



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF PERMIT

Mr. William R. Osborne, Project Environmentalist
Environmental Affairs Department
Florida Gas Transmission Company
Post Office Box 1188
Houston, Texas 77251-1188

May 9, 1991

Enclosed is construction permit AC 57-188869 (PSD-FL-156) to install one natural gas-fired engine at the Florida Gas Transmission facility in Santa Rosa County, Florida. This permit is issued pursuant to Section 403, Florida Statutes.

Any party to this permit has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; 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 of Appeal must be filed within 30 days from the date this permit is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

Copy furnished to:

J. Preece, DER
D. Buff, P.E.

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF PERMIT and all copies were mailed before the close of buisness on 5-10-91.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to
§120.52(9), Florida Statutes, with
the designated Department Clerk,
receipt of which is hereby
acknowledged.

Kim Joken
Clerk

5-10-91
Date

Final Determination

Florida Gas Transmission Company
Santa Rosa County, Florida

Natural Gas Engine
AC 57-188869
PSD-FL-156

Department of Environmental Regulation
Division of Air Resources Management
Bureau of Air Regulation

May 9, 1991

Final Determination

The Technical Evaluation and Preliminary Determination for the permit to construct one natural gas-fired engine at the Florida Gas Transmission Company's facility 5 miles north of SR 191, in Munson, Santa Rosa, County, Florida, was distributed on February 15, 1991. The Notice of Intent to Issue was published in the Pensacola News Journal on March 1, 1991. Copies of the evaluation were available for public inspection at the Department of Environmental Regulation, Bureau of Air Regulation, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400 and the Department of Environmental Regulation, Northwest District Office, 160 Governmental Center, Pensacola, Florida, 32501-5794.

Comments were received from Mr. David Buff, P.E., from KBN Engineering and Applied Sciences, Inc. Mr. Buff requested some clarification regarding the requirement and time of the compliance tests. Also, Mr. Buff pointed out some minor typographical errors. As results of his comments, all typographical errors were corrected and an additional sentence was added to the Compliance Determination Section of each permit that reads:

Compliance Determination:

"This source shall demonstrate compliance with its limits for each affected pollutant within 60 days after completion of construction and annually thereafter, as follows:"

The final action of the Department will be to issue construction permit No. AC 57-188869, PSD-FL-156 with the changes as requested by Mr. Buff and noted above.

of the technical environmental, energy and economic impacts. Based on this approach, the lean-burn engine was determined to represent BACT.

The proposed engine will incorporate "lean-burn" technology, which is state-of-the-art design for minimizing air pollutant concentration in the exhaust gases from gas-fired reciprocating IC engines. In the lean-burn design, a small, fuel-rich mixture is combusted in a preignition chamber. The hot combustion gases from the preignition then pass to the main combustion chamber, where they ignite a lean mixture of fuel. Since most of the fuel entering the engine is burned in a lean state (i.e., high ratio of air to fuel), exhaust NO_x emissions are minimized. However, volatile organic compound (VOC) emissions are approximately 40 to 50 percent higher than the standard "rich-burn" engines.

V.2 Emission Limitations

The operation of this source will produce emissions of NO_x, CO, VOCs, particulates, and SO₂ from the burning of natural gas. Table I summarizes the proposed emissions from Unit No. 6. Table II summarizes the emissions from existing units (1 through 5).

TABLE I
SUMMARY OF EMISSIONS
(Unit No. 6)

Pollutant	Maximum Potential Emissions From Proposed Compressor Engine		Significant Emission Rate (TPY)
	(lbs/hr)	(TPY)	
Nitrogen Oxides	17.63	77.2	40
Carbon Monoxide	22.05	96.6	100
Volatile Organic Compounds (non-methane)	8.8	38.6	40
Particulate Matter (TSP)	0.14	0.61	25
Particulate Matter (PM ₁₀)	0.14	0.61	15
Sulfur Dioxide	0.80	3.48	40

TABLE II
SUMMARY OF EXISTING EMISSIONS
(Units Nos. 1 through 5)

Pollutant	Per Each Engine		Total (TPY)
	(lbs/hr)	(TPY)	
NO _x	48.5	212.4	1062
CO	6.17	27.0	135.3
VOC (non-methane)	1.94	8.5	42.5
PM	0.07	0.3	1.6
SO ₂	0.40	1.8	8.9



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

PERMITTEE:

Florida Gas Transmission Company
P. O. Box 1188
Houston, Texas 77251-1188

Permit Number: AC 57-188869
PSD-FL-156

Expiration Date: June 30, 1992

County: Santa Rosa

Latitude/Longitude: 30°54'42"N
86°53'12"W

Project: Natural Gas Compressor
Engine (Unit No. 6)

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

For the construction of one 4,000 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Munson, Santa Rosa County, Florida. The UTM coordinates are Zone 16, 510.83 km East and 3419.03 km North.

The source shall be constructed in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. Application to Construct/Operate Air Pollution Sources
DER Form 17-1.202(1).
2. Department's letter dated November 20, 1990.
3. KBN Engineering and Applied Sciences' letter dated
November 21, 1990.

PERMITTEE: Florida Gas Transmission Company Permit Number: AC 57-188869
Expiration Date: June 30, 1992

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.141, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

PERMITTEE:
Florida Gas Transmission Company

Permit Number: AC 57-188869
Expiration Date: June 30, 1992

GENERAL CONDITIONS:

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

- a. Have access to and copy any records that must be kept under the conditions of the permit;
- b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
- c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

- a. a description of and cause of non-compliance; and
- b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

PERMITTEE: Florida Gas Transmission Company Permit Number: AC 57-188869
Expiration Date: June 30, 1992

GENERAL CONDITIONS:

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

- Determination of Best Available Control Technology (BACT)
- Determination of Prevention of Significant Deterioration (PSD)
- Compliance with New Source Performance Standards (NSPS)

14. The permittee shall comply with the following:

- a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
- b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the

PERMITTEE:
Florida Gas Transmission Company

Permit Number: AC 57-188869
Expiration Date: June 30, 1992

GENERAL CONDITIONS:

permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

Emission Limits

1. The maximum allowable emissions from this source shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.1	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.14	0.61	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.14	0.61	5 lbs/MMscf
Sulfur Dioxide	0.8	3.5	10 gr/100scf

2. Visible emissions shall not exceed 10% opacity.

PERMITTEE:

Florida Gas Transmission Company

Permit Number: AC 57-188869

Expiration Date: June 30, 1992

SPECIFIC CONDITIONS:

Operating Rates

3. This source is allowed to operate continuously (8760 hours per year).

4. This source is allowed to burn natural gas only.

5. The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 27,810 scf/hr.
- Maximum heat input shall not exceed 29.20 MMBtu/hr.

6. Any change in the method of operation, equipment or operating hours shall be submitted to the DER's Bureau of Air Regulation and Northwest District offices.

7. Any other operating parameters established during compliance testing and/or inspection that will ensure the proper operation of this facility shall be included in the operating permit.

Compliance Determination

This source shall demonstrate compliance with its emission limits for each affected pollutant within 60 days after completion of construction and annually thereafter as follows:

8. Compliance with the NO_x, SO₂, CO, and VOC standards shall be determined by the following reference methods as described in 40 CFR 60, Appendix A (July 1, 1988) and adopted by reference in F.A.C. Rule 17-2.700.

- Method 1. Sample and Velocity Traverses
- Method 2. Volumetric Flow Rate
- Method 3. Gas Analysis
- Method 7E. Determination of Nitrogen Oxides Emissions from Stationary Sources
- Method 9. Determination of the Opacity of the Emissions from Stationary Sources
- Method 10. Determination of the Carbon Monoxide Emission from Stationary Sources
- Method 25. Determination of Total Gaseous Nonmethane Organic Emissions as Carbon

PERMITTEE:

Florida Gas Transmission Company

Permit Number: AC 57-188869

Expiration Date: June 30, 1992

SPECIFIC CONDITIONS:

9. Compliance with the SO₂ emission limit can be determined by calculations based on fuel analysis using ASTM D1072-80, D3031-81, D4084-82, or D3246-81 for sulfur content of gaseous fuels.

10. Initial compliance with the volatile organic compound (VOC) emissions limits will be demonstrated by EPA Method 25, thereafter, compliance with the VOC emission limits will be assumed, provided the CO allowable emission rate is achieved.

11. Test results will be the average of 3 valid runs. The Northeast District office will be notified at least 15 days in advance of the compliance test. The source shall operate between 90% and 100% of permitted capacity during the compliance test. Compliance test results shall be submitted to the Northwest District office no later than 45 days after completion.

Rule Requirements

12. This source shall comply with all applicable provisions of Chapter 403, Florida Statutes and Chapters 17-2 and 17-4, Florida Administrative Code.

13. Issuance of this permit does not relieve the facility owner or operator from compliance with any applicable federal, state, or local permitting requirements and regulations (F.A.C. Rule 17-2.210(1)).

14. This source shall comply with F.A.C. Rule 17-2.700, Stationary Point Source Emission Test Procedures.

15. Pursuant to F.A.C. Rule 17-2.210(2), Air Operating Permits, the permittee is required to submit annual reports on the actual operating rates and emissions from this facility. These reports shall include, but are not limited to the following: fuel usage, hours of operation, air to fuel ratio, air emissions limits, stack test results, etc. Annual reports shall be sent to the Department's Northwest District office.

16. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the Bureau of Air Regulation prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

PERMITTEE:

Florida Gas Transmission Company

Permit Number: AC 57-188869

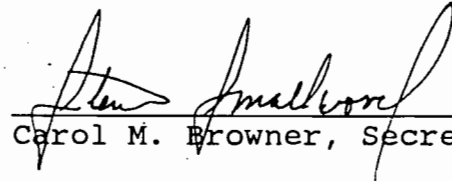
Expiration Date: June 30, 1992

SPECIFIC CONDITIONS:

17. An application for an operation permit must be submitted to the Northwest District office at least 90 days prior to the expiration date of this construction permit or within 45 days after completion of compliance testing, whichever occurs first. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rule 17-4.220).

Issued this 8th day
of May, 1991

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

For 

Carol M. Browner, Secretary

Best Available Control Technology (BACT) Determination
Florida Gas Transmission Company
Santa Rosa County

The applicant proposes to expand its existing natural gas pipeline compressor station No. 12 near the township of Munson in Santa Rosa County, Florida. The proposed expansion consists of adding one new 4,000 brake horsepower (BHP) natural-gas-fired, reciprocating internal combustion engine.

The applicant has indicated the maximum total annual tonnage of regulated air pollutants emitted from the compressor engine based on 8,760 hrs/year operation to be as follows:

<u>Pollutant</u>	<u>Max. Net Increase in Emissions (TPY)</u>	<u>PSD Significant Emission Rate (TPY)</u>
NOx	77.2	40
SO ₂	3.48	40
PM/PM ₁₀	0.61	25/15
CO	96.6	100
VOC	38.6	40

Rule 17-2.500(2)(f)(3) of the Florida Administrative Code (F.A.C.) requires a BACT review for all regulated pollutants emitted in an amount equal to or greater than the significant emission rates listed in the previous table.

BACT Determination Requested by the Applicant

The BACT Determination requested by the applicant is given below:

<u>Pollutant</u>	<u>Determination</u>
NOx	2.0 g/bhp-hr

Date of Receipt of a BACT Application

November 26, 1990

Review Group Members

This determination was based upon comments received from the applicant and the Permitting and Standards Section.

BACT Determination Procedure

In accordance with Florida Administrative Code Chapter 17-2, Air Pollution, this BACT determination is based on the maximum degree of reduction of each pollutant emitted which the Department, on a case by case basis, taking into account energy, environmental and

BACT
Florida Gas Transmission Company

economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques. In addition, the regulations state that in making the BACT determination the Department shall give consideration to:

- (a) Any Environmental Protection Agency determination of Best Available Control Technology pursuant to Section 169, and any emission limitation contained in 40 CFR Part 60 (Standards of Performance for New Stationary Sources) or 40 CFR Part 61 (National Emission Standards for Hazardous Air Pollutants).
- (b) All scientific, engineering, and technical material and other information available to the Department.
- (c) The emission limiting standards or BACT determinations of any other state.
- (d) The social and economic impact of the application of such technology.

The EPA currently stresses that BACT should be determined using the "top-down" approach. The first step in this approach is to determine the most stringent control available for a similar or identical source or source category. If it is shown that this level of control is technically or economically infeasible for the source in question, then the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objections.

BACT Analysis

A review of previous BACT determinations and control measures utilized for natural gas compressor engines indicates that in general the nitrogen oxides emission rate proposed by the applicant is representative of BACT. BACT for nitrogen oxides has been established for reciprocating engines based on the following techniques:

- o engine modifications, and
- o add-on control technology

A review of the BACT/LAER Clearinghouse does not indicate the use of engine modifications on natural gas fired engines as representing BACT. A few engines have, however, been required to use selective catalytic reduction.

Selective catalytic reduction is a post-combustion method for control of NOx emissions. The SCR process combines vaporized ammonia with NOx in the presence of a catalyst to form nitrogen

BACT
Florida Gas Transmission Company

and water. The vaporized ammonia is injected into the exhaust gases prior to passage through the catalyst bed. The SCR process can achieve up to 90% reduction of NOx with a new catalyst. As the catalyst ages, the maximum NOx reduction will decrease to approximately 86 percent.

Given the applicant's proposed BACT level for nitrogen oxides control stated above, an evaluation can be made of the cost and associated benefit of using SCR as follows:

The applicant has indicated that the total levelized annual cost (operating plus amortized capital cost) to install SCR at 100 percent capacity factor is \$715,218. Taking into consideration the total levelized annual cost, a cost/benefit analysis of using SCR can now be developed.

Based on the information supplied, by the applicant, it is estimated that the maximum annual NOx emissions with the proposed compressor engines will be 77.2 tons/year. Assuming that SCR would reduce NOx emissions by an additional 80%, the SCR would control 62 tons of NOx annually. When this reduction is taken into consideration with the total levelized annual cost of \$715,218, the cost per ton of controlling NOx is \$11,535. This cost (\$11,535/ton) is not representative of costs that have been previously justified as BACT and is judged to be cost prohibitive for this facility.

In addition to evaluating the use of SCR, the applicant has examined the energy and economic impacts of using nonselective catalytic reduction, air-to-fuel ratio changes, ignition timing retardation, derating, and exhaust gas recirculation. In each case these alternatives resulted in emissions that were essentially equivalent to that proposed or provided little benefit for the associated expense. As this is the case, none of these control strategies will be elaborated upon in this determination.

Environmental Impact Analysis

The predominant environmental impacts would be related to the use of SCR. The use of SCR could result in accidental spills, emissions of ammonia, and the handling of spent catalyst which is sometimes classified as hazardous waste. Other control techniques such as ignition timing retardation and power derating result in increases of carbon monoxide and hydrocarbons which reduce the gains provided by controlling nitrogen oxides.

In addition to nitrogen oxides, the impacts of toxic pollutants associated with the combustion of natural gas have been evaluated. These toxics (formaldehyde and polycyclic organic matter) common to the combustion of natural gas, are expected to be emitted in minimal amounts and will not have an impact on air quality or this BACT analysis.

BACT
Florida Gas Transmission Company

BACT Determination by DER

Based on the information presented by the applicant and the studies conducted, the Department believes that the compressor engine proposed by the applicant satisfies the BACT requirement for nitrogen oxides. Although engine modifications and add-on control (SCR) could be used to provide additional control, the benefits that would be obtained do not warrant the cost. The emission limit for the compressor engine is thereby established as follows:

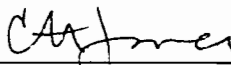
<u>Pollutant</u>	<u>Emission Limit</u>
NOx	2.0 grams/bhp-hr

Details of the Analysis May be Obtained by Contacting:

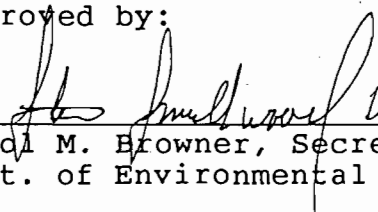
Barry Andrews, P.E., BACT Coordinator
Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Recommended by:

Approved by:



C. H. Fancy, P.E., Chief
Bureau of Air Regulation



Carol M. Browner, Secretary
Dept. of Environmental Regulation

May 8, 1991
Date

May 8, 1991
Date



Florida Gas Transmission Company

P.O. Box 945100, Maitland, Florida 32794-5100 (407) 875-5800

February 29, 2000

OVERNIGHT

RECEIVED

MAR 03 2000

BUREAU OF AIR REGULATION

Mr. Bob Kriegel
Northwest District
Florida Department of Environmental Protection
160 Governmental Center
Pensacola, Florida 32501-5794

Reference: File No. 1130037-002-AC
Facility: 1130037
Compressor Station No. 12, Santa Rosa County
File No. 0390029-002-AC
Facility: 0390029
Compressor Station No. 14, Gadsden County

Dear Mr. Kriegel:

Subject: Comments on Draft Permit

Thank you for taking time to meet with us at FGT's Mt. Vernon Compressor Station. We hope it was informative. While we were there, we reviewed and discussed the draft air permit applications for Compressor Stations No. 12 and 14. During this review of the draft permit a number of items were discussed. This letter addresses each of these items and FGT's viewpoint.

FGT respectfully, submits the following comments.

Item 1 Reference

Page [3]

Section II. Facility-wide Conditions

6. General Pollutant Limiting Standards. Volatile Organic Compounds (VOC) Emissions or Organic Solvents (OS) Emissions

Item 1 Comment:

The words: "[insert any required systems]" appear to be left by error and need to be removed.

Item 2 Reference

Page [6]

Section III. Emission Unit(s) and Conditions

First Paragraph. Last Sentence.

Item 2 Comment:

The stack exit diameter is listed as "8.74 feet." This is the equivalent diameter (De) of the stack. The stack is rectangular in cross section with dimensions of 7.5 x 8 feet. FGT suggest clarifying this by either indicating that 8.74 is an equivalent diameter or by giving the actual dimensions.

Item 3

Page [6]
Section III. Emission Unit(s) and Conditions
Essential Potential to emit (PTE) Parameters
[A].1. Capacity

Item 3 Comment:

The word "either" should be deleted.

The value of 88.6 MMBtu/hr is based on heat input at ISO conditions. FGT suggests that this be stated for correctness.

Finally, since the curve attached to the permit expresses heat input as fuel flow in units of lbM/hr, FGT suggest that the value of 4256.8 lbM/hr be substituted or used in addition to the MMBtu/hr value in this condition to facilitate understanding by others.

Item 4 Reference

Page [8]
Section III. Emission Unit(s) and Conditions
Test Requirements, Methods and Procedures
[A].8.

Item 4 Comment:

The schedule, as written, would be difficult to meet. This is particularly true of notifying the DEP 15 days prior to testing when testing is required to be done within 30 days after initial operation. That allows two weeks to establish a test schedule with a qualified testing company. Additionally, 30 days after initial operation does not allow for any start-up problems that may take more than 30 days to correct.

FGT suggest that the requirement to test "within thirty (30) days after initial operation" be changed to the schedule given in 40 CFR Part 60.8 Performance Tests since the new emission unit will be subject to 40 CFR 60 Subpart GG and the requirements of 60.8(a). 40 CFR 60.8(a) requires that testing be performed "within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup of such facility..."

Item 5 Reference

Page [8]
Section III. Emission Unit(s) and Conditions
Test Requirements, Methods and Procedures
[A].10.
First Sentence.

Item 5 Comment:

The first sentence requires testing at four different loads. FGT requests that this requirement be changed to require peak load only since testing at different loads is intended to establish operating conditions for turbines with water injection and this turbine will not have water injection.

Item 6 Reference

Page [8]
Section III. Emission Unit(s) and Conditions
Test Requirements, Methods and Procedures
[A].10.
Second Sentence.

Item 6 Comment:

The word "corrected" is misspelled.

Item 7 Reference

Page [8]
Section III. Emission Unit(s) and Conditions
Test Requirements, Methods and Procedures
[A].10.
Last Sentence.

Item 7 Comment:

This sentence refers to the attached curve. The use of this curve is not clear from the permit condition as written in the draft permit. From our discussion, FGT's understanding is that emissions will be limited to 8.8 lb/hr at inlet temperatures below ISO conditions and to the value on the curve for inlet temperatures above ISO conditions.

FGT believes that this is an unreasonable requirement and inappropriate application of this curve. The curve clearly indicates that emissions could exceed 8.8 lb/hr at inlet temperatures below ISO conditions. Limiting emissions to 8.8 lb/hr below ISO conditions could potentially lead to non-compliance situations whenever lower inlet temperatures occur. Additionally, use of the curve instead of 8.8 lb/hr at higher inlet temperatures is inconsistent.

FGT requests that lb/hr emission rates be limited to the curve value for a given inlet temperature. The 8.8 lb/hr emission rate represents a nominal short-term emission rate that is based on the expected tons per year (tpy) emission rate at ISO conditions. Emissions at ISO conditions are a slightly conservative estimate of annual emissions compared to the average annual site conditions. The curve shows that a maximum short-term emission rate of approximately 9.6 lb/hr could occur at extremely low inlet temperatures. FGT suggests that a separate maximum lb/hr emission rate of 9.6 lb/hr be identified in the permit along with the nominal 8.8 lb/hr.

FGT would like to point out that the National Ambient Air Quality Standard (NAAQS) for NO_x is an annual standard only. Impacts of NO_x emissions on this standard are assessed using tpy emission rates. There is no short-term NAAQS for NO_x. Also, Prevention of Significant Deterioration (PSD) is based on annual ton per year emission rates and not short-term, lb/hr emission rates. Finally, the New Source Performance Standards (40 CFR 60 Subpart GG) for NO_x is a concentration standard (ppmv) and not a mass rate standard. Likewise, Best Available Control Technology for stationary gas-fired turbines under PSD is normally established as a concentration (ppmv). Severely limiting short-term emission rates (lb/hr) of NO_x, as this permit condition does, is inconsistent with the established regulations and standards pertaining to NO_x and stationary turbines.

Item 8

Page [9]
Section III. Emission Unit(s) and Conditions
Recordkeeping and Reporting Requirements
[A].12. Custom Fuel Monitoring Schedule

Item 8 Comment:

FGT accepts the schedule as given; however, there is a question as to the correct procedure for approval of this schedule. It is FGT's understanding that custom fuel monitoring schedules cannot be used until approved and that individual requests must be made to the Administrator and approvals given on a case-by-case basis. FGT further understands that the Administrator, in this case, is considered to be the USEPA Regional Office. If this is the true, then this permit condition would not be valid until such a request is made and subsequent approval given.

Please confirm that FGT can legally use this custom fuel monitoring schedule prior to approval from the Administrator.

Thank you for the opportunity to comment on the draft permit. FGT trusts that this letter clearly presents FGT's view on these matters. If you have any need to further discuss these items or need additional information, please call me at (407) 838-7119.

Sincerely,



David H. Parham, P.E.

Attachments

CC: Jordan Hunter, FGT w/o attachments
Glenn Sellars, FGT
Arnold Eisenstein, Enron
Frank Diemont, Enron
Clay Roesler, FGT
Alvero Linero, FDEP - Tallahassee
V. Duane Pierce, Ph.D., AQMcS, LLC
Compressor Station No. 12
Compressor Station No. 14
Project file

ENV2398

P 872 562 513



Receipt for Certified Mail

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

Sent to Mr. Allan Weatherford	
Street and No. P. O. Box 94500	
P.O., State and ZIP Code Maitland, Florida 32794-5100	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date Mailed: 12/21/93 Request for Amendments to Construction Permits	

PS Form 3800, JUNE 1991

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

1. Addressee's Address
2. Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Mr. Allan Weatherford
Compliance Environmentalist
Florida Gas Transmission Company
P.O. Box 94500
Maitland, Florida 32794-5100

4a. Article Number

P 872 562 513

4b. Service Type

- | | |
|---|---|
| <input type="checkbox"/> Registered | <input type="checkbox"/> Insured |
| <input checked="" type="checkbox"/> Certified | <input type="checkbox"/> COD |
| <input type="checkbox"/> Express Mail | <input type="checkbox"/> Return Receipt for Merchandise |

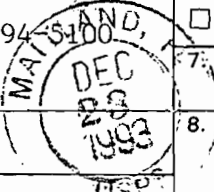
7. Date of Delivery

5. Signature (Addressee)

Jean Clark

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)



Thank you for using Return Receipt Service.



Florida Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

December 9, 1993

Mr. Allan Weatherford
Compliance Environmentalist
Florida Gas Transmission Company
P.O. Box 94500
Maitland, Florida 32794-5100

Dear Mr. Weatherford:

RE: Request for Amendments and Extensions to Air Construction
Permits AC 57-188869, AC 67-189220, AC 20-189438,
AC 62-189439, AC 04-189454, AC 42-189455, AC 48-189456,
AC 05-189655, and AC 56-189457
Phase II - Florida Gas Transmission Company

The Department is in receipt of Mr. Barry Andrew's letter dated December 3, 1993, on behalf of your company, requesting to amend the above permits to use EPA Method 3A instead of EPA Method 3 for Gas Analysis. The Department has reviewed this request and has determined to amend the above mentioned permits as requested.

Specific Condition No. 8 of the above mentioned permits will be amended as follows:

SPECIFIC CONDITION NO. 8

FROM:

8. Compliance with the NO_x, SO₂, CO, VE, and VOC standards shall be determined by the following reference methods as described in 40 CFR 60, Appendix A (July 1, 1988) and adopted by reference in F.A.C. Rule 17-2.700.

- Method 1. Sample and Velocity Traverses
- Method 2. Volumetric Flow Rate
- Method 3. Gas Analysis
- Method 7E. Determination of Nitrogen Oxides Emissions from Stationary Sources
- Method 9. Determination of the Opacity of the Emissions from Stationary Sources
- Method 10. Determination of the Carbon Monoxide Emission from Stationary Sources
- Method 25. Determination of Total Gaseous Nonmethane Organic Emissions as Carbon

Mr. Allan Weatherford
December 9, 1993
Page Two

TO:

8. Compliance with the NO_x, SO₂, CO, VE, and VOC standards shall be determined by the following reference methods as described in 40 CFR 60, Appendix A (July 1, 1992) and adopted by reference in F.A.C. Rule 17-2.700.

- Method 1. Sample and Velocity Traverses
- Method 2. Volumetric Flow Rate
- **Method 3A. Gas Analysis**
- Method 7E. Determination of Nitrogen Oxides Emissions from Stationary Sources
- Method 9. Determination of the Opacity of the Emissions from Stationary Sources
- Method 10. Determination of the Carbon Monoxide Emission from Stationary Sources
- **Method 25A. Determination of Total Gaseous Organic Concentrations Using a Flame Ionization Analyses**

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, 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 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the applicant of the amendment request/application and the parties listed below must be filed within 14 days of receipt of this amendment. Petitions filed by other persons must be filed within 14 days of the amendment issuance or within 14 days of their receipt of this amendment, whichever occurs first. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

- (a) The name, address and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;

Mr. Allan Weatherford
December 9, 1993
Page Three

(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;


(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action;

(g) A statement of the relief sought by petitioner, stating precisely the action the petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this amendment. Persons whose substantial interests will be affected by any decision of the Department with regard to the request/application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of receipt of this amendment in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

This letter must be attached to the above mentioned permits and shall become a part of each permit.

Sincerely,



Howard Rhodes
Director
Division of Air Resources
Management

Attachment to be Incorporated

Mr. Barry Andrew's letter of December 3, 1993.

cc: E. Middleswart, NWD
Robert Leetch, NED
Charles Collins, CD
Isidore Goldman, SED
Duane Pierce, FGTC
Barry Andrews, ENSR

Mr. Allan Weatherford
December 9, 1993
Page Four

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this AMENDMENT and all copies were mailed by certified mail before the close of business on 12/21/93 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED,
on this date, pursuant to
§120.52(11), Florida Statutes,
with the designated Department
Clerk, receipt of which is hereby
acknowledged.

Barbara J. Boutwell
Clerk

12/21/93
Date



ENSR Consulting
and Engineering

2809 West Mall Drive
Florence, AL 35630
(205) 767-1210
FAX (205) 767-1211

December 3, 1993

Mr. Clair Fancy, P.E.
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
2600 Blairstone Road
Tallahassee, FL 32399-2400

RECEIVED

DEC - 6 1993

Division of Air
Resources Management

Dear Clair:

**RE: Request for Amendments to Permits
Florida Gas Transmission Company**

Station 12 - Permit No. AC57-188869
Munson, Santa Rosa County, Florida

Station 13 - Permit No. AC67-189220
Caryville, Washington county, Florida

Station 14 - Permit No. AC20-189438
Quincy, Gadsden County, Florida

Station 15 - Permit No. AC62-189439
Perry, Taylor County, Florida

Station 16 - Permit No. AC04-189454
Brooker, Bradford County, Florida

Station 17 - Permit No. AC42-189455
Salt Springs, Marion County, Florida

Station 18 - Permit No. AC48-189456
Orlando, Orange County, Florida

Station 19 - Permit No. AC05-189665
Melbourne, Brevard County, Florida

Station 20 - Permit No. AC56-189457
Ft. Pierce, St. Lucie County, Florida



December 3, 1993
Mr. Clair Fancy
Page 2

This letter is in response to our recent conversation regarding a previous request by Florida Gas Transmission Company (FGTC) to amend the above permits to include Method 3A instead of Method 3.

On June 29, 1993, FGTC requested that the permits for the compressor engines referenced in this letter be amended to adjust the horsepower ratings and heat input rates. On September 9, 1993 (letter attached), FGTC further requested that specific condition 8 in each of the permits be amended to replace Method 3 with 3A, and that the SO₂ emission limits be clarified to base SO₂ emissions on the fuels sulfur content.

On September 17, 1993 the Division of Air Resources Management (DARM) responded to FGTC's request with a letter amending the permits. Included were the amendments for horsepower ratings, heat input, restrictions, and clarification of sulfur as the basis for SO₂ emissions.

It has recently come to FGTC's attention through the process of obtaining operating permits from the district offices that the request to replace Method 3 with Method 3A was not included in DARM's response. Until now it was assumed that the request had been included in the September 17, 1993 letter of amendment.

Accordingly, FGTC requests that DARM evaluate the request for the amendment to the testing method. This should not require an alternate sampling procedure since there is no regulatory requirement for determining the oxygen and carbon dioxide concentrations from compressor station engines.

Your expedited response to this request is appreciated since it relates to the issuance of our operating permits. Should you need additional information or have any questions please contact Mr. Alan Weatherford with FGTC at (407) 875-5816.

Sincerely,

A handwritten signature in cursive script that reads "Barry Andrews".


Barry D. Andrews, P.E.
Manager, Air Quality Services

cc : Alan Weatherford

Enclosure

Memorandum

Florida Department of
Environmental Protection

TO: Howard L. Rhodes
FROM: Clair Fancy 
DATE: December 9, 1993
SUBJ: Request for Amendments and Extensions to Air
Construction Permits AC 57-188869, AC 67-189220,
AC 20-189438, AC 62-189439, AC 04-189454, AC 42-189455,
AC 48-189456, AC 05-189655, and AC 56-189457
Phase II - Florida Gas Transmission Company

Attached for your approval and signature is an amendment to the above construction permits prepared by the Bureau of Air Regulation for the above referenced company. The purpose of the amendment is to use EPA Method 3A instead of EPA Method 3 for Gas Analyses.

I recommend your approval and signature.

CF/TH/bjb

Attachment

OK
GPL
CLARK 12/13



ENSR Consulting
and Engineering

2809 West Mall Drive
Florence, AL 35630
(205) 767-1210
FAX (205) 767-1211

December 3, 1993

Mr. Clair Fancy, P.E.
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
2600 Blirstone Road
Tallahassee, FL 32399-2400

RECEIVED

DEC - 6 1993

Division of Air
Resources Management

Dear Clair:

**RE: Request for Amendments to Permits
Florida Gas Transmission Company**

Station 12 - Permit No. AC57-188869
Munson, Santa Rosa County, Florida

Station 13 - Permit No. AC67-189220
Caryville, Washington county, Florida

Station 14 - Permit No. AC20-189438
Quincy, Gadsden County, Florida

Station 15 - Permit No. AC62-189439
Perry, Taylor County, Florida

Station 16 - Permit No. AC04-189454
Brooker, Bradford County, Florida

Station 17 - Permit No. AC42-189455
Salt Springs, Marion County, Florida

Station 18 - Permit No. AC48-189456
Orlando, Orange County, Florida

Station 19 - Permit No. AC05-189665
Melbourne, Brevard County, Florida

Station 20 - Permit No. AC56-189457
Ft. Pierce, St. Lucie County, Florida



December 3, 1993
Mr. Clair Fancy
Page 2

This letter is in response to our recent conversation regarding a previous request by Florida Gas Transmission Company (FGTC) to amend the above permits to include Method 3A instead of Method 3.

On June 29, 1993, FGTC requested that the permits for the compressor engines referenced in this letter be amended to adjust the horsepower ratings and heat input rates. On September 9, 1993 (letter attached), FGTC further requested that specific condition 8 in each of the permits be amended to replace Method 3 with 3A, and that the SO₂ emission limits be clarified to base SO₂ emissions on the fuels sulfur content.

On September 17, 1993 the Division of Air Resources Management (DARM) responded to FGTC's request with a letter amending the permits. Included were the amendments for horsepower ratings, heat input, restrictions, and clarification of sulfur as the basis for SO₂ emissions.

It has recently come to FGTC's attention through the process of obtaining operating permits from the district offices that the request to replace Method 3 with Method 3A was not included in DARM's response. Until now it was assumed that the request had been included in the September 17, 1993 letter of amendment.

Accordingly, FGTC requests that DARM evaluate the request for the amendment to the testing method. This should not require an alternate sampling procedure since there is no regulatory requirement for determining the oxygen and carbon dioxide concentrations from compressor station engines.

Your expedited response to this request is appreciated since it relates to the issuance of our operating permits. Should you need additional information or have any questions please contact Mr. Alan Weatherford with FGTC at (407) 875-5816.

Sincerely,

A handwritten signature in cursive script that reads "Barry Andrews".

Barry D. Andrews, P.E.
Manager, Air Quality Services

cc : Alan Weatherford

Enclosure



Florida Gas Transmission Company

P. O. Box 945100 Maitland, Florida 32794-5100 (407) 875-5800

Barry

September 9, 1993

Certified Mail

Mr. Clair Fancy, Chief
Bureau of Air Regulation
Florida Department of
Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Fancy:

**RE: Request for Amendments to Permits
Florida Gas Transmission Company**

**Station 12 - Permit No. AC57-188869
Munson, Santa Rosa County, Florida**

**Station 13 - Permit No. AC67-189220
Caryville, Washington County, Florida**

**Station 14 - Permit No. AC20-189438
Quincy, Gadsden County, Florida**

**Station 15 - Permit No. AC62-189439
Perry, Taylor County, Florida**

**Station 16 - Permit No. AC04-189454
Brooker, Bradford County, Florida**

**Station 17 - Permit No. AC42-189455
Salt Springs, Marion County, Florida**

**Station 18 - Permit No. AC48-189456
Orlando, Orange County, Florida**

**Station 19 - Permit No. AC05-189665
Melbourne, Brevard County, Florida**

**Station 20 - Permit No. AC56-189457
Ft. Pierce, St. Lucie County, Florida**

This letter is in response to your request that Florida Gas Transmission Company (FGTC) follow up in writing certain requests made at a meeting held in your office on August 10, 1993.

Two of the issues discussed at that meeting in which FGTC was represented by Duane Pierce and Barry Andrews (ENSR Consulting and Engineering) dealt with the need to change method 3 to 3A in the Phase II construction permits and the confusion associated with the basis for the SO₂ emissions

Mr. Clair Fancy
Page 2 of 2
September 9, 1993

limits.

Accordingly, FGTC requests that specific condition 8 in the permits referenced above be amended to replace Method 3 with Method 3A. Since the regulations do not specify a particular Method, Method 3A is the preferred choice because it is easier to use and provides more accurate results.

In addition, FGTC would like to clarify that our initial concern that the SO₂ emissions were high by a factor of 2 is no longer a problem. Therefore, we ask that you disregard our request in the June 29, 1993 letter to amend the SO₂ emission limitations. We do note, however, that the SO₂ emissions basis, originally stated at 10gr/100scf in the construction permits, is equivalent to the maximum amount of sulfur in the natural gas transported and should not represent the SO₂ emission factor. Accordingly FGTC requests that the SO₂ emission factor in specific condition 1 in each permit be amended as follows:

XXgr/100scf be amended to read XXgrS/100scf

FGTC appreciates your assistance in helping us resolve these permitting issues. Please call me at 407-875-5816 if you have any questions.

Sincerely,



Allan Weatherford, REM
Compliance Environmentalist

bc
aw0809cf

cc: Bernie Sandner	Duwood Mulford
Fred Griffin	Clayton Howell
Duane Pierce	James Dollar
Barry Andrews, ENSR	Sonny Beets
Christi Patrick	Les Shadd
Charlie Thompson	Leroy Coker
Levon Carroll	Wayne Daniels
Mike Teal	Riley Jackson
Glenn Sellars	Allan Vollmer



Lawton Chiles
Governor

Florida Department of Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

September 17, 1993

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Allan Weatherford
Compliance Environmentalist
Florida Gas Transmission Company
P. O. Box 94500
Maitland, Florida 32794-5100

Dear Mr. Weatherford:

Re: Request for Amendments and Extensions to Air Construction
Permits AC57-188869, AC67-189220, AC20-189438, AC62-189439,
AC04-189454, AC42-189455, AC48-189456, AC05-189655, and
AC56-189457

The Department is in receipt of your letter dated June 29, 1993, requesting to extend the expiration date and to change the engine horsepower (HP) capacity, fuel consumption and heat input at various compressor stations. The Department has reviewed this request and has determined to amend the above mentioned permits as requested since there is no increase in permitted emission levels (lbs/hr and tons/yr).

The following changes are allowed by the Department:

COMPRESSOR STATION NO. 12 - SANTA ROSA COUNTY:

Description

FROM: For the construction of one 4,000 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Munson, Santa Rosa County, Florida. The UTM coordinates are Zone 16, 510.83 km East and 3419.03 km North.

TO: For the construction of one 4,100 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Munson, Santa Rosa County, Florida. The UTM coordinates are Zone 16, 510.83 km East and 3419.03 km North.

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.1	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.14	0.61	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.14	0.61	5 lbs/MMscf
Sulfur Dioxide	0.8	3.5	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	1.95 g/bhp-hr
Carbon Monoxide	22.1	96.6	2.44 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	0.97 g/bhp-hr
Particulate Matter (TSP)	0.14	0.61	4.03 lbs/MMscf
Particulate Matter (PM ₁₀)	0.14	0.61	4.03 lbs/MMscf
Sulfur Dioxide	0.8	3.5	8.06 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 27,810 scf/hr.
- Maximum heat input shall not exceed 29.20 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 34,525 scf/hr.
- Maximum heat input shall not exceed 36.25 MMBtu/hr.

COMPRESSOR STATION NO. 13 - WASHINGTON COUNTY:

Description

FROM: For the construction of one 2,400 bhp natural gas fired engine to be located 9 miles south of Caryville on CR 284. The UTM coordinates are Zone 16, 610.69 km East and 3394.28 km North.

TO: For the construction of one 2,700 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Caryville, Washington County, Florida. The UTM coordinates are Zone 16, 610.69 km East and 3394.28 km North.

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	5 lbs/MMscf
Sulfur Dioxide	0.46	2.0	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.87 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	3.87 lbs/MMscf
Sulfur Dioxide	0.46	2.0	7.74 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 16,154 scf/hr.
- Maximum heat input shall not exceed 16.80 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 20,856 scf/hr.
- Maximum heat input shall not exceed 21.69 MMBtu/hr.

COMPRESSOR STATION NO. 14 - GADSDEN COUNTY:

Description

FROM: For the construction of one 2,400 bhp natural gas fired engine to be located 8 miles southwest of Quincy on SR 65. The UTM coordinates are Zone 16, 719.97 km East and 3377.39 km North.

TO: For the construction of one 2,700 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Quincy, Gadsden County, Florida. The UTM coordinates are Zone 16, 719.97 km East and 3377.39 km North.

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	5 lbs/MMscf
Sulfur Dioxide	0.46	2.0	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr

Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.87 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	3.87 lbs/MMscf
Sulfur Dioxide	0.46	2.0	7.74 qr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 16,154 scf/hr.
- Maximum heat input shall not exceed 16.80 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 20,856 scf/hr.
- Maximum heat input shall not exceed 21.69 MMBtu/hr.

COMPRESSOR STATION NO. 18 - ORANGE COUNTY:

FROM: For the construction of one 2,400 bhp natural gas fired engine to be located at 7990 Steer Lake Road. The UTM coordinates are Zone 17, 451.86 km East and 3154.79 km North.

TO: For the construction of one 2,700 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Orlando, Orange County, Florida. The UTM coordinates are Zone 16, 451.86 km East and 3154.79 km North.

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr

Volatile Organic Compounds (non-methane)	2.6	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	5 lbs/MMscf
Sulfur Dioxide	0.476	2.2	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.95 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	3.95 lbs/MMscf
Sulfur Dioxide	0.476	2.2	7.90 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 16,311 scf/hr.
- Maximum heat input shall not exceed 16.80 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 20,640 scf/hr.
- Maximum heat input shall not exceed 21.26 MMBtu/hr.

COMPRESSOR STATION NO. 19 - BREVARD COUNTY:

Description

FROM: For the construction of two 2,500 bhp natural gas fired engines to be located 6 miles west-southwest of Melbourne Regional Airport. The UTM coordinates are Zone 17, 528.67 km East and 3101.64 km North.

TO: For the construction of two 2,600 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Melbourne, Brevard County, Florida. The UTM coordinates are Zone 17, 528.67 km East and 3101.64 km North.

Specific Condition No. 1

FROM: The maximum allowable emissions from each engine shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	11.0	48.3	2.0 g/bhp-hr
Carbon Monoxide	15.4	67.6	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.4	41.0	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	5 lbs/MMscf
Sulfur Dioxide	0.51	2.2	10 qr/100scf

TO: The maximum allowable emissions from each engine shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	11.0	48.3	1.92 g/bhp-hr
Carbon Monoxide	15.4	67.6	2.69 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.4	41.0	1.64 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	3.90 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	3.90 lbs/MMscf
Sulfur Dioxide	0.51	2.2	7.80 qr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for these natural gas compressor engines shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 17,718 scf/hr per engine.
- Maximum heat input shall not exceed 36.50 MMBtu/hr for both engines.

TO: The permitted operating parameters and utilization rates for these natural gas compressor engines shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 22,703 scf/hr per engine.
- Maximum heat input shall not exceed 46.77 MMBtu/hr for both engines.

COMPRESSOR STATION NO. 15 - TAYLOR COUNTY:

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.13	0.6	5 lbs/MMscf
Sulfur Dioxide	0.75	3.3	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	4.23 lbs/MMscf
Particulate Matter (PM ₁₀)	0.13	0.6	4.23 lbs/MMscf
Sulfur Dioxide	0.75	3.3	8.53 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 26,154 scf/hr.
- Maximum heat input shall not exceed 27.20 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed **30,943** scf/hr.
- Maximum heat input shall not exceed **32.18** MMBtu/hr.

COMPRESSOR STATION NO. 16 - BRADFORD COUNTY:

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.13	0.6	5 lbs/MMscf
Sulfur Dioxide	0.75	3.3	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	3.90 lbs/MMscf
Particulate Matter (PM ₁₀)	0.13	0.6	3.90 lbs/MMscf
Sulfur Dioxide	0.75	3.3	7.80 gr 8 /100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 26,408 scf/hr.
- Maximum heat input shall not exceed 27.20 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 33,833 scf/hr.
- Maximum heat input shall not exceed 34.85 MMBtu/hr.

COMPRESSOR STATION NO. 17 - MARION COUNTY

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	5 lbs/MMscf
Sulfur Dioxide	0.49	2.2	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	4.13 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	4.13 lbs/MMscf
Sulfur Dioxide	0.49	2.2	8.27 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 17,010 scf/hr.
- Maximum heat input shall not exceed 17.52 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed **20,569** scf/hr.
- Maximum heat input shall not exceed **21.19** MMBtu/hr.

COMPRESSOR STATION NO. 20 - ST. LUCIE COUNTY

FROM: The maximum allowable emissions from this unit shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	5 lbs/MMscf
Sulfur Dioxide	0.49	2.0	10 gr/100scf

TO: The maximum allowable emissions from this unit shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	4.13 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	4.13 lbs/MMscf
Sulfur Dioxide	0.49	2.0	8.27 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 17,010 scf/hr.
- Maximum heat input shall not exceed 17.52 MMBtu/hr.

Mr. Allan Weatherford
Request for Amendments and Extensions
Page 12

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed **20,569** scf/hr.
- Maximum heat input shall not exceed **21.19** MMBtu/hr.

Expiration Date

The expiration date of the above mentioned permit will be changed from June 30, 1993, to **December 31, 1993**.

This letter must be attached to the above mentioned permits and shall become a part of each permit. If you have any questions, please call Teresa Heron at (904) 488-1344.

Sincerely,



Howard L. Rhodes
Director
Division of Air Resources
Management

HLR/TH/plm

Attachment to be Incorporated:

Mr. Allan Weatherford's letter of June 29, 1993

cc: E. Middleswart, NWD
Robert Leetch, NED
Charles Collins, CD
Isidore Goldman, SED
Duane Pierce, FGTC
Barry Andrews, ENSR

STATION 13

CARRYVILLE, FLORIDA

Station	Model Run Factor	MAXIMUM 1-HR CONCENTRATION (ug/m**3)					Maximum Emission (lb/hr)				
		NOx	CO	VOCs	Particulates	SO2	NOx	CO	VOCs	Particulates	SO2
13 Permitted	3.888	41.213	43.157	10.109	0.311	1.788	10.60	11.10	2.60	0.08	0.46
13 Revised	3.507	41.733	43.838	10.451	0.386	1.894	11.90	12.50	2.98	0.11	0.54

Model Run Factor is maximum 1-hr concentration based on emission of 1 lb/hr.

Maximum 1-hr concentrations calculated as (Model Run Factor) X (Maximum Emission).

*** SCREEN-1.1 MODEL RUN ***
*** VERSION DATED 88300 ***

Station 13--Permit--Simple Terrain, no Downwash

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = POINT
EMISSION RATE (G/S) = .1260
STACK HEIGHT (M) = 15.24
STK INSIDE DIAM (M) = .39
STK EXIT VELOCITY (M/S) = 30.07
STK GAS EXIT TEMP (K) = 560.93
AMBIENT AIR TEMP (K) = 293.00
RECEPTOR HEIGHT (M) = .00
IOPT (1=URB,2=RUR) = 2
BUILDING HEIGHT (M) = .00
MIN HORIZ BLDG DIM (M) = .00
MAX HORIZ BLDG DIM (M) = .00

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	0	.0	.0	.0	.0	.0	.0	
100.	1.005	1	3.0	3.1	960.0	39.4	27.4	15.0	NO
200.	3.673	2	5.0	5.1	1600.0	29.7	36.4	20.7	NO
300.	3.888	3	5.0	5.2	1600.0	29.6	34.5	20.7	NO
400.	3.728	3	3.0	3.1	960.0	39.1	45.2	27.3	NO
500.	3.493	3	3.0	3.1	960.0	39.1	55.2	33.1	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:
300. 3.888 3 5.0 5.2 1600.0 29.6 34.5 20.7 NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

*** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	3.888	300.	0.

** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

*** SCREEN-1.1 MODEL RUN ***
*** VERSION DATED 88300 ***

Station 13--Actual--Simple Terrain, no Downwash

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = POINT
EMISSION RATE (G/S) = .1260
STACK HEIGHT (M) = 16.92
STK INSIDE DIAM (M) = .66
STK EXIT VELOCITY (M/S) = 10.35
STK GAS EXIT TEMP (K) = 560.93
AMBIENT AIR TEMP (K) = 293.00
RECEPTOR HEIGHT (M) = .00
IOPT (1=URB,2=RUR) = 2
BUILDING HEIGHT (M) = .00
MIN HORIZ BLDG DIM (M) = .00
MAX HORIZ BLDG DIM (M) = .00

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	0	.0	.0	.0	.0	.0	.0	
100.	.7592	1	3.0	3.1	960.0	40.9	27.4	15.0	NO
200.	3.370	1	3.0	3.1	960.0	40.9	50.4	30.1	NO
300.	3.453	3	5.0	5.3	1600.0	31.1	34.5	20.7	NO
400.	3.439	3	4.0	4.2	1280.0	34.6	44.9	26.9	NO
500.	3.282	3	3.0	3.2	960.0	40.5	55.2	33.1	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:
356. 3.507 3 4.0 4.2 1280.0 34.6 40.5 24.4 NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

*** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	3.507	356.	0.

** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

Air Emissions Estimates for Permitting

Station 13; Carryville, FL

	NOX (TPY)	CO (TPY)	NMHC (TPY)	SO2 (TPY)	PM (TPY)
Engines					
Compressor Engine 1	212.5	27.0	8.5	1.8	0.3
Compressor Engine 2	212.5	27.0	8.5	1.8	0.3
Compressor Engine 3	212.5	27.0	8.5	1.8	0.3
Compressor Engine 4	212.5	27.0	8.5	1.8	0.3
Compressor Engine 5	212.5	27.0	8.5	1.8	0.3
Compressor Engine 6	52.2	54.8	13.0	2.4	0.5
Emergency Generator Engine 1	1.8	0.2	0.1	0.0	0.0
Emergency Generator Engine 2	1.8	0.2	0.1	0.0	0.0
Air Compressor Engine 1 (de minimus)	0.0	0.0	0.0	0.0	0.0
Tanks					
Oil and Water Separator 1	0.0	0.0	0.6	0.0	0.0
Oil and Water Separator 2	0.0	0.0	0.6	0.0	0.0
Pipeline Condensate Tank 1	0.0	0.0	0.1	0.0	0.0
Waste Oil Storage Tank 1	0.0	0.0	0.0	0.0	0.0
Lube Oil Storage Tank 1 (de minimus)	0.0	0.0	0.0	0.0	0.0
Lube Oil Storage Tank 2 (de minimus)	0.0	0.0	0.0	0.0	0.0
Machines					
Parts Cleaning Machine 1	?	?	?	?	?
Parts Cleaning Machine 2	?	?	?	?	?
Paint Cleaning Machine 1	?	?	?	?	?
Blowdowns					
ESD and Maintenance blowdowns	0.0	0.0	1.6	0.0	0.0
Fugitive Emissions					
Valves	?	?	?	?	?
Flanges	?	?	?	?	?
Total Emissions	1118.1	190.4	58.6	11.4	2.1

Engine Emission Calculation Worksheet

Station 13; Carryville, FL

Emergency Generator Engine 1

Engine data

Annual use (maximum); hr./yr.	400 hr./yr.
Power; Hp	184 Hp
Power; Btu/hr. (@ 8026 (Btu/hr.)/Hp)	1476784 Btu/hr.
Fuel consumption; scf/hr. (@ 1040 Btu/scf)	1420 scf/hr.

Emissions data

NOx	22.0 g/Hp-hr.
CO	2.0 g/Hp-hr.
NMHC	1.0 g/Hp-hr.
SO2	0.1 grains/scf
PM	5.0 lb/MMscf

Emissions calculations

NOx	1.8 TPY
CO	0.2 TPY
NMHC	0.1 TPY
SO2	0.0 TPY
PM	0.0 TPY

Engine Emission Calculation Worksheet

Station 13; Carryville, FL

Emergency Generator Engine 2

Engine data

Annual use (maximum); hr./yr.	400 hr./yr.
Power; Hp	184 Hp
Power; Btu/hr. (@ 8026 (Btu/hr.)/Hp)	1476784 Btu/hr.
Fuel consumption; scf/hr. (@ 1040 Btu/scf)	1420 scf/hr.

Emissions data

NOx	22.0 g/Hp-hr.
CO	2.0 g/Hp-hr.
NMHC	1.0 g/Hp-hr.
SO2	0.1 grains/scf
PM	5.0 lb/MMscf

Emissions calculations

NOx	1.8 TPY
CO	0.2 TPY
NMHC	0.1 TPY
SO2	0.0 TPY
PM	0.0 TPY

FIXED ROOF TANK VOLATILE ORGANIC COMPOUND EMISSIONS

COMPANY: Florida Gas Transmission Co.

DATE: 5/9/93

LOCATION: Station 13; Carryville, FL

CALCULATED USING AP-42, FOURTH EDITION SEP. 85, EQUATIONS 4.3-(1)&(2)

TANK PHYSICAL DATA

TANK IDENTIFICATION NUMBER	Oil and Water Separator 1
EMISSION CONTROLS	None
PERCENT EFFICIENCY	0.
TANK PAINT COLOR	Black
TANK DIAMETER (FT), D	10.0
TANK HEIGHT (FT), H	15.0
PAINT FACTOR, Fp	1.58
TANK CAPACITY (BBLS), VB	210
TANK CAPACITY (GALLONS), V	8812
ADJUSTMENT FACTOR FOR DIA., C	0.5

WEATHER DATA

AVG. DAILY TEMP. CHANGE (DEG F), DeltaT	20.0
STORAGE TEMP. (DEG. F)	72.4
AVG. ATM. PRESS. (PSIA), Pa	14.7

PRODUCT PHYSICAL DATA

MATERIAL STORED	Condensate, oil, water
MOLECULAR WEIGHT (##MOLE) Mv	53.0
VAPOR PRESS. AT STG. TEMP. (DEG. F), P	2.8
PRODUCT FACTOR, KsubC (CRUDE 0.65, OTHER 1.0)	1.0

THROUGHPUT DATA

DAYS IN SERVICE, Ds	365
VAPOR SPACE HEIGHT (FT), VH	7.5
TANK THROUGHPUT (BBLS FOR DAYS IN SERVICE), TT	7000
FILLING RATE (BBLS/HR), FR	70
NUMBER OF TURNOVERS FOR DAYS IN SERVICE, N	33.4
TURNOVER FACTOR, Kn	1

FIXED ROOF TANK BREATHING LOSS, # Lb =
 $0.0226 * Mv * ((P / (Pa - P))^{0.68}) * (D^{1.73}) * (VH^{0.51}) * (\Delta T^{0.5}) * Fp * C * Kc * Ds / 365 * (100 - \%eff) / 100$

FIXED ROOF TANK WORKING LOSS, # Lw =
 $0.000024 * Mv * P * V * N * Kn * Kc * (100 - \%eff) / 100$

VOLATILE ORGANIC COMPOUND LOSSES	BREATHING	WORKING	TOTAL
POUNDS FOR DAYS SERVICE =	237.4	1047.1	1284.5
TONS FOR DAYS SERVICE =	0.1	0.5	0.6
POUNDS PER YEAR =	237.4	1047.1	1284.5
TONS PER YEAR =	0.1	0.5	<u>0.6</u>
AVERAGE POUNDS PER HOUR =	0.0	0.1	0.1
MAXIMUM POUNDS PER HOUR =	0.1	10.5	10.5

FIXED ROOF TANK VOLATILE ORGANIC COMPOUND EMISSIONS

COMPANY: Florida Gas Transmission Co.

DATE: 5/9/93

LOCATION: Station 13; Carryville, FL

CALCULATED USING AP-42, FOURTH EDITION SEP. 85, EQUATIONS 4.3-(1)&(2)

TANK PHYSICAL DATA

TANK IDENTIFICATION NUMBER	Oil and Water Separator 2
EMISSION CONTROLS	None
PERCENT EFFICIENCY	0
TANK PAINT COLOR	Black
TANK DIAMETER (FT), D	10.0
TANK HEIGHT (FT), H	15.0
PAINT FACTOR, Fp	1.58
TANK CAPACITY (BBLs), VB	210
TANK CAPACITY (GALLONS), V	8812
ADJUSTMENT FACTOR FOR DIA., C	0.5

WEATHER DATA

AVG. DAILY TEMP. CHANGE (DEG F), DeltaT	20.0
STORAGE TEMP. (DEG. F)	72.4
AVG. ATM. PRESS. (PSIA), Pa	14.7

PRODUCT PHYSICAL DATA

MATERIAL STORED	Condensate, oil, water
MOLECULAR WEIGHT (##MOLE) Mv	53.0
VAPOR PRESS. AT STG. TEMP. (DEG. F), P	2.8
PRODUCT FACTOR, KsubC (CRUDE 0.65, OTHER 1.0)	1.0

THROUGHPUT DATA

DAYS IN SERVICE, Ds	365
VAPOR SPACE HEIGHT (FT), VH	7.5
TANK THROUGHPUT (BBLs FOR DAYS IN SERVICE), TT	7000
FILLING RATE (BBLs/HR), FR	70
NUMBER OF TURNOVERS FOR DAYS IN SERVICE, N	33.4
TURNOVER FACTOR, Kn	1

FIXED ROOF TANK BREATHING LOSS, # Lb =
 $0.0226 * Mv * ((P / (Pa - P))^{0.68}) * (D^{1.73}) * (VH^{0.51}) * (\Delta T^{0.5}) * Fp * C * Kc * Ds / 365 * (100 - \%eff) / 100$

FIXED ROOF TANK WORKING LOSS, # Lw =
 $0.000024 * Mv * P * V * N * Kn * Kc * (100 - \%eff) / 100$

VOLATILE ORGANIC COMPOUND LOSSES	BREATHING	WORKING	TOTAL
POUNDS FOR DAYS SERVICE =	237.4	1047.1	1284.5
TONS FOR DAYS SERVICE =	0.1	0.5	0.6
POUNDS PER YEAR =	237.4	1047.1	1284.5
TONS PER YEAR =	0.1	0.5	0.6
AVERAGE POUNDS PER HOUR =	0.0	0.1	0.1
MAXIMUM POUNDS PER HOUR =	0.1	10.5	10.5

FIXED ROOF TANK VOLATILE ORGANIC COMPOUND EMISSIONS

COMPANY: Florida Gas Transmission Co.

DATE: 5/9/93

LOCATION: Station 13; Carryville, FL

CALCULATED USING AP-42, FOURTH EDITION SEP. 85, EQUATIONS 4.3-(1)&(2)

TANK PHYSICAL DATA

TANK IDENTIFICATION NUMBER	Condensate 1
EMISSION CONTROLS	None
PERCENT EFFICIENCY	0
TANK PAINT COLOR	Black
TANK DIAMETER (FT), D	10.0
TANK HEIGHT (FT), H	15.0
PAINT FACTOR, Fp	1.58
TANK CAPACITY (BBLS), VB	210
TANK CAPACITY (GALLONS), V	8812
ADJUSTMENT FACTOR FOR DIA., C	0.5

WEATHER DATA

AVG. DAILY TEMP. CHANGE (DEG F), DeltaT	20.0
STORAGE TEMP. (DEG. F)	72.4
AVG. ATM. PRESS. (PSIA), Pa	14.7

PRODUCT PHYSICAL DATA

MATERIAL STORED	Condensate
MOLECULAR WEIGHT (##MOLE) Mv	53.0
VAPOR PRESS. AT STG. TEMP. (DEG. F), P	2.8
PRODUCT FACTOR, KsubC (CRUDE 0.65, OTHER 1.0)	1.0

THROUGHPUT DATA

DAYS IN SERVICE, Ds	365
VAPOR SPACE HEIGHT (FT), VH	7.5
TANK THROUGHPUT (BBLS FOR DAYS IN SERVICE), TT	140
FILLING RATE (BBLS/HR), FR	140
NUMBER OF TURNOVERS FOR DAYS IN SERVICE, N	0.7
TURNOVER FACTOR, Kn	1

FIXED ROOF TANK BREATHING LOSS, # Lb =
 $0.0226 \cdot Mv \cdot ((P/(Pa-P))^{0.68}) \cdot (D^{1.73}) \cdot (VH^{0.51}) \cdot$
 $(\Delta T^{0.5}) \cdot Fp \cdot C \cdot Kc \cdot Ds / 365 \cdot (100 - \% \text{eff}) / 100$

FIXED ROOF TANK WORKING LOSS, # Lw =
 $0.000024 \cdot Mv \cdot P \cdot V \cdot N \cdot Kn \cdot Kc \cdot (100 - \% \text{eff}) / 100$

VOLATILE ORGANIC COMPOUND LOSSES	BREATHING	WORKING	TOTAL
POUNDS FOR DAYS SERVICE =	237.4	20.9	258.4
TONS FOR DAYS SERVICE =	0.1	0.0	0.1
POUNDS PER YEAR =	237.4	20.9	258.4
TONS PER YEAR =	0.1	0.0	0.1
AVERAGE POUNDS PER HOUR =	0.0	0.0	0.0
MAXIMUM POUNDS PER HOUR =	0.1	20.9	21.0

FIXED ROOF TANK VOLATILE ORGANIC COMPOUND EMISSIONS

COMPANY: Florida Gas Transmission Co.

DATE: 5/9/93

LOCATION: Station 13; Carryville, FL

CALCULATED USING AP-42, FOURTH EDITION SEP. 85, EQUATIONS 4.3-(1)&(2)

TANK PHYSICAL DATA

TANK IDENTIFICATION NUMBER	Waste Oil 1
EMISSION CONTROLS	None
PERCENT EFFICIENCY	0
TANK PAINT COLOR	Black
TANK DIAMETER (FT), D	8.0
TANK HEIGHT (FT), H	10.0
PAINT FACTOR, Fp	1.58
TANK CAPACITY (BBLS), VB	90
TANK CAPACITY (GALLONS), V	3760
ADJUSTMENT FACTOR FOR DIA., C	0.4

WEATHER DATA

AVG. DAILY TEMP. CHANGE (DEG F), DeltaT	20.0
STORAGE TEMP. (DEG. F)	72.4
AVG. ATM. PRESS. (PSIA), Pa	14.7

PRODUCT PHYSICAL DATA

MATERIAL STORED	Waste oil
MOLECULAR WEIGHT (##MOLE) Mv	190.0
VAPOR PRESS. AT STG. TEMP. (DEG. F), P	0.0019
PRODUCT FACTOR, KsubC (CRUDE 0.65, OTHER 1.0)	1.0

THROUGHPUT DATA

DAYS IN SERVICE, Ds	365
VAPOR SPACE HEIGHT (FT), VH	7.5
TANK THROUGHPUT (BBLS FOR DAYS IN SERVICE), TT	140
FILLING RATE (BBLS/HR), FR	70
NUMBER OF TURNS FOR DAYS IN SERVICE, N	1.6
TURNOVER FACTOR, Kn	1

FIXED ROOF TANK BREATHING LOSS, # Lb =
 $0.0226 * Mv * ((P / (Pa - P))^{0.68}) * (D^{1.73}) * (VH^{0.51}) * (DeltaT^{0.5}) * Fp * C * Kc * Ds / 365 * (100 - \%eff) / 100$

FIXED ROOF TANK WORKING LOSS, # Lw =
 $0.000024 * Mv * P * V * N * Kn * Kc * (100 - \%eff) / 100$

VOLATILE ORGANIC COMPOUND LOSSES	BREATHING	WORKING	TOTAL
POUNDS FOR DAYS SERVICE =	2.8	0.1	2.9
TONS FOR DAYS SERVICE =	0.0	0.0	0.0
POUNDS PER YEAR =	2.8	0.1	2.9
TONS PER YEAR =	0.0	0.0	0.0
AVERAGE POUNDS PER HOUR =	0.0	0.0	0.0
MAXIMUM POUNDS PER HOUR =	0.0	0.0	0.0

Calculation of annual HC emissions from blowdowns
(for a typical station)

unmetered gas released (due to blowdowns)	300 Mscf/mo.
unmetered gas released (due to blowdowns)	3.6 MMscf/yr.
unmetered gas released (due to blowdowns) (@21.98 scf/lb)	0.16 MMlb/yr.
unmetered gas released (due to blowdowns) (@21.98 scf/lb)	81.89 TPY
VOCs released (due to blowdowns) (@2% VOCs)	1.64 TPY

FGTC COMPRESSOR STATION 13
CURRENT INVENTORY

UNIT	Included in Most Recent Operating Permit As	Required to be in Title V Operating Permit	In Compliance with Current Regulations	Information Required For New Permit Application
COOP. LS-8-SG	Engine 1	X	Yes	None
COOP. LS-8-SG	Engine 2	X	Yes	None
COOP. LS-8-SG	Engine 3	X	Yes	None
COOP. LS-8-SG	Engine 4	X	Yes	None
COOP. LS-8-SG	Engine 5	X	Yes	None
CB GMVH-12	Engine 6	X	Yes	None
Emergency Generator # 1	Omitted	X	No	Emission rates for NOx, CO, NM-NE HC, SO2, and PM
Emergency Generator # 2	Omitted	X	No	Emission rates for NOx, CO, NM-NE HC, SO2, and PM
Air Compressor # 1	Omitted	X	No	Emission rates for NOx, CO, NM-NE HC, SO2, and PM, Horsepower
Oil and Water Sep. # 1	Omitted	X	No	Emission rate for NM-NE HC
Oil and Water Sep. # 2	Omitted	X	No	Emission rate for NM-NE HC
Waste Oil Stor. # 1	Omitted	X	No	Emission rate for NM-NE HC
Pipeline Condensate # 1	Omitted	X	No	Emission rate for NM-NE HC
Lube Oil Storage # 1	Omitted	X	No	Emission rate for NM-NE HC
Lube Oil Storage # 2	Omitted	X	No	Emission rate for NM-NE HC
Part Cleaner # 1	Omitted	X	No	Emission rate for VOC's
Part Cleaner # 2	Omitted	X	No	Emission rate for VOC's
Paint Cleaner # 1	Omitted	X	No	Emission rate for VOC's
ESD & Blowdown Stacks	Omitted	X	No	Emission rates, Volume B/D, Stack Info

F:\
 NATURAL GAS COMPRESSION FACILITY
 STATION 13
 CARRYVILLE, FLORIDA

PURPOSE OF ENGINES: THE ENGINES ACT AS PRIME MOVERS FOR THE NATURAL GAS COMPRESSORS

EMISSION SOURCE	CURRENT PERMIT STATUS	SOURCE ID	SERIAL NUMBER	HP	BTU/HP*HR	PERMIT EMISSION RATES (TPY)				PM
						NOX	VOC	CO	SO2	
ENGINE # 1	PERMITTED UNIT	_____	6374	2000	6000	212.5	8.5	27	1.8	0.3
ENGINE # 2	PERMITTED UNIT	_____	6375	2000	6000	212.5	8.5	27	1.8	0.3
ENGINE # 3	PERMITTED UNIT	_____	6376	2000	6000	212.5	8.5	27	1.8	0.3
ENGINE # 4	PERMITTED UNIT	_____	7019	2000	6200	212.5	8.5	27	1.8	0.3
ENGINE # 5	PERMITTED UNIT	_____	7053	2000	6200	212.5	8.5	27	1.8	0.3
ENGINE # 6	PERMITTED UNIT	_____	48488	2700	7300	52.15	13	54.8	2.4	0.5
						1115	56	190	11	2

Phase I Station Characteristics

02-Jun-92
CS13.WK1

Compressor Station: Number 13
 Name: Carryville
 County: Washington
 Nearest City: Caryville
 Compressor Supervisor: Buddy Morris
 Mailing Address: Route 1, Box 553
 Carryville, Florida 32427-9801
 Telephone: 904-535-2350
 Latitude: 30-40-40
 Longitude: 85-50-40
 UTM Zone: 16
 UTM Easting: 610.69 km
 UTM Northing: 3,394.28 km
 Elevation (ft): 100

Phase I Engine Characteristics

Engine Identification	1	2	3	4	5
Permit Number					
Serial Number	6374	6375	6376	7019	7053
Operating Time					
Hours/Day	24	24	24	24	24
Days/Week	7	7	7	7	7
Weeks/Year	52	52	52	52	52
Engine Type	Recip	Recip	Recip	Recip	Recip
Date of Installation	1958	1958	1958	1966	1968
Engine Make	Cooper	Cooper	Cooper	Cooper	Cooper
Engine Model	LS-8-SG	LS-8-SG	LS-8-SG	LS-8-SG	LS-8-SG
Horsepower Rating	2000	2000	2000	2000	2000
Air Charging	Turbo.	Turbo.	Turbo.	Turbo.	Turbo.
Exhaust Temperature (F)	875	875	875	875	875
Mass Flow Rate (lbs/hr) (a)	21000	21000	21000	21000	21000
Volumetric Flow Rate (acfm)	11760	11760	11760	11760	11760
Volumetric Flow Rate (dscfm)	4279	4279	4279	4279	4279
Exit Velocity (af/s)	154.5	154.5	154.5	154.5	154.5
Water Vapor Content (%)	8	8	8	8	8
Ave. Fuel Consumption (MMCF/Hr) (b)	0.0144	0.0144	0.0144	0.0144	0.0144
Max. Fuel Consumption (MMCF/Hr) (b)	0.0144	0.0144	0.0144	0.0144	0.0144
Specific Fuel Consump. (BTU/bhp-hr)	6000	6000	6000	6200	6200
Maximum Heat Input (MMBTU/Hr)	15	15	15	15	15
Stack Height (ft)	26.42	26.42	26.42	26.42	26.42
Stack Diameter (in)	15.25	15.25	15.25	15.25	15.25
Stack to Building Offset (ft)	17.00	17.00	17.00	17.00	17.00
Building Height (ft) (c)	32.42	32.42	32.42	32.42	32.42
Building Length (ft) (c)	180.00	180.00	180.00	180.00	180.00
Building Width (ft) (c)	55.00	55.00	55.00	55.00	55.00

Phase I Fuel Characteristics

Fuel Type	N.G.	N.G.	N.G.	N.G.	N.G.
Heating Value (BTU/CF)	1040	1040	1040	1040	1040
Heat Capacity (BTU/lb)	23077	23077	23077	23077	23077
Density (lb/cubic ft)	0.0455	0.0455	0.0455	0.0455	0.0455
Percent Sulfur (%) (d)	0.031	0.031	0.031	0.031	0.031
Percent Ash (%)	N/A	N/A	N/A	N/A	N/A

Phase I Emissions Rates by Engine for Station 13

Engine Identification	1	2	3	4	5
Grams/BHP-Hour					
NOX	11.000	11.000	11.000	11.000	11.000
CO	1.400	1.400	1.400	1.400	1.400
NMHC	0.440	0.440	0.440	0.440	0.440
SO2 (e)	0.093	0.093	0.093	0.093	0.093
PM (f)	0.016	0.016	0.016	0.016	0.016
Pounds/Hour					
NOX	48.51	48.51	48.51	48.51	48.51
CO	6.17	6.17	6.17	6.17	6.17
NMHC	1.94	1.94	1.94	1.94	1.94
SO2	0.41	0.41	0.41	0.41	0.41
PM	0.07	0.07	0.07	0.07	0.07
Tons/Year					
NOX	212.47	212.47	212.47	212.47	212.47
CO	27.04	27.04	27.04	27.04	27.04
NMHC	8.50	8.50	8.50	8.50	8.50
SO2	1.79	1.79	1.79	1.79	1.79
PM	0.31	0.31	0.31	0.31	0.31

Phase I Emissions Rates for Total Station

Grams/BHP-Hour	
NOX	11.000
CO	1.400
NMHC	0.440
SO2	0.093
PM	0.016
Pounds/Hour	
NOX	242.55
CO	30.87
NMHC	9.70
SO2	2.04
PM	0.36
Tons/Year	
NOX	1062.37
CO	135.21
NMHC	42.49
SO2	8.94
PM	1.57

SOURCE CLASSIFICATION WITH RESPECT TO PSD

MAJOR SOURCE

Notes:

- (a) Wet mass flow (@ 60 F, 14.7 psi).
- (b) Based on heating value of fuel gas.
- (c) All engines enclosed in one building.
- (d) Percent by weight.
- (e) Based on 10 grains/SCF.
- (f) Based AP-42 factor of 5 lbs/MMSCF.

Phase II Station Characteristics

23-Jun-92

CS13.WK1

Compressor Station: Number 13
 Name: Carryville
 County: Washington
 Nearest City: Caryville
 Compressor Supervisor: Buddy Morris
 Mailing Address: Route 1, Box 553
 Caryville, Florida 32427-9801
 Telephone: 904-535-2350
 Latitude: 30-40-40
 Longitude: 85-50-40
 UTM Zone: 16
 UTM Easting: 610.69 km
 UTM Northing: 3,394.28 km
 Elevation (ft): 100

Phase II Engine Characteristics

Engine Identification	6
Permit Number	
Serial Number	48488
Operating Time	
Hours/Day	24
Days/Week	7
Weeks/Year	52
Engine Type	Recip
Date of Installation	1991
Engine Make	Cooper-Bessemer
Engine Model	GMVH-12
Horsepower Rating	2700
Air Charging	Turbo.
Exhaust Temperature (F)	550
Mass Flow Rate (lbs/hr) (a)	46070
Volumetric Flow Rate (acfm)	19753.2
Volumetric Flow Rate (dscfm)	7511
Exit Velocity (af/s)	89.29
Water Vapor Content (%)	8
Ave. Fuel Consumption (MMCF/Hr) (b)	0.0168
Max. Fuel Consumption (MMCF/Hr) (b)	0.0168
Specific Fuel Consump. (BTU/bhp-hr)	7300
Maximum Heat Input (MMBTU/Hr)	17.68
Stack Height (ft)	55.5
Stack Diameter (in)	26
Stack to Building Offset (ft)	17.00
Building Height (ft) (c)	32.42
Building Length (ft) (c)	220.00
Building Width (ft) (c)	55.00

Phase II Fuel Characteristics

Fuel Type	N.G.
Heating Value (BTU/CF)	1040
Heat Capacity (BTU/lb)	22857
Density (lb/cubic ft)	0.0455
Percent Sulfur (%) (d)	0.031
Percent Ash (%)	N/A

Phase II Emissions Rates by Engine for Station 13
Engine Identification 6

Grams/BHP-Hour		
	NOX	2.000
	CO	2.100
	NMHC	0.500
	SO2 (e)	0.090
	PM (f)	0.018
Pounds/Hour		
	NOX	11.91
	CO	12.50
	NMHC	2.98
	SO2	0.54
	PM	0.10
Tons/Year		
	NOX	52.15
	CO	54.76
	NMHC	13.04
	SO2	2.35
	PM	0.46

Phase II Emissions Rates for Total Station

Grams/BHP-Hour		
	NOX	9.086
	CO	1.549
	NMHC	0.453
	SO2	0.092
	PM	0.016
Pounds/Hour		
	NOX	254.46
	CO	43.37
	NMHC	12.68
	SO2	2.58
	PM	0.46
Tons/Year		
	NOX	1114.52
	CO	189.97
	NMHC	55.53
	SO2	11.29
	PM	2.02

SOURCE CLASSIFICATION WITH RESPECT TO PSD

MAJOR SOURCE

Notes:

- (a) Wet mass flow (@ 60 F, 14.7 psi).
- (b) Based on heating value of fuel gas.
- (c) All engines enclosed in one building.
- (d) Percent by weight.
- (e) Based on 10 grains/SCF.
- (f) Based AP-42 factor of 5 lbs/MMSCF.

C
NATURAL GAS COMPRESSION FACILITY
STATION 13
CARRYVILLE, FLORIDA

PURPOSE OF EMERGENCY GENERATOR: THE EMERGENCY GENERATOR USED IN THE CASES OF POWER FAILURE

PURPOSE OF THE AIR COMPRESSOR: TO PROVIDE AIR FOR TIRES, ETC..

EMISSION SOURCE	CURRENT PERMIT STATUS	SOURCE ID	SERIAL NUMBER	HP	BTU/HP*HR	PERMIT EMISSION RATES (TPY)				
						NOX	NMHC	CO	SO2	PM
EMERGENCY GENERATOR # 1	NOT PERMITTED	_____	_____	184	_____	_____	_____	_____	_____	
EMERGENCY GENERATOR # 2	NOT PERMITTED	_____	_____	184	_____	_____	_____	_____	_____	
AIR COMPRESSOR # 1	NOT PERMITTED	_____	_____	_____	_____	0	0	0	0	0

FLORIDA GAS TRANSMISSION COMPANY
COMPRESSOR STATION EMISSIONS QUESTIONAIRE
STATION No. 13

GENERATORS SETS

UNIT NUMBER 19543 # 1

Installed	EXISTING
Permitted	NO
Internal Combustion Engine	YES
If Int. Comb. Engine, Is Catalytic Converter present	NO
Manufacturer	Waukesha
Model	6WAKCU
Actual Maximum Hours of Operation (Hr / Year)	250 400
If Internal Combustion Engine Complete the following information:	
Type of Fuel Used	N.G.
BTU Rating (MMBTU/HR)	8 mmcf (approx)
Horse Power Rating	184
Stack Height Above Grade (ft)	9'-10.5"
Stack Diameter (inch)	6
Location of Stack(s)	N of W end of aux. bldg. ; horizontal
Stack Temperature (F)	500 (approx)

UNIT NUMBER 19542 # 2

Installed	EXISTING
Permitted	NO
Internal Combustion Engine	YES
If Int. Comb. Engine, Is Catalytic Converter present	NO
Manufacturer	Waukesha
Model	6WAKCU
Actual Maximum Hours of Operation (Hr / Year)	250 400
If Internal Combustion Engine Complete the following information:	
Type of Fuel Used	N.G.
BTU Rating (MMBTU/HR)	8 mmcf (approx)
Horse Power Rating	184
Stack Height Above Grade (ft)	9'-10.5"
Stack Diameter (inch)	6
Location of Stack(s)	N of W end of aux. bldg. ; horizontal
Stack Temperature (F)	500 (approx)

FLORIDA GAS TRANSMISSION COMPANY
COMPRESSOR STATION EMISSIONS QUESTIONNAIRE
STATION No. 13

OTHER SOURCES

Unit No. 397494	EXISTING
Permitted	NO
Purpose of Unit	Air Compressor # 1
Type	I.C.
Manufacturer	Waukesha
Model	VRG - 220 U
Size (BTU ,or HP ,or Kw)	220 c.i.,3.875 bore,4.665 stroke, 8:1 compr.
Fuel Used (if applicable)	N.G.
Stack Parameters (ft)	H = 13 ft Dia. = 2"

OTHER.

C
 NATURAL GAS COMPRESSION FACILITY
 STATION 13
 CARRYVILLE, FLORIDA

PURPOSE OF OIL/WATER SEPARATOR TANKS: TO SEPARATE AN OIL AND WATER MIXTURE IN ORDER TO REUSE THE WATER.

PURPOSE OF WASTE OIL TANK: TO STORE EXCESS OIL COLLECTED IN COMPRESSOR STATION PROCESSES.

PURPOSE OF PIPELINE CONDENSATE TANK: TO STORE LIGHT HYDROCARBON LIQUID OBTAINED BY CONDENSATION OF HYDROCARBON VAPORS.

PURPOSE OF LUBE OIL STORAGE TANKS: TO STORE LUBE OIL USED FOR ENGINE OPERATIONS.

VESSEL	PERMIT STATUS	SOURCE ID	CAPACITY (GAL)	PERMIT FUGITIVE EMISSION RATES (TPY) NMHC
OIL/WATER SEPARATOR # 1	NOT PERMITTED	_____	8820	_____
OIL/WATER SEPARATOR # 2	NOT PERMITTED	_____	8820	_____
WASTE OIL TANK # 1	NOT PERMITTED	_____	8820	_____
PIPELINE CONDENSATE # 1	NOT PERMITTED	_____	8820	_____
LUBE OIL STORAGE # 1	NOT PERMITTED	_____	10000	_____
LUBE OIL STORAGE # 2	NOT PERMITTED	_____	3000	_____



Florida Gas Transmission Company

P. O. Box 945100 Maitland, Florida 32794-5100 (407) 875-5800

September 9, 1993

Mr. Clair Fancy, Chief
Bureau of Air Regulation
Florida Department of
Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Certified Mail

RECEIVED

SEP 13 1993

Division of Air
Resources Management

Dear Mr. Fancy:

**RE: Request for Amendments to Permits
Florida Gas Transmission Company**

Station 12 - Permit No. AC57-188869
Munson, Santa Rosa County, Florida

Station 13 - Permit No. AC67-189220
Caryville, Washington County, Florida

Station 14 - Permit No. AC20-189438
Quincy, Gadsden County, Florida

Station 15 - Permit No. AC62-189439
Perry, Taylor County, Florida

Station 16 - Permit No. AC04-189454
Brooker, Bradford County, Florida

Station 17 - Permit No. AC42-189455
Salt Springs, Marion County, Florida

Station 18 - Permit No. AC48-189456
Orlando, Orange County, Florida

Station 19 - Permit No. AC05-189665
Melbourne, Brevard County, Florida

Station 20 - Permit No. AC56-189457
Ft. Pierce, St. Lucie County, Florida

This letter is in response to your request that Florida Gas Transmission Company (FGTC) follow up in writing certain requests made at a meeting held in your office on August 10, 1993.

Two of the issues discussed at that meeting in which FGTC was represented by Duane Pierce and Barry Andrews (ENSR Consulting and Engineering) dealt with the need to change method 3 to 3A in the Phase II construction permits and the confusion associated with the basis for the SO₂ emissions

Mr. Clair Fancy
Page 2 of 2
September 9, 1993

limits.

Accordingly, FGTC requests that specific condition 8 in the permits referenced above be amended to replace Method 3 with Method 3A. Since the regulations do not specify a particular Method, Method 3A is the preferred choice because it is easier to use and provides more accurate results.

In addition, FGTC would like to clarify that our initial concern that the SO₂ emissions were high by a factor of 2 is no longer a problem. Therefore, we ask that you disregard our request in the June 29, 1993 letter to amend the SO₂ emission limitations. We do note, however, that the SO₂ emissions basis, originally stated at 10gr/100scf in the construction permits, is equivalent to the maximum amount of sulfur in the natural gas transported and should not represent the SO₂ emission factor. Accordingly FGTC requests that the SO₂ emission factor in specific condition 1 in each permit be amended as follows:

XXgr/100scf be amended to read XXgrs/100scf

FGTC appreciates your assistance in helping us resolve these permitting issues. Please call me at 407-875-5816 if you have any questions.

Sincerely,



Allan Weatherford, REM
Compliance Environmentalist

bc
aw0809cf

cc: Bernie Sandner
Fred Griffin
Duane Pierce
Barry Andrews, ENSR
Christi Patrick
Charlie Thompson
Levon Carroll
Mike Teal
Glenn Sellars

Duwood Mulford
Clayton Howell
James Dollar
Sonny Beets
Les Shadd
Leroy Coker
Wayne Daniels
Riley Jackson
Allan Vollmer

J. Nelson



Florida Gas Transmission Company

P. O. Box 945100 Maitland, Florida 32794-5100 (407) 875-5800

July 16, 1993

RECEIVED

JUL 19 1993

Division of Air
Resources Management

Mr. Clair Fancy, P.E.
Chief, Bureau of Air Regulation
Florida Department of
Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Fancy:

RE: Corrections to our June 29, 1993 letter

Upon further review, we have identified several typographical errors in our June 29 letter to you. I've attached a complete corrected letter in addition to highlighted pages that show the corrections.

I apologize for the errors. Please call me at 407-875-5816 if you have any questions.

Sincerely,

Allan Weatherford, REM
Compliance Environmentalist

bc
aw0716cf
attach

cc: Raymond Young
Duane Pierce
Barry Andrews
Ed Middleswart
Robert Leetch
Chuck Collins
Isadore Goldman
J. Harper, EPA
J. Dunyak, NPS



Florida Gas Transmission Company

P. O. Box 945100 Maitland, Florida 32794-5100 (407) 875-5800

RECEIVED
DER - MAIL ROOM

1993 JAN 20 AM 11:00

January 18, 1993

Mr. C. H. Fancy, Chief
Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Fancy:

Re: Permit Amendment Processing Fee for
Nine Florida Gas Transmission Permits

As instructed in your January 13, 1993 letter, a check for \$250 is enclosed to cover the permit amendment processing fee for all nine of the subject permits.

Please call me at 407/875-5816, if you have any questions.

Very truly yours,

Allan Weatherford
Compliance Environmentalist

AW0118a.swp

Enclosure

cc: Chuck Truby
Raymond Young

CHECK NO.

DATE OF CHECK

FLORIDA GAS TRANSMISSION COMPANY
P.O. BOX 1188
HOUSTON, TEXAS 77251-1188

June 29, 1993



PAY EXACTLY Two Thousand Two Hundred Fifty Dollar DOLLARS

2,250.00

This check is VOID unless printed on BLUE background

PAY
TO THE
ORDER
OF

Florida Dept of Environmental Regulation
2600 Blair Stone Road
Tallahassee FL 32399-2400

Betty J. Clark

NOT VALID OVER \$5,000 UNLESS COUNTERSIGNED

UNITED BANK OF GRAND JUNCTION

RECEIVED
JUN 30 1993

CHECK NO.

REMITTANCE STATEMENT

Division of Air
Resources Management

VOUCHER NO.	INVOICE DATE	INVOICE NUMBER	PURCHASE ORDER	AMOUNT		
				GROSS	DISCOUNT	NET
		<i>Fee</i>				
		Amendment to Air Emissions Construction Permits for C/S's 12-20 Florida Gas Transmission Company				
<p><i>7/2</i></p> <p><i>Dehesa,</i></p> <p><i>This was received with the processing fee (\$250 for 9 amendments) on 6/30. I haven't logged it in yet - or made any copies - I can do that when I return on 7/13. It looks like FGT already copied the districts. I'll get with you on it when I get back -</i></p> <p><i>Patley</i></p>						

Special Instructions

the Phase II engine additions addressed in this letter. In preparing the applications, I noted that for some compressor stations, engines which were slightly larger than that proposed in the construction permit applications have been installed.

To resolve this situation, FGT requests that those permits for stations in which larger engines (increased horsepower) than permitted be amended to include the correct horsepower, fuel consumption and heat input. In addition, FGT requests that the remaining permits (those for which there have been no changes in horsepower) be amended to include fuel consumption levels and heat inputs which are more realistic based on our compliance testing. In most cases it was observed that the fuel consumption levels provided by the manufacturer were exceeded during compliance testing.

Because the construction permits for the referenced compressor engines are soon to expire (June 30, 1993), FGT is requesting that the construction permits be extended until September 30, 1993 to provide ample time to process the requested changes to the construction permits and obtain the operating permits.

FGT has enclosed a check for \$2,250.00 to cover the cost of these permitting actions. Please note that FGT is not requesting that any emissions limitations be increased for any of the compressor stations. Even though the horsepower was increased from what was originally permitted at some stations, the actual emissions determined from the compliance testing were well below permitted levels.

Specifically, horsepower increases have occurred at Station 12 (4100 HP instead of 4000 HP), 13, 14, and 18 (2700 HP instead of 2400 HP), and 19 (2600 HP instead of 2500 HP). In most cases the higher potential emission rates do not result in higher ambient concentrations since the compressor engines were equipped with higher stack heights than that proposed in the construction permit applications. For cases in which the increased potential emission rates due to changes in horsepower resulted in higher ambient concentrations, the concentrations still remained well below any ambient air quality standards. A summary of the screening modeling conducted for each station has been provided for your review. Again this modeling was based on the increased potential to emit. FGT is not requesting that permitted emissions limitations be increased.

FGT requests that the permit for Station 12 (AC57-188869) be amended to indicate the correct horsepower (4100 HP) and that the permit for this station be modified as follows:

Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.1	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.14	0.61	5 lbs/MMscf
Particulate Matter (PM10)	0.14	0.61	5 lbs/MMscf
Sulfur Dioxide	0.8	3.5	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	1.95 g/bhp-hr
Carbon Monoxide	22.1	96.6	2.44 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	0.97 g/bhp-hr
Particulate Matter (TSP)	0.14	0.61	4.03 lbs/MMscf
Particulate Matter (PM10)	0.14	0.61	4.03 lbs/MMscf
Sulfur Dioxide	0.4	1.8	8.06 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 27,810 scf/hr.
- Maximum heat input shall not exceed 29.20 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 34,525 scf/hr.
- Maximum heat input shall not exceed 36.25 MMBtu/hr.

FGT requests that the permits for Stations 13 (AC67-189220) and 14 (AC20-189438) be amended to indicate the correct horsepower (2700 HP) and that the permits for these stations be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM10)	0.08	0.4	5 lbs/MMscf
Sulfur Dioxide	0.46	20	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.87 lbs/MMscf
Particulate Matter (PM10)	0.08	0.4	3.87 lbs/MMscf
Sulfur Dioxide	0.23	10	7.74 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 16,154 scf/hr.
- Maximum heat input shall not exceed 16.80 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 20,856 scf/hr.
- Maximum heat input shall not exceed 21.69 MMBtu/hr.

FGT requests that the permit for Station 18 (AC48-189456) be amended to indicate the correct horsepower (2700 HP) and that the permit for this station be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.61	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM10)	0.476	2.2	5 lbs/MMscf
Sulfur Dioxide	0.476	2.2	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.95 lbs/MMscf
Particulate Matter (PM10)	0.08	0.4	3.95 lbs/MMscf
Sulfur Dioxide	0.23	1.0	7.90 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 16,311 scf/hr.
- Maximum heat input shall not exceed 16.80 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 20,640 scf/hr.
- Maximum heat input shall not exceed 21.26 MMBtu/hr.

FGT requests that the permit for Station 19 (AC05-189665) be amended to indicate the correct horsepower (2600 HP) and that the permit for this station be modified as follows:

Modify Specific Condition 1 which currently reads

"Maximum allowable emissions from each engine shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	11.0	48.3	2.0 g/bhp-hr
Carbon Monoxide	15.4	67.6	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.4	41.0	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	5 lbs/MMscf
Particulate Matter (PM10)	0.09	0.4	5 lbs/MMscf
Sulfur Dioxide	0.51	2.2	10 gr/100scf

so that it reads

"The maximum allowable emissions from each engine shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	11.0	48.3	1.92 g/bhp-hr
Carbon Monoxide	15.4	67.6	2.69 g/bhp-hr
Volatile Organic Compounds (non methane)	9.4	41.0	1.64 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	3.90 lbs/MMscf
Particulate Matter (PM10)	0.09	0.4	3.90 lbs/MMscf
Sulfur Dioxide	0.25	1.1	7.80 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for these natural gas compressor engines shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 17,718 scf/hr per engine.

- Maximum heat input shall not exceed 36.50 MMBtu/hr for both engines.

so that it reads

"The permitted operating parameters and utilization rates for these natural gas compressor engines shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 22,703 scf/hr per engine.
- Maximum heat input shall not exceed 46.77 MMBtu/hr for both engines.

FGT requests that the permit for Station 15 (AC62-189439) be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 f/bhp-hr
Particulate Matter (TSP)	0.13	0.6	5 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	5 lbs/MMscf
Sulfur Dioxide	0.75	3.3	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp.hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp.hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp.hr
Particulate Matter (TSP)	0.13	0.6	4.23 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	4.23 lbs/MMscf
Sulfur Dioxide	0.38	1.7	8.53 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates

for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 26,154 scf/hr.
- Maximum heat input shall not exceed 27.20 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 30,943 scf/hr.
- Maximum heat input shall not exceed 32.18 MMBtu/hr.

FGT requests that the permit for Station 16 (AC04-189454) be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp.hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp.hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp.hr
Particulate Matter (TSP)	0.13	0.6	5 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	5 lbs/MMscf
Sulfur Dioxide	0.75	3.3	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp.hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp.hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp.hr
Particulate Matter (TSP)	0.13	0.6	3.90 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	3.90 lbs/MMscf
Sulfur Dioxide	0.38	1.7	7.80 gr/100scf

Modify Specific Condition 5 which currently reads

"the permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 26,408 scf/hr.
- Maximum heat input shall not exceed 27.20 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 33,833 scf/hr.
- Maximum heat input shall not exceed 34.85 MMBtu/hr.

FGT requests that the permits for Stations 17 (AC42-189455) and 20 (AC56-189457) be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxide	10.6	46.3	2.0 g/bhp.hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp.hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp.hr
Particulate Matter (TSP)	0.09	0.4	5 lbs/MMscf
Particulate Matter (PM10)	0.09	0.4	5 lbs/MMscf
Sulfur Dioxide	0.49	2.2	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	48.3	2.0 g/bhp.hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp.hr
Volatile Organic Compounds	9.0	39.4	1.7 g/bhp.hr

(non-methane)			
Particulate Matter (TSP)	0.09	0.4	4.13 lbs/MMscf
Particulate Matter (PM10)	0.09	0.4	4.13 lbs/MMscf
Sulfur Dioxide	0.24	1.1	8.27 gr/100scf

Modify Specific Condition in 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 17,010 scf/hr.
- Maximum heat input shall not exceed 17.52 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

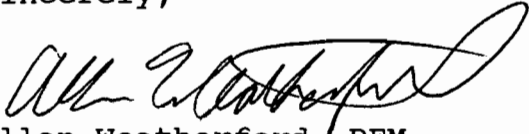
- Maximum natural gas consumption shall not exceed 20,569 scf/hr.
- Maximum heat input shall not exceed 21.19 MMBtu/hr.

Please note that horsepower rating and fuel consumption rates are dependent upon several factors such as engine speed, load, and ambient conditions. Variances in these factors result in changes to horsepower and fuel usage and account for any differences in outputs or ratings that are presented in the attachments.

Also enclosed in an emission inventory for ancillary equipment (small storage tanks, emergency generators, etc) which were not addressed in the construction permit applications. Although the emissions from this equipment is negligible compared to the engines, this emission information has been included to fully address all sources at these compressor stations.

If you have any questions or require additional information, please call me at 407-875-5816.

Sincerely,



Allan Weatherford, REM
Compliance Environmentalist

bc
aw062993

cc: Raymond Young
Duane Pierce
Barry Andrews
Ed Middleswart
Robert Leetch
Chuck Collins
Isadore Goldman
J. Harper, EPA
J. Bunyak, NPS

STATION 12

MILTON, FLORIDA

Station	Model Run Factor	MAXIMUM 1-HR CONCENTRATION (ug/m**3)					Maximum Emission (lb/hr)				
		NOx	CO	VOCs	Particulates	SO2	NOx	CO	VOCs	Particulates	SO2
12 Permitted	3.035	53.416	66.770	26.708	0.425	2.428	17.60	22.00	8.80	0.14	0.80
12 Revised	1.785	32.273	40.341	16.136	0.268	1.446	18.08	22.60	9.04	0.15	0.81

Model Run Factor is maximum 1-hr concentration based on emission of 1 lb/hr.

Maximum 1-hr concentrations calculated as (Model Run Factor) X (Maximum Emission).

*** SCREEN-1.1 MODEL RUN ***
*** VERSION DATED 88300 ***

Station 12--Actual--Simple Terrain, no Downwash

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = POINT
EMISSION RATE (G/S) = .1260
STACK HEIGHT (M) = 18.29
STK INSIDE DIAM (M) = .91
STK EXIT VELOCITY (M/S) = 12.77
STK GAS EXIT TEMP (K) = 530.37
AMBIENT AIR TEMP (K) = 293.00
RECEPTOR HEIGHT (M) = .00
IOPT (1=URB,2=RUR) = 2
BUILDING HEIGHT (M) = .00
MIN HORIZ BLDG DIM (M) = .00
MAX HORIZ BLDG DIM (M) = .00

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	0	.0	.0	.0	.0	.0	.0	
100.	.1890E-01	2	5.0	5.2	1600.0	44.3	19.7	11.4	NO
200.	1.171	3	10.0	10.6	3200.0	30.5	23.9	14.4	NO
MAXIMUM 1-HR CONCENTRATION AT OR BEYOND					1. M:				
313.	1.785	3	10.0	10.6	3200.0	30.5	35.9	21.5	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

*** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	1.785	313.	0.

** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

*** SCREEN-1.1 MODEL RUN ***
*** VERSION DATED 88300 ***

Station 12--Permit--Simple Terrain, no Downwash

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = POINT
EMISSION RATE (G/S) = .1260
STACK HEIGHT (M) = 10.67
STK INSIDE DIAM (M) = .64
STK EXIT VELOCITY (M/S) = 25.95
STK GAS EXIT TEMP (K) = 530.37
AMBIENT AIR TEMP (K) = 293.00
RECEPTOR HEIGHT (M) = .00
IOPT (1=URB,2=RUR) = 2
BUILDING HEIGHT (M) = .00
MIN HORIZ BLDG DIM (M) = .00
MAX HORIZ BLDG DIM (M) = .00

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF .00 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	0	.0	.0	.0	.0	.0	.0	
100.	.3231	3	10.0	10.1	3200.0	24.1	12.7	7.8	NO
200.	2.865	3	10.0	10.1	3200.0	24.1	23.9	14.5	NO
300.	2.893	3	8.0	8.1	2560.0	27.5	34.6	20.9	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:
238. 3.035 3 10.0 10.1 3200.0 24.1 28.1 17.0 NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

*** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	3.035	238.	0.

** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

Air Emissions Estimates for Permitting

Station 12; Milton, FL

	NOX (TPY)	CO (TPY)	NMHC (TPY)	SO2 (TPY)	PM (TPY)
Engines					
Compressor Engine 1	212.5	27.0	8.5	1.8	0.3
Compressor Engine 2	212.5	27.0	8.5	1.8	0.3
Compressor Engine 3	212.5	27.0	8.5	1.8	0.3
Compressor Engine 4	212.5	27.0	8.5	1.8	0.3
Compressor Engine 5	212.5	27.0	8.5	1.8	0.3
Compressor Engine 6	77.3	38.6	96.6	3.5	0.7
Emergency Generator Engine 1	1.9	0.2	0.1	0.0	0.0
Emergency Generator Engine 2	2.1	0.2	0.1	0.1	0.0
Air Compressor Engine 1	0.5	0.0	0.0	0.0	0.0
Tanks					
Oil and Water Separator 1	0.0	0.0	0.9	0.0	0.0
Oil and Water Separator 2	0.0	0.0	0.9	0.0	0.0
Pipeline Condensate Tank 1	0.0	0.0	0.5	0.0	0.0
Waste Oil Storage Tank 1	0.0	0.0	0.0	0.0	0.0
Gasoline Storage Tank 1	0.0	0.0	0.0	0.0	0.0
Diesel Storage Tank 1	0.0	0.0	0.0	0.0	0.0
Lube Oil Storage Tank 1 (de minimus)	0.0	0.0	0.0	0.0	0.0
Lube Oil Storage Tank 2 (de minimus)	0.0	0.0	0.0	0.0	0.0
Lube Oil Rundown Tank 1 (de minimus)	0.0	0.0	0.0	0.0	0.0
Machines					
Parts Cleaning Machine 1	?	?	?	?	?
Parts Cleaning Machine 2	?	?	?	?	?
Paint Cleaning Machine 1	?	?	?	?	?
Blowdowns					
ESD and Maintenance blowdowns	0.0	0.0	1.6	0.0	0.0
Fugitive Emissions					
Valves	?	?	?	?	?
Flanges	?	?	?	?	?
Total Emissions	1144.1	174.2	143.2	12.5	2.2

Engine Emission Calculation Worksheet

Station 12; Milton, FL

Emergency Generator Engine 1

Engine data

Annual use (maximum); hr./yr.	400 hr./yr.
Power; Hp	200 Hp
Power; Btu/hr. (@ 8026 (Btu/hr.)/Hp)	1605200 Btu/hr.
Fuel consumption; scf/hr. (@ 1040 Btu/scf)	1543 scf/hr.

Emissions data

NOx	22.0 g/Hp-hr.
CO	2.0 g/Hp-hr.
NMHC	1.0 g/Hp-hr.
SO2	0.1 grains/scf
PM	5.0 lb/MMscf

Emissions calculations

NOx	1.9 TPY
CO	0.2 TPY
NMHC	0.1 TPY
SO2	0.0 TPY
PM	0.0 TPY

Engine Emission Calculation Worksheet

Station 12; Milton, FL

Emergency Generator Engine 2

Engine data

Annual use (maximum); hr./yr.	400 hr./yr.
Power; Hp	220 Hp
Power; Btu/hr. (@ 8026 (Btu/hr.)/Hp)	1765720 Btu/hr.
Fuel consumption; scf/hr. (@ 1040 Btu/scf)	1698 scf/hr.

Emissions data

NOx	22.0 g/Hp-hr.
CO	2.0 g/Hp-hr.
NMHC	1.0 g/Hp-hr.
SO2	0.1 grains/scf
PM	5.0 lb/MMscf

Emissions calculations

NOx	2.1 TPY
CO	0.2 TPY
NMHC	0.1 TPY
SO2	0.0 TPY
PM	0.0 TPY

Engine Emission Calculation Worksheet

Station 12; Milton, FL

Air Compressor Engine 1

Engine data

Annual use (maximum); hr./yr.	150 hr./yr.
Power; Hp	125 Hp
Power; Btu/hr. (@ 8026 (Btu/hr.)/Hp)	1003250 Btu/hr.
Fuel consumption; scf/hr. (@ 1040 Btu/scf)	965 scf/hr.

Emissions data

NOx	22.0 g/Hp-hr.
CO	2.0 g/Hp-hr.
NMHC	1.0 g/Hp-hr.
SO2	0.1 grains/scf
PM	5.0 lb/MMscf

Emissions calculations

NOx	0.5 TPY
CO	0.0 TPY
NMHC	0.0 TPY
SO2	0.0 TPY *
PM	0.0 TPY

FIXED ROOF TANK VOLATILE ORGANIC COMPOUND EMISSIONS

COMPANY: Florida Gas Transmission Co.

DATE: 5/8/93

LOCATION: Station 12; Milton, FL

CALCULATED USING AP-42, FOURTH EDITION SEP. 85, EQUATIONS 4.3-(1)&(2)

TANK PHYSICAL DATA

TANK IDENTIFICATION NUMBER	Oil and Water Separator 1
EMISSION CONTROLS	None
PERCENT EFFICIENCY	0
TANK PAINT COLOR	Black
TANK DIAMETER (FT), D	10.0
TANK HEIGHT (FT), H	15.0
PAINT FACTOR, Fp	1.58
TANK CAPACITY (BBLs), VB	210
TANK CAPACITY (GALLONS), V	8812
ADJUSTMENT FACTOR FOR DIA., C	0.5

WEATHER DATA

AVG. DAILY TEMP. CHANGE (DEG F), DeltaT	20.0
STORAGE TEMP. (DEG. F)	72.4
AVG. ATM. PRESS. (PSIA), Pa	14.7

PRODUCT PHYSICAL DATA

MATERIAL STORED	Condensate, oil, water
MOLECULAR WEIGHT (#/#MOLE) Mv	53.0
VAPOR PRESS. AT STG. TEMP. (DEG. F), P	2.8
PRODUCT FACTOR, KsubC (CRUDE 0.65, OTHER 1.0)	1.0

THROUGHPUT DATA

DAYS IN SERVICE, Ds	365
VAPOR SPACE HEIGHT (FT), VH	7.5
TANK THROUGHPUT (BBLs FOR DAYS IN SERVICE), TT	150
FILLING RATE (BBLs/HR), FR	85
NUMBER OF TURNOVERS FOR DAYS IN SERVICE, N	0.7
TURNOVER FACTOR, Kn	1

FIXED ROOF TANK BREATHING LOSS, # Lb =
 $0.0226 * Mv * ((P / (Pa - P))^{0.68} * (D^{1.73}) * (VH^{0.51}) * (\Delta T^{0.5}) * Fp * C * Kc * Ds / 365 * (100 - \%eff) / 100$

FIXED ROOF TANK WORKING LOSS, # Lw =
 $0.000024 * Mv * P * V * N * Kn * Kc * (100 - \%eff) / 100$

VOLATILE ORGANIC COMPOUND LOSSES	BREATHING	WORKING	TOTAL
POUNDS FOR DAYS SERVICE =	237.4	22.4	259.8
TONS FOR DAYS SERVICE =	0.1	0.0	0.1
POUNDS PER YEAR =	237.4	22.4	259.8
TONS PER YEAR =	0.1	0.0	0.1
AVERAGE POUNDS PER HOUR =	0.0	0.0	0.0
MAXIMUM POUNDS PER HOUR =	0.1	12.7	12.8

FIXED ROOF TANK VOLATILE ORGANIC COMPOUND EMISSIONS

COMPANY: Florida Gas Transmission Co.

DATE: 5/8/93

LOCATION: Station 12; Milton, FL

CALCULATED USING AP-42, FOURTH EDITION SEP. 85, EQUATIONS 4.3-(1)&(2)

TANK PHYSICAL DATA

TANK IDENTIFICATION NUMBER	Oil and Water Separator 2
EMISSION CONTROLS	None
PERCENT EFFICIENCY	0
TANK PAINT COLOR	Black
TANK DIAMETER (FT), D	10.0
TANK HEIGHT (FT), H	15.0
PAINT FACTOR, Fp	1.58
TANK CAPACITY (BBLs), VB	210
TANK CAPACITY (GALLONS), V	8812
ADJUSTMENT FACTOR FOR DIA., C	0.5

WEATHER DATA

AVG. DAILY TEMP. CHANGE (DEG F), DeltaT	20.0
STORAGE TEMP. (DEG. F)	72.4
AVG. ATM. PRESS. (PSIA), Pa	14.7

PRODUCT PHYSICAL DATA

MATERIAL STORED	Condensate, oil, water
MOLECULAR WEIGHT (#/#MOLE) Mv	53.0
VAPOR PRESS. AT STG. TEMP. (DEG. F), P	2.8
PRODUCT FACTOR, KsubC (CRUDE 0.65, OTHER 1.0)	1.0

THROUGHPUT DATA

DAYS IN SERVICE, Ds	365
VAPOR SPACE HEIGHT (FT), VH	7.5
TANK THROUGHPUT (BBLs FOR DAYS IN SERVICE), TT	3000
FILLING RATE (BBLs/HR), FR	85
NUMBER OF TURNOVERS FOR DAYS IN SERVICE, N	14.3
TURNOVER FACTOR, Kn	1

FIXED ROOF TANK BREATHING LOSS, # Lb =
 $0.0226 * Mv * ((P / (Pa - P))^{0.68}) * (D^{1.73}) * (VH^{0.51}) * (\Delta T^{0.5}) * Fp * C * Kc * Ds / 365 * (100 - \%eff) / 100$

FIXED ROOF TANK WORKING LOSS, # Lw =
 $0.000024 * Mv * P * V * N * Kn * Kc * (100 - \%eff) / 100$

VOLATILE ORGANIC COMPOUND LOSSES	BREATHING	WORKING	TOTAL
POUNDS FOR DAYS SERVICE =	237.4	448.8	686.2
TONS FOR DAYS SERVICE =	0.1	0.2	0.3
POUNDS PER YEAR =	237.4	448.8	686.2
TONS PER YEAR =	0.1	0.2	0.3
AVERAGE POUNDS PER HOUR =	0.0	0.1	0.1
MAXIMUM POUNDS PER HOUR =	0.1	12.7	12.8

FIXED ROOF TANK VOLATILE ORGANIC COMPOUND EMISSIONS

COMPANY: Florida Gas Transmission Co.

DATE: 5/8/93

LOCATION: Station 12; Milton, FL

CALCULATED USING AP-42, FOURTH EDITION SEP. 85, EQUATIONS 4.3-(1)&(2)

TANK PHYSICAL DATA

TANK IDENTIFICATION NUMBER	Condensate 1
EMISSION CONTROLS	None
PERCENT EFFICIENCY	0
TANK PAINT COLOR	Black
TANK DIAMETER (FT), D	10.0
TANK HEIGHT (FT), H	15.0
PAINT FACTOR, Fp	1.58
TANK CAPACITY (BBLS), VB	210
TANK CAPACITY (GALLONS), V	8812
ADJUSTMENT FACTOR FOR DIA., C	0.5

WEATHER DATA

AVG. DAILY TEMP. CHANGE (DEG F), DeltaT	20.0
STORAGE TEMP. (DEG. F)	72.4
AVG. ATM. PRESS. (PSIA), Pa	14.7

PRODUCT PHYSICAL DATA

MATERIAL STORED	Condensate
MOLECULAR WEIGHT (##MOLE) Mv	53.0
VAPOR PRESS. AT STG. TEMP. (DEG. F), P	2.8
PRODUCT FACTOR, KsubC (CRUDE 0.65, OTHER 1.0)	1.0

THROUGHPUT DATA

DAYS IN SERVICE, Ds	365
VAPOR SPACE HEIGHT (FT), VH	7.5
TANK THROUGHPUT (BBLS FOR DAYS IN SERVICE), TT	50
FILLING RATE (BBLS/HR), FR	85
NUMBER OF TURNS FOR DAYS IN SERVICE, N	0.2
TURNOVER FACTOR, Kn	1

FIXED ROOF TANK BREATHING LOSS, # Lb =
 $0.0226 * Mv * ((P / (Pa - P))^{0.68}) * (D^{1.73}) * (VH^{0.51}) * (\Delta T^{0.5}) * Fp * C * Kc * Ds / 365 * (100 - \%eff) / 100$

FIXED ROOF TANK WORKING LOSS, # Lw =
 $0.000024 * Mv * P * V * N * Kn * Kc * (100 - \%eff) / 100$

VOLATILE ORGANIC COMPOUND LOSSES	BREATHING	WORKING	TOTAL
POUNDS FOR DAYS SERVICE =	237.4	7.5	244.9
TONS FOR DAYS SERVICE =	0.1	0.0	0.1
POUNDS PER YEAR =	237.4	7.5	244.9
TONS PER YEAR =	0.1	0.0	<u>0.1</u>
AVERAGE POUNDS PER HOUR =	0.0	0.0	0.0
MAXIMUM POUNDS PER HOUR =	0.1	12.7	12.8

FIXED ROOF TANK VOLATILE ORGANIC COMPOUND EMISSIONS

COMPANY: Florida Gas Transmission Co.

DATE: 5/8/93

LOCATION: Station 12; Milton, FL

CALCULATED USING AP-42, FOURTH EDITION SEP. 85, EQUATIONS 4.3-(1)&(2)

TANK PHYSICAL DATA

TANK IDENTIFICATION NUMBER	Waste Oil 1
EMISSION CONTROLS	None
PERCENT EFFICIENCY	0
TANK PAINT COLOR	Black
TANK DIAMETER (FT), D	8.0
TANK HEIGHT (FT), H	10.0
PAINT FACTOR, Fp	1.58
TANK CAPACITY (BBLs), VB	90
TANK CAPACITY (GALLONS), V	3760
ADJUSTMENT FACTOR FOR DIA., C	0.4

WEATHER DATA

AVG. DAILY TEMP. CHANGE (DEG F), DeltaT	20.0
STORAGE TEMP. (DEG. F)	72.4
AVG. ATM. PRESS. (PSIA), Pa	14.7

PRODUCT PHYSICAL DATA

MATERIAL STORED	Waste oil
MOLECULAR WEIGHT (##MOLE) Mv	190.0
VAPOR PRESS. AT STG. TEMP. (DEG. F), P	0.0019
PRODUCT FACTOR, KsubC (CRUDE 0.65, OTHER 1.0)	1.0

THROUGHPUT DATA

DAYS IN SERVICE, Ds	365
VAPOR SPACE HEIGHT (FT), VH	7.5
TANK THROUGHPUT (BBLs FOR DAYS IN SERVICE), TT	300
FILLING RATE (BBLs/HR), FR	85
NUMBER OF TURNS FOR DAYS IN SERVICE, N	3.4
TURNOVER FACTOR, Kn	1

FIXED ROOF TANK BREATHING LOSS, # Lb =
 $0.0226 * Mv * ((P / (Pa - P))^{0.68}) * (D^{1.73}) * (VH^{0.51}) * (\Delta T^{0.5}) * Fp * C * Kc * Ds / 365 * (100 - \%eff) / 100$

FIXED ROOF TANK WORKING LOSS, # Lw =
 $0.000024 * Mv * P * V * N * Kn * Kc * (100 - \%eff) / 100$

VOLATILE ORGANIC COMPOUND LOSSES	BREATHING	WORKING	TOTAL
POUNDS FOR DAYS SERVICE =	2.8	0.1	2.9
TONS FOR DAYS SERVICE =	0.0	0.0	0.0
POUNDS PER YEAR =	2.8	0.1	2.9
TONS PER YEAR =	0.0	0.0	0.0
AVERAGE POUNDS PER HOUR =	0.0	0.0	0.0
MAXIMUM POUNDS PER HOUR =	0.0	0.0	0.0

Calculation of annual HC emissions from blowdowns
(for a typical station)

unmetered gas released (due to blowdowns)	300 Mscf/mo.
unmetered gas released (due to blowdowns)	3.6 MMscf/yr.
unmetered gas released (due to blowdowns) (@21.98 scf/lb)	0.16 MMlb/yr.
unmetered gas released (due to blowdowns) (@21.98 scf/lb)	81.89 TPY
VOCs released (due to blowdowns) (@2% VOCs)	1.64 TPY

FGTC COMPRESSOR STATION 12
CURRENT INVENTORY

UNIT	Included in Most Recent Operating Permit As	Required to be in Title V Operating Permit	In Compliance with Current Regulations	Information Required For New Permit Application
COOP. LS-8-SG	Engine 1	X	Yes	None
COOP. LS-8-SG	Engine 2	X	Yes	None
COOP. LS-8-SG	Engine 3	X	Yes	None
COOP. LS-8-SG	Engine 4	X	Yes	None
COOP. LS-8-SG	Engine 5	X	Yes	None
DR 10 TCV	Engine 6	X	Yes	None
Emergency Generator # 1	Omitted	X	No	Horsepower, Serial number, Stack temp, BTU/HP*HR, Emission rates for NOx, CO, NM-NE HC, SO2, and PM
Emergency Generator # 2	Omitted	X	No	Serial Number, Stack temp, BTU/HP*HR, Emission rates for NOx, CO, NM-NE HC, SO2, and PM
Air Compressor # 1	Omitted	X	No	Model, Stack Parameters, Emission rates for NOx, CO, NM-NE HC, SO2, and PM
Oil and Water Sep. # 1	Omitted	X	No	Emission rate for NM-NE HC, Throughput, Fill rate
Oil and Water Sep. # 2	Omitted	X	No	Emission rate for NM-NE HC, Throughput, Fill rate
Waste Oil Stor. # 1	Omitted	X	No	Emission rate for NM-NE HC, Throughput, Fill rate
Pipeline Condensate # 1	Omitted	X	No	Emission rate for NM-NE HC, Throughput, Fill rate
Lube Oil Storage # 1	Omitted	X	No	Orientation, Throughput, Emission rate for NM-NE HC, Tank dimensions, Vent data, Fill rate
Lube Oil Storage # 2	Omitted	X	No	Orientation, Throughput, Emission rate for NM-NE HC, Tank dimensions, Vent data, Fill rate
Lube Oil Rundown # 1	Omitted	X	No	Orientation, Throughput, Emission rate for NM-NE HC, Tank dimensions, Vent data, Fill rate
Gasoline Tank # 1	Omitted	X	No	Tank Dimensions, Fill rate, Emission rate for VOC's
Diesel Tank # 1	Omitted	X	No	Tank Dimensions, Fill rate, Emission rate for VOC's
Part Cleaner # 1	Omitted	X	No	Emission rate for VOC's
Part Cleaner # 2	Omitted	X	No	Emission rate for VOC's
Paint Cleaner # 1	Omitted	X	No	Emission rate for VOC's
ESD & Blowdown Stacks	Omitted	X	No	Emission rates, Volume B/D, Stack Info

ESD stack:
11 ft, 10" dia
Comp. stacks:
8 ft, 12" dia

FL
 NATURAL GAS COMPRESSION FACILITY
 STATION 12
 MILTON, FLORIDA

PURPOSE OF ENGINES: THE ENGINES ACT AS PRIME MOVERS FOR THE NATURAL GAS COMPRESSORS

EMISSION SOURCE	CURRENT PERMIT STATUS	SOURCE ID	SERIAL NUMBER	HP	BTU/HP*HR	PERMIT EMISSION RATES (TPY)				PM
						NOX	NMHC	CO	SO2	
ENGINE # 1	PERMITTED UNIT	_____	5829	2000	6200	212.5	8.5	27	1.79	0.31
ENGINE # 2	PERMITTED UNIT	_____	5830	2000	6200	212.5	8.5	27	1.79	0.31
ENGINE # 3	PERMITTED UNIT	_____	5831	2000	6200	212.5	8.5	27	1.79	0.31
ENGINE # 4	PERMITTED UNIT	_____	7018	2000	6200	212.5	8.5	27	1.79	0.31
ENGINE # 5	PERMITTED UNIT	_____	7052	2000	6200	212.5	8.5	27	1.79	0.31
ENGINE # 6	PERMITTED UNIT	_____	10TCV112AP	4000	7300	77.3	38.6	96.6	3.5	0.68
						1140	81	232	12	2

Phase I Station Characteristics

02-Jun-92
CS12.WK1

Compressor Station: Number 12
 Name: Milton
 County: Santa Rosa
 Nearest City: Munson
 Compressor Supervisor: Duwood Mulford
 Mailing Address: Route 1, Box 146
 Milton, Florida 32570-9740
 Telephone: 904-957-4221
 Latitude: 30-54-42
 Longitude: 86-53-12
 UTM Zone: 16
 UTM Easting: 510.83 km
 UTM Northing: 3,419.63 km
 Elevation (ft): 180

Phase I Engine Characteristics

Engine Identification	1	2	3	4	5
Permit Number	A057-19/323	← same	← same	← same	← same
Serial Number	5829	5830	5831	7018	7052
Operating Time					
Hours/Day	24	24	24	24	24
Days/Week	7	7	7	7	7
Weeks/Year	52	52	52	52	52
Engine Type	Recip	Recip	Recip	Recip	Recip
Date of Installation	1958	1958	1958	1966	1968
Engine Make	Cooper	Cooper	Cooper	Cooper	Cooper
Engine Model	LS-8-SG	LS-8-SG	LS-8-SG	LS-8-SG	LS-8-SG
Horsepower Rating	2000	2000	2000	2000	2000
Air Charging	Turbo.	Turbo.	Turbo.	Turbo.	Turbo.
Exhaust Temperature (F)	875	875	875	875	875
Mass Flow Rate (lbs/hr) (a)	21000	21000	21000	21000	21000
Volumetric Flow Rate (acfm)	11760	11760	11760	11760	11760
Volumetric Flow Rate (dscfm)	4279	4279	4279	4279	4279
Exit Velocity (af/s)	154.5	154.5	154.5	154.5	154.5
Water Vapor Content (%)	8	8	8	8	8
Ave. Fuel Consumption (MMCF/Hr) (b)	0.0143	0.0143	0.0143	0.0143	0.0143
Max. Fuel Consumption (MMCF/Hr) (b)	0.0143	0.0143	0.0143	0.0143	0.0143
Specific Fuel Consump. (BTU/bhp-hr)	6200	6200	6200	6200	6200
Maximum Heat Input (MMBTU/Hr)	15	15	15	15	15
Stack Height (ft)	26.42	26.42	26.42	26.42	26.42
Stack Diameter (in)	15.25	15.25	15.25	15.25	15.25
Stack to Building Offset (ft)	17.00	17.00	17.00	17.00	17.00
Building Height (ft) (c)	OK → 32.42	← (same)	←	←	←
Building Length (ft) (c)	225.00 - 180.00	←	←	←	←
Building Width (ft) (c)	53.00 - 55.00	←	←	←	←

Phase I Fuel Characteristics

Fuel Type	N.G.	N.G.	N.G.	N.G.	N.G.
Heating Value (BTU/CF)	1050	1050	1050	1050	1050
Heat Capacity (BTU/lb)	23077	23077	23077	23077	23077
Density (lb/cubic ft)	0.0455	0.0455	0.0455	0.0455	0.0455
Percent Sulfur (%) (d)	0.031	0.031	0.031	0.031	0.031
Percent Ash (%)	N/A	N/A	N/A	N/A	N/A

Phase I Emissions Rates by Engine for Station 12

Engine Identification	1	2	3	4	5
Grams/BHP-Hour					
NOX	11.000	11.000	11.000	11.000	11.000
CO	1.400	1.400	1.400	1.400	1.400
NMHC	0.440	0.440	0.440	0.440	0.440
SO2 (e)	0.093	0.093	0.093	0.093	0.093
PM (f)	0.016	0.016	0.016	0.016	0.016
Pounds/Hour					
NOX	48.51	48.51	48.51	48.51	48.51
CO	6.17	6.17	6.17	6.17	6.17
NMHC	1.94	1.94	1.94	1.94	1.94
SO2	0.41	0.41	0.41	0.41	0.41
PM	0.07	0.07	0.07	0.07	0.07
Tons/Year					
NOX	212.47	212.47	212.47	212.47	212.47
CO	27.04	27.04	27.04	27.04	27.04
NMHC	8.50	8.50	8.50	8.50	8.50
SO2	1.79	1.79	1.79	1.79	1.79
PM	0.31	0.31	0.31	0.31	0.31

Phase I Emissions Rates for Total Station

Grams/BHP-Hour	
NOX	11.000
CO	1.400
NMHC	0.440
SO2	0.093
PM	0.016
Pounds/Hour	
NOX	242.55
CO	30.87
NMHC	9.70
SO2	2.04
PM	0.36
Tons/Year	
NOX	1062.37
CO	135.21
NMHC	42.49
SO2	8.94
PM	1.57

SOURCE CLACIFICATION WITH RESPECT TO PSD

MAJOR SOURCE

Notes:

- (a) Wet mass flow (@ 60 F, 14.7 psi).
- (b) Based on heating value of fuel gas.
- (c) All engines enclosed in one building.
- (d) Percent by weight.
- (e) Based on 10 grains/SCF.
- (f) Based AP-42 factor of 5 lbs/MMSCF.

Phase II Station Characteristics

02-Jun-92
CS12.WK1

Compressor Station: Number 12
 Name: Milton
 County: Santa Rosa
 Nearest City: Munson
 Compressor Supervisor: Duwood Mulford
 Mailing Address: Route 1, Box 146
 Milton, Florida 32570-9740
 Telephone: 904-957-4221
 Latitude: 30-54-42
 Longitude: 86-53-12
 UTM Zone: 16
 UTM Easting: 510.83 km
 UTM Northing: 3,419.63 km
 Elevation (ft): 180

Phase II Engine Characteristics

Engine Identification	6
Permit Number	AC57-188069
Serial Number	10TCV112AP
Operating Time	
Hours/Day	24
Days/Week	7
Weeks/Year	52
Engine Type	Recip
Date of Installation	1991
Engine Make	Dresser-Rand
Engine Model	10 TCV
Horsepower Rating	4000 4100
Air Charging	Turbo.
Exhaust Temperature (F)	495
Mass Flow Rate (lbs/hr) (a)	87514
Volumetric Flow Rate (acfm)	35820
Volumetric Flow Rate (dscfm)	17763
Exit Velocity (af/s)	84.46
Water Vapor Content (%)	8
Ave. Fuel Consumption (MMCF/Hr) (b)	0.0278
Max. Fuel Consumption (MMCF/Hr) (b)	0.0278
Specific Fuel Consump. (BTU/bhp-hr)	7300
Maximum Heat Input (MMBTU/Hr)	29.2
Stack Height (ft)	60
Stack Diameter (in)	36
Stack to Building Offset (ft)	17.00
Building Height (ft) (c)	ok 32.42
Building Length (ft) (c)	225.00 220.00
Building Width (ft) (c)	53.00 55.00

Phase II Fuel Characteristics

Fuel Type	N.G.
Heating Value (BTU/CF)	1050
Heat Capacity (BTU/lb)	23077
Density (lb/cubic ft)	0.0455
Percent Sulfur (%) (d)	0.031
Percent Ash (%)	N/A

Phase II Emissions Rates by Engine for Station 12
Engine Identification 6

Grams/BHP-Hour		
	NOX	2.000
	CO	2.500
	NMHC	1.000
	SO2 (e)	0.090
	PM (f)	0.018
Pounds/Hour		
	NOX	17.64
	CO	22.05
	NMHC	8.82
	SO2	0.79
	PM	0.15
Tons/Year		
	NOX	77.26
	CO	96.58
	NMHC	38.63
	SO2	3.48
	PM	0.68

Phase II Emissions Rates for Total Station

Grams/BHP-Hour		
	NOX	8.428
	CO	1.714
	NMHC	0.600
	SO2	0.092
	PM	0.017
Pounds/Hour		
	NOX	260.19
	CO	52.92
	NMHC	18.52
	SO2	2.84
	PM	0.51
Tons/Year		
	NOX	1139.63
	CO	231.79
	NMHC	81.13
	SO2	12.42
	PM	2.24

SOURCE CLACIFICATION WITH RESPECT TO PSD

MAJOR SOURCE

Notes:

- (a) Wet mass flow (@ 60 F, 14.7 psi).
- (b) Based on heating value of fuel gas.
- (c) All engines enclosed in one building.
- (d) Percent by weight.
- (e) Based on 10 grains/SCF.
- (f) Based AP-42 factor of 5 lbs/MMSCF.

C
NATURAL GAS COMPRESSION FACILITY
STATION 12
MILTON, FLORIDA

PURPOSE OF EMERGENCY GENERATOR: THE EMERGENCY GENERATOR USED IN THE CASES OF POWER FAILURE

PURPOSE OF AIR COMPRESSOR: TO PROVIDE AIR FOR TIRES, ETC...

EMISSION SOURCE	CURRENT PERMIT STATUS	SOURCE ID	SERIAL NUMBER	HP	BTU/HP*HR	PERMIT EMISSION RATES (TPY)				
						NOX	NMHC	CO	SO2	PM
EMERGENCY GENERATOR # 1	NOT PERMITTED									
EMERGENCY GENERATOR # 2	NOT PERMITTED			220						
AIR COMPRESSOR # 1	NOT PERMITTED			125						
						0	0	0	0	0

FLORIDA GAS TRANSMISSION COMPANY
COMPRESSOR STATION EMISSIONS QUESTIONAIRE
STATION No. 12

GENERATORS SETS

UNIT NUMBER 1 108559	
Installed	EXISTING
Permitted	YES
Internal Combustion Engine	YES
If Int. Comb. Engine, Is Catalytic Converter present	NO
Manufacturer	Waukesha
Model	6-WAK
Actual Maximum Hours of Operation (Hr / Year)	35
If Internal Combustion Engine Complete the following information:	
Type of Fuel Used	N.G.
BTU Rating (MMBTU/HR)	
Horse Power Rating	200 125 KVA
Stack Height Above Grade (ft)	9.5
Stack Diameter (inch)	6 4 horiz
Location of Stack(s)	Southeast side of Aux. Bldg.
Stack Temperature (F)	500 °F

UNIT NUMBER 2 25176940	
Installed	PHASE II
Permitted	YES
Internal Combustion Engine	YES
If Int. Comb. Engine, Is Catalytic Converter present	NO
Manufacturer	Cummins
Model	G855
Actual Maximum Hours of Operation (Hr / Year)	0
If Internal Combustion Engine Complete the following information:	
Type of Fuel Used	N.G.
BTU Rating (MMBTU/HR)	
Horse Power Rating	220 (125 KVA)
Stack Height Above Grade (ft)	8'-7"
Stack Diameter (inch)	6 horiz
Location of Stack(s)	East side of Aux. Bldg.
Stack Temperature (F)	270 °F

FLORIDA GAS TRANSMISSION COMPANY
COMPRESSOR STATION EMISSIONS QUESTIONNAIRE
STATION No. 12

OTHER SOURCES

~~55204~~ 55201

Unit No. 1	EXISTING
Permitted	
Purpose of Unit	Auxiliary Air Compressor
Type	CU-211 Nat. gas 6 cyl
Manufacturer	International
Model	CU-211
Size (BTU ,or HP ,or Kw)	125 HP
Fuel Used (if applicable)	N.G.
Stack Parameters (ft)	2" , 15' , vert.

150 hrs / yr

C
 NATURAL GAS COMPRESSION FACILITY
 STATION 12
 MILTON, FLORIDA

PURPOSE OF OIL/WATER SEPARATOR TANKS: TO SEPARATE AN OIL AND WATER MIXTURE IN ORDER TO REUSE THE WATER.

PURPOSE OF WASTE OIL TANK: TO STORE EXCESS OIL COLLECTED IN COMPRESSOR STATION PROCESSES.

PURPOSE OF PIPELINE CONDENSATE TANK: TO STORE LIGHT HYDROCARBON LIQUID OBTAINED BY CONDENSATION OF HYDROCARBON VAPORS.

PURPOSE OF LUBE OIL STORAGE TANKS: TO STORE LUBE OIL USED FOR ENGINE OPERATIONS.

PURPOSE OF THE LUBE OIL RUNDOWN TANK: TO CAPTURE EXCESS LUBE OIL FROM ENGINE OPERATIONS.

PURPOSE OF GAS & DIESEL TANKS: TO STORE FUEL FOR EQUIPMENT USAGE.

VESSEL	PERMIT STATUS	SOURCE ID	CAPACITY (GAL)	PERMIT FUGITIVE EMISSION RATES (TPY) NMHC
OIL/WATER SEPARATOR # 1	NOT PERMITTED		8820	
OIL/WATER SEPARATOR # 2	NOT PERMITTED		8820	
WASTE OIL TANK # 1	NOT PERMITTED		8820	
PIPELINE CONDENSATE # 1	NOT PERMITTED		8820	
LUBE OIL STORAGE # 1	NOT PERMITTED		10000	
LUBE OIL STORAGE # 2	NOT PERMITTED		3000	
LUBE OIL RUNDOWN TANK # 1	NOT PERMITTED		700	
GASOLINE TANK # 1	NOT PERMITTED		350	
DIESEL TANK # 1	NOT PERMITTED		350	

Complete
7/16/93 Corrected Copy

June 29, 1993

VIA FEDERAL EXPRESS
(overnight delivery)

Mr. Clair Fancy, P.E.
Chief, Bureau of Air Regulation
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Fancy:

**RE: Request for Amendments and Extensions to Air
Construction Permits**

Permit No. AC57-188869
Florida Gas Transmission Company, Station 12
Munson, Santa Rosa County, Florida

Permit No. AC67-189220
Florida Gas Transmission Company, Station 13
Caryville, Washington County, Florida

Permit No. AC20-189438
Florida Gas Transmission Company, Station 14
Quincy, Gadsden County, Florida

Permit No. AC62-189439
Florida Gas Transmission Company, Station 15
Perry, Taylor County, Florida

Permit No. AC04-189454
Florida Gas Transmission Company, Station 16
Brooker, Bradford County, Florida

Permit No. AC42-189455
Florida Gas Transmission Company, Station 17
Salt Springs, Marion County, Florida

Permit No. AC48-189456
Florida Gas Transmission Company, Station 18
Orlando, Orange County, Florida

Permit No. AC05-189665
Florida Gas Transmission Company, Station 19
Melbourne, Brevard County, Florida

Permit No. AC56-189457
Florida Gas Transmission Company, Station 20
Ft. Pierce, St. Lucie County, Florida

On May 27, 1993, Florida Gas Transmission Company (FGT) submitted Certificates of Completion of Construction to the appropriate district offices to obtain operating permits for the Phase II engine additions addressed in this letter. In preparing the applications, I noted that for some compressor stations, engines which were slightly larger than that proposed in the construction permit applications have been installed.

To resolve this situation, FGT requests that those permits for stations in which larger engines (increased horsepower) than permitted be amended to include the correct horsepower, fuel consumption and heat input. In addition, FGT requests that the remaining permits (those for which there have been no changes in horsepower) be amended to include fuel consumption levels and heat inputs which are more realistic based on our compliance testing. In most cases it was observed that the fuel consumption levels provided by the manufacturer were exceeded during compliance testing.

Because the construction permits for the referenced compressor engines are soon to expire (June 30, 1993), FGT is requesting that the construction permits be extended until September 30, 1993 to provide ample time to process the requested changes to the construction permits and obtain the operating permits.

FGT has enclosed a check for \$2,250.00 to cover the cost of these permitting actions. Please note that FGT is not requesting that any emissions limitations be increased for any of the compressor stations. Even though the horsepower was increased from what was originally permitted at some stations, the actual emissions determined from the compliance testing were well below permitted levels.

Specifically, horsepower increases have occurred at Stations 12 (4100 HP instead of 4000 HP), 13, 14, and 18 (2700 HP instead of 2400 HP), and 19 (2600 HP instead of 2500 HP). In most cases the higher potential emission rates do not result in higher ambient concentrations since the compressor engines were equipped with higher stack heights than that proposed in the construction permit applications. For cases in which the increased potential emission rates due to changes in horsepower resulted in higher ambient concentrations, the concentrations still remained well below any ambient air quality standards. A summary of the screening modeling conducted for each station has been provided for your review. Again this modeling was based on the increased potential to emit. FGT is not requesting that permitted emissions limitations be increased.

FGT requests that the permit for Station 12 (AC57-188869) be amended to indicate the correct horsepower (4100 HP) and that the permit for this station be modified as follows:

Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.1	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.14	0.61	5 lbs/MMscf
Particulate Matter (PM10)	0.14	0.61	5 lbs/MMscf
Sulfur Dioxide	0.8	3.5	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	1.95 g/bhp-hr
Carbon Monoxide	22.1	96.6	2.44 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	0.97 g/bhp-hr
Particulate Matter (TSP)	0.14	0.61	4.03 lbs/MMscf
Particulate Matter (PM10)	0.14	0.61	4.03 lbs/MMscf
Sulfur Dioxide	0.4	1.8	8.06 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 27,810 scf/hr.
- Maximum heat input shall not exceed 29.20 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 34,525 scf/hr.
- Maximum heat input shall not exceed 36.25 MMBtu/hr.

FGT requests that the permits for Stations 13 (AC67-189220) and 14 (AC20-189438) be amended to indicate the correct horsepower (2700 HP) and that the permits for these stations be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM10)	0.08	0.4	5 lbs/MMscf
Sulfur Dioxide	0.46	2.0	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.87 lbs/MMscf
Particulate Matter (PM10)	0.08	0.4	3.87 lbs/MMscf
Sulfur Dioxide	0.23	7.0	7.74 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 16,154 scf/hr.
- Maximum heat input shall not exceed 16.80 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 20,856 scf/hr.
- Maximum heat input shall not exceed 21.69 MMBtu/hr.

FGT requests that the permit for Station 18 (AC48-189456) be amended to indicate the correct horsepower (2700 HP) and that the permit for this station be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.61	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM10)	0.08	0.4	5 lbs/MMscf
Sulfur Dioxide	0.476	2.2	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.95 lbs/MMscf
Particulate Matter (PM10)	0.08	0.4	3.95 lbs/MMscf
Sulfur Dioxide	0.23	1.0	7.90 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed

- 16,311 scf/hr.
- Maximum heat input shall not exceed 16.80 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 20,640 scf/hr.
- Maximum heat input shall not exceed 21.26 MMBtu/hr.

FGT requests that the permit for Station 19 (AC05-189665) be amended to indicate the correct horsepower (2600 HP) and that the permit for this station be modified as follows:

Modify Specific Condition 1 which currently reads

"Maximum allowable emissions from each engine shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	11.0	48.3	2.0 g/bhp-hr
Carbon Monoxide	15.4	67.6	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.4	41.0	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	5 lbs/MMscf
Particulate Matter (PM10)	0.09	0.4	5 lbs/MMscf
Sulfur Dioxide	0.51	2.2	10 gr/100scf

so that it reads

"The maximum allowable emissions from each engine shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	11.0	48.3	1.92 g/bhp-hr
Carbon Monoxide	15.4	67.6	2.69 g/bhp-hr
Volatile Organic Compounds (non methane)	9.4	41.0	1.64 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	3.90 lbs/MMscf
Particulate Matter (PM10)	0.09	0.4	3.90 lbs/MMscf
Sulfur Dioxide	0.25	1.1	7.80 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for these natural gas compressor engines shall not

exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 17,718 scf/hr per engine.
- Maximum heat input shall not exceed 36.50 MMBtu/hr for both engines.

so that it reads

"The permitted operating parameters and utilization rates for these natural gas compressor engines shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 22,703 scf/hr per engine.
- Maximum heat input shall not exceed 46.77 MMBtu/hr for both engines.

FGT requests that the permit for Station 15 (AC62-189439) be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	5 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	5 lbs/MMscf
Sulfur Dioxide	0.75	3.3	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	4.23 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	4.23 lbs/MMscf
Sulfur Dioxide	0.38	1.7	8.53 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 26,154 scf/hr.
- Maximum heat input shall not exceed 27.20 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 30,943 scf/hr.
- Maximum heat input shall not exceed 32.18 MMBtu/hr.

FGT requests that the permit for Station 16 (AC04-189454) be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	5 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	5 lbs/MMscf
Sulfur Dioxide	0.75	3.3	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr

Particulate Matter (TSP)	0.13	0.6	3.90 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	3.90 lbs/MMscf
Sulfur Dioxide	0.38	1.7	7.80 gr/100scf

Modify Specific Condition 5 which currently reads

"the permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 26,408 scf/hr.
- Maximum heat input shall not exceed 27.20 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 33,833 scf/hr.
- Maximum heat input shall not exceed 34.85 MMBtu/hr.

FGT requests that the permits for Stations 17 (AC42-189455) and 20 (AC56-189457) be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxide	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	5 lbs/MMscf
Particulate Matter (PM10)	0.09	0.4	5 lbs/MMscf
Sulfur Dioxide	0.49	2.2	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	48.3	2.0 g/bhp-hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	4.13 lbs/MMscf
Particulate Matter (PM10)	0.09	0.4	4.13 lbs/MMscf
Sulfur Dioxide	0.24	1.1	8.27 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 17,010 scf/hr.
- Maximum heat input shall not exceed 17.52 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 20,569 scf/hr.
- Maximum heat input shall not exceed 21.19 MMBtu/hr.

Please note that horsepower rating and fuel consumption rates are dependent upon several factors such as engine speed, load, and ambient conditions. Variances in these factors result in changes to horsepower and fuel usage and account for any differences in outputs or ratings that are presented in the attachments.

Also enclosed is an emission inventory for ancillary equipment (small storage tanks, emergency generators, etc) which were not addressed in the construction permit applications. Although the emissions from this equipment is negligible compared to the engines, this emission information has been included to fully address all sources at these compressor stations.

If you have any questions or require additional information, please call me at 407-875-5816.

Sincerely,

Allan Weatherford, REM
Compliance Environmentalist

tp and bc
aw062993

cc: Raymond Young
Duane Pierce
Barry Andrews
Ed Middleswart
Robert Leetch
Chuck Collins
Isadore Goldman

On May 27, 1993, Florida Gas Transmission Company (FGT) submitted Certificates of Completion of Construction to the appropriate district offices to obtain operating permits for the Phase II engine additions addressed in this letter. In preparing the applications, I noted that for some compressor stations, engines which were slightly larger than that proposed in the construction permit applications have been installed.

To resolve this situation, FGT requests that those permits for stations in which larger engines (increased horsepower) than permitted be amended to include the correct horsepower, fuel consumption and heat input. In addition, FGT requests that the remaining permits (those for which there have been no changes in horsepower) be amended to include fuel consumption levels and heat inputs which are more realistic based on our compliance testing. In most cases it was observed that the fuel consumption levels provided by the manufacturer were exceeded during compliance testing.

Because the construction permits for the referenced compressor engines are soon to expire (June 30, 1993), FGT is requesting that the construction permits be extended until September 30, 1993 to provide ample time to process the requested changes to the construction permits and obtain the operating permits.

FGT has enclosed a check for \$2,250.00 to cover the cost of these permitting actions. Please note that FGT is not requesting that any emissions limitations be increased for any of the compressor stations. Even though the horsepower was increased from what was originally permitted at some stations, the actual emissions determined from the compliance testing were well below permitted levels.

Specifically, horsepower increases have occurred at Station^S 12 (4100 HP instead of 4000 HP), 13, 14, and 18 (2700 HP instead of 2400 HP), and 19 (2600 HP instead of 2500 HP). In most cases the higher potential emission rates do not result in higher ambient concentrations since the compressor engines were equipped with higher stack heights than that proposed in the construction permit applications. For cases in which the increased potential emission rates due to changes in horsepower resulted in higher ambient concentrations, the concentrations still remained well below any ambient air quality standards. A summary of the screening modeling conducted for each station has been provided for your review. Again this modeling was based on the increased potential to emit. FGT is not requesting that permitted emissions limitations be increased.

- Maximum natural gas consumption shall not exceed 34,525 scf/hr.
- Maximum heat input shall not exceed 36.25 MMBtu/hr.

FGT requests that the permits for Stations 13 (AC67-189220) and 14 (AC20-189438) be amended to indicate the correct horsepower (2700 HP) and that the permits for these stations be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM10)	0.08	0.4	5 lbs/MMscf
Sulfur Dioxide	0.46	20 2.0	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.87 lbs/MMscf
Particulate Matter (PM10)	0.08	0.4	3.87 lbs/MMscf
Sulfur Dioxide	0.23	10 1.0	7.74 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 16,154 scf/hr.
- Maximum heat input shall not exceed 16.80 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 20,856 scf/hr.
- Maximum heat input shall not exceed 21.69 MMBtu/hr.

FGT requests that the permit for Station 18 (AC48-189456) be amended to indicate the correct horsepower (2700 HP) and that the permit for this station be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.61	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM10)	0.476 ^{0.08}	2.2 ^{0.4}	5 lbs/MMscf
Sulfur Dioxide	0.476	2.2	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.95 lbs/MMscf
Particulate Matter (PM10)	0.08	0.4	3.95 lbs/MMscf
Sulfur Dioxide	0.23	1.0	7.90 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed

exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 17,718 scf/hr per engine.
- Maximum heat input shall not exceed 36.50 MMBtu/hr for both engines.

so that it reads

"The permitted operating parameters and utilization rates for these natural gas compressor engines shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 22,703 scf/hr per engine.
- Maximum heat input shall not exceed 46.77 MMBtu/hr for both engines.

FGT requests that the permit for Station 15 (AC62-189439) be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	5 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	5 lbs/MMscf
Sulfur Dioxide	0.75	3.3	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	4.23 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	4.23 lbs/MMscf
Sulfur Dioxide	0.38	1.7	8.53 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 26,154 scf/hr.
- Maximum heat input shall not exceed 27.20 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 30,943 scf/hr.
- Maximum heat input shall not exceed 32.18 MMBtu/hr.

FGT requests that the permit for Station 16 (AC04-189454) be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp.hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp.hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp.hr
Particulate Matter (TSP)	0.13	0.6	5 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	5 lbs/MMscf
Sulfur Dioxide	0.75	3.3	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp.hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp.hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp.hr

Particulate Matter (TSP)	0.13	0.6	3.90 lbs/MMscf
Particulate Matter (PM10)	0.13	0.6	3.90 lbs/MMscf
Sulfur Dioxide	0.38	1.7	7.80 gr/100scf

Modify Specific Condition 5 which currently reads

"the permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 26,408 scf/hr.
- Maximum heat input shall not exceed 27.20 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 33,833 scf/hr.
- Maximum heat input shall not exceed 34.85 MMBtu/hr.

FGT requests that the permits for Stations 17 (AC42-189455) and 20 (AC56-189457) be modified as follows:

Modify Specific Condition 1 which currently reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxide	10.6	46.3	2.0 g/bhp.hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp.hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp.hr
Particulate Matter (TSP)	0.09	0.4	5 lbs/MMscf
Particulate Matter (PM10)	0.09	0.4	5 lbs/MMscf
Sulfur Dioxide	0.49	2.2	10 gr/100scf

so that it reads

"The maximum allowable emissions from this source shall not exceed the emission rates as follows:"

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	48.3	2.0 g/bhp.hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp.hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp.hr
Particulate Matter (TSP)	0.09	0.4	4.13 lbs/MMscf
Particulate Matter (PM10)	0.09	0.4	4.13 lbs/MMscf
Sulfur Dioxide	0.24	1.1	8.27 gr/100scf

Modify Specific Condition 5 which currently reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 17,010 scf/hr.
- Maximum heat input shall not exceed 17.52 MMBtu/hr.

so that it reads

"The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:"

- Maximum natural gas consumption shall not exceed 20,569 scf/hr.
- Maximum heat input shall not exceed 21.19 MMBtu/hr.

Please note that horsepower rating and fuel consumption rates are dependent upon several factors such as engine speed, load, and ambient conditions. Variances in these factors result in changes to horsepower and fuel usage and account for any differences in outputs or ratings that are presented in the attachments.

Also enclosed ^{is} in an emission inventory for ancillary equipment (small storage tanks, emergency generators, etc) which were not addressed in the construction permit applications. Although the emissions from this equipment is negligible compared to the engines, this emission information has been included to fully address all sources at these compressor stations.

If you have any questions or require additional information, please call me at 407-875-5816.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

RECEIVED

JAN 22 1991

JAN 15 1991

DER-BAQM

4APT-AEB

Mr. Clair H. Fancy, P.E., Chief
Bureau of Air Regulation
Florida Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: Florida Gas Transmission Company Compressor Stations
PSD-FL-156 Santa Rosa County
PSD-FL-158 Washington County
PSD-FL-159 Gadsden County
PSD-FL-160 Taylor County
PSD-FL-161 Bradford County
PSD-FL-162 Marion County
PSD-FL-163 Orange County
PSD-FL-164 St. Lucie County

Dear Mr. Fancy:

This is to acknowledge receipt of the Prevention of Significant Deterioration (PSD) permit application for Compressor Station Nos. 12 through 18 and 20 of the above referenced source, by letter dated November 28, 1990.

The proposed projects are similar in scope in that they each consist of the addition of one reciprocating internal combustion engine to an existing compressor station. The engines proposed for the stations in Santa Rosa, Taylor, and Bradford Counties will be sized at 4000 brake horsepower. The engines for the remaining five counties will be sized at 2400 brake horsepower. We have reviewed the package as requested and have no adverse comments at this time.

Thank you for the opportunity to review and comment on this application. If you have any questions or comments on this package, please contact Mr. Gregg Worley of my staff at (404) 347-2904.

Sincerely yours,

Douglas Worley for

Jewell A. Harper, Chief
Air Enforcement Branch
Air, Pesticides, and Toxics
Management Division

cc: *A. Heron*
L. Holladay
B. Andrews
E. Middleman

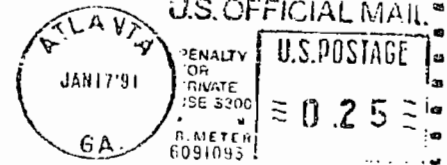
A. Rutledge
C. Collins
J. Goldmann
C. Shaver, OPS

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300

AIR-4

Clair H. Fancy, P.E., Chief
Bureau of Air Regulation
Fl. Dept. of Environmental Regulation
266 Blair Stone Rd./Twin Towers Building
Tallahassee, FL 32399-2400





State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee	
To: _____	Location: _____
To: _____	Location: _____
To: _____	Location: _____
From: _____	Date: _____

Interoffice Memorandum

TO: Howard Rhodes
FROM: Clair Fancy *CAF*
DATE: February 12, 1993
SUBJ: Amendment of Permits
Florida Gas Transmission Company

Attached for your approval and signature is a letter amending Specific Condition No. 10 of numerous permits for the above mentioned company. This amendment was requested in order to demonstrate compliance with the VOC emission standards using EPA Method 25A instead of EPA Method 25.

The Bureau recommends approval of the above.

CF/TH/plm

Attachment



State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee	
To: _____	Location: _____
To: _____	Location: _____
To: _____	Location: _____
From: _____	Date: _____

Interoffice Memorandum

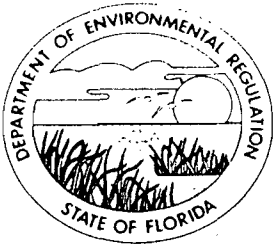
TO: Howard Rhodes
FROM: Clair Fancy *CAF*
DATE: February 12, 1993
SUBJ: Amendment of Permits
Florida Gas Transmission Company

Attached for your approval and signature is a letter amending Specific Condition No. 10 of numerous permits for the above mentioned company. This amendment was requested in order to demonstrate compliance with the VOC emission standards using EPA Method 25A instead of EPA Method 25.

The Bureau recommends approval of the above.

CF/TH/plm

Attachment



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

February 12, 1993

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Alan Weatherford
Compliance Environmentalist
Florida Gas Transmission Company
P.O. Box 945100
Maitland, Florida 32794-5100

Dear Mr. Weatherford:

Re: Permits AC57-188869, AC67-189220, AC20-189438, AC62-189439,
AC04-189454, AC42-189455, AC48-189456, AC05-189665 and
AC56-189457; Permit Amendment Request

The Department is in receipt of your letter dated January 18, 1993, requesting an amendment of the specific condition regarding test method for measuring VOC emissions for each one of the above referenced permits. The Department has reviewed your request and has determined to change Specific Condition No. 10 for each one of the permits as follows:

Specific Condition No. 10:

FROM: Initial compliance with the volatile organic compound emission (VOC) limits will be demonstrated by EPA Method 25, thereafter, compliance with the VOC emission limits will be assumed, provided the CO allowable emission rate is achieved.

TO: Initial compliance with the volatile organic compound emission (VOC) limits will be demonstrated by EPA Method 25A, thereafter, compliance with the VOC emission limits will be assumed, provided the CO allowable emission rate is achieved.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, 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 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant and the parties listed below must be filed within

Mr. Alan Weatherford
Florida Gas Transmission Company
Page 2

14 days of receipt of this intent. Petitions filed by other persons must be filed within 14 days of publication of the public notice or within 14 days of their receipt of this intent, whichever first occurs. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

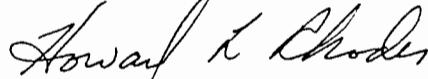
- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this intent. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of receipt of this intent in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

Mr. Alan Weatherford
Florida Gas Transmission Company
Page 3

A copy of this letter shall be attached to the above mentioned permit and shall become a part of that permit.

Sincerely,



Howard L. Rhodes
Director
Division of Air Resources
Management

HLR/TH/plm

Attachment to be Incorporated:

Mr. Alan Weatherford's letter of December 7, 1992

cc: Ed Middleswart, NWD
Charles Collins, CD
Isidore Goldman, SED
Andy Kutyna, NED



Florida Gas Transmission Company

P. O. Box 945100 Maitland, Florida 32794-5100 (407) 875-5800

Certified Mail

December 7 , 1992

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

Dear Mr. Fancy:

RE: Request for Modification to Permits

Permit No. AC57-188869
Florida Gas Transmission Company, Station 12
Munson, Santa Rosa County, Florida

Permit No. AC67-189220
Florida Gas Transmission Company, Station 13
Caryville, Washington County, Florida

Permit No. AC20-189438
Florida Gas Transmission Company, Station 14
Quincy, Gadsden County, Florida

Permit No. AC62-189439
Florida Gas Transmission Company, Station 15
Perry, Taylor County, Florida

Permit No. AC04-189454
Florida Gas Transmission Company, Station 16
Brooker, Bradford County, Florida

Permit No. AC42-189455
Florida Gas Transmission Company, Station 17
Salt Springs, Marion County, Florida

Permit No. AC48-189456
Florida Gas Transmission Company, Station 18
Orlando, Orange County, Florida

Permit No. Ac05-189665
Florida Gas Transmission Company, Station 19
Melbourne, Brevard County, Florida

Permit No. AC56-189457
Florida Gas Transmission Company, Station 20
Ft. Pierce, St. Lucie County, Florida

RECEIVED

DEC 17 1992

An **ENRON/SONAT** Affiliate

Division of Air
Resources Management

Mr. Clair Fancy
Page 2 of 2
December 7, 1992

Florida Gas Transmission Company (FGT) requests that the permits referenced above be modified as follows:

Modify Specific Condition 10 which currently reads

"Initial compliance with the volatile organic compound (VOC) emissions limits will be demonstrated by EPA Method 25, thereafter, compliance with the VOC emission limits will be assumed, provided the CO allowable emission rate is achieved."

so that it reads

"Initial compliance with the volatile organic compound (VOC) emissions limits will be demonstrated by EPA Method 25A, thereafter, compliance with the VOC emission limits will be assumed, provided the CO allowable emission rate is achieved."

FGT has supplied your office with evidence supporting our contention that the use of Method 25 to measure VOC emissions in compressor engines is questionable. We believe the evidence supports the use of Method 25A. Mr. Barry Andrews, ENSR Consulting & Engineering, has spoken to you about this on FGT's behalf.

Since no specific test method is listed for our source (i.e. NSPS or 17-2.700), we ask that this change be made through a simple permit modification.

Please call me at 407-875-5816 if you have any questions.

Sincerely,



Allan Weatherford
Compliance Environmentalist

bc
aw1207cf

cc: Chuck Truby
Raymond Young
Fred Griffin
Barry Andrews, ENSR

J. Nelson
C. Middelwart



Florida Gas Transmission Company

P. O. Box 945100 Maitland, Florida 32794-5100 (407) 875-5800

June 29, 1993

VIA FEDERAL EXPRESS
(overnight delivery)

JUN 30 1993
Div: Resources Management

Mr. Clair Fancy, P.E.
Chief, Bureau of Air Regulation
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Fancy:

RE: Request for Amendments and Extensions to Air Construction Permits

Permit No. AC57-188869
Florida Gas Transmission Company, Station 12
Munson, Santa Rosa County, Florida

Permit No. AC67-189220
Florida Gas Transmission Company, Station 13
Caryville, Washington County, Florida

Permit No. AC20-189438
Florida Gas Transmission Company, Station 14
Quincy, Gadsden County, Florida

Permit No. AC62-189439
Florida Gas Transmission Company, Station 15
Perry, Taylor County, Florida

Permit No. AC04-189454
Florida Gas Transmission Company, Station 16
Brooker, Bradford County, Florida

Permit No. AC42-189455
Florida Gas Transmission Company, Station 17
Salt Springs, Marion County, Florida

Permit No. AC48-189456
Florida Gas Transmission Company, Station 18
Orlando, Orange County, Florida

Permit No. AC05-189665
Florida Gas Transmission Company, Station 19
Melbourne, Brevard County, Florida

Permit No. AC56-189457
Florida Gas Transmission Company, Station 20
Ft. Pierce, St. Lucie County, Florida

On May 27, 1993, Florida Gas Transmission Company (FGT) submitted Certificates of Completion of Construction to the appropriate district offices to obtain operating permits for

RECEIVED

JUN 30 1993

Division of Air Resources Management

FEDERAL EXPRESS

QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL NUMBER

1403970720DATE
6/29/93AIRBILL NUMBER
1403970720

From (Your Name) **H. Weatherford**
Fl. Gas Transmission
 Company
601 South Lake Destiny # 450
 Street Address
 City **Maitland** State **FL** ZIP Required For Correct Invoicing **32751**

Your Phone Number (Very Important)
407 875-5816

To (Recipient's Name)
Mr. Clair Fancy, P.E.
 Recipient's Phone Number (Very Important)
904 488-1344
 Company
Fl. Dept. of Environmental Reg.
 Department/Floor No.
 Exact Street Address (Use of P.O. Boxes or P.O. Zip Codes Will Delay Delivery And Result In Extra Charge.)
2600 Blair Stone Road
 City **Tallahassee** State **FL** ZIP Street Address Zip Required **32399-2400**

YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.)

HOLD FOR PICK-UP AT THIS FEDERAL EXPRESS LOCATION:
Street Address (See Service Guide or Call 800-238-5355)

PAYMENT Bill Sender Bill Recipient's FedEx Acct. No. Bill 3rd Party FedEx Acct. No. Bill Credit Card
 Cash

Federal Express Use
 Base Charges
 City
 State

SERVICES CHECK ONLY ONE BOX

1 **PRIORITY 1** Overnight Delivery Using Your Packaging
 6 **OVERNIGHT LETTER*** (Our Packaging) 9 1/2" x 12 1/2"

2 **OVERNIGHT DELIVERY USING OUR PACKAGING** Courier-Pak Overnight Envelope* 12" x 15 1/2"
 Overnight Box 12 1/2" x 17 1/2" x 3" A
 Overnight Tube 38" x 6" x 6" B

4 **STANDARD AIR** Delivery not later than second business day

5 **SERVICE COMMITMENT**
 PRIORITY 1 - Delivery is scheduled early next business morning in most locations. It may take two or more business days if the destination is outside our primary service areas.
 STANDARD AIR - Delivery is generally next business day or not later than second business day. It may take three or more business days if the destination is outside our primary service areas.

DELIVERY AND SPECIAL HANDLING CHECK SERVICES REQUIRED

1 **HOLD FOR PICK-UP** (P-1 in Section 9 at right)
 2 **DELIVER WEEKDAY**
 3 **DELIVER SATURDAY** (Extra charge)
 4 **DANGEROUS GOODS** (P-1 and Standard Air Packages only) (Extra charge)
 5 **CONSTANT SURVEILLANCE SERVICE (CSS)** (Extra charge) (Do Not Complete Section 9)
 6 **DRY ICE** Lbs
 7 **OTHER SPECIAL SERVICE**
 8
 9 **SATURDAY PICK-UP** (Extra charge)
 10

PACKAGES	WEIGHT	YOUR DECLARED VALUE	OVER SIZE
1	LBS		
	LBS		
	LBS		
	LBS		
Total	Total	Total	

Received At
 1 Regular Stop
 2 On-Call Stop
 3 Drop Box
 4 B.S.C.
 5 Station
 Federal Express Corp. Employee No.

ZIP Zip Code of Street Address Required

Emp. No. Date
 Cash Received
 Return Shipment
 Third Party Chg. To Del. Chg. To Hold

Street Address
 City State Zip

Received By:
 X
 Date/Time Received FedEx Employee Number

Declared Value Charge
 Origin Agent Charge
 Other
 Total Charges

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.
 Release Signature: **H. P. Sullivan**

Date/Time For Federal Express Use

PART #2041738900
 REC-S-750-25
 REVISION DATE 10/86
 PRINTED U.S.A. NCRE

RECIPIENT'S COPY



Florida Gas Transmission Company

P. O. Box 945100 Mailand, Florida 32794-5100 (407) 875-5800

RECEIVED
DER - MAIL ROOM

1993 JAN 20 AM 11:00

January 18, 1993

Mr. C. H. Fancy, Chief
Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Fancy:

Re: Permit Amendment Processing Fee for
Nine Florida Gas Transmission Permits

As instructed in your January 13, 1993 letter, a check for \$250 is enclosed to cover the permit amendment processing fee for all nine of the subject permits.

Please call me at 407/875-5816, if you have any questions.

Very truly yours,

Allan Weatherford
Compliance Environmentalist

AW0118a.swp

Enclosure

cc: Chuck Truby
Raymond Young

CHECK NO.
0622503989

**ENRON
CORP**

FLORIDA GAS TRANSMISSION COMPANY
P.O. BOX 1188
HOUSTON, TEXAS 77251-1188

DATE OF CHECK

January 18, 1993

PAY EXACTLY TWO HUNDRED FIFTY AND NO/100 DOLLARS 250.00

This check is VOID unless printed on BLUE background

PAY
TO THE
ORDER
OF

Florida Department of Environmental Regulations
Twin Towers Office Bldg.
2600 Blair Stone Rd.
Tallahassee, FL 32399-2400

NOT VALID OVER \$5,000 UNLESS COUNTERSIGNED

UNITED BANK OF GRAND JUNCTION



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

May 15, 1992

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Allan Weatherford
Compliance Environmentalist
Florida Gas Transmission Company
P.O. Box 945100
Maitland, Florida 32399-2400

Dear Mr. Weatherford:

Re: Construction Permits Nos. AC 57-188869, AC 67-189220,
AC 20-189438, AC 62-189439, AC 04-189454, AC 42-189455,
AC 48-189456, AC 05-189665, and AC 56-189457

The Department is in receipt of your letter dated April 29, 1992, requesting the extension of the expiration dates of the above referenced permits. This request is acceptable. The expiration dates of these construction permits will be changed as follows:

FROM: June 30, 1992
TO: June 30, 1993

This letter must be attached to the above mentioned permits and shall become a part of each permit.

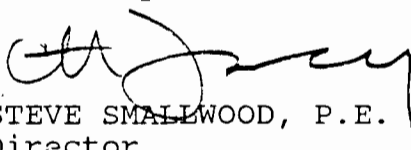
A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant and the parties listed below must be filed within 14 days of receipt of this intent. Petitions filed by other persons must be filed within 14 days of publication of the public notice or within 14 days of their receipt of this intent, whichever first occurs. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this intent. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of receipt of this intent in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

Sincerely,

for 

STEVE SMALLWOOD, P.E.
Director
Division of Air Resources Mgmt.

SS/TH/plm

Attachment to be Incorporated:

Mr. Weatherford's letter of April 29, 1992

cc: Ed Middleswart Andy Kutyna
 Charles Collins Isidore Goldman



Florida Gas Transmission Company

P. O. Box 945100 Maitland, Florida 32794-5100 (407) 875-5800

Federal Express

April 29, 1992

RECEIVED
DER - MAIL ROOM
1992 APR 30 AM 10:49

Mr. Clair Fancy
Florida Department of
Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Fancy:

**RE: Request for Extensions of Construction Permits
Phase II Air Permits**

Permit No. AC57-188869
Florida Gas Transmission Company, Station 12
Munson, Santa Rosa County, Florida

Permit No. AC67-189220
Florida Gas Transmission Company, Station 13
Caryville, Washington County, Florida

Permit No. AC20-189438
Florida Gas Transmission Company, Station 14
Quincy, Gadsden County, Florida

Permit No. AC62-189439
Florida Gas Transmission Company, Station 15
Perry, Taylor County, Florida

Permit No. AC04-189454
Florida Gas Transmission Company, Station 16
Brooker, Bradford County, Florida

Permit No. AC42-189455
Florida Gas Transmission Company, Station 17
Salt Springs, Marion County, Florida

Permit No. AC48-189456
Florida Gas Transmission Company, Station 18
Orlando, Orange County, Florida

Permit No. AC05-189665
Florida Gas Transmission Company, Station 19
Melbourne, Brevard County, Florida

Permit No. AC56-189457
Florida Gas Transmission Company, Station 20
Ft. Pierce, St. Lucie County, Florida

Mr. Clair Fancy
Page 2 of 2
April 29, 1992

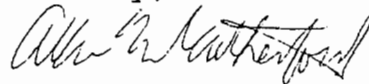
On behalf of Florida Gas Transmission Company, I respectfully request extensions of the construction permits referenced above. The permits are due to expire on June 30, 1992 and FGT needs more time to evaluate the operation and performance of the engines.

Emissions tests were done on the engines in March 1992. The test reports will be submitted to DER within the next two weeks. Preliminary results indicate that all emission limits were met.

FGT requests the expiration dates be extended to June 30, 1993. This 12-month extension will allow FGT the necessary time to thoroughly evaluate the operation of the new engines and to determine if additions or revisions to the permits are needed.

In anticipation of your approval, I've enclosed a check for \$450 to cover the permit extension fee for each of the nine stations.

Sincerely,



Allan Weatherford
Compliance Environmentalist

bc
aw0429cf

cc: Chuck Truby
Raymond Young
Fred Griffin
Bill Osborne
Glenn Sellars
Levon Carroll
Bob Beckham
Don Sterba
Duwood Mulford
Buddy Morris
James Dollar
Jim Read
Les Shadd
Leroy Coker
Wayne Daniels
Riley Jackson
Donnie Owings
Joe Kolb
Tom Gardiner, ENSR

S. Allen



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

May 15, 1992

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Allan Weatherford
Compliance Environmentalist
Florida Gas Transmission Company
P.O. Box 945100
Maitland, Florida 32399-2400

Dear Mr. Weatherford:

Re: Construction Permits Nos. AC 57-188869, AC 67-189220,
AC 20-189438, AC 62-189439, AC 04-189454, AC 42-189455,
AC 48-189456, AC 05-189665, and AC 56-189457

The Department is in receipt of your letter dated April 29, 1992, requesting the extension of the expiration dates of the above referenced permits. This request is acceptable. The expiration dates of these construction permits will be changed as follows:

FROM: June 30, 1992
TO: June 30, 1993

This letter must be attached to the above mentioned permits and shall become a part of each permit.

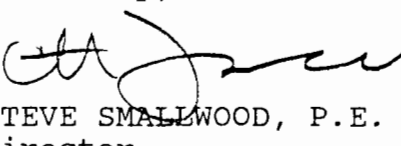
A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant and the parties listed below must be filed within 14 days of receipt of this intent. Petitions filed by other persons must be filed within 14 days of publication of the public notice or within 14 days of their receipt of this intent, whichever first occurs. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this intent. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of receipt of this intent in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

Sincerely,

for 
STEVE SMALLWOOD, P.E.
Director
Division of Air Resources Mgmt.

SS/TH/plm

Attachment to be Incorporated:

Mr. Weatherford's letter of April 29, 1992

cc: Ed Middleswart Andy Kutyna
Charles Collins Isidore Goldman



Florida Gas Transmission Company

P. O. Box 945100 Maitland, Florida 32794-5100 (407) 875-5800

Federal Express

April 29, 1992

RECEIVED
DER - MAIL ROOM
1992 APR 30 AM 10:49

Mr. Clair Fancy
Florida Department of
Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Fancy:

**RE: Request for Extensions of Construction Permits
Phase II Air Permits**

Permit No. AC57-188869
Florida Gas Transmission Company, Station 12
Munson, Santa Rosa County, Florida

Permit No. AC67-189220
Florida Gas Transmission Company, Station 13
Caryville, Washington County, Florida

Permit No. AC20-189438
Florida Gas Transmission Company, Station 14
Quincy, Gadsden County, Florida

Permit No. AC62-189439
Florida Gas Transmission Company, Station 15
Perry, Taylor County, Florida

Permit No. AC04-189454
Florida Gas Transmission Company, Station 16
Brooker, Bradford County, Florida

Permit No. AC42-189455
Florida Gas Transmission Company, Station 17
Salt Springs, Marion County, Florida

Permit No. AC48-189456
Florida Gas Transmission Company, Station 18
Orlando, Orange County, Florida

Permit No. AC05-189665
Florida Gas Transmission Company, Station 19
Melbourne, Brevard County, Florida

Permit No. AC56-189457
Florida Gas Transmission Company, Station 20
Ft. Pierce, St. Lucie County, Florida

Mr. Clair Fancy
Page 2 of 2
April 29, 1992

On behalf of Florida Gas Transmission Company, I respectfully request extensions of the construction permits referenced above. The permits are due to expire on June 30, 1992 and FGT needs more time to evaluate the operation and performance of the engines.

Emissions tests were done on the engines in March 1992. The test reports will be submitted to DER within the next two weeks. Preliminary results indicate that all emission limits were met.

FGT requests the expiration dates be extended to June 30, 1993. This 12-month extension will allow FGT the necessary time to thoroughly evaluate the operation of the new engines and to determine if additions or revisions to the permits are needed.

In anticipation of your approval, I've enclosed a check for \$450 to cover the permit extension fee for each of the nine stations.

Sincerely,



Allan Weatherford
Compliance Environmentalist

bc
aw0429cf

cc: Chuck Truby
Raymond Young
Fred Griffin
Bill Osborne
Glenn Sellars
Levon Carroll
Bob Beckham
Don Sterba
Duwood Mulford
Buddy Morris
James Dollar
Jim Read
Les Shadd
Leroy Coker
Wayne Daniels
Riley Jackson
Donnie Owings
Joe Kolb
Tom Gardiner, ENSR

S. Allen

TABLE OF CONTENTS

INTRODUCTION	1
Table 1: Background Data	2
SUMMARY OF RESULTS	4
Table 2 Summary of Results	8
PROCESS DESCRIPTION	9
ANALYTICAL TECHNIQUE	10
Table 3: Analytical Instrumentation	15
Figure 1: Instrumental Sampling and Analysis System	16
QUALITY ASSURANCE ACTIVITIES	17
APPENDICES	
A. Field Data Sheets and Operational Data	
B. Example Calculations	
C. Quality Assurance Activities	
D. Calibration Certifications	
E. Strip Chart Records	
NO _x , CO, O ₂	
CO ₂ , THC	
F. Chromatograms	
G. Opacity Observations	
H. Fuel Analyses	
I. Unofficial Compliance Test Data	

INTRODUCTION

One Dresser Rand 10TCV engine was tested to determine the quantity of emissions released into the atmosphere. The tests were conducted on March 17, 1992 at Compressor Station No. 12 located near Munson, in Santa Rosa County, Florida. This compressor station is owned and operated by Florida Gas Transmission Company (an affiliate of Enron).

The tests were conducted to determine the unit's compliance status with regard to the Florida Department of Environmental Regulation's Permit No. AC 57-188869.

Quantities of nitrogen oxides (NO_x), carbon monoxide (CO), nonmethane hydrocarbon emissions (VOC), and other combustion products were determined in the exhaust stack of the engine. The tests followed the procedures set forth in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 1, 2, 3, 3a, 4, 7e, 9, 10, 18, 19, 25 and 25a, ASTM D-3246, and the American Gas Association's Carbon Balance Method*. All field testing was conducted by Cubix Corporation of Austin, Texas. The laboratory analyses for VOC concentrations and total sulfur in the fuel were conducted by Clean Air Engineering of Palatine, Illinois and Southern Petroleum Labs of Houston, Texas, respectively.

This test report has been reviewed and approved for submittal to the FDER by the following representatives:

*NOTE: Additional test methods (3a, 18, 25a, 19 and carbon balance) were done for comparison purposes. Florida Gas intends to formally request that Methods 3 and 25 be replaced by Methods 3a and 25a.


Florida Gas Transmission Co.


Cubix Corporation

Table 1
Background Data

<u>Source Owner/Operator:</u>	Florida Gas Transmission Co. 601 South Lake Destiny Drive Maitland, Florida 32751 (407) 875-5816 TEL (407) 875-5896 FAX Attn: Allan Weatherford
<u>Testing Organization</u>	Cubix Corporation 9225 Lockhart Hwy Austin, Texas 78747 (512) 243-0202 TEL (512) 243-0222 FAX Attn: Lowell Faulkner
<u>Test Participants:</u>	Florida Gas Transmission Co. Allan Weatherford Jerry Thomas Bill Rogers Fred Griffin Dresser Rand Bill Hutchins Cubix Corporation Lowell Faulkner Norman Franco Tony Sacre
<u>Test Date:</u>	March 17, 1992
<u>Location:</u>	near Munson, in Santa Rosa County, Florida
<u>Process Description:</u>	Dresser Rand 10TCV compressor engine
<u>Sampling Points:</u>	Exhaust stack of compressor engine (See Appendix A)

Regulatory Application:

Florida Department of
Environmental Regulation Permit
No. AC 188869

Required Test Methods:

EPA Method 1 for traverse point layout
EPA Method 2 for stack gas velocity
EPA Method 3 for O₂ and CO₂
concentrations
EPA Method 4 for moisture content
EPA Method 7e for NO_x concentrations
EPA Method 9 for opacity observations
EPA Method 10 for CO concentrations
EPA Method 25 for VOC concentration
ASTM D-3246 for indirect measurement
of SO₂ emissions

Alternate Test Methods:
(conducted for
comparison purposes)

EPA Method 3a for CO₂ and O₂
concentrations
Stoichiometric calculation of moisture
content
EPA Method 18 for VOC portion of
THC concentration
EPA Method 19 for calculation of stack
flow rate
EPA Method 25a for THC concentration
AGA Carbon Balance Method for stack
flow rate calculation

SUMMARY OF RESULTS

One Dresser Rand 10TCV compressor engine was tested to determine the quantity of emissions vented to the atmosphere. The emission measurements reported herein result from tests conducted on March 17, 1992 at Compressor Station No. 12 located near Munson, in Santa Rosa County, Florida. The purpose of these tests was to determine the compliance status of this engine with regard to the FDER permit.

The permit required that tests be conducted for NO_x, O₂, CO₂, CO, nonmethane hydrocarbons (i.e. VOC), SO₂, and opacity. These parameters were measured throughout three 1-hour test runs on this engine while operating at full load and full speed.

The results from these three test runs are presented in Table 2. This table includes the operating data and ambient conditions for each test run. The measured concentrations of NO_x, CO, O₂, CO₂, VOC, and the stack flow rates are presented in the same units and using the same test methods listed in the permit. The calculated mass emission rates of NO_x, CO, and VOC are presented in terms of lbs/hr, TPY, and g/hp-hr for comparison with the permit limits.

The sulfur content of the fuel provided an indirect measurement of SO₂ emissions. The SO₂ emission rate is calculated from the total sulfur in the fuel and the estimated fuel flow as based on the Florida Gas provided horsepower.

The average emissions over the three test runs for NO_x were found to be 9.27 lbs/hr, 40.7 tons/yr, and 1.01 g/hp-hr. By comparison, permit limits are 17.6 lbs/hr, 77.2 tons/yr, and 2.0 g/hp-hr. CO emissions averaged 20.6 lbs/hr, 90.4 tons/yr, and 2.25 g/hp-hr and are limited by the permit to 22.1 lbs/hr, 96.6 tons/yr, and 2.5 g/hp-hr. The tons/yr emission rates are based on 8760 hrs/year operation of the engine.

The total sulfur content of the fuel was determined via laboratory analysis by Southern Petroleum Labs of Houston, Texas. The result of that analysis is contained in Appendix H and show that the fuel contained less than 0.059 grains/100 DSCF. The permit limits the sulfur content of the fuel to

10 grains/100 DSCF. The mass emission rate of SO₂ presented in Table 2 was calculated from the estimated fuel flow to the engine assuming that all sulfur in the fuel was oxidized to SO₂. The SO₂ emission rate based on this calculation averaged <0.0026 lbs/hr or <0.012 tons/yr. The permit limits for SO₂ mass emissions are 0.8 lbs/hr and 3.5 tons/yr.

Nonmethane hydrocarbon (i.e. VOC) concentrations were measured as required by the permit using EPA Method 25. Table 2 contains the results of those measurements. The average VOC emissions using Method 25 were 15.3 lbs/hr, 67.0 tons/yr, and 1.66 g/hp-hr. The permit limits nonmethane hydrocarbon emissions to 8.8 lbs/hr, 38.6 tons/yr, and 1.0 g/hp-hr.

It is Cubix's belief that the applicability of using EPA Method 25 on this type of source is questionable. Method 25 results are affected by CO₂ and moisture interferents, both of which are present in percent levels in engine exhaust. These interferences would be expected to cause a high bias of the VOC concentration measurements. Even under ideal circumstances (i.e. measurements made from a matrix of air containing little or no CO₂ or moisture), the minimum detection limit of this method is 50 ppmv as compared to a minimum detection limit of <1.0 ppmv using other EPA test methods. For this reason, Cubix chose to also conduct VOC testing on this source using alternate, more appropriate methods.

Appendix I contains the unofficial results of these engine tests using alternate test methods. The alternate methods provided for a continuous measurement of total hydrocarbon concentrations (THC) using EPA Method 25a. The nonmethane portion of the THC was measured periodically during each test run using an on-site gas chromatograph as per EPA Method 18.

Examination of the data in Appendix I shows that the VOC emissions using the alternate methods averaged 3.53 lbs/hr (15.4 tons/yr and 0.38 g/hp-hr). When compared with the data obtained from Method 25, one can see that the CO₂ and moisture interferents may have biased the VOC concentrations high. In addition, the alternate methods are much less labor intensive, which eliminates a lot of the possibility of human error from the field or lab personnel.

Other alternate methods test results presented in Appendix I include the use of EPA Method 3a for O₂ and CO₂ concentrations rather than the Orsat procedure of EPA Method 3. Also, since turbulent, pulsating, engine exhaust can sometimes produce questionable flow rate results using a pitot tube, the exhaust flow rates were calculated stoichiometrically using two

methods: (1) EPA Method 19 F-factors and (2) American Gas Association's Carbon Balance Method. Appendix I contains data that compares the flow rate results using these methods with those using the pitot tube traverse techniques of EPA Methods 1-4. The moisture content was also calculated stoichiometrically and compared with that obtained using EPA Method 4.

Appendix I shows that the instrumental techniques of EPA Method 3a provide more precision in measuring O₂ and CO₂ concentrations than the Orsat procedures of Method 3. When the proper analyzer range is used, EPA Method 3a provides a precision of tenfold that of EPA Method 3, even under the best of circumstances (i.e. no human error in performing Orsat). In addition, the *Quality Assurance* section of this report shows that EPA Method 3a results can be directly traced to various QA procedures including certified calibration gases and instrument linearity and interference tests. EPA Method 3 provides for no quality assurance procedures to ensure the accuracy of the results.

Data showing the use of stoichiometric calculations for determination of stack flow rate (i.e. F-factors and carbon balance) as well as for the stack moisture content included in Appendix I demonstrates that alternate methods are in agreement with the pitot tube traverse technique. During all three test runs on this engine, the moisture content obtained from stoichiometric calculations showed agreement within 10% of that obtained using EPA Method 4. The flow rate determination using F-factors agreed with the pitot tube measurements within 10%, averaged over the three test runs, and the carbon balance provided agreement within 15%.

Cubix used the flow measurement technique that resulted in the highest calculated mass emission rates. In this case, the pitot tube technique provided the worst case scenario. The higher pitot tube flow is believed to be due to the turbulent exhaust flow causing the pitot tube readings to be biased high. However, the data of Appendix I shows that alternate flow rate measurement techniques can produce good results when pitot tube traverses are impractical. The data from the stoichiometry provides a good check of the pitot tube data.

Cubix's purpose in performing the additional testing on this unit in order to provide the data included in Appendix I is threefold:

(1) The unofficial VOC data provides alternate results to consider with regard to the compliance status of the unit. As stated earlier, Cubix believes that the data obtained from the alternate methods is more accurate than that obtained from the permit required test method.

(2) It is hoped that the data included in Appendix I can be used to

allow for alternate test methods to be used on future emission tests on similar sources.

(3) The stoichiometric flow rate data included in Appendix I helps to verify the reasonableness of the results obtained from the pitot tube measurements of the exhaust flow.

Examples of any calculations necessary for presentation of the results of this section of the report or the unofficial data contained in Appendix I are available in Appendix B of this report. Field data sheets and chain of custody records is presented in Appendix A as is the Method 25 laboratory analysis results. The strip chart records on which the instrumental analyses were recorded are provided in Appendix E and the chromatograms used for the Method 18 analyses can be found in Appendix F.

Opacity observation results and the certification for the technician performing the visible emission readings are contained in Appendix G. The permit stipulated that visible emissions shall not exceed 10%. No opacity was observed throughout the three 1-hour tests.

TABLE 2 SUMMARY OF RESULTS

Operator/Plant
Location
Source
Technicians

Florida Gas Munson Compressor Station
Santa Rosa County, Florida
Dresser Rand Compressor Engine
LF,TS,NF

Test Run No.	C-1	C-2	C-3
Date	3/17/92	3/17/92	3/17/92
Start Time	14:15	15:35	16:52
Stop Time	15:15	16:35	17:52
Engine/Compressor Operation			
Engine Speed (rpm)	330	330	330
Ignition Timing (°BTDC)	8	8	8
Air Manifold Pressure (psig)	16	16	16
Air Manifold Temperature (°F)	124	124	124
Estimated Fuel Flow AT 7600 BTU/hp-hr (SCFH)	31386	31386	31386
Fuel Temperature (°F)	48	47	46
Fuel Manifold Pressure (psig)	35	35.5	35
Loading Step (pockets open out of 10 total)	9	9	9
Suction Pressure (psig)	681	680	679
Suction Temperature (°F)	63	63	62
Discharge Pressure (psig)	919	920	918
Discharge Temperature (°F)	105	105	105
Engine Load (BHP)	4171	4171	4171
Torque (%)	97	96	96
Ambient Conditions			
Atmospheric Pressure (in. Hg)	29.95	29.92	29.92
Temperature (°F) : Dry bulb	78	78	71
(°F) Wet bulb	73	76	66
Humidity (lb/lb air)	0.0159	0.0184	0.0123
Measured Emissions			
NOx (ppmv)	68.0	66.0	62.0
CO (ppmv)	240	236	240
O2 via EPA Method 3 (vol %)	15.00	15.50	15.50
CO2 via EPA Method 3 (vol %)	3.00	3.00	3.00
VOC via EPA Method 25 (ppmv)	318.0	331.6	277.7
SO2 in fuel (grains/100 SCF)	<0.059	<0.059	<0.059
Stack Volumetric Flow Rates			
via Pitot Tube (SCFH, dry)	1.21E+06	1.20E+06	1.16E+06
Calculated Emission Rates (via pitot tube)			
NOx (lbs/hr)	9.83	9.43	8.60
CO (lbs/hr)	21.1	20.5	20.3
VOC (lbs/hr)	16.0	16.5	13.4
SO2 (lbs/hr)	<0.0026	<0.0026	<0.0026
NOx (tons/yr)	43.1	41.3	37.7
CO (tons/yr)	92.5	89.9	88.8
VOC (tons/yr)	70.0	72.2	58.7
SO2 (tons/yr)	<0.012	<0.012	<0.012
NOx (g/hp-hr)	1.07	1.03	0.94
CO (g/hp-hr)	2.30	2.23	2.21
VOC (g/hp-hr)	1.74	1.79	1.46

PROCESS DESCRIPTION

Florida Gas Transmission Co. owns and operates the Munson Compressor Station No. 12 located near Munson, Florida. This plant uses engines to compress natural gas to allow for transportation in the main pipeline system. This compressor station is a part of a system developed by Florida Gas Transmission Company to allow the transport of natural gas from reserves in Texas to the Florida market.

The engine tested is a Dresser Rand 10TCV compressor engine bearing the serial number 10TCV112AP. The engine is rated at 4,000 BHP. It is a lean burn, high air/fuel ratio engine including a precombustion chamber on each cylinder, main chamber mixture regulation, and a variable timing spark control responsive to speed, torque, and air temperature.

The engine emissions are vented to the atmosphere through a 23.0" ID exhaust pipe at approximately 45 feet above grade. Two sample ports were installed in a straight horizontal section of the exhaust pipe between the engine and the silencer. However, these sample ports were also located upstream of the turbocharger. It was determined by Florida Gas personnel and the Dresser Rand representative that use of these ports would affect the operation of the turbocharger. Consequently, two additional sample ports were installed in a vertical section of the pipe at the silencer. The stack inside diameter at that location is 35-1/5 inches. These ports were used during the testing. A field diagram of the sampling location can be found in Appendix A.

ANALYTICAL TECHNIQUE

The sampling and analysis procedures used during these tests conform in principle with the methods outlined in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 1, 2, 3, 3a, 4, 7e, 9, 10, 18, 19, 25, and 25a, ASTM D-3246, and AGA's carbon balance method for flow rate measurement. Table 3 provides a description of the analyzers used for the instrumental portion of the tests.

Figure 1 depicts the sample system used for the tests. A stainless steel probe was inserted into the sample port of the stack. The gas sample was continuously pulled through the probe and transported via 3/8 inch heat-traced Teflon® tubing to the mobile laboratory located at ground level. To prevent the possibility of condensation of heavier hydrocarbons, the sample was then delivered to the THC analyzer and gas chromatograph portion of the sample manifold via a stainless steel/Teflon® diaphragm pump through more heat-traced sample line (i.e. wet sample). The remaining sample then passed through a stainless steel minimum-contact condenser designed to dry it. The dry sample returned to the sample manifold. From the manifold, the sample was partitioned to the NO_x, CO, O₂, and CO₂ analyzers through glass and stainless steel rotameters that controlled the flow rate of the sample.

Figure 1 shows that the sample system was also equipped with a separate path through which a calibration gas could be delivered to the probe and back through the entire sampling system. This allowed for convenient performance of system bias checks as required by the testing methods.

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

All data from the continuous monitoring instruments were recorded on two synchronized 3-pen strip chart recorders (Soltec Model 1243). These recorders were operated at a chart speed of 30 centimeters/hour, recording over a 25-centimeter width. Strip chart records can be found in Appendix E of this report.

EPA Method 1 was used to determine the velocity traverse point locations. The stack diagram of Appendix A shows the sample port locations.

EPA Method 2 was used to measure the stack gas velocity. A pitot tube and inclined manometer were used to measure the head pressure at each of sixteen traverse points. The stack temperature was determined with a K-type thermocouple and digital thermometer. Cubix checked for cyclonic flow (i.e. measured pitch and yaw flow angles) during the first test run and found that none existed.

The stack gas analyses for CO₂ and O₂ concentrations were performed in accordance with procedures set forth in EPA Method 3. An Orsat device was used on a bag sample collected throughout each test run. Instrumental analyses (NDIR) as per EPA Method 3a were also used for O₂ and CO₂ concentrations due to the greater accuracy and precision provided by the instruments. The CO₂ analyzer was based on the principle of infrared absorption; and, the O₂ analyzer operated on a paramagnetic cell. The data presented in *Summary of Results* contains the O₂ and CO₂ concentrations obtained from EPA Method 3. Appendix I makes use of the data obtained from EPA Method 3a.

EPA Method 4 was used to measure the moisture content of the stack during each test run. An impinger train was used in conjunction with a calibrated dry gas meter. The sample used for the moisture determination was taken from the heat traced-line upstream of the condensor (see *Figure 1*). The moisture content was also estimated stoichiometrically using the combustion moisture, excess air dilution, and ambient humidity in the combustion air. The velocity template in Appendix I shows that the agreement was greater than 90% between stack moisture measurement methods. All calculations involved in the *Summary of Results* make use of the moisture measurements obtained from EPA Method 4.

Means, in addition to EPA Methods 1-4, were employed to obtain the stack gas flow rate. The F-factor calculations of EPA Method 19 provided results that were approximately 10% less than those obtained by the pitot tube measurement. AGA's carbon balance technique yielded results approximately 15% lower than those of EPA Methods 1-4. Both of these methods use stoichiometric relationships based on the estimated fuel flow, fuel composition, and excess air concentration for calculation of the stack flow rates. As required by the permit, *Summary of Results* uses the flow

rate results obtained from the pitot tube traverses in all calculations. In this case, since the pitot tube values consistently provided the highest flow rate rates, this resulted in a worst case scenario. However, the alternate methods provided for a check of the pitot tube traverse results.

EPA Method 7e was used to determine concentrations of NO_x. A chemiluminescence cell analyzer was used. The NO_x mass emission rates were calculated as if all the NO_x were in the form of NO₂. This approach corresponds to EPA's convention. However, it tends to overestimate the actual stack NO_x mass emission rates, since the majority of the NO_x is in the form of NO which is less dense (i.e. lbs of emissions per ppmv concentration) than the NO₂ form of NO_x. This gives a worst case scenario of NO_x emissions.

Opacity was determined via EPA Method-9. ~~A one-hour opacity test run was performed concurrently with each gaseous compliance test run. The observer was certified with Texas Air Control Board. Appendix G provides the observer's field data sheets as well as Method 9 certification documentation.~~

CO emission concentrations were quantified in accordance with procedures set forth in EPA Method 10. A continuous nondispersive infrared (NDIR) analyzer was used for this purpose. This analyzer was equipped with a gas correlation filter which also removes any interference from CO₂, or other combustion products.

The non-methane portion of the hydrocarbon emissions (i.e. VOC) were determined using EPA Method 25 as required by the permit. Clean Air Engineering of Palatine, Illinois provided the sample system apparatus for Cubix's sample collection. A Clean Air Engineering Model 2610 instrument was used for the sample collection.

A gaseous sample was pulled under a vacuum through a heated probe and filter to a trap/tank assembly. The trap was immersed in dry ice to remove moisture and heavier hydrocarbons. The remaining sample was then collected in the tank. The tank started with a vacuum of approximately 30 in. Hg and the sample rate was set such that the vacuum was nearly depleted at the end of each one-hour test run. Each one-hour test run coincided with the other gaseous analyses. The field data sheets involved with the sample collection of this measurement are included in Appendix A. Following sample collection, the tanks and traps were packed in dry ice and shipped to Clean Air Engineering where the laboratory analyses for nonmethane hydrocarbon concentrations were performed.

The data presented in *Summary of Results* reflects the VOC measurements taken using this technique.

VOC concentrations were also quantified during each test run using EPA Methods 25a and 18. Cubix feels that these test methods provide more accurate results on this type of source than does Method 25. The unofficial data contained in Appendix I summarizes the results obtained using these alternate methods.

Total hydrocarbon concentrations were determined continuously throughout each test run using an flame ionization detector (FID). This instrument was calibrated before and after each test run using methane standards of a known concentration. Therefore, the response of this instrument is based on methane equivalents.

During each test run, a minimum of two shots were taken on a gas chromatograph as per the procedures of EPA Method 18. The chromatograms contained in Appendix F show that the methane concentration of the THC was separated on the unit to allow for the determination of the VOC portion of the THC. A Hewlett Packard 5890 gas chromatograph equipped with a flame ionization detector and a 1cc sample loop was operated with a temperature program of 40°C for 1 min. and an increase of 15°C per minute until 150°C was reached. The Chrompack PoraPlot Q capillary column head pressure was maintained at 8 psi. The hydrogen and air flows to the detector were maintained at 10 psi and 20 psi respectively. This instrument was calibrated on methane standards before and after each test run.

One fuel sample was taken at this compressor station and analyzed via ASTM D-3246 to determine the total sulfur content of the fuel. By assuming that all of the sulfur in the fuel was oxidized to SO₂, the SO₂ mass emission rate can be calculated from the fuel flow to the engine. The fuel flow to the engine was estimated based on the horsepower value provided by Florida Gas, the heating value of the fuel, and an assumed heat efficiency (i.e. BTU/hp-hr) for an engine of this type. The fuel analysis was conducted by Southern Petroleum Labs of Houston, Texas and a copy of that report is contained in Appendix H.

Cubix personnel collected ambient absolute pressure, temperature and humidity data. A sling psychrometer was used to determine temperature and humidity conditions. An aircraft-type aneroid barometer (altimeter) was used to measure absolute atmospheric pressure.

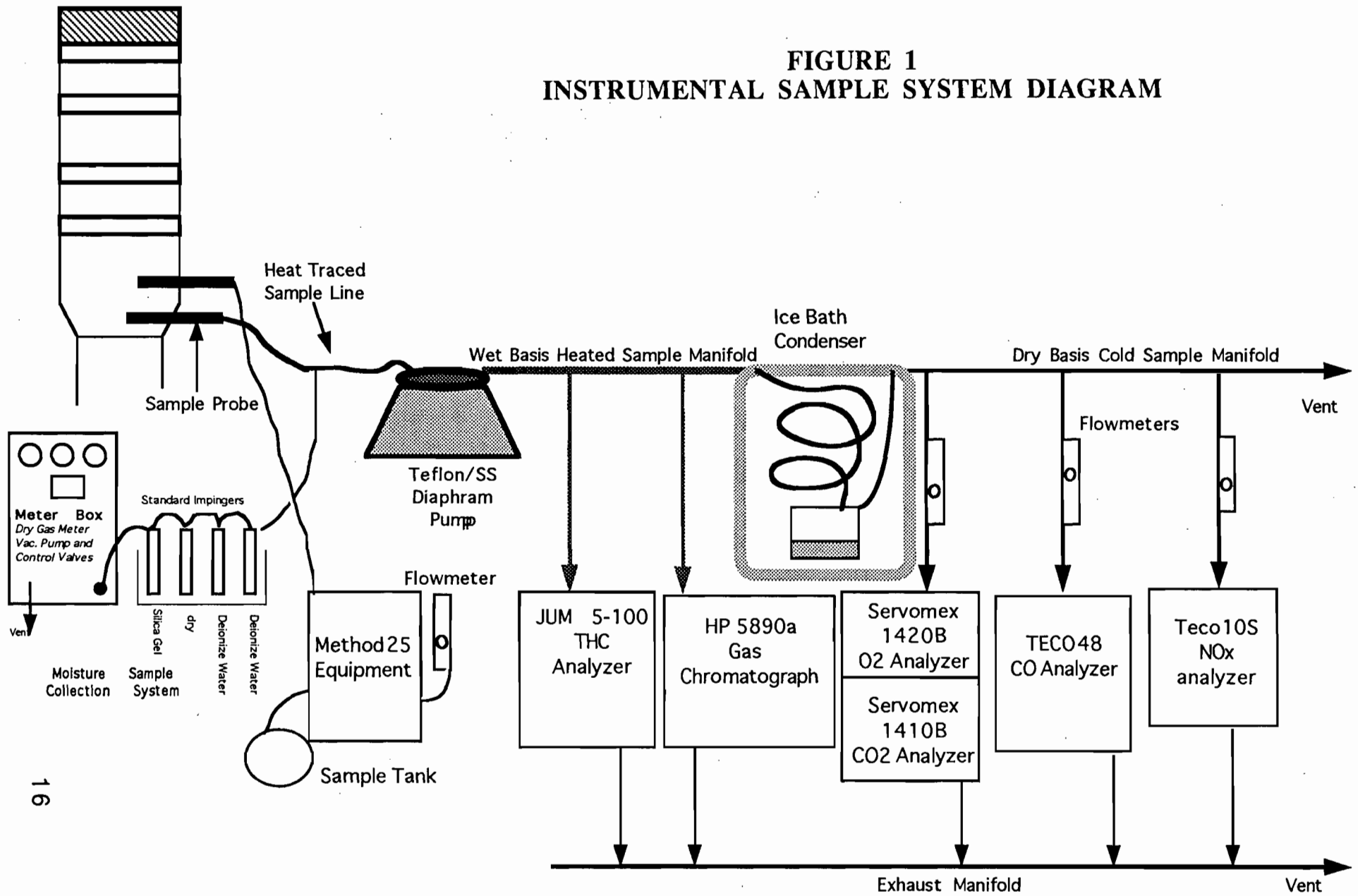
During the tests, the engine and compressor operational data was collected by Florida Gas personnel and is presented in Appendix A. Key operational data collected include compressor discharge pressures, compressor suction pressures, engine manifold pressure, engine speed, timing, and horsepower. Florida Gas also provided a recent fuel composition analysis to allow for the calculation of the heating values and F-factors.

**TABLE 3
ANALYTICAL INSTRUMENTATION**

<u>Parameter</u>	<u>Model and Manufacturer</u>	<u>Common Use Ranges</u>	<u>Sensitivity</u>	<u>Response Time (sec.)</u>	<u>Detection Principle</u>
NO _x	TECO 10S	0-10 ppm 0-100 ppm 0-200 ppm 0-500 ppm 0-1,000 ppm 0-5,000 ppm	0.1ppm	1.7	Thermal reduction of NO ₂ to NO. Chemiluminescence of reaction of NO with O ₃ . Detection by PMT. Inherently linear for listed ranges.
CO	TECO 48	0-10 ppm 0-20 ppm 0-50 ppm 0-100 ppm 0-200 ppm 0-500 ppm 0-1000 ppm	0.1ppm	10	Infrared absorption, gas filter correlation detector, micro-processor based linearization.
CO ₂	Servomex 1410 B	0-4% 0-20%	0.02%	30	Infrared absorption, analog linearization.
O ₂	Servomex 1420 B	0-10% 0-25 %	0.1%	15	Paramagnetic cell, inherently linear.
THC	JUM Model 5-100	0-10, 0-100, 0-1000, 0-10000 0-100000 ppm	0.2 ppm	5.0	Flame ionization of hydrocarbons inherently linear over 2 orders of magnitude.
VOC	HP 5890A	0-10, 0-100 ppm	0.5 ppm	na	Flame ionization of hydrocarbons inherently linear over 2 orders of magnitude.

NOTE: Higher ranges available by sample dilution.
Other ranges available via signal attenuation.

**FIGURE 1
INSTRUMENTAL SAMPLE SYSTEM DIAGRAM**



QUALITY ASSURANCE ACTIVITIES

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

Each instrument's response was checked and adjusted in the field prior to the collection of data via multi-point calibration. The instrument's linearity was checked by first adjusting the its zero and span responses to zero (nitrogen) and an upscale calibration gas in the range of the expected concentrations. The instrument response was then challenged with other calibration gases of known concentration and accepted as being linear if the response of the other calibration gases agreed within ± 2 percent of range of the predicted values. (The response of the infrared absorption type CO and CO₂ analyzers is electronically linearized.). The strip chart excerpts that present the results of the multi-point linearity test are provided in Appendix C.

Before and after each test run, the analyzers were checked for zero and span drift. This allowed each test run to be bracketed by calibrations and documents the precision of the data just collected. The criterion for acceptable data is that the instrument drift is no more than 2 percent of the full scale response. The quality assurance worksheets in Appendix E summarize all multipoint calibration checks and zero to span checks performed during the tests. These worksheets (as prepared from the strip chart records of Appendix E) show that no drifts in excess of 2 percent existed.

Interference response tests on the instruments were conducted by the instrument vendors and Cubix Corporation on the NO_x, CO, CO₂, and O₂ analyzers. The sum of the interference responses for H₂O, CO, SO₂, CO₂ and O₂ (as appropriate for each analyzer) are less than 2 percent of the applicable full scale span value. The instruments used for the tests meet the performance specifications for EPA Methods 3a, 7e, and 10. The results of the interference tests are available in Appendix C of this report.

The residence time of the sampling and measurement system was

estimated using the pump flow rate and the sampling system volume. The pump's rated flow is 0.8 SCFM at 5 psig. The sampling system volume is 0.13 scf. Therefore, the sample residence time is approximately 10 seconds.

The NO_x and O₂ sampling and analysis system was checked for response time per the procedures outlined in EPA's Method 20. The average NO_x analyzer's response times were 0.61 minutes upscale and 0.65 minutes downscale. The O₂ analyzer's response times were 0.76 minutes (46 seconds) upscale and 0.88 minutes (53 seconds) downscale. The results of these response time tests are contained in Appendix C.

The sampling systems were leak checked by demonstrating that a vacuum greater than 10" Hg (21 in. Hg actual) could be held for at least 1 minute with a decline of less than 1" Hg. A leak test was conducted after the sample system was set up and before the system was dismantled (i.e. after testing was completed). This test was conducted to ensure that ambient air had not diluted the sample. Any leakage detected prior to the tests was repaired and another leak check conducted before testing commenced. No leaks were found during the post test leak checks.

The moisture train and Method 25 sample systems were leak checked independently of the gaseous sample system before and after each individual test run. These leak checks were performed in accordance with EPA Methods 4 and 25 to ensure that the sample was not diluted by ambient air. No leaks were detected.

The absence of leaks in the sampling system was also verified by a system bias check. The sampling system's integrity was tested by comparing the responses of the NO_x analyzer to a calibration gas introduced via two paths. The first path was into the analyzer via the zero/span calibration manifold. The second path was to introduce a calibration gas into the sample system at the sample probe. Any difference in the instrument responses by these two methods was attributed to sampling system bias or leakage. NO_x was used for this bias check because it is the most reactive of the compounds measured. The bias check was also conducted using methane standards on the THC analyzer. The criteria for acceptance is agreement within 2% of the full scale range of the analyzer. Examination of the strip chart excerpts and Instrumental Analysis Quality Assurance Data worksheet in Appendix C show that the analyzer response via both sample paths agreed within 2% in all cases.

The efficiency of the NO₂ to NO converter in the NO_x analyzer was checked by having the analyzer sample a mixture of NO in N₂ standard gas and zero air from a Tedlar® bag. When this bag is mixed and exposed to sunlight, the NO is oxidized to NO₂ over approximately a 30-minute period. If the NO_x instrument's converter is 100% efficient, then the NO_x response does not decrease as the NO in the bag is converted to NO₂. The criterion for acceptability is a demonstrated NO_x converter efficiency greater than 90%. The strip chart excerpts that demonstrate the converter efficiency test are available in Appendix C. The above mentioned quality assurance worksheet of Appendix C also summarizes the results of the converter efficiency test.

The control gases used to calibrate the instruments were analyzed and certified by the compressed gas vendors to $\pm 1\%$ accuracy for NO_x and O₂, and to $\pm 2\%$ accuracy for the remaining gases. EPA Protocol No. 1 was used, where applicable (i.e. NO_x gases), to assign the concentration values traceable to the National Bureau of Standards, Standard Reference Materials (SRM's). The gas calibration sheets as prepared by the vendor are contained in Appendix D.

The pitot tube tips used during the testing were visually inspected to ensure that they met the criteria of EPA Method 2. The pitot tubes were also wind tunnel tested and the results of those tests are contained in Appendix D. The pitot tube lines were leak checked in the field each time connection to the manometer was made in accordance with EPA Method 2 guidelines.

The dry gas meter used for the moisture train was calibrated prior to testing in accordance with EPA Method 4. A standard dry gas meter traceable to NIST was used for this calibration. Calibration certification documentation of the dry gas meter can be found in Appendix D.

Appendix D also contains calibration data on the altimeter and digital thermometer used during this testing.

The observer for the opacity measurements was certified by the Texas Air Control Board. The certification for the observer can be found in Appendix G.

Two Method 25 audit samples were provided by EPA at another compressor station during this series of compressor station tests. These audit samples were collected using the same equipment and techniques used during this test. The laboratory analysis of these audits were conducted

concurrently with the sample analyses. The results of the audit samples are included in Appendix C.

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

**APPENDIX A:
FIELD DATA SHEETS AND
OPERATIONAL DATA**

SIGN IN SHEET

JOB NAME: FLORIDA GAS

DATE: 3 11 7 1 92

LOCATION: MUNSON FLORIDA

PERMIT # AC57-188869

SOURCE(S): DRESSER Rand Engine

#LD-FL-156

PARTICIPANTS: Cubix Corporation

FLORIDA GAS

ENRON

Dresser-Rand



NAME:

AFFILIATION:

PHONE NUMBER:

PIERRE PRINT

HOWELL FAULKNER Cubix

512 243 0202

TONY SACCA "

"

NORRINA FRANCO "

"

JERRY THOMAS Enron

713-853-7331

BILL HUTCHINS D-R

607-937-2120

ALLAN WEATHERS FLORIDA GAS

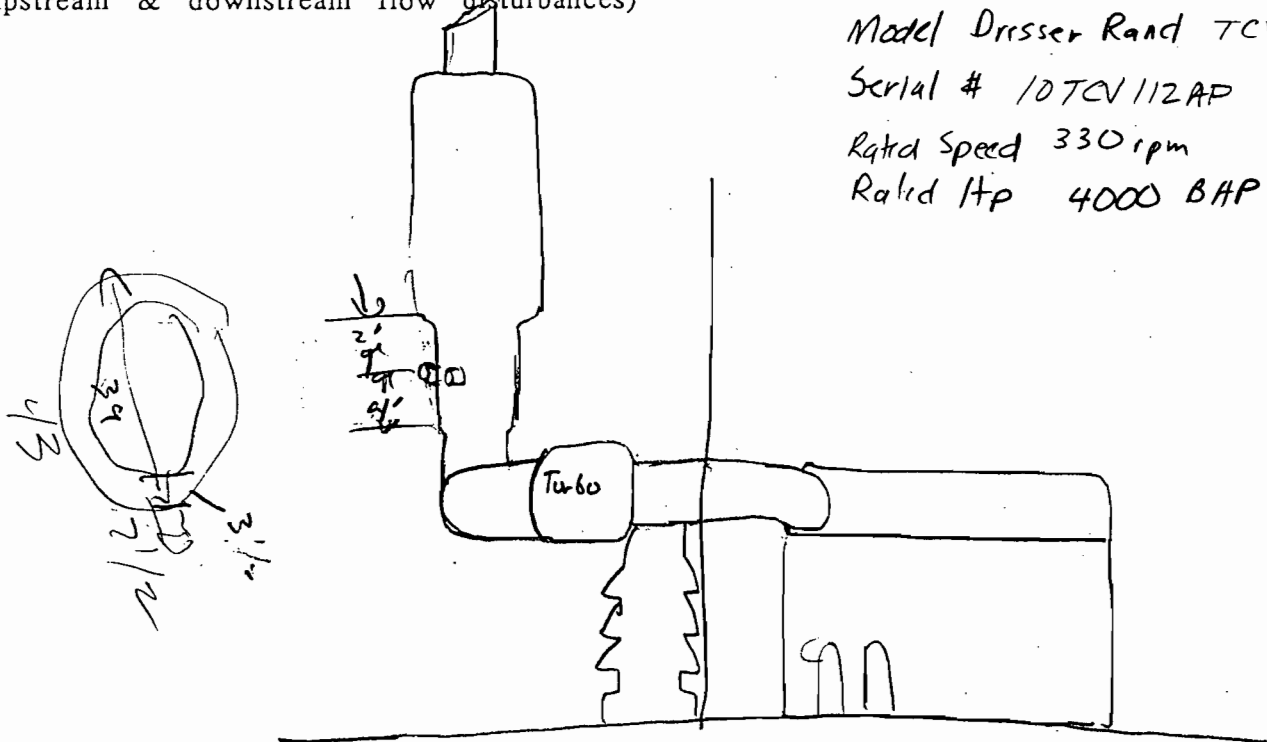
407 875-5816

Circular Stack Sampling Traverse Point Layout (EPA Method 1)

Date: 3/17/92
 Plant: FGT MUNSON
 Source: Compressor Engine
 Technician(s): F.N.F.T.S

Port + Stack ID: 43 in.
 Port Extension: 7.5 in.
 Stack ID: 35.5 in.
 Stack Area: 6.87 ft²
 Total Req'd Traverse Pts.: 16
 No. of Traverse Pts.: 8 /diam.
 No. of Traverse Pts.: 8 /port

Stack Diagram (Side View showing major unit components, dimensions and nearest upstream & downstream flow disturbances)



Traverse Point Number	Length Factor (% of diameter)				Distance from Reference Point (inches)
	4	6	8	12	
1	6.7	4.4	3.2	2.1	<u>1.1</u>
2	25.0	14.6	10.5	8.2	<u>3.7</u>
3	75.0	29.6	19.4	11.8	<u>6.9</u>
4	93.3	70.4	32.3	17.7	<u>11.5</u>
5		85.4	67.7	25.0	<u>24.0</u>
6		95.6	80.6	35.6	<u>28.6</u>
7			89.5	64.4	<u>31.8</u>
8			96.8	75.0	<u>34.4</u>
9				82.3	_____
10				88.2	_____
11				93.3	_____
12				97.9	_____

MOISTURE AND VELOCITY FIELD DATA SHEETS

Date: 3/17/92
 Plant/Operator: F6T Munson
 Source: Driscoll Pond
 Technicians: LF, NF, TS
 Atm. Pres. 29.95 in.Hg(Pb)
 Test Run # C-1

Dry Gas Meter ID: Anderson
 Dry Gas Meter Factor: 0.9904 (Kd)
 Pitot Tube #/Type: #107 S-Type
 Pitot Tube Factor: 0.84 (Kp)
 Static Pres. -0.18 in.H₂O(Pg)
 Average Stack Temp. 539 °F(Ts)

Pre-test Leak check	ft.3/min at in. Hg Vacuum	Impinger #	Contents	Initial Weight	Final Weight
0.0 <i>OK</i>	12" Hg	1	dH ₂ O	629.4	650.8
Post-test Leak check <i>OK</i>	0.000 ft.3/min at in. Hg Vacuum 22.0	2	dH ₂ O	660.9	664.0
		3	MT	473.7	475.1
		4	SiGel	778.9	786.5
		5			
		6			
		Totals		XXXX	

Moisture Train

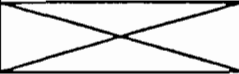
	Initial	Final
Time:	1422	1528
Meter Reading (ft ³ or L)	388.525	413.220
Meter Temp. (°F)	122	140
Sample Box #	Tr 7 Box	
<i>DRSMT</i>		
O ₂ %	15.0	
CO ₂ %	3.0	

Pitot Tube Traverse/Stack Temp./Angle

Traverse Pt.	ΔP (" H ₂ O)	°F	B	ΔP (" H ₂ O)	°F	B
1	0.82			2.20		
2	0.94			2.30		
3	1.50			2.90		
4	1.50			2.0		
5	1.8			1.20		
6	2.80			0.81		
7	2.90			0.65		
8	3.10			0.62		
9						
10						
11						
12						

MOISTURE AND VELOCITY FIELD DATA SHEETS

Date: 3/17/92 Dry Gas Meter ID: Anderson
 Plant/Operator: F&T Munson, FLGA Dry Gas Meter Factor: 0.9901 (Kd)
 Source: D-R Engine Pitot Tube #/Type: R107 S-type
 Technicians: L.F.N.F.T.S. Pitot Tube Factor: 0.89 (Kp)
 Atm. Pres. 29.92 in.Hg(Pb) Static Pres. -0.10 in.H₂O(Pg)
 Test Run # C-2 Average Stack Temp. 543 °F(Ts)

Pre-test Leak check	0.000 ft.3/min at in. Hg Vacuum	Impinger #	Contents	Initial Weight	Final Weight
<u>OK</u>	<u>20.0</u>	1	<u>H₂O</u>	<u>663.8</u>	<u>770.9</u>
Post-test Leak check	0.0 ft.3/min at in. Hg Vacuum	2	<u>H₂O</u>	<u>664.6</u>	<u>582.0</u>
<u>OK</u>	<u>20</u>	3	<u>MT</u>	476.7 <u>476.7</u>	<u>475.1</u>
		4	<u>S. Gas</u>	<u>786.8</u>	<u>791.7</u>
		5			
		6			
		Totals		<u>2591.9</u>	<u>2622.7</u>

Moisture Train

Pitot Tube Traverse/Stack Temp./Angle

	Initial	Final
Time:	<u>1535</u>	<u>1645</u>
Meter Reading (ft ³ or L)	<u>413.528</u>	<u>435.100</u>
Meter Temp. (°F)	<u>128</u>	<u>130</u>
Sample Box #	<u>TK7 B0</u>	
	<u>ORGT</u>	
O ₂ %	<u>15.5</u>	
CO ₂ %	<u>3.0</u>	

Traverse Pt.	ΔP (" H ₂ O)	°F	β	ΔP (" H ₂ O)	°F	β
1	<u>2.5</u>			<u>1.1</u>		
2	<u>2.6</u>			<u>1.4</u>		
3	<u>2.1</u>			<u>1.4</u>		
4	<u>1.9</u>			<u>1.5</u>		
5	<u>0.85</u>			<u>2.1</u>		
6	<u>0.05</u>			<u>2.1</u>		
7	<u>0.01</u>			<u>2.5</u>		
8	<u>0.74</u>			<u>2.5</u>		
9						
10						
11						
12						

MOISTURE AND VELOCITY FIELD DATA SHEETS

Date: 3/17/92
 Plant/Operator: FGT Munson
 Source: D-R Engine
 Technicians: LF, NF, TS
 Atm. Pres. 29.86 in.Hg(Pb)
 Test Run # C-3

Dry Gas Meter ID: Anderson
 Dry Gas Meter Factor: 0.9904 (Kd)
 Pitot Tube #/Type: A107 S-type
 Pitot Tube Factor: .87 (Kp)
 Static Pres. -1.05 in.H₂O(Pg)
 Average Stack Temp. 542 °F(Ts)

Pre-test Leak check	ft. ³ /min at in. Hg Vacuum	Impinger #	Contents	Initial Weight	Final Weight
<u>OK</u>	<u>12</u>	1	<u>H₂O</u>	<u>770.9</u>	<u>816.0</u>
Post-test Leak check	ft. ³ /min at in. Hg Vacuum	2	<u>H₂O</u>	<u>582.0</u>	<u>557.9</u>
<u>OK</u>	<u>16</u>	3	<u>WT</u>	<u>478.1</u>	<u>484.3</u>
		4	<u>S. Gel</u>	<u>791.7</u>	<u>790.3</u>
		5			
		6			
		Totals	XXXXXXXXXX	<u>2622.7</u>	<u>2649.1</u>

Moisture Train

Pitot Tube Traverse/Stack Temp./Angle

	Initial	Final
Time:	<u>17:00</u>	<u>1806</u>
Meter Reading (ft ³ or L)	<u>435.260</u>	<u>457.398</u>
Meter Temp. (°F)	<u>124</u>	<u>130</u>
Sample Box #	<u>JX 7 BOX</u>	
	<u>PRSA 1</u>	
O ₂ %	<u>15.5</u>	
CO ₂ %	<u>3.0</u>	

Traverse Pt.	ΔP (" H ₂ O)	°F	β	ΔP (" H ₂ O)	°F	β
1	<u>1.5</u>			<u>2.2</u>		
2	<u>1.5</u>			<u>2.5</u>		
3	<u>1.3</u>			<u>2.3</u>		
4	<u>1.41</u>			<u>1.8</u>		
5	<u>1.5</u>			<u>1.1</u>		
6	<u>1.9</u>			<u>1.6</u>		
7	<u>2.0</u>			<u>1.6</u>		
8	<u>2.1</u>			<u>1.7</u>		
9						
10						
11						
12						

Munson Compressor Station: Moisture, Molecular Weight, Stack Flow Rate

Operator/Plant
Location
Source
Technicians

Florida Gas Munson Compressor Station
Santa Rosa County, Florida
Dresser Rand Compressor Engine
LF,TS,NF

Test Run No.	C-1	C-2	C-3
Stack Moisture & Molecular Wt. via EPA Method 4			
CO2 (%)	3.00	3.00	3.00
O2 (%)	15.00	15.50	15.50
Beginning Meter Reading (ft3)	388.525	413.528	435.260
Ending Meter Reading (ft3)	413.270	435.160	457.398
Beginning Impinger Wt (g)	2542.9	2591.9	2622.7
Ending Impinger Wt. (g)	2576.4	2619.7	2649.1
Dry Gas Meter Factor (Kd)	0.9904	0.9904	0.9904
Dry Gas Meter Temperature (°F begin)	122	128	124
Dry Gas Meter Temperature (°F end)	140	130	130
Atmospheric Pressure (in Hg, abs.)	29.95	29.95	29.92
Stack Gas Moisture (% volume)	<u>6.73</u>	<u>6.39</u>	<u>5.94</u>
Dry Gas Fraction	0.933	0.936	0.941
Stack Gas Molecular Wt. (lbs/lb-mole)	28.33	28.39	28.44
Stack Flow Rate via Pitot Tube			
Pitot Tube Factor	0.84	0.84	0.84
ΔP #1	0.82	2.50	1.10
ΔP #2	0.94	2.60	1.40
ΔP #3	1.50	2.10	1.30
ΔP #4	1.50	1.90	1.40
ΔP #5	1.80	0.85	1.50
ΔP #6	2.80	0.65	1.80
ΔP #7	2.90	0.61	2.00
ΔP #8	3.10	0.74	2.10
ΔP #9	2.20	1.10	2.20
ΔP #10	2.30	1.40	2.50
ΔP #11	2.40	1.40	2.30
ΔP #12	2.00	1.50	1.80
ΔP #13	1.20	2.10	1.10
ΔP #14	0.81	2.10	0.68
ΔP #15	0.65	2.50	0.65
ΔP #16	0.62	2.50	0.74
Sum of Square Root of ΔP's	20.4	20.1	19.4
Number of Traverse Points	16	16	16
Average Square Root of ΔP's	1.27	1.26	1.22
Average Temperature (°F)	539	541	542
Static Pressure (in. H2O)	-0.18	-0.1	-0.05
Stack Diameter (in.)	35.5	35.5	35.5
Stack Area (ft2)	6.87	6.87	6.87
Stack Velocity (ft/min)	5948	5870	5683
Stack Flow,wet (ACFM)	40885	40350	39060
Stack Flow,dry (SCFH)	1.21E+06	1.20E+06	1.16E+06

RHP BY LOADING CURVES

3550

Run	1A	1B	2A	2B	3A	3B	4
FUEL TEMP., OF	46.7	46.9	46.6	46.3	46.0	45.4	44.3
BHP by panel	3977	+1.1% 4021					
TIME	2:08	2:45	4:05	4:31	5:05	5:35	6:13
FLOWER INLET TEMP °F	76	76	74.5	74.0	71.0	70.0	70
AIR MFLD TEMP. °F	124.5 / 125	124.9 / 125	124.2 / 124	124.1 / 124	124.2 / 124	124.1 / 124	103.6 / 103.5
ENGINE SPEED, RPM	330 / 332	330 / 332	331 / 332	330 / 332	330 / 331	330.5 / 332	331 / 331
LOAD STEP	16	16	16	16	16	16	7
SUCT PRESS PSIG	685	683	681	680	680	678	672
DISCH PRESS, PSIG	921	921	918	918	918	916	917
AIR MFLD PRESS, PSIG	16.1	16.2	16.2	16.1	16.2	16.25	18.8
FUEL MFLD PRESS, PSIG	35.3	35.15	35.1	35.1	35.5	35.2	40.5
PCC FUEL PRESS, PSIG	37.0	37.0	36.7	36.8	37.2	37.1	40.9
SPARK °BTC	8°	8	8	8	8	8	6
JW PRESS, PSIG IN/OUT	15.9 / 15.1	15.9 / 15.1	15.9 / 15.3	15.9 / 15.1	15.9 / 15.1	15.9 / 15.3	15.9 / 15.3
M.B. OIL PRESS, PSIG	48.7	48.4	48.4	48.6	48.8	48.6	48.5
TURBO OIL PRESS, PSIG	20.0	20.2	20.2	20.1	20.1	20.2	20.2
TURBO SPEED, RPM	11,900	11,900	11,900	11,900	11,850	11,800	12,600
AFTERC. H ₂ O IN, OF. SETPOINT	123	123	123	123	123	123	95.1
AFTERC H ₂ O IN ACTUAL	122.9 / 126	123.7 / 126	122.9 / 125.5	122.6 / 125.5	123.6 / 126	122.7 / 125	101.1 / 103.5
AFTERCOOLER H ₂ O OUT, OF	131	131.5	131	131	131	130.5	111.5
JW TEMP., OF. IN/OUT	152 / 156	152.5 / 154	152 / 154	152 / 154	151 / 154	151 / 154	150.5 / 154
OIL TEMP., OF. IN/OUT	142 / 153	142 / 153	141.5 / 152.5	142 / 153	141 / 152	141 / 152	140 / 152
CYL #1 LB OF	614	615	614	616	614	613	651
2LB	681	682	682	683	679	680	697
3LB	610	652	649	647	646	644	683
4LB	630	641	638	638	637	638	665
5LB	637	635	631	633	633	630	658
1RB	591	593	592	595	590	588	617
2RB	610	611	611	610	611	610	614
3RB	630	631	631	629	627	627	662
4RB	603	602	602	602	603	601	627
5RB	616	615	615	613	616	616	637
TURBINE IN/OUT °F	702 / 526	701 / 538	702 / 529	701 / 539	701 / 539	701 / 539	728 / 548
% TORQUE DYNALCO/MOORE	97 / 97	96.5 / 96.5	96.5 / 97	96 / 97	96 / 97	96 / 97	110.5 / 110.5
KAROM., IN HG.	29.95	29.95	—	29.95	29.96	29.95	
% O ₂	15.25		15.7		15.625		15.6
% CO ₂	3.02		3.00		3.05		2.93
CO, PPM	240		236		240		191
CO LBS/HR	21.23		21.23				
CO g/BHP-HR	2.42		2.22				
NO _x , PPM	68		66		62		86
NO _x LBS/HR	9.89		9.38				
NO _x g/BHP-HR	1.13		1.02				
THC, PPM WAT	1200		1115		1200		1050
THC LBS/HR	60.7		55.18				
THC, g/BHP-HR	6.92		6.01				

(15 CYCLES) BHP by PFM =
SPEED IN " "
AVG BHP
Woodward speed

4241.4
333
4131
330.4-334.2 330.6-333.8

10TCVII2 AP FIELD TEST

FLORIDA GAS STATION 12
MUNSON, FLA.

GHP BY LOADING CURVES

3550

Run	1A	1B	2A	2B	3A	3B	4
FUEL TEMP., OF	46.7	46.9	46.6	46.3	46.0	45.4	44.3
BHP by panel	3977	+1.1% 4021					
TIME	2:08	2:45	4:05	4:31	5:05	5:35	6:13
FLOWER INLET TEMP °F	76	76	74.5	74.0	71.0	70.0	70
AIR MFLD TEMP °F	124.5 / 125	124.9 / 125	124.2 / 124	124.1 / 124	124.1 / 124	124.1 / 124	103.6 / 103.5
ENGINE SPEED, RPM	330 / 332	330 / 332	331 / 332	330 / 332	330 / 331	330.5 / 332	331 / 331
LOAD STEP	16	16	16	16	16	16	7
SUCT PRESS, PSIG	685	683	681	680	680	678	672
DISCH PRESS, PSIG	921	921	918	918	918	916	917
AIR MFLD PRESS, PSIG	16.1	14.2	16.2	16.1	16.2	16.25	18.8
FUEL MFLD PRESS, PSIG	35.3	35.15	35.1	35.1	35.5	35.2	40.5
PCL FUEL PRESS, PSIG	37.0	37.0	36.7	36.8	37.2	37.1	40.9
SPARK, DEGC	8°	8	8	8	8	8	6
LW PRESS, PSIG, IN/OUT	150 / 29.9	29.3 / 15.4	29.4 / 15.3	29.3 / 15.1	30 / 15.1	29.6 / 15.3	30.1 / 15.3
M.O. OIL PRESS, PSIG	48.7	48.4	48.4	48.6	48.8	48.6	48.5
TURBO OIL PRESS, PSIG	20.0	20.2	20.2	20.1	20.1	20.2	20.2
TURBO SPEED, RPM	11,400	11,900	11,900	11,700	11,850	11,800	12,600
AFTERC. H2O IN, OF, SETPOINT	123	123	123	123	123	123	95.1
AFTERC H2O IN, ACTUAL	122.9 / 126	123.7 / 126	122.9 / 125.5	122.1 / 125.5	123.6 / 126	122.4 / 125	101.1 / 103.5
AFTERC. H2O OUT, OF	131	131.5	131	131	131	130.5	111.5
IN TEMP, OF, IN/OUT	152 / 156	152.5 / 154	152 / 154	152 / 154	151 / 154	151 / 154	150.5 / 154
OIL TEMP, OF, IN/OUT	141 / 153	143 / 153	141.5 / 153	142 / 153	141 / 152	141 / 152	140 / 152
CYL #1 LB OF	614	615	614	616	614	613	651
2LB	681	682	682	683	679	680	697
3LB	690	652	649	647	646	644	683
4LB	678	641	638	638	637	638	665
5LB	633	635	631	633	632	630	658
1RB	591	593	592	595	590	588	617
2RB	610	611	611	610	611	610	614
3RB	630	631	631	629	627	627	662
4RB	603	602	602	602	603	601	627
5RB	616	615	615	613	614	616	637
TURBINE IN/OUT, OF	70 / 529	70 / 538	70 / 529	70 / 534	70 / 534	70 / 539	72.8 / 548
% TORQUE	97 / 97	96.5 / 96.5	96.5 / 97	96 / 97	96 / 97	96 / 97	110.5 / 110.5
LAKOM, IN HG.	29.95	29.95	-	29.95	29.96	29.95	
% O2	15.25		15.7		15.625		15.6
% CO2	3.02		3.00		3.05		2.93
CO, PPM	240		236		240		191
CO LBS/HR	21.23		21.23				
CO g/BHP-HR	2.42		2.22				
NOx, PPM	68		66		62		86
NOx LBS/HR	9.89		9.38				
NOx g/BHP-HR	1.13		1.02				
TNC, PPM WAT	1200		1115		1200		1050
TNC LBS/HR	60.7		55.18				
TNC, g/BHP-HR	6.92		6.01				

(15 CYCLES) GHP by PFM =
SPEED IN " 4241.4
A/G BHP " 333
WOODWARD speed 4131

3304-334.2 333.5
270.6-337.8

Volatile Organic Carbon by Method 25

Client: <u>FLORIDA GAS</u>	Project #: _____
Plant: <u>MADISON STATION</u>	Sample Location: <u>Center of exhaust stack</u>
Operator: <u>LF NF TS</u>	Date: <u>3/17/92</u>
Run Number: <u>C-1</u>	Sample ID: <u>C-1</u>
Tank Number: <u>UT238</u>	Trap Number: <u>SOOB A 00020 N-13</u>
Sampling Train ID#: <u>RX25</u>	% CO2: <u>3.02</u>
Side: Left / Right: <u>#2</u>	% H2O: <u>9.2 7%</u>
Start Time: <u>1425</u>	Stop Time: <u>1530</u>

Pressure Readings	Tank Vacuum		Barometric Pressure mm Hg / in Hg	Ambient Temperature C / F
	Manometer mm Hg / in Hg	Gauge mm Hg / in Hg		
Pre Test	27.8	27.4	1015.6	25
Post Test	17.2	17.0	1015	25

Leak Rate	Tank (in Hg)		Trap black ball reading
	Allowable	Actual	
Pre Test	1.05	0.0	0
Post Test	1.05	0.0	0

$$\Delta P = .01 \frac{F P_b \theta}{V_t} = .01 \times 35 \times 29.45 \times 100 = 100$$

ΔP = Pressure Change (in Hg)
 F = Sampling Flow Rate (cc/min)
 P_b = Barometric Pressure (in Hg)
 θ = Leak Check Time Period (min)
 V_t = Sample Train Volume (cc); approx 100 cc

21.25 - 21 = .25

Clock Time	Gauge Vacuum (in Hg)	Flowmeter Setting (silver ball)	Probe Temp C / F	Filter Temp C / F	Notes
1425	27.4	35	265	250	
1430	27.0	35	265	250	
1435	26.2	35	265	250	
1440	24.9	35	264	251	
1445	24.5	33	263	254	
1450	24.0	35	262	252	
1455	23.4	33	265	251	
1500	22.9	35	264	250	
1505	21.5	35	262	249	
1510	19.7	35	265	250	
1515	19.0	35	266	251	
1520	18.5	35	267	254	
1525	17.7	35	264	255	
1530	17.2	35	263	253	



Volatile Organic Carbon by Method 25

Client: <u>Florida Gas</u>	Project #: _____
Plant: <u>MUNSON station</u>	Sample Location: <u>Centroid</u>
Operator: <u>LENE, JS</u>	Date: <u>3/17/92</u>
Run Number: <u>C-2</u>	Sample ID: <u>C-2</u>
Tank Number: <u>4T 222</u>	Trap Number: <u>(B53-</u>
Sampling Train ID#: <u>EX 25</u>	% CO ₂ : <u>3%</u>
Side: Left / Right: <u># 2</u>	% H ₂ O: <u>7%</u>
Start Time: <u>1530</u>	Stop Time: <u>1630</u>

Pressure Readings	Tank Vacuum		Barometric Pressure mm Hg / in Hg	Ambient Temperature C/F
	Manometer mm Hg / in Hg	Gauge mm Hg / in Hg		
Pre Test	27.9	28.4	29.92	77
Post Test	4.2	3.9	29.92 29.89	80

Leak Rate	Tank* (in Hg)		Trap black ball reading
	Allowable	Actual	
Pre Test	0.52	0.4	0
Post Test	.52	0.40	0

$$\Delta P = .01 \frac{F P_b \theta}{V_t}$$

ΔP = Pressure Change (in Hg) .01 $\frac{3521.92 (5)}{100}$
 F = Sampling Flow Rate cc / min
 P_b = Barometric Pressure (in Hg)
 θ = Leak Check Time Period (min)
 V_t = Sample Train Volume (cc); approx 100 cc

Clock Time	Gauge Vacuum (in Hg)	Flowmeter Setting (silver ball)	Probe Temp C/F	Filter Temp C/F	Notes
1530	28.4	35	264	250	
1535	26.0	35	263	251	
1540	25.1	35	264	250	
1545	24.0	35	265	252	
1550	22.3	35	264	251	
1555	20.5	35	262	254	
1600	18.0	37	269	259	
1605	17.0	38	265	252	
1610	14.3	40	265	253	
1615	10.9	39	264	252	
1620	7.8	38	266	250	
1625	6.2	39	265	252	
1630	3.9	40	266	253	



Volatile Organic Carbon by Method 25

Client: <u>FERROVIA GNS</u>	Project #: _____
Plant: <u>MUNSON STATION</u>	Sample Location: <u>center of engine shed</u>
Operator: <u>NE LF TS</u>	Date: <u>3/17/92</u>
Run Number: <u>C-3</u>	Sample ID: <u>C-3</u>
Tank Number: <u>4T 254</u>	Trap Number: <u>C-13</u>
Sampling Train ID#: <u>EX 25</u>	% CO2: <u>30%</u>
Side: Left / Right: <u>R 2</u>	% H2O: <u>7%</u>
Start Time: <u>1643</u>	Stop Time: <u>1743</u>

Pressure Readings	Tank Vacuum		Barometric Pressure mm Hg / in Hg	Ambient Temperature C/F
	Manometer mm Hg / in Hg	Gauge mm Hg / in Hg		
Pre Test	29.4	27.9	29.86	80 80
Post Test	7.1	6.1	29.86	73

Leak Rate	Tank* (in Hg)		Trap black ball reading
	Allowable	Actual	
Pre Test	.52	0	0
Post Test	1.52	0	0

$$\Delta P = .01 \frac{F P_b \emptyset}{V_t} = .01 \times 35 \times 29.86 \times 5$$

ΔP = Pressure Change (in Hg)

F = Sampling Flow Rate cc / min

P_b = Barometric Pressure (in Hg)

\emptyset = Leak Check Time Period (min)

V_t = Sample Train Volume (cc); approx 100 cc

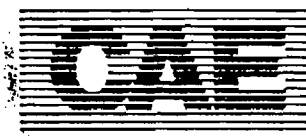
Clock Time	Gauge Vacuum (in Hg)	Flowmeter Settling (silver ball)	Probe Temp C/F	Filter Temp C/F	Notes
1643	29.4	40	260	252	
1648	27.1	40	262	252	
1653	25.0	40	264	254	
1658	23.1	40	265	255	
1703	20.9	40	267	255	
1708	18.1	40	267	256	
1713	17.2	39	267	254	
1718	16.3	37	270	253	
1723	15.4	39	265	251	
1728	14.2	38	264	253	
1733	12.2	37	260	255	
1738	9.0	40	260	255	
1743	6.1	37	261	252	



CHAIN OF CUSTODY RECORD
BEST AVAILABLE COPY

4550

PROJ. NO.		PROJECT NAME				NO. OF CONTAINERS	REMARKS				
DEPT. NO.		SAMPLERS: (Signature)									
8151		Cubix Corp				NHHO BLANK VALUE (ppmv)					
		Joseph Rudyk									
LAB NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION							
				TANK # 4T206	1.1						
	C-2	3/19/92	1020	4T210	0.7				Quincy - Fla GAS ?		
				4T217	0.4						
	C-2	3/17/92	1530	4T222	0.0				MUNSON - Fla GAS		
	C-1	3/17/92	1425	4T238	1.6				MUNSON - Fla GAS		
	C-1	3/18/92	1100	4T248	0.3				Garyville Fla GAS		
	C-3	3/17/92	1643	4T254	0.1				MUNSON - Fla GAS		
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
[Signature]		4/1/92 11:42		[Signature]		[Signature]		[Signature]		[Signature]	
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
[Signature]		[Signature]		[Signature]		[Signature]		[Signature]		[Signature]	
Relinquished by: (Signature)		Date / Time		Received for Laboratory by:		Date / Time					
[Signature]		[Signature]		[Signature]		[Signature]					
REMARKS:											



Clean Air Engineering

500 W. Wood Street
Palatine, IL 60067
708/991-3300

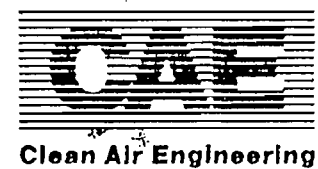
4334

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME				NO. OF CONTAINERS	REMARKS							
DEPT. NO.		SAMPLERS: (Signature)												
LAB NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION										
8151		Cubix Corp.				008 BLANK VALUE (ppmv)	/ / / / / /							
Joseph Rudyk														
	C-1	3/26/92	830	Trap # B35	3.0						Melbourne - Fla. GAS ✓			
	C-2	3/7/92	1530	B53	4.5						MUNSON - Fla. GAS ✓			
	C-5	3/27/92		B233	1.3						Melbourne			
	C-2	3/24/92	1130	C1	2.4						Silver Springs - Fla. GAS ✓			
	C-1	3/19/92	900	C3	3.5						Quincy - Fla. GAS ✓			
	Audit-2	3/26/92		C7	0.8						Melbourne			
	C-3	3/29/92	1120	C10	6.6						Perry - Fla. GAS ✓			
	C-3	3/17/92	1643	C13	3.6						MUNSON - Fla. GAS ✓			
	C-3			C15	3.6						BROOKER			
	C-2	3/6/92	955	C37	0.8						Melbourne - Fla. GAS ✓			
	C-2	3/7/92	1300	Room	4.3	Caring with C-Perf								
				Room	1.2									
				Room	2.5									
				X1	2.6									
	C-1	3/20/92	830	X10	2.5	Perry - Fla. GAS ✓								

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[Signature]	4/1/92 1:42	[Signature]	[Signature]		
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[Signature]		[Signature]	[Signature]		
Relinquished by: (Signature)	Date / Time	Received for Laboratory by:	Date / Time		
[Signature]		[Signature]			

REMARKS:



500 W. Wood Street
Palatine, IL 60067
708/991-3300

4335

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME				NO. OF CONTAINERS	REMARKS				
DEPT. NO.		SAMPLERS: (Signature)									
8151		Cubix Corp				CO ₂	BLANK VALUE (ppmV)				
		Joseph Rudyk									
LAB NO.	SAMPLE NO.	DATE	TIME	SAMPLE LOCATION							
→	C-2	3/20/92	1000	Trap # X13 ? Brooker		1.8				Perry - Fla. GAS ✓	
				X14		0.9					
				X16		2.3					
	Audit 1	3/26/92		X23		2.6				Melbourne	
				X27		1.8					
				X28		8.0					
	C-3	3/24/92	1100	X32		3.3				Melbourne - Fla. GAS ✓	
	C-1	3/24/92	1000	X48		9.0				Silver Springs - Fla. GAS ✓	
	C-4	3/27/92		X4		2.3				Melbourne	
	C-3	3/19/92	1135	N2		5.6				Quincy - Fla. GAS ✓	
	C-3	3/24/92	1310	N4		3.0				Silver Spring - Fla. GAS ✓	
				N7		2.1					
	C-6	3/27/92		N8		2.6				Melbourne	
	C-1	3/17/92	1425	N15		8.7				Munson - Fla GAS ✓	
	C-1	3/26/92	1100	N19		3.0				Carville Fla GAS ✓	
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
[Signature]		4/1/92 142		[Signature]		[Signature]		[Signature]		[Signature]	
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
[Signature]		[Signature]		[Signature]		[Signature]		[Signature]		[Signature]	
Relinquished by: (Signature)		Date / Time		Received for Laboratory Use		Date / Time		Date / Time		Date / Time	
[Signature]		[Signature]		[Signature]		[Signature]		[Signature]		[Signature]	
REMARKS:											



Clean Air Engineering

500 W. Wood Street
Palatine, IL 60067
708/991-3300

Table of Carbon Concentration for Method 25.
 Samples collected by Cubix Corp. at Florida
 Gas & Trans on 3/17/92 and reported on 4/30/92.

Source	Sample - Run ID #	Carbon Concentration			
		Total (Mc) (mg/dscm)	Total (C) (ppmv)	Conden- sible (Ccm) (ppmv)	Noncon- densible (Ctm) (ppmv)
MUNSON STATION	C-1	158.8	318.0	269.5	48.5
	C-2	165.6	331.6	285.7	45.9
	C-3	138.6	277.7	235.3	42.4

Compiled By: *Skipped my* On: 5-1-92

Approved By: *B.C.* On: 5/1/92



Job No. 8160
 Client Cubix
 Disk/File 8160MUN
 Page No. 2

Plant: Florida Gas & Trans.
 Sample Loc. Munson Station
 (In/Out) Centroid
 Date 3/19/92

Preliminary Data-----

Run No.	C-1	C-2	C-3
Tank No.	4T238	4T222	4T254
Trap No.	N0 13	B53	C13
Tank Volume V(cc)	4272	4255	4265

Field Data-----

PTI (mm Hg)	-706	-709	-747
TTI (F)	85	77	80
PbI (mm Hg)	760	760	758
PT (mm Hg)	-437	-107	-180
TT (F)	85	80	73
Pb (mm Hg)	760	759	758

Noncondensable Organics-----

PT(Lab) (mm Hg)	-400	-80	-158
TT(Lab) (F)	77	77	77
Pb(Lab) (mm Hg)	749	749	749
PTF (mm Hg)	922	920	920
TTF (F)	77	77	77
PbF (mm Hg)	749	749	749
Ba (ppmv C)	1.6	0.0	0.1
Ctm 1 (ppmv C)	9.1	15.7	14.7
Ctm 2 (ppmv C)	9.5	17.5	14.4
Ctm 3 (ppmv C)	9.3	16.1	14.7
Avg. Ctm (ppmv C)	9.3	16.4	14.6
RSD Ctm (%)	2.2	5.8	1.2

Condensable Organics-----

ICV Tank No.	4T243	4T249	4T154
ICV Tank, Vv (cc)	4277	4255	3995
PFI (mm Hg)	-742	-742	-742
TFI (F)	77	77	77
PbFI (mm Hg)	749	749	749
PF (mm Hg)	920	920	920
TF (F)	78	77	78
PbFf (mm Hg)	749	749	749
Bt (ppmv C)	8.7	4.5	3.6
Ccm 1 (ppmv C)	50.2	105.9	87.5
Ccm 2 (ppmv C)	52.1	106.2	90.8
Ccm 3 (ppmv C)	52.4	108.3	90.7
Avg. Ccm (ppmv C)	51.6	106.8	89.7
RSD Ccm (%)	2.3	1.2	2.1

Total Gaseous Nonmethane Organics (TGNMO)=====

Vs (cc)	1467	3291	3151
Dil. Factor (Non)	6.298	2.793	2.924
Dil. Factor (Con)	6.286	2.793	2.734
Ct (ppmv C)	48.5	45.9	42.4
Cc (ppmv C)	269.5	285.7	235.3
Ct+Cc= C (ppmv C)	318.0	331.6	277.7
Mc (mg C/dscm)	158.8	165.6	138.6



APPENDIX B: EXAMPLE CALCULATIONS

MOISTURE CONTENT

refers to test run C-1 at Munson Station No. 12

$$\begin{aligned}V_1 &= \text{initial dry gas meter reading} = 388.525 \text{ ft}^3 \\V_2 &= \text{final dry gas meter reading} = 413.270 \text{ ft}^3 \\V_{\text{net}} &= \text{total gas sample volume collected (ft}^3\text{)} \\&= V_2 - V_1 \\&= 413.270 - 388.525 = 24.745 \text{ ft}^3\end{aligned}$$

$$\begin{aligned}M_1 &= \text{initial weight of impinger train} = 2542.9 \text{ g} \\M_2 &= \text{final weight of impinger train} = 2576.4 \text{ g}\end{aligned}$$

$$\begin{aligned}\text{MWC} &= \text{total weight gain of all impingers (g)} \\&= M_2 - M_1 = 2576.4 - 2542.9 \\&= 33.5 \text{ g}\end{aligned}$$

$$K_d = \text{dry gas meter factor (unitless)} = 0.9904$$

$$\begin{aligned}V_{\text{corrected}} &= V_{\text{net}} \times K_d = x \\&= 24.745 \times 0.9904 = 24.507 \text{ ft}^3\end{aligned}$$

1.335 liters weighs 1 gram at standard conditions
499.4 = Gas constant

$$\begin{aligned}P_{\text{bar}} &= \text{barometric pressure (in Hg)} = 29.95 \\T &= \text{temperature of gas DGM (F}^\circ\text{)} = 131.0\end{aligned}$$

F_w = moisture fraction by volume

$$\begin{aligned}&= \frac{\text{volume H}_2\text{O collected in impingers}}{\text{vol. H}_2\text{O collected} + \text{volume gas dry gas collected}}\end{aligned}$$

$$\begin{aligned}&= \frac{\text{MWC} \times 1.335}{(\text{MWC} \times 1.335) + (((V_{\text{cor}} \times P_{\text{bar}}) / (T + 460)) \times 1.335)} \\&= \frac{(33.5 \times 1.335)}{(33.5 \times 1.335) + (((24.507 \times 29.95) / (131.0 + 460)) \times 499.4)} \\&= 0.063 \text{ moisture}\end{aligned}$$

Moisture Content via Stoichiometry

Refers to test run #1

H = Ambient humidity (via psychrometer) = 0.0159 lb/lb air

O₂ = O₂ concentration in stack = 15.25%

F = wet basis O₂ F-factor (from fuel calcs)

= 10641 DSCF/MMBTU

FW = moisture F-factor = 2006 SCF of H₂O/MMBTU

CM = combustion moisture % at 0% O₂

= $F_w / F \times 100 = 2006 / 10641 \times 100$

= 18.85 %

F_w = moisture content

= $(CM \times (20.9 - O_2) / 20.9) + (H \times 64.3)$

= $(18.85 \times (20.9 - 15.25) / 20.9) + (.0159 \times 64.3)$

= 6.12 %

MOLECULAR WEIGHT

refers to test run C-1 at Munson Station No. 12

$$\begin{aligned} MW_{H_2O} &= \text{molecular wt of } H_2O = 18 \text{ lb/lb-mole} \\ MW_{CO_2} &= \text{molecular wt of } CO_2 = 44 \text{ lb/lb-mole} \\ MW_{O_2} &= \text{molecular wt of } O_2 = 32 \text{ lb/lb-mole} \\ MW_{N_2} &= \text{molecular wt of } N_2 = 28 \text{ lb/lb-mole} \\ C_{CO_2} &= \text{concentration of } CO_2 = 3.0 \text{ (from analyzer)} \\ C_{O_2} &= \text{concentration of } O_2 = 15.0 \text{ (from analyzer)} \\ C_{N_2} &= \text{concentration of } N_2 = 1 - (C_{CO_2} + C_{O_2}) = 0.82 \\ F_w &= \text{moisture fraction} = 0.0673 \\ F_d &= \text{dry gas fraction} = 1 - F_w = 0.9327 \end{aligned}$$

MW = molecular weight of stack gas (lb/lb-mole)

$$= \text{wt of } H_2O + \text{wt. of } CO_2 + \text{wt. of } O_2 + \text{wt. of } N_2$$

$$= (MW_{H_2O} \times F_w) + (F_d \times ((MW_{CO_2} \times C_{CO_2}) + (MW_{O_2} \times C_{O_2}) + (MW_{N_2} \times C_{N_2})))$$

$$= (18 \times 0.0673) + (0.9327 \times ((44 \times 0.03) + (32 \times 0.15) + (28 \times 0.82)))$$

$$= 28.33 \text{ lb/lb-mole}$$

STACK GAS VELOCITY AND FLOW RATE

refers to test run C-1 at Munson Station No. 12

$$\begin{aligned}K_p &= \text{pitot tube factor} = .84 \\ \Delta P &= \text{pressure difference in stack as measured (in. H}_2\text{O)} \\ (\sqrt{\Delta P})_{\text{avg}} &= \text{average of square root of } \Delta P\text{'s} = 1.27221 \\ T_s &= \text{stack temperature} = 539 \text{ F}^\circ = 999 \text{ R}^\circ \\ P_b &= \text{atmospheric pressure (in Hg)} = 29.95 \\ P_g &= \text{stack static pressure (in. H}_2\text{O)} = -0.18 \\ P_s &= \text{absolute stack pressure} \\ &= P_b + (P_g \times .0735 \text{ in.Hg / in.H}_2\text{O}) = 29.93 \text{ in. Hg}\end{aligned}$$

V = stack velocity (ft/min)

$$\begin{aligned}&= 5128.8 \times K_p \times (\sqrt{\Delta P})_{\text{avg}} \times \sqrt{(T_s / (P_s \times MW))} \\ &= 5128.8 \times .84 \times 1.27221 \times \sqrt{(999 / (29.93 \times 28.33))} \\ &= 5949 \text{ ft/min}\end{aligned}$$

Q_a = stack flow rate (ft³/min)

$$\begin{aligned}&= V \times A, \text{ where } A = \text{area of stack} = 6.87 \text{ ft}^2 \\ &= 6131 \times 6.87 = 40,871 \text{ ft}^3/\text{min}\end{aligned}$$

Q_d = stack flow rate on dry basis at standard conditions (SCFH)

$$\begin{aligned}&= Q_a \times 1059 \times (P_s / T_s) \times F_d \\ &= 40871 \times 1059 \times (29.93 / 999) \times 0.9327 \\ &= 1.21 \times 10^6 \text{ SCFH}\end{aligned}$$

FLOW RATE DETERMINATION BY F-FACTOR (EPA Method 19)
refers to test run C-1 at Munson Station No. 12

$$\begin{aligned}Q_f &= \text{fuel flow} = 30866 \text{ SCF/hr} \\F_{\text{BTU}} &= \text{heating value of gas} = 1027 \text{ BTU/SCF} \\F &= \text{O}_2 \text{ F factor} = 8635 \text{ SCF/MMBTU} \\C_{\text{O}_2} &= \text{concentration of O}_2 = 15.25 \%(\text{from analyzer})\end{aligned}$$

$$\begin{aligned}Q_d &= \text{stack flow rate on dry basis at standard conditions (SCFH)} \\&= Q_f \times F_{\text{BTU}} \times 10^{-6} \times F \times 20.9 / (20.9 - C_{\text{O}_2}) \\&= 30,866 \times 1027 \times 10^{-6} \times 8635 \times 20.9 / (20.9 - 15.25) \\&= 1.01 \times 10^6 \text{ SCFH}\end{aligned}$$

With CO₂ F-factor (i.e. F=1023), same calculation is used except for final term.....

$$\begin{aligned}Q_d &= Q_f \times F_{\text{BTU}} \times 10^{-6} \times F \times 100/C_{\text{CO}_2} \\&= 30866 \times 1027 \times 10^{-6} \times 1023 \times 100/3.02 \\&= 1.07 \times 10^6 \text{ SCFH}\end{aligned}$$

* For calculation of f-factor and heating value of fuels, see Appendix H.

MASS EMISSION RATES

refers to test run C-1 at Munson Station No. 12

NO_x = concentration of NO_x (uncorrected) = 68 ppmv

CO = observed concentration of CO = 240 ppmv

VOC = observed concentration via EPA Method 25 and 18
= 66 ppmv

1 SCF NO_x = 11.94×10^{-8} lbs

1 SCF CO = 7.26×10^{-8} lbs

1 SCF C1(methane) = 4.15×10^{-8} lbs

E_{NO_x} = mass emission rate of NO_x (lb/hr)

= NO_x x Qd x 11.94×10^{-8}

E_{NO_x} = $68 \times 1.21 \times 10^6 \times 11.94 \times 10^{-8}$

E_{NO_x} = 9.8 lb/hr

E_{CO} = 21.1 lb/hr

E_{VOC} = 3.3 lb/hr

HP = engine horsepower = 4171 hp

454 g = 1.0 lb

E_{NO_x} (g/hp-hr) = E_{NO_x} x 454 / HP
= $9.8 \times 454 / 4171$

E_{NO_x} (g/hp-hr) = 1.07 g/hp-hr

E_{CO} (g/hp-hr) = 2.3 g/hp-hr

E_{VOC} (g/hp-hr) = 0.36 g/hp-hr

Stack Gas Flow Rate via AGA Carbon Balance Method

Refers to Test Run #C-1

Assume 7600 BTU/hp-hr (standard for engine)

HTG = heating value of fuel = 1026 BTU/SCF (from fuel calcs)

hp = engine load = 4171 BHP

$$\begin{aligned} Q_f &= \text{fuel flow} = 7600 \times 4171 / 1026 \\ &= 30896 \text{ SCF/hr} \end{aligned}$$

Cf = carbon content of fuel (from fuel analysis) = 1.026

$$\begin{aligned} C_e &= \text{exhaust gas carbon content} \\ &= \text{CO} + \text{THC (as C1)} + \text{CO}_2 \\ &= (240 + 1200) / 10000 + 3.02 = 3.16 \% \end{aligned}$$

Q = stack flow rate

$$\begin{aligned} &= Q_f \times C_f \times 100 / C_e \\ &= 30896 \times 1.026 \times 100 / 3.16 \\ &= 1 \times 10 \text{ SCFH} \end{aligned}$$

SO2 Emission Rate from Fuel Analysis

Refers to Test Run #C-1

S = sulfur content of fuel = <0.059 grains/100 DSCF

7000 grains = 1.0 lb

Q_f = 30896 SCF/hr

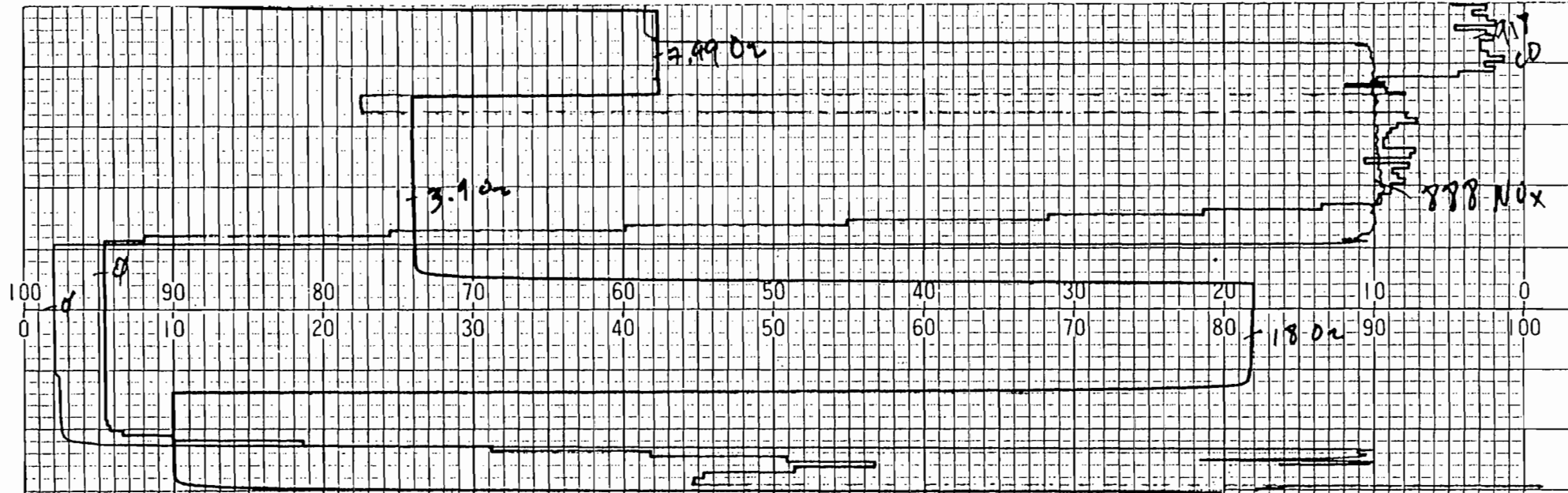
SO₂ = mass emission rate of SO₂

= S / 100 / 7000 x Q_f

= <.059 / 100 / 7000 x 30896

= <0.0026 lbs/hr

**APPENDIX C:
QUALITY ASSURANCE ACTIVITIES**



Multipoint Linearity

• FLORID GAS
MUNSON STATION
3-17-92

NOx
CO
O2

Leak Check @ 21" Hg

1600cm (6334)

N2-01-25-20M

NO_x CONVERTER EFFICIENCY

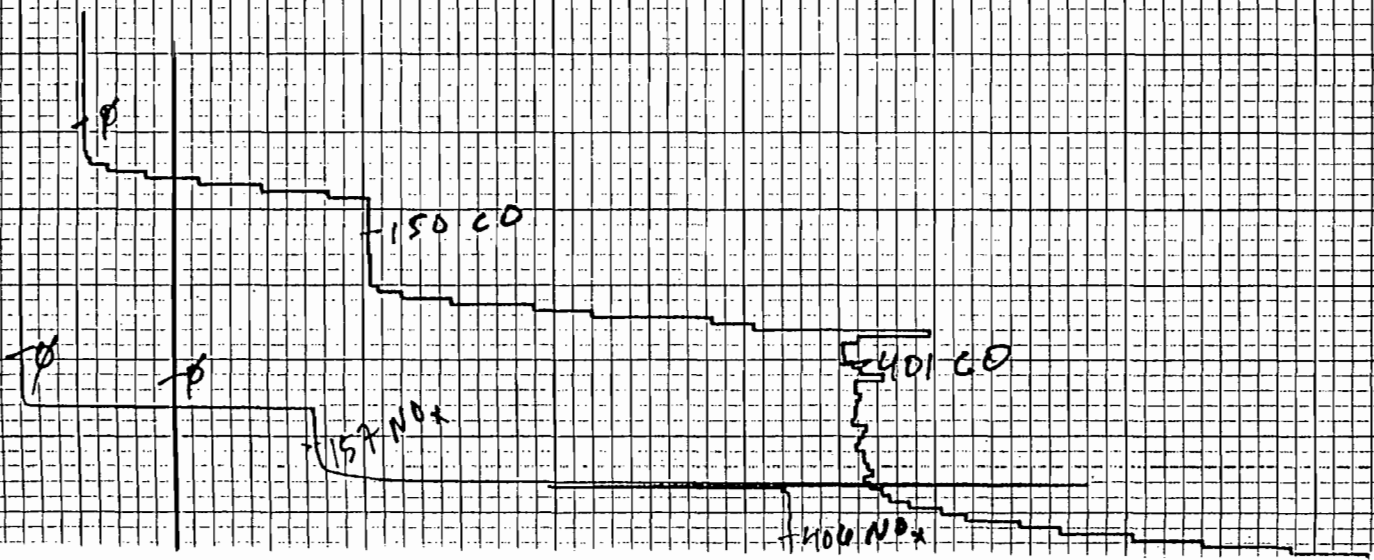
CHART NO. RN2-01-25-20M

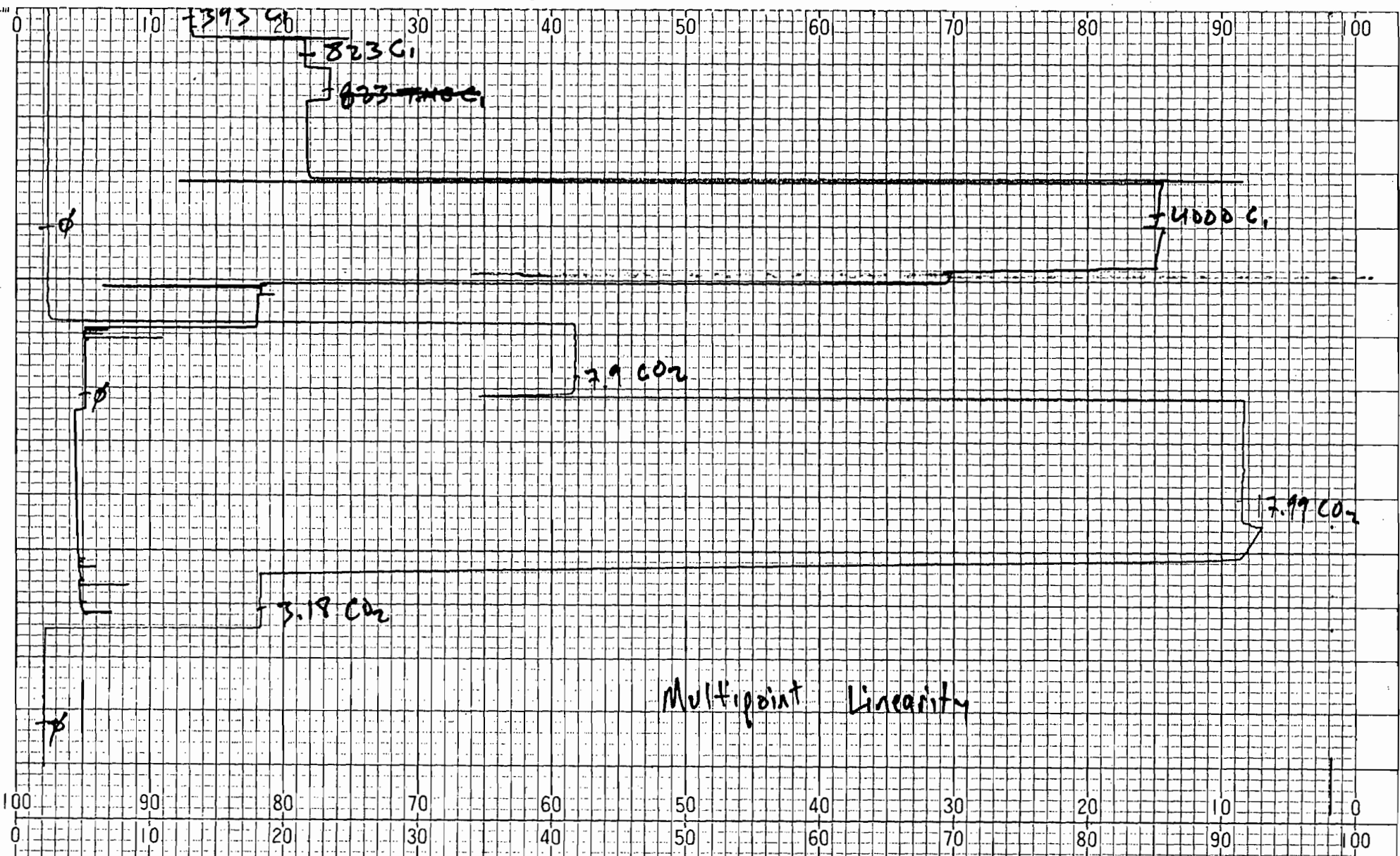
Thru the Probe 157 NO_x
NO_x IS AVAILABLE SYSTEM BIKES CHECK

Charts, Inc.

1580cm

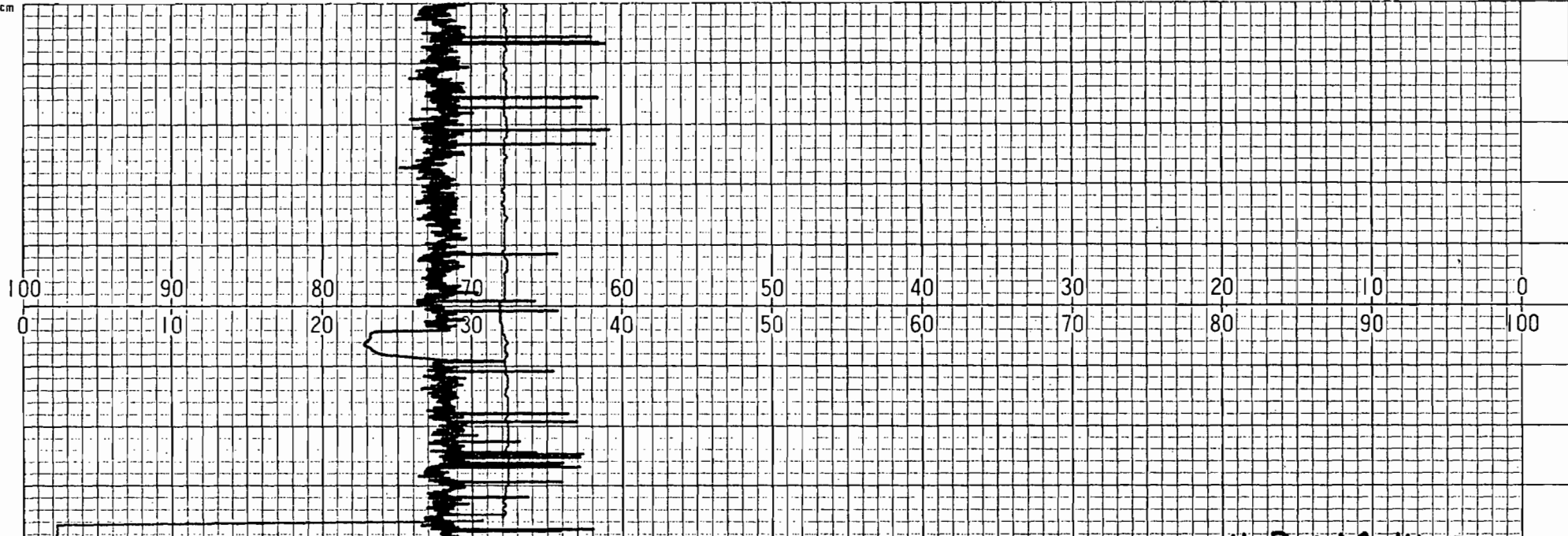
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100





FLORIDA GAS
MUNSON Station
3-17-92

CO₂
TAC



(6334)

CHART NO. RN2-01-25-20M

Charts, Inc

Start cal @ 14:15

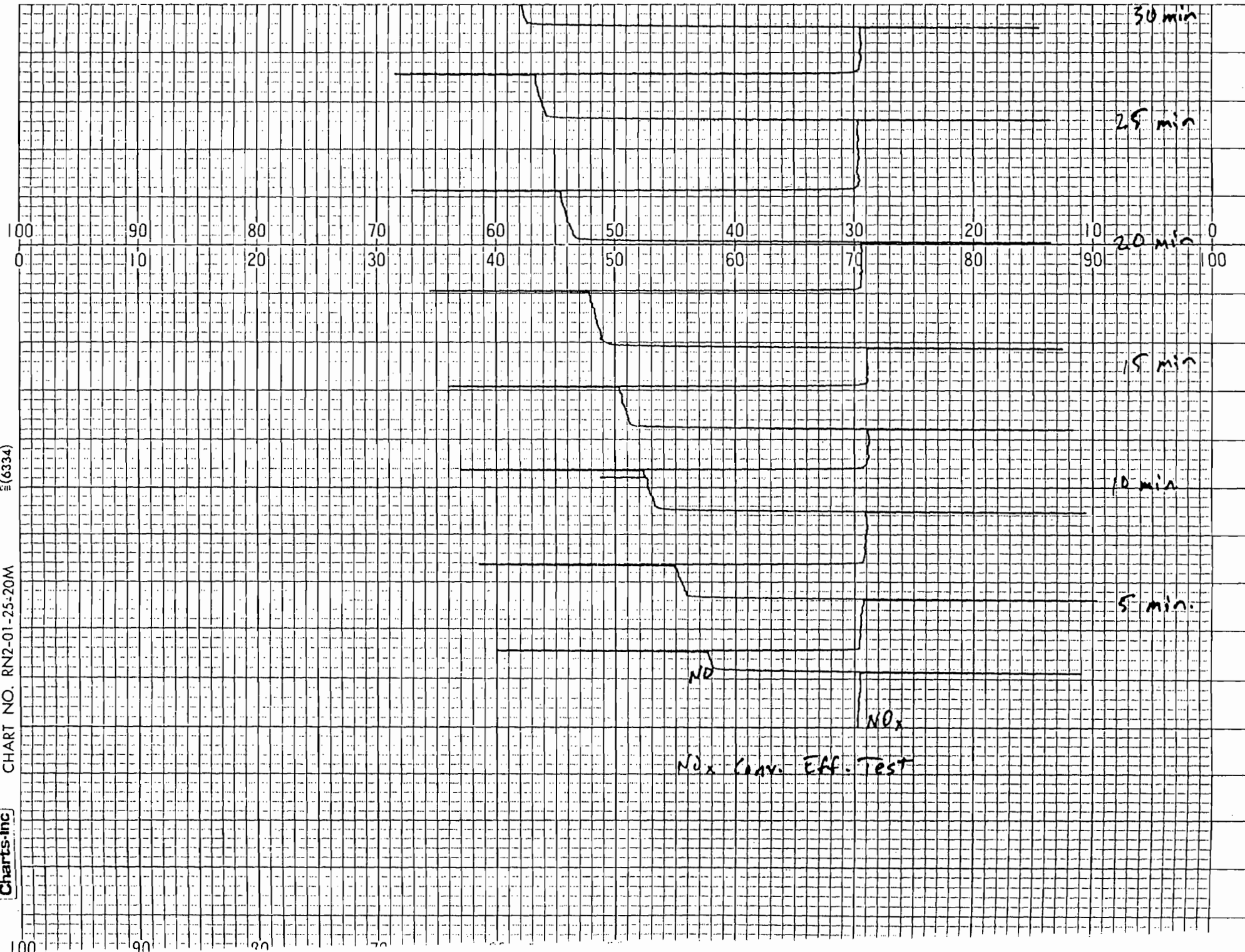
4000 C₁

3.17 CO₂

4000 C₁

Through Probe Time
4000 C₁

80 C₁



1540
E (6334)

CHART NO. RN2-01-25-20M

Charts-Inc

100 90 80 70 60 50 40 30 20 10 0

Gaseous Emission QA Worksheet: Munson Compressor Station

GASEOUS EMISSION	CERTIFIED GAS INPUT		INITIAL CALIBRATION & LINEARITY CHECK			ZERO and SPAN CALIBRATION CHECK			ZERO and SPAN CALIBRATION CHECK			ZERO and SPAN CALIBRATION CHECK		
	Concentration (% or ppm)	Target (% Chart)	Initial (% Chart)	Difference (% Chart)	TEST RUN C-1 Avg. ppm	Final (% Chart)	Drift (% Chart)	TEST RUN C-2 Avg. ppm	Final (% Chart)	Drift (% Chart)	TEST RUN C-3 Avg. ppm	Final (% Chart)	Drift (% Chart)	
NOx														
zero	0.0	2.0	2.0	0.0	68.0	2.0	0.0	66.0	2.0	0.0	62.0	0.0	0.0	
low	157.7	17.8	17.5	-0.3	% Chart			% Chart			% Chart			
mid	406.4	42.6	41.5	-1.1	36.0	81.1	0.6	35.0	0.5	0.0	33.0	80.5	0.0	
high	888.1	90.8	90.5	-0.3										
full scale	1000.0				200.0			200			200			
O2					Avg. %			Avg. %			Avg. %			
zero	0.0	10.0	10.0	0.0	15.3	10.0	0.0	15.70	10.0	0.0	15.62	10.0	0.0	
low	3.99	26.0	26.0	0.0	% Chart			% Chart			% Chart			
mid	7.98	41.9	42.4	-0.1	71.0	81.5	-0.5	72.8	81.8	-0.2	72.5	81.5	-0.5	
high	17.99	82.0	82.0	0.0										
full scale	25.0				25.0			25			25			
CO					Avg. ppm			Avg. ppm			Avg. ppm			
zero	0.0	5.0	5.0	0.0	240.0	5.0	0.0	236.0	5.0	0.0	240.0	5.0	0.0	
low	150.0	20.0	20.2	0.2	% Chart			% Chart			% Chart			
mid	401.0	45.1	46.0	0.9	53.0	84.9	-0.1	52.2	86.0	0.8	53.0	85.5	0.3	
high	918.0	96.8	97.0	0.2										
full scale	1000.0				500.0			500			500			
CO2					Avg. %			Avg. %			Avg. %			
zero	0.0	2.0	2.0	0.0	3.02	2.0	0.0	3.00	2.0	0.0	3.05	2.0	0.0	
low	3.18	17.9	18.1	0.2	% Chart			% Chart			% Chart			
mid	7.99	42.0	41.9	0.0	32.2			32.0			32.5			
high	17.99	92.0	91.8	-0.1		33.8	0.0		33.5	-0.3		33.8	0.0	
full scale	20.0				10.0			10			10			
THC					Avg. ppm			Avg. ppm			Avg. ppm			
zero	0.0	5.0	5.0	0.0	1200.0	10.0	5.0	1115.0	10.0	5.0	1200.0	10.0	5.0	
low	19.80	6.6	11.9	5.3	% Chart			% Chart			% Chart			
mid	395.0	12.9	13.0	0.1	29.0			27.3			29.0			
high	823.0	21.5	21.8	0.3		85.0	0.0		85.5	0.5		85.0	0.0	
full scale	5000.0				5000.0			5000			5000			

TR 7

Environmental Instruments Division

108 South Street
Hopkinton, Massachusetts 01748
(617) 435-5321

INTERFERENCE RESPONSE TEST

DATE OF TEST JAN 20, 1992

ANALYZER TYPE 10AAS RANGE 0-25PPM SERIAL NO. 105-19481-184

<u>TEST GAS TYPE</u>	<u>CONCENTRATION PPM</u>	<u>ANALYZER OUTPUT RESPONSE</u>	<u>% OF SPAN</u>
<u>CO</u>	<u>500</u>	<u><.1 PPM</u>	<u><.1%</u>
<u>CO₂</u>	<u>201</u>	<u><.1 PPM</u>	<u><.1%</u>
<u>CO₂</u>	<u>10%</u>	<u><.1 PPM</u>	<u><.1%</u>
<u>O₂</u>	<u>20.9%</u>	<u><.1 PPM</u>	<u><.1%</u>

Continuous Emission Analyzer Interference Response Tests

Date: 7/8/88
 Technician: KRB/MMM

Analyzer Type: Thermo Environmental
 Analyzer Model: Model 48 Gas Filter Correlation Analyzer
 Serial Number: 48-23576-210
 Analyzer Test Range: 0-20 ppmv

Test Gas		Analyzer Response		Response Ratio
Type Gas	Concentration	Concentration <u>ppmv</u>	% of Range	
Air	CO Free	0.0	N/A	
CO ₂ /O ₂	4% / 18%	0.0	↓	0.000
CO ₂ /O ₂	12% / 18%	-0.2		-0.017 / -0.025 } ppmv / %
CO ₂ /O ₂	21% / 13%	-0.3		-0.014 / -0.100 } CO Impurity?
Air	Dry	0.4		0.002
NO _x	176 ppmv	0.4		0.0001
NO _x	3230 ppmv	0.4		0.0005
SO ₂	401 ppmv	-0.2		0.002
Propane	240 ppmv	0.4		

↑
 all interferences are
 negligible

Response Time Data Sheet

Date: 3/24/89

Plant: Austin Office

Technician: MM/DC

Sample Manifold Press.: 6 psi

Sample Line Length: 140 ft.

Pump Model No.: 6-3 Dia-pump

Analyzer: NO_x Analyzer

Oxygen Analyzer

Model: TECO 10AR

Teledyne 320 AX

Range: 0-1000 ppm

0-25%

Span Gas: 900 ppm NO_x

Air = 20.9% O₂

Upscale Response .65 min

.72 min

.60

.75

.60

.80

Average .61 min

.76 min

Downscale Response .65 min

.90 min

.65

.90

.65

.85

Average .65 min

.88 min

Comments:

3/8" Sample line
Igloo Condenser

Instrumental Analysis
Quality Assurance Data

Date: 3/17/92
Plant: MONSON COMPRESSOR Station
Technician: LF TS NT

NOx Analyzer: NO2 to NO Converter Efficiency Test

	NOx Concentration (ppm)	% Decrease from Initial Concentration	NO Concentration (ppm)
Initial Concentration	685	0	560
10 minute Concentration	685	0	505
20 minute Concentration	685	0	450
30 minute Concentration	685	0	400
Full Scale	1000		

Sample System Bias Check

Parameter	Calibration Gas Concentration (ppm)	Full Scale Span (ppm)	Direct Calibration Response (ppm)	Sample System Response (ppm)	Sample System Bias (% of Span)
NOx	157.7	1000	159	158	< 0.1%
THC	4000	5000	4000	4000	0%
NOx					
NOx					

Sample System Leak Check

Run #	in. of mercury Initial	in. of mercury Final
1	21.0	21.0
3	20.5	20.5

Table of Carbon Concentration for Method 25.
 Audit samples collected by Cubix Corp. at Fl.
 Gas & Trans on 3/26/92 and reported on 4/30/92.

Source	Sample - Run ID #	Carbon Concentration			
		Total (Mc) (mg/dscm)	Total (C) (ppmv)	Conden- sible (Ccm) (ppmv)	Noncon- densible (Ctm) (ppmv)
AUDITS	#470A	110.7	221.8	89.3	132.5
	#470B	806.8	1615.9	131.8	1484.1

Compiled By: *Stefan J. J...* On: 5-1-92

Approved By: *S.C.* On: 5/1/92



Job No. 8160
 Client Cubix
 Disk/File 8160
 Page No. 2

Plant: Florida Gas & Trans
 Sample Loc. Audits
 (In/Out)
 Date 3/26/92

Preliminary Data-----

	Audit #473B	Audit #473A
Run No.		
Tank No.	4T128	4T107
Trap No.	X23	C7
Tank Volume V(cc)	4033	4010

Field Data-----

PTI (mm Hg)	-711	-709
TTI (F)	85	82
PbI (mm Hg)	760	760
PT (mm Hg)	0	0
TT (F)	82	78
Pb (mm Hg)	760	760

Noncondensable Organics-----

PT(Lab) (mm Hg)	24	4
TT(Lab) (F)	78	78
Pb(Lab) (mm Hg)	734	734
PTF (mm Hg)	924	920
TTF (F)	78	78
PbF (mm Hg)	734	734
Ba (ppmv C)	0.2	0.1
Ctm 1 (ppmv C)	56.3	642.8
Ctm 2 (ppmv C)	56.7	627.8
Ctm 3 (ppmv C)	56.9	639.3
Avg. Ctm (ppmv C)	56.6	636.6
RSD Ctm (%)	0.5	1.2

Condensable Organics-----

ICV Tank No.	4T143	4T266
ICV Tank, Vv (cc)	4047	4270
PFI (mm Hg)	-720	-722
TFI (F)	78	78
PbFI (mm Hg)	734	734
PF (mm Hg)	1840	940
TF (F)	78	78
PbFf (mm Hg)	734	734
Bt (ppmv C)	2.6	0.8
Ccm 1 (ppmv C)	26.6	52.1
Ccm 2 (ppmv C)	27.2	53.9
Ccm 3 (ppmv C)	27.2	53.7
Avg. Ccm (ppmv C)	27.0	53.2
RSD Ccm (%)	1.3	1.9

Total Gaseous Nonmethane Organics (TGNMO)=====

Vs (cc)	3678	3675
Dil. Factor (Non)	2.348	2.332
Dil. Factor (Con)	3.658	2.513
Ct (ppmv C)	132.5	1484.1
Cc (ppmv C)	89.3	131.8
Ct+Cc= C (ppmv C)	221.8	1615.9
Mc (mg C/dscm)	110.7	806.8



**APPENDIX D:
CALIBRATION CERTIFICATIONS**

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 532228

Your P.O. # : 92 0000

Expiration Date : 7-21-93

Cylinder Number : AAL5112

Cylinder Pressure 1900 psig

1 of 1 Component(s)

Customer : CUBIX CORPORATION 9225 LOCKHART HWY AUSTIN TX 78747

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES PERFORMED ACCORDING TO SECTION 3.0.4 Certified Per Traceability Procedure # G1 Protocol # 1 File # PD-2143 Certified Accuracy 1% NPS traceable

Table with columns: ANALYZED CYLINDER, REFERENCE STD, INSTRUMENTATION, COMPONENT, CERTIFIED CONC., SRM #, CYLINDER NUMBER, CONC., INSTR/MODEL/SERIAL #, LAST CALIBRATION DATE, ANALYTICAL PRINCIPLE. Includes data for Nitrogen Dioxide and Nitrogen.

Table with columns: FIRST ANALYSIS, SECOND ANALYSIS, CALIBRATION CURVE. Includes sub-columns for TEST, REFERENCE, ZERO, RESULTS, DATE, SRM #, CONC., SFLIT, DVM, FITTED, PERCENT.

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

Handwritten signatures and initials: F.P. Davis, J. Shapiro

BEST AVAILABLE COPY



Scott Specialty Gases, Inc.

FAX: 713-644-0244
PHONE: 713-644-4820

3714 LAPAS DRIVE, HOUSTON, TEXAS 77023

6/03/91

CUBIX CORPORATION
9225 LOCKHART

PROJECT #: 04-11057
PO #: 91105

AUSTIN
KEVUN JANCK

TX 78747-0000

CYLINDER #: ALM006621

ANALYTICAL ACCURACY: +-1%

COMPONENT	REQUESTED CONCENTRATION	ANALYSIS 1 (MOLES) U/M
COBALT MONOXIDE	150.0 PPM	150. PPM
ETHANE	80.0 PPM	79.7 PPM
HYDROGEN	BALANCE	BALANCE

ANALYTICAL METHOD: GRAV.MASTER GAS

DATE OF ANALYSIS: 6/03/91

ANALYST:

John P. McCulloch
ANALYST

APPROVED BY:

[Signature]
SUPERVISOR

CERTIFIED

BEST AVAILABLE COPY



Scott Specialty Gases, Inc.

3714 LAFAS DRIVE, HOUSTON, TX 77023-0000
PHONE: 713-644-4820 FAX: 713-644-0244

10/17/91

CUBIX CORPORATION
9225 LOCKHART HWY

PROJECT #: 04-13936
PO #: 910523

AUSTIN

TX 78747-0000

CYLINDER #: AAL9308

ANALYTICAL ACCURACY: +-1%

COMPONENT	REQUESTED CONCENTRATION	ANALYSIS 1 (MOLES) U/M
RBON MONOXIDE	400.0 PPM	401. PPM
THANE	400.0 PPM	395. PPM
TROGEN	BALANCE	BALANCE

ANALYTICAL METHOD: ACUBLEND MASTER

DATE OF ANALYSIS: 10/17/91

ANALYST: John R. Waller
ANALYST

APPROVED BY: [Signature]
SUPERVISOR



Scott Specialty Gases, Inc.

3714 LAPAS DRIVE, HOUSTON, TX 77023-0000
PHONE: 713-644-4820 FAX: 713-644-0244

10/22/91

CUBIX CORPORATION
9225 LOCKHART HWY

PROJECT #: 04-18836
PO #: 910505

AUSTIN

TX. 78747-0000

CYLINDER #: AAL13971

ANALYTICAL ACCURACY: +-1%

COMPONENT	REQUESTED CONCENTRATION	ANALYSIS 1 (MOLES) U/M
CARBON MONOXIDE	910.0 PPM	818. PPM
ETHANE	820.0 PPM	823. PPM
NITROGEN	BALANCE	BALANCE

NOTES: EXP: 11/92

ANALYTICAL METHOD: ACUBLEND MASTER

DATE OF ANALYSIS: 10/22/91

ANALYST:

ANALYST

APPROVED BY:

SUPERVISOR

FILED

[Handwritten signature]

[Handwritten signature] 10/23



POST OFFICE BOX 908
 LA PORTE, TEXAS 77571
 TELEPHONE: (713) 471-2544

RECEIVED JAN 17 1992

WILSON OXYGEN AND SUPPLY CO.
 2801 MONTOPOLIS
 AUSTIN, TX 78760

Date 1-8-92

Our Invoice # 104-63230

Your P.O. # 04312

Lot No. _____

Gentlemen:

Below are the results of the analysis you requested, as reported by our laboratory. Results are in volume percent, unless otherwise indicated.

LABORATORY REPORT ON GAS ANALYSIS

IR

	CYL. # MIXTURE REQ.	ANALYSIS
CARBON DIOXIDE	<u>SX-23633</u>	<u>3.18% ± .02</u>
OXYGEN	<u>18.00%</u>	<u>17.9% ± .02</u>
NITROGEN	<u>BALANCE</u>	<u>BALANCE</u>

IR

	CYL. # MIXTURE REQ.	ANALYSIS
	<u>SX-23625</u>	<u>7.99% ± .02</u>
	<u>8.00%</u>	<u>7.98% ± .02</u>
	<u>BALANCE</u>	<u>BALANCE</u>

IR

	CYL. # MIXTURE REQ.	ANALYSIS
CARBON DIOXIDE	<u>SX-23652</u>	<u>17.99% ± .02</u>
OXYGEN	<u>18.00%</u>	<u>3.99% ± .02</u>
NITROGEN	<u>4.00%</u>	<u>BALANCE</u>

	CYL. # MIXTURE REQ.	ANALYSIS

ACCEPTED BY

[Signature]

WILSON OXYGEN

Analyst *[Signature]*
 JOHN K. WRIGHT

Pitot Tube Calibration Sheet

Date: 10/22/91
Technician: JB
Calibration pitot tube
 Type: std
 Size (OD): 1/4"
 ID number: 450
 Cp (std): 0.99
S-Type pitot tube
 Size (OD): 1/4"
 ID Number: 107

A-Side Calibration			
Δp std in H2O	Δp s in H2O	Cp(s)	DEV
0.640	0.895	0.837	0.002
0.640	0.900	0.835	0.004
0.635	0.890	0.836	0.003
0.415	0.575	0.841	0.002
0.420	0.580	0.842	0.003
0.415	0.570	0.845	0.006
0.210	0.290	0.842	0.003
0.205	0.285	0.840	0.001
0.205	0.290	0.832	0.007
A-Side Averages		0.839	0.003

B-Side Calibration			
Δp std in H2O	Δp s in H2O	Cp(s)	DEV
0.205	0.290	0.832	0.003
0.205	0.285	0.840	0.004
0.205	0.285	0.840	0.004
0.430	0.600	0.838	0.003
0.435	0.605	0.839	0.004
0.430	0.605	0.835	0.001
0.625	0.885	0.832	0.003
0.625	0.890	0.830	0.006
0.630	0.890	0.833	0.002
B-Side Averages		0.835	0.003

Average DEV =	0.003	must be less \leq 0.01
Cp(s) from Side A - Cp(s) from Side B =	0.004	must be less \leq 0.01

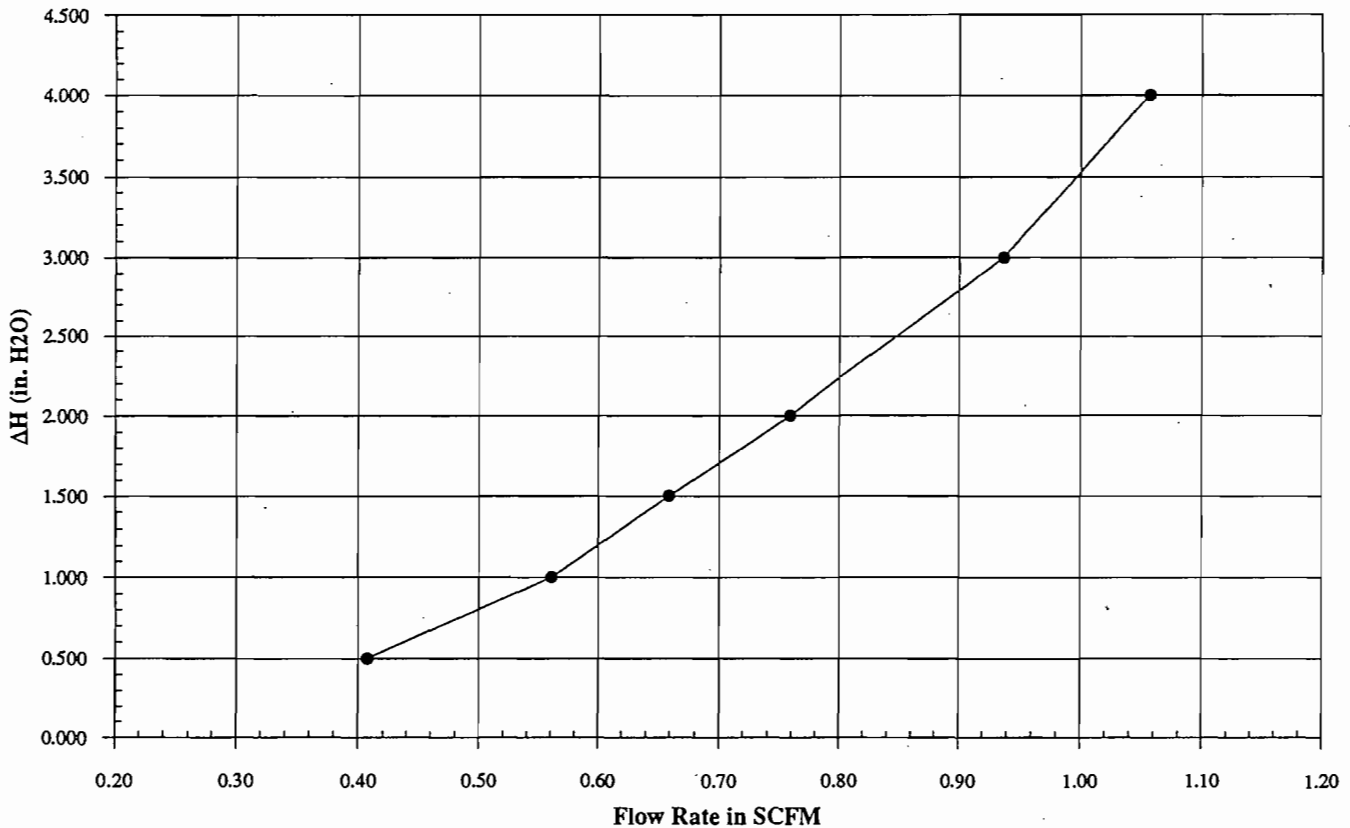
METER BOX DRY GAS METER and ORIFICE CALIBRATION

Date: 8/2/91
 Prev. Callb. Date: 12/27/90
 Location: 1713 Fortview, Austin, Tx
 Technician: DH,LI,JB
 Meter No: 1286-3061
 Atm. Pressure: 29.32

Test Meter ID: P164240
 Make & Model: American Singer
 Calibration Factor: 0.998

Orifice Meter Setting ΔH (in. H ₂ O)	Elapsed Time (min.)	Meter Box				Standard Test Meter				Calculated Meter Factor (Kd)	Calculated $\Delta H @ 0.75$ SCFM (" H ₂ O)
		Starting Reading ft ³	Ending Reading ft ³	Starting Avg. Temp. °F	Ending Avg. Temp. (°F)	Starting Reading (ft ³)	Ending Reading (ft ³)	Starting Avg. Temp. (°F)	Ending Avg. Temp. (°F)		
0.50	10.00	43.095	47.310	77	86	0.000	4.080	72	72	0.9821	1.704
1.00	10.00	47.310	53.164	86	97	4.080	9.695	72	72	0.9899	1.767
1.50	10.00	53.164	60.138	97	109	9.695	16.300	72	73	0.9956	1.880
2.00	10.00	60.138	68.398	109	114	16.300	23.900	73	73	0.9797	1.868
3.00	10.00	68.398	78.344	114	120	23.900	33.287	73	73	1.0121	1.820
4.00	10.00	78.344	89.968	120	124	33.287	43.872	73	72	0.9834	1.888
Averages:				101	108			73	73	0.9904	1.845

Differential Pressure vs. Flow Rate Calibration Curve Andersen 8/91



Trailer # 7 Altimeter

ALTIMETER SCALE ERROR					
PART NO. <u>5934P-1A.83</u>			SERIAL NO. <u>3H909</u>		
ALTIMETER PRESSURE					
TEST PT (FT)	INDICATOR READINGS AT + 25 ° C	TEST PT (FT)	INDICATOR READINGS AT + 25 ° C	TEST PT (FT)	INDICATOR READINGS AT + 25 ° C
-1000	0	8,000	-45	30,000	
0 0	-20	10,000	-50	35,000	
500	-15	12,000	-70	40,000	
1000	-10	14,000	-70	45,000	
1500	-15	16,000	-65	50,000	
2000	-15	18,000	-50	55,000	
3000	-25	20,000	-45	60,000	
4000	-25	22,000		70,000	
6000	-30	25,000		80,000	

BFG/C9102

COMPONENT ALTIMETER
 PART NO. 5934P-1A.83
 SERIAL NO. 3H909
 MFG. UNITED WORK ORDER # K0687

Overhaul Repair Bench Check & Test

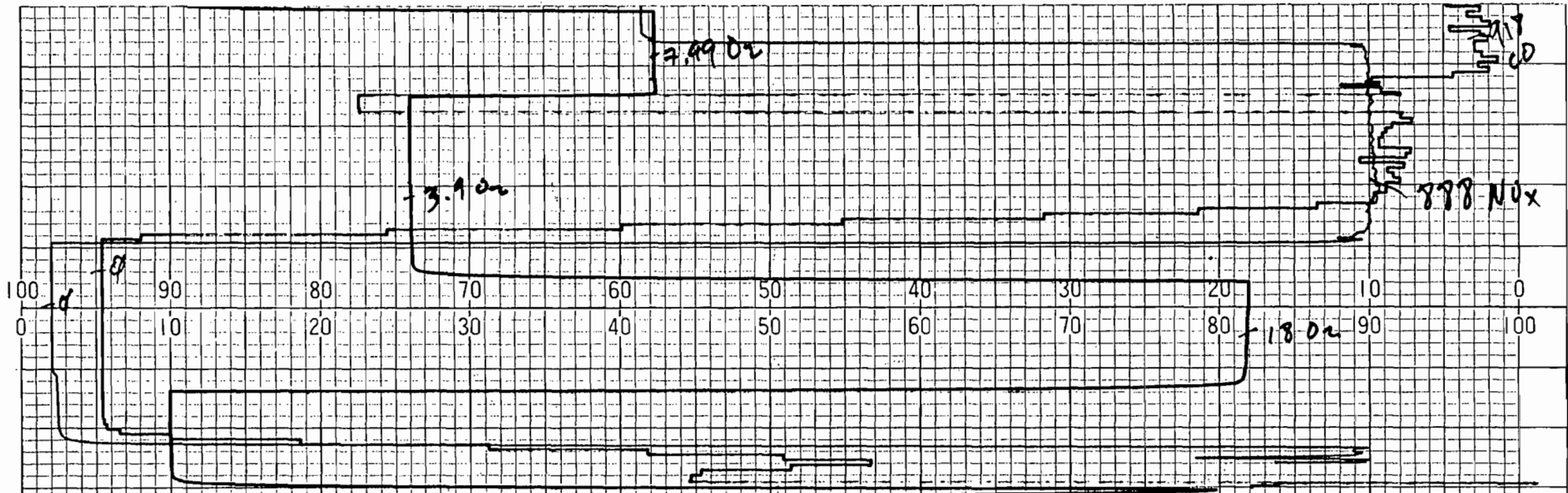
The Aircraft Appliance Identified above was overhauled, repaired, or bench tested (as per block marked) and inspected, in accordance with current Federal Aviation Administration Regulations, and is approved for return to service. Details of this component are on file at this repair station.

Joy Lucerni
 AUTHORIZED SIGNATURE

FEB 11 1992
 DATE

**APPENDIX E:
STRIP CHART RECORDS**

NO_x, O₂, CO



Multipoint Linearity

• FLOZID GAS
MUNSON STATION
3-17-92

NOx
CO
Oz

Leak Check @ 31" Hg

N2-01-25-20M
1600cm (6334)

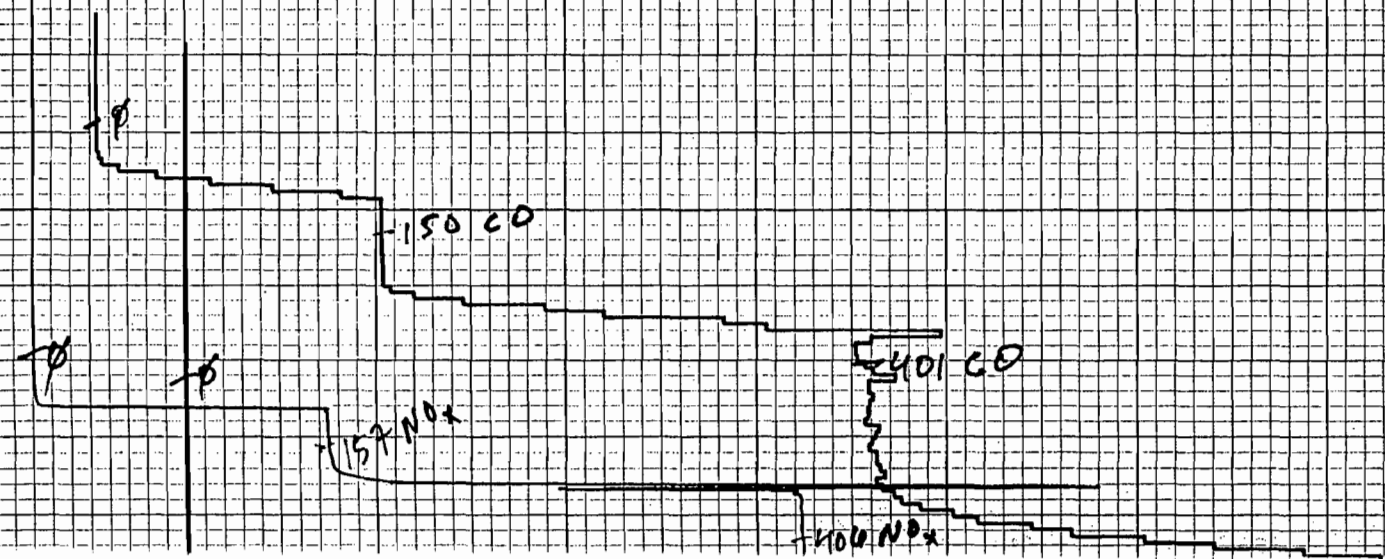
NOx CONVERTER EFFICIENCY

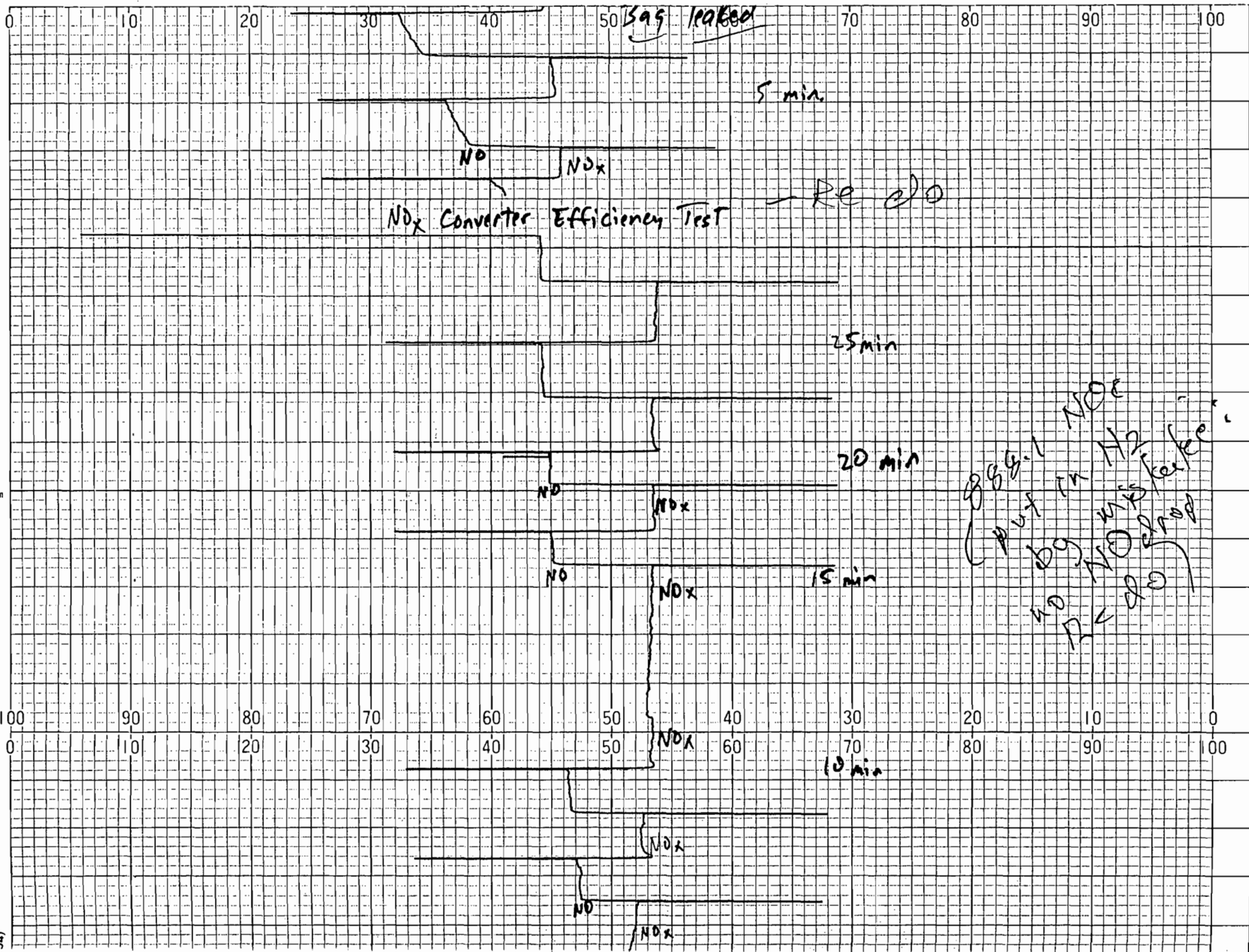
CHART NO. RN2-01-25-20M

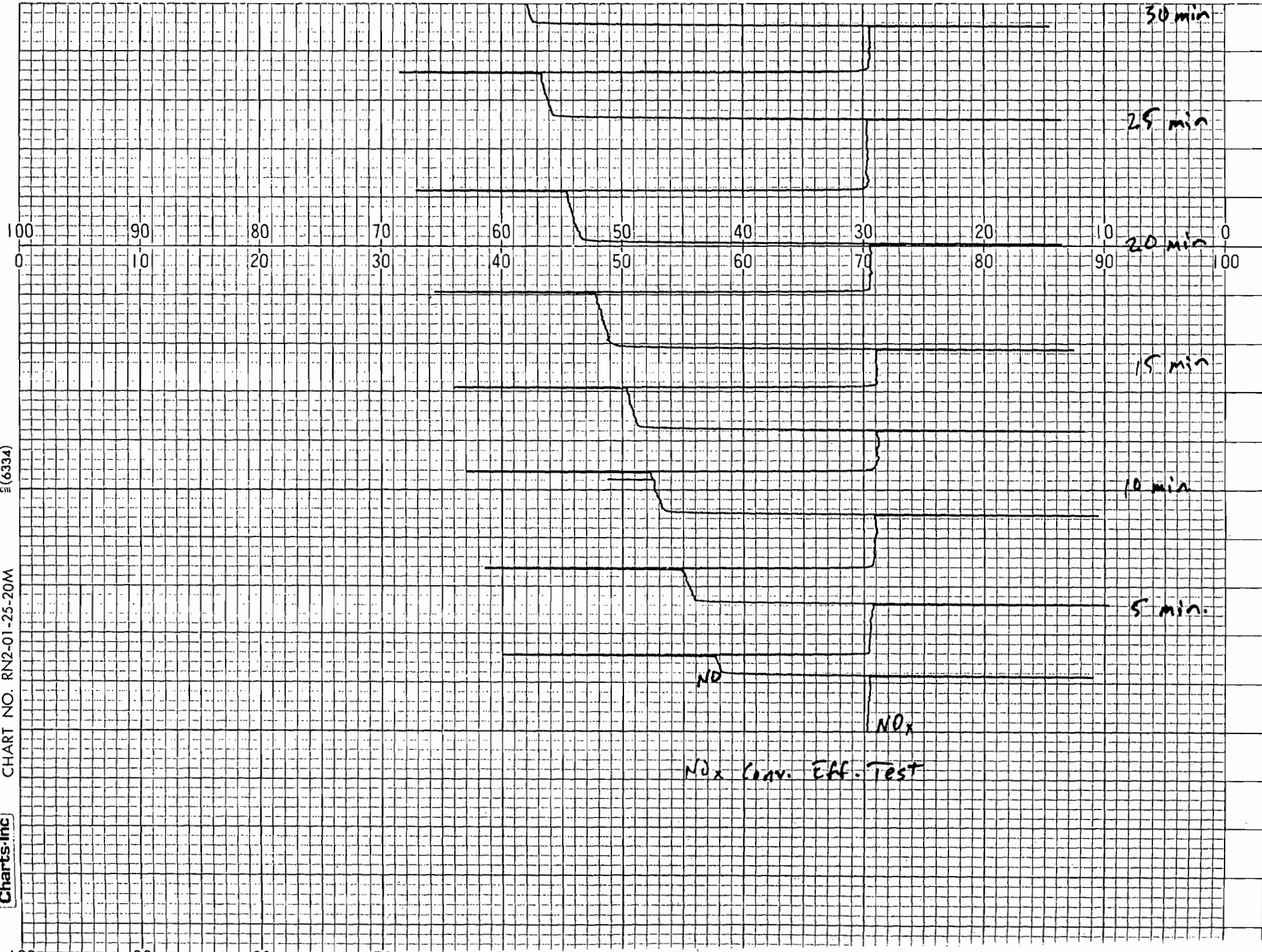
Thru the Probe 157 NOx
NOx IS AVAILABLE & SYSTEM BIMS CHECK

Charts, Inc.

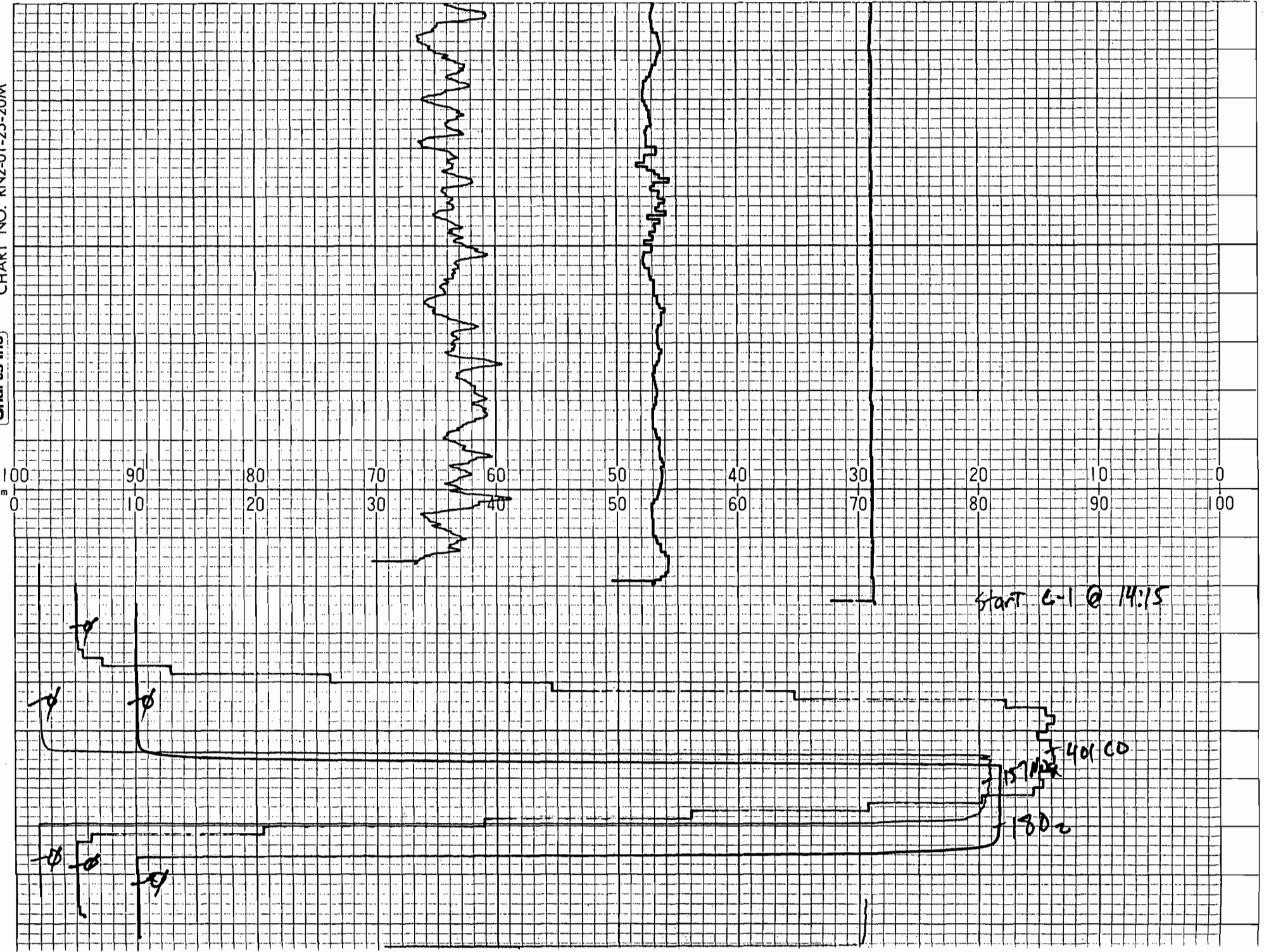
1580cm
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100





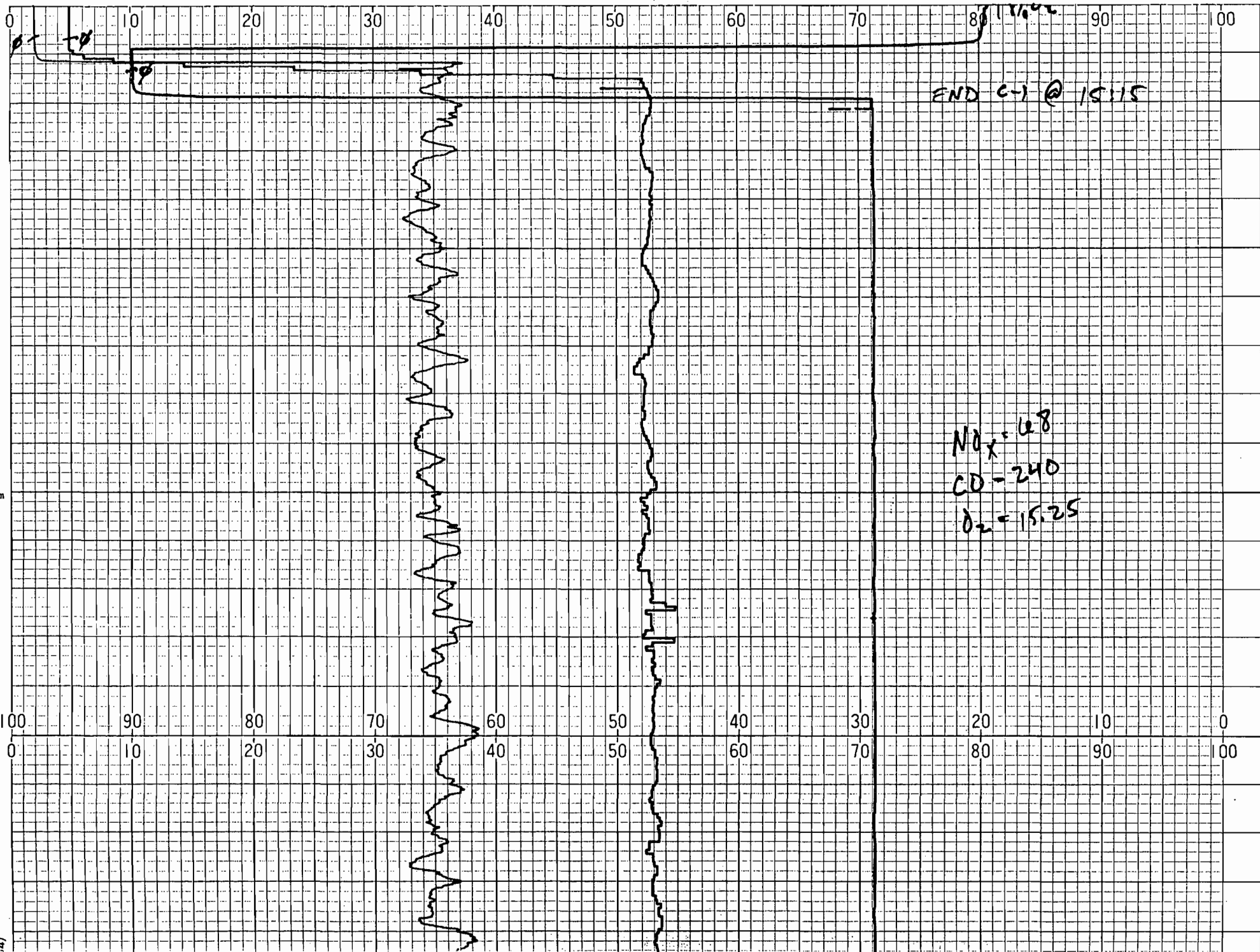


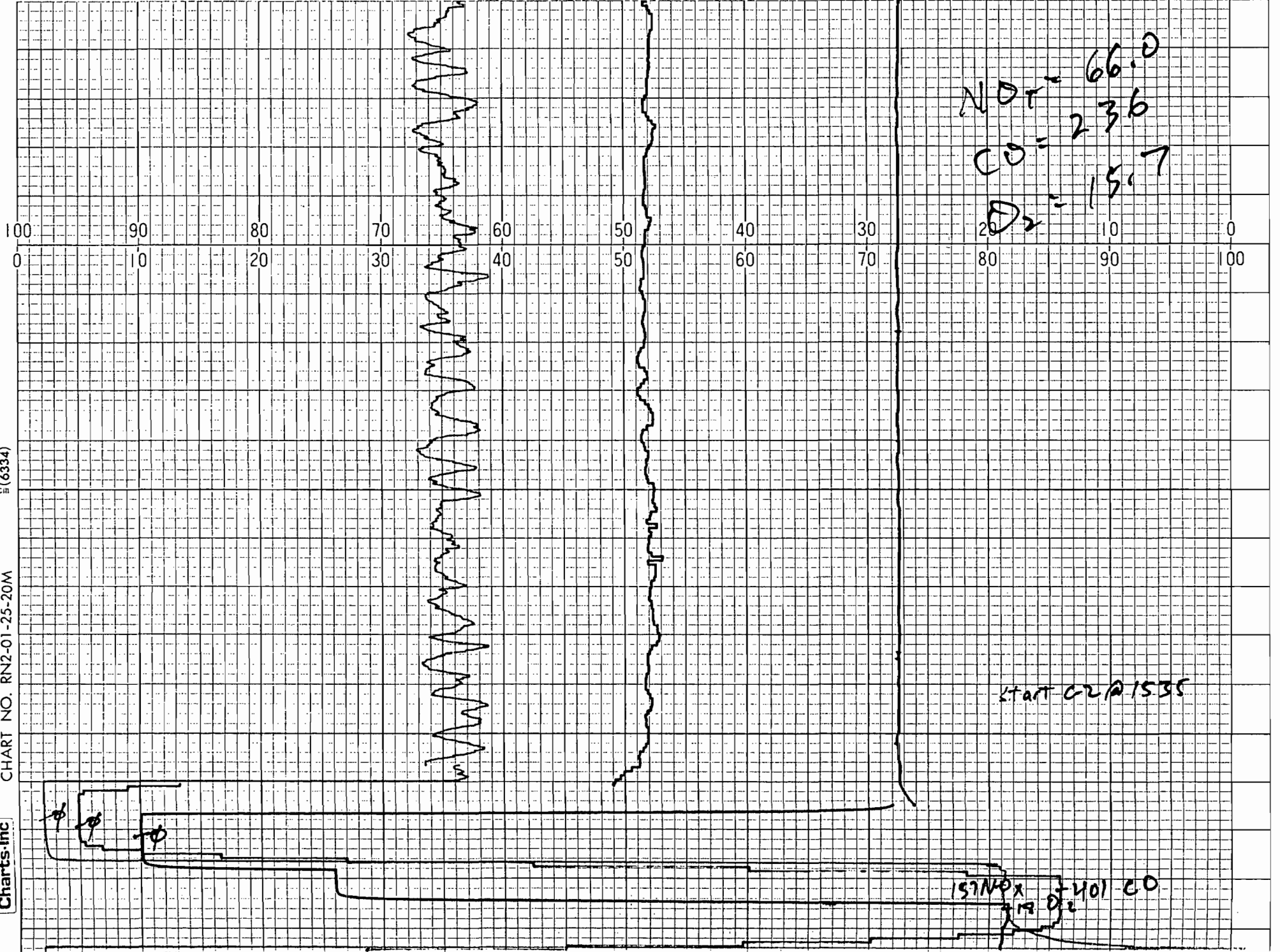
1520cm



Start C-1 @ 14:15

1300
1570
400 CO





NO₂ = 66.0
CO = 236
O₂ = 15.7

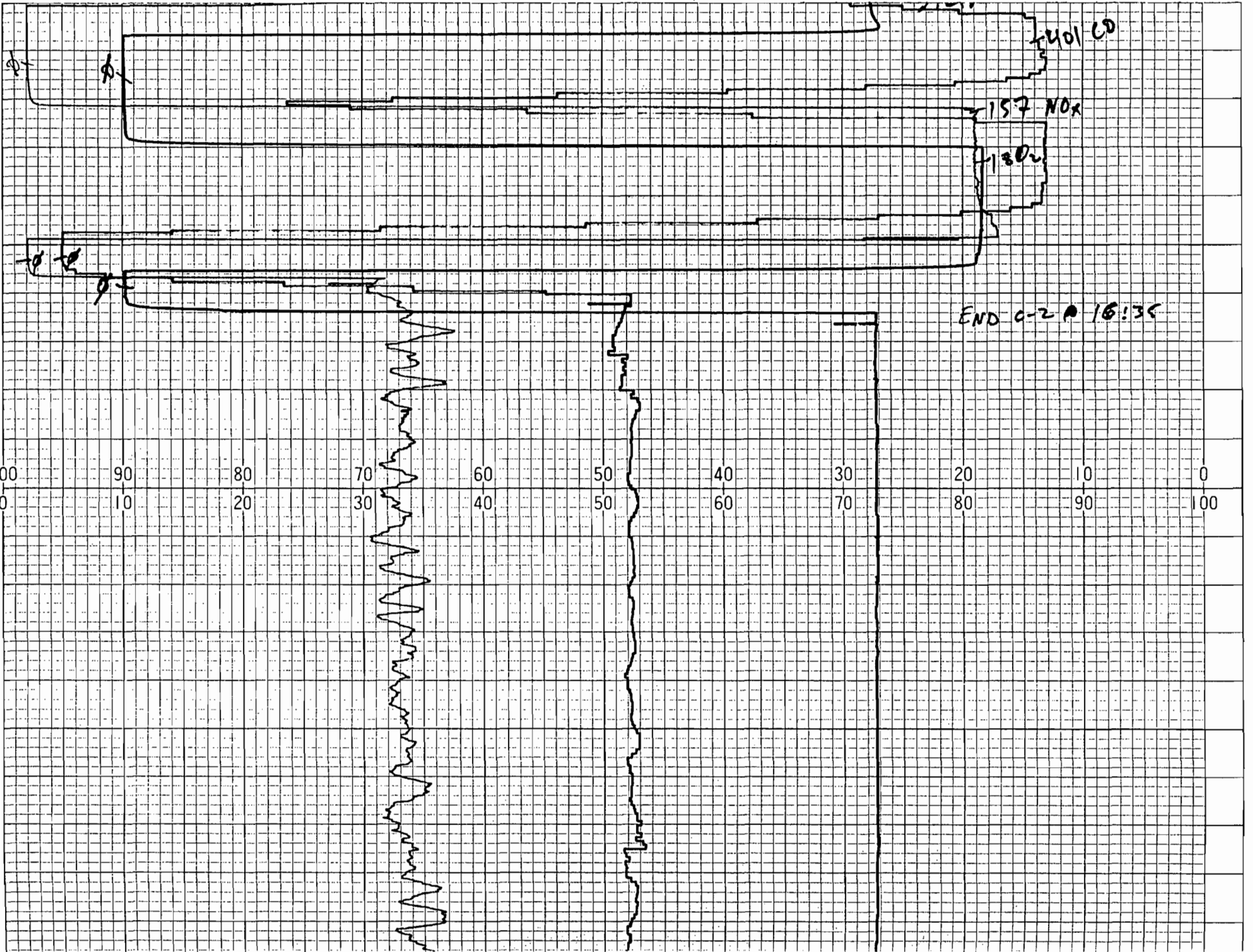
Start O₂ @ 1535

157NO_x
1701 CO

CHART NO. RN2-01-25-20M

Charts-Inc

1460cm

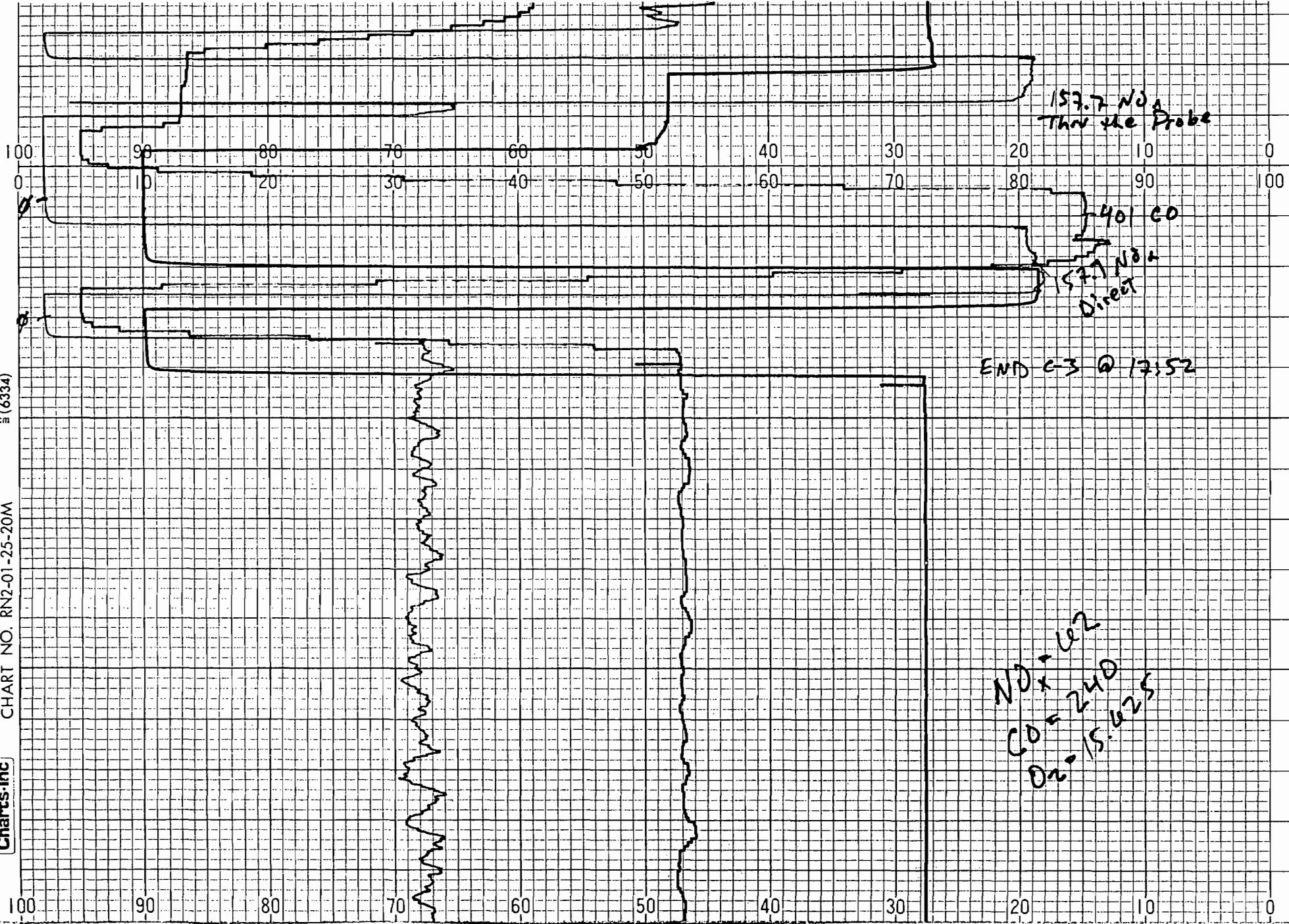




1426 (6334)

CHART NO. RN2-01-25-20M

Charts Inc



157.7 N/A
Thru the Probe

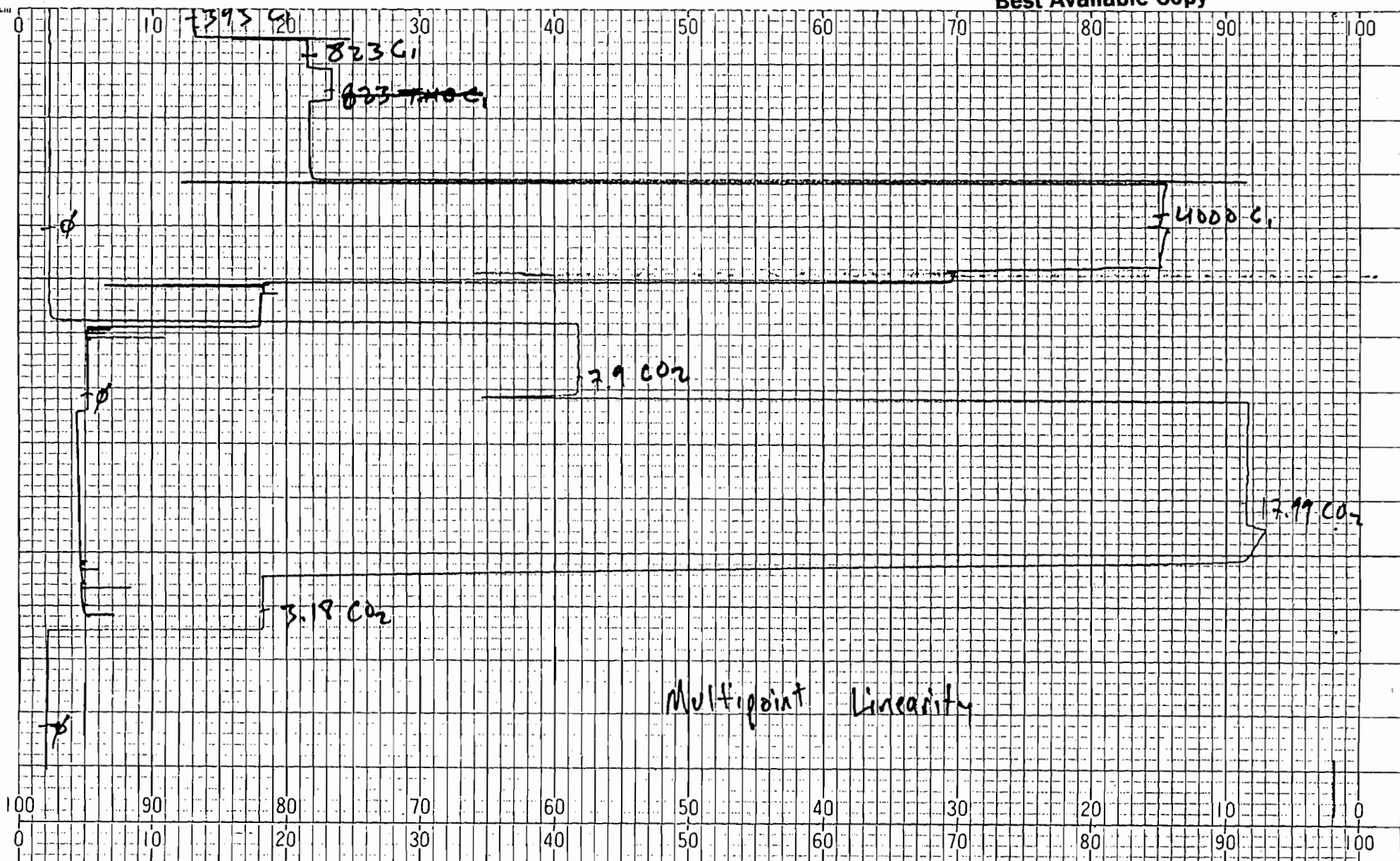
401 CO

157.7 N/A
Direct

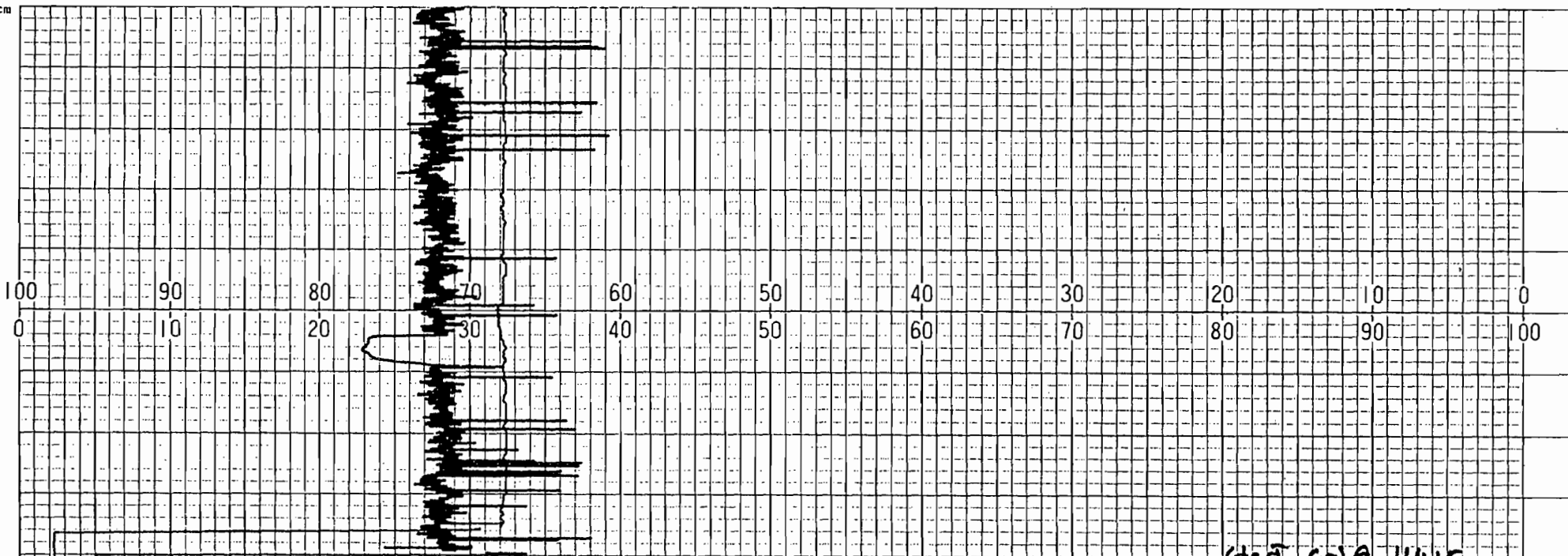
END C-3 @ 17:52

ND = 42
CO = 240
Dz = 15.425

CO₂, THC



FLORIDA GAS
MUNSON Station CO₂
3-17-92 THC



(6334)

CHART NO. RN2-01-25-20M

Charts-Inc

START @ 14:15

4000 G.

3.17 CO₂

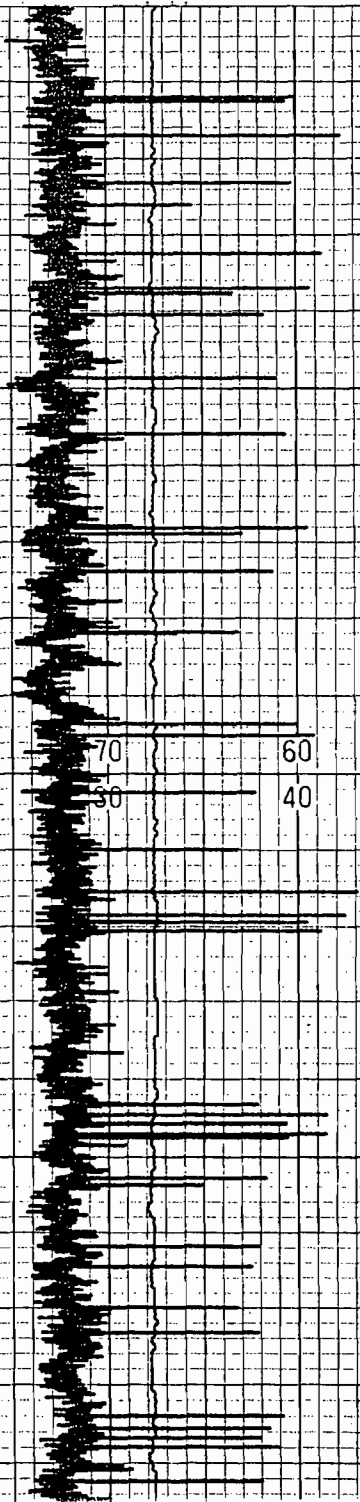
4000 G.

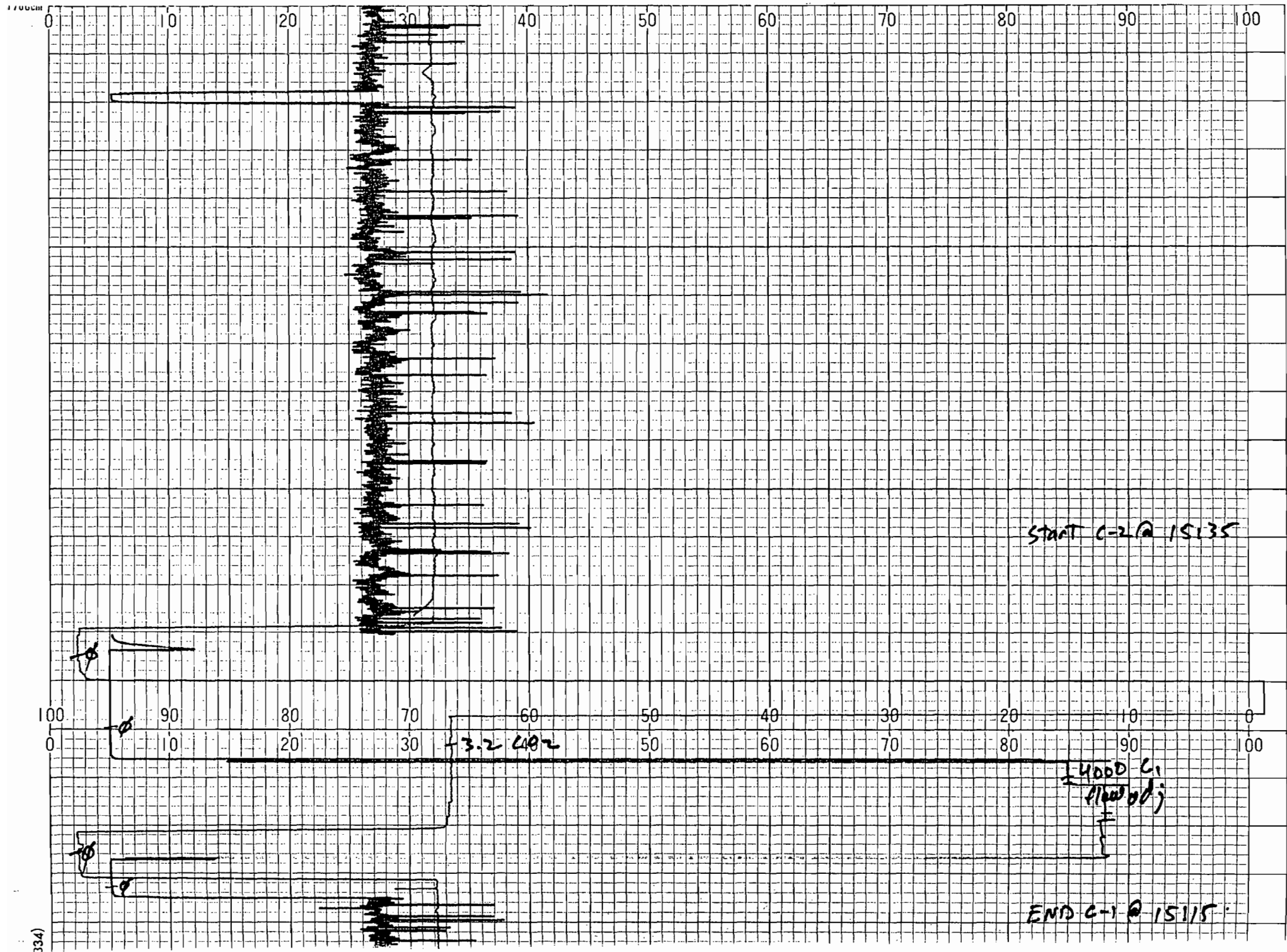
Through Probe T/C
4000 G.

80 G.

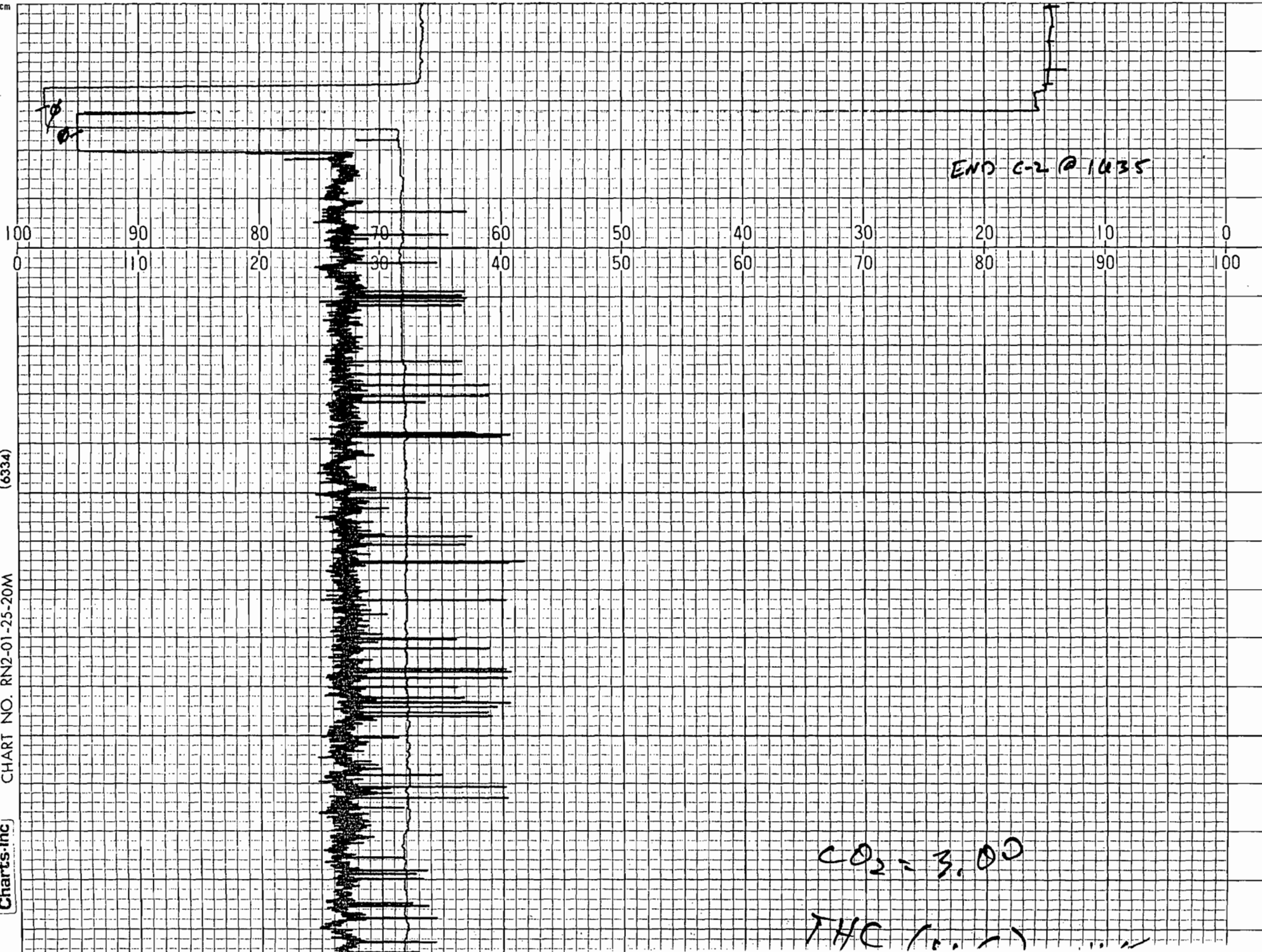
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100

CO₂ = 3.02
TAL = 1200





1/4UCM



END C-2 @ 1035

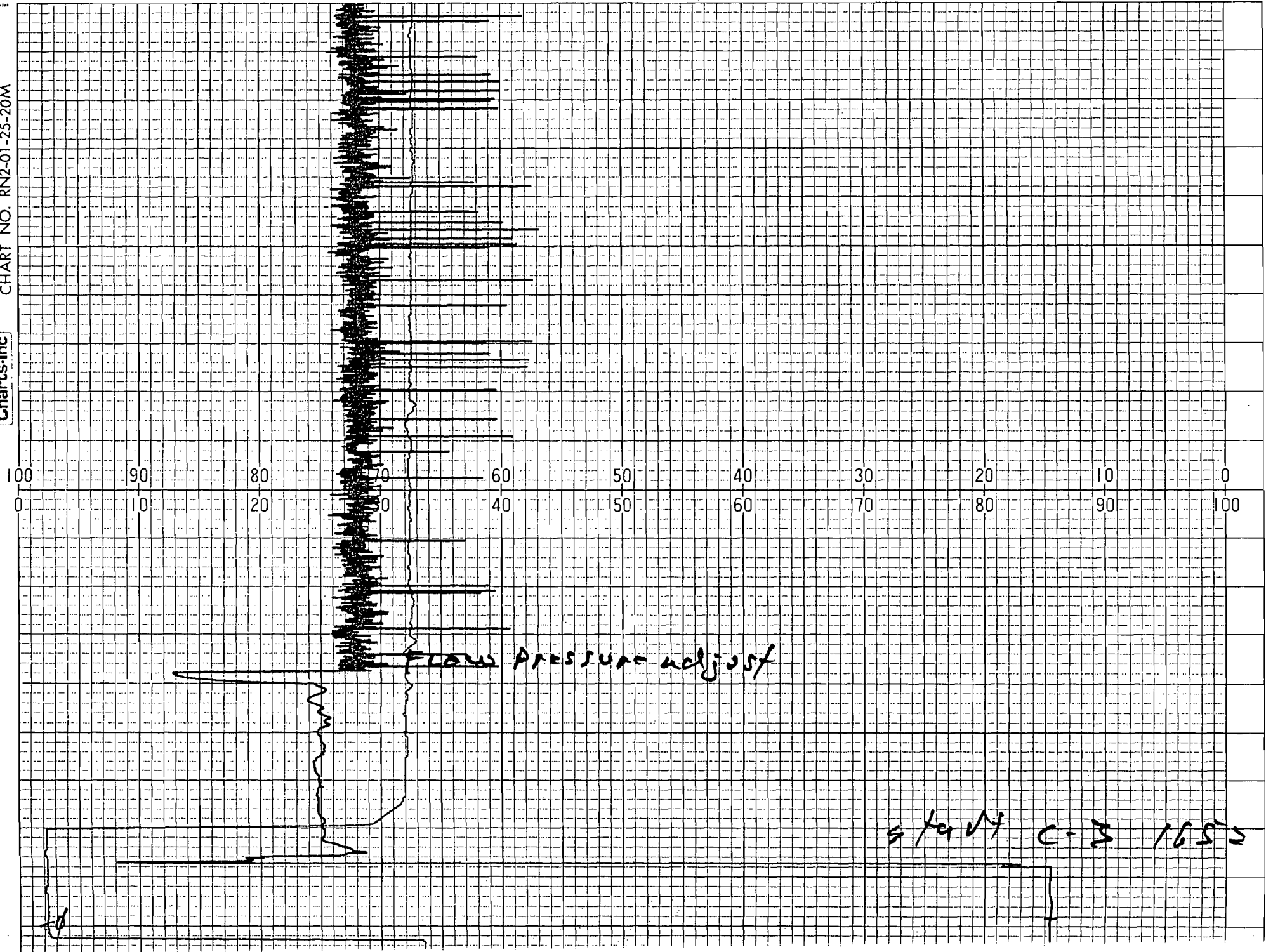
CO₂ = 3.00

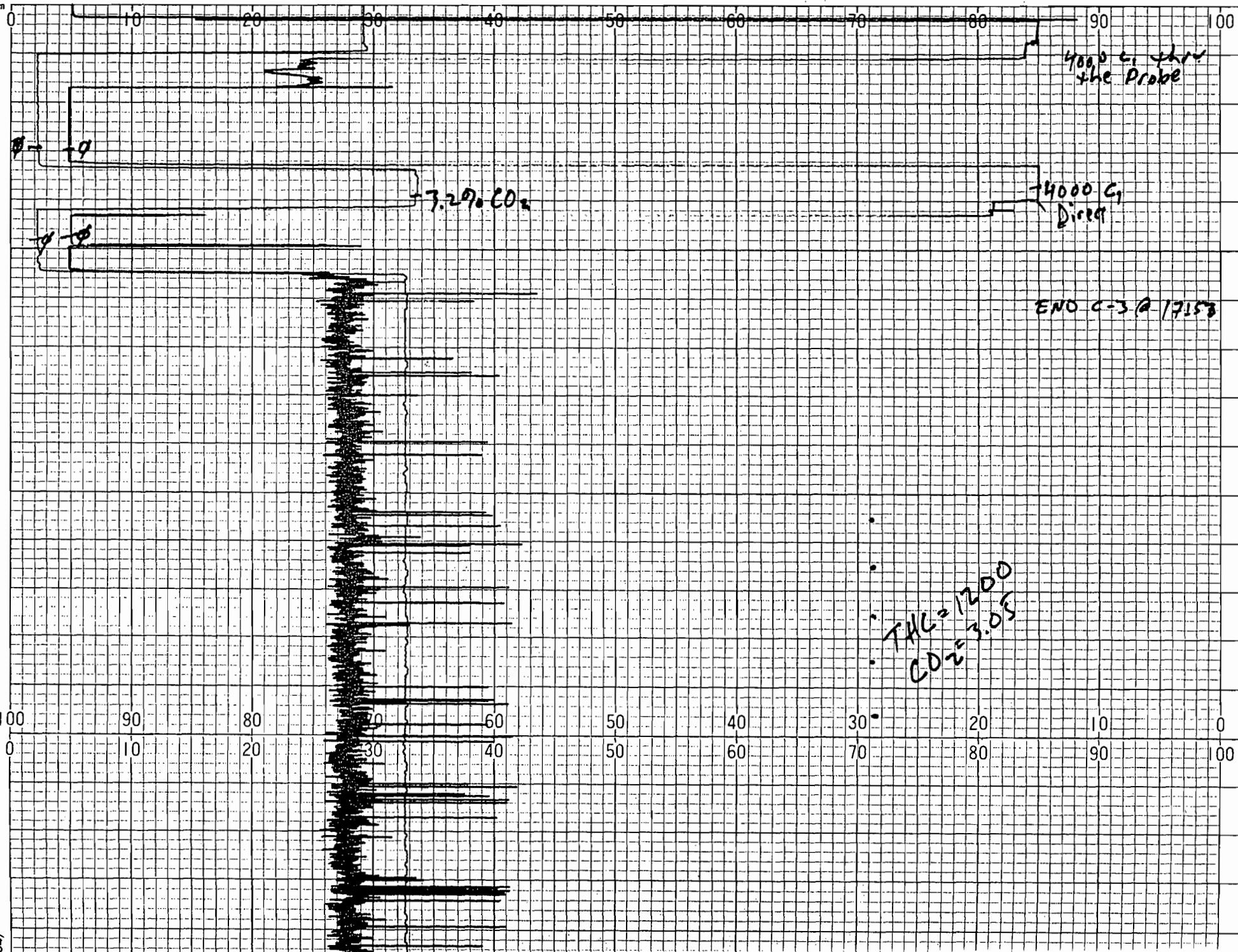
THC (.....)

(6334)

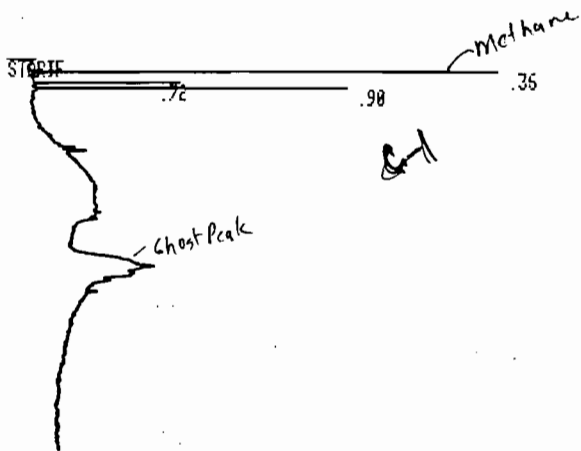
CHART NO. RN2-01-25-20M

Charts-Inc





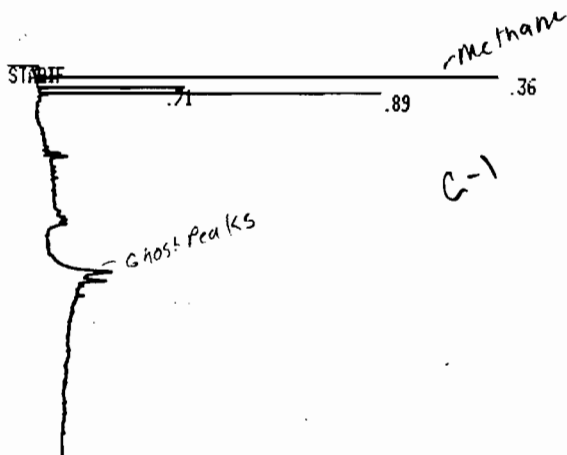
APPENDIX F
CHROMATOGRAMS



RUN # 98 MAR/17/92 14:25:38
 WORKFILE ID: C
 WORKFILE NAME:

AREA%	RT	AREA TYPE	AR/HT	AREA%
94.856	0.36	198750 D PB	0.015	94.856
1.481	0.72	3103 D PB	0.020	1.481
3.663	0.98	7675 D PB	0.023	3.663

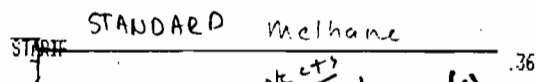
TOTAL AREA= 209520
 MUL FACTOR= 1.0000E+00



RUN # 99 MAR/17/92 14:47:46
 WORKFILE ID: C
 WORKFILE NAME:

AREA%	RT	AREA TYPE	AR/HT	AREA%
94.770	0.36	206370 D PB	0.015	94.770
1.392	0.71	3032 D PB	0.020	1.392
3.838	0.89	8357 D PB	0.023	3.838

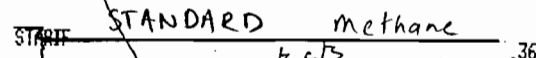
TOTAL AREA= 217760
 MUL FACTOR= 1.0000E+00



RUN # 95 MAR/17/92 13:07:44
 WORKFILE ID: C
 WORKFILE NAME: average = 221 ppts/ppm CI

AREA%	RT	AREA TYPE	AR/HT	AREA%
100.000	0.36	18132 D BB	0.016	100.000

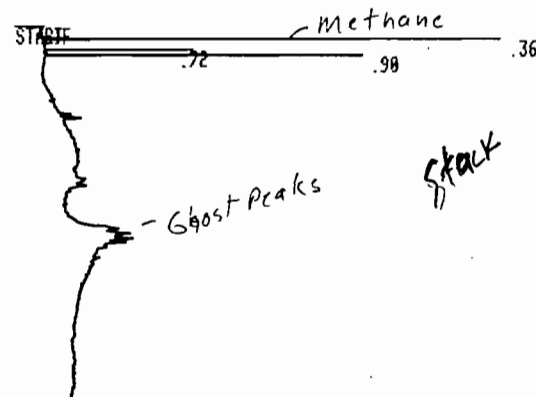
TOTAL AREA= 18132
 MUL FACTOR= 1.0000E+00



RUN # 96 MAR/17/92 13:16:31
 WORKFILE ID: C
 WORKFILE NAME:

AREA%	RT	AREA TYPE	AR/HT	AREA%
100.000	0.36	176980 D PB	0.015	100.000

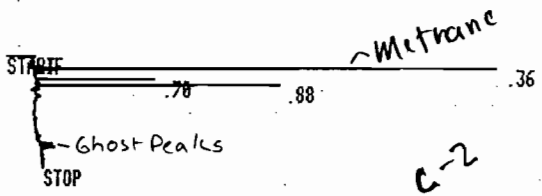
TOTAL AREA= 176980
 MUL FACTOR= 1.0000E+00



RUN # 97 MAR/17/92 13:26:28
 WORKFILE ID: C
 WORKFILE NAME:

AREA%	RT	AREA TYPE	AR/HT	AREA%
95.393	0.36	233330 D PB	0.015	95.393
1.371	0.72	3353 D BB	0.021	1.371
3.236	0.90	7916 D PB	0.023	3.236

TOTAL AREA= 244600
 MUL FACTOR= 1.0000E+00

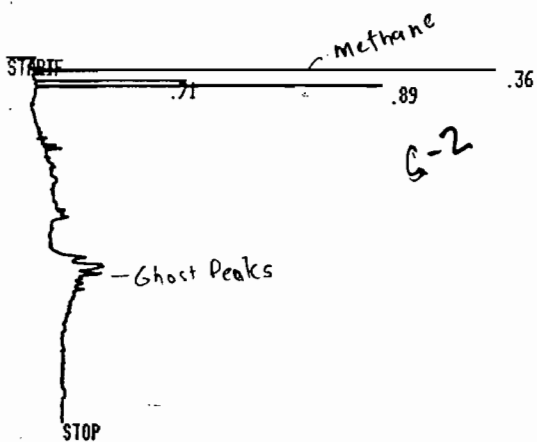


RUN # 103 MAR/17/92 16:03:25
 WORKFILE ID: C
 WORKFILE NAME:

VOL C

AREA%	RT	AREA TYPE	AR/HT	AREA%
0.36	172490 D BB	0.015	95.288	
0.70	2521 D PB	0.020	1.393	
0.88	6008 D PB	0.024	3.319	

TOTAL AREA= 181020
 MUL FACTOR= 1.0000E+00

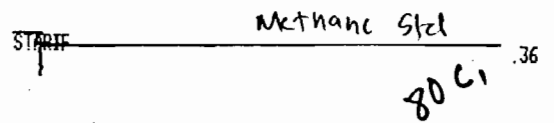


RUN # 104 MAR/17/92 16:11:37
 WORKFILE ID: C
 WORKFILE NAME:

VOL

AREA%	RT	AREA TYPE	AR/HT	AREA%
0.36	199110 D PB	0.015	94.440	
0.71	3143 D PB	0.020	1.491	
0.89	8579 D BB	0.024	4.069	

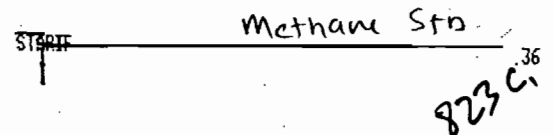
TOTAL AREA= 210830
 MUL FACTOR= 1.0000E+00



RUN # 100 MAR/17/92 15:11:54
 WORKFILE ID: C
 WORKFILE NAME:

AREA%	RT	AREA TYPE	AR/HT	AREA%
0.36	18008 D PB	0.016	100.000	

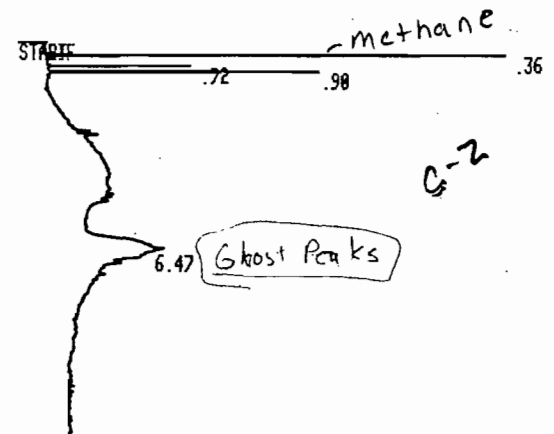
TOTAL AREA= 18008
 MUL FACTOR= 1.0000E+00



RUN # 101 MAR/17/92 15:20:43
 WORKFILE ID: C
 WORKFILE NAME:

AREA%	RT	AREA TYPE	AR/HT	AREA%
0.36	176980 D PB	0.015	100.000	

TOTAL AREA= 176980
 MUL FACTOR= 1.0000E+00

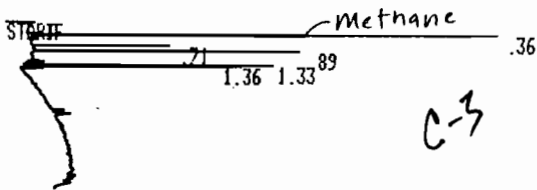


RUN # 102 MAR/17/92 15:44:29
 WORKFILE ID: C
 WORKFILE NAME:

VOL

AREA%	RT	AREA TYPE	AR/HT	AREA%
0.36	193700 D PB	0.015	83.496	
0.72	3101 D BB	0.021	1.337	
0.90	6761 D BB	0.024	2.914	
6.47	28425 PB	0.458	12.253	

TOTAL AREA= 231990

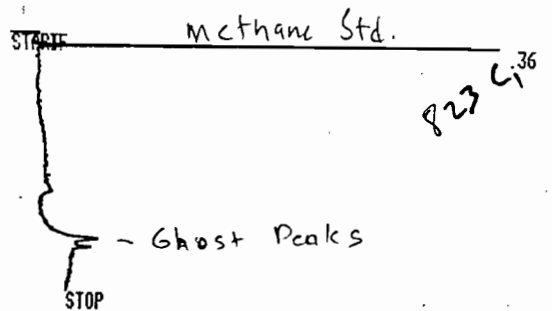


RUN # 106 MAR/17/92 17:00:48
 WORKFILE ID: C
 WORKFILE NAME:

9.01% VOC

AREA%	RT	AREA TYPE	AR/HT	AREA%
VOC	0.36	184580 D PB	0.015	90.990
	0.71	2832 D PB	0.020	1.396
	0.89	6577 D PB	0.024	3.242
	1.33	3934 D BP	0.015	1.939
	1.36	4935 D PB	0.022	2.433

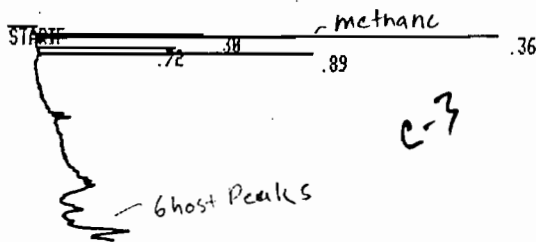
TOTAL AREA= 202850
 MUL FACTOR= 1.0000E+00



RUN # 105 MAR/17/92 16:38:49
 WORKFILE ID: C
 WORKFILE NAME:

AREA%	RT	AREA TYPE	AR/HT	AREA%
	0.36	176800 D PB	0.015	100.000

TOTAL AREA= 176800
 MUL FACTOR= 1.0000E+00



RUN # 107 MAR/17/92 17:22:06
 WORKFILE ID: C
 WORKFILE NAME:

4.56% VOC

AREA%	RT	AREA TYPE	AR/HT	AREA%
VOC	0.30	2883 D PP	0.017	1.367
	0.36	198370 D PB	0.015	94.074
	0.72	2869 D PB	0.020	1.361
	0.89	6743 D PB	0.024	3.198

TOTAL AREA= 210870
 MUL FACTOR= 1.0000E+00

APPENDIX G
OPACITY DATA SHEETS

The Texas Air Control Board
Certifies That

EDWARD A. SACRE II

Has completed a course conducted by The Texas Air Control Board and
has met the requirements for evaluating visible emissions.



September 20, 1991
Date Certified

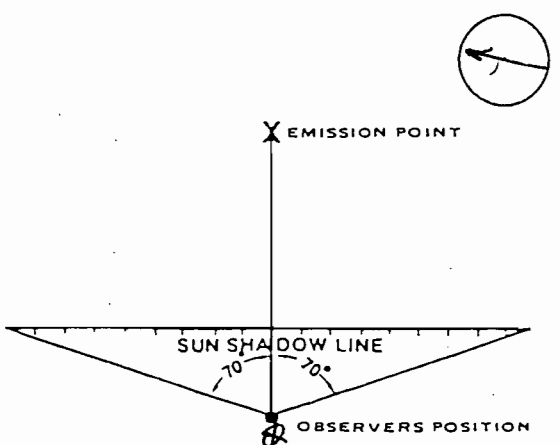

March 21, 1992
This Certificate Expires

Shirley J. Olan 9/20/91
Certifying Officer Date

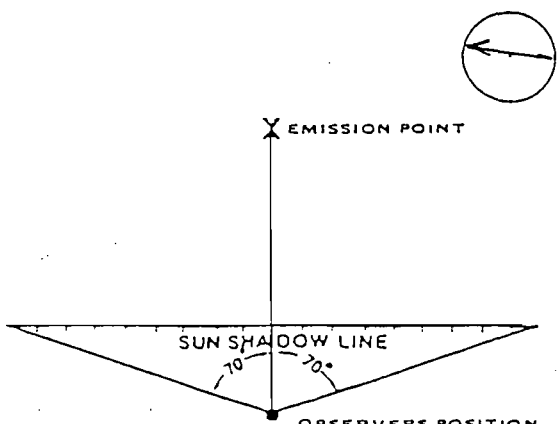
VISIBLE EMISSION OBSERVATION FORM

SOURCE NAME Dresser Rand Compressor/Engine 10TCV112AP				OBSERVATION DATE 3-17-92				START TIME 1535				STOP TIME 1835			
ADDRESS Rt.1 Box 146				sec M	0	15	30	45	sec M	0	15	30	45		
Milton, FL				1	0	0	0	0	31	0	0	0	0		
CITY Milton, FL		STATE FL		ZIP 32570		2	0	0	0	32	0	0	0		
PHONE (904)957-4221		SOURCE ID NUMBER 10TCV112AP		3	0	0	0	0	33	0	0	0	0		
PROCESS EQUIPMENT Turbo Charger		OPERATING MODE normal maximum		4	0	0	0	0	34	0	0	0	0		
CONTROL EQUIPMENT		OPERATING MODE		5	0	0	0	0	35	0	0	0	0		
DESCRIBE EMISSION POINT Circular stack				6	0	0	0	0	36	0	0	0	0		
HEIGHT ABOVE GROUND LEVEL ~75'		HEIGHT RELATIVE TO OBSERVER ~75'		7	0	0	0	0	37	0	0	0	0		
DISTANCE FROM OBSERVER ~200'		DIRECTION FROM OBSERVER E		8	0	0	0	0	38	0	0	0	0		
DESCRIBE EMISSIONS None				9	0	0	0	0	39	0	0	0	0		
EMISSION COLOR		PLUME TYPE: CONTINUOUS <input type="checkbox"/>		10	0	0	0	0	40	0	0	0	0		
		FUGITIVE <input type="checkbox"/> INTERMITTENT <input type="checkbox"/>		11	0	0	0	0	41	0	0	0	0		
WATER DROPLETS PRESENT NO <input checked="" type="checkbox"/> YES <input type="checkbox"/>		IS WATER DROPLET PLUME ATTACHED <input type="checkbox"/> DETACHED <input type="checkbox"/>		12	0	0	0	0	42	0	0	0	0		
AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED 2 duct diameters downstream of emission point				13	0	0	0	0	43	0	0	0	0		
DESCRIBE BACKGROUND SKY				14	0	0	0	0	44	0	0	0	0		
BACKGROUND COLOR Blue/white		SKY CONDITIONS Partly Cloudy		15	0	0	0	0	45	0	0	0	0		
WIND SPEED 5-10 mph		WIND DIRECTION S-SW		16	0	0	0	0	46	0	0	0	0		
AMBIENT TEMP. 78	WET BULB TEMP. 76	RELATIVE HUMIDITY 91%		17	0	0	0	0	47	0	0	0	0		
SOURCE LAYOUT SKETCH DRAW NORTH ARROW				18	0	0	0	0	48	0	0	0	0		
<p>The sketch shows an 'X' for the emission point. A north arrow points to the left. A sun shadow line is drawn below the emission point, forming a V-shape with 70-degree angles. The observer's position is marked with a circle at the bottom of the V.</p>				19	0	0	0	0	49	0	0	0	0		
				20	0	0	0	0	50	0	0	0	0	0	
				21	0	0	0	0	51	0	0	0	0	0	0
				22	0	0	0	0	52	0	0	0	0	0	0
				23	0	0	0	0	53	0	0	0	0	0	0
				24	0	0	0	0	54	0	0	0	0	0	0
				25	0	0	0	0	55	0	0	0	0	0	0
				26	0	0	0	0	56	0	0	0	0	0	0
				27	0	0	0	0	57	0	0	0	0	0	0
				28	0	0	0	0	58	0	0	0	0	0	0
				29	0	0	0	0	59	0	0	0	0	0	0
				30	0	0	0	0	60	0	0	0	0	0	0
COMMENTS				AVERAGE OPACITY FOR HIGHEST PERIOD				NUMBER OF READINGS ABOVE % WERE							
				RANGE OF OPACITY READINGS											
				MINIMUM		MAXIMUM									
				OBSERVER'S NAME (PRINT) Tony Saure				DATE 3-17-92							
				OBSERVER'S SIGNATURE <i>Tony Saure</i>											
				ORGANIZATION CUBIX											
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS				CERTIFIED BY TACB				DATE 9-20-91							
SIGNATURE				VERIFIED BY				DATE 9-15-90							
TITLE															

VISIBLE EMISSION OBSERVATION FORM

SOURCE NAME Dresser Band Compressor Engine			OBSERVATION DATE 3-17-92				START TIME 14:15		STOP TIME 15:15																			
ADDRESS Rt. 1 Box 146			<table border="1" style="width:100%; text-align: center;"> <tr> <td>SEC</td> <td>0</td> <td>15</td> <td>30</td> <td>45</td> <td>SEC</td> <td>0</td> <td>15</td> <td>30</td> <td>45</td> </tr> <tr> <td>M</td> <td></td> <td></td> <td></td> <td></td> <td>M</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>				SEC	0	15	30	45	SEC	0	15	30	45	M					M						
SEC	0	15					30	45	SEC	0	15	30	45															
M					M																							
CITY Milton, FL																												
CITY Milton		STATE FL	ZIP 32570		1		0	0	0	0																		
PHONE (904) 957-4221		SOURCE ID NUMBER 10TCV112AP			2		0	0	0	0																		
PROCESS EQUIPMENT Turbo charger		OPERATING MODE Normal Maximum			3		0	0	0	0																		
CONTROL EQUIPMENT None		OPERATING MODE			4		0	0	0	0																		
DESCRIBE EMISSION POINT Circular stack			HEIGHT ABOVE GROUND LEVEL ~75'		HEIGHT RELATIVE TO OBSERVER ~75'		5		0	0																		
DISTANCE FROM OBSERVER ~200'		DIRECTION FROM OBSERVER East			6		0	0	0	0																		
DESCRIBE EMISSIONS None			7		0		0		0																			
EMISSION COLOR		PLUME TYPE: CONTINUOUS <input type="checkbox"/>			8		0		0																			
WATER DROPLETS PRESENT NO YES <input type="checkbox"/>		IS WATER DROPLET PLUME ATTACHED <input type="checkbox"/> DETACHED <input type="checkbox"/>			9		0		0																			
AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED 2 Duct diameters downstream from stack			10		0		0		0																			
DESCRIBE BACKGROUND Blue/white sky			11		0		0		0																			
BACKGROUND COLOR Blue/white		SKY CONDITIONS Partly cloudy			12		0		0																			
WIND SPEED 5-10 m.p.h.		WIND DIRECTION S-SW			13		0		0																			
AMBIENT TEMP. 77		WET BULB TEMP. 73		RELATIVE HUMIDITY 79%		14		0		0																		
SOURCE LAYOUT SKETCH 			DRAW NORTH ARROW 		15		0		0																			
COMMENTS			16		0		0		0																			
			17		0		0		0																			
			18		0		0		0																			
			19		0		0		0																			
			20		0		0		0																			
			21		0		0		0																			
			22		0		0		0																			
			23		0		0		0																			
			24		0		0		0																			
			25		0		0		0																			
			26		0		0		0																			
			27		0		0		0																			
			28		0		0		0																			
			29		0		0		0																			
			30		0		0		0																			
			AVERAGE OPACITY FOR HIGHEST PERIOD 0		NUMBER OF READINGS ABOVE 0		% WERE																					
			RANGE OF OPACITY READINGS MINIMUM 0 MAXIMUM 0		OBSERVER'S NAME (PRINT) Tony Sacre		OBSERVER'S SIGNATURE <i>Tony Sacre</i>		DATE 3-17-92																			
			OBSERVER'S SIGNATURE <i>Tony Sacre</i>		ORGANIZATION Cubix		I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS		CERTIFIED BY TACB																			
			SIGNATURE		DATE 9-20-91		VERIFIED BY		DATE 9-15-91																			
			TITLE		DATE		DATE		DATE																			

VISIBLE EMISSION OBSERVATION FORM

SOURCE NAME Dresser Rand Compressor Engine				OBSERVATION DATE 3-17-92				START TIME 11:50				STOP TIME 17:50							
ADDRESS Rt. 1 Box 146				sec M \ 0 15 30 45				sec M \ 0 15 30 45											
Milton FL				1 0 0 0 0				31 0 0 0 0											
CITY Milton		STATE FL		ZIP 32570		2 0 0 0 0				32 0 0 0 0									
PHONE (904) 957-4221				SOURCE ID NUMBER 10TCV112AP				3 0 0 0 0				33 0 0 0 0							
PROCESS EQUIPMENT Turbo charger				OPERATING MODE Normal Maximum				4 0 0 0 0				34 0 0 0 0							
CONTROL EQUIPMENT				OPERATING MODE				5 0 0 0 0				35 0 0 0 0							
DESCRIBE EMISSION POINT				7 0 0 0 0				37 0 0 0 0											
HEIGHT ABOVE GROUND LEVEL ~75'		HEIGHT RELATIVE TO OBSERVER ~75'		8 0 0 0 0				38 0 0 0 0											
DISTANCE FROM OBSERVER ~200'		DIRECTION FROM OBSERVER East		9 0 0 0 0				39 0 0 0 0											
DESCRIBE EMISSIONS None				10 0 0 0 0				40 0 0 0 0											
EMISSION COLOR		PLUME TYPE: CONTINUOUS <input type="checkbox"/>		11 0 0 0 0				41 0 0 0 0											
		FUGITIVE <input type="checkbox"/> INTERMITTENT <input type="checkbox"/>		12 0 0 0 0				42 0 0 0 0											
WATER DROPLETS PRESENT NO <input checked="" type="checkbox"/> YES <input type="checkbox"/>		IS WATER DROPLET PLUME ATTACHED <input type="checkbox"/> DETACHED <input type="checkbox"/>		13 0 0 0 0				43 0 0 0 0											
AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED 2 duct diameters downstream of emission point				14 0 0 0 0				44 0 0 0 0											
DESCRIBE BACKGROUND sky				15 0 0 0 0				45 0 0 0 0											
BACKGROUND COLOR Blue/white		SKY CONDITIONS Partly Cloudy		16 0 0 0 0				46 0 0 0 0											
WIND SPEED 10-15 mph		WIND DIRECTION S-SW		17 0 0 0 0				47 0 0 0 0											
AMBIENT TEMP. 71		WET BULB TEMP. 66		RELATIVE HUMIDITY 76%		18 0 0 0 0				48 0 0 0 0									
SOURCE LAYOUT SKETCH 				DRAW NORTH ARROW				19 0 0 0 0				49 0 0 0 0							
				20 0 0 0 0				50 0 0 0 0											
				21 0 0 0 0				51 0 0 0 0											
				22 0 0 0 0				52 0 0 0 0											
				23 0 0 0 0				53 0 0 0 0											
				24 0 0 0 0				54 0 0 0 0											
				25 0 0 0 0				55 0 0 0 0											
				26 0 0 0 0				56 0 0 0 0											
				27 0 0 0 0				57 0 0 0 0											
				28 0 0 0 0				58 0 0 0 0											
				29 0 0 0 0				59 0 0 0 0											
				30 0 0 0 0				60 0 0 0 0											
				AVERAGE OPACITY FOR HIGHEST PERIOD 0				NUMBER OF READINGS ABOVE % WERE											
COMMENTS				RANGE OF OPACITY READINGS				MINIMUM				MAXIMUM							
				OBSERVER'S NAME (PRINT) TONY SACIE				OBSERVER'S SIGNATURE Tony Sacie				DATE 3-17-92							
				ORGANIZATION CUBIX				I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS				CERTIFIED BY TALB							
SIGNATURE				DATE				DATE 3-20-92				DATE 3-15-92							
TITLE				DATE				VERIFIED BY				DATE							

APPENDIX H
FUEL ANALYSIS



CERTIFICATE OF ANALYSIS NUMBER 199904

SAMPLE IDENT.: MUNSON STATION 810 DATE: APRIL 08, 1992
 FLORIDA GAS TRANS.
 INLET GAS (NATURAL) FGT P. O. NO.: 92143
 03/17/92 @ 10:00

FOR: CUBIX CORPORATION
 9225 LOCKHART HIGHWAY
 AUSTIN, TEXAS 78747

ATTN: MR. JOE RUDYK

ASTM D-3246
TOTAL SULFUR ANALYSIS

< 1 ppm by wt.

< 0.059 Grains/100 cu. ft. by vol.

< 0.105 Grains/100 cu. ft. by wt.

SOUTHERN PETROLEUM LABORATORIES, INC.

.....*J. C. Winerey*.....
J. C. WINEREY

Fuel Calculations: From Carryville Compressor Station

Client: Florida Gas
 Sample ID: Carryville Station Fuel Gas

CALCULATION OF DENSITY AND HEATING VALUE

Component	% Volume	Molecular Wt.	% volume x			Component		Gross Heating Value (Btu/SCF)	Volume Fract. Btu
			Density (lb/ft3)	Density	weight %	Gross Btu/lb	Weight Fract. Btu		
Hydrogen		2.016	0.0053	0.00000	0.0000	61100	0.00	325	0
Oxygen		32.000	0.0846	0.00000	0.0000	0	0.00	0	
Nitrogen	0.3550	28.016	0.0744	0.00026	0.5982	0	0.00	0	0
CO2	0.6890	44.01	0.117	0.00081	1.8257	0	0.00	0	0
CO		28.01	0.074	0.00000	0.0000	4347	0.00	322	0
Methane	96.7700	16.041	0.0424	0.04103	92.9239	23879	22189.31	1013	980.28
Ethane	1.7530	30.067	0.0803	0.00141	3.1880	22320	711.56	1792	31.414
Ethylene		28.051	0.0746	0.00000	0.0000	21644	0.00	1614	0
Propane	0.2240	44.092	0.1196	0.00027	0.6067	21661	131.43	2590	5.8016
propylene		42.077	0.111	0.00000	0.0000	21041	0.00	2336	0
Isobutane	0.0630	58.118	0.1582	0.00010	0.2257	21308	48.10	3363	2.1187
n-butane	0.0520	58.118	0.1582	0.00008	0.1863	21257	39.60	4016	2.0883
Isobutene		56.102	0.148	0.00000	0.0000	20840	0.00	3068	0
Isopentane	0.0240	72.144	0.1904	0.00005	0.1035	21091	21.83	4008	0.9619
n-pentane	0.0160	72.144	0.1904	0.00003	0.0690	21052	14.52	3993	0.6389
n-hexane	0.0530	86.169	0.2274	0.00012	0.2730	20940	57.16	4762	2.5239
H2S		34.076	0.0911	0.00000	0.0000	7100	0.00	647	0
total	100.00								

Average Density	0.04415	100.0000	Gross Heating Value	
Specific Gravity	0.57719		Btu/lb	23214
			Gross Heating Value	Btu/SCF
				1026

CALCULATION OF F FACTORS

Component	Mol. Wt.	C Factor	H Factor	% volume	Fract. Wt.	Weight Percents				
						Carbon	Hydrogen	Nitrogen	Oxygen	Sulfur
Hydrogen	2.016	0	1	0.00	0.0000	0	0			
Oxygen	32	0	0	0.00	0.0000				0	
Nitrogen	28.016	0	0	0.36	9.9457	0	0	0.59580783		
CO2	44.01	0.272273	0	0.69	30.3229	0.49459178	0		1.3206	
CO	28.01	0.42587	0	0.00	0.0000	0	0		0	
Methane	16.041	0.75	0.25	96.77	1552.2876	69.7437295	23.24791			
Ethane	30.067	0.8	0.2	1.75	52.7075	2.5260022	0.6315006			
Ethylene	28.051	0.85714	0.14286	0.00	0.0000	0	0			
Propane	44.092	0.81818	0.18182	0.22	9.8766	0.48409255	0.1075763			
Propene	42.077	0.85714	0.14286	0.00	0.0000	0	0			
Isobutane	58.118	0.82759	0.17247	0.06	3.6614	0.18152572	0.03783			
n-butane	58.118	0.82759	0.17247	0.05	3.0221	0.14983075	0.0312248			
Isobutene	56.102	0.85714	0.14286	0.00	0.0000	0	0			
Isopentane	72.144	0.83333	0.16667	0.02	1.7315	0.0864371	0.0172878			
n-pentane	72.144	0.83333	0.16667	0.02	1.1543	0.05762474	0.0115252			
n-hexane	86.169	0.83721	0.16279	0.05	4.5670	0.22905145	0.0445376			
H2S	34.08	0	0	0.00	0.0000	0	0			0
Totals				99.99900	1669.2765	73.9528858	24.13	0.59580783	1.3206	0

CALCULATED VALUES	
O2 F Factor (dry)	8635 DSCF of Exhaust/MM Btu of Fuel Burned @ 0% excess air
O2 F Factor (wet)	10641 SCF of Exhaust/MM Btu of Fuel Burned @ 0% excess air
Moisture F Factor	2006 SCF of Water/MM Btu of Fuel Burned @ 0% excess air
Combust. Moisture	18.85 volume % water in flue gas @ 0% excess air
Fo	1.8 fuel factor (dimensionless)
VOC Portion of fuel	2.21 %
CO2 F Factor	1023 DSCF of CO2/MM Btu of Fuel Burned @ 0% excess air

**APPENDIX I:
UNOFFICIAL COMPLIANCE TEST DATA**

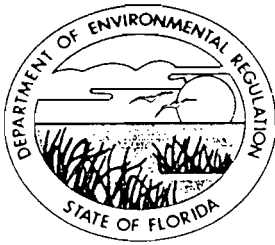
Munson Compressor Station--Unofficial Data

Operator/Plant	Florida Gas Munson Compressor Station		
Location	Santa Rosa County, Florida		
Source	Dresser Rand Compressor Engine		
Technicians	LF,TS,NF		
Test Run No.	C-1	C-2	C-3
Date	3/17/92	3/17/92	3/17/92
Start Time	14:15	15:35	16:52
Stop Time	15:15	16:35	17:52
Engine/Compressor Operation			
Engine Speed (rpm)	330	330	330
Ignition Timing (°BTDC)	8	8	8
Air Manifold Pressure (psig)	16	16	16
Air Manifold Temperature (°F)	124	124	124
Estimated Fuel Flow AT 7600 BTU/hp-hr (SCFH)	30896	30896	30896
Fuel Temperature (°F)	48	47	46
Fuel Manifold Pressure (psig)	35	35.5	35
Loading Step (pockets open out of 10 total)	9	9	9
Suction Pressure (psig)	681	680	679
Suction Temperature (°F)	63	63	62
Discharge Pressure (psig)	919	920	918
Discharge Temperature (°F)	105	105	105
Engine Load (BHP)	4171	4171	4171
Torque (%)	97	96	96
Ambient Conditions			
Atmospheric Pressure (in. Hg)	29.95	29.92	29.92
Temperature (°F) : Dry bulb	78	78	71
(°F) Wet bulb	73	76	66
Humidity (lb/lb air)	0.0159	0.0184	0.0123
Measured Emissions			
NOx (ppmv)	68.0	66.0	62.0
CO (ppmv)	240	236	240
O2 via Method 3a (%)	15.3	15.7	15.6
CO2 via Method 3a (%)	3.02	3.00	3.05
THC via EPA Method 25a (ppmv, wet)	1200	1115	1200
VOC via EPA Method 18 (% of THC)	5.19%	5.04%	6.79%
VOC i.e. non methane via EPA 18 (ppmv, wet)	62.2	56.2	81.4
VOC via Methods 25a and 18 (ppmv, dry)	66.7	60.0	86.6
SO2 in fuel (grains/100 DSCF)	<0.059	<0.059	<0.059
Stack Volumetric Flow Rates			
via Pitot Tube (SCFH, dry)	1.21E+06	1.20E+06	1.16E+06
Calculated Emission Rates (via pitot tube)			
NOx (lbs/hr)	9.83	9.43	8.60
CO (lbs/hr)	21.1	20.5	20.3
VOC (lbs/hr)	3.35	2.98	4.18
SO2 (lbs/hr)	<0.0026	<0.0026	<0.0026
NOx (tons/yr)	43.0	41.3	37.7
CO (tons/yr)	92.4	89.9	88.7
VOC (tons/yr)	14.7	13.1	18.3
SO2 (tons/yr)	0.0	0.0	0.0
NOx (g/hp-hr)	1.07	1.03	0.94
CO (g/hp-hr)	2.30	2.23	2.21
VOC (g/hp-hr)	0.37	0.32	0.45

Munson Compressor Station--Unofficial Data

Operator/Plant Florida Gas Munson Compressor Station
 Location Santa Rosa County, Florida
 Source Dresser Rand Compressor Engine
 Technicians LF,TS,NF

Test Run No.	C-1	C-2	C-3
Stack Moisture & Molecular Wt. via EPA Method 4			
CO2 (%)	3.02	3.00	3.05
O2 (%)	15.25	15.70	15.63
Beginning Meter Reading (ft3)	388.525	413.528	435.260
Ending Meter Reading (ft3)	413.270	435.160	457.398
Beginning Impinger Wt (g)	2542.9	2591.9	2622.7
Ending Impinger Wt. (g)	2576.4	2619.7	2649.1
Dry Gas Meter Factor (Kd)	0.9904	0.9904	0.9904
Dry Gas Meter Temperature (°F begin)	122	128	124
Dry Gas Meter Temperature (°F end)	140	130	130
Atmospheric Pressure (in Hg, abs.)	29.95	29.95	29.92
Stack Gas Moisture (% volume)	6.73	6.39	5.94
Dry Gas Fraction	0.933	0.936	0.941
Stack Gas Molecular Wt. (lbs/lb-mole)	28.35	28.40	28.45
Stack Moisture via Stoichiometry			
Fuel Moisture Content (vol % @ 0% O2)	18.85	18.85	18.85
Moisture Content (vol % at stack)	6.12	5.87	5.55
Difference between methods	9%	8%	7%
Stack Flow Rate via Pitot Tube			
Pitot Tube Factor	0.84	0.84	0.84
ΔP #1	0.82	2.50	1.10
ΔP #2	0.94	2.60	1.40
ΔP #3	1.50	2.10	1.30
ΔP #4	1.50	1.90	1.40
ΔP #5	1.80	0.85	1.50
ΔP #6	2.80	0.65	1.80
ΔP #7	2.90	0.61	2.00
ΔP #8	3.10	0.74	2.10
ΔP #9	2.20	1.10	2.20
ΔP #10	2.30	1.40	2.50
ΔP #11	2.40	1.40	2.30
ΔP #12	2.00	1.50	1.80
ΔP #13	1.20	2.10	1.10
ΔP #14	0.81	2.10	0.68
ΔP #15	0.65	2.50	0.65
ΔP #16	0.62	2.50	0.74
Sum of Square Root of ΔP's	20.4	20.1	19.4
Number of Traverse Points	16	16	16
Average Square Root of ΔP's	1.27	1.26	1.22
Average Temperature (°F)	539	541	542
Static Pressure (in. H2O)	-0.18	-0.1	-0.05
Stack Diameter (in.)	35.5	35.5	35.5
Stack Area (ft2)	6.87	6.87	6.87
Stack Velocity (ft/min)	5947	5870	5681
Stack Flow,wet (ACFM)	40876	40345	39052
Stack Flow,dry (SCFH)	1.21E+06	1.20E+06	1.16E+06
Stack Flow Rate via EPA Method 19			
Fuel Flow to Engine (SCFH)	30896	30896	30896
Fuel Heating Value (BTU/SCF)	1026	1026	1026
Fuel O2 F-Factor (DSCFH/MMBTU)	8635	8635	8635
Fuel CO2 F-Factor (DSCFH/MMBTU)	1023	1023	1023
Stack Flow Rate, dry via O2 F-factor (SCFH)	1.01E+06	1.10E+06	1.08E+06
Stack Flow Rate, dry via CO2 F-factor (SCFH)	1.07E+06	1.08E+06	1.06E+06
Difference between O2 F-factor and pitot tube	16%	8%	7%
Difference between CO2 F-factor and pitot tube	11%	10%	8%
Stack Flow Rate via Carbon Balance			
Fuel Carbon Content	1.026	1.026	1.026
Exhaust Carbon Content	3.16	3.14	3.19
Stack Flow Rate, dry via Carbon Balance (SCFH)	1.00E+06	1.01E+06	9.93E+05
Difference between Carbon Balance and pitot tube	17%	15%	15%



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

March 9, 1992

Carol M. Browner, Secretary

Mr. Allan Weatherford
Compliance Environmentalist
Florida Gas Transmission Company
P. O. Box 945100
Maitland, Florida 32794-5100

Re: Air Permit AC20-189438, AC57-188869 and AC67-189220.
Florida Gas Transmission Company - Station 14, 12, and
13, respectively.

Dear Mr. Weatherford:

This letter is in reference to your letter of February 25, 1992 regarding air emissions testing at the above referenced facilities.

The testing protocol submitted by the Cubix Corporation does not reflect the specific conditions for determining compliance as required in the above mentioned construction permits. Any deviations from the testing methods specified in the permit would require an alternate sampling procedures request, as outlined in F.A.C. 17-2.700(3). The utilization of EPA Methods 3A and 25A would require such a request.

The minimum sampling time for each test run shall be 60 minutes in accordance with 17-2.700(d)1a, unless a shorter time has been approved for the EPA test method, and is specified in 40 CFR 60, Appendix A.

In addition, the minimum period for opacity observations shall be 60 minutes, and three 60-minute opacity observations for the purpose of demonstrating initial compliance is required as specified in 40 CFR 60.11(b).

If there are any additional questions, please call me at (904)488-1344 or write to me at the letterhead address.

Sincerely,

Syed Arif
Compliance Engineer

SA:cjh

cc: ✓ Teresa Heron, Permit Engineer; Tallahassee
Rick Prusa, Permit Engineer; Pensacola



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

4APT-AEB

MAY 31 1991

Mr. Clair H. Fancy, P.E., Chief
Bureau of Air Regulation
Florida Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: Florida Gas Transmission Company Compressor Stations
PSD-FL-156 Santa Rosa County
PSD-FL-158 Washington County
PSD-FL-159 Gadsden County
PSD-FL-160 Taylor County
PSD-FL-161 Bradford County
PSD-FL-162 Marion County
PSD-FL-163 Orange County
PSD-FL-164 St. Lucie County

RECEIVED

JUN 03 1991

Division of Air
Resources Management

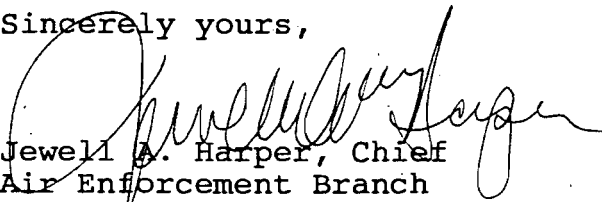
Dear Mr. Fancy:

This is to acknowledge receipt of your final determinations and permits for modifications to Compressor Station Nos. 12 through 18 and 20 of the above referenced source, by letters dated May 9, 1991.

The proposed projects are similar in scope in that they each consist of the addition of one reciprocating internal combustion engine to an existing compressor station. The engines proposed for the stations in Santa Rosa, Taylor and Bradford Counties will be sized at 4000 brake horsepower. The engines for the remaining five counties will be sized at 2400 brake horsepower. We have reviewed the packages as requested and have no adverse comments.

Thank you for the opportunity to review and comment on this application. If you have any questions or comments on this package, please contact Mr. Gregg Worley of my staff at (404) 347-2904.

Sincerely yours,


Jewell A. Harper, Chief
Air Enforcement Branch
Air, Pesticides, and Toxics
Management Division

J. Dixon
CHF/BA

PM
4-2-91
Gainesville, FL

File Co 87



April 2, 1991
90051

Mr. C. H. Fancy, P.E.
Chief, Bureau of Air Regulation
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

RECEIVED
APR 3 1991
DER - BAQM

Re: AC57-188869; PSD-FL-156
Florida Gas Transmission Co.
Station 12, Unit No. 6
Santa Rosa County; Munson, Florida

Dear Mr. Fancy:

On behalf of Florida Gas Transmission Co. (FGTC), KBN has reviewed the Technical Evaluation and Preliminary Determination (TE&PD) and the draft construction permit for the above referenced PSD permit application. Based on this review, I offer the following comments for your consideration.

In the TE&PD, item V.2., Table II, the lb/hr listed for sulfur dioxide should be 0.80 instead of 0.39.

In the draft construction permit:

1. Specific Condition 1, the emission factor for carbon monoxide should be 2.5 g/bhp-hr instead of the 2.0 g/bhp-hr shown.
2. Under Compliance Determination, it is not specifically stated what initial compliance tests will be required, or when such tests must be conducted.

Thank you for consideration of these comments.

Sincerely,

David A. Buff, M.E., P.E.
Principal Engineer

cc: Bill Osborne
Jim Alves

Teresa Heron
BAICHF
Ed Middlesworth, MUD

} 4-4-91 BA

KBN ENGINEERING AND APPLIED SCIENCES, INC.

1034 Northwest 57th Street Gainesville, Florida 32605 904/331-9000 FAX: 904/332-4189



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

MAR -5 1991

RECEIVED

MAR 11 1991

DER-BAQM

4APT-AEB

Mr. Clair H. Fancy, P.E., Chief
Bureau of Air Regulation
Florida Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: Florida Gas Transmission Company Compressor Station
PSD-FL-156 Santa Rosa County

Dear Mr. Fancy:

This is to acknowledge receipt of the Prevention of Significant Deterioration (PSD) preliminary determination and draft permit for Compressor Station No. 12 of the above referenced source, by letter dated February 15, 1991.

The proposed project consists of the addition of one reciprocating internal combustion engine to an existing compressor station. The engine proposed for the station in Santa Rosa will be sized at 4000 brake horsepower. We have reviewed the package as requested and have no adverse comments at this time.

Thank you for the opportunity to review and comment on this package. If you have any questions or comments on this package, please contact Mr. Gregg Worley of my staff at (404) 347-2904.

Sincerely yours,

Jewell A. Harper, Chief
Air Enforcement Branch
Air, Pesticides, and Toxics
Management Division

cc: J. Nelson
B. Andrews
C. Holladay
E. Middlemart, NW Dist.

The Press-Gazette

Best Available Copy

PUBLISHED WEEKLY

Milton, Santa Rosa County, Florida

STATE OF FLORIDA

County of Santa Rosa

Before the undersigned authority personally appeared _____

Leah M. Ward

who on oath says that he is Cashier

of the Press Gazette, a weekly newspaper published at

Milton in Santa Rosa County, Florida; that the attached copy

of advertisement being a Notice of Intent to Issue

in the matter of Install one natural gas fired engi

in the _____ court,

was published in said newspaper in the issues of:

March 4, _____ A.D., 19 91

_____ A.D., 19

_____ A.D., 19

_____ A.D., 19

_____ A.D., 19

_____ A.D., 19

Affiant further says that the Press-Gazette is a newspaper published at Milton in said Santa Rosa County, Florida, and that said newspaper has heretofore been continuously published in said Santa Rosa County, Florida, each week and has been entered as second class mail matter at the post office in Milton in Santa Rosa County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Leah M. Ward

Sworn to and subscribed before me this 4

day of March 19 91

(SEAL) Carolyn V. Darnes

Notary Public

NOTARY PUBLIC, STATE OF FLORIDA.
MY COMMISSION EXPIRES: Nov. 12, 1994.
BONDED THRU NOTARY PUBLIC UNDERWRITERS.

STATE OF FLORIDA
Department of Environmental Regulation
Notice of Intent to Issue
The Department of Environmental Regulation hereby gives notice of its intent to issue a permit to Florida Gas Transmission Company to install one natural gas fired engine. The Company's facility is located 5 miles north of Munson on SR 191 in Munson, Florida. A determination of Best Available Control Technology (BACT) was required. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, 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 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated

above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

(a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;

(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;

(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;

(d) A statement of the material facts disputed by Petitioner, if any;

(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, 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 decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

The application is available for public inspection during business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida
32399-2400

Department of Environmental Regulation
Northwest District
160 Governmental Center
Pensacola, Florida
32501-5794

Any person may send written comments on the proposed action to Mr. Barry Andrews at the Department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the Department's final determination.

030491

030491

02275

petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, 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 decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

The application is available for public inspection during business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida
32399-2400

Department of Environmental Regulation
Northwest District
160 Governmental Center
Pensacola, Florida
32501-5794

Any persons may send written comments on the proposed action to Mr. Barry Andrews at the Department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the Department's final determination.

RECEIVED

MAR 14 1991

DER-BAQM

News Journal

PUBLISHED DAILY
PENSACOLA, ESCAMBIA COUNTY, FLORIDA

State of Florida,
County of Escambia.

Before the undersigned authority personally appeared

Cindy Vance
who on oath says that she is Legal Advertising Supervisor
of the Pensacola News Journal, a daily newspaper published at Pensacola in
Escambia County, Florida; with general circulation in Escambia, Santa
Rosa, Okaloosa and Walton Counties that the attached copy of
advertisement, being a NOTICE in the matter of

Intent to Issue

_____ in the _____ Court,

was published in said newspaper in the issues of _____

March 1, 1991

Affiant further say that the said The Pensacola News
Journal is a newspaper published at Pensacola, in said Escam-
bia County, Florida, and that the said newspaper has heretofore
been continuously published in said Escambia County, Florida,
each day and has been entered as second class mail matter at
the post office in Pensacola, in said Escambia County, Florida,
for a period of one year next preceding the first publication of
the attached copy of advertisement; and affiant further says
that he has neither paid nor promised any person, firm or cor-
poration any discount, rebate, commission or refund for the
purpose of securing this advertisement for publication in the
said newspaper.

cc: J. Nelson
E. ...
J. ... FPA

Cindy Vance

Sworn to and subscribed before me this _____
day of _____ A.D., 1991

[Signature]
NOTARY PUBLIC.

My Commission Expires October 26, 1991

LEGAL NOTICE

State of
Florida
Department
of Environmental
Regulation
Notice of
Intent to Issue

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit to Florida Gas Transmission Company to install one natural gas fired engine. The Company's facility is located 6 miles north of Munson on SR 191 in Munson, Florida. A determination of Best Available Control Technology (BACT) was required. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, 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 2600 Blair Stone Road Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within the time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the County in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes

<p style="margin-left: 100px;">QUESTIONS? CALL 800-238-5355 TOLL FREE.</p>		<p>AIRBILL PACKAGE TRACKING NUMBER</p> <h1 style="font-size: 2em; margin: 0;">2835724404</h1>	
<h2 style="font-size: 2em; margin: 0;">2835724404</h2>		<p>RECIPIENT'S COPY</p>	
<p>Date: 5-13-11</p>			
<p>From (Your Name) Please Print: [Handwritten Name]</p> <p>Your Phone Number (Very Important): [Handwritten Number]</p> <p>Company: [Handwritten Company]</p> <p>Department/Floor No.: [Handwritten Dept/Floor]</p> <p>Street Address: [Handwritten Address]</p> <p>City: [Handwritten City] State: [Handwritten State] ZIP Required: [Handwritten ZIP]</p>		<p>To (Recipient's Name) Please Print: [Handwritten Name]</p> <p>Recipient's Phone Number (Very Important): [Handwritten Number]</p> <p>Company: [Handwritten Company]</p> <p>Department/Floor No.: [Handwritten Dept/Floor]</p> <p>Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): [Handwritten Address]</p> <p>City: [Handwritten City] State: [Handwritten State] ZIP Required: [Handwritten ZIP]</p>	
<p>YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.)</p>		<p>IF HOLD FOR PICK-UP, Print FEDEX Address Here</p> <p>Street Address: [Handwritten Address]</p> <p>City: [Handwritten City] State: [Handwritten State] ZIP Required: [Handwritten ZIP]</p>	
<p>PAYMENT: 1 <input checked="" type="checkbox"/> Bill Sender 2 <input type="checkbox"/> Bill Recipient's FedEx Acct. No. 3 <input type="checkbox"/> Bill 3rd Party FedEx Acct. No. 4 <input checked="" type="checkbox"/> Bill Credit Card 5 <input type="checkbox"/> Cash/Check</p>			
<p>SERVICES (Check only one box)</p> <p>Priority Overnight Service (Delivery by next business morning):</p> <p>11 <input type="checkbox"/> YOUR PACKAGING 51 <input type="checkbox"/></p> <p>16 <input type="checkbox"/> FEDEX LETTER * 56 <input type="checkbox"/> FEDEX LETTER *</p> <p>12 <input type="checkbox"/> FEDEX PAK * 52 <input type="checkbox"/> FEDEX PAK *</p> <p>13 <input type="checkbox"/> FEDEX BOX 53 <input type="checkbox"/> FEDEX BOX</p> <p>14 <input type="checkbox"/> FEDEX TUBE 54 <input type="checkbox"/> FEDEX TUBE</p> <p>Economy Two-Day Service (formerly Standard Air) (Delivery by second business day):</p> <p>30 <input type="checkbox"/> ECONOMY TWO-DAY SVC.</p> <p>Heavyweight Service (for Extra Large or any package over 150 lbs.):</p> <p>70 <input type="checkbox"/> HEAVYWEIGHT **</p> <p>80 <input type="checkbox"/> DEFERRED HEAVYWEIGHT **</p> <p>*Declared Value Limit \$100. **Call for delivery schedule.</p>	<p>DELIVERY AND SPECIAL HANDLING (Check services required)</p> <p>1 <input type="checkbox"/> HOLD FOR PICK-UP (Fill in Box #)</p> <p>2 <input checked="" type="checkbox"/> DELIVER WEEKDAY</p> <p>3 <input type="checkbox"/> DELIVER SATURDAY (Extra charge) (Not available to all locations)</p> <p>4 <input type="checkbox"/> DANGEROUS GOODS (Extra charge)</p> <p>5 <input type="checkbox"/></p> <p>6 <input type="checkbox"/> DRY ICE lbs.</p> <p>7 <input type="checkbox"/> OTHER SPECIAL SERVICE</p> <p>8 <input type="checkbox"/></p> <p>9 <input type="checkbox"/> SATURDAY PICK-UP (Extra charge)</p> <p>10 <input type="checkbox"/></p> <p>11 <input type="checkbox"/></p> <p>12 <input type="checkbox"/> HOLIDAY DELIVERY (Extra charge)</p>	<p>PACKAGES: [Handwritten]</p> <p>WEIGHT in Pounds Only: [Handwritten]</p> <p>YOUR DECLARED VALUE: [Handwritten]</p> <p>Total Total Total</p> <p>DIM SHIPMENT (Chargeable Weight)</p> <p>Received At:</p> <p>1 <input type="checkbox"/> Regular Stop 3 <input type="checkbox"/> Drop Box</p> <p>2 <input type="checkbox"/> On-Call Stop 4 <input type="checkbox"/> BSC</p> <p>5 <input type="checkbox"/> Station</p> <p>FedEx Emp. No. [Handwritten]</p>	<p>Emp. No. [Handwritten] Date: [Handwritten]</p> <p><input type="checkbox"/> Cash Received</p> <p><input type="checkbox"/> Return Shipment</p> <p><input type="checkbox"/> Third Party <input type="checkbox"/> Chg. To Del. <input type="checkbox"/> Chg. To Hold</p> <p>Street Address: [Handwritten]</p> <p>City: [Handwritten] State: [Handwritten] Zip: [Handwritten]</p> <p>Received By: [Handwritten Signature]</p> <p>Date/Time Received: [Handwritten] FedEx Employee Number: [Handwritten]</p> <p>Release Signature: [Handwritten Signature]</p> <p>Date/Time: [Handwritten]</p>
			<p>Federal Express Use Base Charges</p> <p>Declared Value Charge</p> <p>Other 1</p> <p>Other 2</p> <p>Total Charges</p> <p>REVISION DATE 8/90 PAR# 119500 GBFE FORMAT #041</p> <p>041</p> <p>© 1990 F.E.C. PRINTED IN U.S.A.</p>



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

February 15, 1991

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. William R. Osborne, Project Environmentalist
Environmental Affairs Department
Florida Gas Transmission Company
P. O. Box 1188
Houston, Texas 77251-1188

Dear Mr. Osborne:

Attached is one copy of the Technical Evaluation and Preliminary Determination and proposed permit to install one natural gas fired engine.

Please submit any written comments you wish to have considered concerning the Department's proposed action to Mr. Barry Andrews of the Bureau of Air Regulation.

Sincerely,

C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

CHF/TH/plm

Attachments

c: Jack Preece, DER
David Buff, P.E.

P 407 853 162

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL

(See Reverse)

U.S.G.P.O. 1989-234-555

PS Form 3800, June 1985

Sent to Mr. William R. Osborne, Fla.	
Street and No. Gas Transmission P. O. Box 1188	
P.O. State and ZIP Code Houston, Texas 77251-1188	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$
Postmark or Date Mailed: 2-15-91 Permit: AC 57-188869 PSD-FL-156	

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of
Application for Permit by:

Florida Gas Transmission Company
P. O. Box 1188
Houston, Texas 77251-1188

DER File No. AC 57-188869
PSD-FL-156

INTENT TO ISSUE

The Department of Environmental Regulation hereby gives notice of its intent to issue an air construction permit (copy attached) for the proposed project as detailed in the application specified above. The Department is issuing this Intent to Issue for the reasons stated in the attached Technical Evaluation and Preliminary Determination.

The applicant, Florida Gas Transmission Company, applied on October 22, 1990, to the Department of Environmental Regulation for a permit to install one natural gas fired engine.

The Department has permitting jurisdiction under Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. The project is not exempt from permitting procedures. The Department has determined that an air construction permit is required for the proposed work.

Pursuant to Section 403.815, F.S. and DER Rule 17-103.150, F.A.C., you (the applicant) are required to publish at your own expense the enclosed Notice of Intent to Issue Permit. The notice shall be published one time only within 30 days, in the legal ad section of a newspaper of general circulation in the area affected. For the purpose of this rule, "publication in a newspaper of general circulation in the area affected" means publication in a newspaper meeting the requirements of Sections 50.011 and 50.031, F.S., in the county where the activity is to take place. The applicant shall provide proof of publication to the Department, at the address specified within seven days of publication. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permit.

The Department will issue the permit with the attached conditions unless a petition for an administrative proceeding (hearing) is filed pursuant to the provisions of Section 120.57, F.S.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, 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 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant and the parties listed below must be filed within 14 days of receipt of this intent. Petitions filed by other persons must be filed within 14 days of publication of the public notice or within 14 days of receipt of this intent, whichever first occurs. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

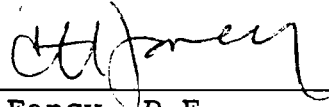
- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, 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 decision of the Department with regard to the application(s) have the right to petition to become a party to the proceeding. The petition must conform to the requirements

specified above and be filed (received) within 30 days of publication of this notice in the Office in General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION



C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

Copies furnished to:

Jack Preece, DER
David Buff, P.E.

State of Florida
Department of Environmental Regulation
Notice of Intent to Issue

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit to Florida Gas Transmission Company to install one natural gas fired engine. The Company's facility is located 5 miles north of Munson on SR 191 in Munson, Florida. A determination of Best Available Control Technology (BACT) was required. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, 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 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, 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 decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

The application is available for public inspection during business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Department of Environmental Regulation
Northwest District
160 Governmental Center
Pensacola, Florida 32501-5794

Any person may send written comments on the proposed action to Mr. Barry Andrews at the Department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the Department's final determination.

Technical Evaluation
and
Preliminary Determination

Florida Gas Transmission Company
Santa Rosa County
Munson, Florida

Natural Gas Compressor Engine
Permit No. AC 57-188869
PSD-FL-156

Department of Environmental Regulation
Division of Air Resources Management
Bureau of Air Regulation

February 15, 1991

I. SYNOPSIS OF APPLICATION

I.1 Applicant Name and Address

Florida Gas Transmission Company
P. O. Box 1188
Houston, Texas 77251-1188

I.2 Reviewing and Process Schedule

Date of Receipt of Application: October 26, 1990.

30 Days Completeness Review: November 20, 1990.

Additional Information Received: November 26, 1990.

Application Completeness Date: November 26, 1990.

II. FACILITY INFORMATION

II.1 Facility Location

Florida Gas Transmission Company's (FGTC) facility is located 5 miles north of Munson on SR 191 in Munson, Florida. The UTM coordinates are Zone 16, 510.83 km E and 3419.03 km N.

II.2 Standard Industrial Classification Code

This facility is classified as follows:

Major Group No. 49 - Electric, Gas and Sanitary Services

Group No. 492 - Gas Production and Distribution

Industry No. 4922 - Natural Gas Transmission

II.3 Facility Category

The FGTC site, in Munson, is classified as a major emitting facility for nitrogen oxides (NO_x) and carbon monoxide (CO). The proposed project will increase NO_x emissions by 77 tons per year and CO emissions by 97 tons per year. The total permitted emissions for this facility (including the existing engines) shall not exceed 1139 tons NO_x per year and 232 tons CO per year.

III. PROJECT DESCRIPTION

The FGTC proposed to install one natural gas fired engine (Dresser-Rand Model 10TCV integral engine compressor unit). The engine has 10 power cylinders and is rated at 4,000 bhp at 330 revolutions per minute (rpm). The engine is turbocharged, increasing the air inlet manifold pressure, which allows the engine to operate at a high air-to-fuel ratio. This turbocharging produces more power output from the engine than would otherwise be attained without having to use a larger size engine. A flow diagram of the integral engine compressor unit is presented in the attached figure 2.2.

III.1 Background Information

The FGTC existing compressor station consists of five 2,000 bhp natural gas fired reciprocating IC engines. All of the engines are Cooper-Bessemer LS-8-SG. These engines were installed before the CAA amendment of 1977: three engines were installed in 1959, the fourth engine was installed in 1966; and the fifth engine was installed in 1968. These existing engines are not being modified as part of this Phase II expansion project.

In general, the FGTC Phase II expansion project will be increasing the natural gas transport capacity of the existing Florida gas pipeline system. The scope of work for Phase II includes expansions by addition of state-of-the-art compressor engines at light existing compressor stations and at a newly proposed compressor station. The proposed engines would be used solely for the purpose of transporting natural gas in the pipeline for distribution in Florida. The main gas pipeline and the approximate locations of the existing and proposed compressor stations along the main pipeline are shown in Figure 1-1.

IV. RULE APPLICABILITY

The proposed project is subject to preconstruction review under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code (F.A.C.) Chapter 17-2.

This plant is located in an area (Santa Rosa County) designated attainment for all criteria pollutants in accordance with F.A.C. Rule 17-2.420.

The proposed project will be reviewed in accordance with F.A.C. Rule 17-2.500, Prevention of Significant Deterioration, because it will be a major modification to a major facility. This review consists of a determination of Best Available Control Technology (BACT) and unless otherwise exempted, an air quality impact of the increased emissions. The review also includes a review of the project's impacts on soils, vegetation and visibility air quality impact resulting from residential and industrial growth.

The proposed facility shall comply with applicable provisions of F.A.C. Rule 17-2.700, Emission Test Procedures; F.A.C. Rule 17-2.630, Best Available Control Technology; and F.A.C. Rule 17-2.500, Prevention of Significant Deterioration.

V. SOURCE IMPACT ANALYSIS

V.1 Control Technology Review

A complete BACT evaluation was submitted with the application. This evaluation included analyses technologies involving engine modification and technologies involving exhaust gas treatment. Furthermore, the evaluation also included the feasibility of the different NO_x control methods and a comparison

of the technical environmental, energy and economic impacts. Based on this approach, the lean-burn engine was determined to represent BACT.

The proposed engine will incorporate "lean-burn" technology, which is state-of-the-art design for minimizing air pollutant concentration in the exhaust gases from gas-fired reciprocating IC engines. In the lean-burn design, a small, fuel-rich mixture is combusted in a preignition chamber. The hot combustion gases from the preignition then pass to the main combustion chamber, where they ignite a lean mixture of fuel. Since most of the fuel entering the engine is burned in a lean state (i.e., high ratio of air to fuel), exhaust NO_x emissions are minimized. However, volatile organic compound (VOC) emissions are approximately 40 to 50 percent higher than the standard "rich-burn" engines.

V.2 Emission Limitations

The operation of this source will produce emissions of NO_x, CO, VOCs, particulates, and SO₂ from the burning of natural gas. Table II summarizes the proposed emissions from this Unit No. 6. Table III summarizes the emissions from existing units (Unit 1 through 5).

TABLE II
SUMMARY OF EMISSIONS
(Unit No. 6)

Pollutant	Maximum Potential Emissions From Proposed Compressor Engine		Significant Emission Rate (TPY)
	(lbs/hr)	(TPY)	
Nitrogen Oxides	17.63	77.2	40
Carbon Monoxide	22.05	96.6	100
Volatile Organic Compounds (non-methane)	8.8	38.6	40
Particulate Matter (TSP)	0.14	0.61	25
Particulate Matter (PM ₁₀)	0.14	0.61	15
Sulfur Dioxide	0.39	3.48	40

TABLE III
SUMMARY OF EXISTING EMISSIONS
(Units Nos. 1 through 5)

Pollutant	Per Each Engine		Total
	(lbs/hr)	(TPY)	
Nitrogen Oxides	48.5	212.4	1,062
Carbon Monoxide	6.17	27.0	135.3
Volatile Organic Compounds	1.94	8.5	42.5
Particulate Matter	0.07	0.3	1.6
Sulfur Dioxide	0.40	1.8	8.9

V.3 Air Quality Analysis

a. Introduction

The operation of the proposed engine will result in emissions increases which are projected to be greater than the PSD significant rate for NOx. Therefore, the project is subject to the PSD review requirements contained in F.A.C. Rule 17-2.500 for NOx. Part of the requirements is an air quality impact analysis for NOx which includes:

- o An analysis of existing air quality;
- o A PSD increment analysis
- o An Ambient Air Quality Standards analysis;
- o An analysis of impacts on soils, vegetation, visibility and growth-related air quality impacts; and
- o A Good Engineering Practice (GEP) stack height determination

The analysis of existing air quality generally relies on preconstruction monitoring data collected in accordance with EPA-approved methods. The PSD increment and AAQS analyses are based on air quality dispersion modeling completed in accordance with the EPA guidelines. Based on these required analyses, the Department has reasonable assurance that the proposed project, as described in this report and subject to the conditions of approval proposed herein, will not cause or contribute to a violation of any PSD increment or AAQS. A brief description of the modeling method used and results of the required analyses follow. A more complete description is contained in the permit application on file.

b. Analysis of the Existing Air Quality

Preconstruction ambient air quality monitoring may be required for pollutants subject to PSD review. However, an exemption to the monitoring requirement can be obtained if the maximum air quality impact resulting from the projected emissions increase, as determined through air quality modeling, is less than a pollutant-specific de minimus concentration. The predicted maximum increase for NOx is 0.92 ug/m³, annual average which is less than the de minimus concentration for NOx of 14 ug/m³ annual coverage. Therefore, no pre-construction monitoring is required for NOx.

c. Modeling Method

The EPA-approved Industrial Source Complex Long-Term (ISCLT) dispersion model was used by the applicant to predict the impact of NOx emissions from the proposed project on the surrounding ambient air. All recommended EPA default options were used. Downwash parameters were used because the proposed stack was less than the good engineering practice (GEP) stack height. Five years of surface weather observations (1982-1986) from the National Weather Service (NWS) station located at

Pensacola were used. These data were input into the National Climatic Data Center (NCDC) stability array (STAR) preprocessor program for use as input to the ISCLT model. The STAR program converts the hourly data into the joint frequency of occurrence of wind direction, windspeed and atmospheric stability. The STAR program can produce monthly, seasonal and annual stability arrays for input into ISCLT. The highest predicted yearly impact from the proposed NOx emissions was compared with the standards.

d. Modeling Results

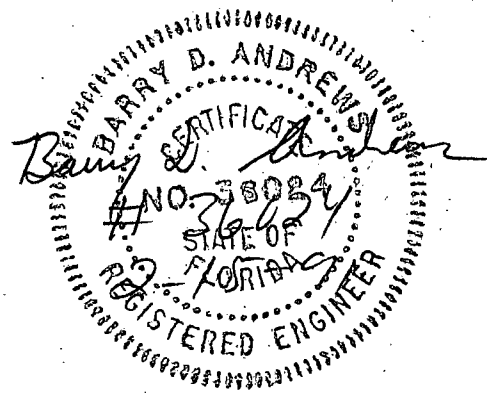
The applicant evaluated the potential increase in ambient ground-level concentration associated with the project to determine if these projected ambient concentration increases would be greater than the specified PSD significant impact level for NOx. Dispersion modeling was performed with 144 receptors located on 16 radials centered on the proposed engine's stack location and at downwind differences of 30, 100, 200, 300, 400, 500, 750, 1000, and 1250m. In addition, to account for plant boundaries in all directions, 36 discrete receptors were located along 36 radials separated by 10-degree increments. These discrete receptors were located at the nearest plant boundary in each direction. The maximum predicted annual NO₂ impact from this modeling was 0.92 ug/m³, which is less than the NO₂ significant impact level of 1 ug/m³ annual average concentration. Because the maximum predicted NO₂ concentration is less than the significant impact level, further modeling for NO₂ was not required in this case.

e. Additional Impacts Analysis

The increased emissions from the proposed project are not expected to affect the Bradwell Bay National Wilderness Area or the St. Marks National Wilderness Area since the nearest of these areas is greater than 100 km from the project. Because the impacts from NOx emissions are less than the PSD significant impact level, no harmful effects on soils and vegetation is expected. In addition, the proposed modification will not significantly change employment, population, housing or commercial/industrial development.

VI. CONCLUSION

Based on the information provided by Florida Gas Transmission Company, the Department has reasonable assurance that the proposed project, as described in this evaluation, and subject to the conditions proposed herein, will not cause or contribute to a violation of any air quality standard, PSD increment, or any other technical provision of Chapter 17-2 of the Florida Administrative Code.





Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

PERMITTEE:
Florida Gas Transmission Company
P. O. Box 1188
Houston, Texas 77251-1188

Permit Number: AC 57-188869
Expiration Date: June 30, 1992
County: Santa Rosa
Latitude/Longitude: 30°54'42"N
86°53'12"W
Project: Natural Gas Compressor
Engine (Unit No. 6)

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

For the construction of one 4,000 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Munson, Santa Rosa County, Florida. The UTM coordinates are Zone 16, 510.83 km East and 3419.03 km North.

The source shall be constructed in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. DER Form 17-2(202)(1) Application to Construct/Operate Air Pollution Sources.
2. Department's letter dated November 20, 1990.
3. KBN Engineering and Applied Sciences' letter dated November 21, 1990.

PERMITTEE:

Florida Gas Transmission Company

Permit Number: AC 57-188869

Expiration Date: June 30, 1992

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.
2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.
3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.
4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.
5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

PERMITTEE: Florida Gas Transmission Company Permit Number: AC 57-188869
Expiration Date: June 30, 1992

GENERAL CONDITIONS:

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

- a. Have access to and copy any records that must be kept under the conditions of the permit;
- b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
- c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

- a. a description of and cause of non-compliance; and
- b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

PERMITTEE:

Florida Gas Transmission Company

Permit Number: AC 57-188869

Expiration Date: June 30, 1992

GENERAL CONDITIONS:

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

- (x) Determination of Best Available Control Technology (BACT)
- (x) Determination of Prevention of Significant Deterioration (PSD)
- (x) Compliance with New Source Performance Standards (NSPS)

14. The permittee shall comply with the following:

- a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
- b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the

PERMITTEE:

Florida Gas Transmission Company

Permit Number: AC 57-188869

Expiration Date: June 30, 1992

GENERAL CONDITIONS:

permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

Emission Limits

1. The maximum allowable emissions from this engine (Unit No. 6) shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.1	96.6	2.0 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.14	0.61	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.14	0.61	5 lbs/MMscf
Sulfur Dioxide	0.8	3.5	10 gr/100scf

2. Visible emissions shall not exceed 10% opacity.

PERMITTEE:

Florida Gas Transmission Company

Permit Number: AC 57-188869

Expiration Date: June 30, 1992

SPECIFIC CONDITIONS:

Operating Rates

3. This source is allowed to operate continuously (8760 hours per year).

4. This source is allowed to burn natural gas only.

5. The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 27,810 scf/hr.
- Maximum heat input shall not exceed 29.20 MMBtu/hr.

6. Any change in the method of operation, equipment or operating hours shall be submitted to the DER's Bureau of Air Regulation and the Northwest District offices.

7. Any other operating parameters established during compliance testing and/or inspection that will ensure the proper operation of this source shall be included in the operating permit.

Compliance Determination

8. Compliance with the NO_x, SO₂, CO, and VOC standards shall be determined by the following reference methods as described in 40 CFR 60, Appendix A (July 1, 1988) and adopted by reference in F.A.C. Rule 17-2.700.

- Method 1. Sample and Velocity Traverses
- Method 2. Volumetric Flow Rate
- Method 3. Gas Analysis
- Method 7E. Determination of Nitrogen Oxides Emissions from Stationary Sources
- Method 9. Determination of the Opacity of the Emissions from Stationary Sources
- Method 10. Determination of the Carbon Monoxide Emission from Stationary Sources
- Method 25. Determination of Total Gaseous Non-Methane Organic Emissions as Carbon

9. Compliance with the SO₂ emission limit can be determined by calculations based on fuel analysis using ASTM D1072-80, D3031-81, D4084-82, or D3246-81 for sulfur content of gaseous fuels.

PERMITTEE:

Florida Gas Transmission Company

Permit Number: AC 57-188869

Expiration Date: June 30, 1992

SPECIFIC CONDITIONS:

10. Initial compliance with the volatile organic compound (VOC) limits will be determined by Method 25, thereafter, compliance with the VOC emission limits will be assumed, provided the CO allowable emission rate is achieved.

11. Test results will be the average of 3 valid runs. The Northwest District office will be notified at least 30 days in advance of the compliance test. The source shall operate between 90% and 100% of permitted capacity during the compliance test. Compliance test results shall be submitted to the Northwest District office no later than 45 days after completion.

Rule Requirements

12. This source shall comply with all applicable provisions of Chapter 403, Florida Statutes and Chapters 17-2 and 17-4, Florida Administrative Code.

13. Issuance of this permit does not relieve the facility owner or operator from compliance with any applicable federal, state, or local permitting requirements and regulations (F.A.C. Rule 17-2.210(1)).

14. This source shall comply with F.A.C. Rule 17-2.700, Stationary Point Source Emission Test Procedures.

15. Pursuant to F.A.C. Rule 17-2.210(2), Air Operating Permits, the permittee is required to submit annual reports on the actual operating rates and emissions from this facility. These reports shall include, but are not limited to the following: fuel usage, hours of operation, air to fuel ratio, air emissions limits, stack test results, etc. Annual reports shall be sent to the Department's Northwest District office.

17. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the Bureau of Air Regulation prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

18. An application for an operation permit must be submitted to the Northwest District office at least 90 days prior to the expiration date of this construction permit or within 45 days after completion of compliance testing, whichever occurs first. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that

PERMITTEE:

Florida Gas Transmission Company

Permit Number: AC 57-188869

Expiration Date: June 30, 1992

SPECIFIC CONDITIONS:

construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rule 17-4.220).

Issued this _____ day
of _____, 1991

**STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION**

Carol M. Browner, Secretary

Best Available Control Technology (BACT) Determination
Florida Gas Transmission Company
Santa Rosa County

The applicant proposes to expand its existing natural gas pipeline compressor station No. 12 near the township of Munson in Santa Rosa County, Florida. The proposed expansion consists of adding one new 4,000 brake horsepower (BHP) natural-gas-fired, reciprocating internal combustion engine.

The applicant has indicated the maximum total annual tonnage of regulated air pollutants emitted from the compressor engine based on 8,760 hrs/year operation to be as follows:

<u>Pollutant</u>	<u>Max. Net Increase in Emissions (TPY)</u>	<u>PSD Significant Emission Rate (TPY)</u>
NOx	77.2	40
SO ₂	3.48	40
PM/PM ₁₀	0.61	25/15
CO	96.6	100
VOC	38.6	40

Rule 17-2.500(2)(f)(3) of the Florida Administrative Code (F.A.C.) requires a BACT review for all regulated pollutants emitted in an amount equal to or greater than the significant emission rates listed in the previous table.

BACT Determination Requested by the Applicant

The BACT Determination requested by the applicant is given below:

<u>Pollutant</u>	<u>Determination</u>
NOx	2.0 g/bhp-hr

Date of Receipt of a BACT Application

November 26, 1990

Review Group Members

This determination was based upon comments received from the applicant and the Permitting and Standards Section.

BACT Determination Procedure

In accordance with Florida Administrative Code Chapter 17-2, Air Pollution, this BACT determination is based on the maximum degree of reduction of each pollutant emitted which the Department, on a case by case basis, taking into account energy, environmental and

BACT
Florida Gas Transmission Company

economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques. In addition, the regulations state that in making the BACT determination the Department shall give consideration to:

- (a) Any Environmental Protection Agency determination of Best Available Control Technology pursuant to Section 169, and any emission limitation contained in 40 CFR Part 60 (Standards of Performance for New Stationary Sources) or 40 CFR Part 61 (National Emission Standards for Hazardous Air Pollutants).
- (b) All scientific, engineering, and technical material and other information available to the Department.
- (c) The emission limiting standards or BACT determinations of any other state.
- (d) The social and economic impact of the application of such technology.

The EPA currently stresses that BACT should be determined using the "top-down" approach. The first step in this approach is to determine the most stringent control available for a similar or identical source or source category. If it is shown that this level of control is technically or economically infeasible for the source in question, then the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objections.

BACT Analysis

A review of previous BACT determinations and control measures utilized for natural gas compressor engines indicates that in general the nitrogen oxides emission rate proposed by the applicant is representative of BACT. BACT for nitrogen oxides has been established for reciprocating engines based on the following techniques:

- o engine modifications, and
- o add-on control technology

A review of the BACT/LAER Clearinghouse does not indicate the use of engine modifications on natural gas fired engines as representing BACT. A few engines have, however, been required to use selective catalytic reduction.

Selective catalytic reduction is a post-combustion method for control of NO_x emissions. The SCR process combines vaporized ammonia with NO_x in the presence of a catalyst to form nitrogen

BACT
Florida Gas Transmission Company

and water. The vaporized ammonia is injected into the exhaust gases prior to passage through the catalyst bed. The SCR process can achieve up to 90% reduction of NO_x with a new catalyst. As the catalyst ages, the maximum NO_x reduction will decrease to approximately 86 percent.

Given the applicant's proposed BACT level for nitrogen oxides control stated above, an evaluation can be made of the cost and associated benefit of using SCR as follows:

The applicant has indicated that the total levelized annual cost (operating plus amortized capital cost) to install SCR at 100 percent capacity factor is \$715,218. Taking into consideration the total levelized annual cost, a cost/benefit analysis of using SCR can now be developed.

Based on the information supplied by the applicant, it is estimated that the maximum annual NO_x emissions with the proposed compressor engines will be 77.2 tons/year. Assuming that SCR would reduce NO_x emissions by an additional 80%, the SCR would control 62 tons of NO_x annually. When this reduction is taken into consideration with the total levelized annual cost of \$715,218, the cost per ton of controlling NO_x is \$11,535. This cost (\$11,535/ton) is not representative of costs that have been previously justified as BACT and is judged to be cost prohibitive for this facility.

In addition to evaluating the use of SCR, the applicant has examined the energy and economic impacts of using nonselective catalytic reduction, air-to-fuel ratio changes, ignition timing retardation, derating, and exhaust gas recirculation. In each case these alternatives resulted in emissions that were essentially equivalent to that proposed or provided little benefit for the associated expense. As this is the case, none of these control strategies will be elaborated upon in this determination.

Environmental Impact Analysis

The predominant environmental impacts would be related to the use of SCR. The use of SCR could result in accidental spills, emissions of ammonia, and the handling of spent catalyst which is sometimes classified as hazardous waste. Other control techniques such as ignition timing retardation and power derating result in increases of carbon monoxide and hydrocarbons which reduce the gains provided by controlling nitrogen oxides.

In addition to nitrogen oxides, the impacts of toxic pollutants associated with the combustion of natural gas have been evaluated. These toxics (formaldehyde and polycyclic organic matter) common to the combustion of natural gas, are expected to be emitted in minimal amounts and will not have an impact on air quality or this BACT analysis.

BACT
Florida Gas Transmission Company

BACT Determination by DER

Based on the information presented by the applicant and the studies conducted, the Department believes that the compressor engine proposed by the applicant satisfies the BACT requirement for nitrogen oxides. Although engine modifications and add-on control (SCR) could be used to provide additional control, the benefits that would be obtained do not warrant the cost. The emission limit for the compressor engine is thereby established as follows:

<u>Pollutant</u>	<u>Emission Limit</u>
NOx	2.0 grams/bhp-hr

Details of the Analysis May be Obtained by Contacting:

Barry Andrews, P.E., BACT Coordinator
Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Recommended by:

Approved by:

C. H. Fancy, P.E., Chief
Bureau of Air Regulation

Carol M. Browner, Secretary
Dept. of Environmental Regulation

Date 1991

Date 1991

P 360 185 701



Receipt for Certified Mail

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

Sender's Name <i>Alan Weatherford</i>	
Company and No. <i>FIA GAS Trans. Co</i>	
P.O. Name and ZIP Code <i>Maitland, FL</i>	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date <i>2-17-93</i>	
<i>AC 57-188869, 67-189220, 20-189438, 62-189439, 04-189454 - 42-189455 48-189456 - 05-189665</i>	

PS Form 3800, June 1991

56-189457

is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- 1. Addressee's Address
- 2. Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
Alan Weatherford
Compliance Env
FIA. GAS Trans. Co
P O BOX 945100
Maitland, FL 32794-5100

4a. Article Number
P 360 185 701

4b. Service Type
 Registered Insured
 Certified COD
 Express Mail Return Receipt for Merchandise

7. Date of Delivery

5. Signature (Addressee)
M. Johnson

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)

Thank you for using Return Receipt Service.



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

November 28, 1990

Ms. Jewell A. Harper, Chief
Air Enforcement Branch
U.S. EPA - Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Ms. Harper:

Re: Completeness Review

The enclosed information is being forwarded to you for completeness review.

1. Seminole Fertilizer Corp., Polk County, gas turbine cogeneration project, PSD-FL-157.

2. The following applications from Florida Gas Transmission Company:

- Compressor Sta. No. 12, Santa Rosa County, PSD-FL-156
- Compressor Sta. No. 13, Washington County, PSD-FL-158
- Compressor Sta. No. 14, Gadsden County, PSD-FL-159
- Compressor Sta. No. 15, Taylor County, PSD-FL-160
- Compressor Sta. No. 16, Bradford County, PSD-FL-161
- Compressor Sta. No. 17, Marion County, PSD-FL-162
- Compressor Sta. No. 18, Orange County, PSD-FL-163
- Compressor Sta. No. 20, St. Lucie County, PSD-FL-164

If there are any questions, please call Barry Andrews at (904)488-1344 or write to me at the above address. If it is convenient to FAX a response to us, the FAX number to use is (904)922-6979.

Sincerely,

Patricia G. Adams

for
C. H. Fancy, P.E.
Chief

Bureau of Air Regulation

CHF/pa

HOPPING BOYD GREEN & SAMS

ATTORNEYS AND COUNSELORS
123 SOUTH CALHOUN STREET
POST OFFICE BOX 6526
TALLAHASSEE, FLORIDA 32314
(904) 222-7500
FAX (904) 224-8551

CARLOS ALVAREZ
JAMES S. ALVES
BRIAN H. BIBEAU
ELIZABETH C. BOWMAN
WILLIAM L. BOYD, IV
RICHARD S. BRIGHTMAN
PETER C. CUNNINGHAM
WILLIAM H. GREEN
WADE L. HOPPING
FRANK E. MATTHEWS
RICHARD D. MELSON
WILLIAM D. PRESTON
CAROLYN S. RAEPPLE
GARY P. SAMS
ROBERT P. SMITH, JR.

KATHLEEN BLIZZARD
THOMAS M. DEROSE
RICHARD W. MOORE
ANGELA R. MORRISON
DIANA M. PARKER
LAURA BOYD PEARCE
GARY V. PERKO
MICHAEL P. PETROVICH
DAVID L. POWELL
DOUGLAS S. ROBERTS
CECELIA C. SMITH
CHERYL G. STUART
OF COUNSEL
W. ROBERT FOKES

RECEIVED
NOV 21 1990
DER-BAQ/m

November 21, 1990

BY HAND-DELIVERY

Mr. Clair H. Fancy, P.E.
Chief, Bureau of Air Regulation
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road, Room 306F
Tallahassee, Florida 32399-2400


Re: Florida Gas Transmission Company

Dear Clair:

This letter will confirm that you and I conferred by telephone today, and you requested that Florida Gas Transmission Company withhold filing the signed Consent Order (OGC File No. 90-1225), compressor station permit applications, etc., until November 30, 1990. Based upon your request, we will not file the Consent Order or compressor station permit applications until that date.

I hope that you enjoy the Thanksgiving holiday.

Very truly yours,


James S. Alves

/kkm:Fancy3
cc: Teresa Heron



November 21, 1990

Ms. Theresa Heron
Florida Dept. of Environmental Regulation
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, FL 32399

VIA FAX

RECEIVED

NOV 28 1990

DER-BAQM

Re: ENRON/FGTC Compressor Station No. 12 PSD Permit Application

Dear Ms. Heron:

Per your request, please find the attached sheet of emission calculations for FGTC's Compressor Station No. 12. Also, there is a correction in the value calculated for particulate emissions, which now results in slightly lower hourly and annual emission values. Additional pages are attached for substituting three pages in the original submittal in order to update this change.

Please feel free to contact me at your convenience if you have further questions concerning this permit application.

Sincerely,

A handwritten signature in cursive script that reads "David A. Buff". The signature is written in black ink and is positioned above the typed name and title.

David A. Buff, P.E.
Principle Engineer

DAB/tt

cc: Alan Bowman, ENRON

D. Heron
C. Halladay
C. L. Brown
C. Middlerant, NW Dist.
J. Harpiz, EPA

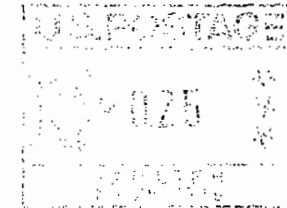
KBN ENGINEERING AND APPLIED SCIENCES, INC.

1034 Northwest 57th Street Gainesville, Florida 32605 904/331-9000 FAX: 904/332-4189

BEST AVAILABLE COPY



David A. Buff

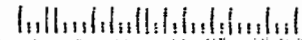


Ms. Theresa Heron
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399

KBN ENGINEERING AND APPLIED SCIENCES, INC.

1034 Northwest 57th Street

Gainesville, Florida 32605



90051

EMISSION CALCULATIONS
FGTC's COMPRESSOR STATION No. 12
SANTA ROSA COUNTY, FLORIDA

Fuel usage and emission calculations are presented below for the proposed Dresser-Rand 10-TCV reciprocating IC engine at Compressor Station No. 12.

Fuel Usage:

$$\begin{aligned}(4,000 \text{ bhp}) \times (7,300 \text{ Btu/bhp-hr}) &= 29.20 \times 10^6 \text{ Btu/hr} \\ (29.20 \times 10^6 \text{ Btu/hr}) / (1,050 \text{ Btu/scf}) &= 27,810 \text{ scf/hr}\end{aligned}$$

Emission Calculations:

$$\begin{aligned}\text{NO}_x: (2.0 \text{ g/bhp-hr})(4,000 \text{ bhp})(1 \text{ lb}/453.593 \text{ g}) &= 17.63 \text{ lb/hr} \\ (17.63 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) &= 77.2 \text{ TPY}\end{aligned}$$

$$\begin{aligned}\text{CO: } (2.5 \text{ g/bhp-hr})(4,000 \text{ bhp})(1 \text{ lb}/453.593 \text{ g}) &= 22.05 \text{ lb/hr} \\ (22.05 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) &= 96.6 \text{ TPY}\end{aligned}$$

VOCs(non-methane hydrocarbon):

$$\begin{aligned}(1.0 \text{ g/bhp-hr})(4,000 \text{ bhp})(1 \text{ lb}/453.593 \text{ g}) &= 8.82 \text{ lb/hr} \\ (8.82 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) &= 38.6 \text{ TPY}\end{aligned}$$

$$\begin{aligned}\text{PM: } (5 \text{ lb}/10^6 \text{ scf})(27,810 \text{ scf/hr}) &= 0.139 \text{ lb/hr}^1 \\ (0.139 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) &= 0.61 \text{ TPY}^1\end{aligned}$$

$$\begin{aligned}\text{SO}_2: (10 \text{ gr}/100 \text{ scf})(27,810 \text{ scf/hr})(1 \text{ lb}/7,000 \text{ gr}) &= 0.397 \text{ lb/hr of Sulfur} \\ (2 \text{ lb SO}_2/\text{lb Sulfur})(0.397 \text{ lb/hr Sulfur}) &= 0.794 \text{ lb/hr of SO}_2 \\ (0.794 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) &= 3.48 \text{ TPY}\end{aligned}$$

¹ Different value than shown in the original submittal. Corrections are concurrently being submitted to reflect this change on page 4 of the permit application form, and pages 2-5 and 3-14 in the PSD report.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Not applicable				

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): Not applicable

2. Product Weight (lbs/hr): Not applicable

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Name of Contaminant	Emission ¹		Allowed Emission Rate per Rule 17-2	Allowable Emission lbs/hr	Potential ⁴ Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
NO _x	17.6	77.2	BACT	BACT	17.6	77.2	
CO	22.0	96.6	N/A	N/A	22.0	96.6	
VOCs	8.8	38.6	N/A	N/A	8.8	38.6	
Particulates	0.14	0.61	N/A	N/A	0.14	0.61	
SO ₂	0.80	3.48	N/A	N/A	0.80	3.48	

¹See Section V, Item 2.

²Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

³Calculated from operating rate and applicable standard.

⁴Emission, if source operated without control (See Section V, Item 3).

Table 2-2. Maximum Emissions From FGTC's Proposed Compressor Engine

Pollutant	Emission Factor	Reference	Maximum Emissions	
			lb/hr	TPY
Nitrogen Oxides	2.0 g/bhp-hr	Manufacturer's guarantee	17.6	77.2
Carbon Monoxide	2.5 g/bhp-hr	Manufacturer's guarantee	22.0	96.6
Volatile Organic Compounds (non-methane)	1.0 g/bhp-hr	Manufacturer's guarantee	8.8	38.6
Particulate Matter	5 lb/MMscf	AP-42, Table 1.4-1	0.14	0.61
Sulfur Dioxide	10 gr/100 scf	ENRON Specification	0.80	3.48

Note: Maximum natural gas consumption is 27,810 standard cubic feet per hour (scf/hr).

g/bhp-hr = grams per brake horsepower per hour.

gr/scf = grains per standard cubic feet.

lb/hr = pounds per hour.

TPY = tons per year.

Table 3-3. Maximum Potential Emissions Due to Proposed Engine at Compressor Station No. 12

Pollutant	Maximum Potential Emissions From Proposed Compressor Engine		Significant Emission Rate (TPY)	PSD Review Applies?
	(lb/hr)	(TPY)		
Particulate Matter (TSP)	0.14	0.61	25	No
Particulate Matter (PM10)	0.14	0.61	15	No
Sulfur Dioxide	0.80	3.48	40	No
Nitrogen Dioxide	17.6	77.2	40	Yes
Carbon Monoxide	22.0	96.6	100	No
Volatile Organic Compounds (non-methane)	8.8	38.6	40	No

P 230 524 391



Receipt for Certified Mail

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

PS Form 3800, June 1991

Sent to Mr. Allan Weatherford	
Street and No. P. O. Box 94500	
P.O., State and ZIP Code Maitland, FL 32794-5100	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date Mailed: 9/20/93 Request for Amendments and Extensions	

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

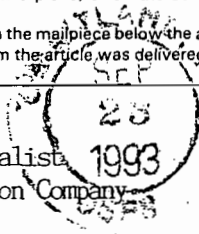
- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- 1. Addressee's Address
- 2. Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
Mr. Allan Weatherford
Compliance Environmentalist
Florida Gas Transmission Company
P. O. Box 94500
Maitland, Florida 32794-5100



4a. Article Number
P 230 524 391

4b. Service Type

<input type="checkbox"/> Registered	<input type="checkbox"/> Insured
<input checked="" type="checkbox"/> Certified	<input type="checkbox"/> COD
<input type="checkbox"/> Express Mail	<input type="checkbox"/> Return Receipt for Merchandise

7. Date of Delivery
10

5. Signature (Addressee)

Allan Weatherford

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)

Thank you for using Return Receipt Service.



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

November 20, 1990

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. W. Alan Bowman
Project Environmentalist
Florida Gas Transmission Company
P. O. Box 1188
Houston, Texas 77251

Dear Mr. Bowman:

Re: Natural Gas Compressor Engine
AC 57-188869, PSD-FL-157

The Department has reviewed your application for a permit to construct a 4000 bhp natural gas compressor engine. The engine is to be located at the Florida Gas Transmission Company site, 5 miles north of Munson, Santa Rosa County, Florida.

Based on this review, we have determined that the following information is needed:

1. Attach a derivation of the emission calculations for this source (Unit No. 12). What is the correct air to fuel ratio (60.89)? State and justify all assumptions.
2. Submit complete air construction applications and fees for each existing engine at this site.

We will resume processing your applications as soon as this information is received. If you have any questions about the data requested, please feel free to call Teresa Heron at 904-488-1344 or write to me at the above address.

Sincerely,

for C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

CHF/TH/plm

c: Jack Preece, NW Dist.
David Buff, P.E.
Jewell Harper, EPA



November 21, 1990

Ms. Theresa Heron
Florida Dept. of Environmental Regulation
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, FL 32399

VIA FAX

RECEIVED

NOV 20 1990

DER-BAQM

Re: ENRON/FGTC Compressor Station No. 12 PSD Permit Application

Dear Ms. Heron:

Per your request, please find the attached sheet of emission calculations for FGTC's Compressor Station No. 12. Also, there is a correction in the value calculated for particulate emissions, which now results in slightly lower hourly and annual emission values. Additional pages are attached for substituting three pages in the original submittal in order to update this change.

Please feel free to contact me at your convenience if you have further questions concerning this permit application.

Sincerely,

David A. Buff, P.E.
Principle Engineer

DAB/tt

cc: Alan Bowman, ENRON

J. Heron
C. Holladay
E. Andrews
E. Middleswart, W W Diet
J. Harper, EPA

KBN ENGINEERING AND APPLIED SCIENCES, INC.

1034 Northwest 57th Street Gainesville, Florida 32605 904/331-9000 FAX: 904/332-4189

EQUAL EMPLOYMENT OPPORTUNITY / AN AFFIRMATIVE ACTION EMPLOYER

EMISSION CALCULATIONS
 FGTC's COMPRESSOR STATION No. 12
 SANTA ROSA COUNTY, FLORIDA

Fuel usage and emission calculations are presented below for the proposed Dresser-Rand 10-TCV reciprocating IC engine at Compressor Station No. 12.

Fuel Usage:

$$(4,000 \text{ bhp}) \times (7,300 \text{ Btu/bhp-hr}) = 29.20 \times 10^6 \text{ Btu/hr}$$

$$(29.20 \times 10^6 \text{ Btu/hr}) / (1,050 \text{ Btu/scf}) = 27,810 \text{ scf/hr}$$

Emission Calculations:

$$\text{NO}_x: (2.0 \text{ g/bhp-hr})(4,000 \text{ bhp})(1 \text{ lb}/453.593 \text{ g}) = 17.63 \text{ lb/hr}$$

$$(17.63 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) = 77.2 \text{ TPY}$$

$$\text{CO: } (2.5 \text{ g/bhp-hr})(4,000 \text{ bhp})(1 \text{ lb}/453.593 \text{ g}) = 22.05 \text{ lb/hr}$$

$$(22.05 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) = 96.6 \text{ TPY}$$

VOCs(non-methane hydrocarbon):

$$(1.0 \text{ g/bhp-hr})(4,000 \text{ bhp})(1 \text{ lb}/453.593 \text{ g}) = 8.82 \text{ lb/hr}$$

$$(8.82 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) = 38.6 \text{ TPY}$$

$$\text{PM: } (5 \text{ lb}/10^6 \text{ scf})(27,810 \text{ scf/hr}) = 0.139 \text{ lb/hr}^1$$

$$(0.139 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) = 0.61 \text{ TPY}^1$$

$$\text{SO}_2: (10 \text{ gr}/100 \text{ scf})(27,810 \text{ scf/hr})(1 \text{ lb}/7,000 \text{ gr}) = 0.397 \text{ lb/hr of Sulfur}$$

$$(2 \text{ lb SO}_2/\text{lb Sulfur})(0.397 \text{ lb/hr Sulfur}) = 0.794 \text{ lb/hr of SO}_2$$

$$(0.794 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) = 3.48 \text{ TPY}$$

¹ Different value than shown in the original submittal. Corrections are concurrently being submitted to reflect this change on page 4 of the permit application form, and pages 2-5 and 3-14 in the PSD report.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Not applicable				

B. Process Rate, if applicable: (See Section V, Item 1)

- Total Process Input Rate (lbs/hr): Not applicable
- Product Weight (lbs/hr): Not applicable

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Name of Contaminant	Emission ¹		Allowed ² Emission Rate per Rule 17-2	Allowable ³ Emission lbs/hr	Potential ⁴ Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
NO _x	17.6	77.2	BACT	BACT	17.6	77.2	
CO	22.0	96.6	N/A	N/A	22.0	96.6	
VOCs	8.8	38.6	N/A	N/A	8.8	38.6	
Particulates	0.14	0.61	N/A	N/A	0.14	0.61	
SO ₂	0.80	3.48	N/A	N/A	0.80	3.48	

¹See Section V, Item 2.

²Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

³Calculated from operating rate and applicable standard.

⁴Emission, if source operated without control (See Section V, Item 3).

Table 2-2. Maximum Emissions From FGTC's Proposed Compressor Engine

Pollutant	Emission Factor	Reference	Maximum Emissions	
			lb/hr	TPY
Nitrogen Oxides	2.0 g/bhp-hr	Manufacturer's guarantee	17.6	77.2
Carbon Monoxide	2.5 g/bhp-hr	Manufacturer's guarantee	22.0	96.6
Volatile Organic Compounds (non-methane)	1.0 g/bhp-hr	Manufacturer's guarantee	8.8	38.6
Particulate Matter	5 lb/MMscf	AP-42, Table 1.4-1	0.14	0.61
Sulfur Dioxide	10 gr/100 scf	ENRON Specification	0.80	3.48

Note: Maximum natural gas consumption is 27,810 standard cubic feet per hour (scf/hr).

g/bhp-hr = grams per brake horsepower per hour.

gr/scf = grains per standard cubic feet.

lb/hr = pounds per hour.

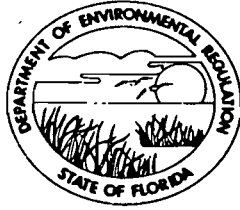
TPY = tons per year.

Table 3-3. Maximum Potential Emissions Due to Proposed Engine at Compressor Station No. 12

Pollutant	Maximum Potential Emissions From Proposed Compressor Engine		Significant Emission Rate (TPY)	PSD Review Applies?
	(lb/hr)	(TPY)		
Particulate Matter (TSP)	0.14	0.61	25	No
Particulate Matter (PM10)	0.14	0.61	15	No
Sulfur Dioxide	0.80	3.48	40	No
Nitrogen Dioxide	17.6	77.2	40	Yes
Carbon Monoxide	22.0	96.6	100	No
Volatile Organic Compounds (non-methane)	8.8	38.6	40	No

10/22/90

DEPARTMENT OF ENVIRONMENTAL REGULATION



APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Natural Gas Compressor Engine [] New¹ [X] Existing¹
 APPLICATION TYPE: [] Construction [X] Operation [] Modification
 COMPANY NAME: Florida Gas Transmission Company COUNTY: Santa Rosa
 Identify the specific emission point source(s) addressed in this application (i.e., Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) Station 12, Unit Nos. 1 to 5
 SOURCE LOCATION: Street 5 miles north of Munson on SR 191 City Munson
 UTM: East 16:510.83 km North 3,419.63 km
 Latitude 30 ° 54 ' 42 "N Longitude 86 ° 53 ' 12 "W
 APPLICANT NAME AND TITLE: W. Alan Bowman, Project Environmentalist
 APPLICANT ADDRESS: P.O. Box 1188, Houston, Texas 77251 Phone: (713) 853-7303

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Florida Gas Transmission Co.

I certify that the statements made in this application for an operating permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: _____

Stanley C. Horton, President

Name and Title (Please Type)

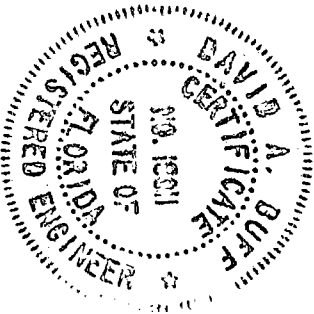
Date: _____ Telephone No. (713) 853-6177

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgement, that

¹See Florida Administration Code Rule 17-2.100(57) and (104)

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.



Signed David A. Buff

David A. Buff, P.E.
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

1034 NW 57th Street, Gainesville, FL 32605
Mailing Address (Please Type)

Florida Registration No. 19011 Date: 10/19/90 Telephone No. (904) 331-9000

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

See Attachment A

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction N/A Completion of Construction N/A

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

Not applicable

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

This multiple-source application is being submitted in compliance with the terms of Consent Order OGC File No. 90-1225.

E. Requested permitted equipment operating time: hrs/day 24; days/wk 7; wks/yr 52;
If power plant, hrs/yr N/A; if seasonal, describe: N/A

F. If this is a new source or major modification, answer the following questions.
(Yes or No) N/A. Sources have been in operation since 1968.

1. Is this source in a non-attainment area for a particular pollutant? _____
 - a. If yes, has "offset" been applied? _____
 - b. If yes, has "Lowest Achievable Emission Rate" been applied? _____
 - c. If yes, list non-attainment pollutants. _____
2. Does best available control technology (BACT) apply to this source?
If yes, see Section VI. _____
3. Does the State "Prevention of Significant Deterioration" (PSD)
requirement apply to this source? If yes, see Sections VI and VII. _____
4. Do "Standards of Performance for New Stationary Sources" (NSPS)
apply to this source? _____
5. Do "National Emission Standards for Hazardous Air Pollutants"
(NESHAP) apply to this source? _____

- H. Do "Reasonably Available Control Technology" (RACT) requirements apply
to this source? No
- a. If yes, for what pollutants? _____
 - b. If yes, in addition to the information required in this form, any information
requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any
justification for any answer of "No" that might be considered questionable.

See Attachment A

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Not Applicable				

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): Not Applicable

2. Product Weight (lbs/hr): Not Applicable

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Note: Emissions represent total for all five engines.

Name of Contaminant	Emission ¹		Allowed ² Emission Rate per Rule 17-2	Allowable ³ Emission lbs/hr	Potential ⁴ Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
NO _x	242.5	1,062.2	N/A	N/A	242.5	1,062.2	
CO	30.9	135.3	N/A	N/A	30.9	135.3	
VOCs (non-methane)	9.7	42.5	N/A	N/A	9.7	42.5	
Particulates	0.36	1.6	N/A	N/A	0.36	1.6	
SO ₂	2.0	8.9	N/A	N/A	2.0	8.9	

¹See Section V, Item 2.

²Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

³Calculated from operating rate and applicable standard.

⁴Emission, if source operated without control (See Section V, Item 3).

D. Control Devices: (See Section V, Item 4) Not Applicable

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Natural Gas	0.0714	0.0714	75.0
(total 5 engines)			

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, others--lbs/hr.

Fuel Analysis:

Percent Sulfur: 0.031 (by weight)** Percent Ash: N/A
 Density: 0.0455 lb/ft³ lbs/gal Typical Percent Nitrogen: N/A
 Heat Capacity: 23.077 (1.050 Btu/scf) BTU/lb N/A BTU/gal
 Other Fuel Contaminants (which may cause air pollution): N/A

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average Not applicable Maximum

G. Indicate liquid or solid wastes generated and method of disposal.

Not applicable

**Based on contract limit of 10 gr/100 ft³ and gas at 0.0455 lb/ft³.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 26.42 ft. Stack Diameter: 1.27 ft.
 Gas Flow Rate: 11,760 ACFM 4,279 DSCFM Gas Exit Temperature: 875 °F.
 Water Vapor Content: 8 % Velocity: 154.5 FPS

SECTION IV: INCINERATOR INFORMATION
 Not Applicable

Type of Waste	Type 0 (Plastics)	Type II (Rubbish)	Type III (Refuse)	Type IV (Garbage)	Type IV (Pathological)	Type V (Liq. & Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste _____
 Total Weight Incinerated (lbs/hr) _____ Design Capacity (lbs/hr) _____
 Approximate Number of Hours of Operation per day _____ day/wk _____ wks/yr. _____
 Manufacturer _____
 Date Constructed _____ Model No. _____

	Volume (ft) ³	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diameter: _____ Stack Temp. _____
 Gas Flow Rate: _____ ACFM _____ DSCFM* Velocity: _____ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control devices: [] Cyclone [] Wet Scrubber [] Afterburner
 [] Other
 (specify) _____

Brief description of operating characteristics of control devices: _____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]
Not applicable.
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods, 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.
See Attachment A.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
See Table A-2 and Attachment B.
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)
Not applicable.
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).
Not applicable.
6. An 8 ½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.
See Figure A-4.
7. An 8 ½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Examples: Copy of relevant portion of USGS topographic map).
See Figure A-2.
8. An 8 ½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.
See Figure A-3.

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.
10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.
Not applicable.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY
Not Applicable

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

Yes No

Contaminant	Rate or Concentration

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

Yes No

Contaminant	Rate or Concentration

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration

D. Describe the existing control and treatment technology (if any).

- | | |
|---------------------------|--------------------------|
| 1. Control Device/System: | 2. Operating Principles: |
| 3. Efficiency:* | 4. Capital Costs: |

*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant

Rate or Concentration

Contaminant	Rate or Concentration

10. Stack Parameters

a. Height: ft.

b. Diameter ft.

c. Flow Rate: ACFM

d. Temperature: °F.

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

a. Control Devices:

b. Operating Principles:

c. Efficiency:¹

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:²

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:¹

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:²

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

¹Explain method of determining efficiency.

²Energy to be reported in units of electrical power - KWH design rate.

- j. Applicability to manufacturing processes:
- k. Ability to construct with control device, install in available space, and operate within proposed levels:

3.

- a. Control Device:
- b. Operating Principles:
- c. Efficiency:¹
- d. Capital Cost:
- e. Useful Life:
- f. Operating Cost:
- g. Energy:²
- h. Maintenance Cost:
- i. Availability of construction materials and process chemicals:
- j. Applicability to manufacturing processes:
- k. Ability to construct with control device, install in available space, and operate within proposed levels:

4.

- a. Control Device:
- b. Operating Principles:
- c. Efficiency:¹
- d. Capital Cost:
- e. Useful Life:
- f. Operating Cost:
- g. Energy:²
- h. Maintenance Cost:
- i. Availability of construction materials and process chemicals:
- j. Applicability to manufacturing processes:
- k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

- 1. Control Device:
- 2. Efficiency:¹
- 3. Capital Cost:
- 4. Useful Life:
- 5. Operating Cost:
- 6. Energy:²
- 7. Maintenance Cost:
- 8. Manufacturer:
- 9. Other locations where employed on similar processes:
 - a. (1) Company:
 - (2) Mailing Address:
 - (3) City:
 - (4) State:

¹Explain method of determining efficiency.

²Energy to be reported in units of electrical power - KWH design rate.

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? [] Yes [] No

b. Was instrumentation calibrated in accordance with Department procedures?

[] Yes [] No [] Unknown

B. Meteorological Data Used for Air Quality Modeling

1. _____ Year(s) of data from _____ / _____ / _____ to _____ / _____ / _____
month day year month day year

2. Surface data obtained from (location) _____

3. Upper air (mixing height) data obtained from (location) _____

4. Stability wind rose (STAR) data obtained from (location) _____

C. Computer Models Used

1. _____ Modified? If yes, attach description.

2. _____ Modified? If yes, attach description.

3. _____ Modified? If yes, attach description.

4. _____ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	_____ grams/sec
SO ²	_____ grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e, jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

ATTACHMENT A

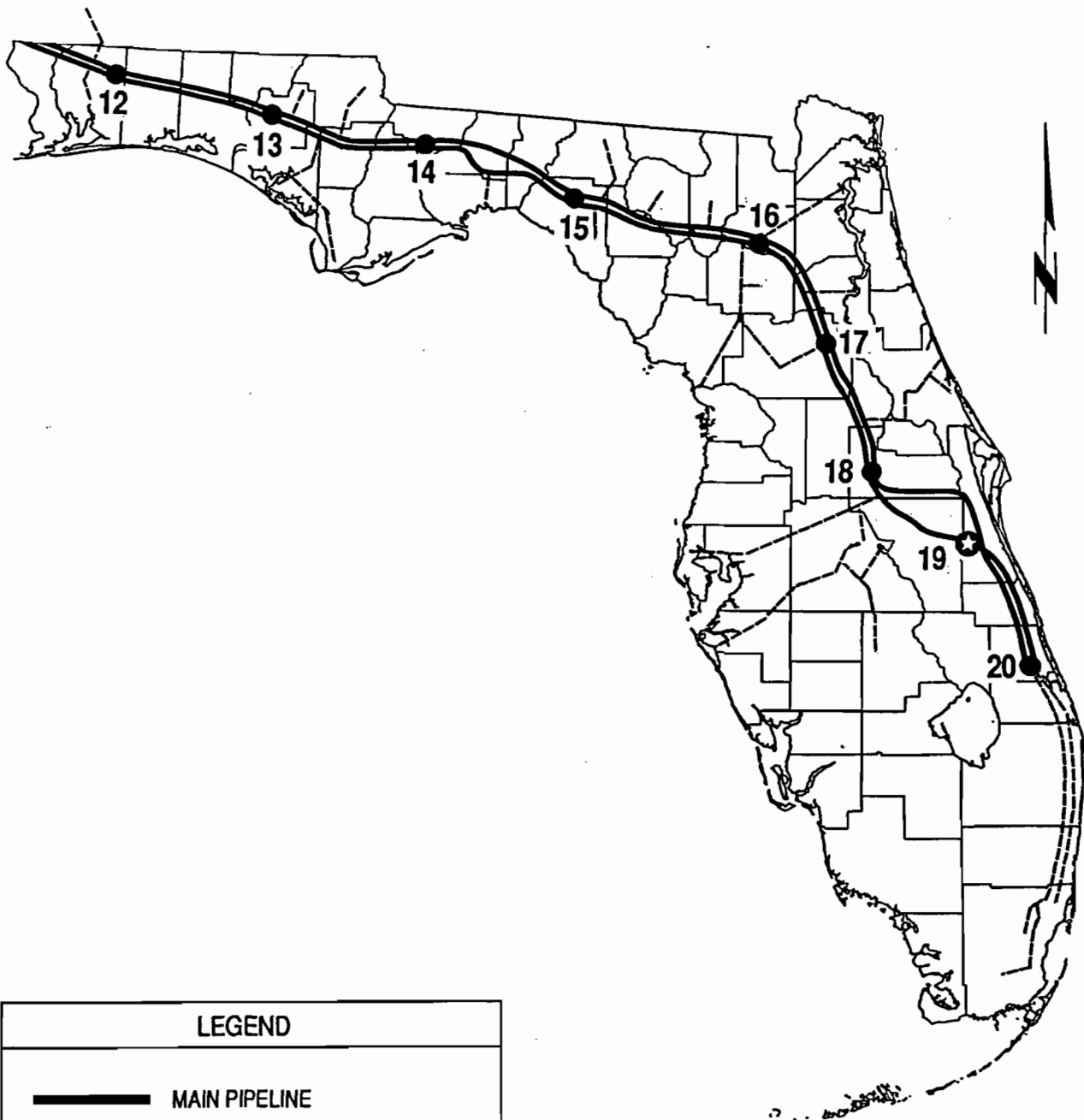
1.0 PROJECT DESCRIPTION

Florida Gas Transmission Company (FGTC), a subsidiary of ENRON Corporation of Houston, Texas, operates the Florida gas transmission pipeline system. The main transmission pipeline crosses into Florida near Pensacola, runs along the northern border of Florida into north-central Florida, then along the Florida turnpike down to the central Florida coastal areas, and ends in St. Lucie County. Shown in Figure A-1 is the layout of the main gas pipeline and the approximate locations of its existing compressor stations along the pipeline. Smaller gas transmission lines are also a part of the overall gas pipeline system. These lines also are shown in Figure A-1. The eight existing compressor stations are shown in the figure and are designated as Station No. 12 through Station No. 20. Station No. 19 is not yet in existence but is planned for future expansion.

Station No. 12 is located about 5 miles north of the township of Munson on State Road 191 in Santa Rosa County, Florida. Figure A-2 shows the site location of Compressor Station No. 12.

FGTC's existing Compressor Station No. 12 consists of five 2,000-bhp natural-gas-fired reciprocating internal combustion (IC) engines. All five engines are identical integral compressor-engine units manufactured by Cooper Industries, Inc. These engines were installed before the Clean Air Act (CAA) amendments of 1977: three engines were installed in 1959; the fourth engine was installed in 1966; and the fifth engine was installed in 1968. The fourth and fifth engines were installed to increase the natural gas transport capacity of the pipeline. Other than routine maintenance procedures, there have been no changes made to these engines since the last engine was installed.

All five engines are Cooper Model LS-8-SG. Each engine is rated at 2,000 bhp. The engines are naturally aspirated and operate at near stoichiometric air-to-fuel ratio. The fuel type is only natural gas





LEGEND	
	MAIN PIPELINE
	DISTRIBUTION PIPELINE

Figure A-1 FGTC'S GAS TRANSMISSION SYSTEM



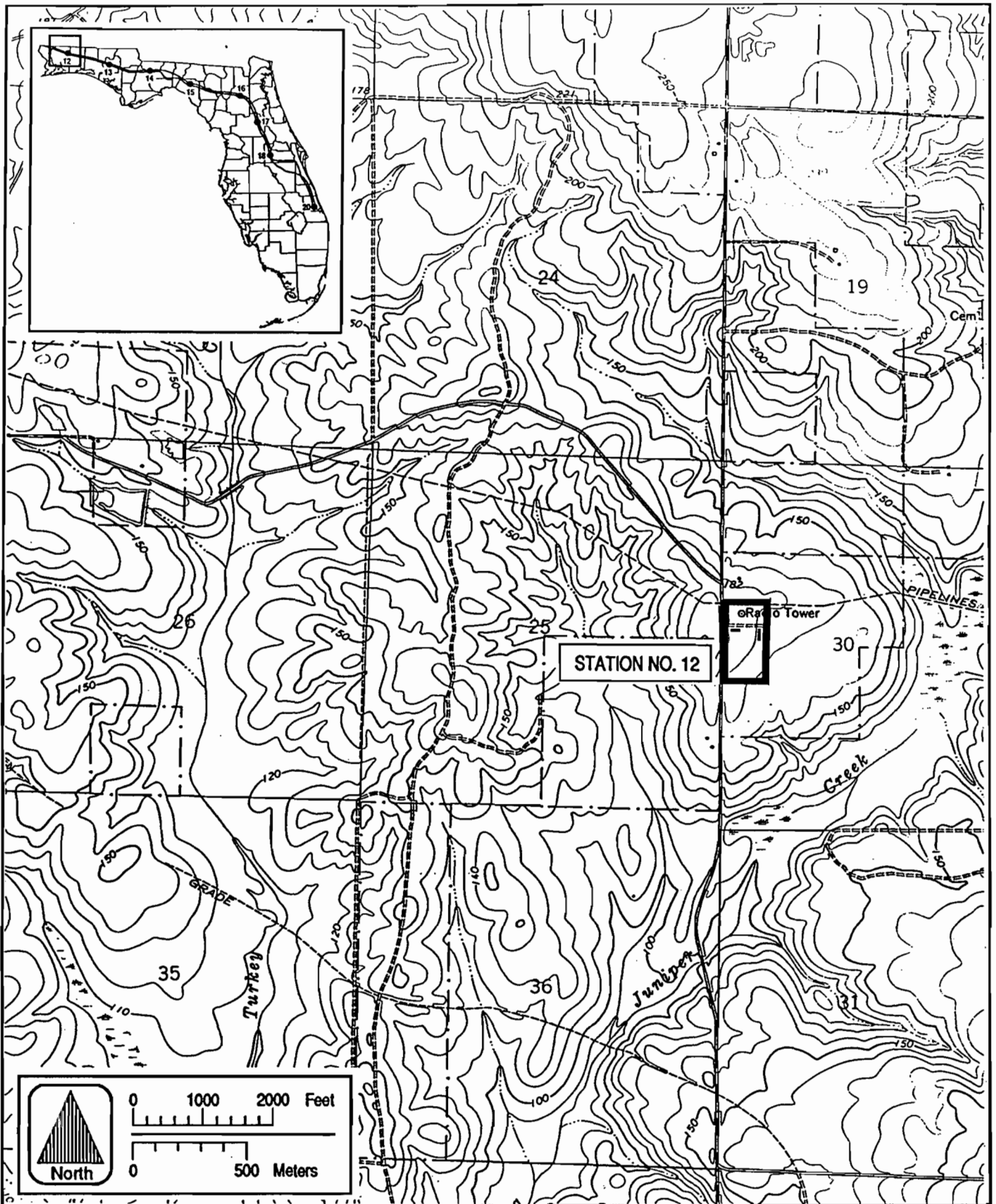


Figure A-2 SITE LOCATION OF ENRON'S FLORIDA GAS TRANSMISSION LINE COMPRESSOR STATION NO. 12, MUNSON, SANTA ROSA COUNTY, FLORIDA



supplied from the Florida gas pipeline. Engine specifications and stack parameters for each existing engine are presented in Table A-1.

A plot plan of FGTC's Compressor Station No. 12, showing the location of the plant boundaries, the existing compressor building, and stack locations, is presented in Figure A-3. Also shown on the plot plan is a future compressor engine, which will be addressed in a separate construction permit application. A flow diagram of each compressor engine is presented in Figure A-4.

Compressor Station No. 12, consisting of the five compressor engines and auxiliary facilities, was constructed and began operating before the implementation of federal and State of Florida air pollution control regulations. As a result, these engines are not subjected to new source review requirements. There are no emission limiting standards that apply to these engines.

This submittal serves as a multiple-source operating permit application for all five existing compression engines at FGTC's Compressor Station No. 12. This application for a permit to operate is being filed to comply with the conditions of a Consent Order (OGC File No.: 90-1225). This action is intended to correct an administrative deficiency in the facility's compliance status and to bring the facility into full compliance with State of Florida air pollution control regulations.

2.0 Emission Estimates

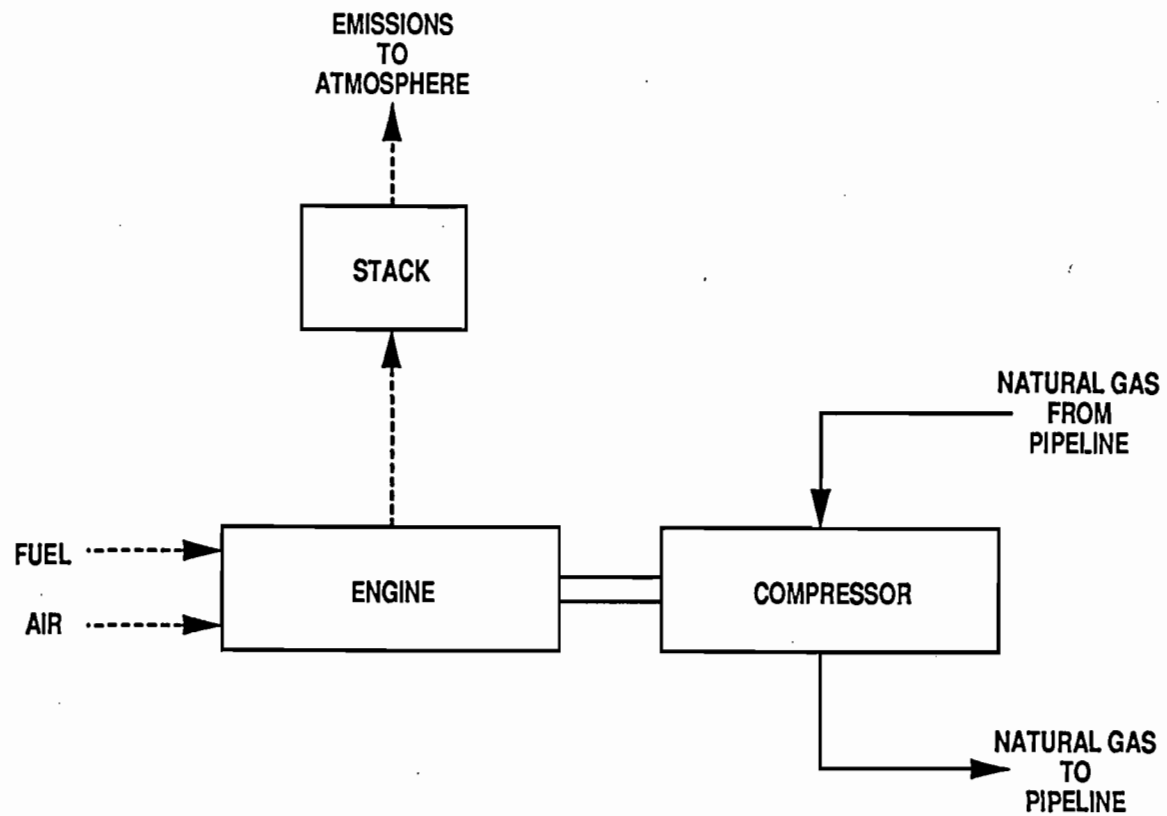
Maximum hourly and annual emissions of regulated pollutants from the proposed engine are presented in Table A-2. Currently, there are no federal or state emission limiting standards that apply to these engines. Emission estimates for nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC) are based on emission factors listed in AP-42 for natural-gas-fired pipeline compressor engines. Emission estimates for particulate matter (PM) are based on the AP-42 emission factor for natural-gas-fired boilers. Emissions of sulfur dioxide (SO₂)

Table A-1. Engine Specifications and Stack Parameters of Existing Engines, Station No. 12.

Parameter	Design Specification
<u>Per Engine</u>	
Manufacturer	Cooper
Model	LS-8-SG
Air Charging	Naturally aspirated
Unit Size	2,000 bhp
Specific Fuel Consumption	7,500 Btu/bhp-hr
Maximum Fuel Consumption	0.0143 MMscf/hr*
<u>Stack Parameters</u>	
Stack Height	26.42 ft
Stack Diameter	15.25 in
Exhaust Gas Flow	21,000 lb/hr
	11,760 acfm
Exhaust Temperature	875°F
Exhaust Gas Velocity	154.5 ft/sec

* Based on heating value for natural gas of 1,050 Btu/scf at Compressor Station No. 12.
(Source: ENRON, 1990).

Note: bhp = brake horsepower.
Btu/bhp-hr = British thermal units per brake horsepower per hour.
MMscf = million standard cubic feet.
lb/hr = pounds per hour.
acfm = actual cubic feet per minute.
°F = degree Fahrenheit.
ft/sec = feet per second.



A-7

Figure A-4 FLOW DIAGRAM OF AN INTEGRAL ENGINE-COMPRESSOR UNIT



Florida Gas
Transmission Company

Table A-2. Maximum Emissions from FGTC's Existing Engines at Compressor Station No. 12.

Pollutant	Emission Factor	Reference	Maximum Emissions			
			Per Engine		Total All Five Engines*	
			lb/hr	TPY	lb/hr	TPY
Nitrogen Oxides	11 g/bhp-hr	AP-42, Section 3.2	48.5	212.4	242.5	1,062.2
Carbon Monoxide	1.4 g/bhp-hr	AP-42, Section 3.2	6.17	27.0	30.9	135.3
Volatile Organic Compounds (Non-methane)	0.44 g/bhp-hr	AP-42, Section 3.2	1.94	8.50	9.7	42.5
Particulate Matter	5 lb/MMscf	AP-42, Table 1.4-1	0.0714	0.313	0.36	1.6
Sulfur Dioxide	10 gr/100 scf	ENRON Corporation	0.408	1.79	2.04	8.9

* All five engines are identical. Total emissions are five times the per engine rate.

Note: Specific brake fuel consumption is 7,500 Btu/bhp-hr, and specific heat value at Compressor Station No. 12 is 1,050 Btu/scf.

Btu/bhp-hr = British thermal units per brake horsepower per hour.

g/bhp-hr = grams per brake horsepower per hour.

gr/100 scf = grains per 100 standard cubic feet.

lb/hr = pounds per hour.

TPY = tons per year.

are based on ENRON's natural gas specification. According to EPA's publication entitled "Toxic Air Pollutant Emission Factors--A Compilation for Selected Air Toxic Compounds and Sources (EPA-450/2-88-006a, 1988)," there are no emission factors for other regulated pollutants caused by natural gas combustion in reciprocating IC engines. Detailed emission calculations are presented in Attachment B.

ATTACHMENT B
EMISSION CALCULATIONS

Fuel usage and emission calculations are presented below for each engine. The basis for the calculations is given in Attachment A and Table A-2.

Fuel Usage:

$$(2,000 \text{ bhp}) \times (7,500 \text{ Btu/bhp-hr}) = 15 \times 10^6 \text{ Btu/hr}$$

$$(15 \times 10^6 \text{ Btu/hr}) / (1,050 \text{ Btu/scf}) = 14,286 \text{ scf/hr}$$

$$\text{NO}_x: (11 \text{ g/bhp-hr})(2,000 \text{ bhp})(1 \text{ lb}/453.593 \text{ g}) = 48.5 \text{ lb/hr}$$

$$(48.5 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) = 212.4 \text{ TPY}$$

$$\text{CO: } (1.4 \text{ g/bhp-hr})(2,000 \text{ bhp})(1 \text{ lb}/453.593 \text{ g}) = 6.17 \text{ lb/hr}$$

$$(6.17 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) = 27.0 \text{ TPY}$$

VOCs(non-methane hydrocarbon):

$$(0.44 \text{ g/bhp-hr})(2,000 \text{ bhp})(1 \text{ lb}/453.593 \text{ g}) = 1.94 \text{ lb/hr}$$

$$(1.94 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) = 8.50 \text{ TPY}$$

$$\text{PM: } (5 \text{ lb}/10^6 \text{ scf})(0.0143 \times 10^6 \text{ scf/hr}) = 0.0715 \text{ lb/hr}$$

$$(0.0715 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) = 0.313 \text{ TPY}$$

$$\text{SO}_2: (10 \text{ gr}/100 \text{ scf})(14,286 \text{ scf/hr})(1 \text{ lb}/7,000 \text{ gr}) = 0.204 \text{ lb/hr of Sulfur}$$

$$(2 \text{ lb SO}_2/\text{lb Sulfur})(0.204 \text{ lb/hr Sulfur}) = 0.408 \text{ lb/hr of SO}_2$$

$$(0.408 \text{ lb/hr})(8,760 \text{ hr/yr})(1 \text{ ton}/2,000 \text{ lb}) = 1.79 \text{ TPY}$$

ENRON
Gas Pipeline Operating Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

October 15, 1990

Mr. Clair Fancy, P.E.
Chief, Bureau of Air Regulation
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32301

Dear Mr. Fancy:

RE: Construction Permit Application - Compressor Station No. 12
Santa Rosa County, Florida - Florida Gas Transmission Company

This permit application, sent separately to you on behalf of Florida Gas Transmission Company (FGT), describes the expansion of FGT's Compressor Station No. 12. With net NO_x emissions exceeding 40 tons per year, this addition, a 4,000 horsepower reciprocating compressor engine, constitutes a major modification. The maximum estimated NO_x concentration from the proposed lean burn engine, however, is less than EPA's significant impact level.

This is the first of nine permit applications we plan to submit to FDER as part of FGT's Phase II expansion. Because it is the first, we have spent a lot of time and effort to ensure that it is of highest quality. For example, the Best Available Control Technology (BACT) analysis follows EPA's (draft) top-down guideline, and capitalizes on what Enron has learned about guideline interpretation from its Northern Natural Gas Company Waterloo, Iowa station - a recently approved permit application that followed the draft guideline.

Since FGT's Phase II project is designed to bring clean fuel to Floridians by the 1991-92 heating season, and to displace foreign oil imports, we would ask that you review this permit application and issue the construction permit as soon as possible.

If you have any questions concerning this letter, please contact me at (713) 853-7303, or David Buff, KBN Engineering and Applied Sciences, Inc., Gainesville, Florida, at (904) 331-9000.

Sincerely,



W. Alan Bowman (Room 2570)
Project Environmentalist
Environmental Affairs Department

Enclosures: 8 Copies of Permit Application (Delivered Oct. 19)
Construction Permit Fee
Letter of Authorization

cc: Jerry Murphy, Enron
Kevin McGlynn, Enron
David Buff, KBN

B. Andrews
C. Halladay
S. Nelson

J. Price, NW West
G. Harper, EPA

FAN1015wab

Part of the Enron Group of Energy Companies

CHECK NO.
0622008071

FLORIDA GAS TRANSMISSION COMPANY
P.O. BOX 1188
HOUSTON, TEXAS 77251-1188

DATE OF CHECK
08-20-90



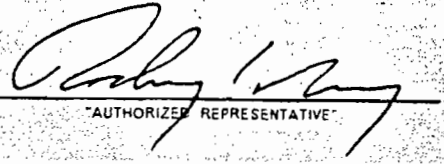
This check is VOID unless printed on BLUE background

EXACTLY \$*****1,000 DOLLARS 00 CENTS

AMOUNT OF CHECK
\$*****1,000.00

C.S. # 12

PAY TO THE ORDER OF
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
NORTHWEST DISTRICT BRANCH
2600 BLAIR STONE RD.
TALLAHASSEE, FL
32399-2400

BY 
AUTHORIZED REPRESENTATIVE

UNITED BANK OF GRAND JUNCTION



REMITTANCE STATEMENT
FLORIDA GAS TRANSMISSION COMPANY

CHECK NO. 0622008071

PAGE 001 OF 001

VOUCHER NO.	INVOICE DATE	INVOICE NUMBER	PURCHASE ORDER	AMOUNT		
				GROSS	DISCOUNT	NET
9008001147	082090	CKR082090		1,000.00	0.00	1,000.00
		CONSTRUCTION PERMIT FLORIDA GAS TRANSMISSION CO.			TOTAL	1,000.00
		C.S. # 12 FGT- Phase II				
				01031		

Special Instructions
CALL X7304 ROBIN TO PICK UP CHECK

FLORIDA GAS TRANSMISSION COMPANY

UNANIMOUS CONSENT OF DIRECTORS

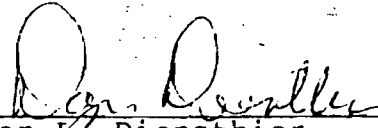
The undersigned, being all the directors of Florida Gas Transmission Company, a Delaware corporation (the "Company"), do hereby unanimously consent and agree, pursuant to Section 141(f) of the Delaware General Corporation Law, to the adoption of the following resolution, as of the date set forth below, as if duly adopted at a meeting of the Board of Directors of the Company:


WHEREAS, Company and Enron Gas Pipeline Operating Company (EPO) have agreed upon certain terms and conditions relating to the operation by EPO of Company's pipelines and related facilities which contemplate that certain contracts relating to the acquisition, installation, modification, maintenance, operation and removal of Company's pipelines and related facilities be executed by Company.

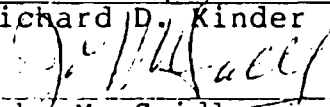
RESOLVED, by the Board of Directors of the Company, that, effective as of February 2, 1987, the Company does hereby constitute and appoint each of the below listed individuals as Company's agent and attorney-in-fact (without power of substitution) to make, execute and deliver, in the name and on behalf of the Company, any and all contracts for the construction and operation of Company's pipelines and related facilities, including, but not limited to, right-of-ways, easements, surfaces leases, deeds, construction contracts, service agreements, equipment purchase and rental agreements and all other agreements and contracts incidental to the acquisition, installation, modification, maintenance, operation and removal of Company's pipelines and related facilities.

Earl Berdine
Robert E. Bradfield
E. J. Burgin
Dale L. Coates
James Hansford
E. W. Sanders
Charles L. Truby

Dated: April 30, 1987



Dan L. Dienstbier


Richard D. Kinder


John M. Seidl

**PSD PERMIT APPLICATION
FLORIDA GAS TRANSMISSION COMPANY
STATION NO. 12**

Prepared For:

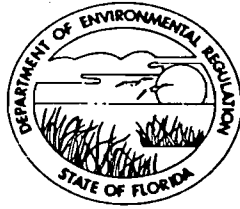
**Florida Gas Transmission Company
1400 Smith Street
Houston, TX 77251-1188**

Prepared By:

**KBN Engineering and Applied Sciences, Inc.
1034 NW 57th Street
Gainesville, FL 32605**

**October 1990
90051B1/P**

DEPARTMENT OF ENVIRONMENTAL REGULATION



#1,000 pd.
10-20-90
Receipt #15 1198

AC 57-188869
PSD-FL-156

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Natural Gas Compressor Engine New¹ Existing¹APPLICATION TYPE: Construction Operation ModificationCOMPANY NAME: Florida Gas Transmission Company COUNTY: Santa RosaIdentify the specific emission point source(s) addressed in this application (i.e., Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) Station 12, Unit No. 6SOURCE LOCATION: Street 5 miles north of Munson on SR 191 City MunsonUTM: East 16: 510.83 km North 3419.63 kmLatitude 30 ° 54 ' 42 "N Longitude 86 ° 53 ' 12 "WAPPLICANT NAME AND TITLE: W. Alan Bowman, Project Environmentalist (713) 853-7303APPLICANT ADDRESS: P.O. Box 1188, Houston, Texas 77251

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Florida Gas Transmission Co.

I certify that the statements made in this application for a construction permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: C. L. Truby

C.L. Truby, Vice President
Name and Title (Please Type)

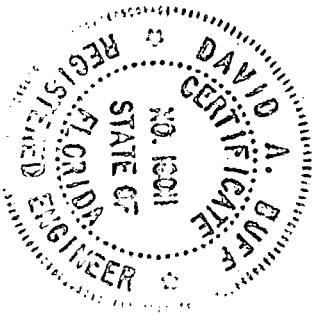
Date: 11-9-90 Telephone No. (713) 853-6161

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgement, that

¹See Florida Administration Code Rule 17-2.100(57) and (104)

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.



Signed David A. Buff

David A. Buff, P.E.
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

1034 NW 57th Street, Gainesville, FL 32605
Mailing Address (Please Type)

Florida Registration No. 19011 Date: 10/18/90 Telephone No. (904) 331-9000

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

See PSD report, Section 1.0--Introduction, and
Section 2.0--Project Description

B. Schedule of project covered in this application (Construction Permit Application Only)
Start of Construction March 15, 1991 Completion of Construction 18 months after permit issuance

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)
Not applicable

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.
Not applicable

E. Requested permitted equipment operating time: hrs/day 24; days/wk 7; wks/yr 52;
If power plant, hrs/yr _____; if seasonal, describe: _____

F. If this is a new source or major modification, answer the following questions.
(Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? No
 - a. If yes, has "offset" been applied? _____
 - b. If yes, has "Lowest Achievable Emission Rate" been applied? _____
 - c. If yes, list non-attainment pollutants. _____
2. Does best available control technology (BACT) apply to this source?
If yes, see Section VI. Yes
3. Does the State "Prevention of Significant Deterioration" (PSD)
requirement apply to this source? If yes, see Sections VI and VII. Yes
4. Do "Standards of Performance for New Stationary Sources" (NSPS)
apply to this source? No
5. Do "National Emission Standards for Hazardous Air Pollutants"
(NESHAP) apply to this source? No

H. Do "Reasonably Available Control Technology" (RACT) requirements
apply to this source? No

- a. If yes, for what pollutants? _____
- b. If yes, in addition to the information required in this form, any information
requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any
justification for any answer of "No" that might be considered questionable.

See PSD Report, Section 3.0--Air Quality Review Requirements and Applicability

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Not applicable				

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): Not applicable

2. Product Weight (lbs/hr): Not applicable

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Name of Contaminant	Emission ¹		Allowed ² Emission Rate per Rule 17-2	Allowable ³ Emission lbs/hr	Potential ⁴ Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
NO _x	17.6	77.2	BACT	BACT	17.6	77.2	
CO	22.0	96.6	N/A	N/A	22.0	96.6	
VOCs	8.8	38.6	N/A	N/A	8.8	38.6	
Particulates	0.15	0.7	N/A	N/A	0.15	0.7	
SO ₂	0.80	3.48	N/A	N/A	0.80	3.48	

¹See Section V, Item 2.

²Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

³Calculated from operating rate and applicable standard.

⁴Emission, if source operated without control (See Section V, Item 3).

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
Lean Burn Engine Design	NO _x	80%	N/A	Design and
				AP-42

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max/hr	
Natural Gas	0.0278	0.0278	29.20

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, others--lbs/hr.

Fuel Analysis:

Percent Sulfur: 0.031 (by weight)* Percent Ash: NA
 Density: 0.0455 lb/ft³ lbs/gal Typical Percent Nitrogen: NA
 Heat Capacity: 23,077 (1.050 Btu/scf) BTU/lb NA BTU/gal
 Other Fuel Contaminants (which may cause air pollution): NA

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average Not applicable Maximum

G. Indicate liquid or solid wastes generated and method of disposal.

Not applicable

*Based on contract limit of 10 gr/100 ft³ and gas at 0.0455 lb/ft³

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 35 ft. Stack Diameter: 2.104 ft.
 Gas Flow Rate: 35,820 ACFM 17,763 DSCFM Gas Exit Temperature: 495 °F.
 Water Vapor Content: 8 % Velocity: 171.7 FPS

SECTION IV: INCINERATOR INFORMATION
 Not Applicable

Type of Waste	Type 0 (Plastics)	Type II (Rubbish)	Type III (Refuse)	Type IV (Garbage)	Type IV (Pathological)	Type V (Liq. & Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste _____
 Total Weight Incinerated (lbs/hr) _____ Design Capacity (lbs/hr) _____
 Approximate Number of Hours of Operation per day _____ day/wk _____ wks/yr. _____
 Manufacturer _____
 Date Constructed _____ Model No. _____

	Volume (ft) ³	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diameter: _____ Stack Temp. _____
 Gas Flow Rate: _____ ACFM _____ DSCFM* Velocity: _____ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control devices: Cyclone Wet Scrubber Afterburner
 Other
 (specify) _____

Brief description of operating characteristics of control devices: _____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods, 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made. See PSD Report, Section 2.0, Tables 2-1 and 2-2
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
See PSD Report, Section 2.0
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.) Not Applicable
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency). Not Applicable
6. An 8 ½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.
7. An 8 ½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Examples: Copy of relevant portion of USGS topographic map).
See PSD Report, Figure 1-1
8. An 8 ½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.
See PSD Report, Figure 2-1

- 9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.
- 10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

See PSD report, Sections 3.0 and 6.0

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

Yes No

Contaminant	Rate or Concentration
_____	_____
_____	_____
_____	_____
_____	_____

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

Yes No

Contaminant	Rate or Concentration
_____	_____
_____	_____
_____	_____
_____	_____

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration
_____	_____
_____	_____
_____	_____
_____	_____

D. Describe the existing control and treatment technology (if any).

- | | |
|---------------------------|--------------------------|
| 1. Control Device/System: | 2. Operating Principles: |
| 3. Efficiency:* | 4. Capital Costs: |

*Explain method of determining

- 5. Useful Life:
- 7. Energy:
- 9. Emissions:

- 6. Operating Costs:
- 8. Maintenance Cost:

Contaminant

Rate or Concentration

Contaminant	Rate or Concentration

10. Stack Parameters

- a. Height: ft.
- b. Diameter ft.
- c. Flow Rate: ACFM
- d. Temperature: °F.
- e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.
 - a. Control Devices: b. Operating Principles:
 - c. Efficiency:¹ d. Capital Cost:
 - e. Useful Life: f. Operating Cost:
 - g. Energy:² h. Maintenance Cost:
 - i. Availability of construction materials and process chemicals:
 - j. Applicability to manufacturing processes:
 - k. Ability to construct with control device, install in available space, and operate within proposed levels:
2.
 - a. Control Device: b. Operating Principles:
 - c. Efficiency:¹ d. Capital Cost:
 - e. Useful Life: f. Operating Cost:
 - g. Energy:² h. Maintenance Cost:
 - i. Availability of construction materials and process chemicals:

¹Explain method of determining efficiency.

²Energy to be reported in units of electrical power - KWH design rate.

- j. Applicability to manufacturing processes:
- k. Ability to construct with control device, install in available space, and operate within proposed levels:

- 3.
 - a. Control Device:
 - b. Operating Principles:
 - c. Efficiency:¹
 - d. Capital Cost:
 - e. Useful Life:
 - f. Operating Cost:
 - g. Energy:²
 - h. Maintenance Cost:
 - i. Availability of construction materials and process chemicals:
 - j. Applicability to manufacturing processes:
 - k. Ability to construct with control device, install in available space, and operate within proposed levels:

- 4.
 - a. Control Device:
 - b. Operating Principles:
 - c. Efficiency:¹
 - d. Capital Cost:
 - e. Useful Life:
 - f. Operating Cost:
 - g. Energy:²
 - h. Maintenance Cost:
 - i. Availability of construction materials and process chemicals:
 - j. Applicability to manufacturing processes:
 - k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

- 1. Control Device:
- 2. Efficiency:¹
- 3. Capital Cost:
- 4. Useful Life:
- 5. Operating Cost:
- 6. Energy:²
- 7. Maintenance Cost:
- 8. Manufacturer:
- 9. Other locations where employed on similar processes:
 - a. (1) Company:
 - (2) Mailing Address:
 - (3) City:
 - (4) State:

¹Explain method of determining efficiency.

²Energy to be reported in units of electrical power - KWH design rate.

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? [] Yes [] No

b. Was instrumentation calibrated in accordance with Department procedures?

[] Yes [] No [] Unknown

B. Meteorological Data Used for Air Quality Modeling

1. _____ Year(s) of data from _____ / _____ / _____ to _____ / _____ / _____
month day year month day year

2. Surface data obtained from (location) _____

3. Upper air (mixing height) data obtained from (location) _____

4. Stability wind rose (STAR) data obtained from (location) _____

C. Computer Models Used

1. _____ Modified? If yes, attach description.

2. _____ Modified? If yes, attach description.

3. _____ Modified? If yes, attach description.

4. _____ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant

Emission Rate

TSP _____ grams/sec

SO² _____ grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e, jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

**PREVENTION OF SIGNIFICANT DETERIORATION
REPORT
FLORIDA GAS TRANSMISSION COMPANY
STATION NO. 12**

TABLE OF CONTENTS
(Page 1 of 3)

LIST OF TABLES	iv
LIST OF FIGURES	vi
1.0 INTRODUCTION	1-1
2.0 PROJECT DESCRIPTION	2-1
2.1 <u>EXISTING OPERATIONS</u>	2-1
2.2 <u>PROPOSED COMPRESSOR STATION ADDITION</u>	2-1
3.0 AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY	3-1
3.1 <u>NATIONAL AND STATE AAQS</u>	3-1
3.2 <u>PSD REQUIREMENTS</u>	3-1
3.2.1 GENERAL REQUIREMENTS	3-1
3.2.2 INCREMENTS/CLASSIFICATIONS	3-3
3.2.3 CONTROL TECHNOLOGY REVIEW	3-7
3.2.4 AIR QUALITY MONITORING REQUIREMENTS	3-9
3.2.5 SOURCE IMPACT ANALYSIS	3-10
3.2.6 ADDITIONAL IMPACT ANALYSES	3-11
3.2.7 GOOD ENGINEERING PRACTICE STACK HEIGHT	3-11
3.3 <u>NONATTAINMENT RULES</u>	3-12
3.4 <u>SOURCE APPLICABILITY</u>	3-13
3.4.1 PSD REVIEW	3-13
3.4.1.1 <u>Pollutant Applicability</u>	3-13
3.4.1.2 <u>Ambient Monitoring</u>	3-13
3.4.1.3 <u>GEP Stack Height Analysis</u>	3-15
3.4.2 NONATTAINMENT REVIEW	3-15

TABLE OF CONTENTS
(Page 2 of 3)

4.0	SOURCE IMPACT ANALYSIS	4-1
4.1	<u>ANALYSIS APPROACH AND ASSUMPTIONS</u>	4-1
4.1.1	GENERAL MODELING APPROACH	4-1
4.1.2	MODEL SELECTION	4-1
4.1.3	METEOROLOGICAL DATA	4-4
4.1.4	SOURCE DATA	4-5
4.1.5	RECEPTOR LOCATIONS	4-5
4.1.6	BUILDING DOWNWASH CONSIDERATIONS	4-5
4.2	<u>MODEL RESULTS</u>	4-10
5.0	SOILS, VEGETATION, VISIBILITY AND ASSOCIATED POPULATION GROWTH IMPACTS	5-1
5.1	<u>IMPACTS UPON SOILS AND VEGETATION</u>	5-1
5.2	<u>IMPACTS UPON VISIBILITY</u>	5-1
5.3	<u>IMPACTS DUE TO ASSOCIATED POPULATION GROWTH</u>	5-1
6.0	BEST AVAILABLE CONTROL TECHNOLOGY EVALUATION	6-1
6.1	<u>NATURAL GAS PRIME MOVERS</u>	6-1
6.2	<u>IDENTIFICATION OF NO_x CONTROL TECHNOLOGIES FOR RECIPROCATING ENGINES</u>	6-2
6.2.1	TECHNOLOGIES INVOLVING ENGINE MODIFICATION	6-3
6.2.1.1	<u>Steam Injection</u>	6-3
6.2.1.2	<u>Air-to-Fuel Ratio Changes</u>	6-4
6.2.1.3	<u>Retarded Ignition Timing</u>	6-5
6.2.1.4	<u>Derating Power Output</u>	6-6
6.2.1.5	<u>Exhaust Gas Recirculation</u>	6-7

TABLE OF CONTENTS
(Page 3 of 3)

6.2.2	TECHNOLOGIES INVOLVING EXHAUST GAS TREATMENT	6-8
6.2.2.1	<u>NO_xOUT Process</u>	6-8
6.2.2.2	<u>THERMAL DeNO_x</u>	6-9
6.2.2.3	<u>Nonselective Catalytic Reduction</u>	6-10
6.2.2.4	<u>Selective Catalytic Reduction with Ammonia Injection</u>	6-10
6.2.2.5	<u>Combination of Rich-Burn Engine and NSCR</u>	6-12
6.2.3	SUMMARY OF TECHNICALLY FEASIBLE NO _x CONTROL METHODS	6-13
6.3	<u>EVALUATION OF TECHNICALLY FEASIBLE NO_x CONTROL METHODS</u>	6-13
6.3.1	RANKING OF FEASIBLE CONTROL TECHNOLOGIES	6-16
6.3.2	ANALYSIS OF LEAN-BURN ENGINE WITH SCR	6-16
6.3.3	ANALYSIS OF RICH-BURN ENGINE WITH NSCR	6-24
6.3.4	ANALYSIS OF LEAN-BURN ENGINE WITH DERATING POWER OUTPUT	6-25
6.3.5	ANALYSIS OF LEAN-BURN ENGINE WITH RETARD IGNITION TIMING	6-28
6.3.6	ANALYSIS OF LEAN-BURN ENGINE	6-29
6.4	<u>BACT SUMMARY AND CONCLUSION</u>	6-32
6.4.1	COMPARISON OF ENVIRONMENTAL EFFECTS	6-32
6.4.2	COMPARISON OF ENERGY IMPACTS	6-32
6.4.3	COMPARISON OF ECONOMIC ANALYSIS	6-33
6.4.4	SUMMARY AND CONCLUSION	6-33
	REFERENCES	REF-1
	APPENDICES	

LIST OF TABLES
(Page 1 of 2)

2-1	Engine Specifications and Stack Parameters for the Proposed Project	2-4
2-2	Maximum Emissions From FGTC's Proposed Compressor Engine	2-5
3-1	National and State AAQS, Allowable PSD Increments, and Significance Levels ($\mu\text{g}/\text{m}^3$)	3-2
3-2	PSD Significant Emission Rates and <u>De Minimis</u> Monitoring Concentrations	3-4
3-3	Maximum Potential Emissions Due to Proposed Engine at Compressor Station No. 12	3-14
4-1	Major Features of the ISCLT Model	4-3
4-2	Summary of Source Parameters Used in the Modeling Analysis	4-6
4-3	Discrete Plant Boundary Receptors, Compressor Station No. 12	4-7
4-4	Building Dimensions Used in the ISCLT Modeling, Compressor Station No. 12	4-9
4-5	Maximum Predicted Annual Average NO_2 Concentrations Due to the Proposed Compressor Engine for Comparison to Significant Impact Levels	4-11
6-1	Summary of Technical Feasibility of NO_x Emission Controls for Reciprocating Engine	6-14
6-2	Summary of BACT Determinations for NO_x Emissions from Gas-Fired Reciprocating Engines	6-15
6-3	BACT "Top-Down" Hierarchy of NO_x Control Technologies	6-17
6-4	Capital Cost Estimates for SCR Systems for NO_x Emission Control	6-22
6-5	Annualized Cost Estimates for SCR Systems for NO_x Emission Control	6-23
6-6	Capital Cost Estimates for Lean-Burn Engine and Rich-Burn Engine/NSCR System	6-26
6-7	Annualized Cost Estimates for Lean-Burn Engine and Rich-Burn Engine/NSCR System	6-27

LIST OF TABLES
(Page 2 of 2)

6-8	Summary of the Operating Parameters for the Proposed Lean-Burn Engine	6-30
6-9	Summary of Top-Down BACT Impact Analysis Results for NO _x	6-34

LIST OF FIGURES

1-1	Site Location of Enron's Florida Gas Transmission Line Compressor Station No. 12, Munson, Santa Rosa County, Florida	1-2
2-1	Plot Plan of Compressor Station No. 12	2-2

1.0 INTRODUCTION

Florida Gas Transmission Company (FGTC), a subsidiary of ENRON Corporation of Houston, Texas, is proposing to expand its existing natural gas pipeline Compressor Station No. 12 near the township of Munson in Santa Rosa County, Florida. Figure 1-1 shows the site location of the existing facility. The site is located on State Road (SR) 191 approximately 5 miles north of the town of Munson.

The proposed expansion at this location consists of the addition of one new 4,000 brake horsepower (bhp) natural-gas-fired, reciprocating internal combustion (IC) engine. The proposed engine would be used solely for the purpose of transporting natural gas in the pipeline for distribution in Florida. The proposed engine is a turbocharged Dresser-Rand Model 10 TCV. Under current federal and state air quality regulations, the proposed engine will constitute a major modification at an existing major stationary source.

This report addresses the requirements of the Prevention of Significant Deterioration (PSD) review procedure pursuant to rules and regulations implementing the Clean Air Act (CAA) Amendments of 1977. The Florida Department of Environmental Regulation (FDER) has PSD review and approval authority in Florida. Based on the proposed emissions from the addition of a 4,000-bhp engine, a PSD review is required for nitrogen oxides (NO_x).

Engineering designs for the proposed expansion project include selection of an engine capable of lean burn technology. The lean burn technology for emission control represents best available control technology (BACT) for the proposed IC engine.

This application contains five additional sections. Descriptions of the existing operation at FGTC's Compressor Station No. 12 and the proposed

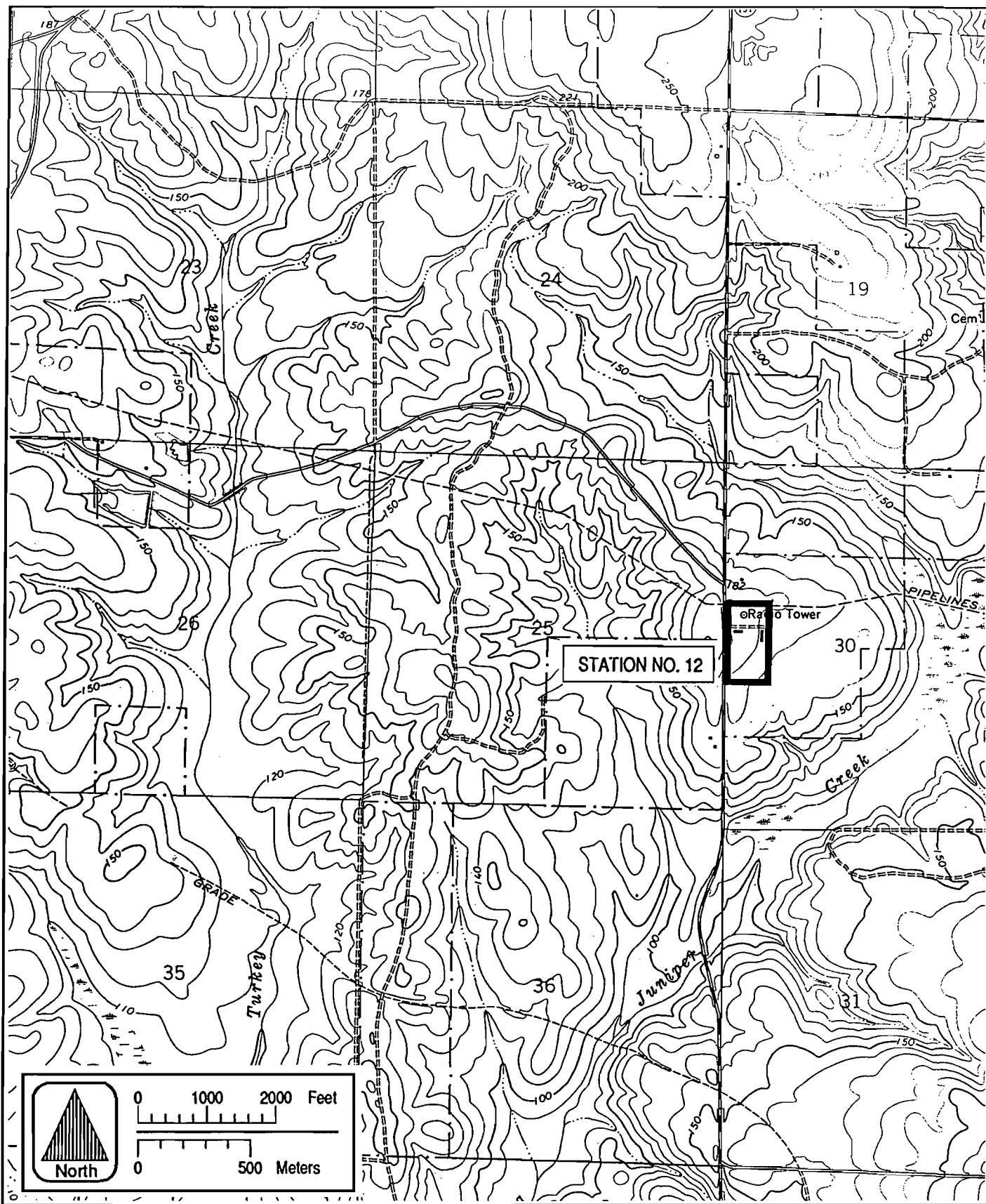


Figure 1-1 SITE LOCATION OF ENRON'S FLORIDA GAS TRANSMISSION LINE COMPRESSOR STATION NO. 12, MUNSON, SANTA ROSA COUNTY, FLORIDA



4,000-bhp engine addition are presented in Section 2.0. The air quality review requirements and source applicability of the proposed engine to the regulations are discussed in Section 3.0. The methodology and results of the air dispersion modeling and air quality impact analysis are presented in Section 4.0, and impacts on soil, vegetation, and visibility are summarized in Section 5.0. The BACT analysis required as part of the PSD permitting process is presented in Section 6.0.

2.0 PROJECT DESCRIPTION

A plot plan of FGTC's Compressor Station No. 12, showing the location of the plant boundaries, the existing engines, and the proposed additional engine, is presented in Figure 2-1. The following sections describe the existing operations at this location, as well as a description of the proposed project.

2.1 EXISTING OPERATIONS

FGTC's existing Compressor Station No. 12 consists of five 2,000-bhp natural-gas-fired IC engines. All of the engines are Cooper Model LS-8-SG. These engines were installed prior to the CAA amendments of 1977: three engines were installed in 1959; the fourth engine was installed in 1966; and the fifth engine was installed in 1968. These existing engines are not being modified as part of this expansion project; therefore, they are not subject to PSD review.

2.2 PROPOSED COMPRESSOR STATION ADDITION

The proposed engine will be used to drive a gas compressor that is a part of the mechanical prime mover of the main gas transmission line that transports natural gas from source wells in Texas and Louisiana. The proposed engine will play a critical part in recompressing the natural gas for delivery throughout Florida. Without the proposed engine, it would not be possible to increase the volumetric delivery capacity in order to meet both short-term and long-term demands for natural gas in Florida.

FGTC proposes to install one natural-gas-fired engine at the Compressor Station No. 12. The expansion plan currently calls for installation of a Dresser-Rand Model 10 TCV engine. This engine has 10 power cylinders and is rated at 4,000 bhp at 330 revolutions per minute (rpm). The engine is turbocharged, increasing the air inlet manifold pressure, which allows the engine to operate at a high air-to-fuel ratio. This turbocharging provides

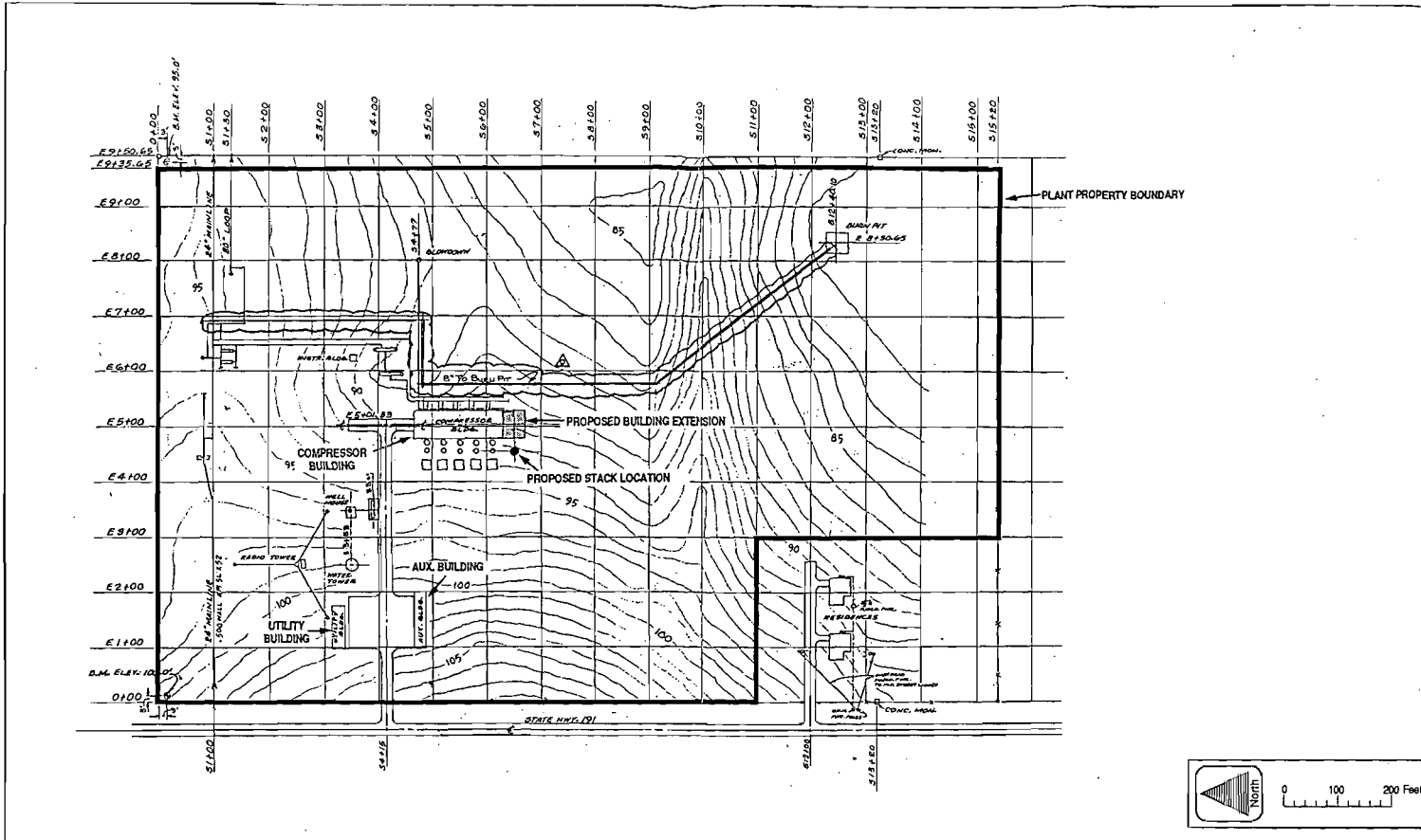


Figure 2-1 PLOT PLAN OF COMPRESSOR STATION NO. 12



more power output from the engine than would otherwise be attained without having to use a larger size engine.

Fuel fired will be natural gas only, supplied from the FGTC gas pipeline. Based on the operating characteristics and design, this engine is classified as a high-power, large-bore, slow-speed IC engine according to the U.S. Environmental Protection Agency's (EPA's) documented classification (EPA, 1979). Engine specifications and stack parameters for the proposed engine are presented in Table 2-1.

The proposed engine will incorporate "lean-burn" technology, which is state-of-the-art design for minimizing air pollutant concentration in the exhaust gases from gas-fired IC engines. In the lean-burn design, a small, fuel-rich mixture is combusted in a pre-ignition chamber. The hot combustion gases from the pre-ignition chamber then pass to the main combustion chamber, where they ignite a lean mixture of fuel. Since most of the fuel entering the engine is burned in a lean state (i.e., high ratio of air to fuel), exhaust NO_x emissions are minimized. However, volatile organic compound (VOC) emissions are somewhat increased over standard "rich-burn" engines.

Maximum hourly and annual emissions of regulated pollutants from the proposed engine are presented in Table 2-2. Emissions of NO_x , carbon monoxide (CO), and VOC are based on the engine manufacturer's guarantee. Emissions of sulfur dioxide (SO_2) are based on ENRON's natural gas specification. Particulate matter (PM) emissions are based upon EPA publication AP-42 (EPA, 1988d) emission factors for natural gas combustion in boilers. According to EPA's publication entitled Toxic Air Pollutant Emission Factors--A Compilation for Selected Air Toxic Compounds and Sources, there are no emission factors for other regulated pollutants due to natural gas combustion in IC engines (EPA, 1988a).

Table 2-1. Engine Specifications and Stack Parameters for the Proposed Project

Parameter	Design Specification
<u>Engine</u>	
Manufacturer	Dresser-Rand
Model	10 TCV
Air Charging	Turbocharged
Unit Size	4,000 bhp
Number of Power Cylinders	10 cylinders
Power Cylinder Data	
Bore Size	17 inches
Stroke	19 inches
Cylinder Power	400 bhp/cylinder
Specific Heat Input	7,300 Btu/bhp-hr
Maximum Fuel Consumption	27,810 scf/hr ^a
Speed	330 rpm
<u>Stack Parameters</u>	
Stack Height	35 ft
Stack Diameter	25.25 inches
Exhaust Gas FLOW	87,514 lb/hr
	35,820 acfm
Exhaust Temperature	495°F
Exhaust Gas Velocity	171.7 ft/sec

Note: acfm = actual cubic feet per minute.
 bhp = brake horsepower.
 Btu/bhp-hr = British thermal units per brake horsepower per hour.
 °F = degrees fahrenheit.
 ft = feet.
 ft/sec = feet per second.
 lb/hr = pounds per hour.
 scf = standard cubic feet.
 rpm = revolutions per minute.

^aBased on heating value for natural gas of 1,050 British thermal units per standard cubic feet (Btu/scf).

Source: ENRON Corporation, 1990.

Table 2-2. Maximum Emissions From FGTC's Proposed Compressor Engine

Pollutant	Emission Factor	Reference	Maximum Emissions	
			lb/hr	TPY
Nitrogen Oxides	2.0 g/bhp-hr	Manufacturer's guarantee	17.6	77.2
Carbon Monoxide	2.5 g/bhp-hr	Manufacturer's guarantee	22.0	96.6
Volatile Organic Compounds (non-methane)	1.0 g/bhp-hr	Manufacturer's guarantee	8.8	38.6
Particulate Matter	5 lb/MMscf	AP-42, Table 1.4-1	0.15	0.7
Sulfur Dioxide	10 gr/100 scf	ENRON Specification	0.80	3.48

Note: Maximum natural gas consumption is 27,810 standard cubic feet per hour (scf/hr).

g/bhp-hr = grams per brake horsepower per hour.

gr/scf = grains per standard cubic feet.

lb/hr = pounds per hour.

TPY = tons per year.

In order to accommodate the new engine at the existing compressor station site, the existing compressor building will be extended. The extent of the addition is shown in Figure 2-1. The new engine will be housed inside the enlarged building, on the south end of the existing compressor building. The location of the exhaust stack for the new engine is also shown in Figure 2-1.

3.0 AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY

The following discussion pertains to the federal and state air regulatory requirements and their applicability to FGTC's proposed compressor station expansion. These regulations must be satisfied before construction can begin on the proposed source.

3.1 NATIONAL AND STATE AAQS

The existing applicable national and Florida ambient air quality standards (AAQS) are presented in Table 3-1. Primary national AAQS were promulgated to protect the public health, and secondary national AAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas of the country in violation of AAQS are designated as "nonattainment" areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements.

3.2 PSD REQUIREMENTS

3.2.1 GENERAL REQUIREMENTS

Federal PSD requirements are contained in the Code of Federal Regulations (CFR), 40, 52.21, Prevention of Significant Deterioration of air quality. The state of Florida has adopted PSD regulations [Chapter 17-2.510, Florida Administrative Code (F.A.C.)] that are essentially identical to the federal regulations. PSD regulations require that all new major stationary sources or major modifications to existing major sources of air pollutants regulated under CAA be reviewed and a construction permit issued. Florida's State Implementation Plan (SIP), which contains PSD regulations, has been approved by EPA, and, therefore, PSD approval authority in Florida has been granted to FDER.

A "major facility" is defined under PSD as any one of 28 named source categories which has the potential to emit 100 TPY or more, or any other

Table 3-1. National and State AAQS, Allowable PSD Increments, and Significance Levels ($\mu\text{g}/\text{m}^3$)

Pollutant	Averaging Time	AAQS			PSD Increments		Significant Impact Levels
		National		State of Florida	Class I	Class II	
		Primary Standard	Secondary Standard				
Particulate Matter (TSP)	Annual Geometric Mean	NA	NA	NA	5	19	1
	24-Hour Maximum ^a	NA	NA	NA	10	37	5
Particulate Matter (PM10)	Annual Arithmetic Mean	50	50	50	4 ^c	17 ^c	1
	24-Hour Maximum ^b	150	150	150	8 ^c	30 ^c	5
Sulfur Dioxide	Annual Arithmetic Mean	80	NA	60	2	20	1
	24-Hour Maximum ^b	365	NA	260	5	91	5
	3-Hour Maximum ^b	NA	1,300	1,300	25	512	25
Carbon Monoxide	8-Hour Maximum ^b	10,000	10,000	10,000	NA	NA	500
	1-Hour Maximum ^b	40,000	40,000	40,000	NA	NA	2,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100	2.5	25	1
Ozone	1-Hour Maximum ^d	235	235	235	NA	NA	NA
Lead	Calendar Quarter Arithmetic Mean	1.5	1.5	15	NA	NA	NA

^aMaximum concentration not to be exceeded more than once per year.

^bAchieved when the expected number of exceedances per year is less than 1.

^cProposed by EPA in the Federal Register on October 5, 1989.

^dAchieved when the expected number of days per year with concentrations above the standard is less than 1.

Note: Particulate matter (TSP) = total suspended particulate matter.

Particulate matter (PM10) = particulate matter with aerodynamic diameter less than or equal to 10 micrometers.

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter.

NA = Not applicable, i.e., no standard exists.

Sources: Federal Register, Vol. 43, No. 118, June 19, 1978.

40 CFR 50.

40 CFR 52.21.

Chapter 17-2.400, F.A.C.

stationary facility that has the potential to emit 250 TPY or more of any pollutant regulated under CAA. A "source" is defined as an identifiable piece of process equipment or emissions unit. "Potential to emit" means the capability, at maximum design capacity, to emit a pollutant considering the application of control equipment and any other federally enforceable limitations on the source's capacity. A "major modification" is defined under PSD regulations as a change at an existing major stationary facility which increases emissions by greater than significant amounts. PSD significant emission rates are shown in Table 3-2.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified facility. Major new facilities and major modifications are required to undergo the following analyses related to PSD for each pollutant emitted in significant amounts:

1. Control technology review,
2. Source impact analysis,
3. Air quality analysis (monitoring),
4. Source information, and
5. Additional impact analyses.

In addition to these analyses, a new facility must also be reviewed with respect to good engineering practices (GEP) stack height regulations. If the proposed new source or modification is located in a nonattainment area for any pollutant, the source may be subject to nonattainment new source review requirements. Discussions concerning each of these requirements are presented in the following sections.

3.2.2 INCREMENTS/CLASSIFICATIONS

The 1977 Clean Air Act (CAA) amendments address PSD of air quality. The law specifies that certain increases in air quality concentrations above the baseline concentration level of sulfur dioxide (SO₂) and particulate matter--total suspended particulates [PM(TSP)]--would constitute

Table 3-2. PSD Significant Emission Rates and De Minimis Monitoring Concentrations

Pollutant	Regulated Under	Significant Emission Rate (TPY)	<u>De Minimis</u> Monitoring Concentration ($\mu\text{g}/\text{m}^3$)
Sulfur Dioxide	NAAQS, NSPS	40	13, 24-hour
Particulate Matter (TSP)	NAAQS, NSPS	25	10, 24-hour
Particulate Matter (PM10)	NAAQS	15	10, 24-hour
Nitrogen Oxides	NAAQS, NSPS	40	14, annual
Carbon Monoxide	NAAQS, NSPS	100	575, 8-hour
Volatile Organic Compounds (Ozone)	NAAQS, NSPS	40	100 TPY ^a
Lead	NAAQS	0.6	0.1, 3-month
Sulfuric Acid Mist	NSPS	7	NM
Total Fluorides	NSPS	3	0.25, 24-hour
Total Reduced Sulfur	NSPS	10	10, 1-hour
Reduced Sulfur Compounds	NSPS	10	10, 1-hour
Hydrogen Sulfide	NSPS	10	0.2, 1-hour
Asbestos	NESHAP	0.007	NM
Beryllium	NESHAP	0.0004	0.001, 24-hour
Mercury	NESHAP	0.1	0.25, 24-hour
Vinyl Chloride	NESHAP	1	15, 24-hour
Benzene	NESHAP	b	NM
Radionuclides	NESHAP	b	NM
Inorganic Arsenic	NESHAP	b	NM

^aNo de minimis concentration; an increase in VOC emissions of 100 TPY or more will require monitoring analysis for ozone.

^bAny emission rate of these pollutants.

Note: Ambient monitoring requirements for any pollutant may be exempted if the impact of the increase in emissions is below de minimis monitoring concentrations.

NAAQS = National Ambient Air Quality Standards.

NM = No ambient measurement method.

NSPS = New Source Performance Standards.

NESHAP = National Emission Standards for Hazardous Air Pollutants.

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter.

Sources: 40 CFR 52.21.
Chapter 17-2, F.A.C.

significant deterioration. The magnitude of the allowable increment depends on the classification of the area in which a new source (or modification) will be located or will have an impact. Congress also directed EPA to evaluate PSD increments for other criteria pollutants and, if appropriate, promulgate PSD increments for such pollutants.

Three classifications were designated, based on criteria established in the CAA Amendments. Certain types of areas (international parks, national wilderness areas, and memorial parks larger than 5,000 acres, and national parks larger than 6,000 acres) were designated as Class I areas. All other areas of the country were designated as Class II. PSD increments for Class III areas were defined, but no areas were designated as Class III. However, Congress made provisions in the law to allow the redesignation of Class II areas to Class III areas.

In 1977, EPA promulgated PSD regulations related to the requirements for classifications, increments, and area designations as set forth by Congress. PSD increments were initially set for only SO₂ and PM(TSP). However, in 1988, EPA promulgated final PSD regulations for nitrogen oxides (NO_x) and established PSD increments for nitrogen dioxide (NO₂).

The current federal PSD increments are shown in Table 3-1. As shown, Class I increments are the most stringent, allowing the smallest amount of air quality deterioration, while the Class III increments allow the greatest amount of deterioration. FDER has adopted the EPA class designations and allowable PSD increments for PM(TSP), SO₂, and NO₂. The Florida NO₂ increments were adopted in August 1990.

On October 5, 1989, EPA proposed PSD increments for PM₁₀. Those proposed increments are shown in Table 3-1. The PM₁₀ increments as proposed are somewhat lower in magnitude than the current PM(TSP) increments.

The term "baseline concentration" evolves from federal and state PSD regulations and refers to a fictitious concentration level corresponding to a specified baseline date and certain additional baseline sources. By definition in the PSD regulations, baseline concentration means the ambient concentration level that exists in the baseline area at the time of the applicable baseline date. A baseline concentration is determined for each pollutant for which a baseline date is established and includes:

1. The actual emissions representative of sources in existence on the applicable baseline date; and
2. The allowable emissions of major stationary sources that began construction before January 6, 1975, for SO₂ and PM(TSP) sources, or February 8, 1988, for NO_x sources; but which were not in operation by the applicable baseline date.

The following emissions are not included in the baseline concentration and therefore affect PSD increment consumption:

1. Actual emissions from any major stationary source on which construction began after January 6, 1975, for SO₂ and PM(TSP) sources, and after February 8, 1988, for NO_x sources; and
2. Actual emission increases and decreases at any stationary source occurring after the baseline date.

In reference to the baseline concentration, the baseline date actually includes three different dates:

1. The major source baseline date, which is January 6, 1975, in the cases of SO₂ and PM(TSP), and February 8, 1988, in the case of NO₂;
2. The minor source baseline date, which is the earliest date after the trigger date on which a major stationary source or major modification subject to PSD regulations submits a complete PSD application; and
3. The trigger date, which is August 7, 1977, for SO₂ and PM(TSP), and February 8, 1988, for NO₂.

The minor source baseline date for SO₂ and PM(TSP) has been set as December 27, 1977, for the entire state of Florida (Chapter 17-2.450, F.A.C.). The minor source baseline date for NO₂ has been set as March 28, 1988, for all of Florida.

3.2.3 CONTROL TECHNOLOGY REVIEW

The control technology review requirements of the federal and state PSD regulations require that all applicable federal and state emission limiting standards be met and that BACT be applied to control emissions from the source [Chapter 17-2.500(5)(c), F.A.C]. The BACT requirements are applicable to all regulated pollutants for which the increase in emissions from the facility or modification exceeds the significant emission rate (see Table 3-2).

BACT is defined in Chapter 17-2.100(25), F.A.C. as:

An emissions limitation, including a visible emission standard, based on the maximum degree of reduction of each pollutant emitted which the department, on a case by case basis, taking into account energy, environmental, and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of such pollutant. If the Department determines that technological or economic limitations on the application of measurement methodology to a particular part of a source or facility would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reductions achievable by implementation of such design, equipment, work practice, or operation.

The requirements for BACT were promulgated within the framework of PSD in the 1977 amendments of the CAA [Public Law 95-95; Part C, Section 165(a)(4)]. The primary purpose of BACT is to optimize consumption of PSD air quality increments and, thereby, enlarge the potential for future economic growth without significantly degrading air quality (EPA,

1978; 1980). Guidelines for the evaluation of BACT can be found in EPA's Guidelines for Determining Best Available Control Technology (BACT) (EPA, 1978) and in the PSD Workshop Manual (EPA, 1980). These guidelines were promulgated by EPA to provide a consistent approach to BACT and to ensure that the impacts of alternative emission control systems are measured by the same set of parameters. In addition, through implementation of these guidelines, BACT in one area may not be identical to BACT in another area. According to EPA (1980),

BACT analyses for the same types of emissions unit and the same pollutants in different locations or situations may determine that different control strategies should be applied to the different sites, depending on site-specific factors. Therefore, BACT analyses must be conducted on a case-by-case basis.

The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, as a minimum, demonstrate compliance with New Source Performance Standards (NSPS) for a source (if applicable). An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology, is required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems, as well as the environmental benefits derived from these systems. A decision on BACT is to be based on sound judgment, balancing environmental benefits with energy, economic, and other impacts (EPA, 1978).

Historically, a "bottom-up" approach consistent with the BACT Guidelines and PSD Workshop Manual has been used. With this approach, an initial control level, which is usually NSPS, is evaluated against successively more stringent controls until a BACT level is selected. However, EPA

developed a concern that the bottom-up approach was not providing the level of BACT decisions originally intended. As a result, in December 1987, the EPA Assistant Administrator for Air and Radiation mandated changes in the implementation of the PSD program including the adoption of a new "top-down" approach to BACT decision making.

The top-down BACT approach essentially starts with the most stringent (or top) technology and emissions limit that have been applied elsewhere to the same or a similar source category. The applicant must next provide a basis for rejecting this technology in favor of the next most stringent technology or propose to use it. Rejection of control alternatives may be based on technical or economic infeasibility. Such decisions are made on the basis of physical differences (e.g., fuel type), locational differences (e.g., availability of water), or significant differences that may exist in the environmental, economic or energy impacts. The differences between the proposed facility and the facility on which the control technique was applied previously must be justified. Recently, EPA issued a draft guidance document on the top-down approach entitled Top-Down Best Available Control Technology Guidance Document (EPA, 1990a).

3.2.4 AIR QUALITY MONITORING REQUIREMENTS

In accordance with requirements of 40 CFR 52.21(m) and Chapter 17-2.500(f), F.A.C, any application for a PSD permit must contain an analysis of continuous ambient air quality data in the area affected by the proposed major stationary facility or major modification. For a new major facility, the affected pollutants are those that the facility would potentially emit in significant amounts. For a major modification, the pollutants are those for which the net emissions increase exceeds the significant emission rate (see Table 3-2).

Ambient air monitoring for a period of up to 1 year is generally appropriate to satisfy the PSD monitoring requirements. A minimum of

4 months of data is required. Existing data from the vicinity of the proposed source may be utilized if the data meet certain quality assurance requirements; otherwise, additional data may need to be gathered. Guidance in designing a PSD monitoring network is provided in EPA's Ambient Monitoring Guidelines for Prevention of Significant Deterioration (EPA, 1987a).

Under the exemption rule, FDER may exempt a proposed major stationary facility or major modification from the monitoring requirements with respect to a particular pollutant if the emissions increase of the pollutant from the facility or modification would cause, in any area, air quality impacts less than the de minimis levels presented in Table 3-2 [Chapter 17-2.500(3)(e), F.A.C.].

3.2.5 SOURCE IMPACT ANALYSIS

A source impact analysis must be performed for a proposed major source subject to PSD for each pollutant for which the increase in emissions exceeds the significant emission rate (Table 3-2). The PSD regulations specifically provide for the use of atmospheric dispersion models in performing impact analysis, estimating baseline and future air quality levels, and determining compliance with AAQS and allowable PSD increments. Designated EPA models must normally be used in performing the impact analysis. Specific applications for other than EPA-approved models require EPA's consultation and prior approval. Guidance for the use and application of dispersion models is presented in the EPA publication Guideline on Air Quality Models (EPA, 1987b). The source impact analysis for criteria pollutants may be limited to only the new or modified source if the net increase in impacts due to the new or modified source is below significance levels, as presented in Table 3-1.

Various lengths of record for meteorological data can be utilized for impact analysis. A 5-year period can be used with corresponding evaluation of highest, second-highest short-term concentrations for comparison to AAQS or PSD increments. The term "highest, second-

highest" (HSH) refers to the highest of the second-highest concentrations at all receptors (i.e., the highest concentration at each receptor is discarded). The second-highest concentration is significant because short-term AAQS specify that the standard should not be exceeded at any location more than once a year. If less than 5 years of meteorological data are used in the modeling analysis, the highest concentration at each receptor must normally be used for comparison to air quality standards.

3.2.6 ADDITIONAL IMPACT ANALYSES

In addition to air quality impact analyses, federal and state of Florida PSD regulations require analysis of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the proposed source [40 CFR 52.21; Chapter 17-2.500(5)(e), F.A.C.]. These analyses are to be conducted primarily for PSD Class I areas. Impacts due to general commercial, residential, industrial, and other growth associated with the source must also be addressed. These analyses are required for each pollutant emitted in significant amounts (Table 3-2).

3.2.7 GOOD ENGINEERING PRACTICE STACK HEIGHT

The 1977 CAA amendments require that the degree of emission limitation required for control of any pollutant not be affected by a stack height that exceeds GEP, or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (EPA, 1985). Identical regulations have been adopted by FDER [Chapter 17-2.270, F.A.C.]. GEP stack height is defined as the highest of:

1. 65 meters (m); or
2. A height established by applying the formula:

$$H_g = H + 1.5L$$

where: H_g = GEP stack height,

H = Height of the structure or nearby structure, and

L = Lesser dimension (height or projected width) of nearby structure(s); or

3. A height demonstrated by a fluid model or field study.

"Nearby" is defined as a distance up to five times the lesser of the height or width dimensions of a structure or terrain feature, but not greater than 0.8 kilometers (km). Although GEP stack height regulations require that the stack height used in modeling for determining compliance with AAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater.

The stack height regulations also allow increased GEP stack height beyond that resulting from the formula in cases where plume impaction occurs. Plume impaction is defined as concentrations measured or predicted to occur when the plume interacts with elevated terrain. Elevated terrain is defined as terrain which exceeds the height calculated by the GEP stack height formula. Because the terrain in the vicinity of Compressor Station No. 12 is relatively flat, plume impaction was not considered in determining the GEP stack height.

3.3 NONATTAINMENT RULES

Based on the current nonattainment provisions (Chapter 17-2.510, F.A.C.), all major new facilities and modifications to existing major facilities located in a nonattainment area must undergo nonattainment review if the proposed pieces of equipment have the potential to emit 100 TPY or more of the nonattainment pollutant, or if the modification results in a significant net emission increase of the nonattainment pollutant.

For major facilities or major modifications that locate in an attainment or unclassifiable area, the nonattainment review procedures apply if the source or modification is located within the area of influence of a nonattainment area. The area of influence is defined as an area which is outside the boundary of a nonattainment area but within the locus of all points that are 50 km outside the boundary of the nonattainment area. Based on Chapter 17-2.510(2)(a)2.a, F.A.C., all VOC sources which are located within an area of influence are exempt from the provisions of new source review for nonattainment areas. Sources which emit other

nonattainment pollutants and are located within the area of influence are subject to nonattainment review unless the maximum allowable emissions from the proposed source do not have a significant impact within the nonattainment area.

3.4 SOURCE APPLICABILITY

3.4.1 PSD REVIEW

3.4.1.1 Pollutant Applicability

FGTC's Compressor Station No. 12 is located in Santa Rosa County, which has been designated by EPA and FDER as an attainment area for all criteria pollutants. The nearest nonattainment area is located more than 100 km from the compressor station site. Santa Rosa County and surrounding counties are designated as PSD Class II areas for SO₂, PM(TSP), and NO₂. The site is also located more than 100 km from the nearest PSD Class I area.

FGTC's existing Compressor Station No. 12 is considered to be an existing major facility because potential emissions of any regulated pollutant exceed 250 TPY. As a result, PSD review is required for the proposed expansion for each pollutant for which the net increase in emissions exceeds the PSD significant emission rates presented in Table 3-2 (i.e., major modification).

Table 3-3 presents the maximum hourly and annual emissions from the proposed new compressor engine. As shown, potential NO_x emissions from the engine will exceed the PSD significant emission rate for this regulated pollutant. Therefore, the proposed expansion project is subject to PSD review for NO_x.

3.4.1.2 Ambient Monitoring

Based upon the increase in emissions from FGTC's proposed expansion at Compressor Station No. 12, presented in Table 3-3, a PSD preconstruction ambient monitoring analysis is required for NO_x. However, if the increase in impacts of a pollutant is less than the de minimis

Table 3-3. Maximum Potential Emissions Due to Proposed Engine at Compressor Station No. 12

Pollutant	Maximum Potential Emissions From Proposed Compressor Engine		Significant Emission Rate (TPY)	PSD Review Applies?
	(lb/hr)	(TPY)		
Particulate Matter (TSP)	0.15	0.7	25	No
Particulate Matter (PM10)	0.15	0.7	15	No
Sulfur Dioxide	0.80	3.48	40	No
Nitrogen Dioxide	17.6	77.2	40	Yes
Carbon Monoxide	22.0	96.6	100	No
Volatile Organic Compounds (non-methane)	8.8	38.6	40	No

monitoring concentration, then an exemption from the preconstruction ambient monitoring requirement may be granted for that pollutant. In addition, if an acceptable ambient monitoring method for the pollutant has not been established by EPA, monitoring is not required.

The maximum annual impact associated with the potential NO_x emissions from the proposed IC engine is 0.92 μg/m³. The methodology used to predict this value is presented in Section 4.0, along with the impact analysis result. The de minimis concentration level for NO_x is 14 μg/m³ annual average. Since the maximum impact of NO_x is less than its de minimis concentration level, the proposed expansion project is exempted from the PSD preconstruction ambient monitoring requirement for NO_x.

3.4.1.3 GEP Stack Height Analysis

The GEP stack height regulations allow any stack to be at least 65 m (213 ft) high. The proposed stack for the new compressor engine will be 35 ft high (10.67 m) and, therefore, does not exceed the GEP stack height. The potential for downwash of the engines' emissions due to nearby structures is discussed in Section 4.0, Source Impact Analysis.

3.4.2 NONATTAINMENT REVIEW

FGTC's Compressor Station No. 12 is not located in any nonattainment area or in any area of influence of a nonattainment area. As a result, nonattainment review does not apply to the proposed expansion project.

4.0 SOURCE IMPACT ANALYSIS

4.1 ANALYSIS APPROACH AND ASSUMPTIONS

4.1.1 GENERAL MODELING APPROACH

The general modeling approach follows EPA and FDER modeling guidelines for determining compliance with AAQS and PSD increments. In general, when model predictions are used to determine compliance with AAQS and PSD increments, current EPA and FDER policies stipulate that the highest annual average concentration and highest, second-highest short-term (i.e., 24 hours or less) concentration can be compared to the applicable standard.

Model predictions for annual average NO_x concentrations were performed using the Industrial Source Complex Long-Term (ISCLT) model (Version 90008). A brief description of the Industrial Source Complex (ISC) model is given in Section 4.1.2.

4.1.2 MODEL SELECTION

The ISC dispersion model (EPA, 1988b) was used to evaluate the NO_x emissions from the proposed compressor engine. This model is contained in the EPA User's Network for Applied Modeling of Air Pollution (UNAMAP), Version 6 (EPA, 1988c). The ISC model was selected primarily for the following reasons:

1. EPA and FDER have approved the general use of the model for air quality dispersion analysis because the model assumptions and methods are consistent with those in the Guideline on Air Quality Models (EPA, 1987b);
2. The ISC model is capable of predicting the impacts from stack, area, and volume sources that are spatially distributed over large areas and located in flat or gently rolling terrain; and
3. The results from the ISC model are appropriate for addressing compliance with AAQS and PSD increments.

The ISCLT model is an extension of the Air Quality Display Model (AQDM) and the Climatological Dispersion Model (CDM). The ISCLT model uses joint

frequencies of wind direction, windspeed, and atmospheric stability to calculate seasonal and/or annual average ground-level concentrations. Because the input wind directions are for 16 sectors, with each sector defined as 22.5 degrees, the model calculates concentrations by assuming that the pollutant is uniformly distributed in the horizontal plane within a 22.5-degree sector.

Major features of the ISCLT model are presented in Table 4-1. Concentrations due to stack and volume sources are calculated by the model using the steady-state Gaussian plume equation for a continuous source. The area source equation in the ISC model is based on the equation for a continuous and finite crosswind line source.

The ISC model has rural and urban options which affect the windspeed profile exponent law, dispersion rates, and mixing-height formulations used in calculating ground-level concentrations. The criteria used to determine when the rural or urban mode is appropriate are based on land use near the proposed plant's surroundings (Auer, 1978). If the land use is classified as heavy industrial, light-moderate industrial, commercial, or compact residential for more than 50 percent of the area within a 3-km radius circle centered on the proposed source, the urban option is selected. Otherwise, the rural option is used.

For modeling analyses that will undergo regulatory review, such as PSD permit applications, the following model features are recommended by EPA (1987a) and are referred to as the regulatory options in the ISC model:

1. Final plume rise at all receptor locations,
2. Stack-tip downwash,
3. Buoyancy-induced dispersion,
4. Default windspeed profile coefficients for rural or urban option,
5. Default vertical potential temperature gradients, and

Table 4-1. Major Features of the ISCLT Model

ISCLT Model Features

- Polar or Cartesian coordinate systems for receptor locations
- Rural or one of three urban options which affect windspeed profile exponent, dispersion rates, and mixing height calculations
- Plume rise due to momentum and buoyancy as a function of downwind distance for stack emissions (Briggs)
- Procedures suggested by Huber and Snyder (1976), Huber (1977), Schulmann and Hanna (1986), and Schulmann and Scire (1980) for evaluating building downwash and wake effects
- Procedures suggested by Briggs for evaluating stack-tip downwash
- Separation of multiple point sources
- Consideration of the effects of gravitational settling and dry deposition on ambient particulate concentrations
- Capability of simulating point, line, volume, and area sources
- Capability to calculate dry deposition
- Variation of windspeed with height (windspeed-profile exponent law)
- Concentration estimates for annual average
- Terrain-adjustment procedures for elevated terrain including a terrain truncation algorithm
- Receptors located above local terrain, i.e., "flagpole" receptors
- Consideration of time-dependent exponential decay of pollutants
- The method of Pasquill (1976) to account for buoyancy-induced dispersion
- A regulatory default option to set various model options and parameters to EPA recommended values (see text for regulatory options used)

Source: EPA, 1988a.

6. Reducing calculated SO₂ concentrations in urban areas by using a decay half-life of 4 hours (i.e., reduce the SO₂ concentration by 50 percent for every 4 hours of plume travel time).

In this analysis, the EPA regulatory options were used to address maximum impacts. Based on a review of the land use around the facility, the rural mode was selected based on the degree of residential, industrial, and commercial development within 3 km of the plant site.

4.1.3 METEOROLOGICAL DATA

EPA (1987b) recommends the use of 5 years of representative meteorological data for use in air quality modeling. The most recent, readily available 5-year period is preferred. The meteorological data may be collected either onsite or at the nearest National Weather Service (NWS) station.

Meteorological data used in the analysis were selected based on the recommendations of the Florida DER for the area in which the project is located. The data consisted of a 5-year record of surface weather observations (1982-1986) from the NWS station located at the Pensacola Regional Airport. The database consists of hourly surface data (i.e., windspeed, wind direction, etc.) that are recorded and then sent to the National Climatic Data Center (NCDC) in Asheville, North Carolina. The NCDC digitizes the recorded data onto magnetic tape for sale to the public.

The NWS station in Pensacola, located 60 km south-southwest of the site, is the nearest weather station that routinely records the hourly surface data required by the air dispersion models. Because of the proximity of the Pensacola NWS station to the plant site and the flat-to-gently rolling terrain between the NWS station and the plant site, the Pensacola meteorological data are considered to be representative of weather conditions occurring at FGTC's Compressor Station No. 12 site.

The ISCLT model requires annual/seasonal mixing height data and ambient air temperatures. The appropriate values for Pensacola for input to the model

were obtained from FDER. The Pensacola hourly surface data were input into the National Climatic Data Center (NCDC) stability array (STAR) preprocessor program. The STAR program converts the hourly data into the joint frequency of occurrence of wind direction, windspeed and atmospheric stability. The program can produce monthly, seasonal and annual stability arrays.

4.1.4 SOURCE DATA

The model parameters for the proposed compressor engine are given in Table 4-2. The location of the proposed engine stack within the FGTC's Compressor Station No. 12 site are presented in Figure 2-1.

4.1.5 RECEPTOR LOCATIONS

The locations of the receptors were based on identifying the areas in which maximum concentrations would be expected due to the proposed compressor engine. The terrain in the vicinity of the site is flat to gently rolling, therefore, no terrain elevations were required. A description of the receptor locations for determining maximum predicted concentrations is as follows:

1. For the ISCLT model, 144 receptors were located on 16 radials centered on the proposed engine's stack location and at downwind distances of 30, 100, 200, 300, 400, 500, 750, 1,000, and 1,250 m.
2. To account for plant boundaries in all directions, 36 discrete receptors were located along 36 radials separated by 10-degree increments. These discrete receptors were located at the nearest plant boundary in each direction. The locations of the discrete receptors are given in Table 4-3.

Only those receptors located outside FGTC's Compressor Station No. 12 plant property were used in the determination of maximum impacts.

4.1.6 BUILDING DOWNWASH CONSIDERATIONS

Table 4-2. Summary of Source Parameters Used in the Modeling Analysis

Modeled Source Number	<u>Stack Dimensions (m)</u>		<u>Operating Parameters</u>		<u>Emissions (g/s)</u>
	Height	Diameter	Temperature (K)	Velocity (m/s)	NO ₂
1	10.67	0.64	530	52.31	2.22

0

Table 4-3. Discrete Plant Boundary Receptors, Compressor Station No. 12^a

Direction	Distance (km)	Direction	Distance (km)
10	0.201	190	0.271
20	0.210	200	0.146
30	0.229	210	0.158
40	0.241	220	0.177
50	0.204	230	0.180
60	0.180	240	0.158
70	0.165	250	0.146
80	0.158	260	0.140
90	0.155	270	0.137
100	0.158	280	0.140
110	0.165	290	0.146
120	0.180	300	0.158
130	0.204	310	0.183
140	0.241	320	0.216
150	0.311	330	0.229
160	0.287	340	0.180
170	0.271	350	0.201
180	0.268	360	0.198

^aRelative to the proposed stack located at (0,0) meters.

height. Also, based on the location of the proposed engine's exhaust stack in relation to the compressor building, the stack will be in the influence of the compressor building. Therefore, the potential for building downwash must be considered in the modeling analysis.

The procedures used for addressing the effects of building downwash are those recommended in the ISC Dispersion Model User's Guide. In the ISCLT model, the building height and width are input to the model, which are used to modify the dispersion parameters if the Huber-Snyder building downwash routine is used. The effective width used by the program is the diameter of a circle of equal area to the square of the width input to the model. If a specific width is to be modeled, then the value input to the model must be calculated according to the following formula:

$$M_w = \sqrt{\pi \left(\frac{H_w}{2}\right)^2} = 0.886 H_w$$

where: M_w = building width input to the model to produce a building width of H_w used in the dispersion calculation.
 H_w = the actual building width for which dispersion calculations are desired.

If the Schulman-Scire wake effects method is used, the user inputs the building height and projected width associated with each 10 degrees of wind direction. These building heights and projected widths are the same used for GEP stack height calculations.

A summary of actual and modeled building dimensions is presented in Table 4-4. Due to the proximity of the proposed stack to the compressor building (approximately 17 ft), potential downwash from this structure was assumed to occur in all directions, which is a conservative approach to produce maximum impacts. Because the stack-to-building height ratio is less than 1.5, the Schulman-Scire downwash method was used in the analysis.

Table 4-4. Building Dimensions used in the ISCLT Modeling, Compressor Station No. 12

Building	<u>Actual Building Dimensions</u>			<u>Modeled Building Dimensions</u>	
	Height (m)	Length (m)	Width (m)	Height (m)	Projected Width ^a (m)
Compressor Building ^b	9.88	67.1	16.8	9.88	69.2

^aMaximum projected building width was assumed to be applicable in all directions.

^bDimensions are for expanded compressor building with proposed engine.

4.2 MODEL RESULTS

A summary of the maximum predicted annual NO₂ concentrations due to the proposed compressor engine only is presented in Table 4-5. The maximum predicted annual average impact due to the proposed compressor engine is 0.92 μg/m³, which is less than the NO₂ significance level of 1 μg/m³, annual average concentration. This maximum concentration is predicted to occur in a direction of 290° and at a distance of 0.146 km from the proposed engine's stack. This is along the FGTC Station No. 12 property boundary. Because of the receptor spacing used and the sector averaging feature of the ISCLT model, no refinements were necessary for these results. Because the predicted maximum NO₂ concentration is less than the significant impact level, further modeling for NO₂ is not required. Computer model printouts are provided in Appendix C.

Table 4-5. Maximum Predicted Annual Average NO₂ Concentrations Due to the Proposed Compressor Engine for Comparison to Significant Impact Levels

Year Modeled	Maximum Concentration (μg/m ³)	<u>Receptor Location</u>		NO ₂ Significant Impact Level (μg/m ³)
		Direction (°)	Distance (km)	
1982	0.92	290	0.146	1
1983	0.74	290	0.146	
1984	0.86	360	0.198	
1985	0.79	360	0.198	
1986	0.87	360	0.198	

5.0 SOILS, VEGETATION, VISIBILITY AND ASSOCIATED POPULATION GROWTH IMPACTS

5.1 IMPACTS UPON SOILS AND VEGETATION

As demonstrated in Section 4.0, FGTC's proposed IC engine will have a very minimal impact upon ambient air quality in the vicinity of the Compressor Station No. 12 site. Maximum predicted impacts of NO_x and CO are below EPA significance levels, and emissions of VOC are low. There are no Class I areas located within 100 km of the site. Based on these considerations, there is expected to be no significant impact to soils or vegetation from the proposed engine.

5.2 IMPACTS UPON VISIBILITY

The visibility analysis required by PSD regulations is directed primarily towards Class I areas. Since there are no Class I areas located within 100 km of the site, there will be no impact upon visibility due to this proposed small source. In regards to local visibility impacts, the proposed source will meet Florida visible emission requirement of 20 percent opacity (FAC Chapter 17-2.610(2)). During normal operations, the expected actual opacity from the IC engine will be much less than 20 percent.

5.3 IMPACTS DUE TO ASSOCIATED POPULATION GROWTH

There will be a small increase in temporary construction workers during construction; however, there will be no increase in permanent employment at Compressor Station No. 12 as a result of adding the new engine. As a result, there will be no permanent impacts on air quality caused by associated population growth.

6.0 BEST AVAILABLE CONTROL TECHNOLOGY EVALUATION

The potential emissions of NO_x from the proposed engine exceed the PSD significant emission rate of 40-TPY; therefore, BACT analysis for NO_x is required. The complete "top-down" BACT evaluation of NO_x includes a description of natural gas prime movers (Section 6.1), the identification of NO_x control technologies for reciprocating engines (Section 6.2), the environmental, energy and economic impact evaluations of all technically feasible methods (Section 6.3), and the BACT analysis summary (Section 6.4).

6.1 NATURAL GAS PRIME MOVERS

The prime movers in the natural gas industry are generally heavy duty natural gas-fired stationary internal combustion (IC) engines. These engines are applied to power compressors used for pipeline transmission, field collection of gas from wells, underground storage, and gas processing plant activities. Stationary IC engines used include both gas turbines and reciprocating engines.

The use of gas turbines at new natural gas pipeline compression stations has increased in recent years for a wide variety of reasons. Their primary benefit is that gas turbines typically emit fewer pollutants than reciprocating engines (i.e., on g/bhp-hr basis); however, gas turbines are generally 10 to 15 percent less fuel efficient, requiring higher specific heat input rate (i.e., on Btu/bhp/hr basis). Also, gas turbines have been found to use more fuel to produce the same compression efficiency.

A primary limitation of gas turbines is related to their inability to respond quickly and efficiently to varying load changes in service demand. This often precludes the use of turbines when supplemental compression is required at a given compressor station. Furthermore, the use of gas turbines in conjunction with reciprocating engines at existing compressor stations is hindered by operating limitations. The mechanical operation of reciprocating engines generates a pulse vibration which can be transferred

to adjacent equipment through physical connection to the pipeline. Gas turbines are sensitive to this type of vibration due to the destructive interference nature of this vibrational frequency; therefore, their operation and reliability can be adversely effected. Based on the above discussion, the use of gas turbines for FGTC's proposed expansion is not considered further.

The use of reciprocating engines has been more widespread in terms of number of installations at natural gas pipeline compressor stations. A recent Gas Research Institute research study (GRI, 1990) reports that the number of reciprocating engines is five times that of gas turbines. Advantages of using reciprocating engines are primarily increased fuel efficiency and their capability to operate at variable loads to meet the fluctuating consumptive demands.

Reciprocating engines used in gas pipeline transmission are generally integral engine-compressor units designed specifically for such application. The integral units provide greater gas-moving efficiency than separable compressors and offer greater operating flexibility than gas turbines. The engines are either two-cycle or four-cycle and are rated between 900 to 13,500 bhp. Old existing engines include four-cycle rich-burn or two- and four-cycle non-lean-burn. New engines installed in pipeline compressor stations are generally of lean-burn combustion design, which achieve 80 percent or greater NO_x emission reduction compared to the older, rich-burn models.

6.2 IDENTIFICATION OF NO_x CONTROL TECHNOLOGIES FOR RECIPROCATING ENGINES

In this section, the control technologies capable of reducing NO_x emissions produced by reciprocating engines will be evaluated relative to their potential application as BACT for the proposed 4,000-bhp reciprocating engine. This BACT analysis follows EPA's most recent draft guideline for the top-down approach (EPA, 1990a).

All potentially applicable control technologies for reciprocating engines are reviewed. The technologies can be separated into two major groups:

1. Reducing pollutant emissions by process modification of the conventional reciprocating engine with "low-NO_x" engine design, and
2. Converting NO_x in the exhaust gas from the IC reciprocating engine by add-on catalytic exhaust gas treatment devices.

The discussion of each potential NO_x control technology includes a description of the technology and the potential NO_x emission reduction, if the technology is concluded to be technically feasible.

6.2.1 TECHNOLOGIES INVOLVING ENGINE MODIFICATION

The concept of low-NO_x reciprocating engines is described in the NSPS Background Information Document (BID) for reciprocating engines issued by EPA in July 1979 (EPA, 1979). Five types of engine or process modifications have been recognized by EPA as technically viable for reducing NO_x emissions from stationary reciprocating engines:

1. Steam injection,
2. Air-to-fuel ratio changes,
3. Retarded ignition timing,
4. Derating power output, and
5. Exhaust gas recirculation.

Each of these is discussed in the following sections.

6.2.1.1 Steam Injection

The concept of designing a low-NO_x reciprocating engine focuses on controlling the combustion temperature, since thermal NO_x generally increases as combustion temperature increases. Favorable conditions for thermal oxidation of molecular nitrogen can be reduced by quenching the flame temperature with low quality steam or water. In this method, water or steam is injected at a location downstream from the combustion zone inside each firing cylinder.

However, water or steam injection to reduce NO_x formation does not work well at the high water injection rate required for reciprocating engines. Reciprocating IC engines are typically designed with high gas flow rates and operate at high excess air. Also, experiments with large-bore reciprocating engines have concluded that steam injection for controlling NO_x emissions can cause irreversible structural damage to the engine block (EPA, 1979). Thus, water or steam injection technology for reciprocating engines is considered technically infeasible. As a result, this method will not be discussed further.

6.2.1.2 Air-to-Fuel Ratio Changes

The state-of-art concept in designing a low- NO_x reciprocating engine involves raising the air-to-fuel ratio to create a lean fuel mixture for the combustion process. The peak combustion temperature is lowered due to lower heat of combustion from burning less fuel, and by the high excess air, which tends to dilute the combustion gases. Cooper-Bessemer was the first original equipment manufacturer of reciprocating engines to incorporate this concept into engine design, which it called CleanBurn[®] technology.

In general, the high air-to-fuel ratio design is referred to as lean-burn technology (LBT) for gas-fired reciprocating engines. The name is derived from the lean mixture of air-to-fuel in the main combustion cylinder. The air-to-fuel ratio can reach as high as 200 for some engine designs and operating conditions, according to one of the major reciprocating engine suppliers (Dresser-Rand, 1990).

LBT is primarily accomplished by increasing the stoichiometric air-to-fuel ratio over the conventional reciprocating rich-burn engine. In general, small increases in the air-to-fuel ratio (approximately 10 percent) cause a significant reduction in NO_x (approximately 30 percent) with less than 5 percent fuel penalty (EPA, 1979). On turbocharged engines, this can be accomplished by operating at high manifold pressures, which results in

lower combustion temperatures and reduces NO_x formation. However, misfiring and erratic combustion can occur at very lean mixtures. The limits to which the air-to-fuel ratio can be increased are related to three major engine design factors:

1. The capability of the turbocharger to produce higher air manifold pressures for rated engine loading,
2. The ability of the ignition system to light-off the leaner mixtures, and
3. The combustion chamber characteristics to maintain efficient combustion with leaner mixtures.

With the current state-of-the-art engine and turbocharger designs coupled with advanced control technology, all of these three factors can be sufficiently achieved.

Lean-burn natural gas reciprocating engines are capable of achieving NO_x emission levels as low as 1.5 to 2.0 g/bhp-hr, depending on size of the engine, manufacturer, type of fuel, etc. The typical rich-burn engine results in NO_x emissions of about 11 g/bhp-hr (EPA, 1988d). Thus, the lean-burn engine results in an NO_x decrease on the order of 85 percent.

6.2.1.3 Retarded Ignition Timing

Retarding the spark ignition timing of the reciprocating engine reduces the peak combustion pressure and temperature, thereby lowering thermal NO_x formation. The timing delay is measured in degrees in reference to the engine's crankshaft rotation. There are limits to how much the ignition timing can be retarded. In general, retard values range from 2 to 6 degrees, depending on engine, and NO_x reduction per degree of retard decreases for increasing levels of retard.

A study by the American Gas Association showed that the NO_x emissions from 10 different gas-fired naturally aspirated engine models ranged from a 7 percent reduction to a 2 percent increase per degree of ignition retardation (Urban and Springer, 1975). EPA's research (1979) reported the

percent of NO_x reduction per degree of retard ranged from 0.6 to 8.5 for turbocharged engines. Overall, EPA's report concluded that retarding ignition timing reduced NO_x emissions 15 percent for gas-fired engines.

Potential NO_x Emission Reduction:

<u>Pollutant</u>	<u>Reciprocating Engine Baseline Emission Level</u>	<u>Achievable Emission Level</u>	<u>Potential Percentage Reduction</u>
NO _x	11.0 g/bhp-hr ^a	9.4 g/bhp-hr	15%
	2.0 g/bhp-hr ^b	1.7 g/bhp-hr	15%

Note: ^a Represents emission level for a conventional rich-burn engine.

^b Represents emission level for a typical lean-burn engine.

6.2.1.4 Derating Power Output

A reciprocating engine can be derated by operating at less than full or rated power. The effect of derating on an engine is to reduce peak combustion cylinder temperatures and pressures, thus lowering NO_x formation rates.

Reported NO_x reduction levels achieved by derating vary greatly for different reciprocating engines. Data compiled by EPA (1979) show that non-turbocharged engines achieve the largest reduction because derating has a greater effect on air-to-fuel ratios. In contrast, turbocharged engines operate at a more constant air-to-fuel ratio and, therefore, very little NO_x reduction is achieved by derating. Normalized NO_x reduction from derating (i.e., percent of NO_x reduction per percent derate) is reported from 0.25 to 6.2 for normally aspirated or blower-charged engines, and 0.01 to 2.6 for turbocharged engines. The EPA report showed that NO_x reduction ranged from 10 percent increase to 90 percent reduction, and averaged approximately 40 percent reduction at a derating of 75 percent of rated torque.

Potential NO_x Emission Reduction:

<u>Pollutant</u>	<u>Reciprocating Engine Baseline Emission Level</u>	<u>Achievable Emission Level</u>	<u>Potential Percentage Reduction</u>
NO _x	11.0 g/bhp-hr ^a	6.6 g/bhp-hr	40%
	2.0 g/bhp-hr ^b	1.2 g/bhp-hr	40%

Note: ^a Represents emission level for a conventional rich-burn reciprocating engine.

^b Represents emission level for a typical lean-burn engine.

6.2.1.5 Exhaust Gas Recirculation

Exhaust gas recirculation (EGR) reduces peak combustion temperatures in a reciprocating engine by replacing a fraction of the combustion air with exhaust gases. The recirculated exhaust gases serve to absorb heat without providing as much additional oxygen for the oxidation of nitrogen.

EGR can be accomplished by either introducing exhaust gases into the intake manifold or restricting the exit of gases from the cylinder by internal recirculation. Externally recirculated gases must be cooled prior to being reintroduced into the combustion cylinder in order to provide greater heat absorption per charge.

EGR is most effective in reducing NO_x emission from conventional, rich-burn reciprocating engines because its application can increase the air-to-fuel ratio. EPA's research (1979) reported a NO_x reduction of 34 percent for a gas-fired, blower-charged engine with 6 percent EGR rate. Excessive EGR rates can result in increased fuel consumption, high CO emissions, and misfire (GRI, 1990).

EGR is not effective for a lean-burn engine with a high air intake flow rate since it cannot significantly further dilute the air/fuel mixture. In addition, no system has been developed to date for the complex control

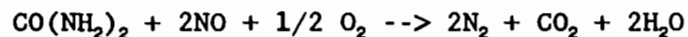
system needed to regulate the recirculation of the exhaust gases. As a result, EGR for lean-burn engines is not considered further.

Based on the typical NO_x emission rate from a rich-burn engine of 11.0 g/bhp-hr, and 34 percent reduction due to EGR, EGR is capable of achieving an NO_x emission rate of 7.3 g/bhp-hr.

6.2.2 TECHNOLOGIES INVOLVING EXHAUST GAS TREATMENT

6.2.2.1 NO_xOUT Process

The NO_xOUT process originated from the initial research by the Electric Power Research Institute (EPRI) in 1976 on the use of urea to reduce NO_x. EPRI licensed the proprietary process to Fuel Tech, Inc., for commercialization. In the NO_xOUT process, aqueous urea is injected into the flue gas stream ideally within a temperature range of 1,600°F to 1,900°F. In the presence of oxygen, the following reaction results:



The amount of urea required is most cost effective when the treatment rate is 0.5 to 2 moles of urea per mole of NO_x. In addition to the original EPRI urea patents, Fuel Tech claims to have a number of proprietary catalysts capable of expanding the effective temperature range of the reaction to between 1,000°F and 1,950°F. Advantages of the system are:

1. Low capital and operating costs due to utilization of urea injection, and
2. The proprietary catalysts used are nontoxic and nonhazardous, thus eliminating potential disposal problems.

Disadvantages of the system are:

1. Formation of ammonia from excess urea treatment rates and/or improper use of reagent catalysts, and
2. SO₃, if present, will react with ammonia created from the urea to form ammonium bisulfate, potentially plugging the cold end equipment downstream.

Commercial application of the NO_xOUT system is limited to three reported cases:

1. Trial demonstration on a 62.5-ton-per-hour (TPH) stoker-fired wood waste boiler with 60 to 65 percent NO_x reduction,
2. A 600-million-British-thermal-unit (MMBtu) CO boiler with 60 to 70 percent NO_x reduction, and
3. A 75-megawatt (MW) pulverized coal-fired unit with 65 percent NO_x reduction.

The NO_xOUT system has not been demonstrated on any stationary IC engine.

The NO_xOUT process is not technically feasible for the proposed lean-burn engine due to the high application temperature of 1,000°F to 1,950°F. The exhaust gas temperature of a lean-burn engine is typically between 495°F to 550°F. Raising the exhaust temperature the required amount would essentially require installation of a heater. This would be economically prohibitive and would result in an increase in fuel consumption, an increase in the volume of gases that must be treated by the control system, and an increase in uncontrolled air emissions, including NO_x.

6.2.2.2 THERMAL DeNO_x

Thermal DeNO_x is Exxon Research and Engineering Company's patented process for NO_x reduction. The process is a high temperature selective noncatalytic reduction (SNCR) of NO_x using ammonia as the reducing agent. Thermal DeNO_x requires the exhaust gas temperature to be above 1,800°F. However, use of ammonia plus hydrogen lowers the temperature requirement to about 1,000°F. For some applications, this must be achieved by additional firing in the exhaust stream prior to ammonia injection.

The only known commercial applications of Thermal DeNO_x are on heavy industrial boilers, large furnaces, and incinerators which consistently produce exhaust gas temperatures above 1,800°F. There are no known applications or experience in the reciprocating engine industry. Temperatures of 1,800°F require alloy materials of construction with very

large size piping and components since the exhaust gas volume would be increased by several times. As with the NO_xOUT process, high capital, operating, and maintenance costs are expected due to material of construction specification, additional duct burner system, and fuel consumption. Uncontrolled emissions would increase because of the additional fuel burning.

Thus, the Thermal DeNO_x process will not be considered for the proposed project because it is technically infeasible due to its high application temperature in the range of 1,000 to 1,800°F. The exhaust gas temperature of a lean-burn engine is typically between 495°F to 550°F. Also, the cost to raise the exhaust gas to such high temperature is prohibitively expensive.

6.2.2.3 Nonselective Catalytic Reduction

Certain manufacturers, such as Engelhard, market a non-selective catalytic reduction system (NSCR) for NO_x control on reciprocating engines. The NSCR process requires a low oxygen content in the exhaust gas stream and high temperature (700°F to 1,400°F) in order to be effective. Rich-burn engines typically achieve low oxygen levels of less than 4 percent and the required temperature and, therefore, can use the NSCR process. Lean-burn engines, on the other hand, have a high air-to-fuel ratio, typical exhaust gas oxygen content of 12 to 15 percent, and the exhaust gas temperature is less than 500°F. As a result, NSCR is not a technically feasible add-on NO_x control device for FGTC's proposed lean-burn engine. Therefore, the combination of a lean-burn engine and NSCR was not considered further in the BACT analysis.

6.2.2.4 Selective Catalytic Reduction with Ammonia Injection

The NO_x abatement technology for oil- and gas-fired combustion sources that is currently receiving considerable attention is the selective catalytic reduction (SCR) process with ammonia injection. Engelhard Corporation's discovery in 1957 that ammonia reacts selectively with NO_x in the presence of a catalyst and excess oxygen has led to the commercialization of SCR

technology for industrial boilers of various sizes. The technology has been well developed and applied in Japan, especially for control of emissions from gas-, oil-, and coal-fired utility boilers. It has been applied domestically on combustion sources which generate large quantities of NO_x , such as gas turbines.

SCR catalysts consist of two types: metal oxides and zeolite. The base metal catalysts are either vanadium or titanium embedded into a ceramic matrix structure; the zeolite catalysts are ceramic molecular sieves extruded into modules of honeycomb shape. The all-ceramic zeolite catalysts are durable, and less susceptible to catalyst masking or poisoning than the noble metal/ceramic base catalysts. All catalysts exhibit advantages and disadvantages in terms of exhaust gas temperatures, ammonia/ NO_x ratio, and optimum exhaust gas oxygen concentrations. A common disadvantage for all catalyst systems is the narrow window of temperature between 600°F and 900°F within which the NO_x reduction process takes place (Schorr, 1989; Steuler, 1990; Engelhard, 1990; Johnson-Matthey, 1990). Operating outside this temperature range results in catastrophic harm to the catalyst system. Chemical poisoning occurs at lower temperature conditions, while thermal degradation occurs at higher temperatures. Reactivity can only be restored through catalyst replacement.

Catalysts are subject to loss of activity over time. Since the catalyst is the most costly component of the SCR system, applications require servicing and cleaning of the catalyst surface every 2,000 to 3,000 hours of operation. The cleaning normally consists of blowing the catalyst surfaces with a compressed air gun or water jet. Most catalyst suppliers guarantee a catalyst life of 3 years, assuming certain operating conditions.

Technically, SCR is potentially applicable to further reduce the already low NO_x emissions (2 g/bhp-hr) from the proposed lean-burn reciprocating engine. SCR is capable of achieving NO_x reduction of 70 to 90 percent. For the proposed lean-burn engine, with already low NO_x concentration in the exhaust gases, vendors guarantee a removal rate of 80 percent. This

would result in NO_x emissions of 0.4 g/bhp-hr. This represents an overall 96 percent NO_x reduction compared to a rich-burn engine (at 11.0 g/bhp-hr).

6.2.2.5 Combination of Rich-Burn Engine and NSCR

Although the draft top-down BACT guideline document dated March 15, 1990, does not require that inherently higher emitting processes than the proposed process be evaluated, the option of using rich-burn engines coupled with NSCR also was considered in the BACT analysis.

Rich-burn reciprocating engines are defined as those which contain less than 4 percent oxygen concentration in the exhaust gas. Rich-burn engines typically are naturally aspirated engines with near stoichiometric air-to-fuel ratios and produce exhaust gas temperatures in the range of 1,200°F to 1,300°F.

NSCR technology uses a precious metal to catalyze the reactions of NO_x with CO and unburned hydrocarbon fuel in the exhaust gas streams to form nitrogen, carbon dioxide, and water vapor. A complete NSCR system includes exhaust gas oxygen sensor, exhaust gas monitor, hydrocarbon fuel injector, automatic air/fuel controller, and temperature sensor for automatic shut-down of the engine if overheating occurs. The engine exhaust entering the catalyst bed is maintained slightly fuel-rich to maximize NO_x reduction. The hydrocarbon fuel injector automatically controls an adjustable valve that supplies a small amount of hydrocarbon fuel to compensate for the changes in engine load or ambient conditions.

Technically, NSCR is potentially applicable to reduce 90 percent or more of the NO_x emissions in the exhaust gas of the rich-burn reciprocating engine. In general, vendors guarantee a removal rate of 90 percent for an equivalent NO_x emission level of 1.1 g/bhp-hr (i.e., 10 percent of the rich-burn engine NO_x emission rate of 11.0 g/bhp-hr).

6.2.3 SUMMARY OF TECHNICALLY FEASIBLE NO_x CONTROL METHODS

In summary, there are two basic alternatives for reduction of NO_x emissions from reciprocating engines: engine modification and add-on control technology. Presented in Table 6-1 is a summary of the technical evaluation of NO_x emission control methods applicable to reciprocating engines.

In the engine modification category, only the alternatives of air-to-fuel ratio change, retard ignition timing, derating power output, and EGR are applicable. EGR is applicable to rich-burn engines only. Steam/water injection and EGR (for lean-burn engines) are considered technically infeasible. In the add-on control technology category, only the lean-burn engine/SCR combination and rich-burn engine/NSCR combination are considered technically feasible. Other methods such as the NO_xOUT process, Thermal DeNO_x, and the lean-burn engine/NSCR combination are considered technically infeasible.

6.3 EVALUATION OF TECHNICALLY FEASIBLE NO_x CONTROL METHODS

This section examines all of the technically feasible NO_x control methods identified in the previous discussion. First, all five remaining control alternatives are ranked according to their total removal effectiveness. Each alternative is then examined further in regards to technical issues, environmental effects, energy requirements and impacts, and economic impacts.

The discussion also reviews current permitting practices for applications similar to FGTC's proposed project. Presented in Table 6-2 is a summary of BACT determinations for NO_x emissions from gas-fired stationary reciprocating engines issued since 1985. The information was obtained from BACT/Lowest Achievable Emission Rate (LAER) Clearinghouse documents from 1985 to 1990, as well as from actual permit applications, issued permits, and personal conversations with personnel of air permitting agencies from various states.

Table 6-1 Summary of Technical Feasibility of NOx Emission Controls for Reciprocating Engine.

Control Technology	NOx Controlled Emission Rate	Technical Feasibility	Comments
<u>Engine Modification Alternatives</u>			
Steam Injection	Not Applicable	NO	Technically infeasible due to irreversible structural damage to engine block.
Air-to-fuel Ratio Change (or Lean-Burn Technology)	1.5-2.0 g/bhp-hr	YES	Lowest emission rate achievable by engine modification, at least 80% control efficiency.
Retarding Ignition Timing			
Rich-burn Engine	9.4 g/bhp-hr	YES	Engine timing retard between 2° and 6°; average 15% NOx reduction.
Lean-burn Engine	1.7 g/bhp-hr	YES	
Derating Power Output			
Rich-burn Engine	6.6 g/bhp-hr	YES	Average 40% NOx reduction at 25% of engine power derated for gas-fired engines.
Lean-burn Engine	1.2 g/bhp-hr	YES	
Exhaust Gas Recirculation			
Rich-burn Engine	7.3 g/bhp-hr	YES	Maximum 34% NOx reduction for standard engine. Ineffective for lean-burn engine.
Lean-burn Engine	Not Applicable	NO	
<u>Add-on Control Technology*</u>			
NOxOUT Process	Not Applicable	NO	Technically infeasible (1000-1600°F), cost prohibitive for high temperature auxiliary equipment.
THERMAL DeNOx	Not Applicable	NO	Technically infeasible (above 1000°F), cost prohibitive for high temperature auxiliary equipment.
Lean-Burn Engine/NSCR	Not Applicable	NO	Technically infeasible for lean-burn engine, required <4% O2 conc. in the exhaust stream.
Lean-Burn Engine/SCR	0.4 g/bhp-hr	YES	Applicable to lean-burn engine with control efficiency of 80 percent.
Rich-Burn Engine/NSCR	1.1 g/bhp-hr	YES	Applicable to rich-burn engine only, required greater than 4% O2 conc. in exhaust gas stream. control efficiency of 90%.

* Except for the rich-burn engine/NSCR option, all add-on control technologies are for lean-burn engines.

Table 6-2 Summary of BACT Determinations for NOx Emissions from Gas-fired Reciprocating Engines

Company Name	State	Permit Number	Date of Permit	Engine Specifications			Size (Bhp)	NOx Emission Limit**			Control Method	Comments
				Fuel* Type	Make	Model		(g/Bhp-hr)	(lb/hr)	(ppm)		
<u>Source Type: Natural Gas Compressor Station</u>												
Northern Natural Gas Company	IA		05-Sep-90	N.G.	Cooper		4,000	1.8	15.9		Lean burn engine	
same as above	IA		05-Sep-90	N.G.	Cooper		2,000	1.8	7.9		Lean burn engine	
National Fuel Gas Supply Corp.	PA	53-329-001	13-Jun-89	N.G.	Cooper	8015JHC2	3,000	2.0	13.2		Lean burn engine	
Natural Gas Pipeline Company	IL	85100014	01-Mar-89	N.G.	Worthington	MLV-10	4,000	9.0	79.4		Design & oper. practice	
Tennessee Gas Pipeline Company	PA	53-339-002	21-Jun-88	N.G.	Cooper	GMVH-10C	2,250	3.0	14.9		Lean burn engine	
Consolidated Gas Transmission Corp.	PA	59-399-008	10-May-88	N.G.	Dresser-Rand	TCV-10	4,200	3.0	27.8		Lean burn engine	Air to fuel ratio is 4.5:1
ANR Production Company	VA	11064	03-Mar-88	N.G.	Caterpillar	G398TAA	600	1.2	1.6		Catalytic converter	N.G. Compressor Sta.
Southern Natural Gas Company	AL	406-0003-X	19-Feb-88	N.G.	Dresser-Rand	TCVD-10	4,160	2.2	20.2		Lean burn engine	Per. cond.: stack test
National Fuel Gas Supply Corp.	PA	53-399-002	01-Feb-88	N.G.	Dresser-Rand	412 KEV-1	2,850	3.0	18.8		Lean burn engine	
Shell California Production Co.	CA	147853	14-Oct-86	N.G.			600	3.2	4.2		SCR	70% reduction
Northern Natural Gas Company	IA		04-Feb-86	N.G.			4,000			250	Engine design	
Consolidated Gas Transmission Corp.	PA	18-399-009	11-Dec-85	N.G.	Cooper	12W-330-C2	6,000	3.0	39.7		Lean burn engine	
Shell California Production	CA	0041-6	02-Dec-85	N.G.	Caterpillar		225	0.805	0.4	50	NSCR, rich burn engine	90% reduction
<u>Source Type: Power Cogeneration and Other Uses</u>												
University of Illinois, Ch. Cir. Camp.	IL	applying	1990	N.G.	Cooper	LSVB-GDC	8,000	1.9	33.5		Lean burn engine	
Northeast Landfill Power	RI	999-1014	12-Dec-89	L.G.	Waukesha	12V-AT25GL	2,400	1.3	6.6		Lean burn engine	High-speed (900 rpm)
Worcester Company	RI	988-990	27-Sep-89	N.G.	Superior	12-SGTB	2,000	1.5	6.6		Lean burn engine	High-speed (900 rpm)
City of Ventura	CA	1379-1	31-Dec-86	D.G.			773	2.0	3.4		Engine design	Digestive gas
State of Utah Natural Resources	UT		01-Sep-86	N.G.			4,630	3.5	36.0		Lean burn engine	Turbocharger ups fuel eff.
Tricounty Sun Energy Sheraton Hotel	CA	1369-1	07-Aug-86	N.G.	Caterpillar		200			50	NSCR, rich burn engine	90% reduction
Genstar Gas Recovery Systems	CA	30970	29-Aug-85	L.G.			2,650	1.5	8.8		Lean burn engine	Landfilled gas
same as above	CA	30893	29-Aug-85	L.G.			1,100	1.5	3.6		Lean burn engine	Landfilled gas
Pacific Lighting Energy	CA	30336	01-Mar-85	N.G.	Superior	16-SGTA	2,650	1.5	8.8		Lean burn engine	High-speed (900 rpm)

* N.G. = Natural Gas; L.G. = Landfilled Gas; and D.G. = Digestive Gas.

** for a single engine.

6.3.1 RANKING OF FEASIBLE CONTROL TECHNOLOGIES

The top-down BACT approach requires the ranking of the NO_x emission control alternatives in terms of achievable emission level. The five options, in order of removal effectiveness, are: first, the lean-burn engine with SCR; second, the rich-burn engine with NSCR; third, the lean-burn engine with derating; fourth, the lean-burn engine with retard ignition timing; and fifth, the lean-burn engine.

A baseline condition must be established for BACT ranking and economic analysis purposes. The baseline is defined as the uncontrolled rate of the process being reviewed. Therefore, the baseline condition for the control technologies involving stationary reciprocating engine would be a conventional rich-burn engine with a NO_x emission level of 11 g/bhp-hr (EPA, 1988d).

Presented in Table 6-3 is the BACT top-down hierarchy of technically feasible NO_x control technologies, their corresponding NO_x emission rate, and their control efficiency calculated from the baseline emission level. Only control options that result in an NO_x emission rate lower than the proposed lean-burn engine (2.0 g/bhp-hr) are shown in the table. Only these options are evaluated further for BACT.

6.3.2 ANALYSIS OF LEAN-BURN ENGINE WITH SCR

Technical Issues

As the most effective NO_x abatement process in terms of removal efficiency, SCR has been a more frequently applied technology for state-of-the-art reciprocating engines. However, the reliability of SCR's performance on reciprocating engines has not been consistently demonstrated. Data on sustained NO_x reduction performance for reciprocating engines are very limited.

Technical issues involved in the use of SCR are the narrow operating temperature range and the possible damage to the catalyst and downstream equipment. A stack gas reheat system would be required to heat the exhaust

Table 6-3 BACT "Top-Down" Hierarchy of NOx Control Technologies

BACT Ranking	Technology	Brake Emission Rate (g/bhp-hr)	Annual Emissions (TPY)	Total Emission Reduction (TPY)*	Total Control Efficiency (%)*
First	Lean-burn Engine with SCR	0.4	15.4	409.4	96%
Second	Rich-burn Engine with NSCR	1.1	42.5	382.4	90%
Third	Lean-burn Engine/Derating Power+	1.2	46.3	378.5	89%
Fourth	Lean-burn Engine/Retard Timing	1.7	65.7	359.2	85%
Fifth	Lean-burn Engine	2.0	77.2	347.6	82%
Baseline	Rich-burn Engine	11.0	424.9	----	----

- * Total emission reduction and total control efficiency are calculated from baseline emission level.
- + The range of control effectiveness is dependent on the percent of engine's rated torque. The calculated values are based on 40% NOx reduction at 25% derated power (or at 75% rated torque).

gases up to the operating temperature of the SCR (see further discussion under Energy Requirements and Impacts). This further complicates an already complicated system consisting of SCR components and ammonia handling system. The use of ammonia as a reactant for the NO_x reduction reactions may allow excess ammonia to form ammonium bisulfate compounds under irregular operating conditions. These compounds can serve as catalyst poisoning agents and also cause damage to metal ductwork downstream. Thus, SCR application requires a strict maintenance service schedule. It is expected that the SCR system may require manual cleaning every 2,000 to 2,500 hours of operation (Steuler, 1990). Cleaning consists of blowing the catalyst surfaces with a compressed air gun and vacuuming any soot.

In California, the South Coast Air Quality Management District (SCAQMD, 1984) reported SCR demonstration tests on seven reciprocating engines. The report indicated that only one SCR system was able to complete the 4,000 hours of continuous testing operation; the other six engine/SCR units failed because of various reasons attributed to either poor catalyst performance and/or problematic ammonia injection operation. A recent survey report by the Gas Research Institute on SCR (GRI, 1990) states:

A total of 13 SCR units are currently installed on reciprocating engines. Only one unit involves gas transmission. A number of operational problems impacting SCR performance and engine operation have been documented. At least three SCR units applied to reciprocating engines are scheduled to be replaced with alternative controls...

In addition, a review of the BACT determinations made to date on gas-fired reciprocating engines (Table 6-2) reveals that SCR has never been applied specifically to any large-bore (i.e., greater than 1,000 bhp) and low-speed (i.e., 300 rpm) lean-burn engine due to the already low NO_x emission rate. The economic consideration is also a significant factor for not using SCR in such applications.

Application of SCR on gas-fired engines has been limited to small-bore, high-speed engines typically less than 1,000 bhp, at 900 rpm or greater (i.e., ANR Production Company's 600-bhp engine, and Shell California Production's 600-bhp engine; see Table 6-2). The only SCR application to a large-bore reciprocating engine was reported for Pfizer, Inc.'s cogeneration facility in Massachusetts. This project was for a 6,710-bhp engine with estimated uncontrolled emission rates between 5 and 12 g/bhp-hr for dual-fuel (94 percent natural gas, 6 percent diesel) and diesel fuel, respectively (see Appendix A). However, Pfizer's engine is different than FGTC's proposed engine in both fuel-type and application. Furthermore, the reliability of Pfizer's operation is still in question pending its performance verification based on upcoming stack testing.

The most recent PSD permit for a natural gas compressor reciprocating engine was issued on September 5, 1990. This permit was issued to Northern Natural Gas Company for a gas-fired 4,000-bhp gas compressor engine in Iowa. It was determined by the permitting agency, the Iowa Department of Natural Resources (IDNR), that "application of SCR systems to the engine as applied for would represent a transfer of technology since none are known to be operational." They further found such "technology transfer to be unreliable at best with a high percentage of down time likely." Therefore, SCR was rejected as BACT by IDNR due to its uncertain reliability.

Environmental Effects

The add-on SCR technology for NO_x control will pose other potential adverse environmental impacts such as accidental spills and emissions of ammonia, and solid waste disposal for the non-inert spent catalyst. These issues are briefly described in the following discussion.

The SCR system requires the use of ammonia as reagent to convert NO_x to nitrogen gas and water. The main environmental impact centers around the issue of delivery, handling, and storage of ammonia, which poses inherent safety and health risks in the event of accidental releases. In proposing NO_x abatement regulations for stationary gas turbines, California's South

Coast Air Quality Management District (SCAQMD) has performed a risk assessment study on spill handling and storage of ammonia. The study has concluded that this aspect of SCR operation could realistically present serious consequences, and recommended further consideration of potential impacts and mitigation measures (SCAQMD, 1979). The current practice is to use an aqueous ammonia system (normally between 25 to 29 percent ammonia concentration) at installations located in populated areas. However, such practice increases the complexity, size, and the cost of the ammonia system. Furthermore, ammonia slippage is a normal occurrence during operation of SCR control equipment. NO_x abatement system suppliers generally report an ammonia slippage level of 10 ppm.

Spent catalysts of the metal oxides pellet-type system must be disposed of properly. Ceramic-based honeycomb-shaped catalysts can be landfilled due to the inert intrinsic properties of ceramic materials.

Energy Requirements and Impacts

The add-on technology of SCR imposes further energy penalties. The additional energy requirements are caused by power loss due to additional back pressure from the SCR, electrical requirements for heating the ammonia solution and operating the injection system, and additional energy necessary for reheating the proposed engine exhaust gases from 495°F up to the SCR operating range of 700°F. [SCR manufacturers specify a typical operating temperature window between 600°F to 900°F (Engelhard, 1990; and Steuler, 1990)]. A minimum of 5.83 MMBtu/hr is required for stack gas reheating or 51,071 MMBtu/yr. However, using the lean-burn engine will result in better fuel economy than the baseline rich-burn engine. The heat input saving amounts to 2.8 MMBtu/hr or 24,528 MMBtu/yr. Thus, the net fuel requirement is 26,543 MMBtu/yr. Also, an addition of 8.6 megawatt-hour is required for the operation of the ammonia vaporizer and injection system.

Economic Analysis

This section presents the total capital investment (TCI) and the annualized cost (AC) of the SCR NO_x control system for the proposed lean-burn engine. The analysis uses the cost of the conventional rich-burn engine as the baseline cost. The detailed economic analysis procedure is given in Appendix B.

Capital and annualized cost estimates were prepared for two SCR systems:

1. Kleenaire system from Nitrogen Nergas Corporation, which uses the metal oxide-based catalyst and can achieve an 80 percent NO_x reduction on the proposed lean-burn engine; and
2. Engelhard NO_x abatement system which uses the all-ceramic honeycomb catalyst and can achieve an NO_x reduction efficiency of 80 percent on the proposed lean-burn engine.

Capital costs for both systems are tabulated in Table 6-4. In the purchased equipment costs for both SCR systems, the differential engine cost of \$100,000 (i.e., Item 1a in Table 6-4) is added to account for the extra cost of the lean-burn engine. The vendor's equipment quote for the Kleenaire system is \$350,000. The direct capital cost of the system is calculated to be \$965,367, and the indirect capital cost is calculated to be \$539,248. The total capital investment is \$1,504,615. The basic equipment cost for the Engelhard System is \$384,780. Direct capital cost is \$1,040,650 and the indirect capital cost is \$574,545 for a total capital investment of \$1,615,195.

The annualized costs for these two NO_x abatement systems are given in Table 6-5. The calculation basis for cost items are also given in the table. The annualized costs are \$745,777 and \$715,218 for the Kleenaire system and the Engelhard system, respectively. Current application trend favors the use of the all-ceramic system due to its advantages of higher removal rates and more reliable catalyst component. The annualized cost of the Engelhard system is the lower cost of the two systems due to less costly replacement parts. Therefore, the all-ceramic catalyst system is

Table 6-4 Capital Cost Estimates for SCR Systems for NOx Emission Control.

Cost Items	Cost Factors	Costs	
		Kleenaire System+	Engelhard System++
DIRECT CAPITAL COSTS (DCC):			
(1) Purchased Equipment			
(a) Differential Engine Cost	See Note 1	\$100,000	\$100,000
(b) SCR Basic Equipment	Vendor Quote	\$350,000	\$384,780
(c) Ammonia System	See Note 2	\$20,000	\$20,000
(d) Auxiliary Equipment (Reheat)*	0.10 x (1b)	\$35,000	\$38,478
(e) Emission Monitoring	0.15 x (1b)	\$52,500	\$57,717
(f) Structure Support	0.10 x (1a-1e)	\$55,750	\$60,098
(g) Instrumentation & controls ¹	0.10 x (1a-1e)	\$55,750	\$60,098
(h) Freight ¹	0.05 x (1a-1g)	\$33,450	\$36,059
(i) Sales Tax (Florida)	0.06 x (1a-1g)	\$40,140	\$43,270
(j) Subtotal	(1a-1i)	\$742,590	\$800,500
(2) Direct Installation ¹	0.30 x (1j)	\$222,777	\$240,150
Total DCC:	(1) + (2)	\$965,367	\$1,040,650
INDIRECT CAPITAL COSTS (ICC):			
(3) Indirect Installation			
(a) Engineering & Supervision ¹	0.10 x (DCC)	\$96,537	\$104,065
(b) Construction & Field Expenses ¹	0.05 x (DCC)	\$48,268	\$52,033
(c) Construction Contractor Fee ¹	0.10 x (DCC)	\$96,537	\$104,065
(d) Contingencies ²	0.25 x (DCC)	\$241,342	\$260,163
(4) Other Indirect Costs			
(a) Startup & Testing ¹	0.03 x (DCC)	\$28,961	\$31,220
(b) Working Capital	30-day DOC**	\$27,603	\$23,001
Total ICC:	(3) + (4)	\$539,248	\$574,545
TOTAL CAPITAL INVESTMENT (TCI):	DCC + ICC	\$1,504,615	\$1,615,195

+ Represents a typical first generation catalyst which is metal oxides embedded in ceramic matrix.

++ Represents second generation all ceramic catalyst extruded into honeycomb-shape.

* Duct burner system to reheat the exhaust gas from 495°F up to 700°F.

** 30 days of direct operating costs, calculated from the annualized cost Table 6-5 (i.e., total DOC/12 months).

¹ Based on catalytic incinerators, from OAQPS Control Cost Manual, Fourth Edition.

² Guaranteed efficiency and operation for the installation of SCR on large-bore and low-speed lean-burn engine. Such application is not considered as well-proven technology.

Note 1: Differential engine cost is calculated from vendor's price quotation for a lean-burn engine minus vendor's price quotation for the rich-burn engine being used as baseline.

Note 2: Ammonia vendor's quotation from LaRoche Industries, Inc. for a 3,000-gallon anhydrous ammonia tank, an ammonia evaporator, and a dual-valve pressure regulator.

Table 6-5 Annualized Cost Estimates for SCR Systems for NOx Emission Control.

Cost Items	Basis	Costs	
		Kleenair System+	Engelhard System++
DIRECT OPERATING COSTS (DOC):			
(1) Operating Labor			
Operator ²	5,840 hr/yr @ \$20/hr	\$116,800	\$116,800
Supervisor ¹	15% of operator cost	\$17,520	\$17,520
(2) Maintenance ²	5% of direct capital cost	\$48,268	\$52,033
(3) Replacement Parts (include freight & tax)			
(a) Catalyst	(Part+Labor)xCRF; See Note 1	\$80,661	\$27,102
(b) Guard Bed	(Part+Labor)xCRF; See Note 2	\$5,436	\$0
(4) Utilities			
(a) Electricity	0.30 MW-hr/ton NH ₃ ; \$85/MW-hr	\$729	\$729
(b) Fuel for stack reheat	\$2.06/MMBtu; See Note 3	\$105,206	\$105,206
(c) Fuel credit	\$2.06/MMBtu; See Note 4	-\$50,528	-\$50,528
(5) Ammonia	0.37 lb NH ₃ /lb NO _x ; \$250/ton NH ₃	\$7,146	\$7,146
Total DOC		\$331,239	\$276,007
INDIRECT OPERATING COSTS (IOC):			
(7) Overhead ¹	60% of operating labor & maintenance	\$109,553	\$111,812
(8) Property Taxes ¹	1% of total capital investment	\$15,046	\$16,152
(9) Insurance ¹	1% of total capital investment	\$15,046	\$16,152
(10) Administration ¹	2% of total capital investment	\$30,092	\$32,304
Total IOC		\$169,738	\$176,419
CAPITAL RECOVERY COST (CRC)	CRF of 0.1627 times TCI	\$244,801	\$262,792
ANNUALIZED COST (AC):	DOC + IOC + CRC	\$745,777	\$715,218

+ Represents a typical first generation catalyst which is metal oxides embeded in ceramic matrix.

++ Represents second generation all ceramic catalyst extruded in honeycomb shape.

¹ Based on catalytic incinerators, from OAQPS Control Cost Manual, Fourth Edition.

² Based on no existing installation of SCR on large-bore and low-speed lean-burn engine: 5.33 hours per shift are devoted to the emission control system operation and maintenance.

Note 1: Catalyst replacement part cost for the Kleenair System is \$180,000 with a service life of 3 years.

Catalyst replacement part cost for the Engelhard system is \$60,000 with a service life of 3 years.

Combined freight and tax factor is 11%; and CRF for a 3-year recovery period and 10% interest rate is 0.4021.

Replacement labor cost is \$50 per hour for two 8-hour days. Total cost includes both material and labor costs.

Note 2: The Kleenair system includes a guard bed which works as a pre-filter upstream from the metal oxides catalyst; the replacement part cost is \$12,000 with an estimated service life of 3 years. Required labor is for 4 hours.

Note 3: Assumed heat transfer efficiency of 80%, heat input required to raise exhaust temperature to 700°F is:

$$Q = (87,514 \text{ lb/hr})(0.26 \text{ Btu/lb}^\circ\text{F for air})(700^\circ\text{F}-495^\circ\text{F})/(0.8) = 5.83 \text{ MMBtu/hr.}$$

Annual heat input equals 5.83 MMBtu/hr times 8,760 hr/yr = 51,071 MMBtu/yr.

Note 4: Heat input for lean-burn engine is calculated from 7,300 Btu/bhp-hr times 4,000 bhp = 29.2 MMBtu/hr.

Heat input for rich-burn engine is calculated from 8,000 Btu/bhp-hr times 4,000 bhp = 32.0 MMBtu/hr.

Therefore, using a better fuel efficient engine results in saving an annual heat input of:

$$(32.0 - 29.2) \text{ MMBtu/hr} \times 8,760 \text{ hr/yr} = 24,528 \text{ MMBtu/yr.}$$

the better system since it is less susceptible to catalyst damage and results in less operating costs. Subsequent economic cost effectiveness analysis uses the cost values computed for the Engelhard system.

6.3.3 ANALYSIS OF RICH-BURN ENGINE WITH NSCR

Technical Issues

Rich-burn engines operate at near stoichiometric air-to-fuel ratios and, therefore, generate high engine cylinder temperatures in the range of 1,200°F to 1,300°F. Engine manufacturers have found that such high temperatures do not allow loading the engine very high. For greater power output, engine manufacturers have found that engine modifications (i.e., turbocharged engines which can produce more power enhancements with lower emission levels) are the better choice than building larger engine blocks. In the current U.S. market, rich-burn engines over 2,000 bhp are not standard off-the-shelf items; however, a 4,000-bhp engine can be obtained by special order.

All known rich-burn engine/NSCR combination applications are found for small engines of approximately 1,000 bhp or less (i.e., a 600-bhp engine for ANR Production Company, Virginia; a 225-bhp engine for Shell California Production, California; and a 200-bhp engine for Tricounty Sheraton Hotel, California; see Table 6-2).

Environmental Effects

Catalyst disposal may be required when using NSCR, depending on the catalyst type. Most vendors guarantee a service life of 3 years for the catalyst system. Environmental impacts are expected to be minimal for the rich-burn engine/NSCR option since no toxic or hazardous reagents are required. Rich-burn/NSCR technology generally produces lower CO and VOC emissions as compared to a lean-burn engine.

Energy Requirements and Impacts

The NSCR converter does not require any additional fuel other than a small amount of hydrocarbon fuel used for injection into the exhaust gas mixture

to ensure fuel rich conditions. However, the fuel economy of the rich-burn engine is approximately 8,000 Btu/bhp-hr compared to the 7,300 Btu/bhp-hr for the proposed lean-burn engine. For a 4,000-bhp output, an additional 2.8 MMBtu/hr heat input is required, or approximately 24,528 MMBtu per year for an annual cost of \$50,528.

Economic Analysis

Capital and annualized cost estimates were prepared for a NSCR converter. Cost of the NSCR converter was provided by Johnson-Matthey as \$80,000. The NSCR can achieve 90 percent NO_x reduction. The resulting NO_x emission rate is 1.1 g/bhp-hr.

The total capital investment cost for a NSCR converter designed for a 4,000-bhp rich-burn engine is tabulated in Table 6-6. The direct capital cost is calculated to be \$159,307, and the indirect capital cost is calculated to be \$93,682. The total capital investment is \$252,989. Also shown in the table is the differential cost of the lean-burn engine over that of the baseline rich-burn engine.

The annualized cost for the NSCR converter is given in Table 6-7. The calculation basis for cost items are also given in the table. The resulting annualized cost is \$207,349. The annualized differential cost of the lean-burn engine itself is \$8,810.

6.3.4 ANALYSIS OF LEAN-BURN ENGINE WITH DERATING POWER OUTPUT

Technical Issues

Derating power output does not require additional equipment. Derating is accomplished by restricting the engine torque to a level below its normal operating design rate. This is done by making adjustment to the throttle valve setting in order to change the power output. Although a derated engine produces less NO_x emissions, such practice will also reduce the overall engine's efficiency and shorten its service life as much as 25 percent (Dresser-Rand, 1990). In addition, continuous derating operation

Table 6-6 Capital Cost Estimates for Lean-burn Engine and Rich-burn Engine/NSCR System.

Cost Items	Cost Factors	Costs	
		Lean-Burn Engine	Johnson-Matthey NSCR System
DIRECT CAPITAL COSTS (DCC):			
(1) Purchased Equipment			
(a) Differential Engine Cost	See Note 1	\$100,000	\$0
(b) NSCR Converter	Vendor Quote	\$0	\$80,000
(c) Emission Monitoring	0.15 x (1b)	\$0	\$12,000
(d) Structural Support	0.10 x (1b-1c)	\$0	\$9,200
(e) Instrumentation ¹	0.10 x (1a-1c)	\$10,000	\$9,200
(f) Freight ¹	0.05 x (1a-1e)	\$5,500	\$5,520
(g) Sales Tax (Florida)	0.06 x (1a-1e)	\$6,600	\$6,624
(h) Subtotal	(1a-1g)	\$122,100	\$122,544
(2) Direct Installation ¹	0.30 x (1h)	\$36,630	\$36,763
Total DCC:	(1) + (2)	\$158,730	\$159,307
INDIRECT CAPITAL COSTS (ICC):			
(3) Indirect Installation			
(a) Engineering & Supervision ¹	0.10 x (DCC)	\$15,873	\$15,931
(b) Construction & Field Expenses ¹	0.05 x (DCC)	\$7,937	\$7,965
(c) Construction Contractor Fee ¹	0.10 x (DCC)	\$15,873	\$15,931
(d) Contingencies	See Note 2	\$23,810	\$39,827
(4) Other Indirect Costs			
(a) Startup & Testing ¹	0.03 x (DCC)	\$4,762	\$4,779
(b) Working Capital	30-day DOC*	\$0	\$9,249
Total ICC:	(3) + (4)	\$68,254	\$93,682
TOTAL CAPITAL INVESTMENT (TCI):	DCC + ICC	\$226,984	\$252,989

* 30 days of direct operating costs, calculated from the annualized cost Table 6-7 (i.e., total DOC/12 months).

¹ Based on catalytic incinerators, from OAQPS Control Cost Manual, Fourth Edition.

Note 1: Differential engine cost is calculated from vendor's price quotation for a lean-burn engine minus vendor's price quotation for the rich-burn engine being designated as baseline.

Note 2: For lean-burn engine, 15 percent of DCC is used for a guaranteed efficiency and operation.

For NSCR application, 25 percent of DCC is used for contingency based on no existing installation of NSCR on large-bore rich-burn engine.

Table 6-7 Annualized Cost Estimates for Lean-Burn Engine and Rich-Burn/NSCR System.

Cost Items	Basis	Costs	
		Lean-Burn Engine	Johnson-Matthey NSCR System
DIRECT OPERATING COSTS (DOC):			
(1) Operating Labor			
Operator ²	\$20/hr (2,920 hr/yr for NSCR)	\$0	\$58,400
Supervisor ¹	15% of operator cost	\$0	\$8,760
(2) Maintenance ²	5% of direct capital cost	\$7,937	\$7,965
(3) Replacement Parts (include freight & tax)			
Catalyst	(Part+Labor)xCRF; See Note 1	\$0	\$35,867
(4) Fuel			
Fuel credit (gas)	\$2.06/MMBtu; See Note 2	-\$50,528	\$0
Total DOC		-\$42,591	\$110,993
INDIRECT OPERATING COSTS (IOC):			
(7) Overhead ¹	60% of operating labor & maintenance	\$4,762	\$45,075
(8) Property Taxes ¹	1% of total capital investment	\$2,270	\$2,530
(9) Insurance ¹	1% of total capital investment	\$2,270	\$2,530
(10) Administration ¹	2% of total capital investment	\$4,540	\$5,060
Total IOC		\$13,841	\$55,195
CAPITAL RECOVERY COST (CRC)	CRF of 0.1627 times TCI	\$36,930	\$41,161
ANNUALIZED COST (AC):	DOC + IOC + CRC	\$8,180	\$207,349

¹ Based on catalytic incinerators, from OAQPS Control Cost Manual, Fourth Edition.

² Based on no existing installation of NSCR on high-load rich-burn engine: 2.667 hours per shift are devoted to the emission control system operation and maintenance.

Note 1: For NSCR, the catalyst accounts for 95% of the basic cost and has a service life of 3 year; therefore, catalyst replacement part cost is \$80,000 times 0.95 plus 11% for the combined freight and tax cost. Replacement labor cost is \$50 per hour for one 8-hour day. Total cost includes both material and labor costs. Thus, the annualized catalyst replacement cost is equal to the total replacement cost multiplied by the CRF for a 3-year recovery period and an interest rate of 10%. CRF = 0.4021.

Note 2: Heat input for lean-burn engine is calculated from 7,300 Btu/bhp-hr times 4,000 bhp = 29.2 MMBtu/hr. Heat input for rich-burn engine is calculated from 8,000 Btu/bhp-hr times 4,000 bhp = 32.0 MMBtu/hr. Therefore, using a better fuel efficient engine results in saving an annual heat input of: (32.0 - 29.2) MMBtu/hr x 8,760 hr/yr = 24,528 Btu/yr.

would require a bigger, more expensive engine to meet the overall power requirement.

Derating power output is not considered BACT for the proposed lean-burn engine because of potential engine reliability problems, shortened engine life, and increased emissions of CO and hydrocarbons.

Environmental Effects

Application of this technology would result in lower NO_x emissions, but emissions of carbon monoxide and hydrocarbon would increase. For instance, Dresser-Rand has reported a 30.9 TPY emissions reduction of NO_x with a corresponding emissions increase of 27.0 TPY carbon monoxide (CO) and 185.4 TPY total hydrocarbons based on a 30 percent derating of the proposed 4,000-bhp lean-burn engine.

Energy Requirements and Impacts

In general, derating an engine will result in less fuel economy. EPA (1979) reported a fuel penalty of 8 percent based on derating 25 percent a dual-fuel engine by 25 percent. Manufacturers of gas-fired reciprocating engines state that approximately an 8 percent increase in fuel consumption will occur for a derating of 30 percent.

Economic Analysis

If derating is employed, a larger engine would be necessary to meet the FGTC power requirement of 4,000 bhp. This will increase both the capital cost and annual operating cost for the engine. A detailed economic analysis was not performed for this technology.

6.3.5 ANALYSIS OF LEAN-BURN ENGINE WITH RETARD IGNITION TIMING

Technical Issues

EPA's research (1979) has reported that retard ignition timing is only effective for dual-fuel and diesel fuel burning engines. Retarding the spark for lean-burn engines will result in misfiring because spark-ignited engines are designed to be sensitive to any small deviation in timing

changes. The summary of previous BACT determinations (Appendix A) shows that all ignition timing changes were exclusively applied to diesel burning reciprocating engines.

Ignition timing retardation increases exhaust temperatures above the engine's normal operating temperature. The increased engine operating temperature will result in additional maintenance, shorter engine life, and higher initial cost for high temperature exhaust components. Thus, retarding ignition timing for a lean-burn engine is not considered further.

Environmental Effects

Retarding ignition timing can increase the emission level of CO and VOC. This is due to less efficient combustion as the engine timing is changed from the optimal setting. In the event of misfiring, unburned hydrocarbons and CO emissions may increase significantly.

Energy Requirements and Impacts

Not performed--inapplicable technology.

Economic Analysis

Not performed--inapplicable technology. The expected capital cost is equal to the cost of the lean-burn engine.

6.3.6 ANALYSIS OF LEAN-BURN ENGINE

Technical Issues

The proposed turbocharged reciprocating engine will operate according to the manufacturer's specified operating parameters listed in Table 6-8. The engine's state-of-the-art design includes small pre-ignition chambers in which a rich fuel mixture is spark-ignited. The hot gases then enter the main combustion chambers and create spontaneous combustion of the lean fuel mixture. As a result, the overall combustion process is conducted under very lean fuel conditions. Operations on the lean side of the air-to-fuel ratio allow the proposed engine to obtain peak fuel economy.

Table 6-8 Summary of the Operating Parameters for the Proposed Lean-burn Engine.

Make and Model	Dresser-Rand 10 TCV
Air/Fuel Ratio	60.89
Exhaust Mass Flow	87,514 lb/hr
Ignition Timing	9 °BTDC
Air Manifold Pressure	32.8 psia (± 0.5 psia)
Air Manifold Temperature	125 °F
Exhaust Temperature	495 °F
Maximum Allowed Back Pressure	2.5 inch of water
Specific Fuel Consumption	7,300 Btu/bhp-hr

Source: Dresser-Rand Company (1990).

In general, NO_x formation is directly proportional to the combustion temperature and residence time of the combustion gases (EPA, 1988d). The high mass flow rate at full-load, as indicated by the 87,514 pounds per hour of exhaust mass flow rate, reduces the residence time of the combustion gases compared to a rich-burn engine, which operates at an air-to-fuel ratio near unity. High mass flow rate also means the engine operates below the peak temperature region for thermal NO_x formation. The exhaust temperature for the proposed engine is 495°F, which is lower than the typical exhaust temperature for reciprocating engines of 550°F or greater. Thus, the rate of thermal NO_x formation is lower compared to the conventional rich-burn engine.

Environmental Effects

There are no adverse environmental impacts expected for using the lean-burn engine, since there is no wastewater or solid waste created.

Energy Requirements and Impacts

The lean-burn engine is more fuel efficient than a comparable rich-burn engine. The fuel saving is 2.8 MMBtu/hr for a total saving of 24,528 MMBtu/yr.

Economic Analysis

Capital and annualized cost estimates were prepared for the lean-burn engine. The differential engine cost of the lean-burn engine compared to the baseline rich-burn engine was provided by ENRON for the proposed 4,000-bhp Dresser-Rand 10 TCV model. The engine has a guaranteed NO_x emission limit of 2 g/bhp-hr.

Capital cost of the integral engine-compressor unit is tabulated in Table 6-6. The differential engine cost for the Dresser-Rand 10 TCV engine is \$100,000, from which the direct capital cost is calculated to be \$158,730, and the indirect capital cost is calculated to be \$68,254. The total capital investment is \$226,984.

The annualized cost is given in Table 6-7. The calculation basis for cost items is also given. The direct operating cost consists of normal maintenance cost of the lean-burn technology parts for \$7,937 and a fuel credit of \$50,528 for better fuel efficiency operation. The annualized cost is \$8,180 for the lean-burn engine.

6.4 BACT SUMMARY AND CONCLUSION

The BACT analysis for NO_x control has identified three feasible control alternatives: the lean-burn engine with SCR, the rich-burn engine with NSCR, and the lean-burn engine. Elimination of a control technology as BACT will be based on comparison of the overall environmental, energy, and economic impacts. The most effective control alternative not eliminated will be selected as BACT.

6.4.1 COMPARISON OF ENVIRONMENTAL EFFECTS

Of the three alternatives, SCR poses the greatest potential for toxic impacts due to ammonia handling and storage and ammonia slip. Comparing potential adverse environmental impacts: the lean-burn engine with SCR option is the worst due to potential ammonia release and disposal of catalysts; the rich-burn engine with NSCR is the next worse option due to disposal of catalyst. The lean-burn engine does not create any waste; therefore, it is the best alternative in terms of the environmental impact analysis.

6.4.2 COMPARISON OF ENERGY IMPACTS

The lean-burn engine with SCR has the highest energy requirements: an additional net fuel requirement of 26,543 MMBtu/yr, accounting for stack gas reheat and the fuel credit for using the more efficient lean-burn engine. In addition, an annual 8.6 MW-hr of electrical power is required for the ammonia vaporizer and injection system. The next highest energy requirement is for the rich-burn/NSCR combination. This alternative does not use any additional fuel or energy for operation. The lean-burn engine shows a saving of 24,528 MMBtu/yr in heat input over the rich-burn engine

because of its inherent fuel efficient design. Thus, the lean-burn engine is the best alternative in view of the energy impact analysis.

6.4.3 COMPARISON OF ECONOMIC ANALYSIS

Economic analysis is based on the cost effectiveness of the control method. Economic impact is determined by the total and incremental cost effectiveness values. The detailed cost estimating procedure is presented in Appendix B. Comparing the total cost effectiveness of the three feasible NO_x control alternatives: the lean-burn engine/SCR technology has the highest cost effectiveness value of \$1,747 per ton of NO_x removed; the rich-burn engine/NSCR technology is the next highest with \$542 per ton of NO_x removed. The lean-burn engine has a nominal total cost effectiveness value of \$24 per ton of NO_x removed.

The incremental cost effectiveness values for the lean-burn engine/SCR technology and the rich-burn engine/NSCR technology are \$18,810 and \$5,723 per ton of NO_x removed, respectively. The lean-burn engine has an incremental cost effectiveness of \$24 per ton of NO_x removed. Therefore, the lean-burn engine is the most cost effective control option.

6.4.4 SUMMARY AND CONCLUSION

The top-down BACT analysis in terms of environmental, energy and economic impacts for the FGTC's proposed project is summarized in Table 6-9. Both the lean-burn engine/SCR and the rich-burn engine/NSCR control options are eliminated primarily based on the high total and incremental cost effectiveness for NO_x control. Recently, FDER has determined that incremental cost effectiveness values of \$4,000 to \$5,000 per ton of NO_x removed are unreasonable. These values were established for much larger sources of NO_x, such as utility gas turbine combined-cycle projects. In addition, add-on control technologies have significant energy penalties along with potential adverse environmental impacts, and these systems are not fully proven on IC engines of the size proposed by FGTC.

Table 6-9 Summary of Top-Down BACT Impact Analysis Results for NOx.

Control Alternative	Environmental Impacts				Energy Impacts		Economic Impacts			
	Total Emission Reduction (TPY)*	Incremental Emission Reduction (TPY)**	Potential toxic air impact?	Potential adverse enviromental impacts?	Incremental increase over baseline		Total Annualized Cost (\$/yr)	Incremental Annualized Cost (\$/yr)	Total Cost Effectiveness (\$/ton)	Incremental Cost Effectiveness (\$/ton)
					Natural gas (MMBtu/yr)	Electricity (MW-hr/yr)				
Lean-Burn Engine with SCR	409.4	27.0	Yes	Yes	26,543	8.6	\$715,218	\$507,869	\$1,747	\$18,810
Rich-Burn Engine with NSCR	382.4	34.8	No	No	0	0	\$207,349	\$199,169	\$542	\$5,723
Lean-Burn Engine	347.6	347.6	No	No	-24,528	0	\$8,180	\$8,180	\$24	\$24
Baseline (rich-burn engine)	----	----	--	--	----	--	----	----	----	----

* Total emission reduction, total annualized cost, and total cost effectiveness are calculated based on similar baseline parameter values.

** Incremental values are based on the next lower control technology's parameter values.

By eliminating lean-burn/SCR and rich-burn/NSCR options, the lean-burn engine is BACT. This is consistent with current BACT determinations shown in Table 6-2 for similar source applications. In the most recent top-down BACT analysis, IDNR has concluded that the inherently low NO_x emitting lean-burn engine is BACT for Northern Natural Gas Company. In its BACT summary, IDNR rejected SCR on the grounds of uncertain reliability and unreasonable cost effectiveness (i.e., total cost effectiveness of \$1,600 and incremental cost effectiveness of \$12,000 per ton NO_x removed).

No other stationary internal combustion sources, whether in natural-gas-related applications or other industrial processes, which use similar fuel and equivalent engines (i.e., natural-gas-fired and 4,000-bhp lean-burn engine) have been required to bear a high incremental cost effectiveness to reduce NO_x emissions. Furthermore, the FGTC's proposed lean-burn engine has low NO_x emissions of 77.2 TPY, and modeling results show an insignificant NO_x impact (less than 1.0 μg/m³). In conclusion, the FGTC's proposed Dresser-Rand 10 TCV lean-burn engine is BACT.

REFERENCES
(Page 1 of 5)

- Auer, A.H. 1978. Correlation of Land Use and Cover With Meteorological Anomalies. J. Appl. Meteor., Vol 17.
- Briggs, G.A. 1969. Plume Rise, USAEC Critical Review Series, TID-25075. National Technical Information Service, Springfield, VA.
- Briggs, G.A. 1971. Some Recent Analyses of Plume Rise Observations. In: Proceedings of the Second International Clean Air Congress. Academic Press, New York, NY.
- Briggs, G.A. 1972. Discussion on Chimney Plumes in Neutral and Stable Surroundings. Atmos. Environ. 6:507-510.
- Briggs, G.A. 1974. Diffusion Estimation for Small Emissions. In: ERL, ARL USAEC Report ATDL-106. U.S. Atomic Energy Commission, Oak Ridge, TN.
- Briggs, G.A. 1975. Plume Rise Predictions. In: Lectures on Air Pollution and Environmental Impact Analysis. American Meteorological Society, Boston, MA.
- Cooper Industries, Inc. 1987. Cooper-Bessemer Integral Gas Engine-Compressors, Performance Through Innovation (Technical sales literature).
- Cooper Industries, Inc. 1990. Personal Communication With Cooper's Sales Engineer on CleanBurn[®] Technology and Lean-Burn Engine Performance.
- Commonwealth of Massachusetts, Department of Environmental Quality Engineering. 1990. Permit application B-87-C-066 for Pfizer, Inc. Diesel Cogen Facility in Adams, MA. Springfield, MA.
- Dresser-Rand Company. 1990. Personal Communications With Dresser-Rand's Sales Engineer on Engine Specification and Performance.
- Engelhard Corporation. 1990. Catalyst Technology for Cleaner Air.
- Engelhard Corporation. 1990. Verbal Budgetary Quotation for NO_x Abatement System.
- Engelhard Corporation. 1990. Budgeting Quotation for NO_x/CO Control System.

REFERENCES
(Page 2 of 5)

- Exxon Research and Engineering Company. 1986. Thermal DeNO_x: A Commercial Selective Non-Catalytic NO_x Reduction Process for Waste-to-Energy Applications (B.E. Hurst and C.M. White, presented at ASME 12th Biennial National Waste Processing Conference, Denver, Colorado, June 2nd).
- Exxon Research and Engineering Company. 1987. Improved ER&E Thermal DeNO_x Process.
- Fuel Tech. 1988. Control of Nitrogen Oxides Emissions From Stationary Sources. Presented at the Annual Meeting of the American Power Conference, April 1988.
- Fuel Tech. 1989. Standard Technical Sales Literature.
- Gas Research Institute. 1990. Evaluation of NO_x Reduction Technology for Natural Gas Industry Prime Movers - Update to Special Report GRI-87/0257 (Compiled by Carlo Castaldini, Acurex Corporation, Mountain View, CA).
- Huber, A.H. 1977. Incorporating Building/Terrain Wake Effects on Stack Effluents. Preprint Volume for the Joint Conference on Applications of Air Pollution Meteorology in Boston, MA. American Meteorological Society.
- Huber, A.H., and W.H. Snyder. 1976. Building Wake Effects on Short Stack Effluents. Preprint Volume for the Third Symposium on Atmospheric Diffusion and Air Quality in Boston, MA. American Meteorological Society.
- Johnson Matthey Catalyst Systems Division. 1990. Standard Technical Sales Literature.
- Neveril, R.B, et al. 1978. Capital and Operating Costs of Selected Air Pollution Control Systems (V). J. of the Air Poll. Control Assoc., Vol. 28(12): 1253-1256.
- Nitrogen Nergas Corporation. 1990. Kleenaire Process.
- Nitrogen Nergas Corporation. 1990. Budgetary Quotation for Kleenaire System.
- Pasquill, F. 1976. Atmospheric Dispersion Parameters in Gaussian Plume Modelings, Part II. Possible Requirements for Changes in the Turner Workbook Values. U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA Report No. EPA 600/4/76-030b.

REFERENCES
(Page 3 of 5)

- Schulman, L.L., and S.R. Hanna. 1986. Evaluation of Downwash Modifications to the Industrial Source Complex Model. J. of Air Poll. Control Assoc., 36(3):258-264.
- Schulman, L.L., and J.S. Scire. 1980. Buoyant Line and Point Source (BLP) Dispersion Model User's Guide. Environmental Research and Technology, Inc., Concord, MA. Document P-7304B.
- Schorr, M.M. 1989. The Real Economics of SCR as BACT for Gas Turbines; Presented at the AWMA 82nd Annual Meeting and Exhibition in Anaheim, CA.
- South Coast Air Quality Management District (SCAQMD). 1979. The California Air Resources Board (CARB) Proposal on Control Strategy for Internal Combustion Engines - Ruling 1110.
- South Coast Air Quality Management District (SCAQMD). 1984. State of Technology Related to Rule 1100 - Emission from Stationary Internal Combustion Engines (Demonstration). Staff report by L.M. Bowen, E. Larson, and A. Rawuka.
- Steuler International Corporation. 1990. Standard Technical Sales Literature.
- Steuler International Corporation. 1990. Budgetary Quotation for CER-NO_x System.
- Texas Air Control Board (TACB). 1990. Personal Communication with a TACB Air Permitting Engineer. Austin, TX.
- Urban, C.M., and K.J. Springer. 1975. Study of Exhaust Emissions From Natural Gas Pipeline Compressor Engines (American Gas Association: Project PR-15-61, p.57). Southwest Research Institute, San Antonio, TX.
- U.S. Department of Energy/Energy Information Administration (DOE/EIA). 1987. Cost and Quality of Fuels for Electric Utility Plants, 1989. U.S. Government Printing Office. DOE/EIA-0191(89).
- U.S. Environmental Protection Agency (EPA). 1977. User's Manual for Single Source (CRSTER) Model. Research Triangle Park, NC. EPA-450/2-77-013.
- U.S. Environmental Protection Agency (EPA). 1978. Guidelines for Determining Best Available Control Technology (BACT). Research Triangle Park, NC.

REFERENCES
(Page 4 of 5)

- U.S. Environmental Protection Agency (EPA). 1979. Stationary Internal Combustion Engine: Standard Support and Environmental Impact Statement. Volume 1: Proposed Standard Performance (Draft). Research Triangle Park, NC. EPA-450/2-78-125a.
- U.S. Environmental Protection Agency (EPA). 1980. PSD Workshop Manual. Research Triangle Park, NC.
- U.S. Environmental Protection Agency (EPA). 1985. Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised). Research Triangle Park, NC. EPA-450/4-80-023.
- U.S. Environmental Protection Agency (EPA). 1986. Environmental Assessment of a Reciprocating Engine Retrofitted With Selective Catalytic Reduction (Volume I: Technical Results). Research Triangle Park, NC. EPA-1699/7-86-014a.
- U.S. Environmental Protection Agency (EPA). 1987a. Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). Research Triangle Park, NC. EPA-450/4-87-007.
- U.S. Environmental Protection Agency (EPA). 1987b. Guideline on Air Quality Models, Supplement A (Revised). EPA-450/2-78-027.
- U.S. Environmental Protection Agency (EPA). 1988a. Toxic Air Pollutant Emission Factors--A Compilation for Selected Air Toxic Compounds and Sources. Research Triangle Park, NC. EPA-450/2-88-006a.
- U.S. Environmental Protection Agency (EPA). 1988b. Industrial Source Complex (ISC) Dispersion Model User's Guide (2nd Ed., Revised). EPA-450/4-88-002a.
- U.S. Environmental Protection Agency (EPA). 1988c. EPA User's Network for Applied Modeling of Air Pollution (UNAMAP) (Version 6, Change 3, January 4). Research Triangle Park, NC.
- U.S. Environmental Protection Agency (EPA). 1988d. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources (Supplement B, p. 3.1-2) AP-42. Research Triangle Park, NC.
- U.S. Environmental Protection Agency (EPA). 1990a. "Top-Down" Best Available Control Technology Guidance Document (Draft). Research Triangle Park, NC.

REFERENCES
(Page 5 of 5)

- U.S. Environmental Protection Agency (EPA). 1990b. OAQPS Control Cost Manual (4th Ed.) EPA Publication: Research Triangle Park, NC. EPA-450/3-90-006.
- U.S. Environmental Protection Agency (EPA). 1985 to 1990. BACT/LAER Clearinghouse--A Compilation of Control Technology Determinations. Research Triangle Park, NC.

APPENDIX A

Appendix A Summary of BACT Determinations for NOx Emissions from Stationary Reciprocating Engines (page 1 of 2).

Company Name	State	Permit Number	Date of Permit	Total Capacity	Engine Specifications			Load (Bhp)	NOx Emission Limit*			Control Method	Comments
					Fuel Type	Make	Model		(g/Bhp-hr)	(lb/hr)	(ppm)		
<u>Source Type: Natural Gas Compressor Station</u>													
Northern Natural Gas Company	IA		05-Sep-90	4,000 Bhp	N.G.	Cooper		4,000	1.8	15.9		Lean burn engine	
same as above	IA		05-Sep-90	4,000 Bhp	N.G.	Cooper		2,000	1.8	7.9		Lean burn engine	
National Fuel Gas Supply Corp.	PA	53-329-001	13-Jun-89	6,000 Bhp	N.G.	Cooper	8015JHC2	3,000	2.0	13.2		Lean burn engine	
Natural Gas Pipeline Company	IL	85100014	01-Mar-89	1,600 Bhp	N.G.	Worthington	MLV-10	4,000	9.0	79.4		Design & oper. practice	
Tennessee Gas Pipeline Company	PA	53-339-002	21-Jun-88	2,250 Bhp	N.G.	Cooper	GMVH-10C	2,250	3.0	14.9		Lean burn engine	
Consolidated Gas Transmission Corp.	PA	59-399-008	10-May-88	8,400 Bhp	N.G.	Dresser-Rand	TCV-10	4,200	3.0	27.8		Lean burn engine	Air to fuel ratio is 4.5:1
ANR Production Company	VA	11064	03-Mar-88	1,800 Bhp	N.G.	Caterpillar	G398TAA	600	1.2	1.6		Catalytic converter	N.G. Compressor Sta.
Southern Natural Gas Company	AL	406-0003-X0	19-Feb-88	4,160 Bhp	N.G.	Dresser-Rand	TCVD-10	4,160	2.2	20.2		Lean burn engine	Per. cond.: stack test
National Fuel Gas Supply Corp.	PA	53-399-002	01-Feb-88	2,850 Bhp	N.G.	Dresser-Rand	412 KEV-1	2,850	3.0	18.8		Lean burn engine	
Shell California Production Co.	CA	147853	14-Oct-86	600 Bhp				600	3.2	4.2		SCR	70% reduction
Northern Natural Gas Company	IA		04-Feb-86	8,000 Bhp	N.G.			4,000			250	Engine design	
Consolidated Gas Transmission Corp.	PA	18-399-009	11-Dec-85	6,000 Bhp	N.G.	Cooper	12W-330-C2	6,000	3.0	39.7		Lean burn engine	
Shell California Production	CA	0041-6	02-Dec-85	225 Bhp	N.G.	Caterpillar		225	0.805	0.4	50	NSCR, rich burn engine	90% reduction

* for a single engine.
N.G. = Natural Gas.

Source: KBN Engineering and Applied Sciences, Inc. (1990).

Appendix A Summary of BACT Determinations for NOx Emissions from Stationary Reciprocating Engines (page 2 of 2).

Company Name	State	Permit Number	Date of Permit	Total Capacity	Engine Specifications			Load (Bhp)	NOx Emission Limit*			Control Method	Comments
					Fuel Type	Make	Model		(g/Bhp-hr)	(lb/hr)	(ppm)		
Source Type: Power Cogeneration and Other Uses													
University of Illinois, Ch. Cir. Camp.	IL	applying	1990	16,000 Bhp	N.G.	Cooper	LSVB-GDC	8,000	1.9	33.5		Lean burn engine	
Northeast Landfill Power	RI	999-1014	12-Dec-89	19,200 Bhp	L.G.	Waukesha	12V-AT25GL	2,400	1.3	6.6		Lean burn engine	High-speed (900 rpm)
Pfizer, Inc.	MA	B-87-C-006	16-Nov-89	6,710 Bhp	Dual/Diesel	Cooper	LSVB-16-GDT	6,710	0.7	10.1		SCR	90% reduction
Cogentrix (formerly Xiox)	PA	33-399-004	31-Oct-89	20,904 Bhp	Dual	Wartsila	18V32GD	6,968	5.0	76.8		Engine retardation	
Worcester Company	RI	988-990	27-Sep-89	6,000 Bhp	N.G.	Superior	12-SGTB	2,000	1.5	6.6		Lean burn engine	High-speed (900 rpm)
Citizens Utilities	HI	HI 88-04	19-Sep-89	42,000 Bhp	Diesel			10,500			605	Engine design	
Key West Electric System	FL	PSD-FL-135	05-Jun-89	26,532 Bhp	Diesel			13,266	6.0	175.5		Engine timing retard	
Maui Electric Company, Inc.	HI	HI 87-01	30-Dec-88	33,400 Bhp	Diesel			16,700	7.0	256.1	595	5° Ignition retard	20% reduction
Power Ventures	FL	PSD-FL-120	05-Dec-88	8,800 Bhp	Dual	Undetermined			5.0			Engine design	
same as above	FL	PSD-FL-120	05-Dec-88	8,800 Bhp	Diesel	Undetermined			12.0			Engine design	
Maui Pineapple Co., Ltd.	HI	HI 87-02	17-May-88	4,020 Bhp	Diesel			2,010	5.2	23.0	536	2° Ignition retard	
same as above	HI	HI 87-02	17-May-88	6,040 Bhp	Diesel			3,020	5.3	35.0	520	2° Ignition retard	
Maui Electric Company, Inc.	HI	HI 86-02	17-Nov-87	6,700 Bhp	Diesel			3,350	9.3	68.4	600	4° Ignition retard	20% reduction
Hawaii Electric Light Co., Inc.	HI	HI 85-03	17-Nov-87	10,050 Bhp	Diesel			3,350	9.3	68.4	600	4° engine retard	20% reduction
City of Ventura	CA	1379-1	31-Dec-86	773 Bhp	D.G.			773	2.0	3.4		Engine design	Digestive gas
State of Utah Natural Resources	UT		01-Sep-86	18,000 Bhp	N.G.			4,630	3.5	36.0		Lean burn engine	Turbocharger ups fuel eff.
Tricounty Sun Energy Sheraton Hotel	CA	1369-1	07-Aug-86	200 Bhp	N.G.	Caterpillar		200			50	NSCR, rich burn engine	90% reduction
LaJet Energy Company	CA	85096	17-Jul-86	1,385 Bhp	Diesel	Cummins	KTTA-50CC	1,385	5.4	16.5		Engine design	
3M	TX	PSD-TX-674	30-May-86	8,386 Bhp	Dual	Cooper	LSVG-20-GDT	8,386	5.0	92.4		Engine design	
Genstar Gas Recovery Systems	CA	30970	29-Aug-85	2,650 Bhp	L.G.			2,650	1.5	8.8		Lean burn engine	Landfilled gas
same as above	CA	30893	29-Aug-85	1,100 Bhp	L.G.			1,100	1.5	3.6		Lean burn engine	Landfilled gas
Pacific Lighting Energy	CA	30336	01-Mar-85	2,650 Bhp	N.G.	Superior	16-SGTA	2,650	1.5	8.6		Lean burn engine	High-speed (900 rpm)

* for a single engine. Note: N.G. = Natural Gas; L.G. = Landfilled Gas; D.G. = Digestive Gas.

Source: KBN Engineering and Applied Sciences, Inc. (1990).

APPENDIX B

APPENDIX B

ECONOMIC IMPACT ANALYSIS METHODOLOGY

In the "top-down" approach, the economic impact along with environmental and energy impacts is one of three main criteria for BACT evaluation in considering any emission control method. The economic analysis determines the cost effectiveness of each applicable emission control alternative.

The economic analysis is based on the cost estimating procedure outlined in EPA's control cost manual (EPA, 1990b). An overall description of this cost estimating methodology is given as follows:

1. The total capital investment consists of direct capital and indirect capital costs. The direct capital cost includes the purchased equipment cost and the direct installation cost. The indirect capital cost accounts for other indirect expenses pertaining to the installation of the emission control device, such as engineering, construction and field expenses, contractor fee, contingencies, and startup and testing.
2. The annualized cost consists of the direct operating cost, the indirect operating cost, and the capital recovery cost. The direct operating cost includes both annual operating and maintenance costs, cost of replacement parts, and fuel costs. The indirect annual operating cost accounts for items such as overhead, property taxes, insurance, and administration. The capital recovery cost is calculated from the total capital investment cost using a capital recovery factor.
3. The total annual operating cost is divided by the total emission reduction of the control system to result in dollars per ton of pollutant removed (i.e., dollars per ton of NO_x in this case). This value is defined as the cost effectiveness of the control method. Incremental cost effectiveness of one control method over

another is also calculated based on the incremental annual cost and incremental emission reduction.

Detailed descriptions of the cost estimates are presented in the following three sections for the SCR system being evaluated as an add-on control device for the lean-burn engine. The discussion includes economic analyses of the lean-burn engine and the NSCR system for the rich-burn engine. The baseline cost estimate is based on the rich-burn engine since it has been defined as the baseline engine on which all emission calculations are based.

SECTION I TOTAL CAPITAL INVESTMENT (TCI)

The TCI cost for the SCR converter covers a complete turn-key system. The basic purchased equipment costs consist of the differential IC engine cost and the SCR system cost. The differential engine cost accounts for the difference in cost between the higher cost lean-burn and the lower cost rich-burn engines as quoted by Dresser-Rand. The cost of the SCR system is either a printed cost quotation or a "ball park" estimate of unit cost per brake horsepower obtained directly from the equipment vendors.

Subsequently, other direct and indirect capital cost items are estimated from cost factors based on standard cost estimating guidelines (EPA, 1990b). The estimating method provides accuracies on the order of plus or minus 20 percent.

The direct capital costs (DCC) for the SCR converter are comprised of purchased equipment costs and direct installation costs. Purchased equipment costs represent the free on board (FOB) delivery costs of the basic equipment, ammonia auxiliary system, exhaust reheat duct burner system, structure support, emission monitoring equipment, instrumentation, freight, and sales tax. Basic equipment consists of all catalyst structure, and mechanical and electrical components required for efficient operation of the device. These include such items as internal piping and exhaust gas ductwork.

The storage tank and delivery equipment costs for the ammonia system were obtained from the ammonia supplier. The ammonia system was designed for a typical 3-month supply of anhydrous ammonia and its auxiliary equipment such as ammonia vaporizer/injection components.

The cost of the auxiliary equipment for reheating the exhaust gas accounts for the duct burner system required to bring the exhaust temperature from 495°F to 700°F. Without raising the temperature, the SCR system would not work properly.

Emission monitoring costs include the cost of NO_x and O₂ continuous monitors, which are not included in the basic equipment costs. These monitors are tied to the ammonia injection system to ensure proper NO_x reduction. These costs are estimated at 15 percent of the SCR basic equipment cost.

Structure support costs account for miscellaneous external piping, auxiliary support, independent flow controllers and indicators for the connection between the basic equipment and the ammonia system. Costs are estimated at 10 percent of the overall SCR equipment cost.

Plant instrumentation and controls are usually not included in the basic equipment cost; typical cost factors range from 10 to 15 percent of the basic equipment cost, depending on the specific application.

The purchased equipment costs are then the basis for determining the direct and indirect installation costs. The installation costs are based on standard cost factors (EPA, 1990b).

The direct installation costs consist of the direct expenditures for materials and labor for site preparation, foundations, structural steel, erection, piping, electrical, painting, and insulation. Direct installation costs are expressed as a percentage of the total basic equipment costs for standard industrial installations.

The indirect capital costs (ICC) typically cover several areas, such as: engineering and supervision, construction and field expenses, construction contractor fee, contingencies, start-up and testing, and working capital. Each of the above items is based on a percentage of the DCC; except for the working capital which is based on the direct operating cost (DOC).

For the proposed lean-burn engine, the TCI cost estimate is also calculated by summing the purchased equipment costs, direct installation costs, and indirect capital costs. In this case, the itemized basic purchased equipment costs only include the differential engine cost, instrumentation, freight, and sales tax. Other direct and indirect installation costs are estimated by multiplying the sum of the basic purchased equipment costs by the standard cost factors.

The TCI cost estimate for the NSCR converter was based on a similar cost estimating procedure. Basic purchased equipment costs for the NSCR system include the basic converter, emission monitoring, structural support, instrumentation, freight, and sales tax. The direct and indirect installation costs follow a similar procedure to the one described above.

SECTION II ANNUALIZED COST (AC)

The AC estimates for each SCR system are comprised of the direct operating costs (DOC), the indirect operating costs (IOC) and the capital recovery cost (CRC). The DOC includes the operating labor, maintenance, replacement catalyst and parts, utilities, and ammonia supply. The IOC includes plant overhead, property taxes, insurance, and administration. The CRC accounts for the annualized cost of the initial capital investment for the emission control system.

In the DOC category, the annual operating labor includes the operator and supervisor costs for continuous operation. The operator cost for the SCR system was calculated based on 5.33 hours per shift devoted to regular maintenance and safety assurance procedure for the emission control system,

which include the operation of the ammonia system. The maintenance requirement is 5 percent of the DCC.

Catalyst replacement cost was calculated using a capital recovery factor (CRF) computed for a three-year recovery period and a 10 percent interest rate. The CRF equation is given below. The total catalyst replacement cost includes the replacement part cost and the labor cost for technical supervision by the catalyst supplier.

The utility costs are the sum of the itemized costs for electricity, natural gas for exhaust stack gas reheat, and a fuel credit for using the more efficient lean-burn engine. Electricity cost is based on the estimated total annual consumption for the ammonia vaporizer/injection system. The unit cost for electrical power is current standard cost value. The price of natural gas is based on current natural gas pricing (DOE/EIA, 1989). The total tonnage of ammonia is calculated by the ammonia molar equivalent required to convert the total estimated NO_x emissions.

Indirect operating costs include the cost of plant overhead, property taxes, insurance, administration, and capital recovery cost. These costs are typically either one or two percent of the total capital investment; except the overhead which is sixty percent of the operating labor and maintenance costs. The capital recovery cost (CRC) is based on the service life of the control system, interest rate, capital depreciation rate, and total capital investment. The CRC is calculated by multiplying the TCI by the capital recovery factor (CRF), which is defined as:

$$CRF = \frac{i(1+i)^n}{(1+i)^n - 1}$$

where: i = annual interest rate (in percent), and
 n = equipment service life (in years).

The standard estimated equipment service life for each alternative is 10 years, and the average interest rate is assumed to be 10 percent.

The annualized cost is the sum of the DOC, IOC, and CRC.

The annualized cost estimates for the lean-burn engine and the NSCR converter use similar cost estimating procedure as shown for the SCR system, with the exception of the ammonia supply in the DOC category. The DOC of the NSCR system includes the costs of the operating labor, maintenance, and catalyst replacement.

SECTION III COST EFFECTIVENESS

In general, the cost effectiveness of SCR, lean-burn engine, or rich-burn engine/NSCR option is based on the annualized cost of each system and the associated annual pollutant emission reduction. This is determined by dividing the annualized cost by the tonnage of pollutant removed per year.

This cost effectiveness value is presented in terms of total cost effectiveness and incremental cost effectiveness. The total cost effectiveness values are based on the differences in costs and tonnages of NO_x emitted between a given emission control option and the baseline. The incremental cost effectiveness values are based on the difference in costs and tonnages of NO_x emitted between a given emission control option and the next most effective control option.

APPENDIX C

**ISCLT PRINTOUTS
FLORIDA GAS TRANSMISSION CO.
STATION NO. 12**

ISCLTK6L MODEL, A VERSION OF
ISCLT (VERSION 90008)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 1. GUIDELINE MODELS.
IN UNAMAP (VERSION 6) JAN 1990.
SOURCE: FILE 7 ON UNAMAP MAGNETIC TAPE FROM NTIS.

CONVERTED BY :
KBN ENGINEERING AND APPLIED SCIENCES, INC.
GAINESVILLE, FLORIDA
(904)331-9000

COPYRIGHT 1990 L

CARD INPUT FILE IS	ER12LT82.I80	
SUMMARY OUTPUT FILE IS	ER12LT82.O80	
TITLE OF RUN IS	1982 ENRON STATION 12 / 35 FT STACK	10-4-90

- ISCLT INPUT DATA -

NUMBER OF SOURCES = 1
 NUMBER OF X AXIS GRID SYSTEM POINTS = 9
 NUMBER OF Y AXIS GRID SYSTEM POINTS = 16
 NUMBER OF SPECIAL POINTS = 36
 NUMBER OF SEASONS = 1
 NUMBER OF WIND SPEED CLASSES = 6
 NUMBER OF STABILITY CLASSES = 6
 NUMBER OF WIND DIRECTION CLASSES = 16
 FILE NUMBER OF DATA FILE USED FOR REPORTS = 1
 THE PROGRAM IS RUN IN RURAL MODE
 CONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR = 0.10000000E+07
 ACCELERATION OF GRAVITY (METERS/SEC**2) = 9.800
 HEIGHT OF MEASUREMENT OF WIND SPEED (METERS) = 6.710
 CORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTH (DEGREES) = 0.000
 DECAY COEFFICIENT = 0.00000000E+00
 PROGRAM OPTION SWITCHES = 1, 2, 2, 0, 0, 3, 2, 1, 3, 2, 2, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0,

RANGE X AXIS GRID SYSTEM POINTS (METERS)=	30.00,	100.00,	200.00,	300.00,	400.00,	500.00,				
750.00,	1000.00,	1250.00,								
RANGE X SPECIAL DISCRETE POINTS (METERS)=	201.00,	210.00,	229.00,	241.00,	204.00,	180.00,				
165.00,	158.00,	155.00,	158.00,	165.00,	180.00,	204.00,	241.00,	311.00,	287.00,	
271.00,	268.00,	271.00,	146.00,	158.00,	177.00,	180.00,	158.00,	146.00,	140.00,	
137.00,	140.00,	146.00,	158.00,	183.00,	216.00,	229.00,	180.00,	201.00,	198.00,	
MUTH BEARING Y AXIS GRID SYSTEM POINTS (DEGREES)=	22.50,	45.00,	67.50,	90.00,	112.50,	135.00,				
157.50,	180.00,	202.50,	225.00,	247.50,	270.00,	292.50,	315.00,	337.50,	360.00,	
MUTH BEARING Y SPECIAL DISCRETE POINTS (DEGREES)=	10.00,	20.00,	30.00,	40.00,	50.00,	60.00,				
70.00,	80.00,	90.00,	100.00,	110.00,	120.00,	130.00,	140.00,	150.00,	160.00,	
170.00,	180.00,	190.00,	200.00,	210.00,	220.00,	230.00,	240.00,	250.00,	260.00,	
270.00,	280.00,	290.00,	300.00,	310.00,	320.00,	330.00,	340.00,	350.00,	360.00,	

- AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -

	STABILITY	STABILITY	STABILITY	STABILITY	STABILITY	STABILITY
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
SEASON 1	298.0000	298.0000	298.0000	293.0000	288.0000	288.0000

- MIXING LAYER HEIGHT (METERS) -

	SEASON 1					
	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
STABILITY CATEGORY 10.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.
STABILITY CATEGORY 20.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
STABILITY CATEGORY 30.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
STABILITY CATEGORY 40.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
STABILITY CATEGORY 50.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.
STABILITY CATEGORY 60.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 1

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00022800	0.00091300	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00006300	0.00057100	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00002500	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00014000	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00008900	0.00079900	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00011400	0.00102700	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00011400	0.00102700	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00002500	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00003800	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00002500	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00016500	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00002500	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00005100	0.00045700	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00001300	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00001300	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00001300	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 2

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00083300	0.00479499	0.00194100	0.00000000	0.00000000	0.00000000
22.500	0.00060200	0.00251100	0.00148400	0.00000000	0.00000000	0.00000000
45.000	0.00011700	0.00239700	0.00194100	0.00000000	0.00000000	0.00000000
67.500	0.00012800	0.00262600	0.00114200	0.00000000	0.00000000	0.00000000
90.000	0.00029800	0.00365299	0.00296800	0.00000000	0.00000000	0.00000000
112.500	0.00017300	0.00353899	0.00410999	0.00000000	0.00000000	0.00000000
135.000	0.00010600	0.00216900	0.00376699	0.00000000	0.00000000	0.00000000
157.500	0.00018700	0.00137000	0.00079900	0.00000000	0.00000000	0.00000000
180.000	0.00007300	0.00148400	0.00091300	0.00000000	0.00000000	0.00000000
202.500	0.00003900	0.00079900	0.00057100	0.00000000	0.00000000	0.00000000
225.000	0.00004500	0.00091300	0.00034200	0.00000000	0.00000000	0.00000000
247.500	0.00027900	0.00079900	0.00068500	0.00000000	0.00000000	0.00000000
270.000	0.00009500	0.00194100	0.00114200	0.00000000	0.00000000	0.00000000
292.500	0.00005600	0.00114200	0.00114200	0.00000000	0.00000000	0.00000000
315.000	0.00005600	0.00114200	0.00148400	0.00000000	0.00000000	0.00000000
337.500	0.00034000	0.00205500	0.00091300	0.00000000	0.00000000	0.00000000

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 3

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00039300	0.00479499	0.00776299	0.00262600	0.00034200	0.00000000
22.500	0.00032000	0.00239700	0.00331099	0.00057100	0.00000000	0.00000000
45.000	0.00054600	0.00365299	0.00399499	0.00011400	0.00000000	0.00000000
67.500	0.00027300	0.00182600	0.00319599	0.00011400	0.00000000	0.00000000
90.000	0.00015900	0.00194100	0.00616399	0.00102700	0.00011400	0.00000000
112.500	0.00037800	0.00159800	0.00696299	0.00388099	0.00011400	0.00000000
135.000	0.00037800	0.00159800	0.00799099	0.00331099	0.00000000	0.00000000
157.500	0.00006500	0.00079900	0.00536499	0.00182600	0.00000000	0.00000000
180.000	0.00032200	0.00091300	0.00970299	0.00490899	0.00000000	0.00000000
202.500	0.00018900	0.00079900	0.00399499	0.00034200	0.00000000	0.00000000
225.000	0.00019800	0.00091300	0.00331099	0.00022800	0.00000000	0.00000000
247.500	0.00018000	0.00068500	0.00251100	0.00091300	0.00000000	0.00000000
270.000	0.00005600	0.00068500	0.00388099	0.00068500	0.00000000	0.00000000
292.500	0.00021700	0.00114200	0.00182600	0.00057100	0.00000000	0.00000000
315.000	0.00007500	0.00091300	0.00331099	0.00011400	0.00000000	0.00000000
337.500	0.00013100	0.00159800	0.00513699	0.00057100	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 4

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00078000	0.00753399	0.02385796	0.02511396	0.00296800	0.00000000
22.500	0.00046300	0.00479499	0.00776299	0.00410999	0.00045700	0.00011400
45.000	0.00096700	0.00844699	0.01255698	0.00342499	0.00000000	0.00000000
67.500	0.00057700	0.00639299	0.01346998	0.00490899	0.00000000	0.00000000
90.000	0.00116300	0.00947499	0.02442896	0.01643797	0.00079900	0.00000000
112.500	0.00034900	0.00490899	0.02260296	0.02168897	0.00182600	0.00011400
135.000	0.00080600	0.00445199	0.01655297	0.01723697	0.00137000	0.00011400
157.500	0.00018700	0.00262600	0.01004598	0.00810499	0.00068500	0.00000000
180.000	0.00032500	0.00285400	0.01312798	0.01198598	0.00045700	0.00000000
202.500	0.00031700	0.00274000	0.00810499	0.00559399	0.00011400	0.00000000
225.000	0.00035800	0.00331099	0.00764799	0.00502299	0.00034200	0.00000000
247.500	0.00015400	0.00216900	0.00502299	0.00262600	0.00011400	0.00000000
270.000	0.00019500	0.00274000	0.00376699	0.00262600	0.00045700	0.00011400
292.500	0.00026800	0.00205500	0.00296800	0.00239700	0.00022800	0.00000000
315.000	0.00015400	0.00216900	0.00662099	0.00570799	0.00114200	0.00011400
337.500	0.00024300	0.00342499	0.01152998	0.02328796	0.00285400	0.00011400

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 5

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00000000	0.01187198	0.01301398	0.00000000	0.00000000	0.00000000
22.500	0.00000000	0.00753399	0.00536499	0.00000000	0.00000000	0.00000000
45.000	0.00000000	0.00821899	0.00627899	0.00000000	0.00000000	0.00000000
67.500	0.00000000	0.00627899	0.00513699	0.00000000	0.00000000	0.00000000
90.000	0.00000000	0.00650699	0.00239700	0.00000000	0.00000000	0.00000000
112.500	0.00000000	0.00376699	0.00274000	0.00000000	0.00000000	0.00000000
135.000	0.00000000	0.00456599	0.00274000	0.00000000	0.00000000	0.00000000
157.500	0.00000000	0.00308200	0.00251100	0.00000000	0.00000000	0.00000000
180.000	0.00000000	0.00422399	0.00376699	0.00000000	0.00000000	0.00000000
202.500	0.00000000	0.00365299	0.00274000	0.00000000	0.00000000	0.00000000
225.000	0.00000000	0.00582199	0.00365299	0.00000000	0.00000000	0.00000000
247.500	0.00000000	0.00662099	0.00251100	0.00000000	0.00000000	0.00000000
270.000	0.00000000	0.00296800	0.00205500	0.00000000	0.00000000	0.00000000
292.500	0.00000000	0.00205500	0.00125600	0.00000000	0.00000000	0.00000000
315.000	0.00000000	0.00331099	0.00410999	0.00000000	0.00000000	0.00000000
337.500	0.00000000	0.00593599	0.01084498	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 6

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00813399	0.02260296	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00345199	0.01015998	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00401399	0.01267098	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00348699	0.00924699	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00221300	0.00525099	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00148700	0.00319599	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00114500	0.00353899	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00140200	0.00445199	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00217800	0.00616399	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00208200	0.00582199	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00290200	0.00924699	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00345499	0.00913199	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00286900	0.00913199	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00276100	0.00719199	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00497699	0.01141598	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00572399	0.01769397	0.00000000	0.00000000	0.00000000	0.00000000

- ISCLT INPUT DATA (CONT.) -

- VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGREES KELVIN/METER) -

	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
ABILITY CATEGORY 10.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
ABILITY CATEGORY 20.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
ABILITY CATEGORY 30.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
ABILITY CATEGORY 40.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
ABILITY CATEGORY 50.	0.200000E-010.	0.200000E-010.	0.200000E-010.	0.200000E-010.	0.200000E-010.	0.200000E-010.
ABILITY CATEGORY 60.	0.350000E-010.	0.350000E-010.	0.350000E-010.	0.350000E-010.	0.350000E-010.	0.350000E-010.

- WIND PROFILE POWER LAW EXPONENTS -

	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
ABILITY CATEGORY 10.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.
ABILITY CATEGORY 20.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.
ABILITY CATEGORY 30.	0.100000E+000.	0.100000E+000.	0.100000E+000.	0.100000E+000.	0.100000E+000.	0.100000E+000.
ABILITY CATEGORY 40.	0.150000E+000.	0.150000E+000.	0.150000E+000.	0.150000E+000.	0.150000E+000.	0.150000E+000.
ABILITY CATEGORY 50.	0.350000E+000.	0.350000E+000.	0.350000E+000.	0.350000E+000.	0.350000E+000.	0.350000E+000.
ABILITY CATEGORY 60.	0.550000E+000.	0.550000E+000.	0.550000E+000.	0.550000E+000.	0.550000E+000.	0.550000E+000.

- SOURCE INPUT DATA -

SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE ELEVATION (M)
---------------	-------------	------------------	------------------	---------------------	--------------------

- SOURCE DETAILS DEPENDING ON TYPE -

1 STACK 0.00 0.00 10.67 0.00 GAS EXIT TEMP (DEG K)= 530.00, GAS EXIT VEL. (M/SEC)= 52.31, STACK DIAMETER (M)= 0.640, HEIGHT OF ASSO. BLDG. (M)= -9.88, WIDTH OF ASSO. BLDG. (M)= 69.17, WAKE EFFECTS FLAG = 0

- DIRECTION SPECIFIC BUILDING DIMENSIONS -

TOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE
1	9.9,	69.2,	0	2	9.9,	69.2,	0	3	9.9,	69.2,	0	4	9.9,	69.2,	0
5	9.9,	69.2,	0	6	9.9,	69.2,	0	7	9.9,	69.2,	0	8	9.9,	69.2,	0
9	9.9,	69.2,	0	10	9.9,	69.2,	0	11	9.9,	69.2,	0	12	9.9,	69.2,	0
13	9.9,	69.2,	0	14	9.9,	69.2,	0	15	9.9,	69.2,	0	16	9.9,	69.2,	0

- SOURCE STRENGTHS (GRAMS PER SEC) -

SEASON 1 SEASON 2 SEASON 3 SEASON 4
2.22000E+00

WARNING - HW/HB > 5 FOR SOURCE 1 PROG. USES LATERAL VIRTUAL DIST. FOR UPPER BOUND OF CONCENTRATION (DEPOSITION) IN SECTOR(S): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16.
LOWER BOUND IS DESIRED SET THE DIRECTION SPECIFIC BUILDING HEIGHT TO < 0 (WAKE EFFECTS FLAG) AND RERUN.

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) DUE TO SOURCE 1 **

- GRID SYSTEM RECEPTORS -
 - X AXIS (RANGE , METERS) -
 - CONCENTRATION -

	30.000	100.000	200.000	300.000	400.000	500.000	750.000	1000.000	1250.000
XIS (AZIMUTH BEARING, DEGREES)									
360.000	0.040246	0.590988	0.511489	0.380291	0.399776	0.472092	0.476446	0.415931	0.351077
337.500	0.050543	0.371625	0.299408	0.220717	0.235509	0.286655	0.304976	0.275065	0.236379
315.000	0.119222	0.879849	0.689067	0.499735	0.512974	0.594770	0.589413	0.512620	0.431403
292.500	0.157917	1.070848	0.815313	0.580879	0.591596	0.690408	0.701227	0.618779	0.522962
270.000	0.070166	0.618942	0.493571	0.365819	0.396909	0.495786	0.559193	0.525670	0.462204
247.500	0.003953	0.157858	0.141804	0.113803	0.135782	0.187172	0.243249	0.250163	0.234474
225.000	0.002772	0.181595	0.164203	0.132709	0.151166	0.197339	0.249445	0.259744	0.247995
202.500	0.049895	0.264258	0.209524	0.160086	0.172627	0.211728	0.235643	0.226610	0.207621
180.000	0.227262	1.085237	0.786689	0.554745	0.583048	0.714892	0.782795	0.726658	0.642045
157.500	0.217213	0.836494	0.569176	0.388234	0.410160	0.509995	0.547783	0.493544	0.429337
135.000	0.094457	0.347527	0.239680	0.168957	0.174335	0.208058	0.218653	0.199817	0.176285
112.500	0.016572	0.167437	0.133505	0.098895	0.102391	0.120404	0.122990	0.110011	0.096151
90.000	0.048751	0.227617	0.182534	0.140848	0.151308	0.180252	0.177967	0.153414	0.130934
67.500	0.009642	0.151328	0.131754	0.100726	0.107347	0.128602	0.138265	0.131344	0.120777
45.000	0.025775	0.162676	0.136397	0.106443	0.123875	0.161835	0.187644	0.181698	0.166670
22.500	0.011808	0.164393	0.148077	0.116735	0.135516	0.175966	0.202658	0.192409	0.171861

- DISCRETE RECEPTORS -

X RANGE (METERS)	Y AZIMUTH BEARING (DEGREES)	CONCENTRATION	X RANGE (METERS)	Y AZIMUTH BEARING (DEGREES)	CONCENTRATION	X RANGE (METERS)	Y AZIMUTH BEARING (DEGREES)	CONCENTRATION
201.0	10.0	0.346091	210.0	20.0	0.183030	229.0	30.0	0.135305
241.0	40.0	0.126929	204.0	50.0	0.133319	180.0	60.0	0.138199
165.0	70.0	0.148741	158.0	80.0	0.175804	155.0	90.0	0.205392
158.0	100.0	0.178543	165.0	110.0	0.153190	180.0	120.0	0.179125
204.0	130.0	0.212470	241.0	140.0	0.270877	311.0	150.0	0.304664
287.0	160.0	0.422159	271.0	170.0	0.547257	268.0	180.0	0.607365
271.0	190.0	0.426010	146.0	200.0	0.317492	158.0	210.0	0.213515
177.0	220.0	0.181650	180.0	230.0	0.164217	158.0	240.0	0.158988
146.0	250.0	0.199377	140.0	260.0	0.387818	137.0	270.0	0.585114
140.0	280.0	0.752871	146.0	290.0	0.924400	158.0	300.0	0.877490
183.0	310.0	0.751925	216.0	320.0	0.573177	229.0	330.0	0.392472
180.0	340.0	0.339568	201.0	350.0	0.412811	198.0	360.0	0.514234

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) DUE TO SOURCE 1 (CONT.) **

- 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF ALL SOURCES COMBINED -

X COORDINATE RANGE (METERS)	Y COORDINATE AZIMUTH BEARING (DEGREES)	CONCENTRATION
100.00	180.00	1.085237
100.00	292.50	1.070848
146.00	290.00	0.924400
100.00	315.00	0.879849
158.00	300.00	0.877490
100.00	157.50	0.836494
200.00	292.50	0.815313
200.00	180.00	0.786689
750.00	180.00	0.782795
140.00	280.00	0.752871

***** END OF ISCLT PROGRAM, 1 SOURCES PROCESSED *****

BEST AVAILABLE COPY

*** RUN TIME STATISTICS ***

ENDING HOUR,MINUTE,SECOND - - - - - : 09:15:01
ENDING MONTH,DAY,YEAR - - - - - : 10/04/90

ENDING HOUR,MINUTE,SECOND - - - - - : 09:16:13
ENDING MONTH,DAY,YEAR - - - - - : 10/04/90

TOTAL CPU SECONDS - - - - - : 72.

ISCLTK6L MODEL, A VERSION OF
ISCLT (VERSION 90008)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 1. GUIDELINE MODELS.
IN UNAMAP (VERSION 6) JAN 1990.
SOURCE: FILE 7 ON UNAMAP MAGNETIC TAPE FROM NTIS.

CONVERTED BY :
KBN ENGINEERING AND APPLIED SCIENCES, INC.
GAINESVILLE, FLORIDA
(904)331-9000

COPYRIGHT 1990 L

CARD INPUT FILE IS	ER12LT83.I80	
SUMMARY OUTPUT FILE IS	ER12LT83.O80	
TITLE OF RUN IS	1983 ENRON STATION 12 / 35 FT STACK	10-4-90

- ISCLT INPUT DATA (CONT.) -

NUMBER OF SOURCES = 1
 NUMBER OF X AXIS GRID SYSTEM POINTS = 9
 NUMBER OF Y AXIS GRID SYSTEM POINTS = 16
 NUMBER OF SPECIAL POINTS = 36
 NUMBER OF SEASONS = 1
 NUMBER OF WIND SPEED CLASSES = 6
 NUMBER OF STABILITY CLASSES = 6
 NUMBER OF WIND DIRECTION CLASSES = 16
 FILE NUMBER OF DATA FILE USED FOR REPORTS = 1
 THE PROGRAM IS RUN IN RURAL MODE
 CONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR = 0.10000000E+07
 ACCELERATION OF GRAVITY (METERS/SEC**2) = 9.800
 HEIGHT OF MEASUREMENT OF WIND SPEED (METERS) = 6.710
 CORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTH (DEGREES) = 0.000
 DECAY COEFFICIENT = 0.00000000E+00
 PROGRAM OPTION SWITCHES = 1, 2, 2, 0, 0, 3, 2, 1, 3, 2, 2, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0,

RANGE X AXIS GRID SYSTEM POINTS (METERS) =	30.00,	100.00,	200.00,	300.00,	400.00,	500.00,				
750.00,	1000.00,	1250.00,								
RANGE X SPECIAL DISCRETE POINTS (METERS) =	201.00,	210.00,	229.00,	241.00,	204.00,	180.00,				
165.00,	158.00,	155.00,	158.00,	165.00,	180.00,	204.00,	241.00,	311.00,	287.00,	
271.00,	268.00,	271.00,	146.00,	158.00,	177.00,	180.00,	158.00,	146.00,	140.00,	
137.00,	140.00,	146.00,	158.00,	183.00,	216.00,	229.00,	180.00,	201.00,	198.00,	
WIND BEARING Y AXIS GRID SYSTEM POINTS (DEGREES) =	22.50,	45.00,	67.50,	90.00,	112.50,	135.00,				
157.50,	180.00,	202.50,	225.00,	247.50,	270.00,	292.50,	315.00,	337.50,	360.00,	
WIND BEARING Y SPECIAL DISCRETE POINTS (DEGREES) =	10.00,	20.00,	30.00,	40.00,	50.00,	60.00,				
70.00,	80.00,	90.00,	100.00,	110.00,	120.00,	130.00,	140.00,	150.00,	160.00,	
170.00,	180.00,	190.00,	200.00,	210.00,	220.00,	230.00,	240.00,	250.00,	260.00,	
270.00,	280.00,	290.00,	300.00,	310.00,	320.00,	330.00,	340.00,	350.00,	360.00,	

- AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -

	STABILITY	STABILITY	STABILITY	STABILITY	STABILITY	STABILITY
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
SEASON 1	298.0000	298.0000	298.0000	293.0000	288.0000	288.0000

- MIXING LAYER HEIGHT (METERS) -

SEASON 1

WIND SPEED WIND SPEED WIND SPEED WIND SPEED WIND SPEED WIND SPEED
 CATEGORY 1 CATEGORY 2 CATEGORY 3 CATEGORY 4 CATEGORY 5 CATEGORY 6

STABILITY CATEGORY 10.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.
STABILITY CATEGORY 20.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
STABILITY CATEGORY 30.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
STABILITY CATEGORY 40.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
STABILITY CATEGORY 50.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.
STABILITY CATEGORY 60.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 1

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00023800	0.00068500	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00019300	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00027300	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00019300	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00023800	0.00068500	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00015800	0.00045700	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00027700	0.00079901	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00011900	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00007900	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00007900	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00004000	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00007900	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00038700	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00004000	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00004000	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00007900	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 2

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00077901	0.00536504	0.00353902	0.00000000	0.00000000	0.00000000
22.500	0.00032400	0.00262602	0.00102701	0.00000000	0.00000000	0.00000000
45.000	0.00059600	0.00296802	0.00182601	0.00000000	0.00000000	0.00000000
67.500	0.00035900	0.00308202	0.00125601	0.00000000	0.00000000	0.00000000
90.000	0.00033200	0.00274002	0.00411003	0.00000000	0.00000000	0.00000000
112.500	0.00080501	0.00570804	0.00536504	0.00000000	0.00000000	0.00000000
135.000	0.00035900	0.00308202	0.00433803	0.00000000	0.00000000	0.00000000
157.500	0.00026300	0.00182601	0.00433803	0.00000000	0.00000000	0.00000000
180.000	0.00008700	0.00114201	0.00239702	0.00000000	0.00000000	0.00000000
202.500	0.00001700	0.00022800	0.00102701	0.00000000	0.00000000	0.00000000
225.000	0.00015800	0.00045700	0.00057100	0.00000000	0.00000000	0.00000000
247.500	0.00016700	0.00057100	0.00057100	0.00000000	0.00000000	0.00000000
270.000	0.00007900	0.00102701	0.00125601	0.00000000	0.00000000	0.00000000
292.500	0.00006100	0.00079901	0.00079901	0.00000000	0.00000000	0.00000000
315.000	0.00042000	0.00228302	0.00159801	0.00000000	0.00000000	0.00000000
337.500	0.00021800	0.00285402	0.00262602	0.00000000	0.00000000	0.00000000

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 3

DIRECTION (DEGREES)	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1 (1.5000MPS)	CATEGORY 2 (2.5000MPS)	CATEGORY 3 (4.3000MPS)	CATEGORY 4 (6.8000MPS)	CATEGORY 5 (9.5000MPS)	CATEGORY 6 (12.5000MPS)
0.000	0.00038100	0.00627904	0.00844706	0.00045700	0.00000000	0.00000000
22.500	0.00033600	0.00353902	0.00319602	0.00011400	0.00000000	0.00000000
45.000	0.00041200	0.00479503	0.00513704	0.00022800	0.00000000	0.00000000
67.500	0.00030800	0.00308202	0.00308202	0.00000000	0.00000000	0.00000000
90.000	0.00015200	0.00251102	0.00559404	0.00045700	0.00000000	0.00000000
112.500	0.00011100	0.00182601	0.00593604	0.00148401	0.00000000	0.00000000
135.000	0.00021500	0.00353902	0.00879006	0.00137001	0.00022800	0.00000000
157.500	0.00012500	0.00205501	0.00662105	0.00239702	0.00000000	0.00000000
180.000	0.00027400	0.00251102	0.01232909	0.00342502	0.00000000	0.00000000
202.500	0.00006900	0.00114201	0.00433803	0.00068500	0.00000000	0.00000000
225.000	0.00005500	0.00091301	0.00388103	0.00022800	0.00011400	0.00000000
247.500	0.00004800	0.00079901	0.00228302	0.00068500	0.00011400	0.00011400
270.000	0.00006200	0.00102701	0.00365303	0.00034200	0.00000000	0.00000000
292.500	0.00008300	0.00137001	0.00399503	0.00045700	0.00000000	0.00000000
315.000	0.00030500	0.00102701	0.00525104	0.00114201	0.00000000	0.00000000
337.500	0.00014500	0.00239702	0.00605004	0.00125601	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 4

DIRECTION (DEGREES)	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1 (1.5000MPS)	CATEGORY 2 (2.5000MPS)	CATEGORY 3 (4.3000MPS)	CATEGORY 4 (6.8000MPS)	CATEGORY 5 (9.5000MPS)	CATEGORY 6 (12.5000MPS)
0.000	0.00119801	0.01164408	0.01495410	0.01221508	0.00125601	0.00011400
22.500	0.00102601	0.00684905	0.00764805	0.00194101	0.00011400	0.00000000
45.000	0.00097701	0.01198608	0.00901806	0.00388103	0.00011400	0.00011400
67.500	0.00060900	0.00993207	0.01164408	0.00216901	0.00011400	0.00000000
90.000	0.00088601	0.01050207	0.01529711	0.01187208	0.00079901	0.00011400
112.500	0.00028700	0.00468003	0.01038807	0.01141608	0.00182601	0.00045700
135.000	0.00043100	0.00308202	0.01038807	0.01312809	0.00125601	0.00034200
157.500	0.00032400	0.00331102	0.00742005	0.00764805	0.00079901	0.00034200
180.000	0.00045700	0.00547904	0.01175808	0.00787705	0.00057100	0.00011400
202.500	0.00019800	0.00125601	0.00399503	0.00593604	0.00068500	0.00000000
225.000	0.00008400	0.00137001	0.00468003	0.00388103	0.00091301	0.00011400
247.500	0.00007700	0.00125601	0.00547904	0.00490903	0.00125601	0.00022800
270.000	0.00026800	0.00239702	0.00673505	0.00422403	0.00034200	0.00034200
292.500	0.00033100	0.00342502	0.00433803	0.00468003	0.00068500	0.00000000
315.000	0.00048000	0.00388103	0.00958907	0.01004607	0.00057100	0.00022800
337.500	0.00092801	0.00525104	0.01050207	0.01221508	0.00148401	0.00000000

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 5

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00000000	0.01312809	0.00593604	0.00000000	0.00000000	0.00000000
22.500	0.00000000	0.00559404	0.00159801	0.00000000	0.00000000	0.00000000
45.000	0.00000000	0.00947507	0.00171201	0.00000000	0.00000000	0.00000000
67.500	0.00000000	0.00901806	0.00102701	0.00000000	0.00000000	0.00000000
90.000	0.00000000	0.00833306	0.00159801	0.00000000	0.00000000	0.00000000
112.500	0.00000000	0.00319602	0.00125601	0.00000000	0.00000000	0.00000000
135.000	0.00000000	0.00513704	0.00194101	0.00000000	0.00000000	0.00000000
157.500	0.00000000	0.00513704	0.00057100	0.00000000	0.00000000	0.00000000
180.000	0.00000000	0.00365303	0.00228302	0.00000000	0.00000000	0.00000000
202.500	0.00000000	0.00205501	0.00182601	0.00000000	0.00000000	0.00000000
225.000	0.00000000	0.00376703	0.00399503	0.00000000	0.00000000	0.00000000
247.500	0.00000000	0.00582204	0.00502303	0.00000000	0.00000000	0.00000000
270.000	0.00000000	0.00650705	0.00251102	0.00000000	0.00000000	0.00000000
292.500	0.00000000	0.00296802	0.00194101	0.00000000	0.00000000	0.00000000
315.000	0.00000000	0.00422403	0.00433803	0.00000000	0.00000000	0.00000000
337.500	0.00000000	0.00502303	0.00593604	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 6

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.01464210	0.02659819	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00806106	0.01232909	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.01044907	0.01392710	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00678205	0.01038807	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00456403	0.00570804	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00190901	0.00422403	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00318402	0.00570804	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00284202	0.00605004	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00256802	0.00525104	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00193501	0.00251102	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00308002	0.00719205	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00452503	0.01095908	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00599304	0.01255709	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00392803	0.00787705	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00676005	0.01255709	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.01147408	0.02317416	0.00000000	0.00000000	0.00000000	0.00000000

BEST AVAILABLE COPY

- ISCLT INPUT DATA (CONT.) -

- VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGREES KELVIN/METER) -

WIND SPEED WIND SPEED WIND SPEED WIND SPEED WIND SPEED WIND SPEED
CATEGORY 1 CATEGORY 2 CATEGORY 3 CATEGORY 4 CATEGORY 5 CATEGORY 6

ABILITY CATEGORY 10.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000
ABILITY CATEGORY 20.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000
ABILITY CATEGORY 30.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000
ABILITY CATEGORY 40.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000.000000E+000
ABILITY CATEGORY 50.200000E-010.200000E-010.200000E-010.200000E-010.200000E-010.200000E-010.200000E-010
ABILITY CATEGORY 60.350000E-010.350000E-010.350000E-010.350000E-010.350000E-010.350000E-010.350000E-010

- WIND PROFILE POWER LAW EXPONENTS -

WIND SPEED WIND SPEED WIND SPEED WIND SPEED WIND SPEED WIND SPEED
CATEGORY 1 CATEGORY 2 CATEGORY 3 CATEGORY 4 CATEGORY 5 CATEGORY 6

ABILITY CATEGORY 10.700000E-010.700000E-010.700000E-010.700000E-010.700000E-010.700000E-010.700000E-010
ABILITY CATEGORY 20.700000E-010.700000E-010.700000E-010.700000E-010.700000E-010.700000E-010.700000E-010
ABILITY CATEGORY 30.100000E+000.100000E+000.100000E+000.100000E+000.100000E+000.100000E+000.100000E+000
ABILITY CATEGORY 40.150000E+000.150000E+000.150000E+000.150000E+000.150000E+000.150000E+000.150000E+000
ABILITY CATEGORY 50.350000E+000.350000E+000.350000E+000.350000E+000.350000E+000.350000E+000.350000E+000
ABILITY CATEGORY 60.550000E+000.550000E+000.550000E+000.550000E+000.550000E+000.550000E+000.550000E+000

- SOURCE INPUT DATA -

SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE ELEVATION (M)
---------------	-------------	------------------	------------------	---------------------	--------------------

- SOURCE DETAILS DEPENDING ON TYPE -

1 STACK 0.00 0.00 10.67 0.00 GAS EXIT TEMP (DEG K)= 530.00, GAS EXIT VEL. (M/SEC)= 52.31, STACK DIAMETER (M)= 0.640, HEIGHT OF ASSO. BLDG. (M)= -9.88, WIDTH OF ASSO. BLDG. (M)= 69.17, WAKE EFFECTS FLAG = 0

- DIRECTION SPECIFIC BUILDING DIMENSIONS -

TOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE
1	9.9,	69.2,	0	2	9.9,	69.2,	0	3	9.9,	69.2,	0	4	9.9,	69.2,	0
5	9.9,	69.2,	0	6	9.9,	69.2,	0	7	9.9,	69.2,	0	8	9.9,	69.2,	0
9	9.9,	69.2,	0	10	9.9,	69.2,	0	11	9.9,	69.2,	0	12	9.9,	69.2,	0
13	9.9,	69.2,	0	14	9.9,	69.2,	0	15	9.9,	69.2,	0	16	9.9,	69.2,	0

- SOURCE STRENGTHS (GRAMS PER SEC) -

SEASON 1	SEASON 2	SEASON 3	SEASON 4
2.22000E+00			

WARNING - HW/HB > 5 FOR SOURCE 1 PROG. USES LATERAL VIRTUAL DIST. FOR UPPER BOUND OF CONCENTRATION (DEPOSITION) IN SECTOR(S): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16.
 LOWER BOUND IS DESIRED SET THE DIRECTION SPECIFIC BUILDING HEIGHT TO < 0 (WAKE EFFECTS FLAG) AND RERUN.

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) DUE TO SOURCE 1 **

- GRID SYSTEM RECEPTORS -

- X AXIS (RANGE , METERS) -

(IS (AZIMUTH BEARING, DEGREES)	30.000	100.000	200.000	300.000	400.000	500.000	750.000	1000.000	1250.000
	- CONCENTRATION -								
360.000	0.061122	0.564343	0.485391	0.369201	0.390673	0.459235	0.459425	0.399561	0.336459
337.500	0.109910	0.666752	0.513343	0.371637	0.368645	0.410913	0.382104	0.319272	0.263585
315.000	0.154959	0.789638	0.601856	0.440678	0.457368	0.535903	0.528158	0.451070	0.374928
292.500	0.195323	0.879440	0.632325	0.451108	0.454734	0.525781	0.511624	0.431335	0.354358
270.000	0.077738	0.580949	0.452410	0.334597	0.353409	0.424842	0.448276	0.409041	0.358156
247.500	0.008961	0.127593	0.113064	0.094028	0.113485	0.158749	0.212294	0.221331	0.210412
225.000	0.027838	0.222331	0.194778	0.157682	0.181441	0.236064	0.278524	0.271662	0.251016
202.500	0.008819	0.117204	0.105805	0.088294	0.106324	0.146403	0.187351	0.188963	0.176249
180.000	0.106997	0.615301	0.479469	0.362636	0.398702	0.500686	0.554863	0.515891	0.459890
157.500	0.104303	0.610744	0.455793	0.328219	0.344200	0.415452	0.433158	0.387376	0.336523
135.000	0.079486	0.431678	0.335481	0.245182	0.262755	0.323438	0.345856	0.312046	0.270957
112.500	0.047338	0.238554	0.182544	0.135043	0.146241	0.179254	0.188659	0.169189	0.147383
90.000	0.077475	0.260393	0.195863	0.145459	0.155740	0.189703	0.199731	0.183133	0.163373
67.500	0.141206	0.374415	0.242302	0.162808	0.158450	0.180349	0.183798	0.170428	0.154149
45.000	0.084541	0.259062	0.180630	0.129182	0.135723	0.163261	0.172303	0.158235	0.140404
22.500	0.048419	0.285415	0.222203	0.163429	0.173751	0.206923	0.206740	0.178476	0.150127

- DISCRETE RECEPTORS -

X RANGE (METERS)	Y AZIMUTH BEARING (DEGREES)	CONCENTRATION	X RANGE (METERS)	Y AZIMUTH BEARING (DEGREES)	CONCENTRATION	X RANGE (METERS)	Y AZIMUTH BEARING (DEGREES)	CONCENTRATION
201.0	10.0	0.364447	210.0	20.0	0.243113	229.0	30.0	0.190689
241.0	40.0	0.165795	204.0	50.0	0.191013	180.0	60.0	0.239207
165.0	70.0	0.273841	158.0	80.0	0.251150	155.0	90.0	0.224952
158.0	100.0	0.213415	165.0	110.0	0.203168	180.0	120.0	0.245269
204.0	130.0	0.296890	241.0	140.0	0.320274	311.0	150.0	0.290920
287.0	160.0	0.343150	271.0	170.0	0.384800	268.0	180.0	0.390808
271.0	190.0	0.263260	146.0	200.0	0.162109	158.0	210.0	0.143881
177.0	220.0	0.181936	180.0	230.0	0.182603	158.0	240.0	0.149486
146.0	250.0	0.167069	140.0	260.0	0.351082	137.0	270.0	0.543091
140.0	280.0	0.641196	146.0	290.0	0.739882	158.0	300.0	0.713969
183.0	310.0	0.639990	216.0	320.0	0.553052	229.0	330.0	0.494553
180.0	340.0	0.542624	201.0	350.0	0.492723	198.0	360.0	0.487901

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) DUE TO SOURCE 1 (CONT.) **

- 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF ALL SOURCES COMBINED -

X COORDINATE RANGE (METERS)	Y COORDINATE AZIMUTH BEARING (DEGREES)	CONCENTRATION
100.00	292.50	0.879440
100.00	315.00	0.789638
146.00	290.00	0.739882
158.00	300.00	0.713969
100.00	337.50	0.666752
140.00	280.00	0.641196
183.00	310.00	0.639990
200.00	292.50	0.632325
100.00	180.00	0.615301
100.00	157.50	0.610744

***** END OF ISCLT PROGRAM, 1 SOURCES PROCESSED *****

BEST AVAILABLE COPY

*** RUN TIME STATISTICS ***

STARTING HOUR,MINUTE,SECOND - - - - - : 09:16:13
STARTING MONTH,DAY,YEAR - - - - - : 10/04/90

ENDING HOUR,MINUTE,SECOND - - - - - : 09:17:26
ENDING MONTH,DAY,YEAR - - - - - : 10/04/90

TOTAL CPU SECONDS - - - - - : 73.

ISCLTK6L MODEL, A VERSION OF
ISCLT (VERSION 90008)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 1. GUIDELINE MODELS.
IN UNAMAP (VERSION 6) JAN 1990.
SOURCE: FILE 7 ON UNAMAP MAGNETIC TAPE FROM NTIS.

CONVERTED BY :
KBN ENGINEERING AND APPLIED SCIENCES, INC.
GAINESVILLE, FLORIDA
(904)331-9000

COPYRIGHT 1990 L

CARD INPUT FILE IS	ER12LT84.I80	
SUMMARY OUTPUT FILE IS	ER12LT84.O80	
TITLE OF RUN IS	1984 ENRON STATION 12 / 35 FT STACK	10-4-90

- ISCLT INPUT DATA (CONT.) -

NUMBER OF SOURCES = 1
 NUMBER OF X AXIS GRID SYSTEM POINTS = 9
 NUMBER OF Y AXIS GRID SYSTEM POINTS = 16
 NUMBER OF SPECIAL POINTS = 36
 NUMBER OF SEASONS = 1
 NUMBER OF WIND SPEED CLASSES = 6
 NUMBER OF STABILITY CLASSES = 6
 NUMBER OF WIND DIRECTION CLASSES = 16
 FILE NUMBER OF DATA FILE USED FOR REPORTS = 1
 THE PROGRAM IS RUN IN RURAL MODE
 CONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR = 0.10000000E+07
 ACCELERATION OF GRAVITY (METERS/SEC**2) = 9.800
 HEIGHT OF MEASUREMENT OF WIND SPEED (METERS) = 6.710
 CORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTH (DEGREES) = 0.000
 DECAY COEFFICIENT = 0.00000000E+00
 PROGRAM OPTION SWITCHES = 1, 2, 2, 0, 0, 3, 2, 1, 3, 2, 2, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0,

RANGE X AXIS GRID SYSTEM POINTS (METERS)=	30.00,	100.00,	200.00,	300.00,	400.00,	500.00,				
750.00,	1000.00,	1250.00,								
RANGE X SPECIAL DISCRETE POINTS (METERS)=	201.00,	210.00,	229.00,	241.00,	204.00,	180.00,				
165.00,	158.00,	155.00,	158.00,	165.00,	180.00,	204.00,	241.00,	311.00,	287.00,	
271.00,	268.00,	271.00,	146.00,	158.00,	177.00,	180.00,	158.00,	146.00,	140.00,	
137.00,	140.00,	146.00,	158.00,	183.00,	216.00,	229.00,	180.00,	201.00,	198.00,	
AZIMUTH BEARING Y AXIS GRID SYSTEM POINTS (DEGREES)=	22.50,	45.00,	67.50,	90.00,	112.50,	135.00,				
157.50,	180.00,	202.50,	225.00,	247.50,	270.00,	292.50,	315.00,	337.50,	360.00,	
AZIMUTH BEARING Y SPECIAL DISCRETE POINTS (DEGREES)=	10.00,	20.00,	30.00,	40.00,	50.00,	60.00,				
70.00,	80.00,	90.00,	100.00,	110.00,	120.00,	130.00,	140.00,	150.00,	160.00,	
170.00,	180.00,	190.00,	200.00,	210.00,	220.00,	230.00,	240.00,	250.00,	260.00,	
270.00,	280.00,	290.00,	300.00,	310.00,	320.00,	330.00,	340.00,	350.00,	360.00,	

- AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -

	STABILITY	STABILITY	STABILITY	STABILITY	STABILITY	STABILITY
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
SEASON 1	298.0000	298.0000	298.0000	293.0000	288.0000	288.0000

- MIXING LAYER HEIGHT (METERS) -

	SEASON 1					
	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
ABILITY CATEGORY 10.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.
ABILITY CATEGORY 20.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
ABILITY CATEGORY 30.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
ABILITY CATEGORY 40.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
ABILITY CATEGORY 50.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.
ABILITY CATEGORY 60.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 1

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00044000	0.00068300	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00004700	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00004700	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00025400	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00014000	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00014000	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00018600	0.00045500	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00009300	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00023300	0.00056900	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00014000	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00009300	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00004700	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00009300	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00009300	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00014000	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00009300	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 2

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00054300	0.00409799	0.00239099	0.00000000	0.00000000	0.00000000
22.500	0.00058500	0.00204899	0.00091100	0.00000000	0.00000000	0.00000000
45.000	0.00018500	0.00182099	0.00113800	0.00000000	0.00000000	0.00000000
67.500	0.00024300	0.00239099	0.00159400	0.00000000	0.00000000	0.00000000
90.000	0.00024300	0.00239099	0.00261799	0.00000000	0.00000000	0.00000000
112.500	0.00032200	0.00193499	0.00364299	0.00000000	0.00000000	0.00000000
135.000	0.00039200	0.00261799	0.00284599	0.00000000	0.00000000	0.00000000
157.500	0.00018500	0.00182099	0.00216299	0.00000000	0.00000000	0.00000000
180.000	0.00046000	0.00204899	0.00387099	0.00000000	0.00000000	0.00000000
202.500	0.00007000	0.00068300	0.00034200	0.00000000	0.00000000	0.00000000
225.000	0.00044600	0.00068300	0.00102500	0.00000000	0.00000000	0.00000000
247.500	0.00019500	0.00068300	0.00045500	0.00000000	0.00000000	0.00000000
270.000	0.00030900	0.00056900	0.00068300	0.00000000	0.00000000	0.00000000
292.500	0.00011600	0.00113800	0.00113800	0.00000000	0.00000000	0.00000000
315.000	0.00073400	0.00227699	0.00068300	0.00000000	0.00000000	0.00000000
337.500	0.00043600	0.00182099	0.00148000	0.00000000	0.00000000	0.00000000

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 3

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.500MPS)	WIND SPEED CATEGORY 2 (2.500MPS)	WIND SPEED CATEGORY 3 (4.300MPS)	WIND SPEED CATEGORY 4 (6.800MPS)	WIND SPEED CATEGORY 5 (9.500MPS)	WIND SPEED CATEGORY 6 (12.500MPS)
0.000	0.00034300	0.00330099	0.01081497	0.00170799	0.00011400	0.00000000
22.500	0.00031500	0.00182099	0.00307399	0.00045500	0.00000000	0.00000000
45.000	0.00051200	0.00250499	0.00375699	0.00034200	0.00000000	0.00000000
67.500	0.00028400	0.00273199	0.00364299	0.00011400	0.00000000	0.00000000
90.000	0.00033900	0.00204899	0.00546398	0.00113800	0.00000000	0.00000000
112.500	0.00013000	0.00125200	0.00694398	0.00352899	0.00000000	0.00000000
135.000	0.00014200	0.00136600	0.00774098	0.00375699	0.00000000	0.00000000
157.500	0.00009500	0.00091100	0.00796898	0.00250499	0.00000000	0.00000000
180.000	0.00022000	0.00091100	0.01149796	0.00591998	0.00000000	0.00000000
202.500	0.00005900	0.00056900	0.00330099	0.00148000	0.00000000	0.00000000
225.000	0.00010600	0.00102500	0.00273199	0.00045500	0.00000000	0.00000000
247.500	0.00005900	0.00056900	0.00159400	0.00022800	0.00000000	0.00000000
270.000	0.00013000	0.00125200	0.00239099	0.00091100	0.00000000	0.00000000
292.500	0.00015400	0.00148000	0.00295999	0.00045500	0.00000000	0.00000000
315.000	0.00016600	0.00159400	0.00284599	0.00136600	0.00000000	0.00000000
337.500	0.00047600	0.00216299	0.00580598	0.00079700	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 4

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.500MPS)	WIND SPEED CATEGORY 2 (2.500MPS)	WIND SPEED CATEGORY 3 (4.300MPS)	WIND SPEED CATEGORY 4 (6.800MPS)	WIND SPEED CATEGORY 5 (9.500MPS)	WIND SPEED CATEGORY 6 (12.500MPS)
0.000	0.00149500	0.00990397	0.01810094	0.01832894	0.00034200	0.00000000
22.500	0.00065100	0.00648898	0.00922097	0.00307399	0.00000000	0.00000000
45.000	0.00067400	0.00671698	0.01001797	0.00148000	0.00000000	0.00000000
67.500	0.00071900	0.00466799	0.01070097	0.00125200	0.00000000	0.00000000
90.000	0.00116300	0.00535098	0.01730395	0.00853797	0.00011400	0.00000000
112.500	0.00049100	0.00364299	0.01468595	0.01855594	0.00125200	0.00000000
135.000	0.00021700	0.00216299	0.01479995	0.01923994	0.00079700	0.00034200
157.500	0.00022900	0.00227699	0.01388896	0.01639295	0.00000000	0.00022800
180.000	0.00075200	0.00250499	0.01616595	0.02174393	0.00091100	0.00000000
202.500	0.00012600	0.00125200	0.00739998	0.00774098	0.00022800	0.00011400
225.000	0.00029700	0.00295999	0.00739998	0.00717198	0.00079700	0.00011400
247.500	0.00031900	0.00193499	0.00591998	0.00466799	0.00045500	0.00000000
270.000	0.00047900	0.00227699	0.00478098	0.00455399	0.00022800	0.00000000
292.500	0.00024000	0.00239099	0.00295999	0.00591998	0.00113800	0.00022800
315.000	0.00025100	0.00250499	0.00387099	0.00819698	0.00159400	0.00022800
337.500	0.00054800	0.00421199	0.00819698	0.01650695	0.00193499	0.00000000

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 5

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.500MPS)	WIND SPEED CATEGORY 2 (2.500MPS)	WIND SPEED CATEGORY 3 (4.300MPS)	WIND SPEED CATEGORY 4 (6.800MPS)	WIND SPEED CATEGORY 5 (9.500MPS)	WIND SPEED CATEGORY 6 (12.500MPS)
0.000	0.00000000	0.00910697	0.01388896	0.00000000	0.00000000	0.00000000
22.500	0.00000000	0.00466799	0.00295999	0.00000000	0.00000000	0.00000000
45.000	0.00000000	0.00694398	0.00375699	0.00000000	0.00000000	0.00000000
67.500	0.00000000	0.00455399	0.00512298	0.00000000	0.00000000	0.00000000
90.000	0.00000000	0.00432599	0.00569198	0.00000000	0.00000000	0.00000000
112.500	0.00000000	0.00421199	0.00341499	0.00000000	0.00000000	0.00000000
135.000	0.00000000	0.00352899	0.00569198	0.00000000	0.00000000	0.00000000
157.500	0.00000000	0.00421199	0.00535098	0.00000000	0.00000000	0.00000000
180.000	0.00000000	0.00535098	0.00626098	0.00000000	0.00000000	0.00000000
202.500	0.00000000	0.00273199	0.00330099	0.00000000	0.00000000	0.00000000
225.000	0.00000000	0.00421199	0.00489498	0.00000000	0.00000000	0.00000000
247.500	0.00000000	0.00330099	0.00455399	0.00000000	0.00000000	0.00000000
270.000	0.00000000	0.00307399	0.00375699	0.00000000	0.00000000	0.00000000
292.500	0.00000000	0.00216299	0.00409799	0.00000000	0.00000000	0.00000000
315.000	0.00000000	0.00341499	0.00295999	0.00000000	0.00000000	0.00000000
337.500	0.00000000	0.00637498	0.00887997	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 6

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.500MPS)	WIND SPEED CATEGORY 2 (2.500MPS)	WIND SPEED CATEGORY 3 (4.300MPS)	WIND SPEED CATEGORY 4 (6.800MPS)	WIND SPEED CATEGORY 5 (9.500MPS)	WIND SPEED CATEGORY 6 (12.500MPS)
0.000	0.01114097	0.02902991	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00517398	0.01331996	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00566698	0.01343396	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00355099	0.00842397	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00287299	0.00546398	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00185199	0.00375699	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00234099	0.00614798	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00226599	0.00591998	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00234099	0.00614798	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00234299	0.00523698	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00332399	0.00819698	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00430599	0.01070097	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00483599	0.01138396	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00309799	0.00705798	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00453399	0.01047397	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00751998	0.01627995	0.00000000	0.00000000	0.00000000	0.00000000

BEST AVAILABLE COPY

- ISCLT INPUT DATA (CONT.) -

- VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGREES KELVIN/METER) -

	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
3ILITY CATEGORY 10.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
3ILITY CATEGORY 20.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
3ILITY CATEGORY 30.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
3ILITY CATEGORY 40.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
3ILITY CATEGORY 50.	0.200000E-010.	0.200000E-010.	0.200000E-010.	0.200000E-010.	0.200000E-010.	0.200000E-010.
3ILITY CATEGORY 60.	0.350000E-010.	0.350000E-010.	0.350000E-010.	0.350000E-010.	0.350000E-010.	0.350000E-010.

- WIND PROFILE POWER LAW EXPONENTS -

	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
3ILITY CATEGORY 10.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.
3ILITY CATEGORY 20.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.
3ILITY CATEGORY 30.	0.100000E+000.	0.100000E+000.	0.100000E+000.	0.100000E+000.	0.100000E+000.	0.100000E+000.
3ILITY CATEGORY 40.	0.150000E+000.	0.150000E+000.	0.150000E+000.	0.150000E+000.	0.150000E+000.	0.150000E+000.
3ILITY CATEGORY 50.	0.350000E+000.	0.350000E+000.	0.350000E+000.	0.350000E+000.	0.350000E+000.	0.350000E+000.
3ILITY CATEGORY 60.	0.550000E+000.	0.550000E+000.	0.550000E+000.	0.550000E+000.	0.550000E+000.	0.550000E+000.

BEST AVAILABLE COPY

- SOURCE INPUT DATA -

SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE ELEVATION (M)
---------------	-------------	------------------	------------------	---------------------	--------------------

- SOURCE DETAILS DEPENDING ON TYPE -

1 STACK 0.00 0.00 10.67 0.00 GAS EXIT TEMP (DEG K)= 530.00, GAS EXIT VEL. (M/SEC)= 52.31, STACK DIAMETER (M)= 0.640, HEIGHT OF ASSO. BLDG. (M)= -9.88, WIDTH OF ASSO. BLDG. (M)= 69.17, WAKE EFFECTS FLAG = 0

- DIRECTION SPECIFIC BUILDING DIMENSIONS -

SECTOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE
1	9.9	69.2	0	2	9.9	69.2	0	3	9.9	69.2	0	4	9.9	69.2	0
5	9.9	69.2	0	6	9.9	69.2	0	7	9.9	69.2	0	8	9.9	69.2	0
9	9.9	69.2	0	10	9.9	69.2	0	11	9.9	69.2	0	12	9.9	69.2	0
13	9.9	69.2	0	14	9.9	69.2	0	15	9.9	69.2	0	16	9.9	69.2	0

- SOURCE STRENGTHS (GRAMS PER SEC) -
 SEASON 1 SEASON 2 SEASON 3 SEASON 4
 2.22000E+00

WARNING - HW/HB > 5 FOR SOURCE 1 PROG. USES LATERAL VIRTUAL DIST. FOR UPPER BOUND OF CONCENTRATION (DEPOSITION) IN SECTOR(S): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16.
 LOWER BOUND IS DESIRED SET THE DIRECTION SPECIFIC BUILDING HEIGHT TO < 0 (WAKE EFFECTS FLAG) AND RERUN.

BEST AVAILABLE COPY

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) DUE TO SOURCE 1 **

- GRID SYSTEM RECEPTORS -

- X AXIS (RANGE , METERS) -

30.000 100.000 200.000 300.000 400.000 500.000 750.000 1000.000 1250.000

XIS (AZIMUTH BEARING, DEGREES)

- CONCENTRATION -

360.000	0.077175	1.033739	0.850601	0.619383	0.638425	0.741117	0.722926	0.616441	0.512854
337.500	0.048801	0.576625	0.488275	0.362589	0.390258	0.477147	0.500059	0.443089	0.376789
315.000	0.119490	0.845947	0.668129	0.481268	0.498864	0.590253	0.596901	0.519596	0.436772
292.500	0.095432	0.870353	0.677476	0.483073	0.493126	0.574469	0.572550	0.496307	0.416483
270.000	0.014435	0.376382	0.322827	0.246109	0.267476	0.332116	0.378168	0.363146	0.324671
247.500	0.001040	0.125844	0.119512	0.101240	0.118698	0.157676	0.199552	0.205661	0.192939
225.000	0.001300	0.115708	0.111469	0.093100	0.108323	0.143437	0.184421	0.193306	0.185581
202.500	0.002609	0.133332	0.122777	0.098797	0.114488	0.152420	0.192095	0.194878	0.182289
180.000	0.042922	0.606487	0.526448	0.405325	0.458473	0.584069	0.642918	0.594411	0.528135
157.500	0.136167	0.643870	0.463174	0.326701	0.347433	0.427143	0.449332	0.402336	0.350969
135.000	0.142976	0.482692	0.329594	0.227686	0.231212	0.272959	0.274423	0.237664	0.201819
112.500	0.111922	0.366121	0.250451	0.175021	0.178247	0.208661	0.206912	0.180621	0.155475
90.000	0.018409	0.195996	0.161566	0.119603	0.127033	0.153197	0.164573	0.154151	0.139055
67.500	0.032660	0.173250	0.128157	0.091860	0.099523	0.125872	0.146443	0.143910	0.133294
45.000	0.073859	0.320494	0.231826	0.164286	0.171860	0.208131	0.226489	0.213097	0.191284
22.500	0.038577	0.278427	0.229214	0.168531	0.180860	0.220545	0.233719	0.211725	0.183693

- DISCRETE RECEPTORS -

X	Y	CONCENTRATION	X	Y	CONCENTRATION	X	Y	CONCENTRATION
NGE	AZIMUTH		RANGE	AZIMUTH		RANGE	AZIMUTH	
ETERS) (DEGREES)	BEARING		(METERS)	BEARING		(METERS)	BEARING	
				(DEGREES)			(DEGREES)	

201.0	10.0	0.568699	210.0	20.0	0.287768	229.0	30.0	0.210743
241.0	40.0	0.202676	204.0	50.0	0.205420	180.0	60.0	0.172251
165.0	70.0	0.146345	158.0	80.0	0.163908	155.0	90.0	0.182163
158.0	100.0	0.228953	165.0	110.0	0.273109	180.0	120.0	0.296747
204.0	130.0	0.306552	241.0	140.0	0.309933	311.0	150.0	0.284212
287.0	160.0	0.346535	271.0	170.0	0.413847	268.0	180.0	0.434221
271.0	190.0	0.296585	146.0	200.0	0.181821	158.0	210.0	0.125991
177.0	220.0	0.117228	180.0	230.0	0.115757	158.0	240.0	0.122564
146.0	250.0	0.153180	140.0	260.0	0.259374	137.0	270.0	0.371794
140.0	280.0	0.560223	146.0	290.0	0.751579	158.0	300.0	0.762117
183.0	310.0	0.702584	216.0	320.0	0.596894	229.0	330.0	0.503572
180.0	340.0	0.554481	201.0	350.0	0.682379	198.0	360.0	0.855650

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) DUE TO SOURCE 1 (CONT.) **

- 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF ALL SOURCES COMBINED -

X COORDINATE RANGE (METERS)	Y COORDINATE AZIMUTH BEARING (DEGREES)	CONCENTRATION
100.00	360.00	1.033739
100.00	292.50	0.870353
198.00	360.00	0.855650
200.00	360.00	0.850601
100.00	315.00	0.845947
158.00	300.00	0.762117
146.00	290.00	0.751579
500.00	360.00	0.741117
750.00	360.00	0.722926
183.00	310.00	0.702584

***** END OF ISCLT PROGRAM, 1 SOURCES PROCESSED *****

*** RUN TIME STATISTICS ***

ENDING HOUR,MINUTE,SECOND - - - - - : 09:17:26
ENDING MONTH,DAY,YEAR - - - - - : 10/04/90

STARTING HOUR,MINUTE,SECOND - - - - - : 09:18:38
STARTING MONTH,DAY,YEAR - - - - - : 10/04/90

TOTAL CPU SECONDS - - - - - : 72.

ISCLTK6L MODEL, A VERSION OF
ISCLT (VERSION 90008)
AN AIR QUALITY DISPERSION MODEL IN
SECTION 1. GUIDELINE MODELS.
IN UNAMAP (VERSION 6) JAN 1990.
SOURCE: FILE 7 ON UNAMAP MAGNETIC TAPE FROM NTIS.

CONVERTED BY :
KBN ENGINEERING AND APPLIED SCIENCES, INC.
GAINESVILLE, FLORIDA
(904)331-9000

COPYRIGHT 1990 L

CARD INPUT FILE IS	ER12LT85.I80	
SUMMARY OUTPUT FILE IS	ER12LT85.O80	
TITLE OF RUN IS	1985 ENRON STATION 12 / 35 FT STACK	10-4-90

- ISCLT INPUT DATA (CONT.) -

NUMBER OF SOURCES = 1
 NUMBER OF X AXIS GRID SYSTEM POINTS = 9
 NUMBER OF Y AXIS GRID SYSTEM POINTS = 16
 NUMBER OF SPECIAL POINTS = 36
 NUMBER OF SEASONS = 1
 NUMBER OF WIND SPEED CLASSES = 6
 NUMBER OF STABILITY CLASSES = 6
 NUMBER OF WIND DIRECTION CLASSES = 16
 FILE NUMBER OF DATA FILE USED FOR REPORTS = 1
 THE PROGRAM IS RUN IN RURAL MODE
 CONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR = 0.10000000E+07
 ACCELERATION OF GRAVITY (METERS/SEC**2) = 9.800
 HEIGHT OF MEASUREMENT OF WIND SPEED (METERS) = 6.710
 CORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTH (DEGREES) = 0.000
 DECAY COEFFICIENT = 0.00000000E+00
 PROGRAM OPTION SWITCHES = 1, 2, 2, 0, 0, 3, 2, 1, 3, 2, 2, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0,

RANGE X AXIS GRID SYSTEM POINTS (METERS) =	30.00,	100.00,	200.00,	300.00,	400.00,	500.00,				
750.00,	1000.00,	1250.00,								
RANGE X SPECIAL DISCRETE POINTS (METERS) =	201.00,	210.00,	229.00,	241.00,	204.00,	180.00,				
165.00,	158.00,	155.00,	158.00,	165.00,	180.00,	204.00,	241.00,	311.00,	287.00,	
271.00,	268.00,	271.00,	146.00,	158.00,	177.00,	180.00,	158.00,	146.00,	140.00,	
137.00,	140.00,	146.00,	158.00,	183.00,	216.00,	229.00,	180.00,	201.00,	198.00,	
IMUTH BEARING Y AXIS GRID SYSTEM POINTS (DEGREES) =	22.50,	45.00,	67.50,	90.00,	112.50,	135.00,				
157.50,	180.00,	202.50,	225.00,	247.50,	270.00,	292.50,	315.00,	337.50,	360.00,	
IMUTH BEARING Y SPECIAL DISCRETE POINTS (DEGREES) =	10.00,	20.00,	30.00,	40.00,	50.00,	60.00,				
70.00,	80.00,	90.00,	100.00,	110.00,	120.00,	130.00,	140.00,	150.00,	160.00,	
170.00,	180.00,	190.00,	200.00,	210.00,	220.00,	230.00,	240.00,	250.00,	260.00,	
270.00,	280.00,	290.00,	300.00,	310.00,	320.00,	330.00,	340.00,	350.00,	360.00,	

- AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -

	STABILITY	STABILITY	STABILITY	STABILITY	STABILITY	STABILITY
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
SEASON 1	298.0000	298.0000	298.0000	293.0000	288.0000	288.0000

- MIXING LAYER HEIGHT (METERS) -

SEASON 1

	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
STABILITY CATEGORY 10.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.	1.65300E+040.
STABILITY CATEGORY 20.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
STABILITY CATEGORY 30.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
STABILITY CATEGORY 40.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.	1.10200E+040.
STABILITY CATEGORY 50.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.
STABILITY CATEGORY 60.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.	1.00000E+050.

BEST AVAILABLE COPY

- SOURCE INPUT DATA -

SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE ELEVATION (M)
1	STACK	0.00	0.00	10.67	0.00

- SOURCE DETAILS DEPENDING ON TYPE -

1 STACK 0.00 0.00 10.67 0.00 GAS EXIT TEMP (DEG K)= 530.00, GAS EXIT VEL. (M/SEC)= 52.31,
 STACK DIAMETER (M)= 0.640, HEIGHT OF ASSO. BLDG. (M)= -9.88, WIDTH OF ASSO. BLDG. (M)= 69.17, WAKE EFFECTS FLAG = 0

- DIRECTION SPECIFIC BUILDING DIMENSIONS -

DR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE
1	9.9,	69.2,	0	2	9.9,	69.2,	0	3	9.9,	69.2,	0	4	9.9,	69.2,	0
5	9.9,	69.2,	0	6	9.9,	69.2,	0	7	9.9,	69.2,	0	8	9.9,	69.2,	0
9	9.9,	69.2,	0	10	9.9,	69.2,	0	11	9.9,	69.2,	0	12	9.9,	69.2,	0
13	9.9,	69.2,	0	14	9.9,	69.2,	0	15	9.9,	69.2,	0	16	9.9,	69.2,	0

- SOURCE STRENGTHS (GRAMS PER SEC) -

SEASON 1 SEASON 2 SEASON 3 SEASON 4
 2.22000E+00

ING - HW/HB > 5 FOR SOURCE 1 PROG. USES LATERAL VIRTUAL DIST. FOR UPPER BOUND OF CONCENTRATION (DEPOSITION) IN SECTOR(S):

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16.

LOWER BOUND IS DESIRED SET THE DIRECTION SPECIFIC BUILDING HEIGHT TO < 0 (WAKE EFFECTS FLAG) AND RERUN.

BEST AVAILABLE COPY

- ISCLT INPUT DATA (CONT.) -

- VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGREES KELVIN/METER) -

	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
ILITY CATEGORY 10.	000000E+000.	000000E+000.	000000E+000.	000000E+000.	000000E+000.	000000E+000.
ILITY CATEGORY 20.	000000E+000.	000000E+000.	000000E+000.	000000E+000.	000000E+000.	000000E+000.
ILITY CATEGORY 30.	000000E+000.	000000E+000.	000000E+000.	000000E+000.	000000E+000.	000000E+000.
ILITY CATEGORY 40.	000000E+000.	000000E+000.	000000E+000.	000000E+000.	000000E+000.	000000E+000.
ILITY CATEGORY 50.	200000E-010.	200000E-010.	200000E-010.	200000E-010.	200000E-010.	200000E-010.
ILITY CATEGORY 60.	350000E-010.	350000E-010.	350000E-010.	350000E-010.	350000E-010.	350000E-010.

- WIND PROFILE POWER LAW EXPONENTS -

	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
ILITY CATEGORY 10.	700000E-010.	700000E-010.	700000E-010.	700000E-010.	700000E-010.	700000E-010.
ILITY CATEGORY 20.	700000E-010.	700000E-010.	700000E-010.	700000E-010.	700000E-010.	700000E-010.
ILITY CATEGORY 30.	100000E+000.	100000E+000.	100000E+000.	100000E+000.	100000E+000.	100000E+000.
ILITY CATEGORY 40.	150000E+000.	150000E+000.	150000E+000.	150000E+000.	150000E+000.	150000E+000.
ILITY CATEGORY 50.	350000E+000.	350000E+000.	350000E+000.	350000E+000.	350000E+000.	350000E+000.
ILITY CATEGORY 60.	550000E+000.	550000E+000.	550000E+000.	550000E+000.	550000E+000.	550000E+000.

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 1

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00008600	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00008600	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00008600	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00008600	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00017100	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00017100	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00028500	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00051400	0.00068500	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00037100	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00008600	0.00011400	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00034200	0.00045700	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00034200	0.00045700	0.00000000	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 2

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00055900	0.00308200	0.00285400	0.00000000	0.00000000	0.00000000
22.500	0.00022900	0.00171200	0.00091300	0.00000000	0.00000000	0.00000000
45.000	0.00035100	0.00171200	0.00091300	0.00000000	0.00000000	0.00000000
67.500	0.00038700	0.00228300	0.00091300	0.00000000	0.00000000	0.00000000
90.000	0.00059600	0.00559400	0.00342500	0.00000000	0.00000000	0.00000000
112.500	0.00093700	0.00331100	0.00331100	0.00000000	0.00000000	0.00000000
135.000	0.00030900	0.00296800	0.00353900	0.00000000	0.00000000	0.00000000
157.500	0.00021500	0.00148400	0.00205500	0.00000000	0.00000000	0.00000000
180.000	0.00022900	0.00171200	0.00331100	0.00000000	0.00000000	0.00000000
202.500	0.00015700	0.00057100	0.00079900	0.00000000	0.00000000	0.00000000
225.000	0.00017900	0.00091300	0.00057100	0.00000000	0.00000000	0.00000000
247.500	0.00018600	0.00102700	0.00045700	0.00000000	0.00000000	0.00000000
270.000	0.00024400	0.00194100	0.00159800	0.00000000	0.00000000	0.00000000
292.500	0.00016500	0.00068500	0.00091300	0.00000000	0.00000000	0.00000000
315.000	0.00038000	0.00216900	0.00171200	0.00000000	0.00000000	0.00000000
337.500	0.00035800	0.00182600	0.00148400	0.00000000	0.00000000	0.00000000

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 3

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.500MPS)	WIND SPEED CATEGORY 2 (2.500MPS)	WIND SPEED CATEGORY 3 (4.300MPS)	WIND SPEED CATEGORY 4 (6.800MPS)	WIND SPEED CATEGORY 5 (9.500MPS)	WIND SPEED CATEGORY 6 (12.500MPS)
0.000	0.00103800	0.00513700	0.00856200	0.00182600	0.00000000	0.00000000
22.500	0.00032800	0.00194100	0.00251100	0.00034200	0.00000000	0.00000000
45.000	0.00063200	0.00365300	0.00365300	0.00022800	0.00000000	0.00000000
67.500	0.00038700	0.00251100	0.00433800	0.00045700	0.00000000	0.00000000
90.000	0.00065100	0.00262600	0.00570800	0.00102700	0.00000000	0.00000000
112.500	0.00019000	0.00182600	0.00559400	0.00251100	0.00011400	0.00000000
135.000	0.00024900	0.00239700	0.00730600	0.00285400	0.00000000	0.00000000
157.500	0.00010700	0.00102700	0.00582200	0.00171200	0.00000000	0.00000000
180.000	0.00056000	0.00296800	0.00890400	0.00331100	0.00000000	0.00000000
202.500	0.00016600	0.00159800	0.00353900	0.00137000	0.00000000	0.00000000
225.000	0.00009500	0.00091300	0.00182600	0.00068500	0.00000000	0.00000000
247.500	0.00038200	0.00125600	0.00228300	0.00022800	0.00000000	0.00000000
270.000	0.00010700	0.00102700	0.00285400	0.00068500	0.00000000	0.00000000
292.500	0.00007100	0.00068500	0.00285400	0.00034200	0.00000000	0.00000000
315.000	0.00054400	0.00159800	0.00342500	0.00034200	0.00011400	0.00000000
337.500	0.00020200	0.00194100	0.00559400	0.00079900	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 4

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.500MPS)	WIND SPEED CATEGORY 2 (2.500MPS)	WIND SPEED CATEGORY 3 (4.300MPS)	WIND SPEED CATEGORY 4 (6.800MPS)	WIND SPEED CATEGORY 5 (9.500MPS)	WIND SPEED CATEGORY 6 (12.500MPS)
0.000	0.00216200	0.00776300	0.01700900	0.01860700	0.00137000	0.00011400
22.500	0.00105000	0.00547900	0.00513700	0.00285400	0.00011400	0.00011400
45.000	0.00183600	0.00821900	0.00627900	0.00102700	0.00011400	0.00022800
67.500	0.00114900	0.00616400	0.00742000	0.00262600	0.00034200	0.00000000
90.000	0.00203200	0.00776300	0.01187200	0.01016000	0.00057100	0.00022800
112.500	0.00098500	0.00593600	0.01130100	0.01632400	0.00057100	0.00034200
135.000	0.00059000	0.00228300	0.00856200	0.01609600	0.00102700	0.00034200
157.500	0.00037700	0.00171200	0.00970300	0.01141600	0.00022800	0.00022800
180.000	0.00059200	0.00411000	0.01484000	0.02328800	0.00205500	0.00011400
202.500	0.00031200	0.00216900	0.00662100	0.00799100	0.00045700	0.00011400
225.000	0.00059000	0.00228300	0.00684900	0.00490900	0.00068500	0.00011400
247.500	0.00050900	0.00262600	0.00525100	0.00490900	0.00022800	0.00011400
270.000	0.00047700	0.00331100	0.00742000	0.00365300	0.00000000	0.00000000
292.500	0.00039400	0.00274000	0.00456600	0.00639300	0.00079900	0.00045700
315.000	0.00042700	0.00296800	0.00570800	0.00958900	0.00114200	0.00000000
337.500	0.00067200	0.00285400	0.01095900	0.01655300	0.00216900	0.00011400

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 5

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00000000	0.01016000	0.00901800	0.00000000	0.00000000	0.00000000
22.500	0.00000000	0.00456600	0.00148400	0.00000000	0.00000000	0.00000000
45.000	0.00000000	0.00696300	0.00376700	0.00000000	0.00000000	0.00000000
67.500	0.00000000	0.00570800	0.00422400	0.00000000	0.00000000	0.00000000
90.000	0.00000000	0.00559400	0.00365300	0.00000000	0.00000000	0.00000000
112.500	0.00000000	0.00411000	0.00228300	0.00000000	0.00000000	0.00000000
135.000	0.00000000	0.00365300	0.00433800	0.00000000	0.00000000	0.00000000
157.500	0.00000000	0.00411000	0.00296800	0.00000000	0.00000000	0.00000000
180.000	0.00000000	0.00502300	0.00388100	0.00000000	0.00000000	0.00000000
202.500	0.00000000	0.00570800	0.00285400	0.00000000	0.00000000	0.00000000
225.000	0.00000000	0.00536500	0.00502300	0.00000000	0.00000000	0.00000000
247.500	0.00000000	0.00468000	0.00365300	0.00000000	0.00000000	0.00000000
270.000	0.00000000	0.00285400	0.00365300	0.00000000	0.00000000	0.00000000
292.500	0.00000000	0.00262600	0.00285400	0.00000000	0.00000000	0.00000000
315.000	0.00000000	0.00433800	0.00353900	0.00000000	0.00000000	0.00000000
337.500	0.00000000	0.00559400	0.00856200	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 6

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.01622200	0.02637000	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00709500	0.00936100	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00839700	0.01290000	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00827000	0.01415500	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00562100	0.00696300	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00442900	0.00525100	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00346900	0.00605000	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00243800	0.00433800	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00442400	0.00719200	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00394000	0.00719200	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00584700	0.01141600	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00405700	0.00981700	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00410900	0.00799100	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00398000	0.00650700	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00499000	0.00856200	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00814400	0.01541100	0.00000000	0.00000000	0.00000000	0.00000000

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) DUE TO SOURCE 1 **

- GRID SYSTEM RECEPTORS -

- X AXIS (RANGE , METERS) -

(IS (AZIMUTH BEARING, DEGREES)	30.000	100.000	200.000	300.000	400.000	500.000	750.000	1000.000	1250.000
360.000	0.167491	1.036142	0.785615	0.559726	0.579971	0.685117	0.684739	0.591445	0.496368
337.500	0.059021	0.469646	0.379616	0.277311	0.292515	0.352939	0.366792	0.323542	0.274413
315.000	0.131260	0.811760	0.622245	0.445261	0.457875	0.537854	0.528639	0.447576	0.370671
292.500	0.108425	0.738987	0.572701	0.410022	0.423072	0.502247	0.510825	0.443990	0.373497
270.000	0.079540	0.533473	0.418320	0.311734	0.335490	0.415750	0.445945	0.400576	0.345684
247.500	0.023946	0.170630	0.145397	0.116096	0.133606	0.174730	0.208192	0.204493	0.189503
225.000	0.042993	0.137351	0.112879	0.090717	0.102617	0.133390	0.166973	0.173636	0.168190
202.500	0.027057	0.153736	0.125612	0.096656	0.107246	0.136750	0.157383	0.151149	0.138493
180.000	0.119795	0.766772	0.589364	0.426166	0.455154	0.562027	0.617487	0.572778	0.508291
157.500	0.168479	0.690996	0.487972	0.343175	0.362904	0.444296	0.467514	0.420084	0.365170
135.000	0.086224	0.434145	0.316476	0.227443	0.241705	0.294187	0.301322	0.264388	0.227018
112.500	0.125773	0.347160	0.235541	0.163121	0.166183	0.196426	0.200134	0.177719	0.153988
90.000	0.003152	0.194633	0.170581	0.132670	0.145890	0.181528	0.197644	0.184169	0.163895
67.500	0.035885	0.167700	0.129364	0.094902	0.105725	0.137160	0.161341	0.156555	0.144052
45.000	0.065031	0.254315	0.178304	0.123273	0.126171	0.153118	0.173733	0.170035	0.157653
22.500	0.053264	0.330181	0.256145	0.182589	0.190616	0.229715	0.245231	0.224053	0.196925

- DISCRETE RECEPTORS -

X GE TERS)	Y AZIMUTH BEARING (DEGREES)	CONCENTRATION	X RANGE (METERS)	Y AZIMUTH BEARING (DEGREES)	CONCENTRATION	X RANGE (METERS)	Y AZIMUTH BEARING (DEGREES)	CONCENTRATION
201.0	10.0	0.545144	210.0	20.0	0.303480	229.0	30.0	0.209299
241.0	40.0	0.169372	204.0	50.0	0.164431	180.0	60.0	0.154213
165.0	70.0	0.146794	158.0	80.0	0.167282	155.0	90.0	0.188996
158.0	100.0	0.225259	165.0	110.0	0.259044	180.0	120.0	0.280024
204.0	130.0	0.293741	241.0	140.0	0.310558	311.0	150.0	0.294803
287.0	160.0	0.364886	271.0	170.0	0.438841	268.0	180.0	0.464526
271.0	190.0	0.313018	146.0	200.0	0.202173	158.0	210.0	0.133265
177.0	220.0	0.121271	180.0	230.0	0.124544	158.0	240.0	0.145904
146.0	250.0	0.196878	140.0	260.0	0.345558	137.0	270.0	0.501533
140.0	280.0	0.576050	146.0	290.0	0.655408	158.0	300.0	0.668117
183.0	310.0	0.642578	216.0	320.0	0.539217	229.0	330.0	0.420626
180.0	340.0	0.448404	201.0	350.0	0.599361	198.0	360.0	0.790699

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) DUE TO SOURCE 1 (CONT.) **

- 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF ALL SOURCES COMBINED -

X COORDINATE RANGE (METERS)	Y COORDINATE AZIMUTH BEARING (DEGREES)	CONCENTRATION
100.00	360.00	1.036142
100.00	315.00	0.811760
198.00	360.00	0.790699
200.00	360.00	0.785615
100.00	180.00	0.766772
100.00	292.50	0.738987
100.00	157.50	0.690996
500.00	360.00	0.685117
750.00	360.00	0.684739
158.00	300.00	0.668117

- SOURCE INPUT DATA -

SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE ELEVATION (M)
---------------	-------------	------------------	------------------	---------------------	--------------------

- SOURCE DETAILS DEPENDING ON TYPE -

1 STACK 0.00 0.00 10.67 0.00 GAS EXIT TEMP (DEG K)= 530.00, GAS EXIT VEL. (M/SEC)= 52.31, STACK DIAMETER (M)= 0.640, HEIGHT OF ASSO. BLDG. (M)= -9.88, WIDTH OF ASSO. BLDG. (M)= 69.17, WAKE EFFECTS FLAG = 0

- DIRECTION SPECIFIC BUILDING DIMENSIONS -

OR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE	SECTOR	DSBH	DSBW	IWAKE
1	9.9,	69.2,	0	2	9.9,	69.2,	0	3	9.9,	69.2,	0	4	9.9,	69.2,	0
5	9.9,	69.2,	0	6	9.9,	69.2,	0	7	9.9,	69.2,	0	8	9.9,	69.2,	0
9	9.9,	69.2,	0	10	9.9,	69.2,	0	11	9.9,	69.2,	0	12	9.9,	69.2,	0
13	9.9,	69.2,	0	14	9.9,	69.2,	0	15	9.9,	69.2,	0	16	9.9,	69.2,	0

- SOURCE STRENGTHS (GRAMS PER SEC) -

SEASON 1 SEASON 2 SEASON 3 SEASON 4
2.22000E+00

ING - HW/HB > 5 FOR SOURCE 1 PROG. USES LATERAL VIRTUAL DIST. FOR UPPER BOUND OF CONCENTRATION (DEPOSITION) IN SECTOR(S): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16.
OWER BOUND IS DESIRED SET THE DIRECTION SPECIFIC BUILDING HEIGHT TO < 0 (WAKE EFFECTS FLAG) AND RERUN.

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 5

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.500MPS)	WIND SPEED CATEGORY 2 (2.500MPS)	WIND SPEED CATEGORY 3 (4.300MPS)	WIND SPEED CATEGORY 4 (6.800MPS)	WIND SPEED CATEGORY 5 (9.500MPS)	WIND SPEED CATEGORY 6 (12.500MPS)
0.000	0.00000000	0.01324206	0.01655308	0.00000000	0.00000000	0.00000000
22.500	0.00000000	0.00525103	0.00274001	0.00000000	0.00000000	0.00000000
45.000	0.00000000	0.00502302	0.00365302	0.00000000	0.00000000	0.00000000
67.500	0.00000000	0.00616403	0.00296801	0.00000000	0.00000000	0.00000000
90.000	0.00000000	0.00536503	0.00148401	0.00000000	0.00000000	0.00000000
112.500	0.00000000	0.00342502	0.00114201	0.00000000	0.00000000	0.00000000
135.000	0.00000000	0.00251101	0.00353902	0.00000000	0.00000000	0.00000000
157.500	0.00000000	0.00159801	0.00353902	0.00000000	0.00000000	0.00000000
180.000	0.00000000	0.00399502	0.00570803	0.00000000	0.00000000	0.00000000
202.500	0.00000000	0.00296801	0.00251101	0.00000000	0.00000000	0.00000000
225.000	0.00000000	0.00353902	0.00639303	0.00000000	0.00000000	0.00000000
247.500	0.00000000	0.00388102	0.00650703	0.00000000	0.00000000	0.00000000
270.000	0.00000000	0.00308202	0.00422402	0.00000000	0.00000000	0.00000000
292.500	0.00000000	0.00319602	0.00262601	0.00000000	0.00000000	0.00000000
315.000	0.00000000	0.00308202	0.00296801	0.00000000	0.00000000	0.00000000
337.500	0.00000000	0.00742004	0.00810504	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 6

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.500MPS)	WIND SPEED CATEGORY 2 (2.500MPS)	WIND SPEED CATEGORY 3 (4.300MPS)	WIND SPEED CATEGORY 4 (6.800MPS)	WIND SPEED CATEGORY 5 (9.500MPS)	WIND SPEED CATEGORY 6 (12.500MPS)
0.000	0.02027110	0.03070815	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00549703	0.00742004	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00671603	0.00981705	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00463002	0.00639303	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00376102	0.00502302	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00207901	0.00205501	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00248901	0.00353902	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00335802	0.00490902	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00514803	0.00673503	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00347602	0.00547903	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00555703	0.00787704	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00833204	0.01130105	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00602503	0.00947505	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00521003	0.00753404	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00445602	0.00605003	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.01082505	0.01552508	0.00000000	0.00000000	0.00000000	0.00000000

*** RUN TIME STATISTICS ***

STARTING HOUR,MINUTE,SECOND - - - - - : 09:19:51
STARTING MONTH,DAY,YEAR - - - - - : 10/04/90

ENDING HOUR,MINUTE,SECOND - - - - - : 09:21:03
ENDING MONTH,DAY,YEAR - - - - - : 10/04/90

TOTAL CPU SECONDS - - - - - : 72.

***** END OF ISCLT PROGRAM, 1 SOURCES PROCESSED *****

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) DUE TO SOURCE 1 (CONT.) **

- 10 CONTRIBUTING VALUES TO PROGRAM DETERMINED MAXIMUM 10 OF ALL SOURCES COMBINED -

X COORDINATE RANGE (METERS)	Y COORDINATE AZIMUTH BEARING (DEGREES)	CONCENTRATION
100.00	360.00	1.124464
100.00	180.00	0.951937
198.00	360.00	0.868236
200.00	360.00	0.862535
750.00	180.00	0.818007
1000.00	180.00	0.768390
200.00	180.00	0.762169
500.00	180.00	0.750090
100.00	315.00	0.711381
500.00	360.00	0.701066

BEST AVAILABLE COPY

** ANNUAL GROUND LEVEL CONCENTRATION (MICROGRAMS PER CUBIC METER) DUE TO SOURCE 1 **

- GRID SYSTEM RECEPTORS -

- X AXIS (RANGE , METERS) -

	30.000	100.000	200.000	300.000	400.000	500.000	750.000	1000.000	1250.000
IS (AZIMUTH BEARING, DEGREES)	- CONCENTRATION -								

360.000	0.207784	1.124464	0.862535	0.618073	0.620474	0.701066	0.662956	0.558407	0.461630
337.500	0.047700	0.552875	0.457979	0.336549	0.346911	0.401287	0.384833	0.323691	0.267172
315.000	0.043322	0.711381	0.581988	0.422832	0.434248	0.501924	0.483571	0.409915	0.340039
292.500	0.027069	0.464375	0.389820	0.293187	0.311126	0.373980	0.386697	0.341866	0.289573
270.000	0.024868	0.240634	0.211861	0.173977	0.199503	0.255079	0.293754	0.282033	0.252223
247.500	0.001912	0.117374	0.109227	0.090808	0.107617	0.145958	0.193134	0.204435	0.195148
225.000	0.002213	0.126828	0.120207	0.101359	0.123241	0.171979	0.229448	0.240920	0.227837
202.500	0.003111	0.151758	0.147118	0.123344	0.148070	0.200985	0.254556	0.256739	0.236350
180.000	0.126133	0.951937	0.762169	0.566795	0.611459	0.750090	0.818007	0.768390	0.688009
157.500	0.110518	0.622497	0.469545	0.339503	0.362244	0.441126	0.452766	0.400425	0.347009
135.000	0.063426	0.309035	0.231456	0.170412	0.182913	0.221936	0.227422	0.201959	0.174829
112.500	0.017419	0.189040	0.157604	0.120235	0.129500	0.157169	0.164338	0.149664	0.132055
90.000	0.026025	0.195047	0.159906	0.120531	0.133183	0.167225	0.188338	0.180176	0.163438
67.500	0.081020	0.392029	0.278513	0.191213	0.197490	0.238493	0.255301	0.236765	0.211201
45.000	0.101071	0.377424	0.257400	0.179668	0.190200	0.232469	0.240716	0.216778	0.190859
22.500	0.073032	0.435314	0.328560	0.230910	0.234905	0.273671	0.274319	0.239980	0.203834

- DISCRETE RECEPTORS -

X	Y	CONCENTRATION	X	Y	CONCENTRATION	X	Y	CONCENTRATION
(RANGE)	(AZIMUTH BEARING)		(RANGE)	(AZIMUTH BEARING)		(RANGE)	(AZIMUTH BEARING)	
(METERS)	(DEGREES)		(METERS)	(DEGREES)		(METERS)	(DEGREES)	

201.0	10.0	0.619486	210.0	20.0	0.373408	229.0	30.0	0.276121
241.0	40.0	0.236719	204.0	50.0	0.257436	180.0	60.0	0.290081
165.0	70.0	0.299629	158.0	80.0	0.240476	155.0	90.0	0.178885
158.0	100.0	0.174622	165.0	110.0	0.172077	180.0	120.0	0.190995
204.0	130.0	0.211600	241.0	140.0	0.251000	311.0	150.0	0.274439
287.0	160.0	0.376262	271.0	170.0	0.519782	268.0	180.0	0.613444
271.0	190.0	0.408347	146.0	200.0	0.233331	158.0	210.0	0.144123
177.0	220.0	0.129145	180.0	230.0	0.120431	158.0	240.0	0.118532
146.0	250.0	0.129606	140.0	260.0	0.180741	137.0	270.0	0.236131
140.0	280.0	0.327201	146.0	290.0	0.422791	158.0	300.0	0.503582
183.0	310.0	0.563836	216.0	320.0	0.527498	229.0	330.0	0.457463
180.0	340.0	0.531094	201.0	350.0	0.676197	198.0	360.0	0.868236

***** END OF ISCLT PROGRAM, 1 SOURCES PROCESSED *****

BEST AVAILABLE COPY

*** RUN TIME STATISTICS ***

STARTING HOUR,MINUTE,SECOND - - - - - : 09:18:38
STARTING MONTH,DAY,YEAR - - - - - : 10/04/90

ENDING HOUR,MINUTE,SECOND - - - - - : 09:19:50
ENDING MONTH,DAY,YEAR - - - - - : 10/04/90

TOTAL CPU SECONDS - - - - - : 72.

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 1

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00062100	0.00137001	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00037300	0.00045700	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00048700	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00026900	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00041400	0.00091300	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00042500	0.00057100	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00041400	0.00091300	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00015500	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00020700	0.00045700	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00010400	0.00022800	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.00037300	0.00045700	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.00015500	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.00015500	0.00034200	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.00037300	0.00045700	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00036200	0.00079900	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00036200	0.00079900	0.00000000	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 2

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00062200	0.00365302	0.00365302	0.00000000	0.00000000	0.00000000
22.500	0.00104301	0.00285401	0.00091300	0.00000000	0.00000000	0.00000000
45.000	0.00067800	0.00296801	0.00102701	0.00000000	0.00000000	0.00000000
67.500	0.00042500	0.00171201	0.00125601	0.00000000	0.00000000	0.00000000
90.000	0.00082700	0.00319602	0.00194101	0.00000000	0.00000000	0.00000000
112.500	0.00045000	0.00319602	0.00296801	0.00000000	0.00000000	0.00000000
135.000	0.00018500	0.00182601	0.00319602	0.00000000	0.00000000	0.00000000
157.500	0.00011600	0.00114201	0.00262601	0.00000000	0.00000000	0.00000000
180.000	0.00039000	0.00137001	0.00411002	0.00000000	0.00000000	0.00000000
202.500	0.00043500	0.00057100	0.00057100	0.00000000	0.00000000	0.00000000
225.000	0.00012700	0.00125601	0.00057100	0.00000000	0.00000000	0.00000000
247.500	0.00033200	0.00079900	0.00034200	0.00000000	0.00000000	0.00000000
270.000	0.00034400	0.00091300	0.00045700	0.00000000	0.00000000	0.00000000
292.500	0.00041300	0.00159801	0.00091300	0.00000000	0.00000000	0.00000000
315.000	0.00043600	0.00182601	0.00079900	0.00000000	0.00000000	0.00000000
337.500	0.00036900	0.00239701	0.00216901	0.00000000	0.00000000	0.00000000

- ISCLT INPUT DATA (CONT.) -

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 3

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00102901	0.00502302	0.01164406	0.00262601	0.00011400	0.00000000
22.500	0.00058200	0.00251101	0.00388102	0.00057100	0.00000000	0.00000000
45.000	0.00065500	0.00216901	0.00285401	0.00034200	0.00000000	0.00000000
67.500	0.00075700	0.00274001	0.00296801	0.00000000	0.00000000	0.00000000
90.000	0.00056100	0.00239701	0.00479502	0.00022800	0.00000000	0.00000000
112.500	0.00054100	0.00228301	0.00525103	0.00171201	0.00022800	0.00000000
135.000	0.00035800	0.00125601	0.00490902	0.00353902	0.00000000	0.00000000
157.500	0.00012200	0.00068500	0.00673503	0.00274001	0.00011400	0.00000000
180.000	0.00039900	0.00148401	0.01267106	0.00536503	0.00000000	0.00000000
202.500	0.00010200	0.00057100	0.00365302	0.00228301	0.00000000	0.00000000
225.000	0.00010200	0.00057100	0.00228301	0.00034200	0.00000000	0.00000000
247.500	0.00012200	0.00068500	0.00148401	0.00114201	0.00000000	0.00000000
270.000	0.00022400	0.00125601	0.00274001	0.00068500	0.00000000	0.00000000
292.500	0.00026400	0.00148401	0.00194101	0.00091300	0.00000000	0.00000000
315.000	0.00028500	0.00159801	0.00228301	0.00068500	0.00000000	0.00000000
337.500	0.00063500	0.00205501	0.00479502	0.00091300	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 4

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.5000MPS)	WIND SPEED CATEGORY 2 (2.5000MPS)	WIND SPEED CATEGORY 3 (4.3000MPS)	WIND SPEED CATEGORY 4 (6.8000MPS)	WIND SPEED CATEGORY 5 (9.5000MPS)	WIND SPEED CATEGORY 6 (12.5000MPS)
0.000	0.00162401	0.00947505	0.02831114	0.02237411	0.00159801	0.00000000
22.500	0.00125101	0.00662103	0.01278506	0.00365302	0.00000000	0.00000000
45.000	0.00141501	0.00787704	0.01426907	0.00262601	0.00000000	0.00000000
67.500	0.00152401	0.00673503	0.01130105	0.00239701	0.00000000	0.00000000
90.000	0.00080500	0.00616403	0.01335607	0.00388102	0.00034200	0.00000000
112.500	0.00044700	0.00342502	0.01141606	0.00901804	0.00011400	0.00000000
135.000	0.00022300	0.00171201	0.01027405	0.01643808	0.00045700	0.00000000
157.500	0.00020900	0.00159801	0.00753404	0.01107305	0.00022800	0.00011400
180.000	0.00055600	0.00228301	0.01358407	0.01621008	0.00194101	0.00045700
202.500	0.00046700	0.00159801	0.00662103	0.00890404	0.00102701	0.00000000
225.000	0.00042700	0.00228301	0.00559403	0.00856204	0.00148401	0.00000000
247.500	0.00032300	0.00148401	0.00742004	0.01027405	0.00114201	0.00000000
270.000	0.00053100	0.00308202	0.00662103	0.00513702	0.00034200	0.00000000
292.500	0.00036700	0.00182601	0.00445202	0.00331102	0.00022800	0.00000000
315.000	0.00064500	0.00296801	0.00479502	0.00662103	0.00091300	0.00000000
337.500	0.00060100	0.00262601	0.00856204	0.01643808	0.00125601	0.00011400

ISCLTK6L MODEL, A VERSION OF
ISCLT (VERSION 90008).
AN AIR QUALITY DISPERSION MODEL IN
SECTION 1. GUIDELINE MODELS.
IN UNAMAP (VERSION 6) JAN 1990.
SOURCE: FILE 7 ON UNAMAP MAGNETIC TAPE FROM NTIS.

CONVERTED BY :
KBN ENGINEERING AND APPLIED SCIENCES, INC.
GAINESVILLE, FLORIDA
(904)331-9000

COPYRIGHT 1990 L

CARD INPUT FILE IS	ER12LT86.I80	
SUMMARY OUTPUT FILE IS	ER12LT86.O80	
TITLE OF RUN IS	1986 ENRON STATION 12 / 35 FT STACK	10-4-90

BEST AVAILABLE COPY

ISCLTK6L, KBN 1/90 ** 1986 ENRON STATION 12 / 35 FT STACK

10-4-90

***** PAGE

5 ****

- ISCLT INPUT DATA (CONT.) -

- VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGREES KELVIN/METER) -

	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
3ILITY CATEGORY 10.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
3ILITY CATEGORY 20.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
3ILITY CATEGORY 30.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
3ILITY CATEGORY 40.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.	0.000000E+000.
3ILITY CATEGORY 50.	0.200000E-010.	0.200000E-010.	0.200000E-010.	0.200000E-010.	0.200000E-010.	0.200000E-010.
3ILITY CATEGORY 60.	0.350000E-010.	0.350000E-010.	0.350000E-010.	0.350000E-010.	0.350000E-010.	0.350000E-010.

- WIND PROFILE POWER LAW EXPONENTS -

	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED	WIND SPEED
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5	CATEGORY 6
3ILITY CATEGORY 10.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.
3ILITY CATEGORY 20.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.	0.700000E-010.
3ILITY CATEGORY 30.	0.100000E+000.	0.100000E+000.	0.100000E+000.	0.100000E+000.	0.100000E+000.	0.100000E+000.
3ILITY CATEGORY 40.	0.150000E+000.	0.150000E+000.	0.150000E+000.	0.150000E+000.	0.150000E+000.	0.150000E+000.
3ILITY CATEGORY 50.	0.350000E+000.	0.350000E+000.	0.350000E+000.	0.350000E+000.	0.350000E+000.	0.350000E+000.
3ILITY CATEGORY 60.	0.550000E+000.	0.550000E+000.	0.550000E+000.	0.550000E+000.	0.550000E+000.	0.550000E+000.

- ISCLT INPUT DATA (CONT.) -

NUMBER OF SOURCES = 1
 NUMBER OF X AXIS GRID SYSTEM POINTS = 9
 NUMBER OF Y AXIS GRID SYSTEM POINTS = 16
 NUMBER OF SPECIAL POINTS = 36
 NUMBER OF SEASONS = 1
 NUMBER OF WIND SPEED CLASSES = 6
 NUMBER OF STABILITY CLASSES = 6
 NUMBER OF WIND DIRECTION CLASSES = 16
 FILE NUMBER OF DATA FILE USED FOR REPORTS = 1
 THE PROGRAM IS RUN IN RURAL MODE
 CONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR = 0.10000000E+07
 ACCELERATION OF GRAVITY (METERS/SEC**2) = 9.800
 HEIGHT OF MEASUREMENT OF WIND SPEED (METERS) = 6.710
 CORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTH (DEGREES) = 0.000
 DECAY COEFFICIENT = 0.00000000E+00
 PROGRAM OPTION SWITCHES = 1, 2, 2, 0, 0, 3, 2, 1, 3, 2, 2, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0,

RANGE X AXIS GRID SYSTEM POINTS (METERS) =	30.00,	100.00,	200.00,	300.00,	400.00,	500.00,
750.00,	1000.00,	1250.00,				
RANGE X SPECIAL DISCRETE POINTS (METERS) =	201.00,	210.00,	229.00,	241.00,	204.00,	180.00,
165.00,	158.00,	155.00,	158.00,	165.00,	180.00,	204.00,
241.00,	241.00,	311.00,	287.00,	271.00,	268.00,	271.00,
146.00,	158.00,	177.00,	180.00,	158.00,	146.00,	140.00,
137.00,	140.00,	146.00,	158.00,	183.00,	216.00,	229.00,
180.00,	201.00,	198.00,	22.50,	45.00,	67.50,	90.00,
112.50,	135.00,	157.50,	180.00,	202.50,	225.00,	247.50,
270.00,	292.50,	315.00,	337.50,	360.00,	10.00,	20.00,
30.00,	40.00,	50.00,	60.00,	70.00,	80.00,	90.00,
100.00,	110.00,	120.00,	130.00,	140.00,	150.00,	160.00,
170.00,	180.00,	190.00,	200.00,	210.00,	220.00,	230.00,
240.00,	250.00,	260.00,	270.00,	280.00,	290.00,	300.00,
310.00,	320.00,	330.00,	340.00,	350.00,	360.00,	

- AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -

	STABILITY CATEGORY 1	STABILITY CATEGORY 2	STABILITY CATEGORY 3	STABILITY CATEGORY 4	STABILITY CATEGORY 5	STABILITY CATEGORY 6
SEASON 1	298.0000	298.0000	298.0000	293.0000	288.0000	288.0000

- MIXING LAYER HEIGHT (METERS) -

	SEASON 1					
	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
BILITY CATEGORY 10	.165300E+04	.165300E+04	.165300E+04	.165300E+04	.165300E+04	.165300E+04
BILITY CATEGORY 20	.110200E+04	.110200E+04	.110200E+04	.110200E+04	.110200E+04	.110200E+04
BILITY CATEGORY 30	.110200E+04	.110200E+04	.110200E+04	.110200E+04	.110200E+04	.110200E+04
BILITY CATEGORY 40	.110200E+04	.110200E+04	.110200E+04	.110200E+04	.110200E+04	.110200E+04
BILITY CATEGORY 50	.100000E+05	.100000E+05	.100000E+05	.100000E+05	.100000E+05	.100000E+05
BILITY CATEGORY 60	.100000E+05	.100000E+05	.100000E+05	.100000E+05	.100000E+05	.100000E+05

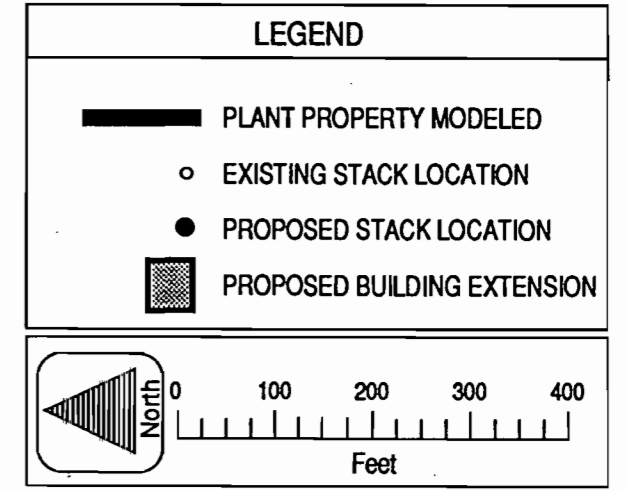
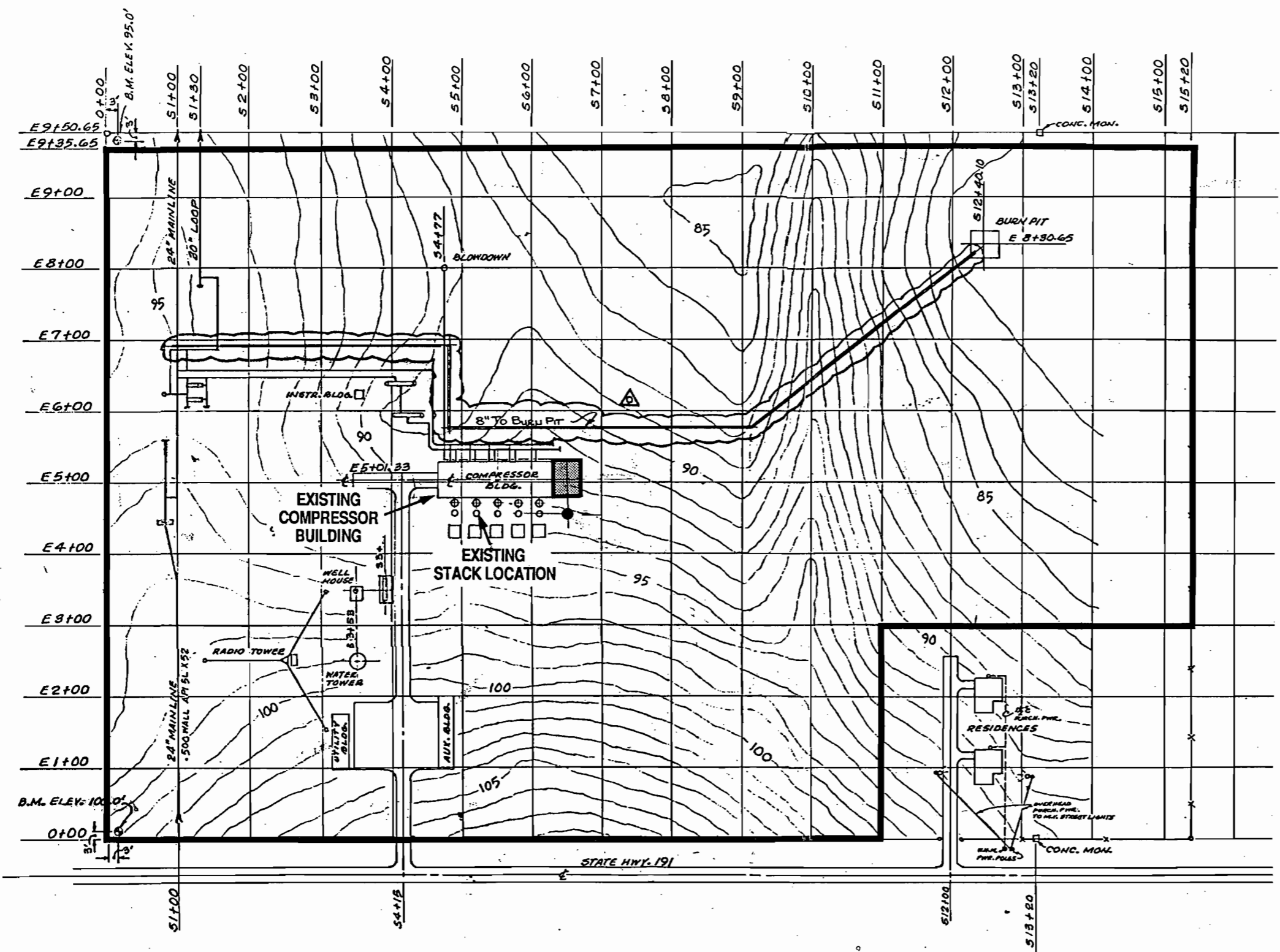


Figure A-3 PLOT PLAN OF COMPRESSOR STATION NO. 12



P 256 396 242

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL

(See Reverse)

U.S.G.P.O. 1989-234-555

PS Form 3800, June 1985

Sent to Alan Bowman	
Street and No. Fla. Gas Trans. Co.	
P.O. State and ZIP Code P.O. Box 1188	
Postage Houston, TX	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$
Postmark or Date 11-21-90 AC 57-188869 P5D-F1-157	

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.
Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. Show to whom delivered, date, and addressee's address. 2. Restricted Delivery (Extra charge)

3. Article Addressed to: Mr. W. Alan Bowman Fla. Gas Transmission Co P.O. Box 1188 Houston, TX 77251	4. Article Number P256 396 242 Type of Service: <input type="checkbox"/> Registered <input type="checkbox"/> Insured <input checked="" type="checkbox"/> Certified <input type="checkbox"/> COD <input type="checkbox"/> Express Mail <input type="checkbox"/> Return Receipt for Merchandise
5. Signature - Addressee X	Always obtain signature of addressee or agent and DATE DELIVERED.
6. Signature - Agent X <i>Alan Harris</i>	8. Addressee's Address (ONLY if requested and fee paid)
7. Date of Delivery NOV 24 1990	



Florida Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

September 17, 1993

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Allan Weatherford
Compliance Environmentalist
Florida Gas Transmission Company
P. O. Box 94500
Maitland, Florida 32794-5100

Dear Mr. Weatherford:

Re: Request for Amendments and Extensions to Air Construction
Permits AC57-188869, AC67-189220, AC20-189438, AC62-189439,
AC04-189454, AC42-189455, AC48-189456, AC05-189655, and
AC56-189457

The Department is in receipt of your letter dated June 29, 1993, requesting to extend the expiration date and to change the engine horsepower (HP) capacity, fuel consumption and heat input at various compressor stations. The Department has reviewed this request and has determined to amend the above mentioned permits as requested since there is no increase in permitted emission levels (lbs/hr and tons/yr).

The following changes are allowed by the Department:

COMPRESSOR STATION NO. 12 - SANTA ROSA COUNTY:

Description

FROM: For the construction of one 4,000 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Munson, Santa Rosa County, Florida. The UTM coordinates are Zone 16, 510.83 km East and 3419.03 km North.

TO: For the construction of one 4,100 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Munson, Santa Rosa County, Florida. The UTM coordinates are Zone 16, 510.83 km East and 3419.03 km North.

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.1	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.14	0.61	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.14	0.61	5 lbs/MMscf
Sulfur Dioxide	0.8	3.5	10 qr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	1.95 g/bhp-hr
Carbon Monoxide	22.1	96.6	2.44 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	0.97 g/bhp-hr
Particulate Matter (TSP)	0.14	0.61	4.03 lbs/MMscf
Particulate Matter (PM ₁₀)	0.14	0.61	4.03 lbs/MMscf
Sulfur Dioxide	0.8	3.5	8.06 qr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 27,810 scf/hr.
- Maximum heat input shall not exceed 29.20 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 34,525 scf/hr.
- Maximum heat input shall not exceed 36.25 MMBtu/hr.

COMPRESSOR STATION NO. 13 - WASHINGTON COUNTY:

Description

FROM: For the construction of one 2,400 bhp natural gas fired engine to be located 9 miles south of Caryville on CR 284. The UTM coordinates are Zone 16, 610.69 km East and 3394.28 km North.

TO: For the construction of one 2,700 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Caryville, Washington County, Florida. The UTM coordinates are Zone 16, 610.69 km East and 3394.28 km North.

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	5 lbs/MMscf
Sulfur Dioxide	0.46	2.0	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.87 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	3.87 lbs/MMscf
Sulfur Dioxide	0.46	2.0	7.74 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 16,154 scf/hr.
- Maximum heat input shall not exceed 16.80 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 20,856 scf/hr.
- Maximum heat input shall not exceed 21.69 MMBtu/hr.

COMPRESSOR STATION NO. 14 - GADSDEN COUNTY:

Description

FROM: For the construction of one 2,400 bhp natural gas fired engine to be located 8 miles southwest of Quincy on SR 65. The UTM coordinates are Zone 16, 719.97 km East and 3377.39 km North.

TO: For the construction of one 2,700 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Quincy, Gadsden County, Florida. The UTM coordinates are Zone 16, 719.97 km East and 3377.39 km North.

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	5 lbs/MMscf
Sulfur Dioxide	0.46	2.0	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr

Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.87 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	3.87 lbs/MMscf
Sulfur Dioxide	0.46	2.0	7.74 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 16,154 scf/hr.
- Maximum heat input shall not exceed 16.80 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 20,856 scf/hr.
- Maximum heat input shall not exceed 21.69 MMBtu/hr.

COMPRESSOR STATION NO. 18 - ORANGE COUNTY:

FROM: For the construction of one 2,400 bhp natural gas fired engine to be located at 7990 Steer Lake Road. The UTM coordinates are Zone 17, 451.86 km East and 3154.79 km North.

TO: For the construction of one 2,700 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Orlando, Orange County, Florida. The UTM coordinates are Zone 16, 451.86 km East and 3154.79 km North.

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	11.1	48.7	2.1 g/bhp-hr

Volatile Organic Compounds (non-methane)	2.6	11.6	0.5 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	5 lbs/MMscf
Sulfur Dioxide	0.476	2.2	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	10.6	46.3	1.78 g/bhp-hr
Carbon Monoxide	11.1	48.7	1.87 g/bhp-hr
Volatile Organic Compounds (non-methane)	2.6	11.6	0.44 g/bhp-hr
Particulate Matter (TSP)	0.08	0.4	3.95 lbs/MMscf
Particulate Matter (PM ₁₀)	0.08	0.4	3.95 lbs/MMscf
Sulfur Dioxide	0.476	2.2	7.90 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 16,311 scf/hr.
- Maximum heat input shall not exceed 16.80 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 20,640 scf/hr.
- Maximum heat input shall not exceed 21.26 MMBtu/hr.

COMPRESSOR STATION NO. 19 - BREVARD COUNTY:

Description

FROM: For the construction of two 2,500 bhp natural gas fired engines to be located 6 miles west-southwest of Melbourne Regional Airport. The UTM coordinates are Zone 17, 528.67 km East and 3101.64 km North.

TO: For the construction of two 2,600 bhp natural gas fired engine to be located at the Florida Gas Transmission facility in Melbourne, Brevard County, Florida. The UTM coordinates are Zone 17, 528.67 km East and 3101.64 km North.

Specific Condition No. 1

FROM: The maximum allowable emissions from each engine shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	11.0	48.3	2.0 g/bhp-hr
Carbon Monoxide	15.4	67.6	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.4	41.0	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	5 lbs/MMscf
Sulfur Dioxide	0.51	2.2	10 qr/100scf

TO: The maximum allowable emissions from each engine shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	11.0	48.3	1.92 g/bhp-hr
Carbon Monoxide	15.4	67.6	2.69 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.4	41.0	1.64 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	3.90 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	3.90 lbs/MMscf
Sulfur Dioxide	0.51	2.2	7.80 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for these natural gas compressor engines shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 17,718 scf/hr per engine.
- Maximum heat input shall not exceed 36.50 MMBtu/hr for both engines.

TO: The permitted operating parameters and utilization rates for these natural gas compressor engines shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 22,703 scf/hr per engine.
- Maximum heat input shall not exceed 46.77 MMBtu/hr for both engines.

COMPRESSOR STATION NO. 15 - TAYLOR COUNTY:

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.13	0.6	5 lbs/MMscf
Sulfur Dioxide	0.75	3.3	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	4.23 lbs/MMscf
Particulate Matter (PM ₁₀)	0.13	0.6	4.23 lbs/MMscf
Sulfur Dioxide	0.75	3.3	8.53 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 26,154 scf/hr.
- Maximum heat input shall not exceed 27.20 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 30,943 scf/hr.
- Maximum heat input shall not exceed 32.18 MMBtu/hr.

COMPRESSOR STATION NO. 16 - BRADFORD COUNTY:

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.13	0.6	5 lbs/MMscf
Sulfur Dioxide	0.75	3.3	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.6	77.2	2.0 g/bhp-hr
Carbon Monoxide	22.0	96.6	2.5 g/bhp-hr
Volatile Organic Compounds (non-methane)	8.8	38.6	1.0 g/bhp-hr
Particulate Matter (TSP)	0.13	0.6	3.90 lbs/MMscf
Particulate Matter (PM ₁₀)	0.13	0.6	3.90 lbs/MMscf
Sulfur Dioxide	0.75	3.3	7.80 gr 8/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 26,408 scf/hr.
- Maximum heat input shall not exceed 27.20 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 33,833 scf/hr.
- Maximum heat input shall not exceed 34.85 MMBtu/hr.

COMPRESSOR STATION NO. 17 - MARION COUNTY

Specific Condition No. 1

FROM: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	5 lbs/MMscf
Sulfur Dioxide	0.49	2.2	10 gr/100scf

TO: The maximum allowable emissions from this source shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	4.13 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	4.13 lbs/MMscf
Sulfur Dioxide	0.49	2.2	8.27 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 17,010 scf/hr.
- Maximum heat input shall not exceed 17.52 MMBtu/hr.

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 20,569 scf/hr.
- Maximum heat input shall not exceed 21.19 MMBtu/hr.

COMPRESSOR STATION NO. 20 - ST. LUCIE COUNTY

FROM: The maximum allowable emissions from this unit shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	5 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	5 lbs/MMscf
Sulfur Dioxide	0.49	2.0	10 gr/100scf

TO: The maximum allowable emissions from this unit shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	10.6	46.3	2.0 g/bhp-hr
Carbon Monoxide	14.8	64.9	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	9.0	39.4	1.7 g/bhp-hr
Particulate Matter (TSP)	0.09	0.4	4.13 lbs/MMscf
Particulate Matter (PM ₁₀)	0.09	0.4	4.13 lbs/MMscf
Sulfur Dioxide	0.49	2.0	8.27 gr S/100scf

Specific Condition No. 5

FROM: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 17,010 scf/hr.
- Maximum heat input shall not exceed 17.52 MMBtu/hr.

Mr. Allan Weatherford
Request for Amendments and Extensions
Page 12

TO: The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed **20,569** scf/hr.
- Maximum heat input shall not exceed **21.19** MMBtu/hr.

Expiration Date

The expiration date of the above mentioned permit will be changed from June 30, 1993, to **December 31, 1993**.

This letter must be attached to the above mentioned permits and shall become a part of each permit. If you have any questions, please call Teresa Heron at (904) 488-1344.

Sincerely,



Howard L. Rhodes
Director
Division of Air Resources
Management

HLR/TH/plm

Attachment to be Incorporated:

Mr. Allan Weatherford's letter of June 29, 1993

cc: E. Middleswart, NWD
Robert Leetch, NED
Charles Collins, CD
Isidore Goldman, SED
Duane Pierce, FGTC
Barry Andrews, ENSR

→ P 5/2

Check Sheet

Company Name: *Fl. Gas Transmission*
Permit Number: *AC 57-188869*
PSD Number:
County: *DSD FL-156*
Permit Engineer:
Others involved:

Application:

- Initial Application
- Incompleteness Letters
- Responses
- Final Application (if applicable)
- Waiver of Department Action
- Department Response
- Other

Intent:

- Intent to Issue
- Notice to Public
- Technical Evaluation
- BACT Determination
- Unsigned Permit
- Correspondence with:
 - EPA
 - Park Services
 - County
 - Other
- Proof of Publication
- Petitions - (Related to extensions, hearings, etc.)
- Other

Final Determination:

- Final Determination
- Signed Permit
- BACT Determination
- Other

Post Permit Correspondence:

- Extensions
- Amendments/Modifications
- Response from EPA
- Response from County
- Response from Park Services
- Other



November 21, 1990

Ms. Theresa Heron
Florida Dept. of Environmental Regulation
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, FL 32399

VIA FAX

RECEIVED

NOV 28 1990

DER-BAQM

Re: ENRON/FGTC Compressor Station No. 12 PSD Permit Application

Dear Ms. Heron:

Per your request, please find the attached sheet of emission calculations for FGTC's Compressor Station No. 12. Also, there is a correction in the value calculated for particulate emissions, which now results in slightly lower hourly and annual emission values. Additional pages are attached for substituting three pages in the original submittal in order to update this change.

Please feel free to contact me at your convenience if you have further questions concerning this permit application.

Sincerely,

A handwritten signature in cursive script that reads 'David A. Buff'. The signature is written in black ink and is positioned above the typed name and title.

David A. Buff, P.E.
Principle Engineer

DAB/tt

cc: Alan Bowman, ENRON

D. Heron
C. Halladay
B. Andrews
E. Middlewart, WW Dist.
J. Harper, EPA

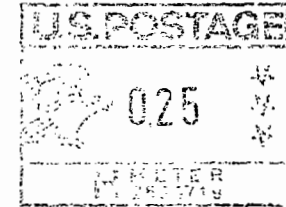
KBN ENGINEERING AND APPLIED SCIENCES, INC.

1034 Northwest 57th Street Gainesville, Florida 32605 904/331-9000 FAX: 904/332-4189

EQUAL EMPLOYMENT OPPORTUNITY / AN AFFIRMATIVE ACTION EMPLOYER



David A. Buff

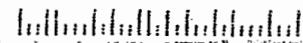


Ms. Theresa Heron
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399

KBN ENGINEERING AND APPLIED SCIENCES, INC.

1034 Northwest 57th Street

Gainesville, Florida 32605



90051

P 872 562 513



Receipt for Certified Mail

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

PS Form 3800, JUNE 1991

Sent to Mr. Allan Weatherford	
Street and No. P. O. Box 94500	
P.O., State and ZIP Code Maitland, Florida 32794-5100	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date Mailed: 12/21/93 Request for Amendments to Construction Permits	

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- Addressee's Address
- Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Mr. Allan Weatherford
Compliance Environmentalist
Florida Gas Transmission Company
P.O. Box 94500
Maitland, Florida 32794-5100

4a. Article Number

P 872 562 513

4b. Service Type

- | | |
|---|---|
| <input type="checkbox"/> Registered | <input type="checkbox"/> Insured |
| <input checked="" type="checkbox"/> Certified | <input type="checkbox"/> COD |
| <input type="checkbox"/> Express Mail | <input type="checkbox"/> Return Receipt for Merchandise |

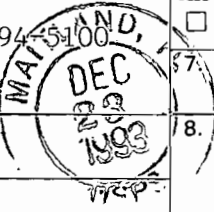
5. Date of Delivery

5. Signature (Addressee)

Jean Clark

6. Signature (Agent)

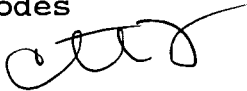
8. Addressee's Address (Only if requested and fee is paid)



Thank you for using Return Receipt Service.

Memorandum

Florida Department of
Environmental Protection

TO: Howard L. Rhodes
FROM: Clair Fancy 
DATE: December 9, 1993
SUBJ: Request for Amendments and Extensions to Air
Construction Permits AC 57-188869, AC 67-189220,
AC 20-189438, AC 62-189439, AC 04-189454, AC 42-189455,
AC 48-189456, AC 05-189655, and AC 56-189457
Phase II - Florida Gas Transmission Company

Attached for your approval and signature is an amendment to the above construction permits prepared by the Bureau of Air Regulation for the above referenced company. The purpose of the amendment is to use EPA Method 3A instead of EPA Method 3 for Gas Analyses.

I recommend your approval and signature.

CF/TH/bjb

Attachment

OK
GPL
CLARK 12/13

P 230 524 391



Receipt for Certified Mail

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

PS Form 3800, June 1991

Sent to Mr. Allan Weatherford	
Street and No. P. O. Box 94500	
P. O. State and ZIP Code Maitland, FL 32794-5100	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date Mailed: 9/20/93 Request for Amendments and Extensions	

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

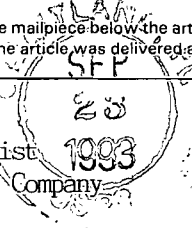
- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- Addressee's Address
- Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
Mr. Allan Weatherford
Compliance Environmentalist
Florida Gas Transmission Company
P. O. Box 94500
Maitland, Florida 32794-5100



4a. Article Number
P 230 524 391

4b. Service Type
 Registered Insured
 Certified COD
 Express Mail Return Receipt for Merchandise

7. Date of Delivery

5. Signature (Addressee)
Allan Weatherford

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)

Thank you for using Return Receipt Service.



Florida Gas Transmission Company

P. O. Box 945100 Maitland, Florida 32794-5100 (407) 875-5800

June 29, 1993

VIA FEDERAL EXPRESS
(overnight delivery)

JUN 30 1993

DIVISION
Resources Management

RECEIVED
DER - MAIL ROOM
1993 JUN 30 AM 10:10

RECEIVED

JUN 30 1993

Division of Air
Resources Management

Mr. Clair Fancy, P.E.
Chief, Bureau of Air Regulation
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Fancy:

**RE: Request for Amendments and Extensions to Air
Construction Permits**

Permit No. AC57-188869
Florida Gas Transmission Company, Station 12
Munson, Santa Rosa County, Florida

Permit No. AC67-189220
Florida Gas Transmission Company, Station 13
Caryville, Washington County, Florida

Permit No. AC20-189438
Florida Gas Transmission Company, Station 14
Quincy, Gadsden County, Florida

Permit No. AC62-189439
Florida Gas Transmission Company, Station 15
Perry, Taylor County, Florida

Permit No. AC04-189454
Florida Gas Transmission Company, Station 16
Brooker, Bradford County, Florida

Permit No. AC42-189455
Florida Gas Transmission Company, Station 17
Salt Springs, Marion County, Florida

Permit No. AC48-189456
Florida Gas Transmission Company, Station 18
Orlando, Orange County, Florida

Permit No. AC05-189665
Florida Gas Transmission Company, Station 19
Melbourne, Brevard County, Florida

Permit No. AC56-189457
Florida Gas Transmission Company, Station 20
Ft. Pierce, St. Lucie County, Florida

On May 27, 1993, Florida Gas Transmission Company (FGT) submitted Certificates of Completion of Construction to the appropriate district offices to obtain operating permits for



QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL NUMBER

4443970720

DATE 6/29/93

AIRBILL NUMBER 4443970720

From (Your Name) H. Weatherford
Fl. Gas Transmission
Your Phone Number (Very Important) 407 875-5816

To (Recipient's Name) Mr. Clair Fancy P.E.
Recipient's Phone Number (Very Important) (904) 488-1344

Company
601 South Lake Destiny # 450
Street Address

Company
Fl. Dept. of Environmental Reg.
Exact Street Address (Use of P.O. Boxes or P.O. Zip Codes Will Delay Delivery And Result in Extra Charge.)
2600 Blair Stone Road

City Martland State FL ZIP Required For Correct Invoicing 32751

City Tallahassee State FL ZIP Street Address Zip Required 32399-2400

YOUR BILLING REFERENCE INFORMATION (FIRST 24 CHARACTERS WILL APPEAR ON INVOICE.)

HOLD FOR PICK-UP AT THIS FEDERAL EXPRESS LOCATION: Street Address (See Service Guide or Call 800-238-5355)

PAYMENT Bill Sender Bill Recipient's FedEx Acct. No. Bill 3rd Party FedEx Acct. No. Bill Credit Card Cash

Federal Express Use Base Charges

4 SERVICES CHECK ONLY ONE BOX
1 PRIORITY 1 Overnight Delivery Using Your Packaging
2 OVERNIGHT DELIVERY USING OUR PACKAGING
3 COURIER-Pak Overnight Envelope*
4 Overnight Box A
5 Overnight Tube B
6 STANDARD AIR
7 DELIVERY AND SPECIAL HANDLING CHECK SERVICES REQUIRED
8 HOLD FOR PICK-UP
9 DELIVER WEEKDAY
10 DELIVER SATURDAY
11 DANGEROUS GOODS
12 CONSTANT SURVEILLANCE SERVICE (CSS)
13 DRY ICE
14 OTHER SPECIAL SERVICE
15 SATURDAY PICK-UP

ZIP Zip Code of Street Address Required

Emp. No. Date

Cash Received
 Return Shipment
 Third Party Chg. To Del. Chg. To Hold

Street Address

City State Zip

Received By: X
Date/Time Received FedEx Employee Number

5 Sender authorizes Federal Express to deliver this shipment without obtaining a delivery signature and shall indemnify and hold harmless Federal Express from any claims resulting therefrom.
Release Signature: K. P. Sullivan

Date/Time For Federal Express Use

PART #2041739800
FECS-750-25
REVISION DATE 10/83
PRINTED U.S.A. NCRE

RECIPIENT'S COPY

CHECK NO.
0622504038

FLORIDA GAS TRANSMISSION COMPANY
P.O. BOX 1188
HOUSTON, TEXAS 77251-1188

DATE OF CHECK

June 29, 1993



PAY EXACTLY Two Thousand Two Hundred Fifty Dollar DOLLARS 2,250.00

This check is VOID unless printed on BLUE background

PAY
TO THE
ORDER
OF

Florida Dept of Environmental Regulation
2600 Blair Stone Road
Tallahassee FL 32399-2400

Betty J. Clark

NOT VALID OVER \$5,000 UNLESS COUNTERSIGNED

UNITED BANK OF GRAND JUNCTION

RECEIVED
JUN 30 1993

CHECK NO.

REMITTANCE STATEMENT

Division of Air
Resources Management

VOUCHER NO.	INVOICE DATE	INVOICE NUMBER	PURCHASE ORDER	AMOUNT		
				GROSS	DISCOUNT	NET
		<i>Fee</i>				
		Amendment to Air Emissions Construction Permits for C/S's 12-20 Florida Gas Transmission Company				

7/2

Terresa,
 This was received with
 the processing fee (\$250 - \$250 for 9
 amendments) on 6/30. I haven't
 logged it in yet - or made any copies -
 I can do that when I return on
 7/13. It looks like FBT already
 copied the districts - I'll get with
 you on it when I get back -
Patty

Special Instructions

P 360 185 701



Receipt for Certified Mail

No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

Sender's Name <i>Alan Weatherford</i>	
Article and No. <i>FIA GAS Trans. Co</i>	
P.O. State and ZIP Code <i>Maitland, FL</i>	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date <i>2-17-93</i>	
<i>AC 57-188869, 67-189220, 20-189438, 62-189439, 04-189454 - 42-189455 48-189456 - 05-189465</i>	

PS Form 3800, June 1991

56-189457

is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- Addressee's Address
- Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to: <i>Alan Weatherford Compliance Env FIA GAS TRANSPORTATION P O BOX 945100 Maitland, FL 32794-5100</i>	4a. Article Number <i>P 360 185 701</i>
4b. Service Type <input checked="" type="checkbox"/> Registered <input type="checkbox"/> Insured <input checked="" type="checkbox"/> Certified <input type="checkbox"/> COD <input type="checkbox"/> Express Mail <input type="checkbox"/> Return Receipt for Merchandise	7. Date of Delivery
5. Signature (Addressee) <i>M. Johnson</i>	8. Addressee's Address (Only if requested and fee is paid)
6. Signature (Agent)	

Thank you for using Return Receipt Service.



Florida Gas Transmission Company

P. O. Box 945100 Maitland, Florida 32794-5100 (407) 875-5800

RECEIVED
DER - MAIL ROOM

1993 JAN 20 AM 11:00

January 18, 1993

Mr. C. H. Fancy, Chief
Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Fancy:

Re: Permit Amendment Processing Fee for
Nine Florida Gas Transmission Permits

As instructed in your January 13, 1993 letter, a check for \$250 is enclosed to cover the permit amendment processing fee for all nine of the subject permits.

Please call me at 407/875-5816, if you have any questions.

Very truly yours,

Allan Weatherford
Compliance Environmentalist

AW0118a.swp

Enclosure

cc: Chuck Truby
Raymond Young

RECEIVED

MAR 14 1991

DER - BAQM



PUBLISHED DAILY
PENSACOLA, ESCAMBIA COUNTY, FLORIDA

State of Florida,
County of Escambia.

Before the undersigned authority personally appeared

Cindy Vance

who on oath says that she is Legal Advertising Supervisor of the Pensacola News Journal, a daily newspaper published at Pensacola in Escambia County, Florida; with general circulation in Escambia, Santa Rosa, Okaloosa and Walton Counties that the attached copy of advertisement, being a NOTICE in the matter of

Intent to Issue

_____ in the _____ Court,

was published in said newspaper in the issues of _____

March 1, 1991

Affiant further say that the said The Pensacola News Journal is a newspaper published at Pensacola, in said Escambia County, Florida, and that the said newspaper has heretofore been continuously published in said Escambia County, Florida, each day and has been entered as second class mail matter at the post office in Pensacola, in said Escambia County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

cc: J. Neron
E. Middleswain
J. Harper, EPA

Cindy Vance



I swear to and subscribed before me this _____

day of _____ A.D., 1991

Betty J. Pester
NOTARY PUBLIC.

My Commission Expires October 26, 1991

LEGAL NOTICE

State of Florida
Department of Environmental Regulation
Notice of Intent to Issue

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit to Florida Gas Transmission Company to install one natural gas fired engine. The Company's facility is located 5 miles north of Munson on SR 191 in Munson, Florida. A determination of Best Available Control Technology (BACT) was required. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, 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 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within the time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the County in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes



QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL
PACKAGE
TRACKING NUMBER

2835724404

2835724404

RECIPIENT'S COPY

From (Your Name) Please Print HEARY GRAY BROTHERS		Your Phone Number (Very Important) (504) 454-2172		To (Recipient's Name) Please Print UNIT 100		Recipient's Phone Number (Very Important)	
Company H. GAS. TRANSPORTATION CO.		Department/Floor No. CLIP		Company UNIT 100		Department/Floor No.	
Street Address 1500 14th				Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes) 2600 BLANK ST. #100			
City 1150 14th		State LA		City TALAHASSEE		State FL	
ZIP Required 32512-09		ZIP Required 32311-2400					
YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.)				IF HOLD FOR PICK-UP, Print FEDEX Address Here			
PAYMENT <input checked="" type="checkbox"/> Bill Sender <input type="checkbox"/> Bill Recipient's FedEx Acct. No. <input type="checkbox"/> Bill 3rd Party FedEx Acct. No. <input type="checkbox"/> Bill Credit Card				Street Address			
<input type="checkbox"/> Cash <input type="checkbox"/> Check				City, State, ZIP Required			

SERVICES (Check only one box)		DELIVERY AND SPECIAL HANDLING (Check services required)		PACKAGES	WEIGHT in Pounds Only	YOUR DECLARED VALUE	Emp. No.	Date	*Federal Express Use Base Charges
Priority Overnight Service (Delivery by next business morning†)	Standard Overnight Service (Delivery by next business afternoon)	<input checked="" type="checkbox"/> HOLD FOR PICK-UP (Fill in Box #)	<input checked="" type="checkbox"/> DELIVER WEEKDAY				<input type="checkbox"/> Cash Received		Declared Value Charge
11 <input type="checkbox"/> YOUR PACKAGING 51	16 <input type="checkbox"/> FEDEX LETTER * 56	3 <input type="checkbox"/> DELIVER SATURDAY (Extra charge) (Not available to all locations)	4 <input type="checkbox"/> DANGEROUS GOODS (Extra charge)	Total	Total	Total	<input type="checkbox"/> Return Shipment		Other 1
12 <input checked="" type="checkbox"/> FEDEX PAK ** 52	13 <input type="checkbox"/> FEDEX BOX 53	5 <input type="checkbox"/>	6 <input type="checkbox"/> DRY ICE _____ Lbs				<input type="checkbox"/> Third Party <input type="checkbox"/> Chg. To Del. <input type="checkbox"/> Chg. To Hold		Other 2
14 <input type="checkbox"/> FEDEX TUBE 54	Economy Two-Day Service (formerly Standard Air) (Delivery by second business day†)	7 <input type="checkbox"/> OTHER SPECIAL SERVICE _____	8 <input type="checkbox"/>	DIM SHIPMENT (Chargeable Weight)			Street Address		Total Charges
70 <input checked="" type="checkbox"/> HEAVYWEIGHT **	Heavyweight Service (for Extra Large or any package over 150 lbs.)	9 <input type="checkbox"/> SATURDAY PICK-UP (Extra charge)	10 <input type="checkbox"/>	Received At			City State Zip		REVISION DATE 8/90 PART #119500 GBFE FORMAT #041
30 <input type="checkbox"/> ECONOMY TWO-DAY SVC.	80 <input type="checkbox"/> DEFERRED HEAVYWEIGHT **	11 <input type="checkbox"/> DESCRIPTION	12 <input type="checkbox"/> HOLIDAY DELIVERY (if offered) (Extra charge)	1 <input type="checkbox"/> Regular Stop	3 <input type="checkbox"/> Drop Box	4 <input type="checkbox"/> BSC	Received By:	Date/Time Received	* 1990 F.E.C. PRINTED IN U.S.A.
† Delivery commitment may be later in some areas.		** Declared Value Limit \$100. Call for delivery schedule.		2 <input type="checkbox"/> On-Call Stop	5 <input checked="" type="checkbox"/> Station	5 <input type="checkbox"/> Station	Release Signature:	Date/Time:	041
				FedEx Emp. No.			131640		

petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, 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 decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

The application is available for public inspection during business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida
32399-2400

Department of Environmental Regulation
Northwest District
160 Governmental Center
Pensacola, Florida
32501-5794

Any persons may send written comments on the proposed action to Mr. Barry Andrews at the Department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the Department's final determination.

The Press-Gazette

PUBLISHED WEEKLY
Milton, Santa Rosa County, Florida

STATE OF FLORIDA

County of Santa Rosa

Before the undersigned authority personally appeared _____
Leah M. Ward

who on oath says that he is Cashier
of the Press Gazette, a weekly newspaper published at
Milton in Santa Rosa County, Florida; that the attached copy
of advertisement being a Notice of Intent to Issue

in the matter of Install one natural gas fired engi

in the _____ court,

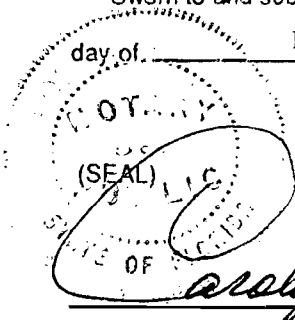
was published in said newspaper in the issues of:

- March 4, _____ A.D., 19 91
- _____ A.D., 19 _____
- _____ A.D., 19 _____
- _____ A.D., 19 _____
- _____ A.D., 19 _____
- _____ A.D., 19 _____

Affiant further says that the Press-Gazette is a newspaper published at Milton in said Santa Rosa County, Florida, and that said newspaper has heretofore been continuously published in said Santa Rosa County, Florida, each week and has been entered as second class mail matter at the post office in Milton in Santa Rosa County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Leah M. Ward

Sworn to and subscribed before me this 4
day of March 19 91



Notary Public

NOTARY PUBLIC, STATE OF FLORIDA.
MY COMMISSION EXPIRES: Nov. 12, 1994.
BONDED THRU NOTARY PUBLIC UNDERWRITERS.

STATE OF FLORIDA
Department of Environmental Regulation
Notice of Intent to Issue
The Department of Environmental Regulation hereby gives notice of its intent to issue a permit to Florida Gas Transmission Company to install one natural gas fired engine. The Company's facility is located 5 miles north of Munson on SR 191 in Munson, Florida. A determination of Best Available Control Technology (BACT) was required. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, 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 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated

above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information:

- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, 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 decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

The application is available for public inspection during business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Regulation
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida
32399-2400

Department of Environmental Regulation
Northwest District
160 Governmental Center
Pensacola, Florida
32501-5794

Any person may send written comments on the proposed action to Mr. Barry Andrews at the Department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the Department's final determination.

030491
030491
02275

P 407 853 162

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL

(See Reverse)

U.S.G.P.O. 1989-234-555

PS Form 3800, June 1985

Sent to Mr. William R. Osborne, Fla.	
Street and No. Gas Transmission P. O. Box 1188	
P.O., State and ZIP Code Houston, Texas 77251-1188	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$
Postmark or Date Mailed: 2-15-91 Permit: AC 57-188869 PSD-FL-156	



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

RECEIVED

JAN 22 1991

JAN 15 1991

DER-BAQM

4APT-AEB

Mr. Clair H. Fancy, P.E., Chief
Bureau of Air Regulation
Florida Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: Florida Gas Transmission Company Compressor Stations
PSD-FL-156 Santa Rosa County
PSD-FL-158 Washington County
PSD-FL-159 Gadsden County
PSD-FL-160 Taylor County
PSD-FL-161 Bradford County
PSD-FL-162 Marion County
PSD-FL-163 Orange County
PSD-FL-164 St. Lucie County

Dear Mr. Fancy:

This is to acknowledge receipt of the Prevention of Significant Deterioration (PSD) permit application for Compressor Station Nos. 12 through 18 and 20 of the above referenced source, by letter dated November 28, 1990.

The proposed projects are similar in scope in that they each consist of the addition of one reciprocating internal combustion engine to an existing compressor station. The engines proposed for the stations in Santa Rosa, Taylor, and Bradford Counties will be sized at 4000 brake horsepower. The engines for the remaining five counties will be sized at 2400 brake horsepower. We have reviewed the package as requested and have no adverse comments at this time.

Thank you for the opportunity to review and comment on this application. If you have any questions or comments on this package, please contact Mr. Gregg Worley of my staff at (404) 347-2904.

Sincerely yours,

Douglas Neely for

Jewell A. Harper, Chief
Air Enforcement Branch
Air, Pesticides, and Toxics
Management Division

cc: *S. Heron*
L. Holladay
B. Andrews
E. Middleton

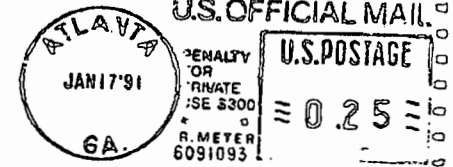
A. Kutyma
C. Collins
J. Goldman
C. Shauer, UPS

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300

AIR-4

Clair H. Fancy, P.E., Chief
Bureau of Air Regulation
FL Dept. of Environmental Regulation
266 Blair Stone Rd./Twin Towers Building
Tallahassee, FL 32399-2400



P 256 396 242

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL

(See Reverse)

* U.S.G.P.O. 1989-234-555

PS Form 3800, June 1985

Sent to <i>Alan Bowman</i>	
Street and No. <i>Fla. Gas Trans. Co.</i>	
P.O. State and ZIP Code <i>P.O. Box 1188</i>	
Postage <i>Houston, TX</i>	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$
Postmark or Date <i>11-21-90</i> <i>AC 57-188869</i> <i>DSD-F1-157</i>	

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.
Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. Show to whom delivered, date, and addressee's address. (Extra charge) 2. Restricted Delivery (Extra charge)

3. Article Addressed to: <i>Mr. W. Alan Bowman Fla. Gas Transmission Co P.O. Box 1188 Houston, TX 77251</i>	4. Article Number <i>P256 396 242</i>
	Type of Service: <input type="checkbox"/> Registered <input type="checkbox"/> Insured <input checked="" type="checkbox"/> Certified <input type="checkbox"/> COD <input type="checkbox"/> Express Mail <input type="checkbox"/> Return Receipt for Merchandise
5. Signature - Addressee X	Always obtain signature of addressee or agent and <u>DATE DELIVERED</u> .
6. Signature - Agent X <i>[Signature]</i>	8. Addressee's Address (ONLY if requested and fee paid)
7. Date of Delivery <i>NOV 24 1990</i>	

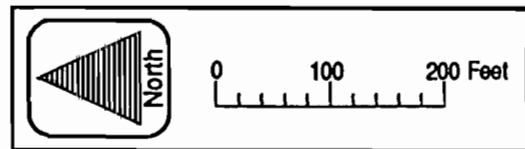
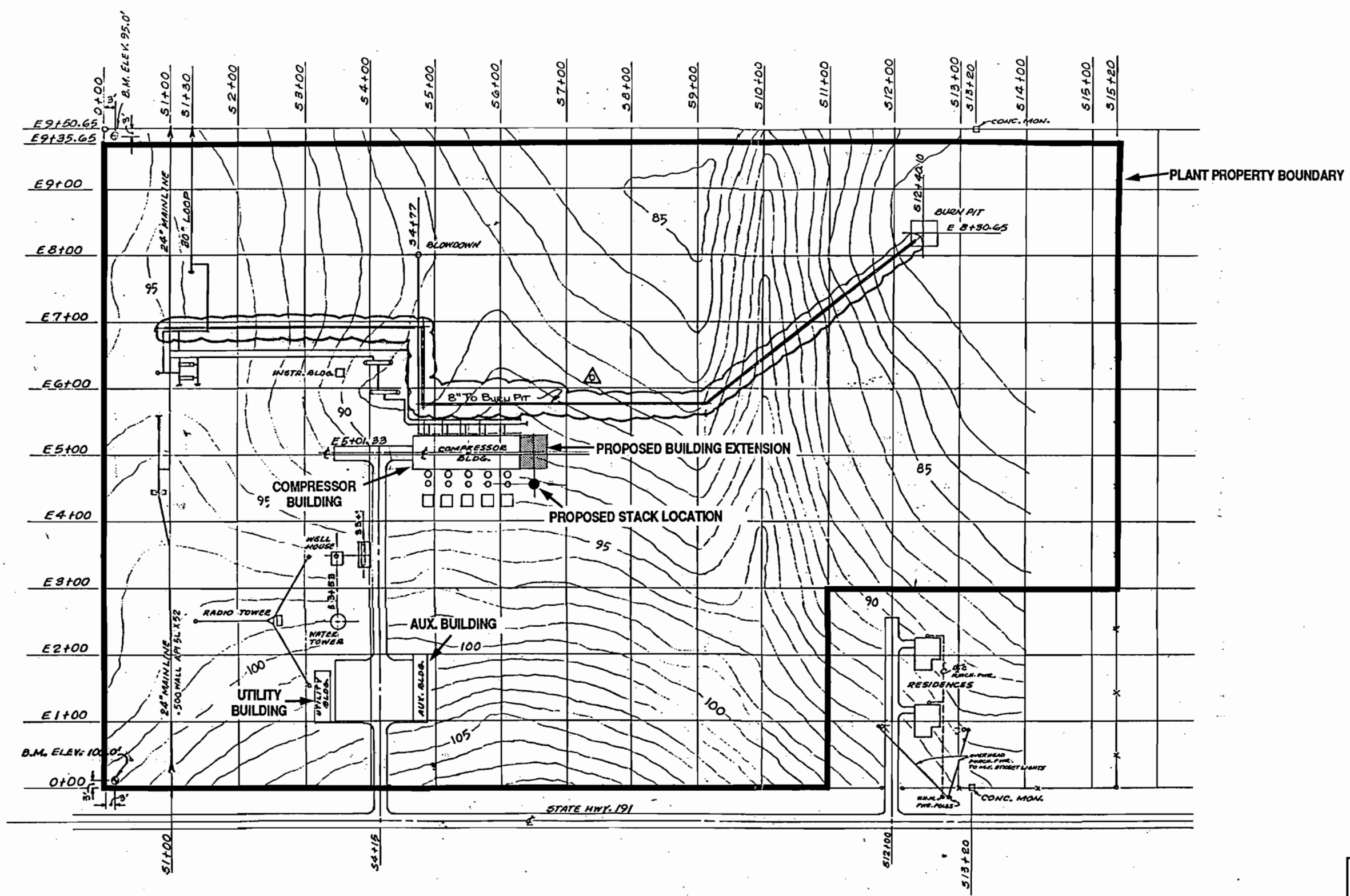


Figure 2-1 PLOT PLAN OF COMPRESSOR STATION NO. 12

