm NOx

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	-9.8	6.9	0.67	5.8	0.62	-0.04
NOx UP-SCALE	1240.1	1281.0	1.64	1278.2	1.52	-0.11

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: RING-HAVER CAT POWER, UNIT 27

TEST DATE: 7/16/01

RUN NUMBER: 3

SPAN VALUES: 2500 ppm NOx

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	-9.8	5.8	0.62	1.7	0.46	-0.16
NOx UP-SCALE	1240.1	1278.2	1.52	1279.9	1.59	0.07

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: H.P RING-HAVER CAT POWER UNIT 28

TEST DATE: 7/18/01

RUN NUMBER: 1

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	1.5	1.5	0.00	3.0	0.06	0.06
NOx UP-SCALE	1280.1	1280.1	0.00	1269.7	-0.42	-0.42
NO ZERO GAS	1.5	1.5	0.00	3.1	0.06	0.06
NO UP-SCALE	1279.3	1279.3	0.00	1271.9	-0.30	-0.30

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: H.P RING-HAVER CAT POWER UNIT 28

TEST DATE: 7/18/01

RUN NUMBER: 2

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	1.5	3.0	0.06	-1.9	-0.14	-0.20
NOx UP-SCALE	1280.1	1269.7	-0.42	1266.8	-0.53	-0.12
NO ZERO GAS	1.50	3.10	0.06	0.00	-0.06	-0.12
NO UP-SCALE	1279.30	1271.90	-0.30	1267.60	-0.47	-0.17

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: H.P RING-HAVER CAT POWER UNIT 28

TEST DATE: 7/18/01

RUN NUMBER: 3

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	1.5	-1.9	-0.14	-0.2	-0.07	0.07
NOx UP-SCALE	1280.1	1266.8	-0.53	1262.5	-0.70	-0.17
NO ZERO GAS	1.50	0.0	-0.06	1.5	0.00	0.06
NO UP-SCALE	1279.30	1267.6	-0.47	1264.6	-0.59	-0.12

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: HOOKERS POINT POWER CAT UNIT 29 TEST

TEST DATE: 7/18/01

RUN NUMBER: 1

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	6.0	6.0	0.00	3.1	-0.12	-0.12
NOx UP-SCALE	1275.8	1275.8	0.00	1277.1	0.05	0.05
NO ZERO GAS	4.60	4.6	0.00	3.1	-0.06	-0.06
NO UP-SCALE	1276.40	1276.4	0.00	1279.4	0.12	0.12

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: HOOKERS POINT POWER CAT UNIT 29 TEST

TEST DATE: 7/18/01

RUN NUMBER: 2

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	6.0	3.1	-0.12	4.6	-0.06	0.06
NOx UP-SCALE	1275.8	1277.1	0.05	1272.7	-0.12	-0.18
NO ZERO GAS	4.60	3.1	-0.06	3.1	-0.06	0.00
NO UP-SCALE	1276.40	1279.4	0.12	1270.5	-0.24	-0.36

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: HOOKERS POINT POWER CAT UNIT 29 TEST

TEST DATE: 7/18/01

RUN NUMBER: 3

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	6.0	4.6	-0.06	4.4	-0.06	-0.01
NOx UP-SCALE	1275.8	1272.7	-0.12	1269.7	-0.24	-0.12
NO ZERO GAS	4.60	3.1	-0.06	3.1	-0.06	0.00
NO UP-SCALE	1276.40	1270.5	-0.24	1271.9	-0.18	0.06

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: HOKERS POINT RING-HAVER UNIT 30

TEST DATE: 7/19/01

RUN NUMBER: 1

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	4.6	4.6	0.00	4.5	-0.00	-0.00
NOx UP-SCALE	1275.7	1275.7	0.00	1275.6	-0.00	-0.00
NO ZERO GAS	2.9	2.9	0.00	3.0	0.00	0.00
NO UP-SCALE	1276.4	1276.4	0.00	1274.4	-0.08	-0.08

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: HOKERS POINT RING-HAVER UNIT 30

TEST DATE: 7/19/01

RUN NUMBER: 2

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	4.6	4.5	-0.00	4.6	0.00	0.00
NOx UP-SCALE	1275.7	1275.6	-0.00	1274.2	-0.06	-0.06
NO ZERO GAS	2.9	3.0	0.00	3.1	0.01	0.00
NO UP-SCALE	1276.4	1274.4	-0.08	1273.5	-0.12	-0.04

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

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

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: HOKERS POINT RING-HAVER UNIT 30

TEST DATE: 7/19/01

RUN NUMBER: 3

SPAN VALUES: 2500 ppm NOx
2500 ppmNO

		------INITIAL VALUES------		------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	4.6	4.6	0.00	3.1	-0.06	-0.06
NOx UP-SCALE	1275.7	1274.2	-0.06	1271.2	-0.18	-0.12
NO ZERO GAS	2.9	3.1	0.01	2.8	-0.00	-0.01
NO UP-SCALE	1276.4	1273.5	-0.12	1267.6	-0.35	-0.24

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

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

E. CALIBRATION GAS CERTIFICATES OF ANALYSIS

EA Ph. 1

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

6141 EASTON ROAD, BLDG 1,PLUMSTEADVILLE,PA 18949-0310 Phone: 800-331-4953 Fax: 215-766-7226

CERTIFICATE OF ACCURACY: Interference Free™ EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
6141 EASTON ROAD, BLDG 1
PLUMSTEADVILLE,PA 18949-0310

P.O. No.: E-N75516
Project No.: 01-51597-001

Customer

TAMPA ELECTRIC

5010 CAUSEWAY BLVD
TAMPA FL 33619

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM005388 **Certification Date:** 3/26/01 **Exp. Date:** 3/26/2003
Cylinder Pressure*:** 1982 PSIA

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
NITRIC OXIDE	1,265	PPM	+/- 1%	Direct NIST and NMi
NITROGEN - OXYGEN FREE		BALANCE		
TOTAL OXIDES OF NITROGEN	1,268.	PPM		Reference Value Only

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

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

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1687	3/01/03	ALM018805	1000. PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9300174	03/05/01	Scott Enhanced FTIR

ANALYZER READINGS

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

NITRIC OXIDE

First Triad Analysis

Date:03/19/01	Response Unit:PPM	
Z1 = -0.22040	R1 = 1000.334	T1 = 1267.950
R2 = 1002.529	Z2 = -0.00910	T2 = 1270.028
Z3 = -0.14000	T3 = 1262.812	R3 = 997.1362
Avg. Concentration:	1267.	PPM

Second Triad Analysis

Date: 03/26/01	Response Unit: PPM	
Z1 = -0.00390	R1 = 1000.372	T1 = 1261.864
R2 = 999.2310	Z2 = 0.33130	T2 = 1264.124
Z3 = 0.20130	T3 = 1263.092	R3 = 1000.396
Avg. Concentration:	1263.	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

APPROVED BY: Michael A. Kuhns

Michael A. Kuhns

CES PhiL 2

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ACCURACY: Interference Free™ EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM NC 27704

P.O. No.: N31923
Project No.: 12-35384-003

Customer

TAMPA ELECTRIC CO
RAY MCDARBY
5010 CAUSEWAY BLVD
TAMPA FL 33619

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM039857 **Certification Date:** 8/03/99 **Exp. Date:** 8/02/2001

48T **Cylinder Pressure***:** 1956 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
NITRIC OXIDE	2,219	PPM	+/- 1%	Direct NIST and NMi
NITROGEN - OXYGEN FREE		BALANCE		
TOTAL OXIDES OF NITROGEN	2,224.	PPM		Reference Value Only

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

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

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM2631	3/01/03	ALM061390	2780. PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400252	07/22/99	Scott Enhanced FTIR

ANALYZER READINGS

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

NITRIC OXIDE

First Triad Analysis

Date:07/27/99	Response Unit:PPM	
Z1 = 0.12400	R1 = 2778.250	T1 = 2221.730
R2 = 2781.907	Z2 = 0.38800	T2 = 2218.676
Z3 = 0.13240	T3 = 2220.326	R3 = 2782.917
Avg. Concentration:	2220.	PPM

Second Triad Analysis

Date: 08/03/99	Response Unit: PPM	
Z1 = 0.20240	R1 = 2778.364	T1 = 2215.877
R2 = 2781.395	Z2 = 0.62730	T2 = 2221.257
Z3 = 0.48200	T3 = 2218.886	R3 = 2780.239
Avg. Concentration:	2219.	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Recd 8-9-99

APPROVED BY: B.M. Becton

F. FIELD DATA SHEETS

TECO
TAMPA ELECTRIC

TEMPERATURE MEASUREMENTS
FIELD DATA SHEET

Date 7/19/01

Facility Hookers Ring-Haver Unit No. 26 Location Outlet

Load (mw) 1.825 Pyrometer I. D. 28-02800 Operator D. Smith

RUN 1

TIME	Temp. deg^F
11:40	846.0
11:54	847.5
12:17	846.9
12:39	844.6
Avg.	846.2

RUN 2

TIME	Temp. deg^F
13:04	851.1
13:17	853.9
13:31	852.9
13:52	852.5
Average:	852.6

RUN 3

TIME	Temp. deg^F
14:19	849.5
14:38	853.4
14:56	854.6
15:12	855.2
Average:	853.2

Unit 26

Molecular Weight of Emissions 76

	Time	Ambient Temperature [F]	Stack Temperature [F]	Corrected Flue Gas Volumetric Flow Rate [ft^3/min]	NOx [ppm]	Nox [lb/hr]
RUN 1	11:40	90	846	6008.3	649.8	44.3
	11:41	90	846	6008.3	644	43.9
	11:42	90	846	6008.3	641.7	43.7
	11:43	90	846	6008.3	641.5	43.7
	11:44	90	846	6008.3	636.3	43.4
	11:45	90	846	6008.3	630.3	43.0
	11:46	90	846	6008.3	628.7	42.9
	11:47	90	846	6008.3	621.3	42.4
	11:48	90	846	6008.3	614.7	41.9
	11:49	90	846	6008.3	614.7	41.9
	11:50	90	846	6008.3	617.3	42.1
	11:51	90	846	6008.3	615.7	42.0
	11:52	90	846	6008.3	611.2	41.7
	11:53	90	846	6008.3	607.8	41.4
	11:54	90	847.5	6001.4	603.1	41.1
	11:55	90	847.5	6001.4	599.1	40.8
	11:56	90	847.5	6001.4	596.9	40.6
	11:57	90	847.5	6001.4	597.2	40.7
	11:58	90	847.5	6001.4	593.1	40.4
	11:59	90	847.5	6001.4	588.6	40.1
	12:00	90	847.5	6001.4	590.4	40.2
	12:01	90	847.5	6001.4	584.8	39.8
	12:02	90	847.5	6001.4	582.3	39.6
	12:03	90	847.5	6001.4	582.6	39.7
	12:04	90	847.5	6001.4	579.4	39.5
	12:05	90	847.5	6001.4	574.3	39.1
	12:06	90	847.5	6001.4	567.2	38.6
	12:07	90	847.5	6001.4	565.9	38.5
	12:08	90	847.5	6001.4	567	38.6
	12:09	90	847.5	6001.4	565.7	38.5
	12:10	90	847.5	6001.4	563.2	38.3
	12:11	90	847.5	6001.4	560.9	38.2
	12:12	90	847.5	6001.4	558.6	38.0
	12:13	90	847.5	6001.4	557.3	37.9
	12:14	90	847.5	6001.4	556.7	37.9
	12:15	90	847.5	6001.4	556.3	37.9
	12:16	90	847.5	6001.4	553.8	37.7
	12:17	90	846.9	6004.2	552.4	37.6
	12:18	90	846.9	6004.2	550.6	37.5
	12:19	90	846.9	6004.2	553.8	37.7
	12:20	90	846.9	6004.2	551.4	37.6
	12:21	90	846.9	6004.2	549	37.4
	12:22	90	846.9	6004.2	553.4	37.7
	12:23	90	846.9	6004.2	546.3	37.2
	12:24	90	846.9	6004.2	548.9	37.4

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12:25	90	846.9	6004.2	545.4	37.2
12:26	90	846.9	6004.2	545.4	37.2
12:27	90	846.9	6004.2	546.2	37.2
12:28	90	846.9	6004.2	544	37.1
12:29	90	846.9	6004.2	544.9	37.1
12:30	90	846.9	6004.2	546	37.2
12:31	90	846.9	6004.2	548.2	37.3
12:32	90	846.9	6004.2	546.5	37.2
12:33	90	846.9	6004.2	543.8	37.0
12:34	90	846.9	6004.2	544.9	37.1
12:35	90	846.9	6004.2	544.9	37.1
12:36	90	846.9	6004.2	542.8	37.0
12:37	90	846.9	6004.2	541.6	36.9
12:38	90	846.9	6004.2	541.8	36.9
12:39	90	844.6	6014.8	541.9	37.0
Run 1	90.0	846.9	6004.3	570.0	38.8
13:02	90	851.1	5984.9	523.6	35.6
13:03	90	851.1	5984.9	523.1	35.5
13:04	90	851.1	5984.9	521.4	35.4
13:05	90	851.1	5984.9	520	35.3
13:06	90	851.1	5984.9	518.7	35.2
13:07	90	851.1	5984.9	519.4	35.3
13:08	90	851.1	5984.9	516.6	35.1
13:09	90	851.1	5984.9	516.9	35.1
13:10	90	851.1	5984.9	516.5	35.1
13:11	90	851.1	5984.9	516.6	35.1
13:12	90	851.1	5984.9	518	35.2
13:13	90	851.1	5984.9	520.1	35.3
13:14	90	851.1	5984.9	518.9	35.2
13:15	90	851.1	5984.9	515.8	35.0
13:16	90	851.1	5984.9	515.4	35.0
13:17	90	853.9	5972.2	515.6	34.9
13:18	90	853.9	5972.2	512.7	34.7
13:19	90	853.9	5972.2	514.6	34.9
13:20	90	853.9	5972.2	512.2	34.7
13:21	90	853.9	5972.2	511.8	34.7
13:22	90	853.9	5972.2	509.8	34.5
13:23	90	853.9	5972.2	507.9	34.4
13:24	90	853.9	5972.2	509.6	34.5
13:25	90	853.9	5972.2	512	34.7
13:26	90	853.9	5972.2	511.3	34.6
13:27	90	853.9	5972.2	511.8	34.7
13:28	90	853.9	5972.2	512.4	34.7
13:29	90	853.9	5972.2	513.9	34.8
13:30	90	853.9	5972.2	515.4	34.9
13:31	90	852.9	5976.7	516.3	35.0
13:32	90	852.9	5976.7	517.4	35.1
13:33	90	852.9	5976.7	516.9	35.1
13:34	90	852.9	5976.7	512.8	34.8
13:35	90	852.9	5976.7	513.9	34.8
13:36	90	852.9	5976.7	515.7	35.0

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13:37	90	852.9	5976.7	515.6	35.0
13:38	90	852.9	5976.7	510.8	34.6
13:39	90	852.9	5976.7	505.9	34.3
13:40	90	852.9	5976.7	506.5	34.3
13:41	90	852.9	5976.7	510.2	34.6
13:42	90	852.9	5976.7	509.3	34.5
13:43	90	852.9	5976.7	506.9	34.4
13:44	90	852.9	5976.7	508.1	34.5
13:45	90	852.9	5976.7	507.3	34.4
13:46	90	852.9	5976.7	506.8	34.4
13:47	90	852.9	5976.7	506.6	34.4
13:48	90	852.9	5976.7	508.6	34.5
13:49	90	852.9	5976.7	509.7	34.6
13:50	90	852.9	5976.7	506.7	34.4
13:51	90	852.9	5976.7	506.5	34.3
13:52	90	852.5	5978.6	507.8	34.4
13:53	90	852.5	5978.6	509.1	34.5
13:54	90	852.5	5978.6	508.1	34.5
13:55	90	852.5	5978.6	506.9	34.4
13:56	90	852.5	5978.6	507.1	34.4
13:57	90	852.5	5978.6	509.1	34.5
13:58	90	852.5	5978.6	509.2	34.5
13:59	90	852.5	5978.6	507.2	34.4
14:00	90	852.5	5978.6	506.7	34.4
14:01	90	852.5	5978.6	507.8	34.4
Run 2	90.0	852.7	5977.4	506.0	34.3
14:19	90	849.5	5992.2	649	44.1
14:20	90	849.5	5992.2	639.3	43.5
14:21	90	849.5	5992.2	639.6	43.5
14:22	90	849.5	5992.2	637.3	43.3
14:23	90	849.5	5992.2	639.9	43.5
14:24	90	849.5	5992.2	637.6	43.3
14:25	90	849.5	5992.2	633.1	43.0
14:26	90	849.5	5992.2	633.3	43.1
14:27	90	849.5	5992.2	630.6	42.9
14:28	90	849.5	5992.2	627.6	42.7
14:29	90	849.5	5992.2	623.8	42.4
14:30	90	849.5	5992.2	623	42.4
14:31	90	849.5	5992.2	619.7	42.1
14:32	90	849.5	5992.2	622.1	42.3
14:33	90	849.5	5992.2	625.6	42.5
14:34	90	849.5	5992.2	632.6	43.0
14:35	90	849.5	5992.2	636.5	43.3
14:36	90	849.5	5992.2	632.3	43.0
14:37	90	849.5	5992.2	630.7	42.9
14:38	90	853.4	5974.5	628.4	42.6
14:39	90	853.4	5974.5	630.7	42.8
14:40	90	853.4	5974.5	628.7	42.6
14:41	90	853.4	5974.5	628.1	42.6
14:42	90	853.4	5974.5	625.1	42.4
14:43	90	853.4	5974.5	625.9	42.4
14:44	90	853.4	5974.5	625.7	42.4

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14:45	90	853.4	5974.5	625.9	42.4
14:46	90	853.4	5974.5	624.8	42.4
14:47	90	853.4	5974.5	623.2	42.2
14:48	90	853.4	5974.5	621.1	42.1
14:49	90	853.4	5974.5	622.2	42.2
14:50	90	853.4	5974.5	621.9	42.2
14:51	90	853.4	5974.5	619	42.0
14:52	90	853.4	5974.5	618.2	41.9
14:53	90	853.4	5974.5	619.6	42.0
14:54	90	853.4	5974.5	617.5	41.9
14:55	90	853.4	5974.5	617	41.8
14:56	90	854.6	5969.0	614.7	41.6
14:57	90	854.6	5969.0	612.5	41.5
14:58	90	854.6	5969.0	609.7	41.3
14:59	90	854.6	5969.0	613.3	41.5
15:00	90	854.6	5969.0	612.8	41.5
15:01	90	854.6	5969.0	611.6	41.4
15:02	90	854.6	5969.0	608.6	41.2
15:03	90	854.6	5969.0	610.2	41.3
15:04	90	854.6	5969.0	609.2	41.3
15:05	90	854.6	5969.0	606.7	41.1
15:06	90	854.6	5969.0	610.1	41.3
15:07	90	854.6	5969.0	611.8	41.4
15:08	90	854.6	5969.0	609.8	41.3
15:09	90	854.6	5969.0	606.9	41.1
15:10	90	854.6	5969.0	607.5	41.1
15:11	90	854.6	5969.0	607.9	41.2
15:12	90	855.2	5966.3	607.6	41.1
15:13	90	855.2	5966.3	608.6	41.2
15:14	90	855.2	5966.3	609.1	41.2
15:15	90	855.2	5966.3	606.7	41.1
15:16	90	855.2	5966.3	608.5	41.2
15:17	90	855.2	5966.3	609.6	41.3
15:18	90	855.2	5966.3	610	41.3
Run 3	90.0	854.6	5968.9	615.0	41.6
	Test Avg.	Test Avg.	Calc. Avg.	Corr. Avg.	Corr. lbs/Hour

TECO
TAMPA ELECTRIC

TEMPERATURE MEASUREMENTS
FIELD DATA SHEET

Date 7/16/01

Facility Ring-Haver Unit No. 27 Location ~~Heater~~ DIS Outlet

Load (mw) 1825 Pyrometer I. D. 28-02800 Operator D. Smith

RUN 1

TIME	Temp. deg^F
12:47	807.9
13:02	820.5
13:17	826.1
13:32	826.9
Avg.	820.4

RUN 2

TIME	Temp. deg^F
14:07	832.8
14:22	834.0
14:45	828.7
14:58	827.0
Avg.	830.6

RUN 3

TIME	Temp. deg^F
15:19	830.5
15:34	832.6
15:58	834.7
16:15	834.2
Avg.	833.0

Unit 27

Molecular Weight of Emissions 76

Time	Ambient Temperature [F]	Stack Temperature [F]	Corrected Flue Gas Volumetric Flow Rate [ft^3/min]	NOx [ppm]	Nox [lb/hr]
12:47	32	807.9	5536.2	503.6	35.4
12:48	90	807.9	6188.9	500.5	35.1
12:49	90	807.9	6188.9	492.3	34.6
12:50	90	807.9	6188.9	499.7	35.1
12:51	90	807.9	6188.9	495.5	34.8
12:52	90	807.9	6188.9	489.4	34.4
12:53	90	807.9	6188.9	487.2	34.2
12:54	90	807.9	6188.9	481.8	33.8
12:55	90	807.9	6188.9	476	33.4
12:56	90	807.9	6188.9	478.4	33.6
12:57	90	807.9	6188.9	483.7	34.0
12:58	90	807.9	6188.9	481.9	33.8
12:59	90	807.9	6188.9	480.5	33.7
13:00	90	807.9	6188.9	477.1	33.5
13:01	90	807.9	6188.9	477.8	33.5
13:02	90	820.5	6128.0	480.9	33.4
13:03	90	820.5	6128.0	487.1	33.9
13:04	90	820.5	6128.0	484	33.7
13:05	90	820.5	6128.0	483.4	33.6
13:06	90	820.5	6128.0	483.4	33.6
13:07	90	820.5	6128.0	481.5	33.5
13:08	90	820.5	6128.0	488	33.9
13:09	90	820.5	6128.0	486.5	33.8
13:10	90	820.5	6128.0	489.3	34.0
13:11	90	820.5	6128.0	489.8	34.1
13:12	90	820.5	6128.0	488.9	34.0
13:13	90	820.5	6128.0	482.2	33.5
13:14	90	820.5	6128.0	485.2	33.7
13:15	90	820.5	6128.0	486.5	33.8
13:16	90	820.5	6128.0	486.9	33.9
13:17	90	826.1	6101.3	484.2	33.5
13:18	90	826.1	6101.3	482.3	33.4
13:19	90	826.1	6101.3	486.5	33.7
13:20	90	826.1	6101.3	487.5	33.7
13:21	90	826.1	6101.3	484.9	33.6
13:22	90	826.1	6101.3	483.3	33.5
13:23	90	826.1	6101.3	484.2	33.5
13:24	90	826.1	6101.3	487.4	33.7
13:25	90	826.1	6101.3	488.4	33.8
13:26	90	826.1	6101.3	515.6	35.7
13:27	90	826.1	6101.3	546.2	37.8
13:28	90	826.1	6101.3	542.7	37.6
13:29	90	826.1	6101.3	544	37.7
13:30	90	826.1	6101.3	539.5	37.3
13:31	90	826.1	6101.3	534.8	37.0

Unit 27

13:32	90	826.9	6097.5	536.9	37.1
13:33	90	826.9	6097.5	529.9	36.7
13:34	90	826.9	6097.5	522.2	36.1
13:35	90	826.9	6097.5	518.4	35.9
13:36	90	826.9	6097.5	524.2	36.3
13:37	90	826.9	6097.5	524.5	36.3
13:38	90	826.9	6097.5	520.8	36.0
13:39	90	826.9	6097.5	519	35.9
13:40	90	826.9	6097.5	512.7	35.5
13:41	90	826.9	6097.5	523.7	36.2
13:42	90	826.9	6097.5	522.5	36.1
13:43	90	826.9	6097.5	520.5	36.0
13:44	90	826.9	6097.5	507.2	35.1
13:45	90	826.9	6097.5	520.9	36.0
13:46	90	826.9	6097.5	527.1	36.5
13:47	90	826.9	6097.5	521.4	36.1
Run 1	89.0	820.5	6117.7	504.0	35.0
14:07	90	832.8	6069.7	710.6	48.9
14:08	90	832.8	6069.7	716.9	49.4
14:09	90	832.8	6069.7	713.4	49.1
14:10	90	832.8	6069.7	710.2	48.9
14:11	90	832.8	6069.7	715	49.2
14:12	90	832.8	6069.7	708.5	48.8
14:13	90	832.8	6069.7	708.7	48.8
14:14	90	832.8	6069.7	711.6	49.0
14:15	90	832.8	6069.7	712.6	49.1
14:16	90	832.8	6069.7	713.5	49.1
14:17	90	832.8	6069.7	707.9	48.7
14:18	90	832.8	6069.7	709.6	48.9
14:19	90	832.8	6069.7	708.3	48.8
14:20	90	832.8	6069.7	707.6	48.7
14:21	90	834	6064.0	719.5	49.5
14:22	90	834	6064.0	716.2	49.3
14:23	90	834	6064.0	710.2	48.9
14:24	90	834	6064.0	706.2	48.6
14:25	90	834	6064.0	703.3	48.4
14:26	90	834	6064.0	703.9	48.4
14:27	90	834	6064.0	702.5	48.3
14:28	90	834	6064.0	697.7	48.0
14:29	90	834	6064.0	697.9	48.0
14:30	90	834	6064.0	692.8	47.7
14:31	90	834	6064.0	687.1	47.3
14:32	90	834	6064.0	694.3	47.8
14:33	90	834	6064.0	686.3	47.2
14:34	90	834	6064.0	716.7	49.3
14:35	90	834	6064.0	709	48.8
14:36	90	834	6064.0	712.1	49.0
14:37	90	834	6064.0	707.2	48.7
14:38	90	834	6064.0	710.8	48.9
14:39	90	834	6064.0	706.3	48.6
14:40	90	834	6064.0	710.1	48.9

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14:41	90	834	6064.0	716	49.3
14:42	90	834	6064.0	703.3	48.4
14:43	90	834	6064.0	705.1	48.5
14:44	90	834	6064.0	709.9	48.8
14:45	90	828.7	6089.0	713	49.3
14:46	90	828.7	6089.0	719.2	49.7
14:47	90	828.7	6089.0	702.2	48.5
14:48	90	828.7	6089.0	702	48.5
14:49	90	828.7	6089.0	694.7	48.0
14:50	90	828.7	6089.0	695.2	48.0
14:51	90	828.7	6089.0	690.3	47.7
14:52	90	828.7	6089.0	703.1	48.6
14:53	90	828.7	6089.0	694.2	48.0
14:54	90	828.7	6089.0	690.8	47.7
14:55	90	828.7	6089.0	703.2	48.6
14:56	90	828.7	6089.0	697.3	48.2
14:57	90	828.7	6089.0	696	48.1
14:58	90	827	6097.0	689.1	47.7
14:59	90	827	6097.0	684	47.3
15:00	90	827	6097.0	687.5	47.6
15:01	90	827	6097.0	678	46.9
15:02	90	827	6097.0	680.5	47.1
15:03	90	827	6097.0	681.8	47.2
15:04	90	827	6097.0	682.8	47.2
15:05	90	827	6097.0	680.2	47.1
15:06	90	827	6097.0	676.9	46.8
Run 2	90.0	831.5	6075.7	693.0	47.8
15:19	90	830.5	6080.5	513.8	35.4
15:20	90	830.5	6080.5	527.5	36.4
15:21	90	830.5	6080.5	515.8	35.6
15:22	90	830.5	6080.5	506.3	34.9
15:23	90	830.5	6080.5	508.2	35.1
15:24	90	830.5	6080.5	512.9	35.4
15:25	90	830.5	6080.5	518.1	35.7
15:26	90	830.5	6080.5	509.6	35.2
15:27	90	830.5	6080.5	502.5	34.7
15:28	90	830.5	6080.5	514.6	35.5
15:29	90	830.5	6080.5	510.4	35.2
15:30	90	830.5	6080.5	499.2	34.4
15:31	90	830.5	6080.5	504.3	34.8
15:32	90	830.5	6080.5	509.3	35.1
15:33	90	830.5	6080.5	514.3	35.5
15:34	90	832.6	6070.6	514.6	35.4
15:35	90	832.6	6070.6	519.4	35.8
15:36	90	832.6	6070.6	522.1	36.0
15:37	90	832.6	6070.6	510.1	35.1
15:38	90	832.6	6070.6	502.5	34.6
15:39	90	832.6	6070.6	492.5	33.9
15:40	90	832.6	6070.6	505.9	34.8
15:41	90	832.6	6070.6	511.6	35.2
15:42	90	832.6	6070.6	512.3	35.3

Unit 27

15:43	90	832.6	6070.6	513.7	35.4
15:44	90	832.6	6070.6	514.3	35.4
15:45	90	832.6	6070.6	494.7	34.1
15:46	90	832.6	6070.6	520.1	35.8
15:47	90	832.6	6070.6	511.5	35.2
15:48	90	832.6	6070.6	518.1	35.7
15:49	90	832.6	6070.6	517.1	35.6
15:50	90	832.6	6070.6	506.7	34.9
15:51	90	832.6	6070.6	510	35.1
15:52	90	832.6	6070.6	530.1	36.5
15:53	90	832.6	6070.6	525.1	36.2
15:54	90	832.6	6070.6	519.8	35.8
15:55	90	832.6	6070.6	525.8	36.2
15:56	90	832.6	6070.6	522.8	36.0
15:57	90	832.6	6070.6	525.1	36.2
15:58	90	834.7	6060.7	525.4	36.1
15:59	90	834.7	6060.7	518.3	35.6
16:00	90	834.7	6060.7	507.9	34.9
16:01	90	834.7	6060.7	515	35.4
16:02	90	834.7	6060.7	525.9	36.2
16:03	90	834.7	6060.7	514.4	35.4
16:04	90	834.7	6060.7	517.4	35.6
16:05	90	834.7	6060.7	514.1	35.4
16:06	90	834.7	6060.7	509.7	35.0
16:07	90	834.7	6060.7	507.8	34.9
16:08	90	834.7	6060.7	528.8	36.4
16:09	90	834.7	6060.7	508.3	35.0
16:10	90	834.7	6060.7	503.5	34.6
16:11	90	834.7	6060.7	515.1	35.4
16:12	90	834.7	6060.7	512.3	35.2
16:13	90	834.7	6060.7	511.7	35.2
16:14	90	834.7	6060.7	521.4	35.9
16:15	90	834.2	6063.1	515.9	35.5
16:16	90	834.2	6063.1	520.1	35.8
16:17	90	834.2	6063.1	512.5	35.3
16:18	90	834.2	6063.1	515.6	35.5
Run 3	90.0	832.8	6069.8	507.0	34.9
	Test Avg.	Test Avg.	Calc. Avg.	Corr. Avg.	Corr. lbs/Hour

TECO
TAMPA ELECTRIC

TEMPERATURE MEASUREMENTS
FIELD DATA SHEET

Date 7/18/01

Facility Ring-Haver Unit No. 28 Location Outlet

Load (mw) 1.825 Pyrometer I. D. 28-02800 Operator D. Smith

RUN 1

TIME	Temp. deg^F
09:31	836
10:11	855.3
10:22	847.6
10:29	847.9
Avg	846.7

RUN 2

TIME	Temp. deg^F
11:00	848.3
11:18	848.8
11:36	851.4
11:46	851.7
Avg.	850.0

RUN 3

TIME	Temp. deg^F
12:07	850.3
12:26	851.8
12:53	859.1
13:04	857.0
Avg.	854.6

Unit 28

Molecular Weight of Emissions 7.6

Time	Ambient Temperature [F]	Stack Temperature [F]	Corrected Flue Gas Volumetric Flow Rate [ft^3/min]	NOx [ppm]	Nox [lb/hr]
9:29	90	836	6054.7	675.4	46.4
9:30	90	836	6054.7	668.7	45.9
9:31	90	836	6054.7	682.4	46.9
9:32	90	836	6054.7	676.6	46.5
9:33	90	836	6054.7	663.1	45.6
9:34	90	836	6054.7	653.1	44.9
9:35	90	836	6054.7	650.8	44.7
9:36	90	836	6054.7	646.5	44.4
9:37	90	836	6054.7	643.9	44.2
9:38	90	836	6054.7	639	43.9
9:39	90	836	6054.7	633.9	43.5
9:40	90	836	6054.7	627.9	43.1
9:41	90	836	6054.7	624	42.9
9:42	90	836	6054.7	620	42.6
9:43	90	836	6054.7	615.6	42.3
9:44	90	836	6054.7	614.2	42.2
9:45	90	836	6054.7	611.3	42.0
9:46	90	836	6054.7	610.9	42.0
9:47	90	836	6054.7	608.1	41.8
9:48	90	836	6054.7	605.7	41.6
9:49	90	836	6054.7	603.5	41.5
9:50	90	836	6054.7	602.6	41.4
9:51	90	836	6054.7	600.1	41.2
9:52	90	836	6054.7	595.4	40.9
9:53	90	836	6054.7	592.4	40.7
9:54	90	836	6054.7	587.7	40.4
9:55	90	836	6054.7	587	40.3
9:56	90	836	6054.7	586.2	40.3
9:57	90	836	6054.7	581.1	39.9
9:58	90	836	6054.7	579	39.8
9:59	90	836	6054.7	576.5	39.6
10:00	90	836	6054.7	576.3	39.6
10:01	90	836	6054.7	575.6	39.5
10:02	90	836	6054.7	572.6	39.3
10:03	90	836	6054.7	571.6	39.3
10:04	90	836	6054.7	567.4	39.0
10:05	90	836	6054.7	569.1	39.1
10:06	90	836	6054.7	567.2	39.0
10:07	90	836	6054.7	565.8	38.9
10:08	90	836	6054.7	566.8	38.9
10:09	90	836	6054.7	564.1	38.7
10:10	90	836	6054.7	561.9	38.6
10:11	90	855.3	5965.8	562.6	38.1
10:12	90	855.3	5965.8	565.3	38.3
10:13	90	855.3	5965.8	571.2	38.7

Unit 28

10:14	90	855.3	5965.8	570.3	38.6
10:15	90	855.3	5965.8	566	38.3
10:16	90	855.3	5965.8	562.4	38.1
10:17	90	855.3	5965.8	562.9	38.1
10:18	90	855.3	5965.8	562.5	38.1
10:19	90	855.3	5965.8	559.6	37.9
10:20	90	855.3	5965.8	557.7	37.7
10:21	90	855.3	5965.8	555	37.6
10:22	90	847.6	6001.0	558.5	38.0
10:23	90	847.6	6001.0	557.7	38.0
10:24	90	847.6	6001.0	554.8	37.8
10:25	90	847.6	6001.0	555	37.8
10:26	90	847.6	6001.0	552.3	37.6
10:27	90	847.6	6001.0	553.3	37.7
10:28	90	847.6	6001.0	553.5	37.7
Run 1	90.0	840.9	6032.1	589.0	40.3
10:46	90	848.3	5997.7	542.9	36.9
10:47	90	848.3	5997.7	541.1	36.8
10:48	90	848.3	5997.7	543	36.9
10:49	90	848.3	5997.7	540	36.7
10:50	90	848.3	5997.7	540.5	36.8
10:51	90	848.3	5997.7	538.6	36.7
10:52	90	848.3	5997.7	536.7	36.5
10:53	90	848.3	5997.7	535.6	36.4
10:54	90	848.3	5997.7	535.9	36.5
10:55	90	848.3	5997.7	532.3	36.2
10:56	90	848.3	5997.7	527.1	35.9
10:57	90	848.3	5997.7	528.3	35.9
10:58	90	848.3	5997.7	528.4	36.0
10:59	90	848.3	5997.7	528	35.9
11:00	90	848.3	5997.7	528	35.9
11:01	90	848.3	5997.7	524.9	35.7
11:02	90	848.3	5997.7	522.9	35.6
11:03	90	848.3	5997.7	523.8	35.6
11:04	90	848.3	5997.7	526.9	35.9
11:05	90	848.3	5997.7	526.1	35.8
11:06	90	848.3	5997.7	525.3	35.7
11:07	90	848.3	5997.7	524	35.7
11:08	90	848.3	5997.7	520.2	35.4
11:09	90	848.3	5997.7	518.8	35.3
11:10	90	848.3	5997.7	522.7	35.6
11:11	90	848.3	5997.7	523.3	35.6
11:12	90	848.3	5997.7	518.8	35.3
11:13	90	848.3	5997.7	518.4	35.3
11:14	90	848.3	5997.7	518	35.2
11:15	90	848.3	5997.7	520.7	35.4
11:16	90	848.3	5997.7	521.2	35.5
11:17	90	848.3	5997.7	522.6	35.6
11:18	90	848.8	5995.5	522	35.5
11:19	90	848.8	5995.5	519.9	35.4
11:20	90	848.8	5995.5	521	35.4

Unit 28

11:21	90	848.8	5995.5	520.8	35.4
11:22	90	848.8	5995.5	519.1	35.3
11:23	90	848.8	5995.5	519.5	35.3
11:24	90	848.8	5995.5	520.8	35.4
11:25	90	848.8	5995.5	522.9	35.6
11:26	90	848.8	5995.5	521	35.4
11:27	90	848.8	5995.5	518.5	35.3
11:28	90	848.8	5995.5	515.8	35.1
11:29	90	848.8	5995.5	516.4	35.1
11:30	90	848.8	5995.5	516.4	35.1
11:31	90	848.8	5995.5	514.2	35.0
11:32	90	848.8	5995.5	515.1	35.0
11:33	90	848.8	5995.5	513.9	35.0
11:34	90	848.8	5995.5	516.6	35.1
11:35	90	848.8	5995.5	517.3	35.2
11:36	90	851.4	5983.6	518.9	35.2
11:37	90	851.4	5983.6	517.8	35.2
11:38	90	851.4	5983.6	520.4	35.3
11:39	90	851.4	5983.6	517.2	35.1
11:40	90	851.4	5983.6	516.1	35.0
11:41	90	851.4	5983.6	515	35.0
11:42	90	851.4	5983.6	515.3	35.0
11:43	90	851.4	5983.6	516.7	35.1
11:44	90	851.4	5983.6	515.8	35.0
11:45	90	851.4	5983.6	520	35.3
Run 2	90.0	849.0	5994.7	523.0	35.6
12:07	90	850.3	5988.6	539.6	36.7
12:08	90	850.3	5988.6	539	36.6
12:09	90	850.3	5988.6	536.2	36.4
12:10	90	850.3	5988.6	532.3	36.2
12:11	90	850.3	5988.6	526.8	35.8
12:12	90	850.3	5988.6	525	35.7
12:13	90	850.3	5988.6	522.7	35.5
12:14	90	850.3	5988.6	520.8	35.4
12:15	90	850.3	5988.6	519.9	35.3
12:16	90	850.3	5988.6	517.7	35.2
12:17	90	850.3	5988.6	515.8	35.0
12:18	90	850.3	5988.6	514.1	34.9
12:19	90	850.3	5988.6	516.3	35.1
12:20	90	850.3	5988.6	517.8	35.2
12:21	90	850.3	5988.6	516.9	35.1
12:22	90	850.3	5988.6	518.3	35.2
12:23	90	850.3	5988.6	525.3	35.7
12:24	90	850.3	5988.6	523	35.5
12:25	90	850.3	5988.6	516.1	35.1
12:26	90	851.8	5981.7	513.9	34.9
12:27	90	851.8	5981.7	519.4	35.2
12:28	90	851.8	5981.7	519.4	35.2
12:29	90	851.8	5981.7	515.5	35.0
12:30	90	851.8	5981.7	517	35.1
12:31	90	851.8	5981.7	516.2	35.0

Unit 28

12:32	90	851.8	5981.7	513.6	34.9
12:33	90	851.8	5981.7	514.2	34.9
12:34	90	851.8	5981.7	514.4	34.9
12:35	90	851.8	5981.7	512.8	34.8
12:36	90	851.8	5981.7	512.2	34.8
12:37	90	851.8	5981.7	509.3	34.6
12:38	90	851.8	5981.7	506.3	34.4
12:39	90	851.8	5981.7	504.5	34.2
12:40	90	851.8	5981.7	504.6	34.2
12:41	90	851.8	5981.7	504.8	34.3
12:42	90	851.8	5981.7	505.3	34.3
12:43	90	851.8	5981.7	503.5	34.2
12:44	90	851.8	5981.7	505	34.3
12:45	90	851.8	5981.7	503.8	34.2
12:46	90	851.8	5981.7	505.7	34.3
12:47	90	851.8	5981.7	506.8	34.4
12:48	90	851.8	5981.7	504.7	34.3
12:49	90	851.8	5981.7	504.4	34.2
12:50	90	851.8	5981.7	502.7	34.1
12:51	90	851.8	5981.7	502.1	34.1
12:52	90	851.8	5981.7	489.1	33.2
12:53	90	859.1	5948.6	482.6	32.6
12:54	90	859.1	5948.6	479.7	32.4
12:55	90	859.1	5948.6	478.2	32.3
12:56	90	859.1	5948.6	478.7	32.3
12:57	90	859.1	5948.6	478.7	32.3
12:58	90	859.1	5948.6	479.2	32.3
12:59	90	859.1	5948.6	479.9	32.4
13:00	90	859.1	5948.6	480.5	32.4
13:01	90	859.1	5948.6	480.1	32.4
13:02	90	859.1	5948.6	479.8	32.4
13:03	90	859.1	5948.6	478.7	32.3
13:04	90	859.1	5948.6	477.8	32.2
13:05	90	859.1	5948.6	478.3	32.3
13:06	90	859.1	5948.6	478.5	32.3
Run 3	90.0	853.0	5976.2	508.0	34.4
	Test Avg.	Test Avg.	Calc. Avg.	Corr. Avg.	Corr. lbs/Hour

TECO
TAMPA ELECTRIC

TEMPERATURE MEASUREMENTS
FIELD DATA SHEET

Date 7/18/01

Facility H.P. Ring-Haver Unit No. 29 Location Outlet

Load (mw) 1.825 Pyrometer I. D. 28-02800 Operator D. Smith

RUN 1

TIME	Temp. deg^F
14:20	903.4
14:35	905.8
14:50	907.3
15:07	909.1
Avg.	906.4

RUN 2

TIME	Temp. deg^F
15:39	910.8
15:56	905.8
16:17	905.8
16:29	906.1
Avg.	907.1

RUN 3

TIME	Temp. deg^F
16:51	905.0
17:04	903.0
17:25	901.3
17:47	899.5
Avg.	902.2

Unit 29

Molecular Weight of Emissions 76

Time	Ambient Temperature [F]	Stack Temperature [F]	Corrected Flue Gas Volumetric Flow Rate [ft^3/min]	NOx [ppm]	Nox [lb/hr]
14:16	90	903.4	5755.4	563.2	36.8
14:17	90	903.4	5755.4	559.3	36.5
14:18	90	903.4	5755.4	556.6	36.3
14:19	90	903.4	5755.4	558.5	36.5
14:20	90	903.4	5755.4	558	36.4
14:21	90	903.4	5755.4	558.4	36.5
14:22	90	903.4	5755.4	562.3	36.7
14:23	90	903.4	5755.4	562.1	36.7
14:24	90	903.4	5755.4	566.7	37.0
14:25	90	903.4	5755.4	567.8	37.1
14:26	90	903.4	5755.4	567.3	37.0
14:27	90	903.4	5755.4	565.1	36.9
14:28	90	903.4	5755.4	566.7	37.0
14:29	90	903.4	5755.4	566	37.0
14:30	90	903.4	5755.4	563.5	36.8
14:31	90	903.4	5755.4	565.9	37.0
14:32	90	903.4	5755.4	573.1	37.4
14:33	90	903.4	5755.4	574.4	37.5
14:34	90	903.4	5755.4	573	37.4
14:35	90	905.8	5745.2	577.4	37.6
14:36	90	905.8	5745.2	577.3	37.6
14:37	90	905.8	5745.2	573.7	37.4
14:38	90	905.8	5745.2	576	37.5
14:39	90	905.8	5745.2	575.7	37.5
14:40	90	905.8	5745.2	576.3	37.6
14:41	90	905.8	5745.2	573.5	37.4
14:42	90	905.8	5745.2	573.6	37.4
14:43	90	905.8	5745.2	575.5	37.5
14:44	90	905.8	5745.2	573.7	37.4
14:45	90	905.8	5745.2	569.7	37.1
14:46	90	905.8	5745.2	567.7	37.0
14:47	90	905.8	5745.2	566.6	36.9
14:48	90	905.8	5745.2	566.4	36.9
14:49	90	905.8	5745.2	573.8	37.4
14:50	90	907.3	5738.9	572.8	37.3
14:51	90	907.3	5738.9	570.3	37.1
14:52	90	907.3	5738.9	569.6	37.1
14:53	90	907.3	5738.9	570.4	37.1
14:54	90	907.3	5738.9	568.8	37.0
14:55	90	907.3	5738.9	568.1	37.0
14:56	90	907.3	5738.9	566.1	36.9
14:57	90	907.3	5738.9	565.9	36.8
14:58	90	907.3	5738.9	566.4	36.9
14:59	90	907.3	5738.9	565	36.8
15:00	90	907.3	5738.9	561.8	36.6

Unit 29

15:01	90	907.3	5738.9	561.3	36.5
15:02	90	907.3	5738.9	559.5	36.4
15:03	90	907.3	5738.9	563.2	36.7
15:04	90	907.3	5738.9	564.8	36.8
15:05	90	907.3	5738.9	563.8	36.7
15:06	90	907.3	5738.9	558.7	36.4
15:07	90	909.1	5731.4	561.9	36.5
15:08	90	909.1	5731.4	567.7	36.9
15:09	90	909.1	5731.4	561.6	36.5
15:10	90	909.1	5731.4	565.3	36.8
15:11	90	909.1	5731.4	564.6	36.7
15:12	90	909.1	5731.4	565.4	36.8
15:13	90	909.1	5731.4	566	36.8
15:14	90	909.1	5731.4	564.1	36.7
15:15	90	909.1	5731.4	564.5	36.7
Run 1	90.0	906.0	5744.6	561.0	36.6
15:34	90	906.4	5742.7	587.7	38.3
15:35	90	906.4	5742.7	587.6	38.3
15:36	90	906.4	5742.7	583.4	38.0
15:37	90	906.4	5742.7	581.9	37.9
15:38	90	906.4	5742.7	582.7	38.0
15:39	90	910.8	5724.3	576.9	37.5
15:40	90	910.8	5724.3	577.2	37.5
15:41	90	910.8	5724.3	580.4	37.7
15:42	90	910.8	5724.3	574.3	37.3
15:43	90	910.8	5724.3	571.9	37.1
15:44	90	910.8	5724.3	572.2	37.2
15:45	90	910.8	5724.3	568.4	36.9
15:46	90	910.8	5724.3	569.7	37.0
15:47	90	910.8	5724.3	574.3	37.3
15:48	90	910.8	5724.3	572.7	37.2
15:49	90	910.8	5724.3	572.5	37.2
15:50	90	910.8	5724.3	566.9	36.8
15:51	90	910.8	5724.3	564.2	36.6
15:52	90	910.8	5724.3	563.6	36.6
15:53	90	910.8	5724.3	563.8	36.6
15:54	90	910.8	5724.3	560.7	36.4
15:55	90	910.8	5724.3	563	36.6
15:56	90	905.8	5745.2	564.7	36.8
15:57	90	905.8	5745.2	563	36.7
15:58	90	905.8	5745.2	562.3	36.7
15:59	90	905.8	5745.2	558.9	36.4
16:00	90	905.8	5745.2	558.6	36.4
16:01	90	905.8	5745.2	557.5	36.3
16:02	90	905.8	5745.2	560.3	36.5
16:03	90	905.8	5745.2	559.5	36.5
16:04	90	905.8	5745.2	558.2	36.4
16:05	90	905.8	5745.2	558.8	36.4
16:06	90	905.8	5745.2	559.3	36.5
16:07	90	905.8	5745.2	559.8	36.5
16:08	90	905.8	5745.2	561.5	36.6

Unit 29

16:09	90	905.8	5745.2	560.1	36.5
16:10	90	905.8	5745.2	561.2	36.6
16:11	90	905.8	5745.2	563.5	36.7
16:12	90	905.8	5745.2	562.3	36.7
16:13	90	905.8	5745.2	563.4	36.7
16:14	90	905.8	5745.2	561.3	36.6
16:15	90	905.8	5745.2	563.5	36.7
16:16	90	905.8	5745.2	559.2	36.5
16:17	90	905.8	5745.2	561.6	36.6
16:18	90	905.8	5745.2	561.4	36.6
16:19	90	905.8	5745.2	560	36.5
16:20	90	905.8	5745.2	561.8	36.6
16:21	90	905.8	5745.2	561.1	36.6
16:22	90	905.8	5745.2	556.8	36.3
16:23	90	905.8	5745.2	559.5	36.5
16:24	90	905.8	5745.2	560.6	36.5
16:25	90	905.8	5745.2	561.1	36.6
16:26	90	905.8	5745.2	560.6	36.5
16:27	90	905.8	5745.2	558.7	36.4
16:28	90	905.8	5745.2	565.5	36.9
16:29	90	906.1	5744.0	565.1	36.8
16:30	90	906.1	5744.0	565.7	36.9
16:31	90	906.1	5744.0	566.8	36.9
16:32	90	906.1	5744.0	561.8	36.6
16:33	90	906.1	5744.0	564.2	36.8
Run 2	90.0	907.3	5739.0	561.0	36.5
16:51	90	905	5748.6	571.5	37.3
16:52	90	905	5748.6	569.3	37.1
16:53	90	905	5748.6	565.7	36.9
16:54	90	905	5748.6	568.6	37.1
16:55	90	905	5748.6	569.7	37.2
16:56	90	905	5748.6	567.3	37.0
16:57	90	905	5748.6	562.3	36.7
16:58	90	905	5748.6	560.1	36.5
16:59	90	905	5748.6	562.4	36.7
17:00	90	905	5748.6	559.6	36.5
17:01	90	905	5748.6	558.8	36.4
17:02	90	905	5748.6	557.6	36.4
17:03	90	905	5748.6	558.1	36.4
17:04	90	903	5757.0	558.3	36.5
17:05	90	903	5757.0	557	36.4
17:06	90	903	5757.0	554.5	36.2
17:07	90	903	5757.0	554.3	36.2
17:08	90	903	5757.0	553.3	36.1
17:09	90	903	5757.0	554	36.2
17:10	90	903	5757.0	552.6	36.1
17:11	90	903	5757.0	552.2	36.1
17:12	90	903	5757.0	551.9	36.0
17:13	90	903	5757.0	551.4	36.0
17:14	90	903	5757.0	550.7	36.0
17:15	90	903	5757.0	550.3	35.9

Unit 29

17:16	90	903	5757.0	553.3	36.1
17:17	90	903	5757.0	552.2	36.1
17:18	90	903	5757.0	551.6	36.0
17:19	90	903	5757.0	551.8	36.0
17:20	90	903	5757.0	553.4	36.1
17:21	90	903	5757.0	554.4	36.2
17:22	90	903	5757.0	553.1	36.1
17:23	90	903	5757.0	553.3	36.1
17:24	90	903	5757.0	551.9	36.0
17:25	90	901.3	5764.2	551.7	36.1
17:26	90	901.3	5764.2	549.9	36.0
17:27	90	901.3	5764.2	547.7	35.8
17:28	90	901.3	5764.2	546.2	35.7
17:29	90	901.3	5764.2	549.6	35.9
17:30	90	901.3	5764.2	548.9	35.9
17:31	90	901.3	5764.2	544.6	35.6
17:32	90	901.3	5764.2	549.7	35.9
17:33	90	901.3	5764.2	552.2	36.1
17:34	90	901.3	5764.2	552.8	36.2
17:35	90	901.3	5764.2	552.6	36.1
17:36	90	901.3	5764.2	550.2	36.0
17:37	90	901.3	5764.2	553.3	36.2
17:38	90	901.3	5764.2	553.1	36.2
17:39	90	901.3	5764.2	553	36.2
17:40	90	901.3	5764.2	553.9	36.2
17:41	90	901.3	5764.2	552.8	36.2
17:42	90	901.3	5764.2	549.7	35.9
17:43	90	901.3	5764.2	549.3	35.9
17:44	90	901.3	5764.2	551.1	36.0
17:45	90	901.3	5764.2	550	36.0
17:46	90	901.3	5764.2	548.6	35.9
17:47	90	899.5	5771.9	550.4	36.0
17:48	90	899.5	5771.9	553	36.2
17:49	90	899.5	5771.9	552.3	36.2
17:50	90	899.5	5771.9	549.3	36.0
Run 2	90.0	902.6	5758.8	550.0	35.9
	Test Avg.	Test Avg.	Calc. Avg.	Corr. Avg.	Corr. lbs/Hour

TECO
TAMPA ELECTRIC

TEMPERATURE MEASUREMENTS
FIELD DATA SHEET

Date 7/19/01

Facility Hookers Ring-Haver **Unit No.** 30 **Location** Outlet

Load (mw) 1.825 **Pyrometer I. D.** 28-02800 **Operator** D. Smith

RUN 1

TIME	Temp. deg^F
06:59	834.5
07:15	836.6
07:29	839.7
07:46	845.4
Avg.	839.1

RUN 2

TIME	Temp. deg^F
08:18	847.5
08:33	849.9
08:52	850.2
09:06	850.2
Avg.	849.4

RUN 3

TIME	Temp. deg^F
~~10:27~~ 09:29	850.6
09:46	853.2
10:00	853.4
10:16	855.4
Avg.	853.2

TEST PARTICIPANTS

Tampa Electric Company

Raymond McDarby	Sr. Environmental Technician
David Perez	Boiler Turbine Operator
David Smith	Coordinator – Air Services
Shannon Todd	Principle Engineer

Ring Haver

Carlos Acosta	Technician

Hillsborough County EPC

Alan Rodriguez	Compliance Engineer

Florida Environmental Protection Commission

Martin Costello	Professional Engineer